

HyPET6e and HyPET HPP6e Injection Molding Machine

Machine Manual

Reference Only

Issue: v 1.0 — October 2023

This product manual is intended to provide information for safe operation and/or maintenance. Husky reserves the right to make changes to products in an effort to continually improve the product features and/or performance. These changes may result in different and/or additional safety measures that are communicated to customers through bulletins as changes occur.

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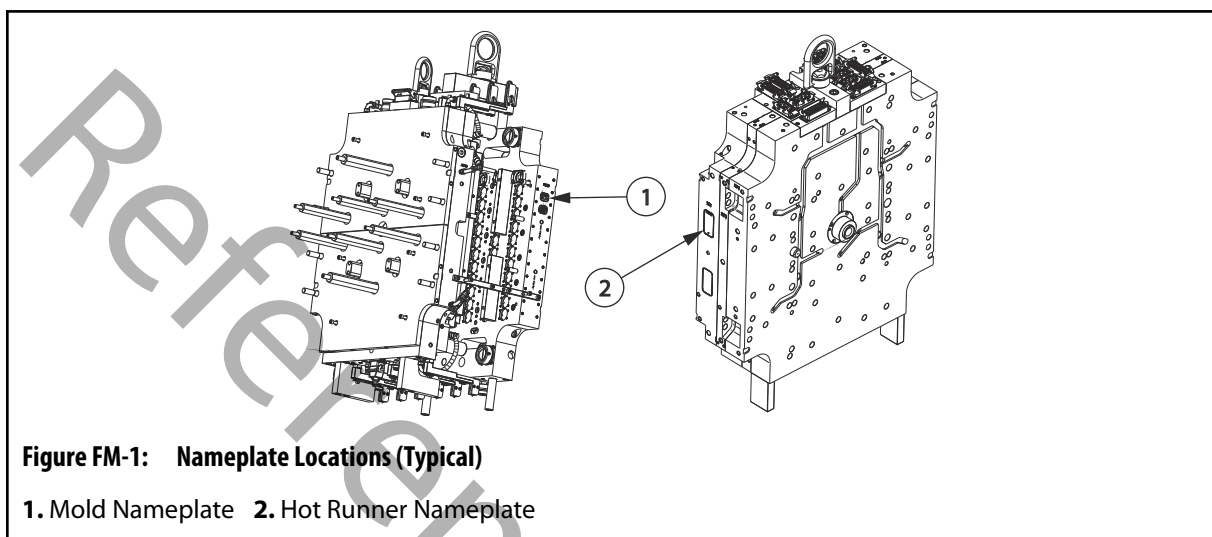
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General Information

Equipment Identification



Documentation

Printed manuals and drawings from the Original Equipment Manufacturers (OEMs) are also provided with the machine when available.



IMPORTANT!

If a Husky mold is equipped, refer to the separate Documentation CD provided with the mold for operation, installation and service information.



IMPORTANT!

Keep all CDs, USBs, and printed documentation in a convenient location for future reference.

Telephone Support Numbers

North America	Toll free	1-800-465-HUSKY (4875)
	Direct	437-781-8572
Europe	EC (most countries)	008000 800 4300
	Direct and Non-EC	+ 352 2786 7967
Asia	Toll Free	400 021 0557
	Direct:	+86 21 6146 9058
	Japan Toll Free	0120988896
	Japan Direct	+03 6316 2444
Latin America	Brazil Toll Free	+55 11 4589-7200
	Brazil Direct	+55 11 3181-0607
	Mexico Toll Free	+52 80 0024-0580
	Mexico and Latin America Direct	+52 55 9085 3008

For on-site service, contact your nearest Husky Regional Service and Sales office.

For non-emergency questions and issues you may also e-mail Husky at techsupport@husky.ca.

Husky Regional Service and Sales Offices

For the location closest to you, please visit www.husky.co.

Product Upgrades

Upgrades are available that can improve your output, reduce cycle times, and add functionality to your Husky equipment.

To see what upgrades are available for your Husky equipment, visit our website at www.husky.co or call your nearest Husky Regional Service and Sales Office.

Ordering Spare Parts

All spare parts for Husky equipment can be ordered through your nearest Husky Parts Distribution Center or online at www.husky.co.

Ordering Additional Manuals

Additional copies of this manual and other documentation can be purchased through your nearest Husky Regional Service and Sales office.

Mold Refurbishing

Husky offers services for repairing or modifying any Husky mold or hot runner, and services for retrofitting Husky hot runners. Contact your nearest Husky Regional Service and Sales office for more information.

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Chapter 1 Introduction

This chapter describes the machine, training opportunities, and the available equipment manuals.

1.1 Applicable Machines

This machine covers the following machine models:

- HyPET6e
- HyPET HPP6e

Not all options are available on all machine models. When referring to the manual make sure to select the procedure or specification based on the machine model where applicable.

1.2 Machine Description

The Husky Injection Molding Machine is comprised of four main sections: the clamp unit, the injection unit, the controls unit and the product handling unit is available for part removal.

- The clamp unit closes and holds the mold sections together during injection of molten resin (from the injection unit) and opens the mold for part removal.
- The injection unit uses a two-stage injection system. The first stage, the extruder, uses a screw to melt resin pellets and fill the shooting pot. The second stage uses a plunger to push the molten resin from the shooting pot into the mold.
- The control unit is comprised of the electrical cabinet and the Human Machine Interface (HMI). All functions of the machine are controlled by an industrial PC located in the electrical cabinet. The Human Machine Interface (HMI) controls the operation of the machine and operating functions. After the initial machine setup, the HMI can begin automatic operation, and control the clamp, injection, and product handling units. The HMI is attached onto the clamp unit.

1.3 Purpose of the Equipment

Husky equipment and systems are designed for injection molding applications only, using approved materials and operating within design guidelines.

Contact your nearest Husky Regional Service and Sales office if you plan to use a Husky product for anything other than its intended use.

1.4 Restrictions of Use

Husky injection molding equipment must never be:

- operated by more than one person
- used for any purpose other than that described in [Section 1.3](#), unless otherwise approved by Husky
- used to extrude any materials not outlined in the scope of the harmonized ISO20430 or ANSI B151.1 standard
- operated or serviced by personnel unfamiliar with the inherent risks and necessary precautions related to injection molding equipment
- operated at temperatures higher than the maximum permissible temperature for the resin

1.5 Unauthorized Modifications

Unauthorized modifications or reconstruction of any Husky injection molding system is strictly prohibited. Modifications can be unsafe and/or void warranty.

Contact your nearest Husky Regional Service and Sales office to discuss modifications or requirements for Husky systems.

1.6 Auxiliary Equipment

Husky is only responsible for the interaction of Husky equipment and systems with auxiliary equipment when Husky is the system integrator. If auxiliary equipment is removed, the user must install proper safeguards to prevent access to the hazards.

For information about integrating non-Husky auxiliary equipment, contact your nearest Husky Regional Service and Sales office.

1.7 Documentation

Printed manuals and drawings from the Original Equipment Manufacturers (OEMs) are also provided with the machine when available.



IMPORTANT!

If a Husky mold is equipped, refer to the separate Documentation CD provided with the mold for operation, installation and service information.

**IMPORTANT!**

Keep all CDs, USBs, and printed documentation in a convenient location for future reference.

1.7.1 Accessing Documentation

Husky manuals, drawings, certificates and other documentation for the machine and/or mold can be accessed in many ways.

1. Documentation CD/USB

A documentation CD or USB containing the full documentation package is delivered with each Husky machine and mold.

2. Internet

The full documentation package for the machine can be accessed through the Spare Parts portal on www.husky.co. A valid username and password is required. Contact Husky for assistance.

3. Human Machine Interface (HMI)

Operator and Service Manuals for the machine and mold can be viewed on the Human Machine Interface (HMI) screen. For more information about viewing manuals on the HMI, refer to [Section 4.12](#).

1.7.2 Manuals

Husky manuals aid in the safe and proper use of Husky products. Where applicable, the manuals provide instructions on installation, operation and maintenance.

Personnel should thoroughly review all manuals provided with their Husky equipment prior to performing any tasks. Proceed with tasks only if all instructions are understood and always follow applicable workplace safety requirements.

**IMPORTANT!**

Images in the manuals are for reference only and may not represent specific equipment details. Refer to engineering drawings, schematics and the HMI for specific details.

The following manuals are provided with each Husky machine upon delivery:

Site Preparation and Installation Manual	Describes preparing the site, receiving/handling the machine, and installation procedures
Machine Manual	Includes specifications and requirements, operator controls, startup and shutdown procedures, scheduled maintenance procedures, service procedures and troubleshooting



IMPORTANT!

Some manuals may contain addendums that detail new or updated information. Before reading a manual, make sure to review all available addendums located at the end of the manual.

1.7.3 Engineering Drawings and Schematics

Each Husky machine is provided with a set of engineering drawings and schematics specific to the machine. These are used for troubleshooting the machine and ordering spare parts.

NOTE:

Each engineering drawing and schematic is specific to the machine it is provided with.

1.7.4 Safety Alert Conventions

Safety alerts highlight hazardous conditions that may arise during installation, operation or maintenance and describe methods for avoiding personal injury and/or property damage.

Depending on the severity of the hazard, safety alerts start with one of the following signal words: Danger, Warning or Caution.



DANGER!

The **DANGER** safety alert indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.



WARNING!

The **WARNING** safety alert indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION!

The **CAUTION** safety alert indicates a potentially hazardous situation that, if not avoided, could result in property damage.

Other non-safety related alert types used in the manuals highlight important information needed by the user to install, operate or maintain the equipment properly. They may also, in some cases, describe best practices, offer an expanded explanation, or reference a related section in the manual.

Non-safety related alerts start with one of the following signal words: Note or Important.

NOTE:

The NOTE alert is used to add information to a subject that does not fit within the general flow of the document.



IMPORTANT!

The IMPORTANT alert is used to highlight important steps, conditions, or considerations related to the subject.

1.8 Training

All designated operators and maintenance personnel must be fully trained before using or servicing Husky injection molding systems.

If training is required, visit www.husky.co or contact your nearest Husky Regional Service and Sales office to learn more about Husky's training solutions.

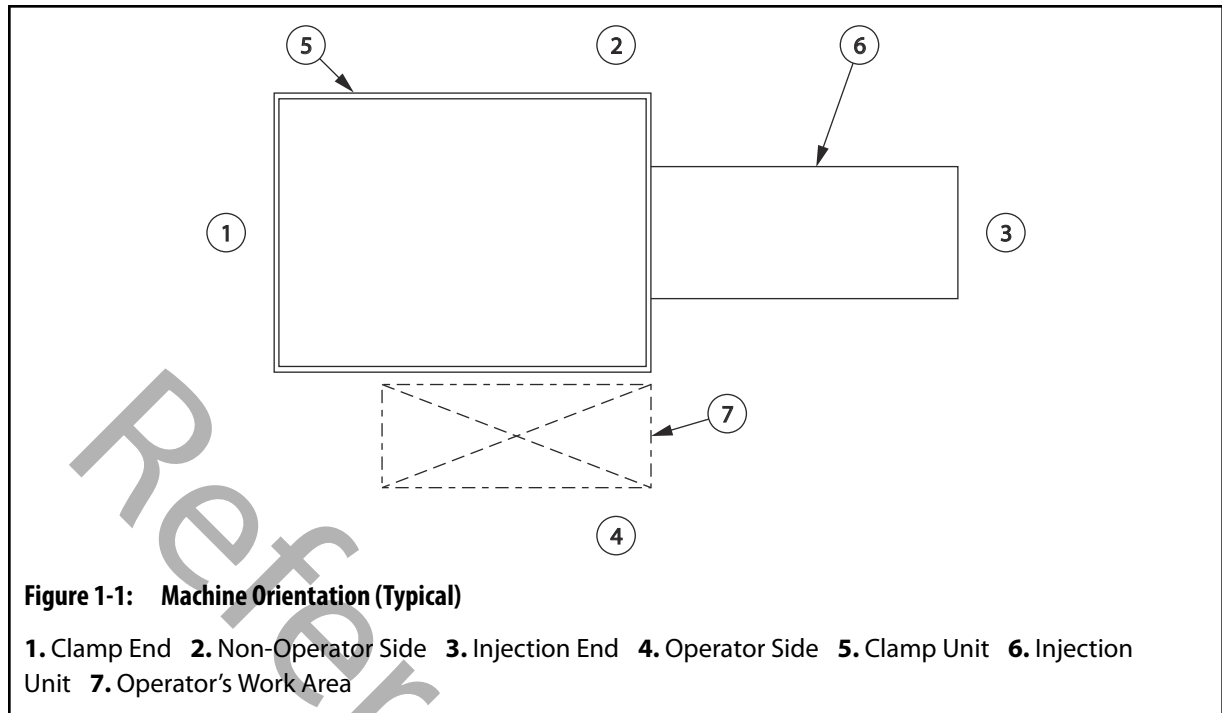


IMPORTANT!

It is the obligation of the employer to properly train and instruct all personnel in the safe methods of operation and maintenance. Manuals and other reference material, which have been prepared by Husky for the operation and maintenance of Husky equipment, do not in any way absolve the employer from fulfilling these obligations and Husky disclaims liability for injury to personnel which is attributable to the employer's failure to do so.

1.9 Machine Layout

Throughout this manual and other documentation provided with the machine, references will be made to specific areas of the machine. The illustration below describes these areas and the standard terminology used to reference them.



1.10 Storage and Operating Conditions

Altitude: Husky machines are designed to operate at altitudes up to 1000 m (3281 ft) above sea level.

Contact Husky if the altitude at your facility exceeds this value.

Transportation and Storage: The ambient temperature during storage or transporting the machine must be within -25 to +55 °C (-13 to +131 °F). Temperatures up to 70 °C (158 °F) are allowed for short periods of time not exceeding 24 hours.

Contact Husky if the ambient temperature exceeds these restrictions.

Long Term Storage: Humidity, salt in the air, rapid weather changes, and even condensation can quickly damage an unprotected machine. Some machine surfaces and components are sensitive to many environmental conditions and require special methods for long term storage.

If long-term storage is required customers must make sure Husky products are properly stored and protected using best practices. Contact Husky if unsure how to protect and prepare the machine for long term storage.

1.11 Consumables

The following consumables are available for purchase through your nearest Husky Parts Distribution Center or online at www.husky.co. Refer to the appropriate specification for correct item and its usage.

NOTE:

If a required consumable is not listed, contact your nearest Husky Parts Distribution Center.

**WARNING!**

Chemical hazard - Some of the chemicals used with Husky equipment are potentially hazardous and may cause injury and illness. Before storing, handling, or working with any chemical or hazardous material, thoroughly read and understand each applicable Material Safety Data Sheet (MSDS), use recommended personal protective equipment and follow the manufacturer's instructions.

Consumable	Type	Quantity	Part Number
Cortec Corp. VpCI-389	Rust Inhibitor	18.9 L (5 U.S. gal) Pail	950196
Cortec Corp. VpCI-414	Cleaner	473 ml (16 oz)	5440807
Busch VS150	Oil	1 L (0.26 U.S. gal)	8618376
Becker G 150	Oil	1 L (0.26 U.S. gal)	9968155
Loctite 222	Thread Adhesive	10 ml (0.3 oz)	2758751
Loctite 242	Thread Adhesive	10 ml (0.3 oz)	699552
Loctite 243	Thread Adhesive	10 ml (0.3 oz)	2758752
Loctite 271	Thread Adhesive	50 ml (1.7 oz)	100106
Loctite 577	Pipe Sealant	50 ml (1.7 oz)	2640664
		250 ml (8.5 oz)	3582638
LPS1 Premium Lubricant	Lubricant	312 g (11 oz)	5746506
Lubriplate 3000	Grease	2.72 kg (6 lb) Pail	664683
		430 ml (14.5 oz) Cartridge	664682
Lubriplate Synxtreme FG-1	Grease	430 ml (14.5 oz) Cartridge	6959517
Lubriplate FGL-1	Grease	430 ml (14.5 oz) Cartridge	681288
Lubriplate FGL-2	Grease	430 ml (14.5 oz) Can	664680
		430 ml (14.5 oz) Cartridge	698524
		15.9 kg (35 lb) Pail	664681
Mobilgear 600 XP 220	Oil	18.9 L (5 U.S. gal) Pail	5505808
Molykote G (MoS2)	Paste	Refer to Note ^[1]	2658271

Consumable	Type	Quantity	Part Number
Optimoly Paste TA	Anti-Seize Compound	1 kg (2.2 lb) Can	644751
		100 g (3.5 oz) Tube	2186684
Shell Tellus S2M 46	Mineral Oil ^[2]	Refer to Note ^[1]	2630836
Shell Tellus S3M 46	Mineral Oil ^[2]	Refer to Note ^[1]	3195680
THK AFJ	High-Speed Bearing Grease	70 g (2.5 oz) Tube	4486392
		400 g (14 oz) Tube	4486395
Ultra Purge 5100 or 5160+	Purge	15 kg (33 lb) Pail	8589025

^[1] Contact your nearest Husky Parts Distribution Center for available quantity.

^[2] Never mix oils in the hydraulic system.

Chapter 2 Safety Summary

This chapter describes the general requirements and conditions for safe installation, operation, and maintenance of the machine.



IMPORTANT!

Personnel must read, understand and follow all safety precautions.



IMPORTANT!

Personnel must follow applicable industry and regulatory safety requirements for safe installation, operation and maintenance of equipment.

2.1 Qualified Personnel

Only fully trained and qualified personnel should be permitted to maintain equipment. Qualified personnel must have demonstrated skills and knowledge related to the construction, installation and operation of the injection molding equipment and have received safety training on the hazards involved.

2.2 Safety Guidelines

Personnel operating, installing, maintaining or servicing Husky equipment must adhere to safe working practices that are in compliance with the following guidelines:

- Use a safety approved ladder or platform to access areas of the machine.
- Lockout and tag electrical, pneumatic and hydraulic energy sources before servicing the machine or entering the mold area.
- Depressurize the hydraulic system using the manual dump valve before servicing any hydraulic component.
- Do not climb over Husky equipment while the machine is in operation.
- Do not operate the machine unless all guards are in place.
- Do not operate the machine if a safety interlock is bypassed, modified or damaged.
- Do not operate the machine if any component or system is missing or damaged.
- Do not operate the machine if safety messages on the Human Machine Interface (HMI) indicate a faulty condition.
- Do not operate the machine unless all safety features have been tested and are operating correctly. If a safety feature is not operating correctly, or if an alarm on the HMI cannot be

cleared by the operator, the operator must stop the machine and engage the emergency stop button until the machine can be safely repaired. The operator must not operate the machine until the machine is repaired.

- Do not operate the machine if scheduled preventive maintenance has not been performed.
- Do not use a magnetic platen without approval from Husky and the magnetic platen supplier/manufacturer.

2.3 Safety Hazards

Some common safety hazards associated with injection molding equipment are:

- Mechanical
- Electrical
- Burn
- High pressure (hydraulic system pressure and molten material spray)
- Slip, trip or fall
- Lifting
- Gas, vapor and dust emissions
- Noise

2.3.1 Mechanical Hazards

- **Worn Hoses and Safety Restraints**

Regularly inspect and replace all flexible hose assemblies and restraints.

- **Cooling Water Hoses**

Cooling water hoses degrade over time and need to be replaced on a yearly basis. Cooling water hoses routed in the vicinity of the barrel are exposed to high temperatures that shorten their useful life and can require more frequent replacement. Degraded hoses become brittle and can break or separate from the fitting when manipulated. To minimize the risk of failure, inspect the hoses regularly and replace as required.

Make sure to wait until the machine has cooled down before servicing cooling water hoses.

- **Injection and Clamp Units**

Hydraulic circuits in injection and clamp units contain high pressure accumulators. Before servicing hydraulic systems, lock out and tag the machine to discharge all stored energy. When servicing hydraulic systems, read the equipment manuals and refer to hydraulic schematics for additional details.

- **Seized Screws or Plugs**

If screws or plugs cannot be removed by normal methods using standard tooling and force, there is a high possibility these items have become seized. Contact Husky for repair recommendation.

**WARNING!**

Mechanical and/or flying debris hazard - Tool breakage: risk projectile debris, serious injury and/or mechanical damage. Do not use excessive force and/or use tools beyond their designated limits. Do not use torque multiplying bars. Failure of tools may produce fragments that can become projectiles that may cause injury. For seized parts, consult Husky for safe disassembly instructions.

2.3.2 Electrical Hazards

Molding equipment draws high amperage current at high voltage. The electrical power requirements are indicated on the electrical nameplate on the electrical cabinet, and in the electrical schematics. Connect equipment to a suitable power supply as specified in the electrical schematics and in compliance with all applicable local regulations.

2.3.3 Burn Hazards

- **Hot Surfaces**
The mold area, auxiliary mold equipment, and injection unit heating elements have numerous high temperature surfaces. At normal operating temperatures, contact with these surfaces will cause severe skin burns. These areas are clearly marked with safety signs. Wear personal protective equipment when working in these areas.
- **Molten Material**
Never touch process material purged or otherwise flowing from the nozzle, mold, hot runner or feed throat area. Molten material can appear cool on the surface, but remain very hot on the inside. Wear personal protective equipment when handling purged material.

2.3.4 High Pressure Hazards

High pressure hazards may exist as a result of pressure in the hydraulic system and pressurized molten material.

2.3.4.1 Hydraulic System Pressure Hazards

- **Hydraulic System**
Flexible hose connections and piping in hydraulic systems must be properly tightened to prevent the release of fluids or gases under pressure. Hoses must be inspected periodically for signs of sweating and/or blistering. Rubber hoses naturally age with time and require replacement at regular intervals as per the manufacturer's specifications and Husky maintenance requirements. Steel tubes should be tested using dye penetrant.



WARNING!

High pressure spray hazard – risk of death or serious injury. High pressure hydraulic oil spray could penetrate human tissue and cause extensive injuries. Lock out and tag the machine before servicing any hydraulic component.



WARNING!

High pressure spray hazard – risk of death or serious injury. Depressurize each individual hydraulic circuit using an oil sampling kit before servicing any hydraulic component.

- **Skin Puncture Injuries**

High pressure hydraulic spray can penetrate human tissue and cause severe bodily injury. Seek immediate medical help in any event of skin puncture by fluid spray.

2.3.4.2 Molten Material Hazards

Pressure can build up in a nozzle or feed throat area and cause some process material to release suddenly. In some cases, molten material can be ejected unintentionally due to insufficient pre-drying or degradation of process materials. These areas are clearly marked with safety signs. Be aware of these areas and wear appropriate personal protective equipment when accessing them.

2.3.5 Slip, Trip or Fall Hazards

Do not walk, stand, climb or sit on machine surfaces not approved for safe access.

Do not step on the tie bar or any surfaces with grease and/or oil.

Use a safety approved platform, walkway and step ladders designated to access areas that are not accessible from the floor.

2.3.6 Lifting Hazards

When lifting equipment, use suitable lifting devices, proper balancing techniques and designated lifting points. Refer to the installation details, and to handling and lifting instructions. Do not exceed the rated capacity of the lifting equipment.

2.3.7 Gas, Vapor and Dust Emissions

Certain processed materials release harmful gas, vapors or dust. Install an exhaust system according to local codes.

2.3.8 Noise Hazards

When the machine is at idle, the average noise level in the operator's work area is 85 dB(A), as measured according to DIN 45 635-T1-Class 2.

The peak noise level will vary depending on processing conditions.

**WARNING!**

Noise hazard - risk of serious injury. All personnel in the machine area must wear appropriate hearing protection according to the user's internal safety policy. Prolonged exposure to excessive noise levels could cause hearing loss.

2.4 Safety Signs

Safety signs clearly mark potentially hazardous areas in or around equipment. For the safety of personnel involved in equipment installation, operation and maintenance, use the following guidelines:

- Verify that all signs are in the proper locations. Refer to the drawing package for details.
- Do not alter signs.
- Keep signs clean and visible.
- Order replacement signs when necessary. Refer to the drawing package for part numbers.

The following safety symbols may appear on safety signs:

NOTE:

Safety signs may include a detailed explanation of the potential hazard and associated consequences.

Safety Symbol (ANSI)	Safety Symbol (ISO)	General Description of Symbol
		General This symbol indicates a potential personal injury hazard. It is usually accompanied by another pictogram or text to describe the hazard.
		Hazardous Voltage This symbol indicates a potential electrical hazard that will cause death or serious injury.
		High Pressure Molten Material This symbol indicates the presence of a high pressure molten material hazard that could cause death or severe burns.
		Lockout/Tagout This symbol identifies an energy source (electrical, hydraulic or pneumatic) that must be de-energized before maintenance is performed.

Safety Symbol (ANSI)	Safety Symbol (ISO)	General Description of Symbol
		Crushing and/or Impact Points This symbol indicates a crushing and/or impact area that could cause serious crushing injury.
		High Pressure This symbol indicates a heated water, steam or gas hazard that could cause severe injury.
		High Pressure Accumulator This symbol indicates the sudden release of high pressure gas or oil could cause death or serious injury.
		Hot Surfaces This symbol identifies the presence of exposed hot surfaces that could cause serious burn injuries.
		Slip, Trip or Fall Hazard This symbol indicates a slip, trip or fall hazard that could cause injury.
		Do Not Step This symbol identifies a location that should not be used as a step because it may be a slip, trip or fall hazard and could cause injury.
		Crushing and/or Shearing Hazard This symbol indicates the presence of a crushing and/or shearing hazard at the rotating screw that could cause serious injury.
		Read Manual Before Operation This symbol indicates that qualified personnel should read and understand all instructions in the equipment manuals before working on the equipment.
		Class 2 Laser Beam This symbol indicates a laser beam hazard that could cause personal injury with prolonged exposure.

Safety Symbol (ANSI)	Safety Symbol (ISO)	General Description of Symbol
		Barrel Cover Grounding Strap This symbol indicates an electrical hazard related to the barrel cover grounding strap that could cause death or serious injury.
		Do Not Grease This symbol indicates greasing is not required under normal operating conditions. Greasing could cause equipment failure.

2.5 Guards and Interlocks

Guards are provided where hazards exist. There are two types of guards: movable and fixed.

Movable guards are interlocked to stop hazardous motion when the guards are moved or removed.

Fixed guards are not interlocked. Fixed guards must be installed and completely secured anytime power is applied to the machine.



IMPORTANT!

Before operating the equipment, make sure of the following:

- Safeguards are in place
- Safeguards are not bypassed or modified
- Safeguards are tested and inspected regularly for correct operation
- Only qualified personnel perform maintenance tasks

2.6 Lockout and Tagout

Lockout/tagout must be performed on the complete system before performing any maintenance tasks or entering the mold area. Lockout/tagout includes de-energizing all systems, isolating all energy sources, and applying locks and tags to all energy sources.



IMPORTANT!

For detailed lockout/tagout instructions for auxiliary equipment refer to the original equipment manufacturer's documentation, along with all applicable local regulations and codes.



IMPORTANT!

When troubleshooting electronics, lockout/tagout may not be possible. In this case, service personnel must secure the work cell by installing a Danger sign at all isolation points and cordoning off the area around the equipment.



IMPORTANT!

Lock out/ tag out procedures are used to provide safe conditions during service, maintenance and setup procedures. The disconnecting devices have a limited number of cycles. Depending on the size of the device, the maximum number of cycles could be 3,000.

Once the maximum number of cycles has been reached the disconnecting devices should be replaced. Contact Husky to replace the disconnect devices.

2.6.1 Provisions for Service

Some service procedures must be performed with the power on. Locks and tags may **ONLY** be removed temporarily from the machine under special testing or positioning conditions. For example, when power is needed to test or troubleshoot the machine, equipment, or components.

Conduct machine startup and operation in accordance with the following steps:

1. Clear the machine or equipment of tools and materials.
2. Clear all non-essential personnel from the machine or equipment area.
3. Remove only the lockout and tagout devices necessary for the operation or test.
4. Power up the machine or equipment only as necessary to perform the operation or test.
5. After completing the procedure, de-energize all systems, isolate the machine or equipment from all energy sources, and re-apply the lockout and tagout devices removed previously.

2.6.2 Lockout and Tagout During Setup

When it is necessary during setup to provide power to the machine heats or the Human Machine Interface (HMI), you must do one of the following:

- Install separate lockable energy isolating devices on all motors, pumps, and any other equipment that could potentially cause serious injury to personnel.
- Make sure all accumulators dump hydraulic pressure automatically to the hydraulic tank when the motor(s) is de-energized.
- Lock the safety gates in the open position with the power source used for controlling motion/movement in the clamp area turned off.

- Make sure the hydraulic pressure in the clamp circuit is dumped automatically to the hydraulic tank when the safety gates are open.

2.6.3 Performing Lockout and Tagout



WARNING!

Hazardous – risk of death or serious injury. Before starting the lockout/tagout procedure, read and understand the entire procedure. Failure to perform the lockout/tagout procedure correctly, before performing any service and/or maintenance activities, could result in death or serious injury.

To lock out and tag the machine, do the following:



DANGER!

Electrocution hazard – risk of death or serious injury. Install a danger sign at all isolation points and block off the area around the machine. When live troubleshooting is required, do not work alone. Have emergency medical assistance nearby throughout the procedure.



WARNING!

Electrocution and arc flash hazard – risk of death or serious injury. Exposure to an electric arc flash could cause death or serious injury. Wear arc rated personal protective equipment conforming to the National Fire Protection Association standards, or the equivalent local arc flash regulations.

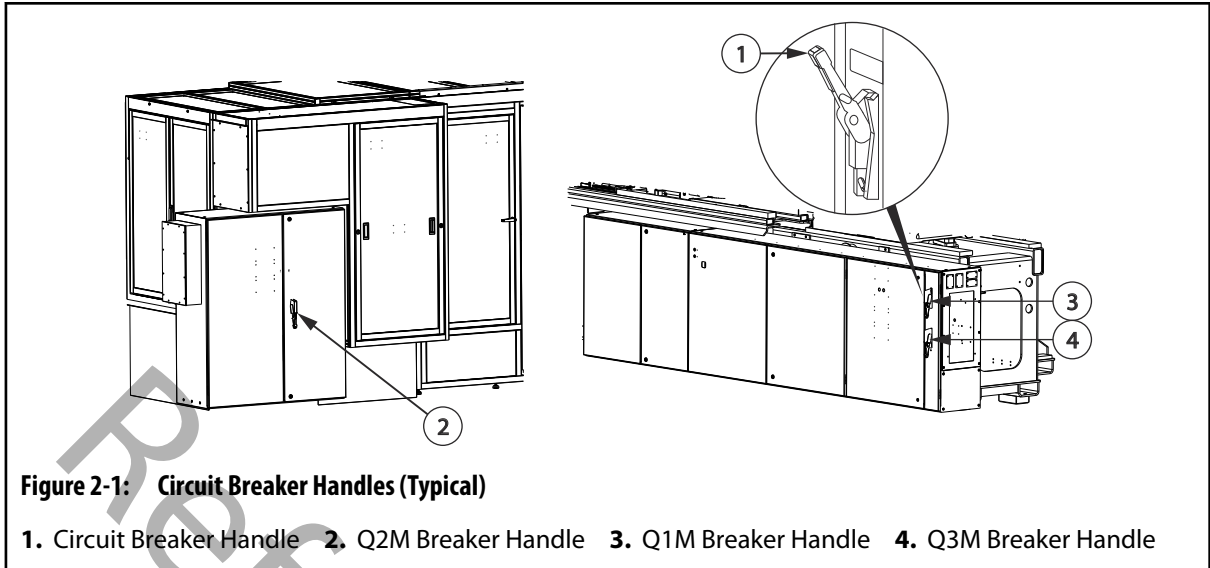


WARNING!

Hazardous voltages, high pressure fluids, crushing or impact hazards – risk of death or serious injury. Perform the lockout/tagout procedure in accordance with local codes.

Only qualified personnel should lock out and tag the machine.

1. Stop the machine. For more information, refer to [Section 4.27](#).
2. Move the Q3M breaker handle to the OFF position. This turns off power to motion control.



3. Move the Q2M breaker handle to the OFF position. This turns off power to the integrated mold heats.

CAUTION!

Electrical hazard – risk of component damage. When powering down the machine, switch off the Q3M and Q2M breaker handles before switching off the Q1M breaker handle. Failure to do so could result in unnecessary wear on components and lead to premature failure.

4. Move the Q1M breaker handle to the OFF position. This turns off power to the machine including the HMI and all other machine functions.
5. Attach a lock and tag to each breaker handle and wait 10 minutes for residual voltage to discharge.
6. Use a calibrated voltmeter with leads that are in good working condition, make sure all power to the machine is switched off.



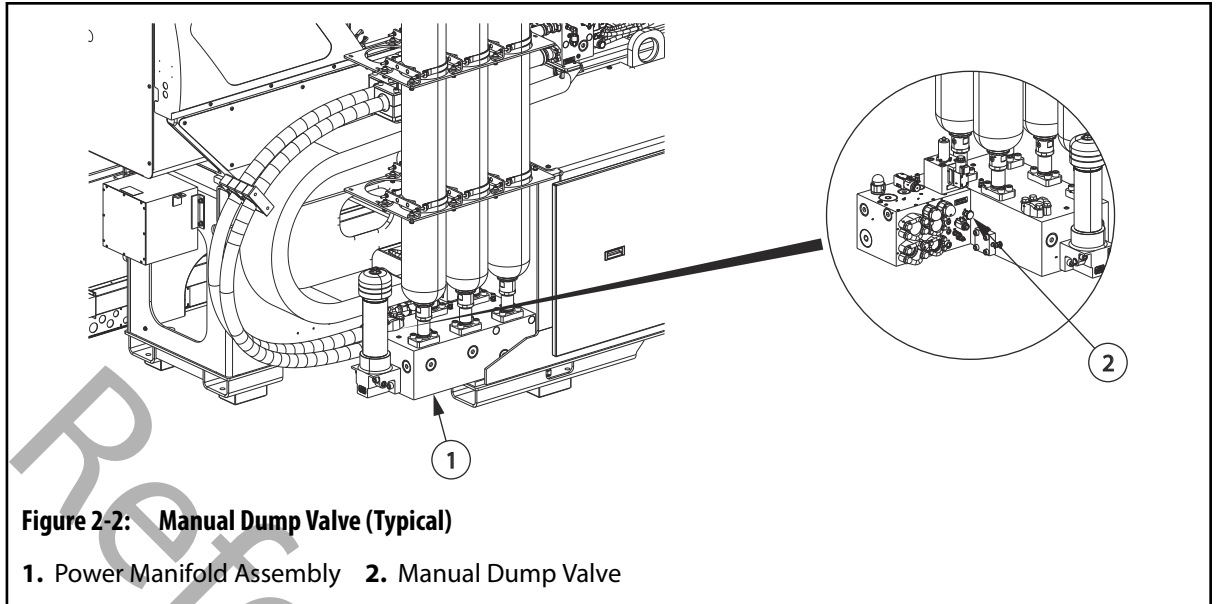
WARNING!

Trapped hydraulic pressure - risk of serious injury. After depressurizing the hydraulic system, and locking and tagging any energy source, verify that all pressure has been discharged before servicing the machine.

7. On the power manifold, remove the gauge port cap and attach a hydraulic pressure gauge to each gauge port used to measure hydraulic pressure in the accumulators. The gauge must be rated for pressures higher than the machine operating pressure and have a quick disconnect fitting.

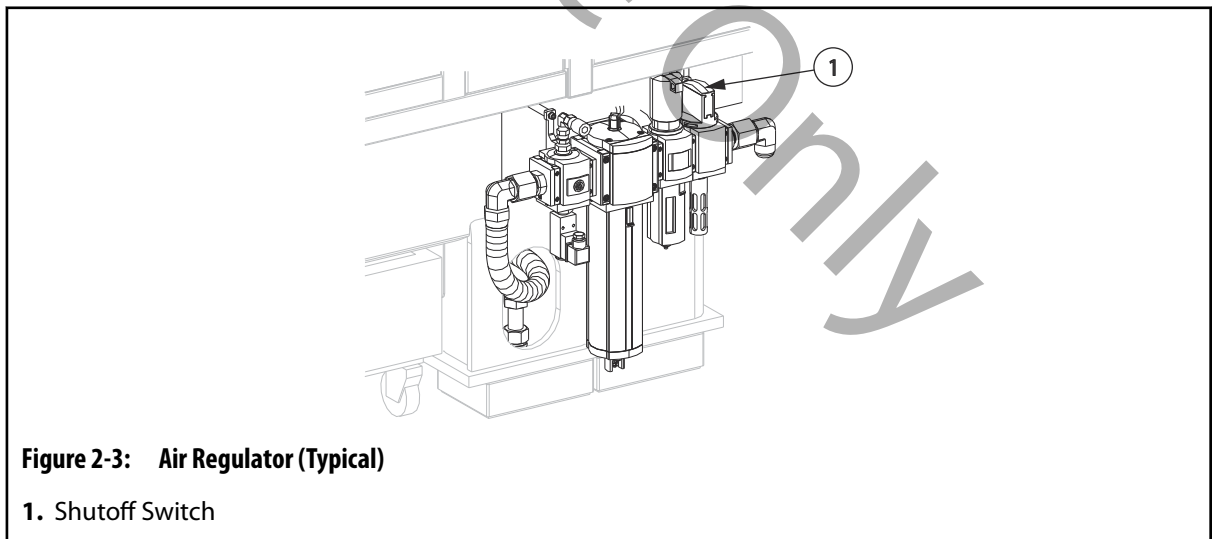
Refer to the hydraulic schematic for the specific location of the gauge port(s).

8. At the power manifold, turn each manual dump valve counter-clockwise to make sure the accumulator(s) discharge.

**WARNING!**

Trapped hydraulic pressure hazard – risk of serious injury. Some hydraulic circuits, other than the accumulator circuit(s), may be designed to contain hydraulic pressure when the machine has been shut down. Make sure to relieve pressure from these circuits before performing any maintenance on related components.

9. Check the hydraulic pressure gauge to verify the accumulator is completely discharged.
10. Rotate the shutoff switch on the air regulator to turn off the compressed air supply.
11. Attach a lock and tag to the shutoff switch.



2.6.4 Removing Locks and Tags

To remove locks and tags from the machine, do the following:

**IMPORTANT!**

Locks and tags should only be removed by the person who installed them.

If the person is unable to personally remove the lock and tag, verbal instructions can be given to remove the lock and tag. The instructions must include any specific measures required to return the machine to safe operating condition.

If the person cannot be contacted, a supervisor and qualified technician (who has a thorough understanding of the machine) can remove the locks and tags. The locks and tags should only be removed when both the supervisor and technician agree that all systems are in order and there is no potential for injury.

1. Make sure a hydraulic pressure gauge or cap is in place for all gauge ports.
2. Make sure all power cables are properly connected.
3. Make sure all personnel are outside the safety barriers.

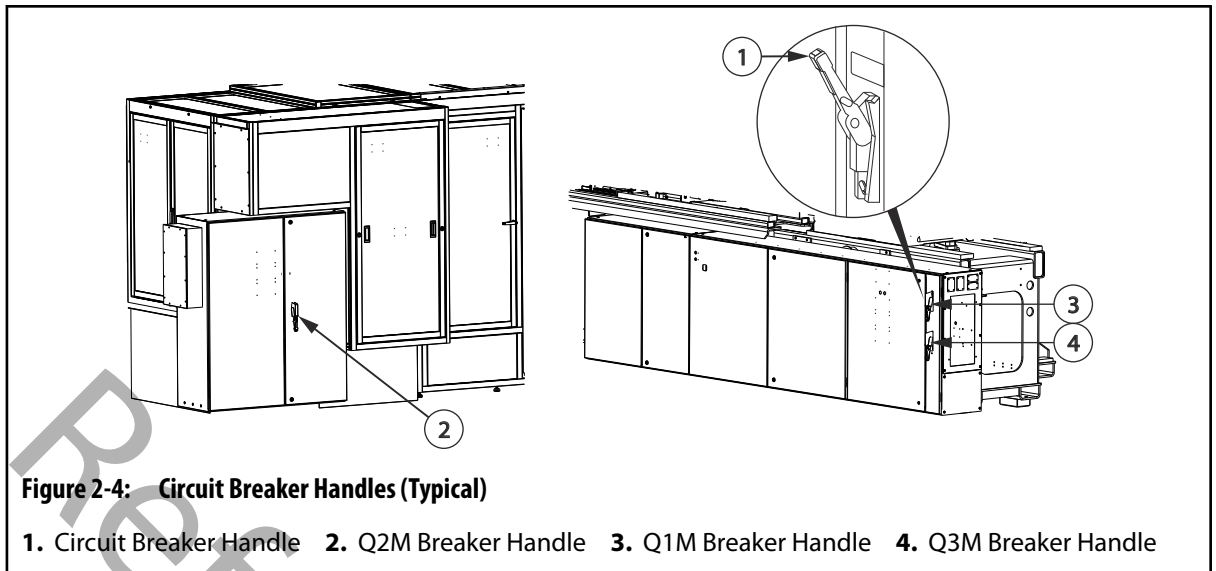
CAUTION!

Electrical hazard – risk of component damage. When powering up the machine, switch on the Q1M breaker handle before switching on the Q3M (if equipped) or Q2M breaker handles. Failure to do so could result in unnecessary wear on the components and lead to premature failure.

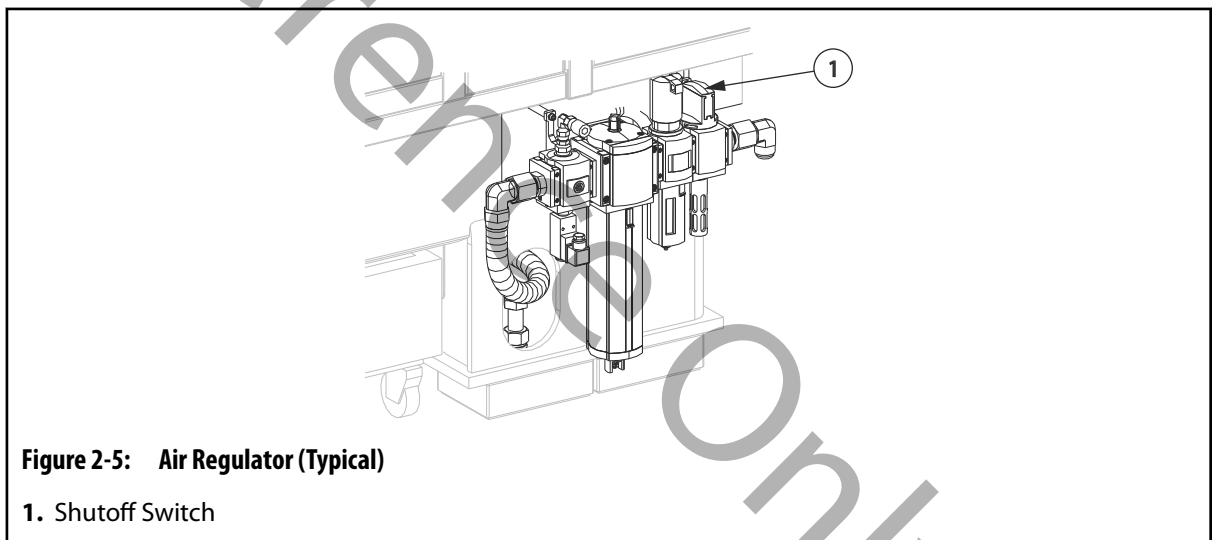
**WARNING!**

Hazardous voltages, high pressure fluids, crushing or impact hazards– risk of death or serious injury. Follow local codes when removing locks and tags. Only qualified personnel should lock out and tag the machine.

4. Move the Q1M breaker handle to the ON position. This turns on power to the machine including the HMI and all other machine functions.
5. Move the Q2M breaker handle to the ON position. This turns on power to the integrated mold heats.
6. If equipped, move the Q3M breaker handle to the ON position. This turns on power to motion control.



7. At the power manifold, turn each manual dump valve clockwise completely to allow the accumulator(s) to charge when the machine is started.
8. Remove the lock and tag from the shutoff switch on the air regulator.



9. Rotate the shutoff switch on the air regulator to turn on the compressed air supply.

2.7 Personal Protective Equipment and Safety Equipment

Personal injury can be avoided when personnel wear appropriate protective gear and use special safety equipment. The following describes the safety gear and equipment that should be used when working with the machine and any auxiliary equipment.

2.7.1 Personal Protective Equipment (PPE)

Wear appropriate personal protective equipment when working on or near equipment. Standard personal protective equipment includes:

Item	Description
	Safety Glasses For protecting the eyes from flying objects/particles, heat, sparks, splash from molten material, and more.
	Face Shield For protecting the entire face area from flying objects/particles, heat, sparks, splash from molten material, and more.
	Heat Resistant Gloves For protecting the hands from extreme heats.
	Hearing Protection For protecting the ears from loud ambient noise.
	Safety Shoes For protecting the feet from electrical shocks, crushing hazards, puncture hazards, splash from molten material, and more.
	Non-Melting Natural Fiber Pants and Long Sleeved Shirt For protecting the body from abrasions, cuts, and potential splash from molten material.

2.7.2 Safety Equipment

Use appropriate safety equipment when working on or near equipment.

Standard safety equipment includes:

- **Exhaust Fan**
For collecting potentially harmful plastic fumes
- **Purging Container**
For containing hot resin purged from the injection unit
- **Vacuum Cleaner**
For collecting spilled resin pellets and other debris that may create a falling hazard
- **Stairs and Ladders**
For ensuring safe access to areas of the machine
- **Danger Signs**
For warning other personnel to stand clear of a component or area of the machine
- **Locks and Tags**
For preventing the use of specific systems and components
- **Fire Extinguishers**
For the expedient suppression of small fires
- **Telescopic Mirror**
For safely inspecting hot runner nozzle tips from outside the mold area

2.8 Material Safety Data Sheet (MSDS)



WARNING!

Chemical hazard - Some of the chemicals used with Husky equipment are potentially hazardous and could cause injury and illness. Before storing, handling, or working with any chemical or hazardous material, thoroughly read and understand each applicable Material Safety Data Sheet (MSDS), use recommended personal protective equipment and follow the manufacturer's instructions.

The Material Safety Data Sheet (MSDS) is a technical document which indicates the potential health effects of a hazardous product. It contains safety guidelines to protect personnel, as well as information about use, storage, handling, and emergency procedures.

Always refer to the applicable Material Safety Data Sheet before doing the following:

- handling a chemical product
- disassembling any portion of Husky equipment that may result in exposure to a chemical product

Contact the material supplier to obtain a copy of the MSDS sheet.

2.9 Materials, Parts and Processing

To prevent personal injury or damage to the equipment, make sure of the following:

- The equipment is only used for its intended purpose, as described in the manuals
- The operating temperatures do not exceed the specified permissible maximum value for the resin
- The maximum temperature set point is set below the flash point of the material being processed
- Lubricants, oils, process materials and tools used on equipment meet Husky specifications
- Only authentic Husky parts are used

2.10 Safety Devices

The machine is equipped with a number of safety devices designed to make sure the operator is safe.

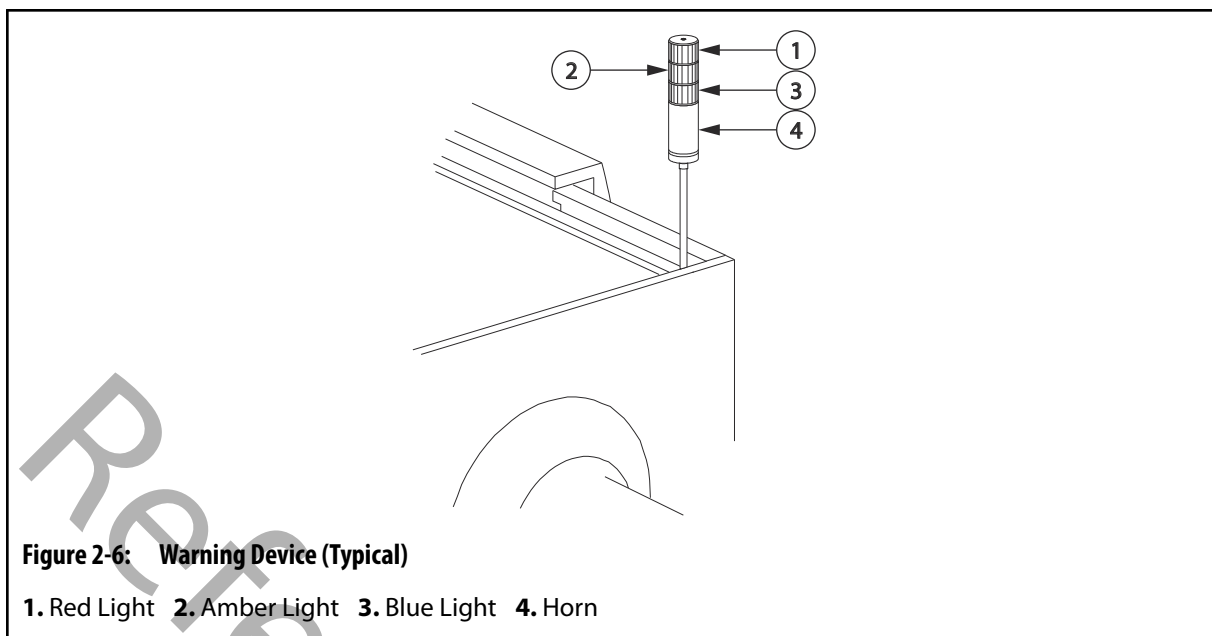
2.10.1 Warning Device

The warning device alerts the operator and other personnel to conditions occurring in the machine. A standard warning device is installed on the clamp unit and features three warning lights: red, amber and blue.

The red warning light activates when the machine stops due to an alarm condition. An optional audible horn also sounds to indicate the alarm condition.

The blue warning light combined with a different optional audible horn indicates a pending warning on the software alarm screen. This feature gives an early warning to the operator that a cycle interruption will occur if not addressed.

The amber warning light is for machines equipped with the Statistical Process Control (SPC) option. It indicates a SPC-related alarm.



2.10.2 Emergency Stop Button

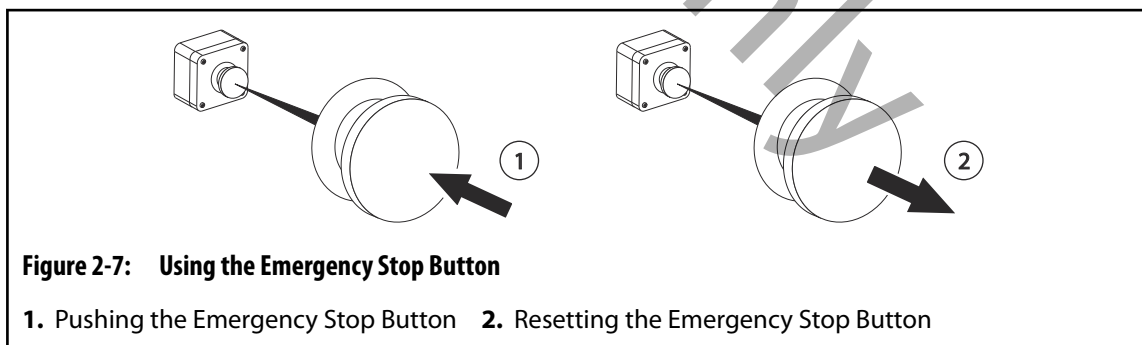
Emergency stop (or E-stop) buttons are used to stop the machine in the event of an emergency. When pressed, all motors will stop, all heats will turn off, all solenoids will de-energize, and all hydraulic oil will return to the hydraulic tank.

This machine is equipped with two emergency stop buttons. The buttons are located:

- On the operator side below the Human Machine Interface (HMI)
- On the non-operator side inside the product handling area

To use an emergency stop button:

1. Push the emergency stop button to stop all machine motions and de-energize all systems.
2. Correct the condition that prompted the use of the emergency stop button.
3. Pull the button to reset it.



2.10.3 Product Handling Gate Reset

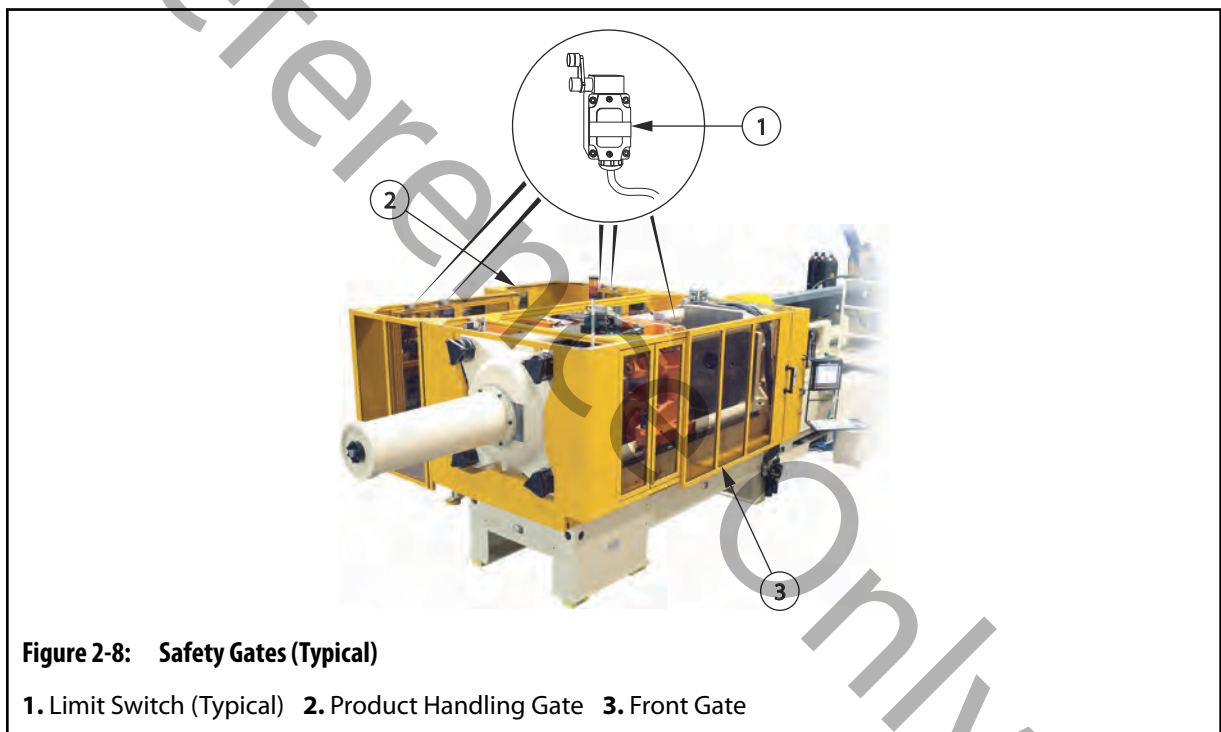
Opening any product handling gate on the non-operator side of the machine will trigger an alarm and prevent the machine from operating.

Press the **Gate Reset** button after closing the product handling gates to dismiss the alarm.

2.10.4 Safety Gates and Doors

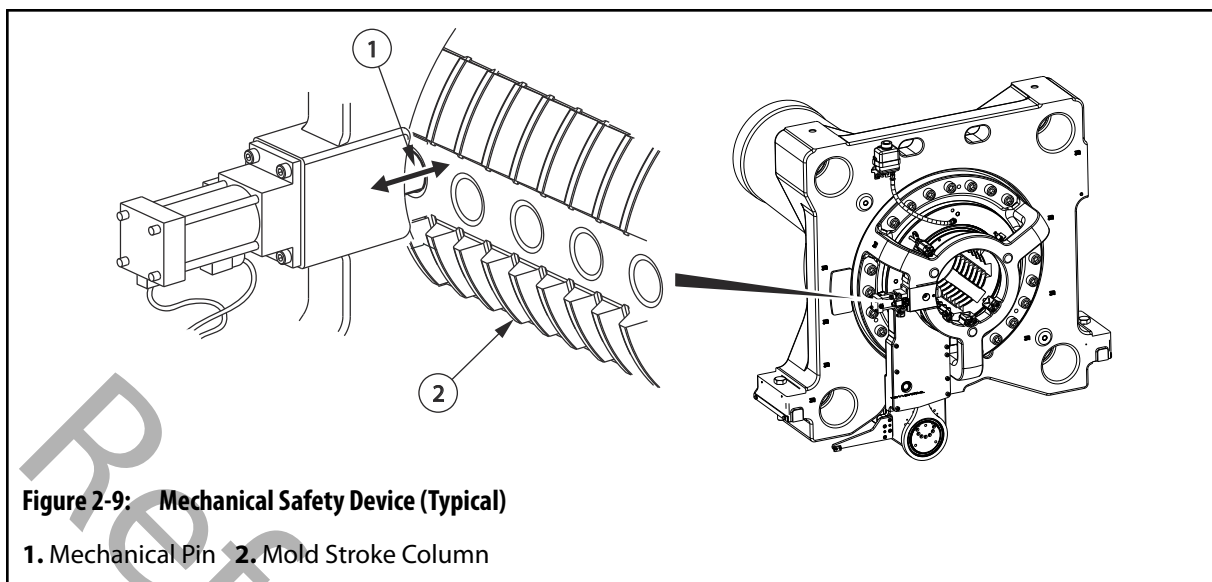
The machine is equipped with safety gates and doors that prevent access to the mold, clamp and product handling areas. The gates and doors feature transparent panels for viewing the production area and a series of limit switches for each that trigger an alarm when the gates or doors are opened.

Safety gates are designed to prevent projection of any molded parts, molded components or molten material from the mold area.



2.10.5 Mechanical Safety Device (If Equipped)

The mechanical safety device inserts a pin into the clamp stroke column when the front safety gate is opened. This prevents unsafe movement of the moving platen while the mold area is accessible to personnel.

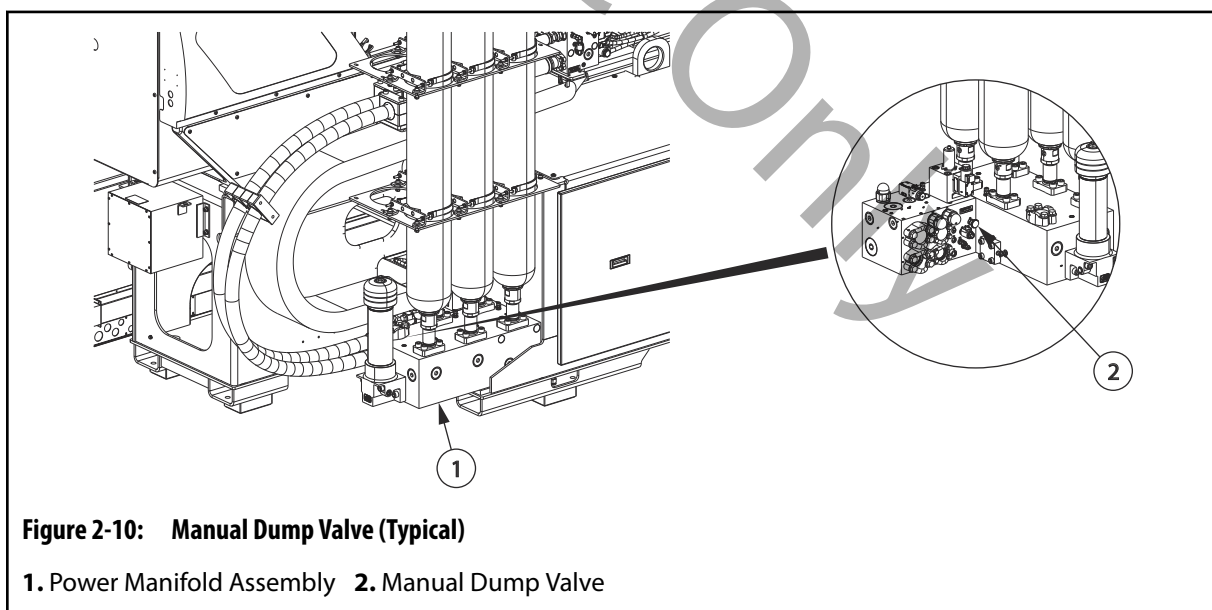


2.10.6 Automatic Dump Valve

The automatic dump valve discharges all hydraulic pressure from the accumulator in a reasonably short period of time when the **Pump Motor Off** key is pressed on the HMI. This makes sure no hydraulic pressure is stored in the system when the machine is shut down.

2.10.7 Manual Dump Valve

The manual dump valve is a backup safety device used to manually relieve hydraulic pressure in the system. Before servicing the hydraulic system, always turn the manual dump valve counter-clockwise to discharge any stored hydraulic pressure.



2.10.8 Purge Guard

The purge guard protects the operator from molten resin that can be sprayed from the injection nozzle. A limit switch monitor the purge guard and trigger an alarm when the purge guard is opened.



WARNING!

Hot resin spray hazard – risk of serious injury. The machine is designed to keep the injection nozzle tip safely within the purge guard during operation and purging. Operating or purging the machine outside of this guarding is prohibited and can result in uncontained molten resin spray, causing serious injury or death.

2.10.9 Electrical Cabinet Door Interlocks and Override (UL Only)

NOTE:

This safety device is available only on machines designed to Underwriters Laboratory (UL) standards.

Each door on the electrical cabinet is equipped with an interlock switch that disables power to electrical components when one of the doors is opened.



Figure 2-11: Electrical Cabinet Door Interlock Switch

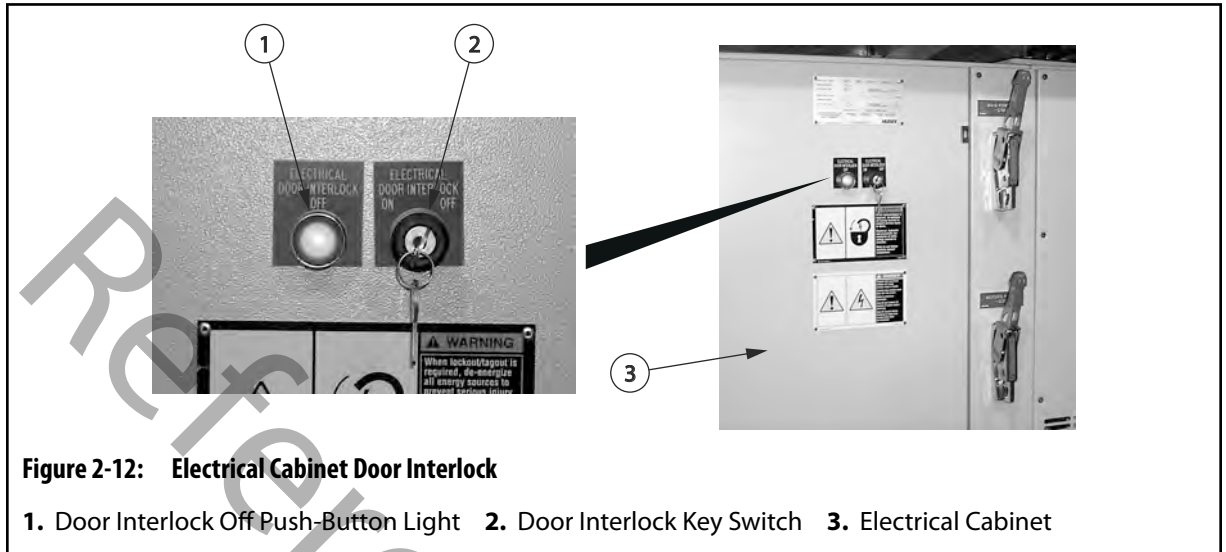
For troubleshooting purposes, the interlock system can be overridden to maintain power while the doors are open.

To override the interlock system, do the following:

1. Insert the interlock override key into the key switch.
2. Turn the key switch to the OFF position. The **Door Interlock Off** indicator push-button light will light up when the interlock system is disabled.

NOTE:

The **Door Interlock Off** indicator push-button light can be pressed at any time to test the light. Replace the bulb immediately if it does not light up.



2.11 Checking the Safety Devices

The functionality of all safety devices on the machine must be checked before production begins. To confirm the functionality of these devices, perform the following procedures:

Task Description	Reference
Check the Emergency Stop Buttons	Section 4.26.1.5.1
Check the Safety Gates	Section 4.26.1.5.2
Check the Mechanical Safety Device (If Equipped)	Section 4.26.1.5.3
Check the Purge Guard	Section 4.26.1.5.4

2.12 Decommissioning the Machine

At the end of service life, the machine must be decommissioned for safe disposal. To decommission the machine, do the following:



WARNING!

High pressure spray hazard – risk of death or serious injury. Depressurize each individual hydraulic circuit using an oil sampling kit.



WARNING!

Environmental hazard – risk of damage to the environment. Spilled hydraulic oil or oil that has not been properly disposed of could pollute the environment and create a health hazard. Clean up all spilled hydraulic oil immediately and dispose of it properly according to local regulations.

1. Depressurize the hydraulic system using the manual dump valve and individual hydraulic circuits using an oil sampling kit.



WARNING!

Explosion hazard – risk of death or serious injury. Pressurized accumulators must be fully discharged before removal from machine and disposal.

2. Fully discharge the accumulators. Refer to [Section 5.6.2.4](#) and [Section 5.6.3.4](#) for instructions.
3. Drain all fluids in accordance with local codes and regulations.
4. Dispose of all materials in accordance with local codes and regulations.

Chapter 3 Commissioning and Mold Installation

This chapter describes how to commission the machine and install a mold.

NOTE:

Some procedures in this chapter may refer to controls on the Human Machine Interface (HMI). For more information about the HMI, refer to [Chapter 4—Operation](#).

NOTE:

Unless specified otherwise, all bolts, screws, fittings and other hardware should be torqued to the standard values listed in [Section 7.13](#).

**IMPORTANT!**

The procedures contained in this chapter are for a standard machine and do not generally cover optional equipment or systems.

**IMPORTANT!**

Complete all installation procedures before commissioning the machine. For more information, refer to the *Site Preparation and Installation Manual*.

3.1 Commissioning the Machine

Once the machine has been installed, complete the following procedures before starting up the machine. For more information about installing the machine, refer to the *Site Preparation and Installation Manual*.

When commissioning the machine, perform the following procedures in order:

Step	Task Description	Reference
1	Lubricate the machine and product handling equipment	Section 3.1.1
2	Charge the accumulator(s)	Section 3.1.2
3	Check the hydraulic connections	Section 3.1.3
4	Connect the offline filtration unit (if equipped)	Section 3.1.4
5	Connect the electrical power supply	Section 3.1.5

Step	Task Description	Reference
6	Fill the hydraulic tank	Section 3.1.6.1
7	Prime the system and gearbox pumps	Section 3.1.6.2
8	Measure the Z-Axis Drive Belt Tension	Section 3.1.7
9	Check the electric motor rotation direction	Section 3.1.8
10	Check the level, parallelism and concentricity	Section 3.1.9
11	Calibrate the machine	Section 3.1.10

3.1.1 Lubricating the Machine and Product Handling Equipment

If the machine and product handling equipment have been brought out of storage, they must be fully lubricated before they are put into production.

NOTE:

All machines and product handling equipment delivered directly from Husky are pre-lubricated.

To lubricate the machine and product handling equipment, do the following:

1. Lubricate the mold stroke column guide bushings. Refer to [Section 5.3.3](#) for more information.
2. Lubricate the moving platen linear bearings. Refer to [Section 5.3.5](#) for more information.
3. Lubricate the mold positioning device lifting wedge. Refer to [Section 5.3.6](#) for more information.
4. Lubricate the injection unit. Refer to [Section 5.4.6](#) for more information.
5. Lubricate the Z-axis linear bearings. Refer to [Section 5.9.13](#) for more information.
6. Lubricate the Y-axis bushings and rod eye (if equipped). Refer to [Section 5.9.19.4](#) for more information.

3.1.2 Charging the Accumulator(s)

Nitrogen gas is depleted from all accumulators before the machine is shipped from Husky. During the installation of the machine, fill the accumulators with nitrogen gas.

Refer to [Section 5.6.2](#) and [Section 5.6.3](#) for more information.

3.1.3 Checking the Hydraulic Connections

To check the hydraulic connections, do the following:

**WARNING!**

High pressure spray hazard – risk of death or serious injury. Loose connections can cause high pressure hydraulic oil spray that could penetrate human tissue causing serious injury or death. Check all hoses for damage and tighten all hydraulic connections before starting up the machine.

**WARNING!**

Fire hazard – risk of death, serious injury or damage to the machine. Hydraulic oil could spray onto hot machine surfaces and could cause a fire. Check all hoses for damage, and tighten all hydraulic connections before starting up the machine.

1. Check and retighten all connections at the inlet and outlet sides of the pumps. Refer to [Section 7.13](#) for standard torque specifications.
2. Check and retighten all connections at the manifolds.
3. Check and retighten all remaining hydraulic connections throughout the machine.

3.1.4 Connecting the Offline Filtration Unit (If Equipped)

Standalone offline filtration units are available as a option. There are two styles of offline filtration units (electrical and mechanical) but the connection to the Husky machine is the same.

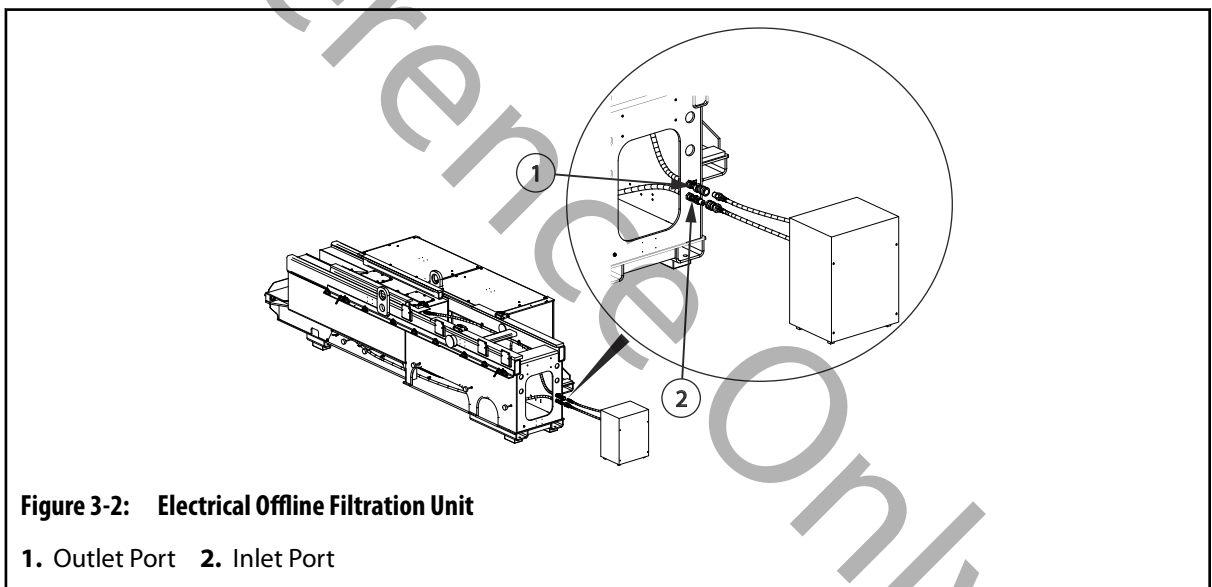
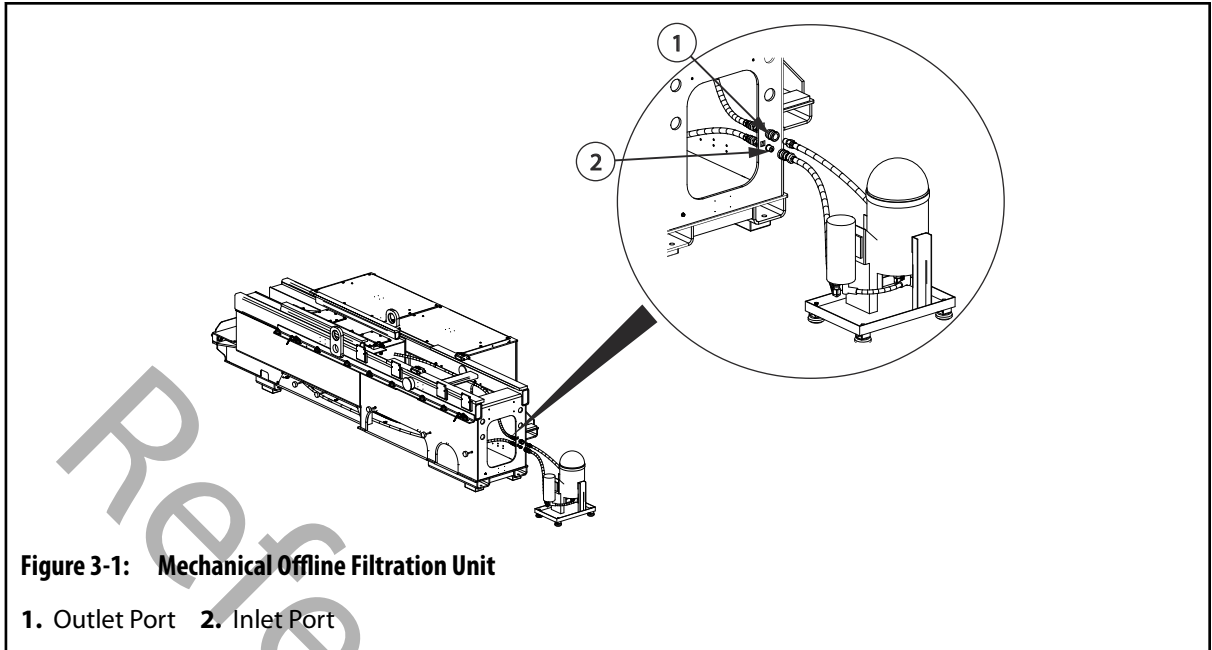
Theses machines are connected to the Husky machines but any controls are on the standalone unit. For details about the unit, controls and maintenance refer to the manufacturer's manual.

**IMPORTANT!**

Read and understand the manufacturer's manual prior to installing and starting the offline filtration unit.

To connect the offline filtration unit, do the following:

1. Position the offline filtration unit.
2. Make sure the machine pump is off.
3. Connect the in and out hoses to the machine.



4. Connect the power for offline filtration unit as instructed in the manufacturer's manual.



IMPORTANT!

Husky recommends plugging the electrostatic offline filtration unit (OLF) into an alternate power source (not into the machine power outlet). This prevents emitting electrical noise into machine power outlets which may cause intermittent cycle interruptions.

5. Follow the manufacturer's manual for startup and maintenance procedures.

3.1.5 Connecting the Electrical Power Supply

To connect and power on the main electrical power supply for the machine, do the following:



DANGER!

Electrocution hazard – risk of death or serious injury.

- **Make sure the prospective short circuit fault level does not exceed 10,000 A RMS.**
 - **Only qualified personnel should connect the electrical power supply.**
 - **All work must conform to local electrical codes.**
 - **High voltages are present in the electrical cabinet after the power supply is connected.**
 - **Only connect the bonding strip where local codes require the neutral bar to be bonded to the enclosure.**
 - **When connecting the PE-to-N bonding strip, follow the manufacturer's instructions. Failure to use the proper mounting bolt will result in an incorrect bonding circuit.**
 - **Properly ground all auxiliary equipment.**
-

CAUTION!

Mechanical hazard – risk of damage to the machine.

- **Do not modify the electrical cabinet**
 - **The main electrical power cable must be rated for the machine power requirements and comply to local codes**
-

1. Turn off the power supply to the machine at the facility's main disconnect switch.
-



DANGER!

Electrocution hazard – risk of death or serious injury. Perform the lockout/tagout procedure in accordance with local codes. Only qualified personnel should Lock out and tag the machine.

2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
3. Remove the fingersafe cover. Refer to [Section 5.5.2](#) for more information.
4. Connect the three-phase wires for the machine to the Q1M, Q2M and Q3M breakers as shown in the electrical schematics.
5. Connect the ground (Potential Earth) wire to the ground strip.
6. If the cabinets are equipped with neutral bars, connect the neutral wire to the neutral bar. Make sure the neutral for the Mold Heats supply (connected to Q2M) is connected to the neutral in the mold heats section, and that the neutral for the Main supply (connected to Q1M) is connected to the neutral in the main power section.
7. Install the fingersafe cover. Refer to [Section 5.5.2](#) for more information.
8. Remove all locks and tags.

9. Turn on the power supply to the machine at the facility's main disconnect switch.

3.1.6 Charging the Hydraulic System

Charge the hydraulic system as described in the following procedures.

3.1.6.1 Filling the Hydraulic Tank

Fill the hydraulic tank with clean hydraulic oil. For information about filling the hydraulic tank, refer to [Section 5.6.7.3](#).

For hydraulic oil requirements, refer to [Section 7.9](#).

3.1.6.2 Priming the System

The system must be primed with oil during the installation of the machine to prevent air from entering the hydraulic system.

For more information, refer to [Section 5.6.17](#).

3.1.7 Measure the Z-Axis Drive Belt Tension

Measure the belt tension for the Z-axis drive motors. Refer to [Section 5.9.15](#) for more information.

3.1.8 Checking the Circulation Pump Motor Rotation Direction

The direction in which the circulation pump motor rotates must be checked in order to verify the machine has been properly connected to the main power supply. If the power supply is connected incorrectly, the electric motor will rotate in the opposite direction.

To check the direction of rotation for the circulation pump motor, do the following:

NOTE:

This procedure requires two service technicians.

1. Remove the access panels on the power pack.
 2. Power up the machine and log on to the HMI. Refer to [Section 4.26.1.2](#) for more information.
-



DANGER!

Electrocution hazard – risk of death or serious injury. Stand clear of the circulation pump motor while power is supplied to the machine to avoid potential electrocution. Do not touch the circulation pump motor.

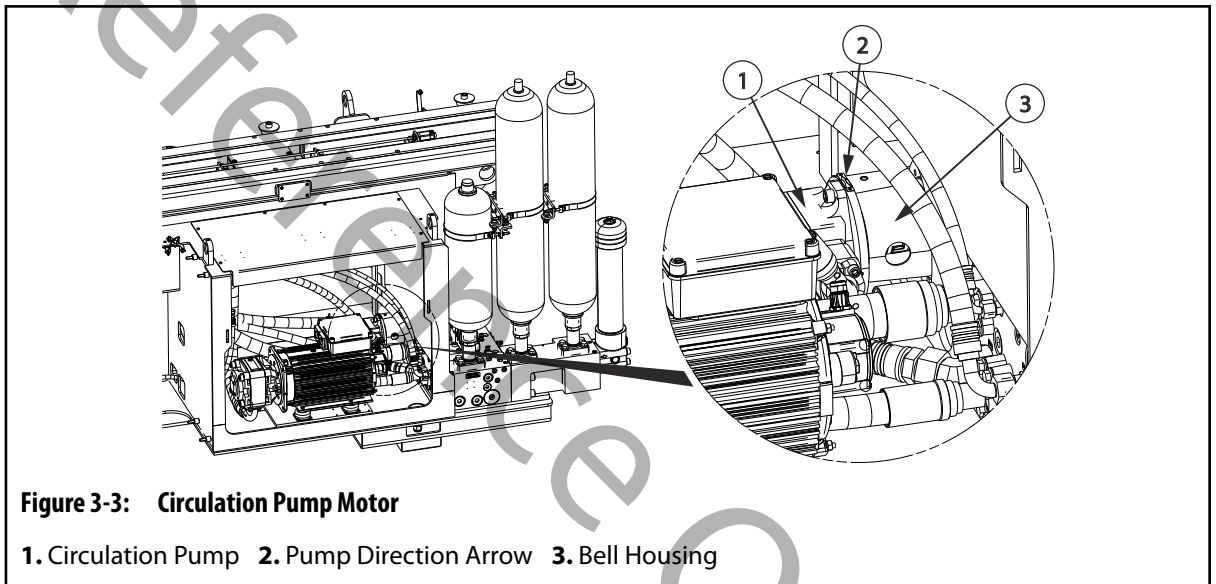
**WARNING!**

Burn hazard – risk of serious injury. Contact with exposed hot surfaces will cause serious burn injuries. Wear personal protective equipment when working near these areas.

**WARNING!**

Entanglement hazard - risk serious injury. Stand a minimum of 1 m (3.3 ft) from the bell housing. Do not stand directly in line with the openings in the bell housing when the circulation pump motor is started.

3. Position a service technician at the power pack to observe the direction of rotation for the circulation pump motor. The direction of rotation is visible through openings in the bell housing. The correct direction is marked on the bell housing.

**CAUTION!**

Mechanical hazard – risk of damage to the machine. When the circulation pump motor first starts, the hydraulic pumps may emit a high pitched noise as the air is purged from the hydraulic system. If the noise continues for more than 10 seconds, turn off the circulation pump motor immediately prevent damage to the hydraulic pumps.

CAUTION!

Mechanical hazard – risk of damage to the machine. If the circulation pump motor is rotating in the wrong direction, stop the motor immediately. Contact Husky for assistance. Do not operate the machine until the problem has been corrected.

4. On the HMI touch the **Production** button, and then touch the **Calibration Overview** tab.

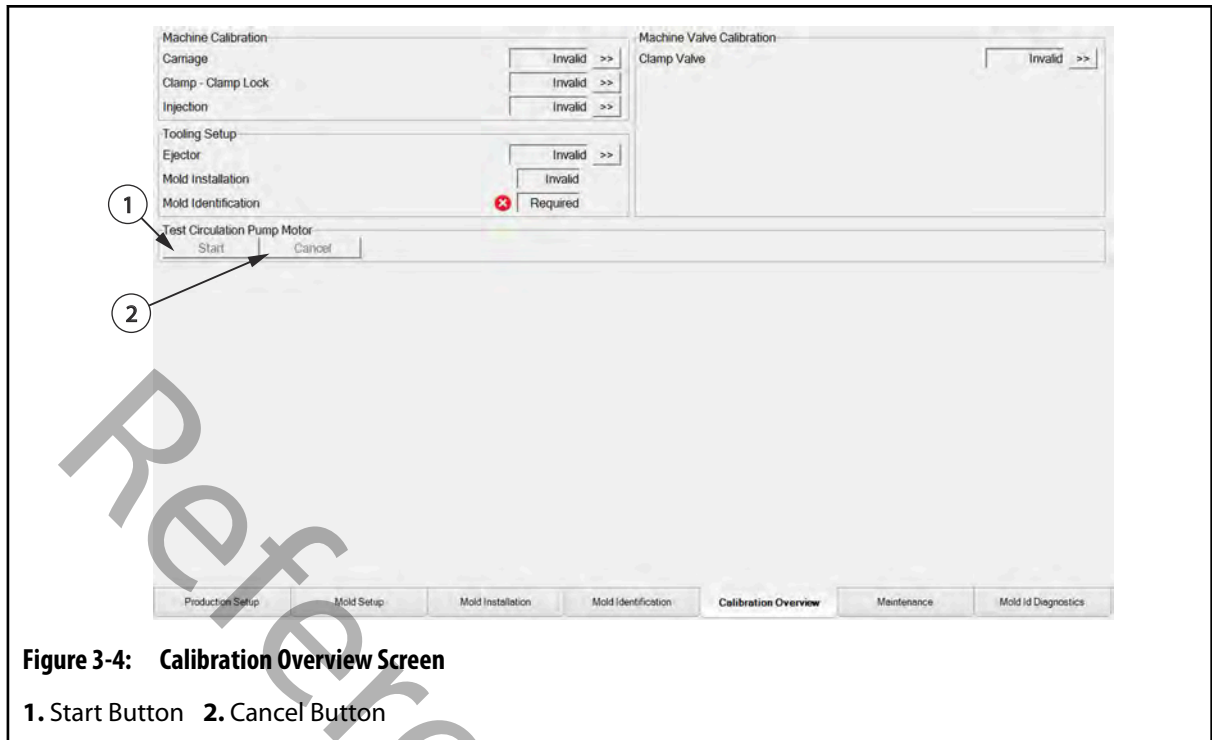


Figure 3-4: Calibration Overview Screen

1. Start Button 2. Cancel Button

5. In the **Test Circulation Pump Motor** area, touch the **Start** button to start the motor. the motor receives a 5 second pulse and then stops. If the direction of rotation is incorrect, contact Husky for assistance.
6. If the direction of rotation is correct, install the access panels for the power pack.

3.1.9 Leveling the Machine and Adjusting Nozzle Concentricity

Level the machine and adjust the nozzle concentricity before connecting services to the machine. Refer to [Section 5.2.6](#) for more information.



IMPORTANT!

The proposed floor location for the machine must be in good repair and stripped of any grease, oil, paint and wax, particularly in the area where the leveling mounts will be positioned. Heavily coated areas should be scraped or sanded back to bare concrete. This is required to provide a suitable contact surface for the rubber pads in the leveling mounts.

3.1.10 Calibrating the Machine

Specific components must be calibrated after installing the machine and all auxiliary equipment to reduce the risks of damage and wear. Refer to [Section 5.10](#) for more information about the available calibration functions and how to calibrate the machine.

3.2 Purging Cooling Water from the Mold Core and Cavity Plate

Cooling water from the mold core and cavity plate can be purged automatically using the quick mold change (formerly the flexibility package) wizard or from the **Cooling Setup** screen. In both cases, the machine must be equipped with the quick mold change option. For details about the water connections, refer to the *Site Preparation and Installation Manual*.

1. To automatically purge cooling water from the mold and cavity using the quick mold change option wizard, do the following:

NOTE:

This procedure can only be performed on a mold with a quick mold change option.

- a. On the HMI, touch the **Production** button.
- b. Touch the **Mold Installation** Tab.
- c. Touch the **Start** button. Follow the instructions on the screen.
- d. If required, touch the **Mold Heats Start** button.

**IMPORTANT!**

Verify all mold cooling lines and services are connected if water circuit purging is required.

- e. Select **Yes** to choose to automatically purge mold cooling water.
- f. Touch the **Accept** button.

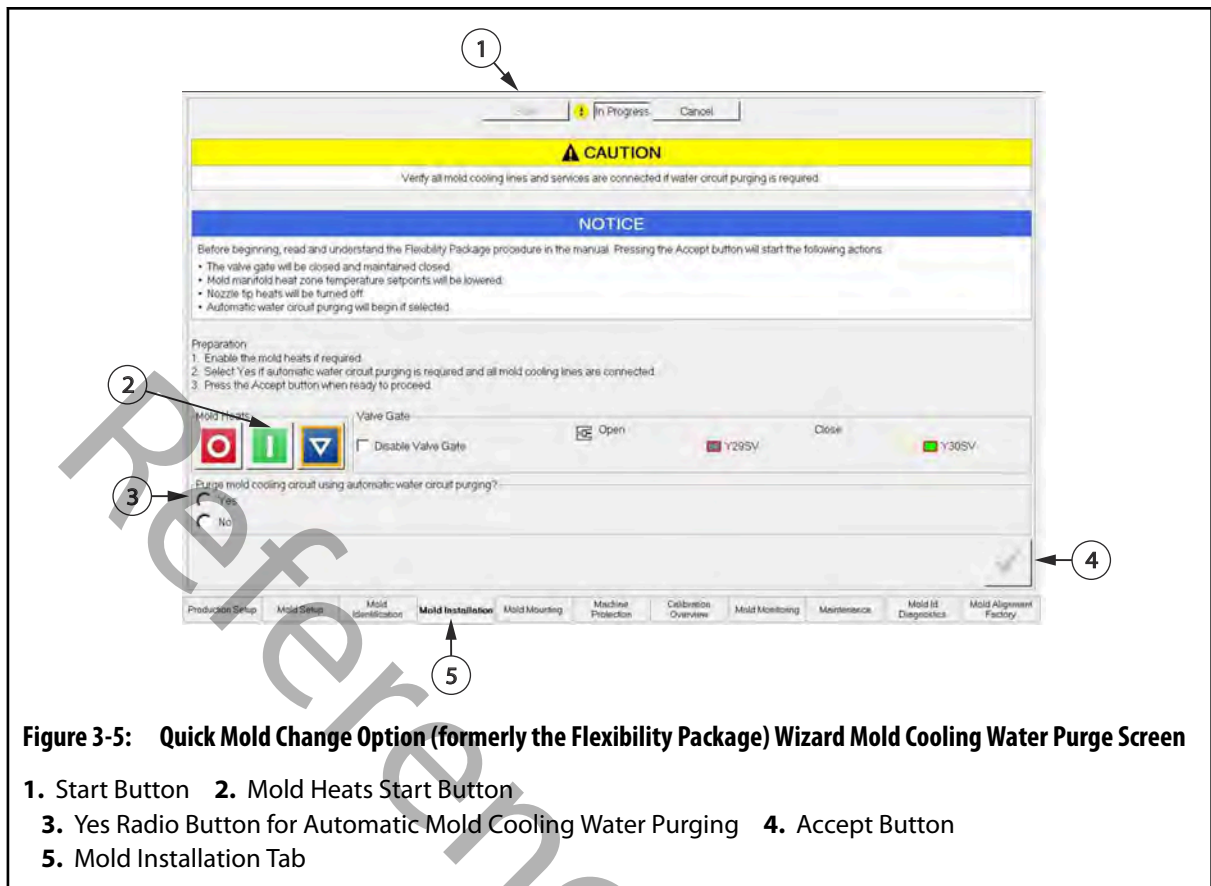


Figure 3-5: Quick Mold Change Option (formerly the Flexibility Package) Wizard Mold Cooling Water Purge Screen

1. Start Button 2. Mold Heats Start Button
3. Yes Radio Button for Automatic Mold Cooling Water Purging 4. Accept Button
5. Mold Installation Tab

2. To automatically purge cooling water from the mold core and cavity plate from the **Cooling Setup** screen, do the following:

NOTE:

This procedure can be performed on a mold with or without the quick mold change option (formerly the flexibility package).

NOTE:

The safety gates must be closed and the machine in mold set mode.

- a. On the HMI, touch the **Heats** button and then touch the **Cooling Setup** tab.
- b. From the Mold Cooling Water Circuit Purge area of the screen, touch the **More** (>>) button next to the **Status** field. A dialog box appears.

NOTE:

The Status field must indicate *Ready to Start*.

- c. Follow the instructions on the dialog box. Confirm the mold cooling lines and services are connected and then touch the **Accept** button.
- d. Touch the **Start** button to begin the mold cooling water purge.

NOTE:

Opening a safety gate while the water purge is active will cancel purging.

- e. When the water purge is complete, press the manual pressure relief valve to depressurize the water circuit.

**IMPORTANT!**

Do not remove any cooling lines until all the pressure is released from the water circuit.

- f. Touch the **Exit** button.

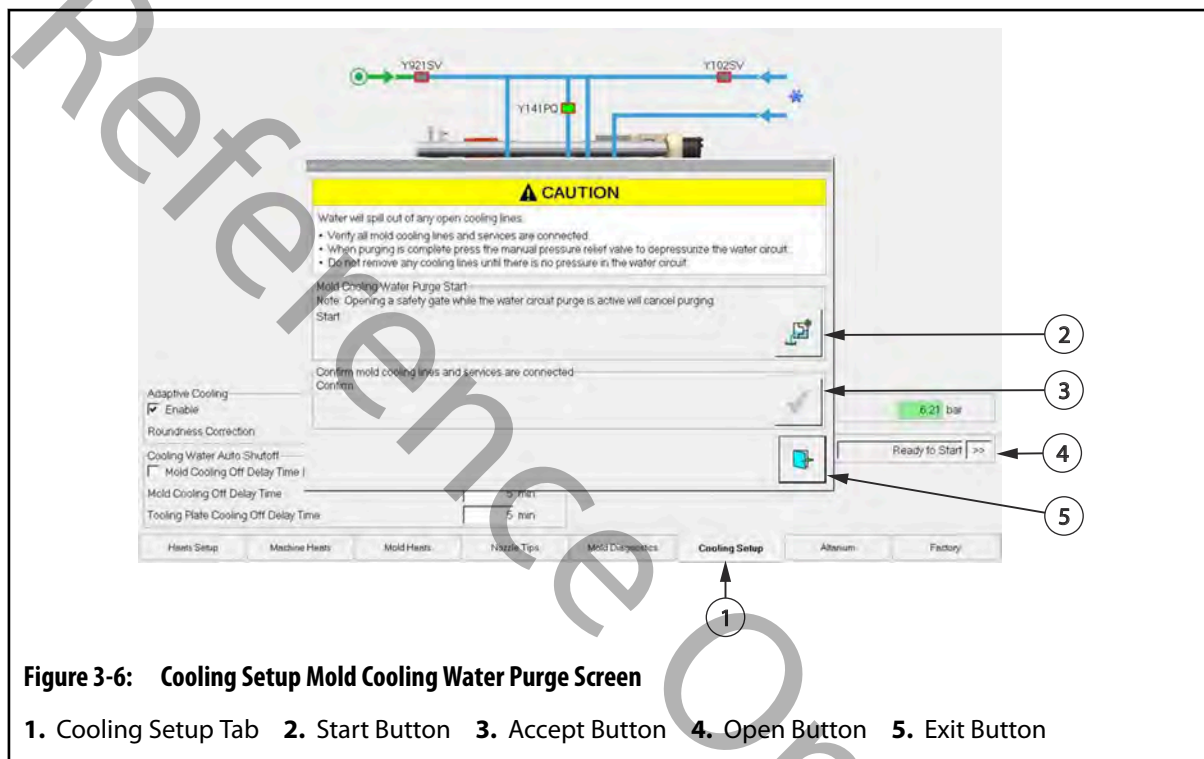


Figure 3-6: Cooling Setup Mold Cooling Water Purge Screen

1. Cooling Setup Tab 2. Start Button 3. Accept Button 4. Open Button 5. Exit Button

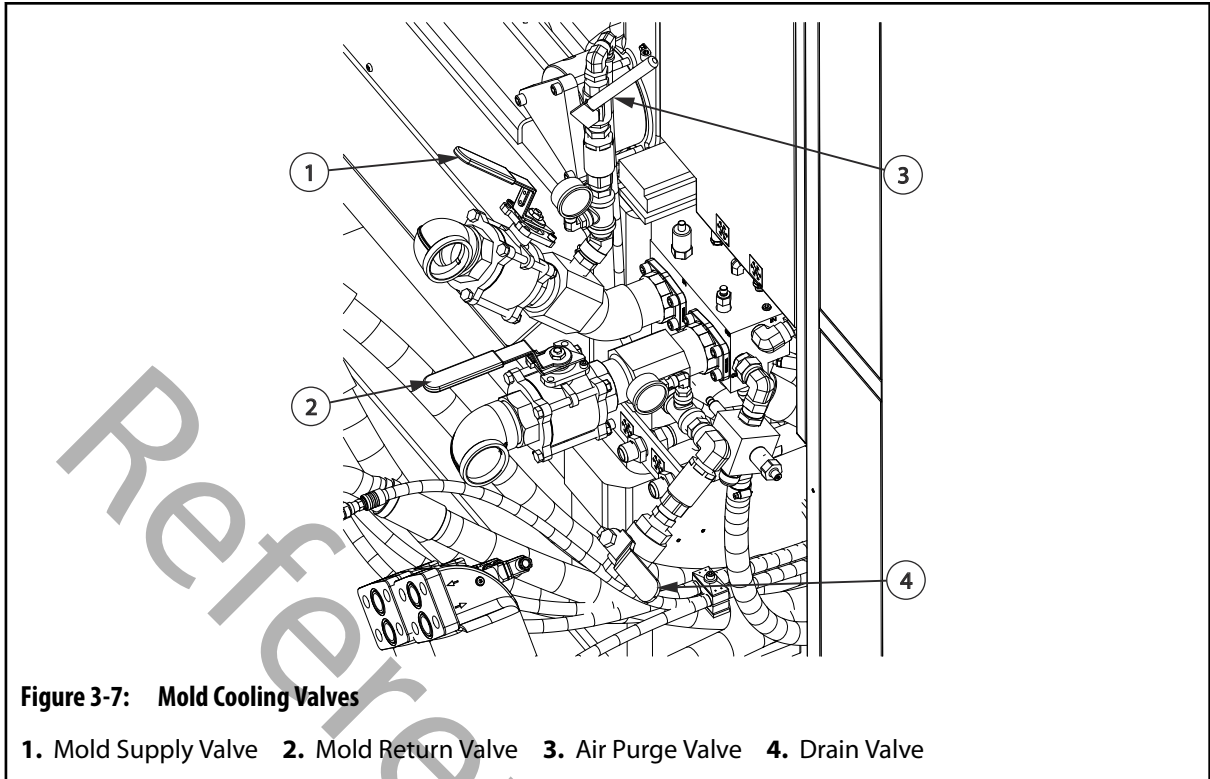
3.3 Purging Cooling Water from the Mold Core, Cavity Plate and Product Handling (HyPET120)

Prior to manually purging, refer to the **Cooling Set Up** screen on HMI, follow the on screen instructions for purging the cooling water.

Cooling water from the mold core, cavity plates and the product handling can be purged manually using manual valve and purge together.

To purge the mold cooling water, position the valves as follows:

1. Close the mold supply valve (valve 1).



2. Close the mold return valve (valve 2).



IMPORTANT!

Before opening the drain valve (valve 4), make sure the valve is equipped with a transfer hose positioned to drain into a suitable waste container. Alternately, position a suitable waste container under the drain valve.

3. Open the drain valve (valve 4).
4. Open the air purge valve (valve 3). Make sure the water is purged from the mold.
5. Close the air purge valve (valve 3).
6. Close the drain valve (valve 4).

3.4 Installing and Setting Up the Mold

Step	Task Description	Reference
1	Load the documentation and mold ID configuration file	Section 3.4.1
2	Identify the mold	Section 3.4.2
3	Set the clamp tonnage	Section 3.4.3
4	Install the mold and hot runner	Section 3.4.4

Step	Task Description	Reference
5	Connect the cavity plate water supply on a HyPET 400 and 500 machine equipped with the quick mold change option	Section 3.4.7
6	Configure the Y-axis robot (if equipped)	Section 3.4.9
7	Check the mold protection parameters	Section 3.4.10
8	Set the injection parameters	Section 3.4.11
9	Enable SoftStart	Section 3.4.12
10	Configure the temperature setpoints	Section 3.4.13
11	Configure the mold heats	Section 3.4.14
12	Set up the CoolPik DH2.2 unit	Section 3.4.15

3.4.1 Loading the Documentation and Mold ID Configuration File

Each mold is shipped with a specific documentation set and mold ID configuration file. Both the documentation and the mold ID configuration file must be loaded onto the Human Machine Interface (HMI) before the mold is installed.

For information about loading these files, refer to [Section 4.13](#).



IMPORTANT!

The documentation must be loaded each time the mold is installed. If a different type or generation of mold was installed previously, users could reference information that is not applicable to the mold currently installed. This could potentially result in damage to the machine and/or mold, as well as serious injury to the operator.

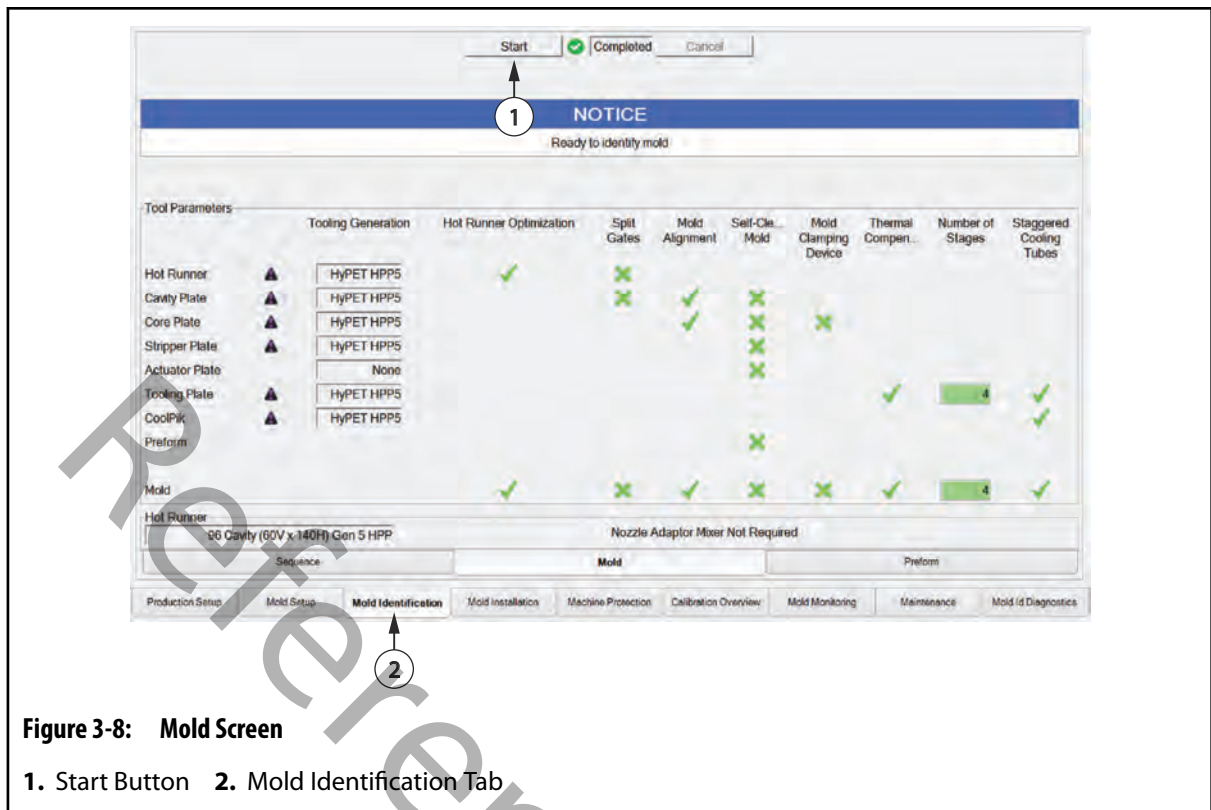
3.4.2 Identifying the Mold

Mold identification uses tags attached to the mold components to identify the parts of the molds and loads values from the mold identification file.

For HyPET5e 120 machines, the mold identification sequence requires operator input

To identify the mold, do the following:

1. On the HMI, touch the **Production** button, and then touch the **Mold Identification** tab.



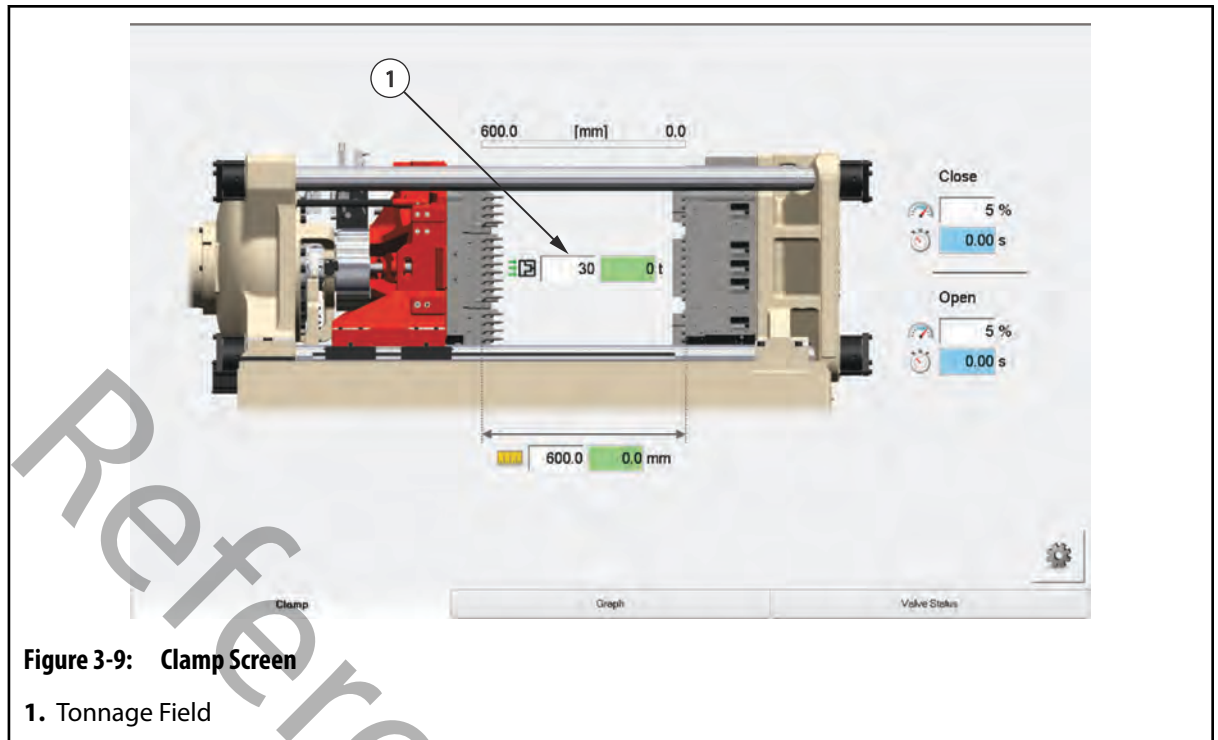
2. Touch the **Mold** tab.
3. On the **Mold** screen, touch the **Start** button to start the start the mold identification on-screen guide. Follow all instructions on the screen.

3.4.3 Setting the Clamp Tonnage

To maintain part quality and protect the mold, the clamp tonnage must be set before the mold is used in production.

To set the clamp tonnage, do the following:

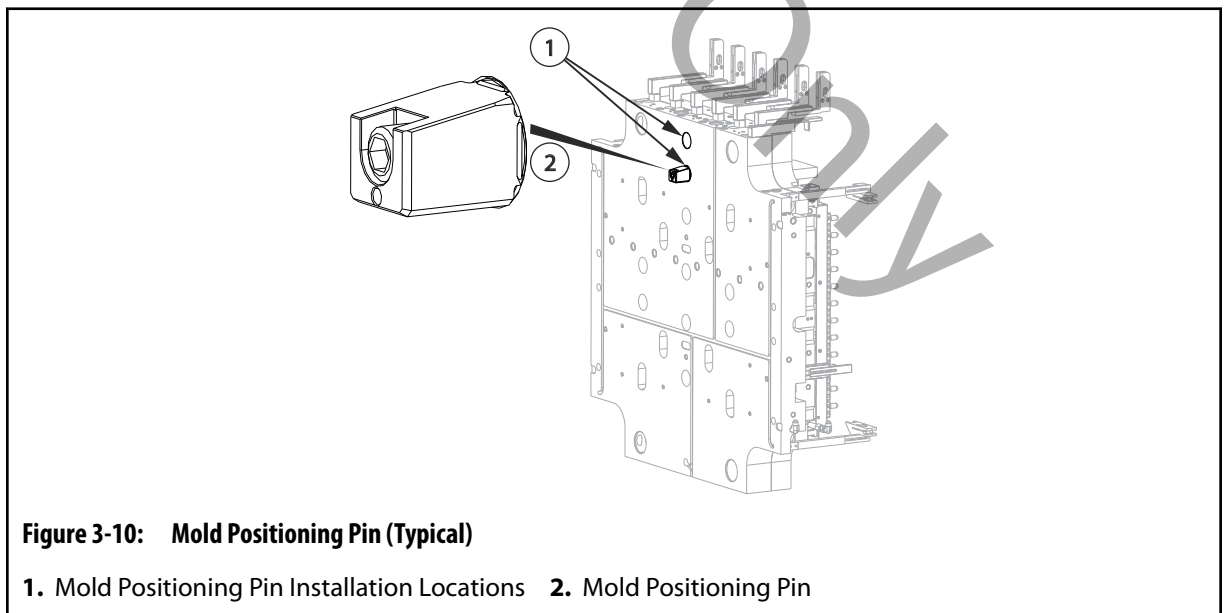
1. On the HMI, touch the **Clamp** button and touch the **Clamp** tab to display the **Clamp** screen.



2. Enter the desired tonnage in the **Tonnage** field. Refer to the *Mold Service Manual* for an initial value.

3.4.4 Installing the Mold and Hot Runner

Some molds contain a mold positioning pin that mates with the mold positioning device. The following procedure is only applicable to molds with a support pin (for example, HyPET5e and HPP5e molds).



**WARNING!**

Crushing, impact or shearing hazard – risk of serious injury. Mold functions may be powered by air and hydraulic energy. A machine may be equipped with gate-protected and non-gate protected air-powered mold functions. If an air-powered mold function is not gate-protected, the air-powered mold function can only be used to blow parts off the mold.

For all other molds refer to the applicable mold *Service Manual* for specific details. If installing a mold wider than the platens, use the ISO 1357 standard to verify safe distances.

To install a mold with a mold positioning pin, do the following:

**WARNING!**

Crushing hazard – risk of death or serious injury. Perform the lockout/tagout procedure according to local codes before working in the clamp area of the machine.

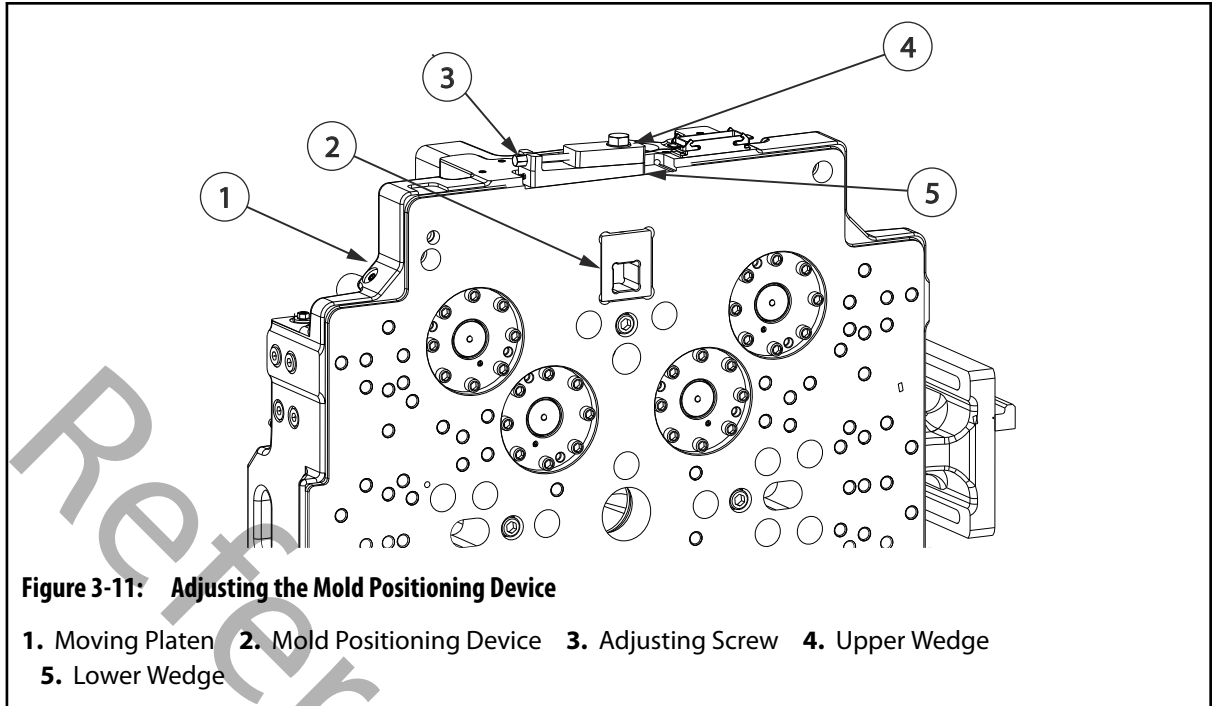
Refer to the mold *Service Manual* for complete instructions on installing the mold and hot runner.

1. If equipped, press the **Tooling Plate Down** function key to lower the Y-axis to the lowest position.
2. Open the platens to a suitable daylight position such that the mold positioning device adjusting screw is visible and accessible.
3. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.

CAUTION!

Mechanical hazard – risk of damage to equipment. The mold positioning device must be adjusted to the lowest position before installing the mold. Failure to do so could result in damage to the device and/or the mold support pin.

4. Adjust the mold positioning device to the lowest position by turning the adjusting screw counterclockwise until the device is no longer free to move downward.



5. Install the mold and hot runner in accordance with the mold *Service Manual*.



IMPORTANT!

Before starting any newly installed mold with the staggered end of arm tool option, the operator must check that the robot Y-axis setup matches the vertical pitch of the mold.

6. Check that the robot Y-axis setup matches the vertical pitch of the mold. Refer to [Section 3.4.9](#).
7. Remove all locks and tags.

3.4.5 Retracting the Tiebar for Mold Clearance (If Equipped)

This procedure describes the using tie bar pull special option.

3.4.5.1 Retracting (Pulling) the Tiebar for Mold Installation or Removal Clearance

To retract the tiebar to allow mold clearance, do the following:



WARNING!

Risk of serious injury or death - Lockout and tag all sources of power. For machine lockout and tag procedures refer to the Lockout and Tagout section of the machine documentation.



WARNING!

Risk of serious injury - Use safe means of access to part and assemblies. Do not step on machine parts that is not intended for walking and working. Failure to heed to this warning can cause serious injuries.



WARNING!

Risk of serious injury - Use lifting means to move or hold the heavy assembly items. Heavy parts may cause injury when contacting operator.

1. Lock out and tag the machine. For machine lockout and tag procedures refer to the Lockout and Tagout section of the machine documentation.
2. Loosen the tiebar locking screw on the tiebar locking plate.

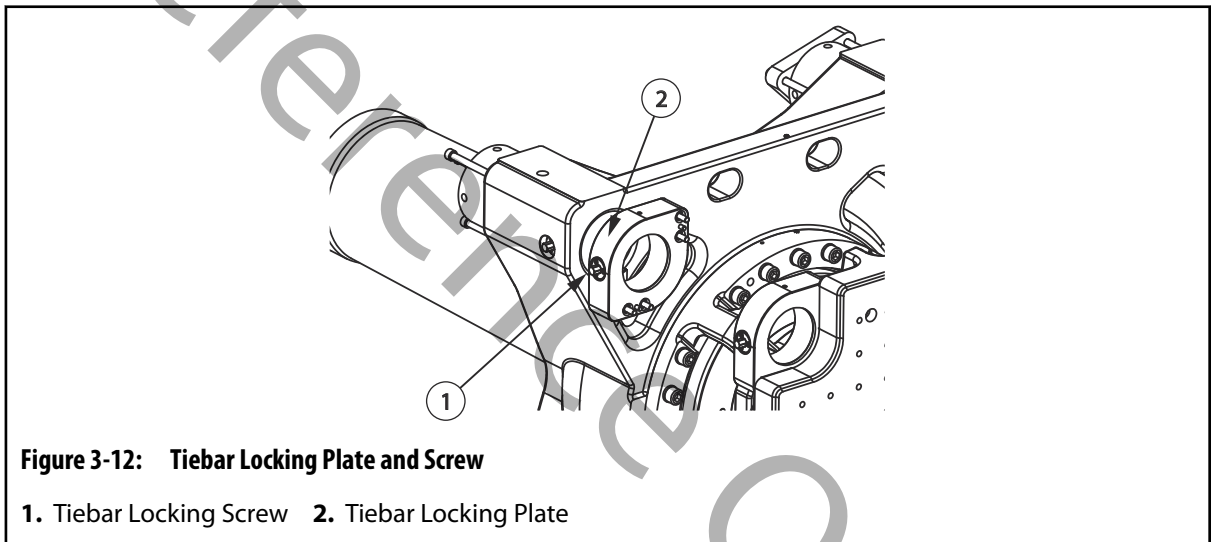
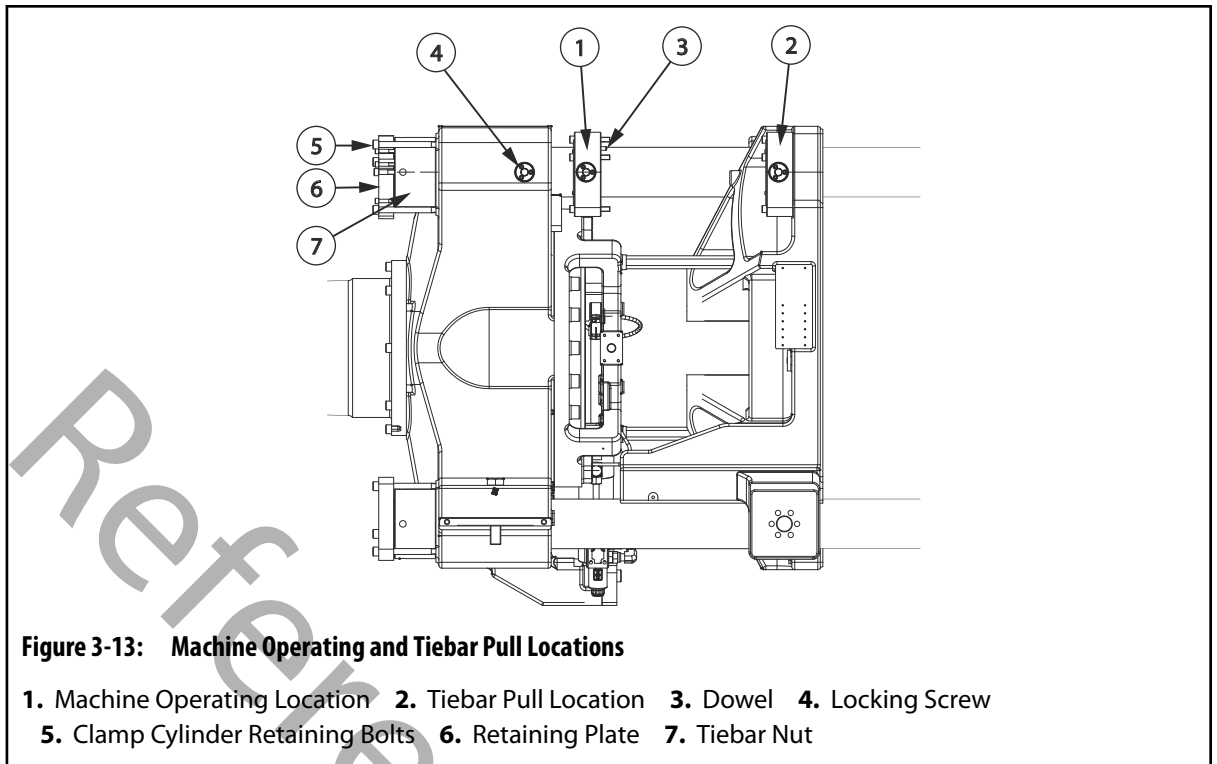


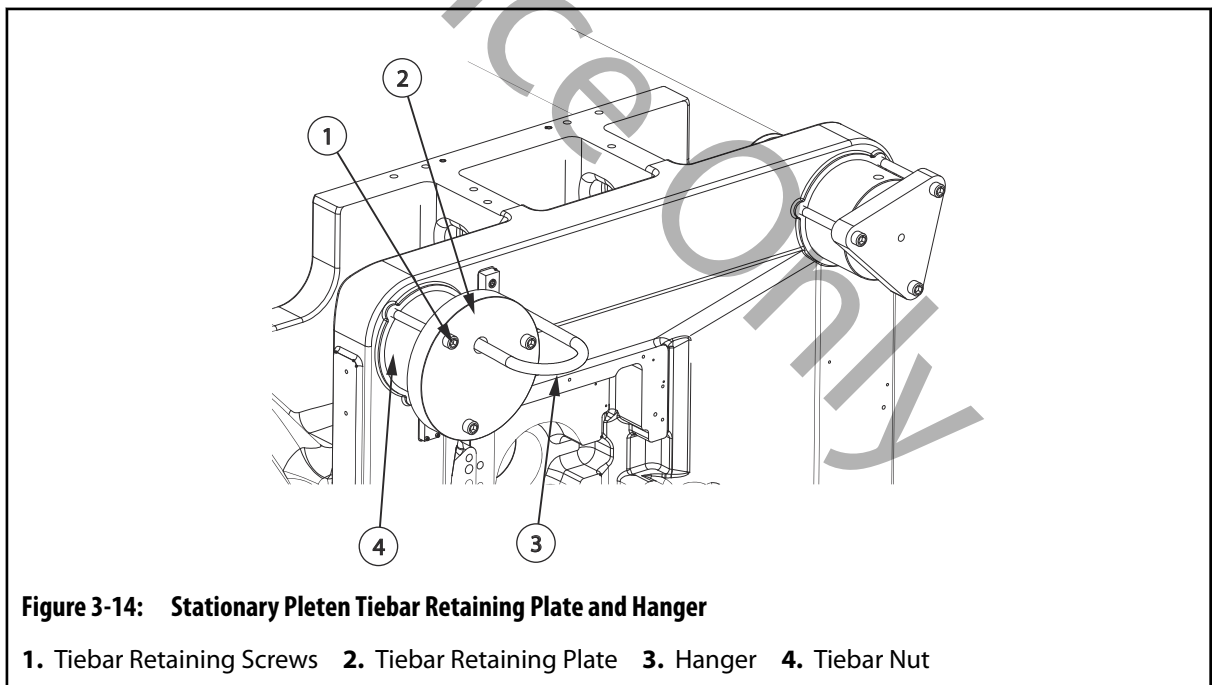
Figure 3-12: Tiebar Locking Plate and Screw

1. Tiebar Locking Screw 2. Tiebar Locking Plate

3. Slide the tiebar locking plate from the machine operating location to the tie bar pull location. Refer to [Figure 3-13](#).
4. Locate the tiebar locking plate onto the moving platen using the dowels and secure with bolts. Torque the bolts as per HS 252.



5. On the stationary platen end, remove the tiebar retaining plate bolts and slide the retaining plate onto the hanger. Using tool HPN 3355874, loosen and remove the tiebar nut at the stationary platen and slide it onto the hanger.



6. On the clamp cylinder end, remove the retaining plate bolts. Do not remove the retaining plate and the tiebar nut (#5 in [Figure 3-13](#)).

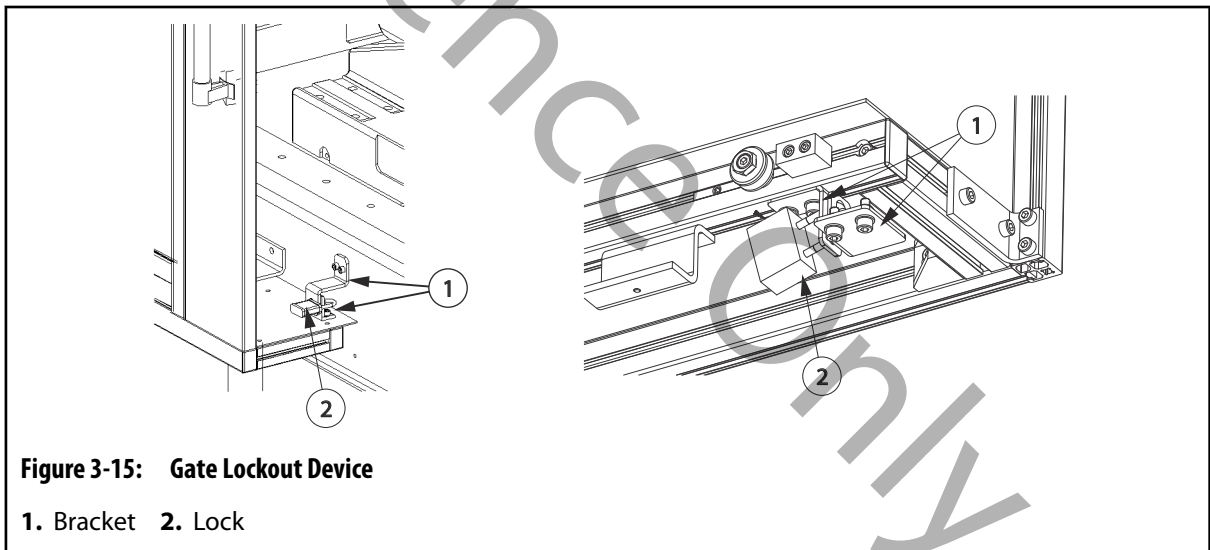
7. Make sure the locking screw (#4 in [Figure 3-13](#)) at the clamp cylinder end is loose. Torque the tiebar locking screw (#1 in [Figure 3-12](#)) on the moving platen to the torque value listed in the assembly drawing.
8. Remove locks and tags.
9. Put the machine into **Mold Set** mode and slowly move the moving platen back to pull the tie bar out.
10. Lock out and tag the machine.
11. Unlock the tiebar locking screw on the moving platen and torque the tiebar locking screw on the clamp cylinder, using torque value of 48 N·m (35 lbf·ft) .
12. Remove locks and tags.
13. Put the machine into **Mold Set** mode and move the moving platen forward, as required.
14. Repeat [step 7](#) and [step 9](#) to retract the tie bar from mold area, as required.

3.4.5.2 Removing or Installing the Mold

When the tiebar is pulled for clearance, remove or install the mold.

To remove or install the mold, do the following:

1. Lock out and tag the machine. For machine lockout and tag procedures refer to the Lockout and Tagout section of the machine documentation.
2. Lockout the front gate by applying a lock on the lockout device.



3. Remove the top rail if there is not enough clearance to remove or install the mold with the gate lock installed.
There is now sufficient clearance to either remove or install the mold.
4. Remove or install the mold, as needed. Refer to the mold manual for instructions.
5. Reinstall the top rail, if it was removed in [step 3](#).
6. Remove the gate lockout.
7. Remove locks and tags.

3.4.5.3 Installing the Tiebar after Mold Removal or Installation

To attach the tiebar after removal, do the following:



WARNING!

Risk of serious injury or death - Lockout and tag all sources of power. For machine lockout and tag procedures refer to the Lockout and Tagout section of the machine documentation.



WARNING!

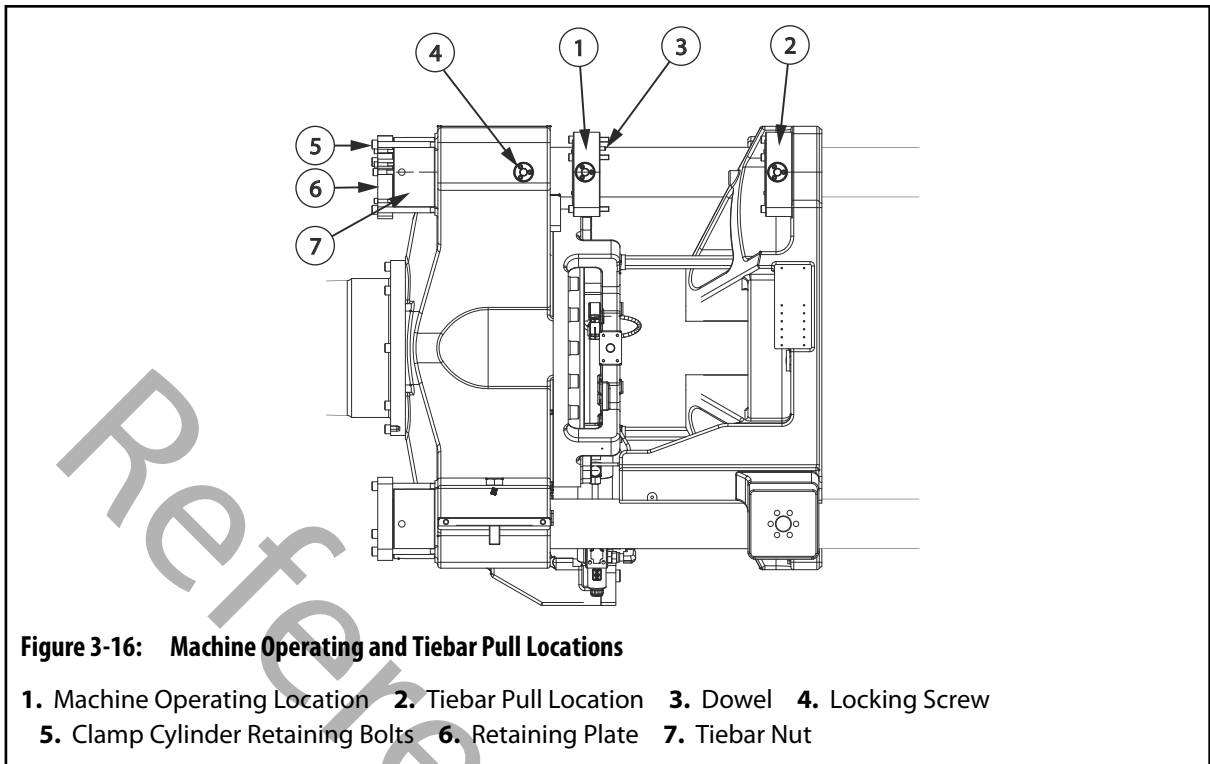
Crushing, slip, trip and fall hazard - Use safe means of access to part and assemblies. Do not step on machine parts that is not intended for walking and working. Failure to do so can cause serious injuries.



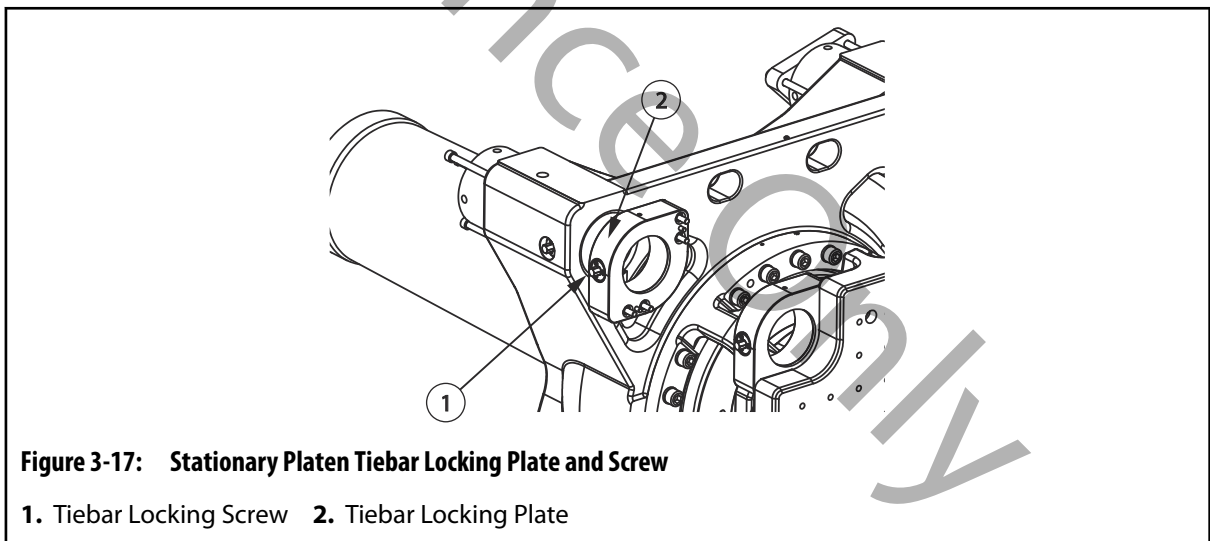
WARNING!

Crushing hazard - Use lifting means to move or hold the heavy assembly items. Heavy parts could cause injury when contacting operator.

1. Lock out and tag the machine. For machine lockout and tag procedures refer to the Lockout and Tagout section of the machine documentation.
2. Using torque value of 48 N·m (35 lbf·ft) , torque the tiebar locking screw on moving platen and unlock the tiebar locking screw on the clamp cylinder end (locking screw on clamp cylinder unscrewed).
3. Remove locks and tags.
4. Put the machine into **Mold Set** mode and move the moving platen forward so that the tie bar aligns with the bushing in the stationary platen.
5. Lock out and tag the machine.
6. Unlock the tiebar locking screw on moving platen and torque the tiebar locking screw at the clamp cylinder end using the specified torque value.
7. Remove locks and tags.
8. Put the machine into **Mold Set** mode and move the moving platen back. Repeat [step 1](#) to [step 9](#) until the tie bar is all the way into the stationary platen bore.
9. Lock out and tag the machine.
10. Install the retaining plate on the clamp cylinder end and verify that a 3 mm (0.12 in) gap exists between the nut and the plate.
11. Install and hand tighten the tie bar nut on the stationary platen end. Install the retaining plate and torque the retaining plate bolts as per HS 252.
12. Confirm that the tiebar locking screws on both the clamp and moving platen are fully retracted out. and are not in contact with the tiebar.
13. Remove the tiebar locking plate from the moving platen and slide it back to machine operating location.



- 14.** Secure the tiebar locking plate in position with the tiebar locking screw to the listed torque value.



3.4.6 Identifying a Machine Equipped with the Quick Mold Change Option

Machine with the quick mold change option (formerly the flexibility package) will have the feature in the Mold Installation screens.

3.4.7 Connecting the Cavity Plate Water Supply on a HyPET 400 and 500 Machine Equipped with the Quick Mold Change Option

If a HyPET 400 and 500 machine is equipped with the quick mold change (QMC) option, use one of the following procedures to connect the cavity plate water supply hoses between the machine and the mold.

Procedure	Reference
Connecting the Cavity Plate Water Supply on a HyPET 400 Machine Equipped with the Quick Mold Change Option	Section 3.4.7.1
Connecting the Cavity Plate Water Supply on a HyPET 500 Machine with the Quick Mold Change Option	Section 3.4.7.2

For more information about identifying a mold equipped with the quick mold change option, refer to the mold *Service Manual*.

3.4.7.1 Connecting the Cavity Plate Water Supply on a HyPET 400 Machine Equipped with the Quick Mold Change Option

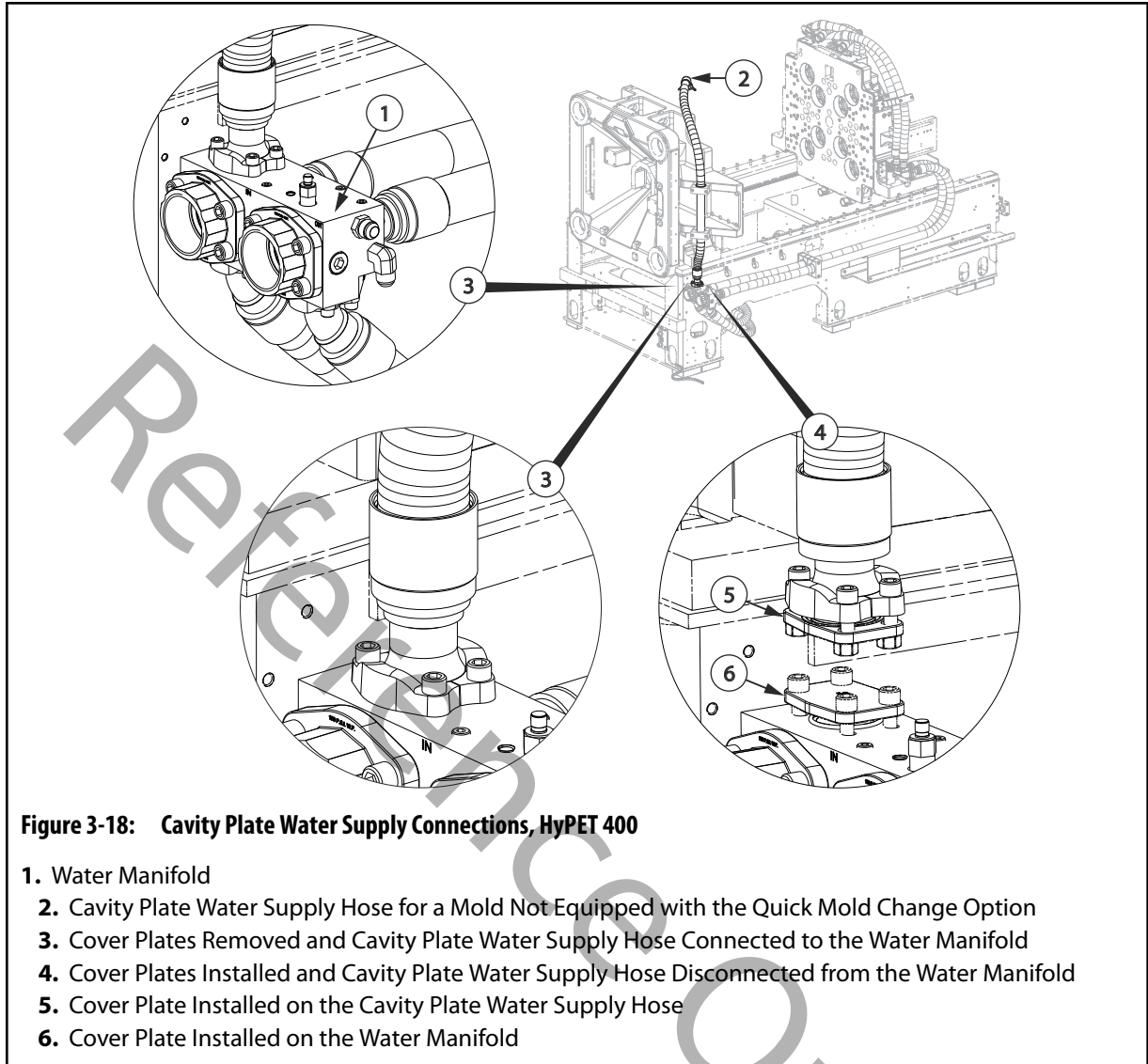
To connect the cavity plate water supply hose for a HyPET 400 machine equipped with the quick mold change option, do the following:

If the mold is not equipped with the quick mold change option:

1. Remove the cover plate from the cavity plate water supply hose.
2. Remove the cover plate from the water manifold.
3. Store the cover plates in a safe location.
4. Connect the cavity plate water supply hose to the water manifold using a set of split flanges and o-rings.

If the mold is equipped with the quick mold change option:

1. Disconnect the cavity plate water supply hose from the water manifold.
2. Install the cover plate on the cavity plate water supply hose.
3. Install the cover plate on the water manifold.



3.4.7.2 Connecting the Cavity Plate Water Supply on a HyPET 500 Machine with the Quick Mold Change Option

To connect the cavity plate water supply hose for a HyPET 500 machine equipped with the quick mold change option, do the following:

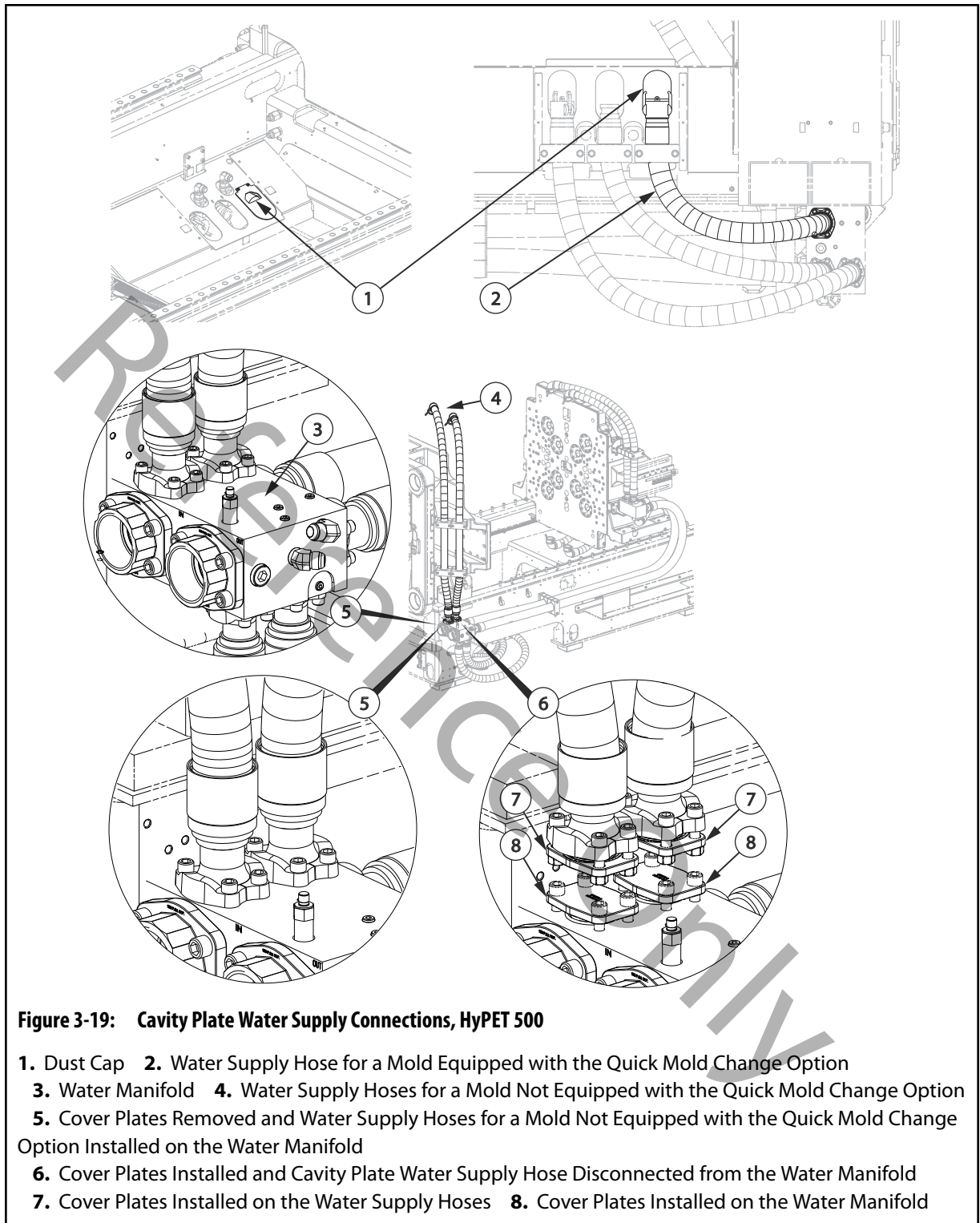
If the mold is not equipped with the flexibility package:

1. Install the dust cap on the cavity plate water supply hose for a mold equipped with the quick mold change option.
2. Remove the cover plates from the two cavity plate water supply hoses for a mold not equipped with the quick mold change option.
3. Remove the cover plates from the water manifold.
4. Store the cover plates in a safe location.
5. Connect the two cavity plate water supply hoses to the water manifold using split flanges and O-rings.

If the mold is equipped with the quick mold change option:

1. Remove the dust cap from the cavity plate water supply hose for a mold equipped with the quick mold change option.
2. Store the dust cap in a safe location.
3. Disconnect the two cavity plate water supply hoses from the water manifold.
4. Install the cover plates on the two cavity plate water supply hoses for a mold equipped with the quick mold change option.
5. Install the cover plates on the water manifold.

Reference Only



3.4.8 Configuring the Y-Axis Robot to Match the Vertical Pitch Mold Setup

Before starting any newly-installed mold with staggered end of arm tool, the operator must check that the robot Y-axis set-up matches the vertical pitch of the mold.

To configure vertical pitch, do the following:

1. Press the **Pump Motor Off** key to stop the pump motor.
2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
3. Check the existing robot set-up for mold pitch by locating the Y-axis mold vertical pitch plate through the Z-support via the vacuum pump door.

**IMPORTANT!**

The Y-axis mold vertical pitch plate is stamped '50V MOLD' on one side and '60V MOLD' on the other side. The existing pitch setup will be visible and right side up.

4. If necessary, remove the six screws securing the Y-axis mold vertical pitch plate. Rotate the plate 180 degrees to the alternate mold pitch set-up. Reinstall the screws to secure the plate.

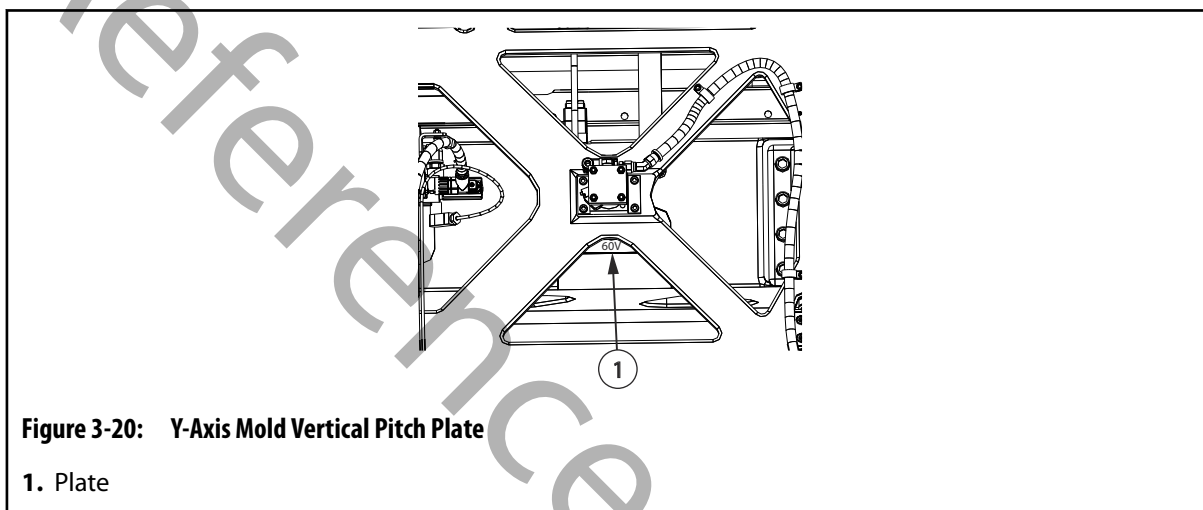
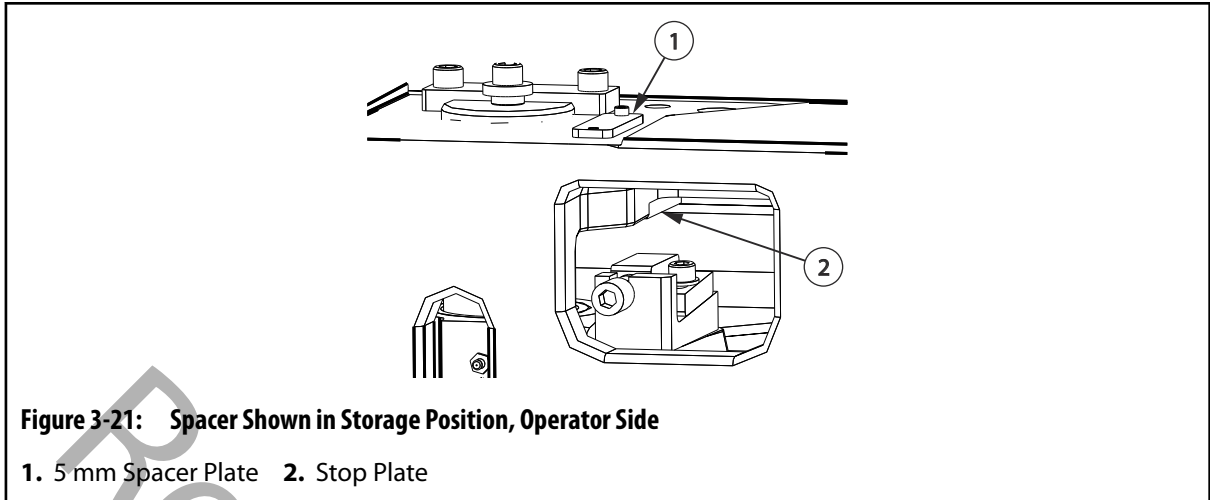


Figure 3-20: Y-Axis Mold Vertical Pitch Plate

1. Plate

5. To change from 60 mm to 50 mm vertical pitch molds:
 - a. Locate and remove the 5 mm (0.2 in) thick spacer plate on the top of the Z-support in the designated storage location.
 - b. Remove the two bolts securing the 10 mm (0.4 in) thick stop plate to the upper inside horizontal surface of the Z-support.
 - c. Insert the 5 mm spacer plate above the stop plate and reinstall the two bolts to secure both the stop plate and the spacer plate to the upper inside horizontal surface of the Z-support. This will shorten the vertical travel stroke.
 - d. Repeat [5.a](#) through [5.c](#) for both upper locations.



6. To change from 50 mm to 60 mm vertical pitch molds:
 - a. Remove the 5 mm (0.2 in) thick spacer plate between the 10 mm (0.4 in) thick stop plate and the Z-support above the upper hard stop wedge on the top of the bushing housing.
 - b. Reinstall the 10 mm (0.4 in) thick stop plate.
 - c. Repeat 6.a and 6.b for both upper locations.
 - d. Install the two 5 mm (0.2 in) thick spacer plates on the top of the Z-support in the designated storage locations.
7. Remove all locks and tags.

3.4.9 Configuring the Y-Axis Robot to Match the Vertical Pitch Mold Setup (500T Only)

Before starting any newly-installed mold with staggered end of arm tool, the operator must check that the robot Y-axis set-up matches the vertical pitch of the mold.

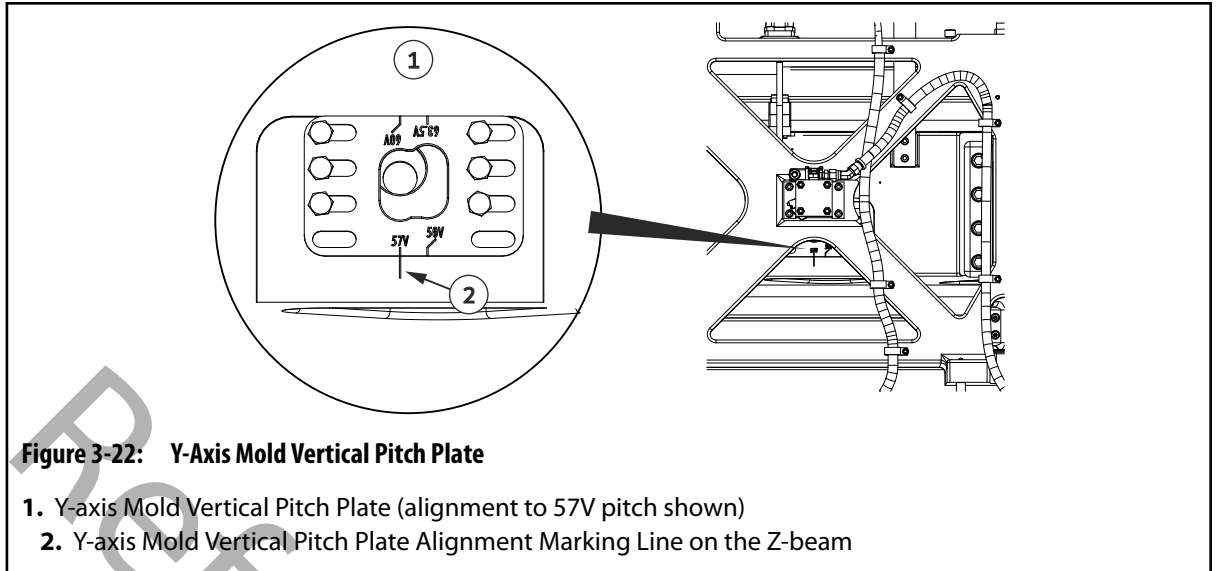
To configure vertical pitch on a 500T machine, do the following:

1. Press the **Pump Motor Off** key to stop the pump motor.
2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
3. Check the existing robot set-up for vertical mold pitch by locating the Y-axis mold vertical pitch plate through the Z-support via the vacuum pump door.

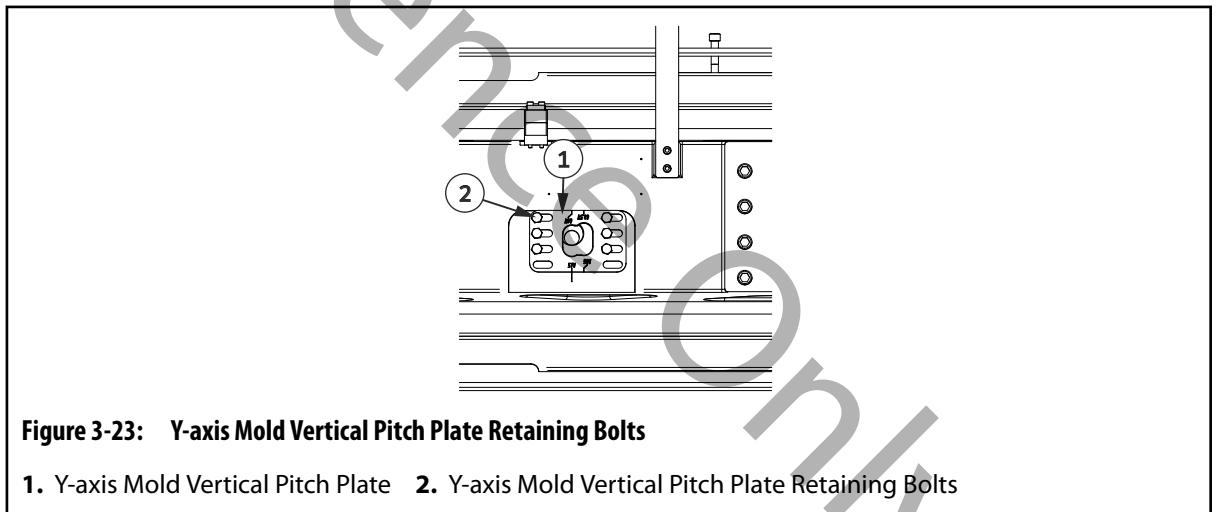


IMPORTANT!

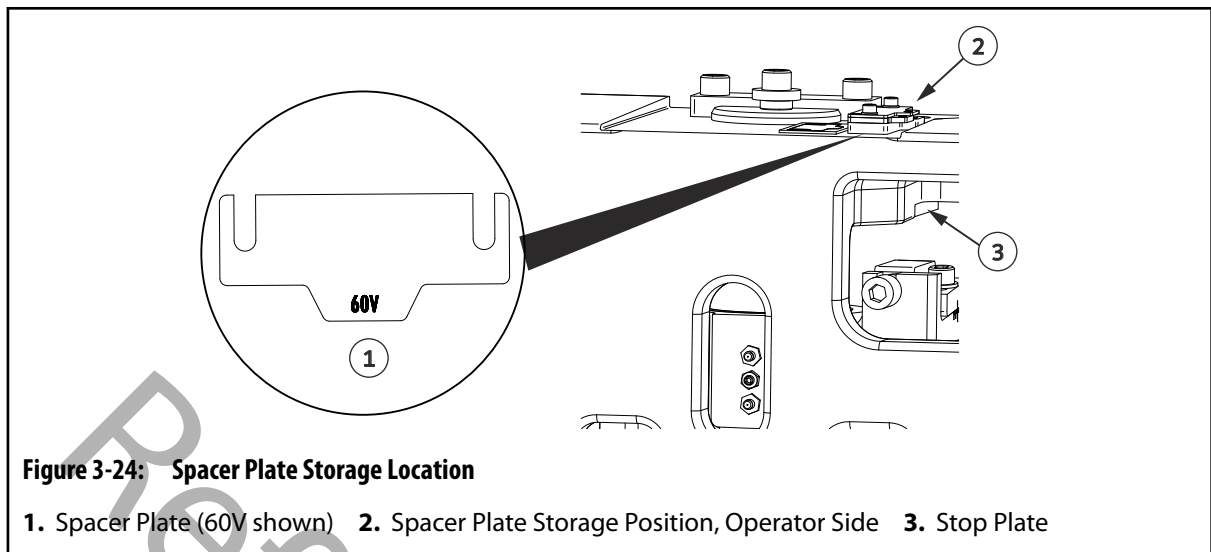
The Y-axis mold vertical pitch plate is stamped '50V, 57V' on one edge and '60V, 63.5V' on the opposite edge. The existing pitch setup is visible, right side up and aligned with the line marked on the z-beam. Refer to the following figure for more details.



4. Adjust the Y-axis mold vertical pitch plate to achieve the desired mold pitch:
 - a. If the desired vertical mold pitch number [(50V <-> 57V) or (60V <-> 63.5V)] is visible and right side up, loosen the six Y-axis mold vertical pitch plate retaining bolts enough to slide the plate so that the desired pitch number (stamped on the plate) is aligned with marking line on the z-beam. Tighten the bolts to secure the plate.



- b. If the desired vertical mold pitch number [(50V or 57V) <-> (60V or 63.5V)] is not visible or right side up, remove the six bolts securing the Y-axis mold vertical pitch plate. Rotate the plate 180 degrees to the alternate mold pitch set-up. Reinstall, but do not tighten, the screws to secure the plate. Slide the vertical pitch plate so that the desired pitch number (stamped on the plate) is aligned with marking line on the z-beam. Tighten the bolts to secure the plate.
5. To change to 50 mm, 57 mm, and 60 mm vertical pitch molds:
 - a. Locate and remove the spacer plate on the top of the Z-support in the designated storage location.

**NOTE:**

The following table lists the specific spacer plate thickness for each applicable mold vertical pitch configuration. However, the spacers are stamped with the appropriate mold pitch numbers 50V, 57V, and 60V. The 63.5V mold does not require the use of spacers.

Table 3-1: Spacer Plate Thickness

Mold Vertical Pitch	Spacer Plate Thickness
50V	6.75 mm (0.266 in)
57V	3.25 mm (0.128 in)
60V	1.75 mm (0.069 in)

- b. Loosen the two bolts securing the 8.25 mm (0.325 in) thick stop plate to the upper inside horizontal surface of the Z-support. Remove any currently installed spacers, if applicable.
 - c. Insert the spacer plate above the stop plate and tighten the two bolts (loosened in the previous step) to secure both the stop plate and the spacer plate to the upper inside horizontal surface of the Z-support. This will appropriately shorten the vertical travel stroke.
 - d. Repeat [step 5a](#) through [step 5c](#) for both upper locations.
 - e. If applicable, install the two spacer plates on the top of the Z-support in the designated storage locations.
6. To change to 63.5 mm vertical pitch molds:
 - a. Remove the spacer plate between the 8.25 mm (0.325 in) thick stop plate and the Z-support above the upper hard stop wedge on the top of the bushing housing.
 - b. Reinstall the 8.25 mm (0.325 in) thick stop plate.
 - c. Repeat [step 6a](#) and [step 6b](#) for both upper locations.

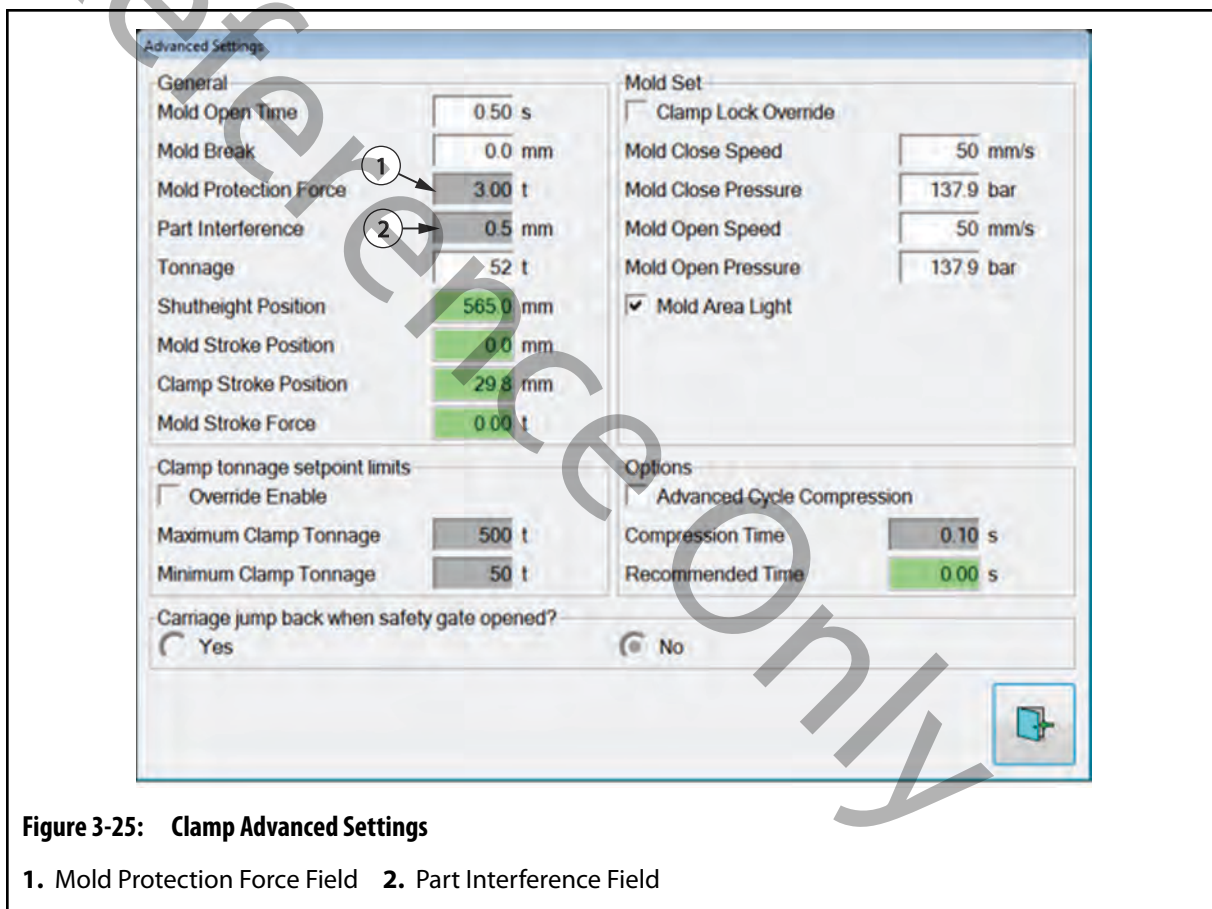
- d. Install the two spacer plates on the top of the Z-support in the designated storage locations.
7. Remove all locks and tags.

3.4.10 Checking the Mold Protection Parameters

The mold protection system protects the machine and mold from potential damage during mold stroke motion by detecting potential obstructions between the mold halves.

Mold protection values are factory set, and can be viewed in the following fields located on the **Clamp Advanced Setting** screen:

- **Mold Protection Force:** The maximum possible net mold stroke force used to close the mold during mold closing deceleration.
- **Part Interference:** The threshold used to define when the mold is closed.



If the size of an obstruction is greater than the Part Interference value, and if the mold closing force is greater than the Mold Protection Force during mold closing deceleration, mold stroke motion will stop, a part interference alarm will be generated, and machine cycling will be interrupted.

NOTE:

During mold closing or opening motion, the machine and mold are also protected by consistency checking between mold stroke force and mold position feedback sensors (acceleration/deceleration). There is no parameter available on screen to view this consistency checking.

3.4.11 Setting the Injection Parameters

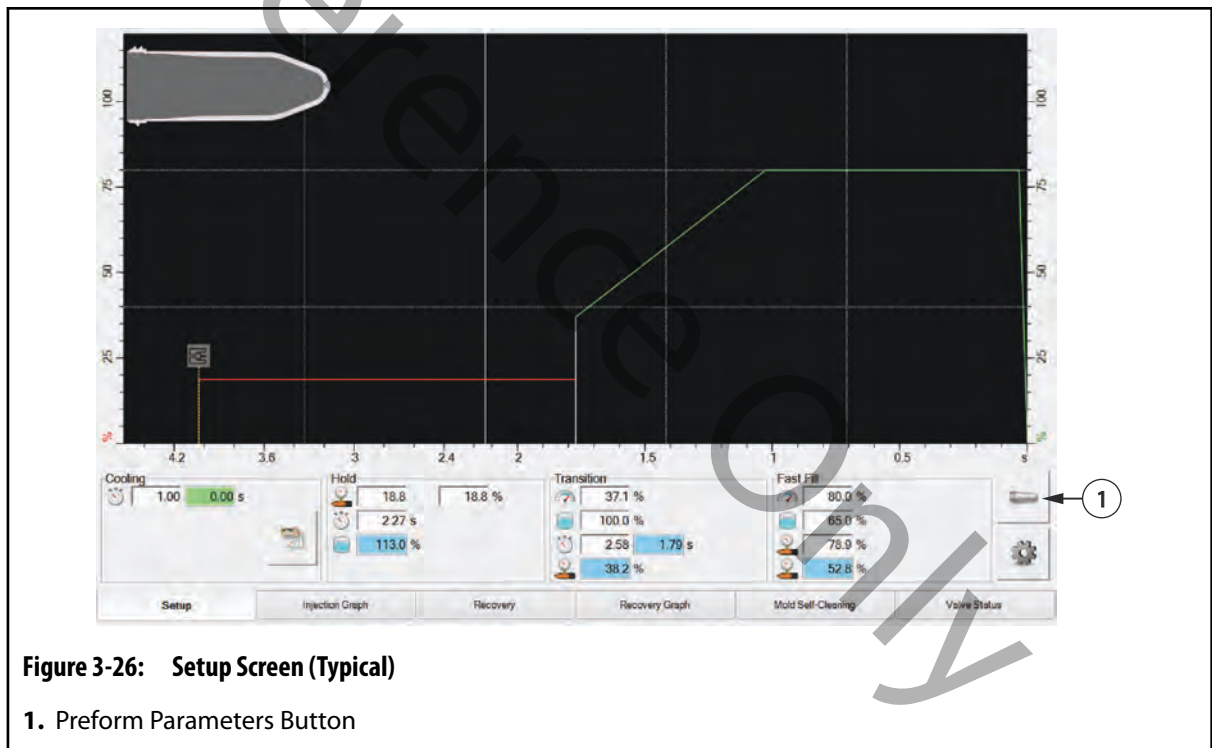
NOTE:

For injection fill, hold and recovery parameters, refer to the *Mold Setup Guide*.

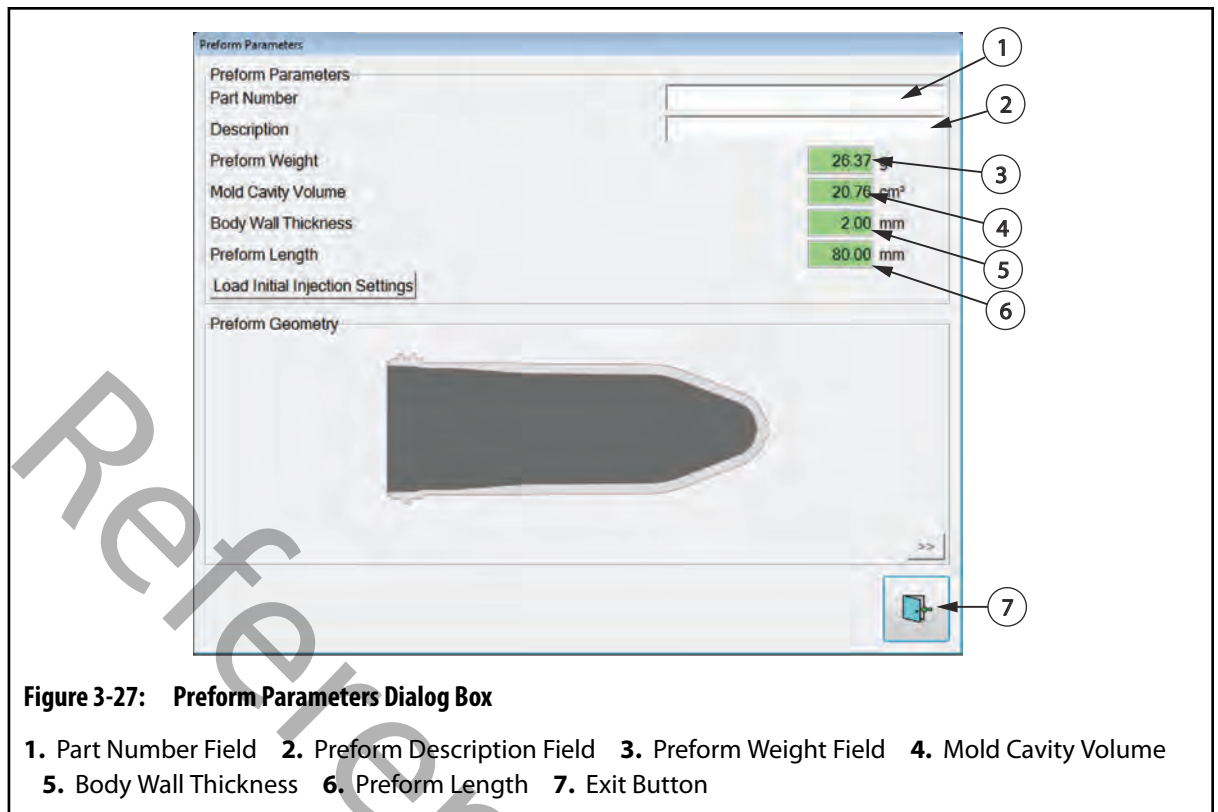
3.4.11.1 Setting the Preform Parameters

To set the preform parameters, do the following:

1. On the HMI, touch the **Injection** button and touch the **Setup** tab to display the **Setup** screen.



2. Touch the **Preform Parameters** button. The **Preform Parameters** dialog box appears as a quick reference about the preform data. Only the part number and description can be modified.



3. Touch the **Load Initial Injection Settings** button to automatically set the hold, transition and fast fill parameters. Loading initial injection settings will overwrite the current Fill and Hold profiles.

3.4.11.2 Setting the Fill and Hold Parameters

To set the fill and hold parameters for injection, do the following:

1. On the HMI, touch the **Injection** button and touch the **Setup** tab to display the **Setup** screen.

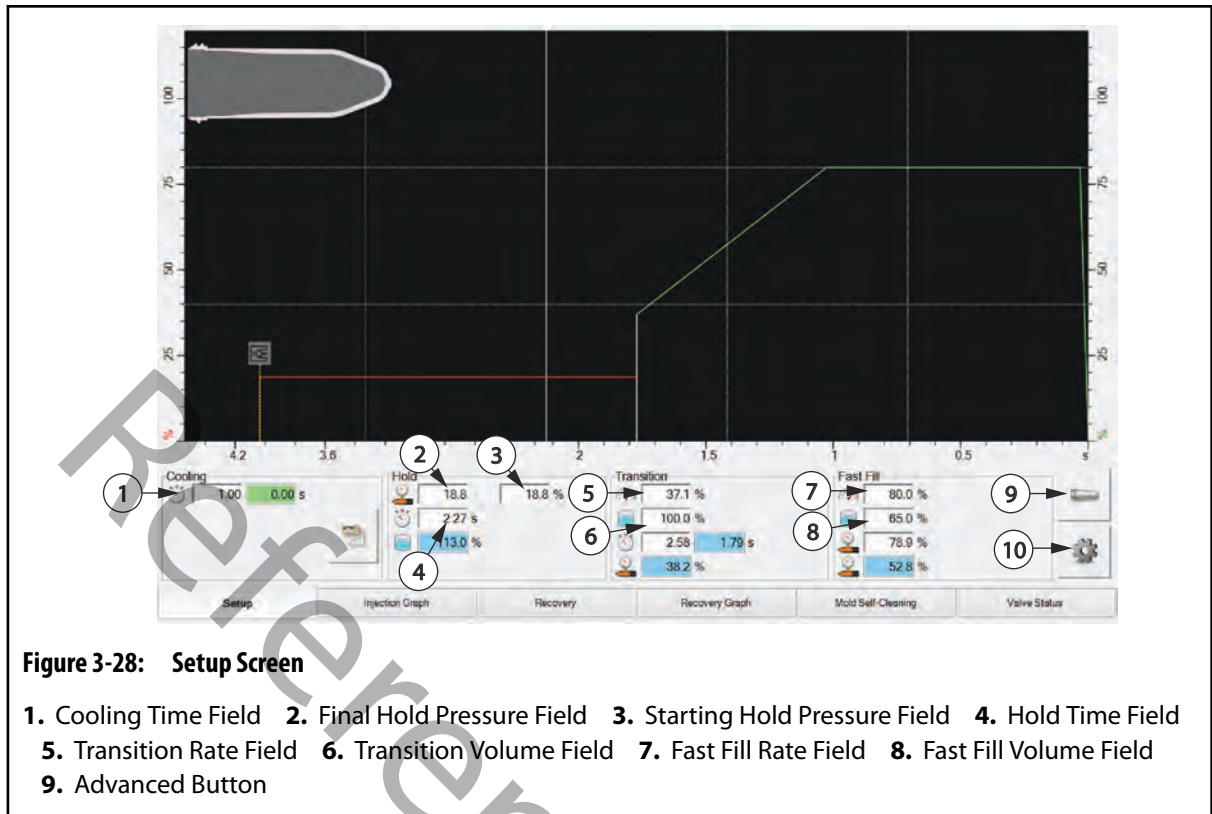


Figure 3-28: Setup Screen

1. Cooling Time Field 2. Final Hold Pressure Field 3. Starting Hold Pressure Field 4. Hold Time Field
5. Transition Rate Field 6. Transition Volume Field 7. Fast Fill Rate Field 8. Fast Fill Volume Field
9. Advanced Button

2. Verify the values in the following fields:

- **Cooling Time**
- **Final Hold Pressure**
- **Starting Hold Pressure**
- **Hold Time**
- **Transition Rate**
- **Transition Volume**
- **Fast Fill Rate**
- **Fast Fill Volume**

If any value needs to be adjusted, touch the field and type a suitable value.

3. Touch the **Advanced** button to open the **Advanced Injection Settings** screen.

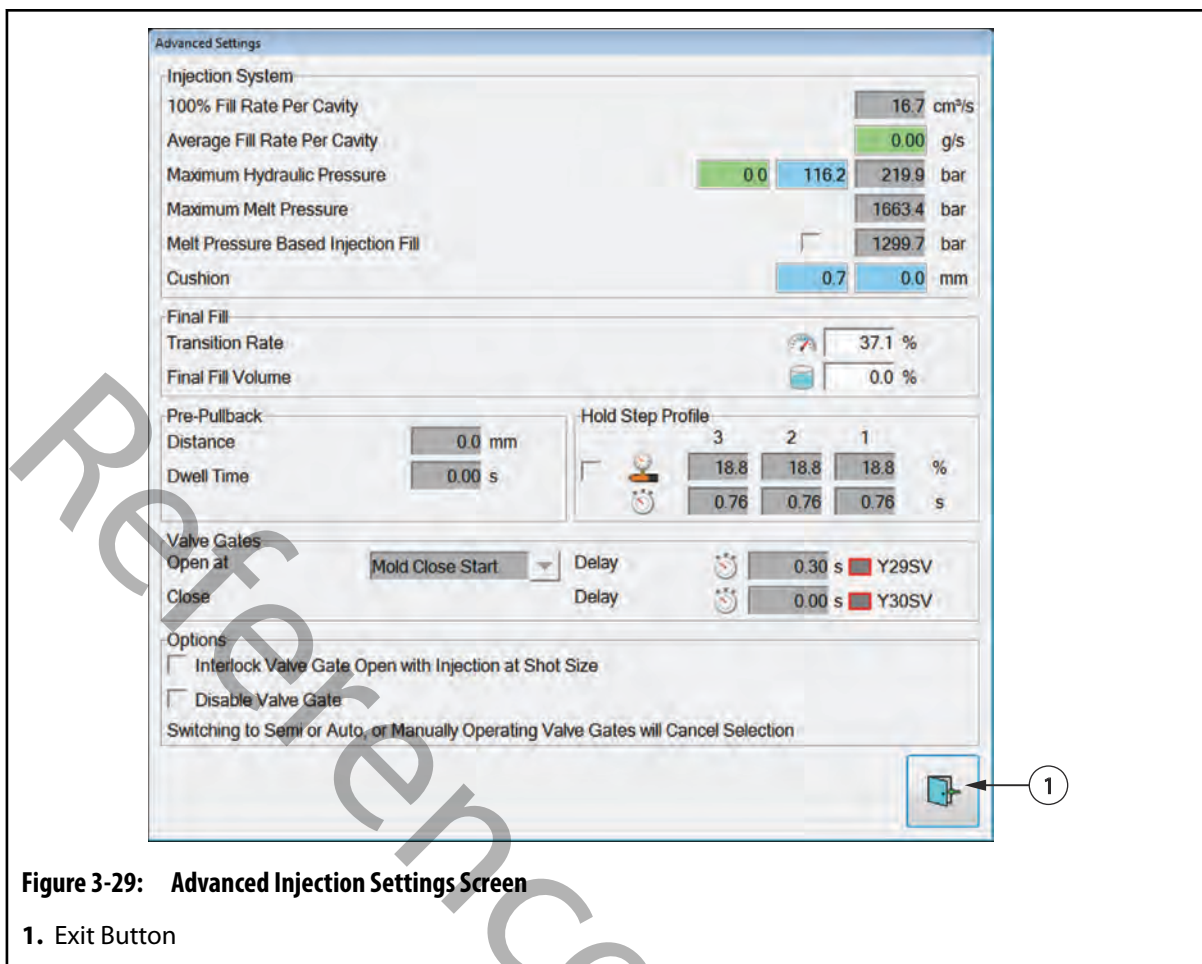


Figure 3-29: Advanced Injection Settings Screen

1. Exit Button

4. Verify the values. If any value needs to be adjusted, touch the field and type a suitable value.

3.4.11.3 Setting the Recovery Parameters

To set the recovery parameters, do the following:

1. On the HMI, touch the **Injection** button and touch the **Recovery** tab to display the **Recovery** screen.
2. Touch the **Plasticizing Pressure** field and type a suitable value.
3. Touch the **Advanced** button to display the **Advanced Settings** dialog box.
4. In the **Transfer** area, touch each of the following fields and type a suitable value:
 - **Cushion**
 - **Melt Transfer Rate**
 - **Melt Pressure Limit**
 - **Hydraulic Pressure Limit**
 - **Melt Packing Pressure**
 - **Packing Time**

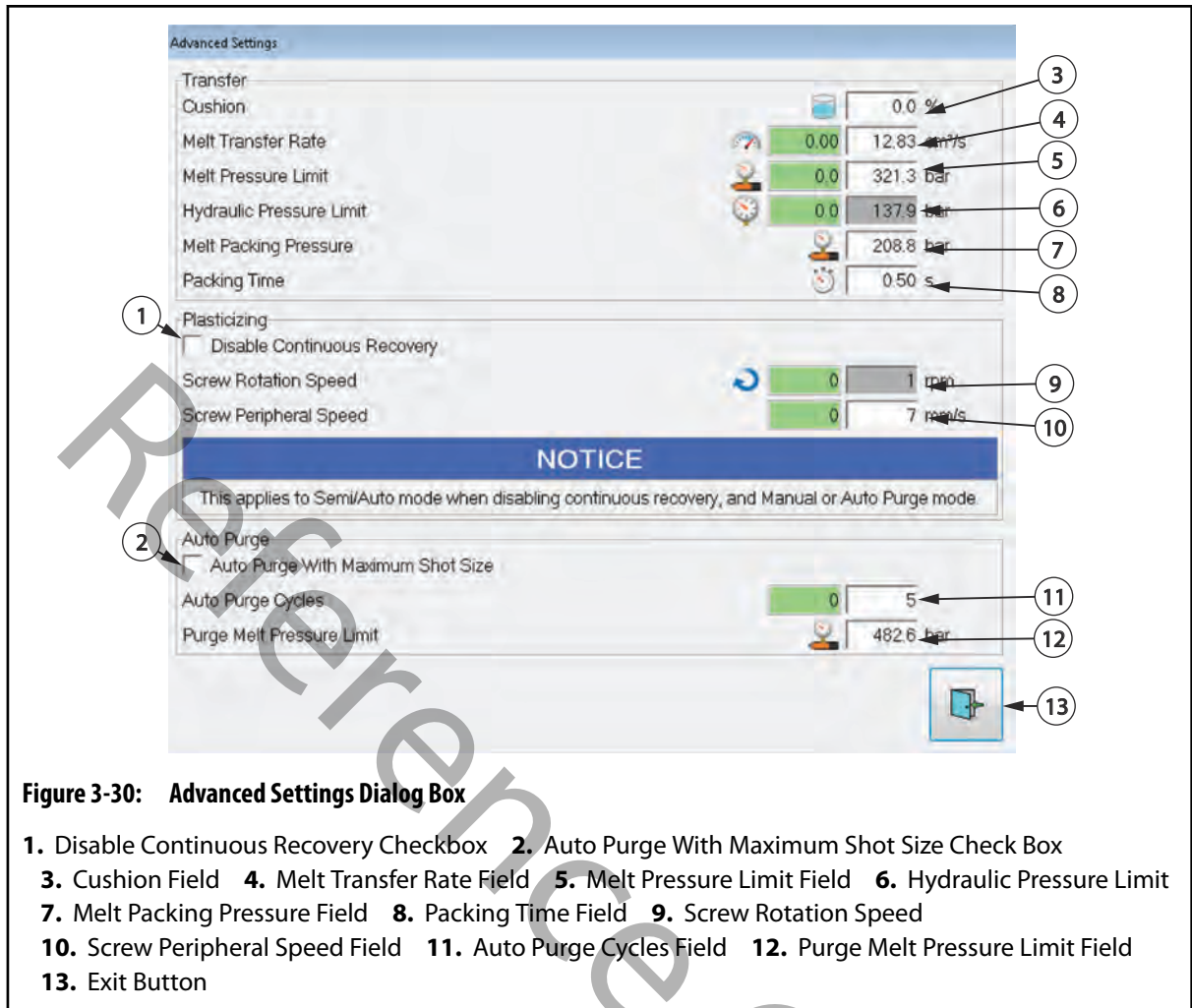


Figure 3-30: Advanced Settings Dialog Box

1. Disable Continuous Recovery Check box
2. Auto Purge With Maximum Shot Size Check Box
3. Cushion Field
4. Melt Transfer Rate Field
5. Melt Pressure Limit Field
6. Hydraulic Pressure Limit
7. Melt Packing Pressure Field
8. Packing Time Field
9. Screw Rotation Speed
10. Screw Peripheral Speed Field
11. Auto Purge Cycles Field
12. Purge Melt Pressure Limit Field
13. Exit Button

5. Touch the **Screw Peripheral Speed** field and type a suitable value.



IMPORTANT!

In some situations, cycle time or part quality variations can be reduced by selecting the **Disable Continuous Recovery** check box and increasing the screw speed.

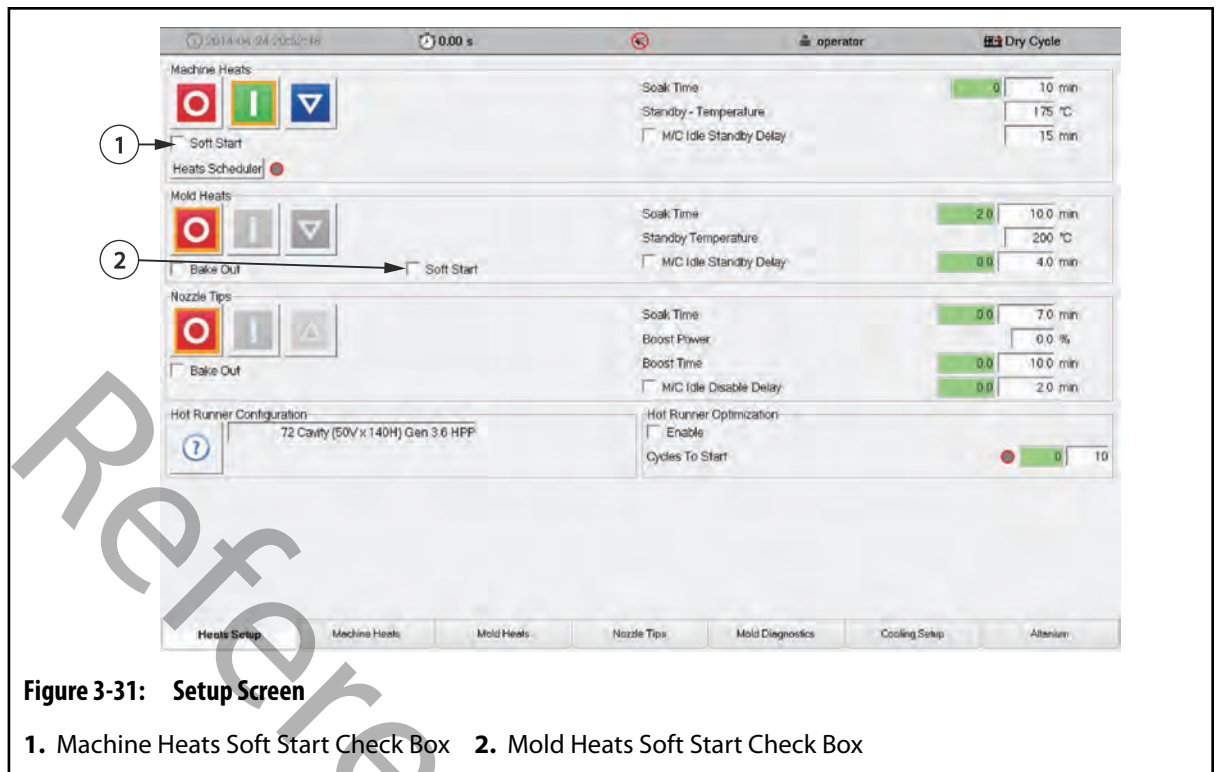
6. Make sure the **Disable Continuous Recovery** check box is not selected.
7. Touch the **Exit** button.

3.4.12 Enabling Soft Start

Soft Start increases the temperature of the heats gradually to avoid surges and extend the life of the heats. Once the heats are at the defined temperature setpoint, Soft Start is automatically disabled and normal control is restored.

To enable Soft Start for the machine or mold, do the following:

1. On the HMI, touch the **Heats** button and touch the **Setup** tab to display the **Setup** screen.



2. In the **Machine Heats** or **Mold Heats** area, select the **Soft Start** check box to enable Soft Start.

3.4.13 Configuring the Temperature Setpoints

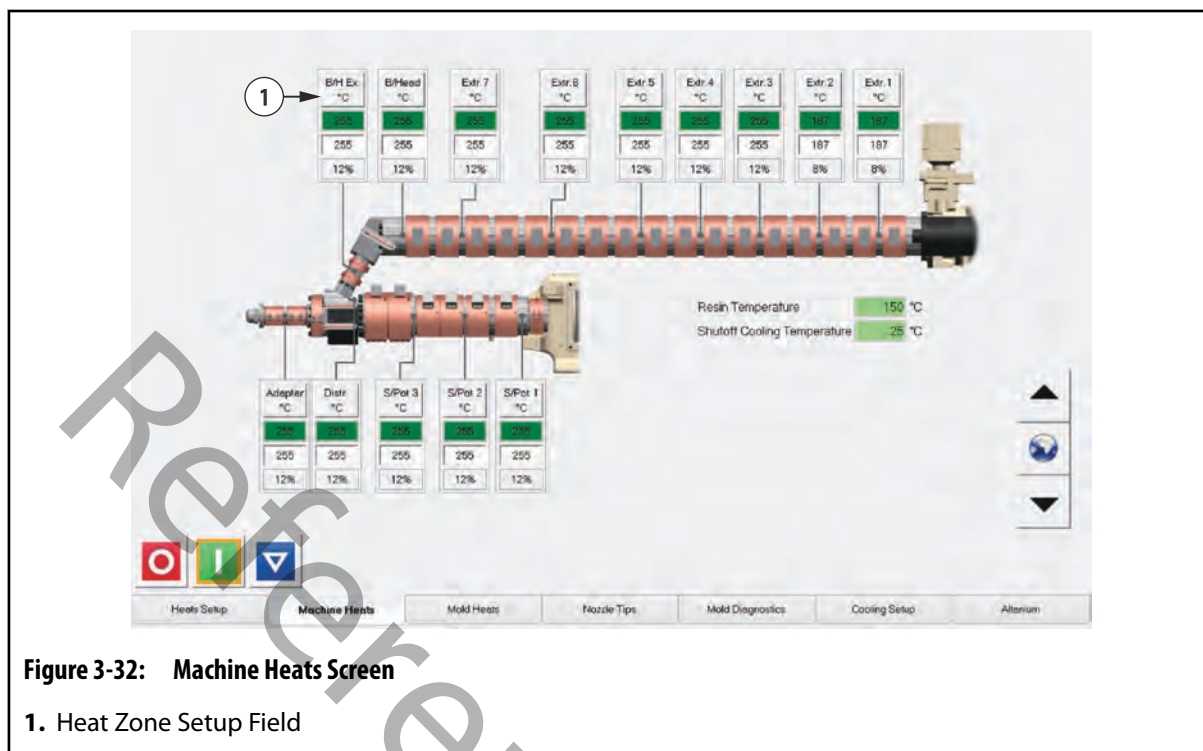
The following procedures describe how to configure the temperature setpoints for the machine, mold and nozzle tip heats. Temperature setpoints can be configured individually, or a global setpoint can be configured for all heats.

Procedure	Reference
Configuring individual temperature setpoints for machine heat zones	Section 3.4.13.1
Configuring individual temperature setpoints for mold heat zones	Section 3.4.13.2
Configuring individual temperature setpoints for nozzle tip heat zones	Section 3.4.13.3
Configuring a global temperature setpoint for machine heat zones	Section 3.4.13.4
Configuring a global temperature setpoint for mold heat zones	Section 3.4.13.5
Configuring a global temperature setpoint for nozzle tip heat zones	Section 3.4.13.6

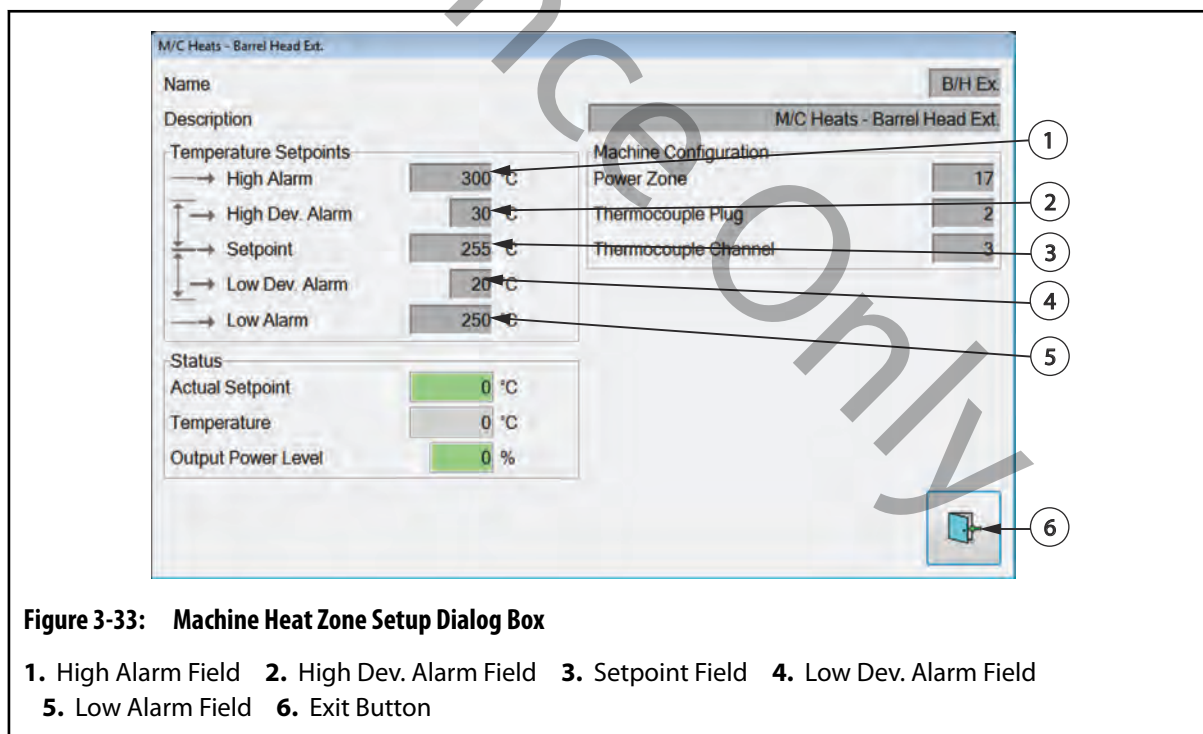
3.4.13.1 Configuring Individual Temperature Setpoints for Machine Heat Zones

To configure individual temperatures for each machine heat zone, do the following:

1. On the HMI, touch the **Heats** button then touch the **Machine Heats** tab.



2. Touch the **Heat Zone Setup** field of the zone to be configured. A dialog box opens.



To configure the heat zone, touch each of the following fields and type a suitable value:

- **High Alarm**
- **High Dev. Alarm**

- **Setpoint**
 - **Low Dev. Alarm**
 - **Low Alarm**
3. Accept changes and touch the **Exit** button.
 4. Repeat [step 1](#) to [step 3](#) for all other heat zones that need to be configured.

3.4.13.2 Configuring Individual Temperature Setpoints for Mold Heat Zones

To configure individual temperatures for each mold heat zone, do the following:

1. On the HMI, touch the **Heats** button and touch the **Mold Heats** tab.

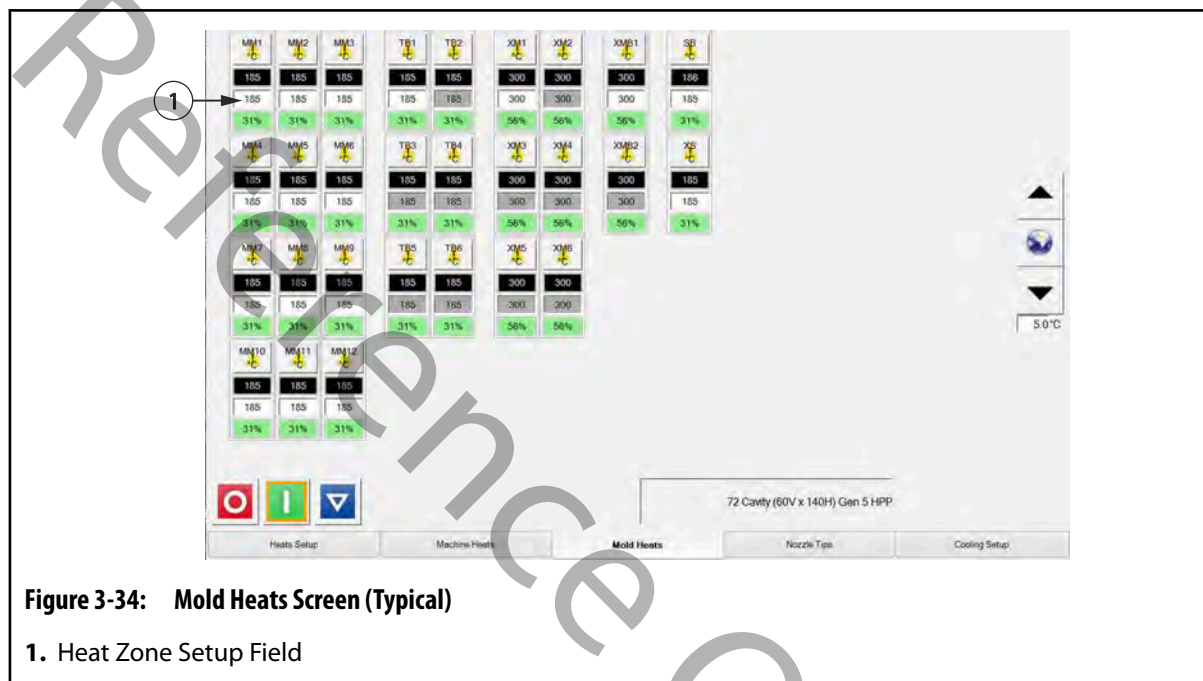


Figure 3-34: Mold Heats Screen (Typical)

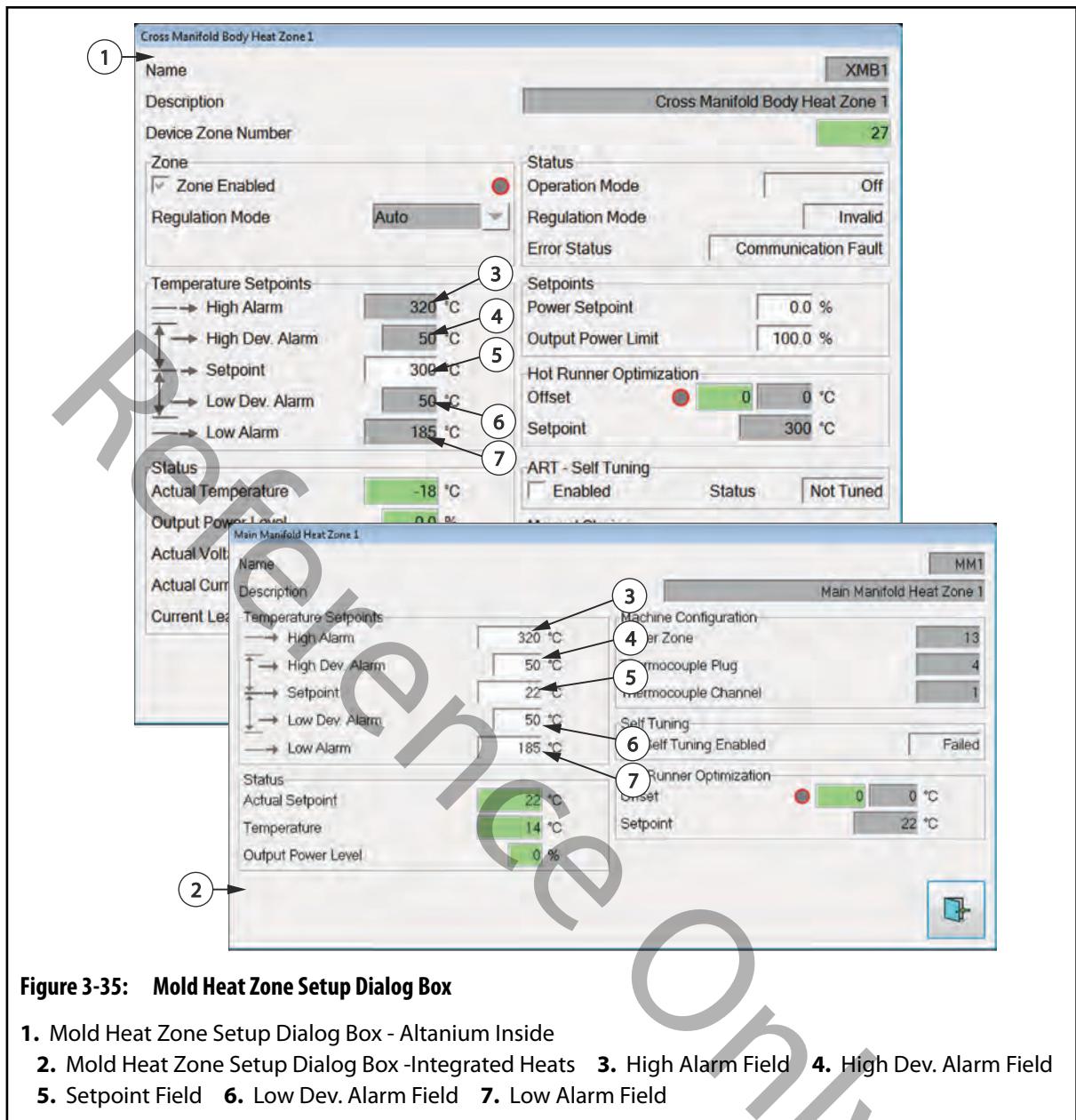
1. Heat Zone Setup Field



IMPORTANT!

For optimal temperature control in the mold, ART - self-tuning should be enabled for the mold after a heat zone has been modified.

2. Touch the **Heat Zone Setup** field of the zone to be configured. A dialog box opens.



To configure the heat zone, touch each of the following fields and type a suitable value:

- **High Alarm**
 - **High Dev. Alarm**
 - **Setpoint**
 - **Low Dev. Alarm**
 - **Low Alarm**
3. Accept changes and touch the **Exit** button
 4. Repeat [step 2](#) to [step 3](#) for all other heat zones that need to be configured.

3.4.13.3 Configuring Individual Temperature Setpoints for Nozzle Tip Heat Zones

To configure individual temperatures for each nozzle tip heat zone, do the following

1. On the HMI, touch the **Heats** button and touch the **Nozzle Tips** tab to display the **Nozzle Tips** screen.

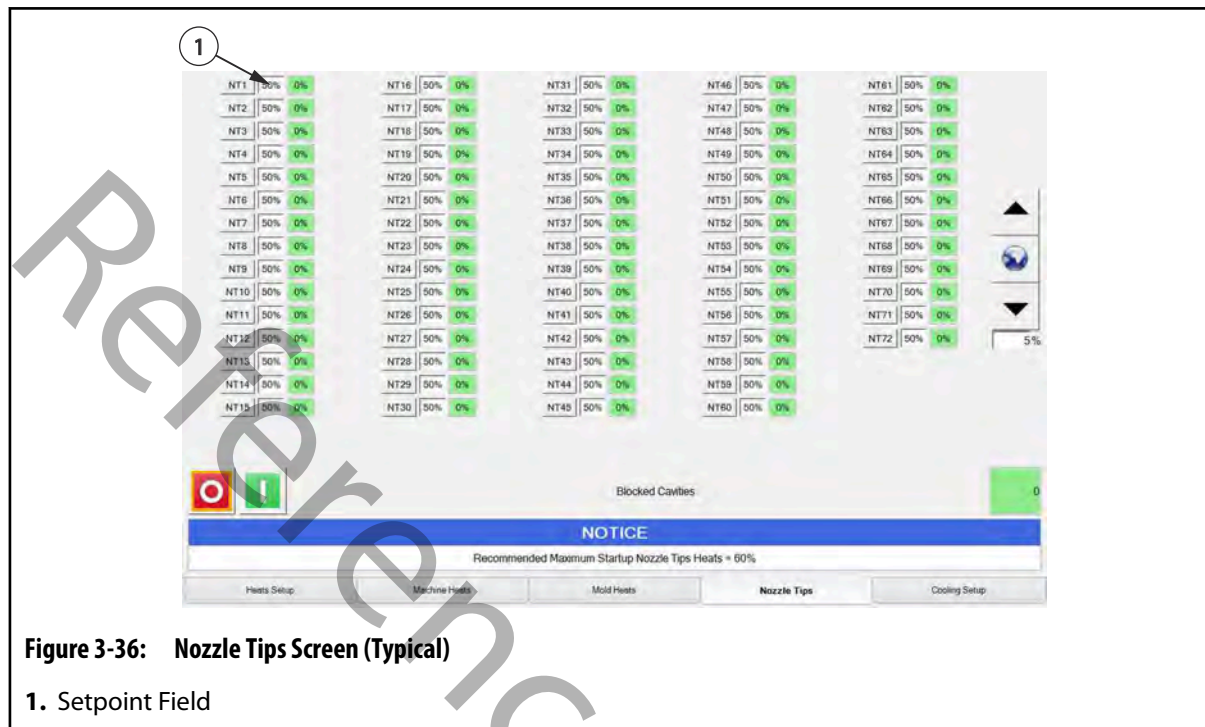


Figure 3-36: Nozzle Tips Screen (Typical)

1. Setpoint Field

CAUTION!

Mechanical hazard – risk of damage to the hot runner. The manifold temperature must not exceed 320 °C (608 °F). Exceeding this temperature could result in component failure.

2. Touch the setpoint field and type a suitable value.

3.4.13.4 Configuring a Global Temperature Setpoint for Machine Heat Zones

To configure a global temperature setpoint for the machine heat zones, do the following:

1. On the HMI, touch the **Heats** button then touch the **Machine Heats** tab.

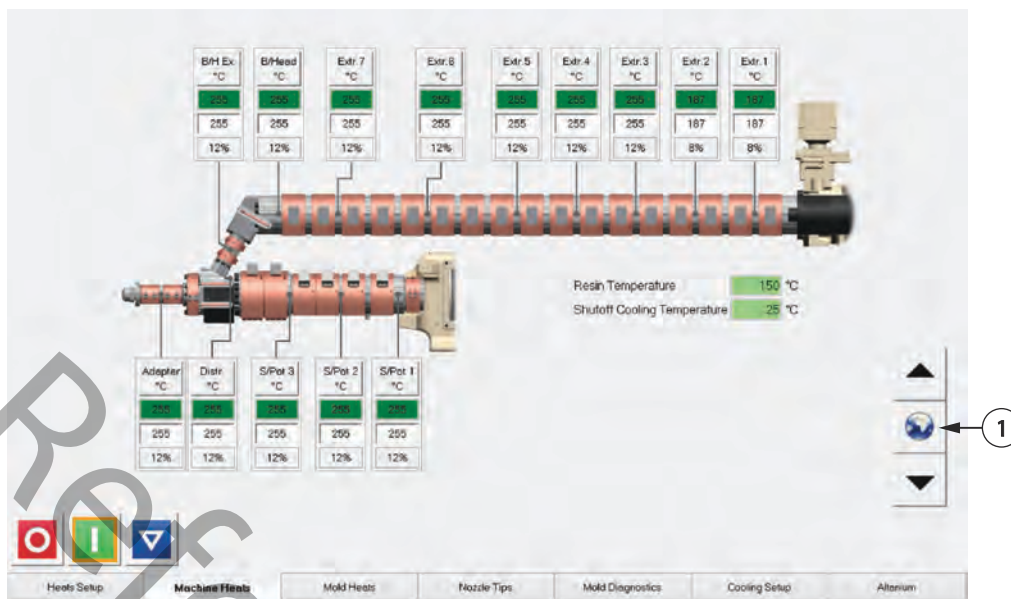


Figure 3-37: Machine Heats Screen

1. Global Change Button

2. Touch the **Global Change** button. The **Global Change** dialog box appears.

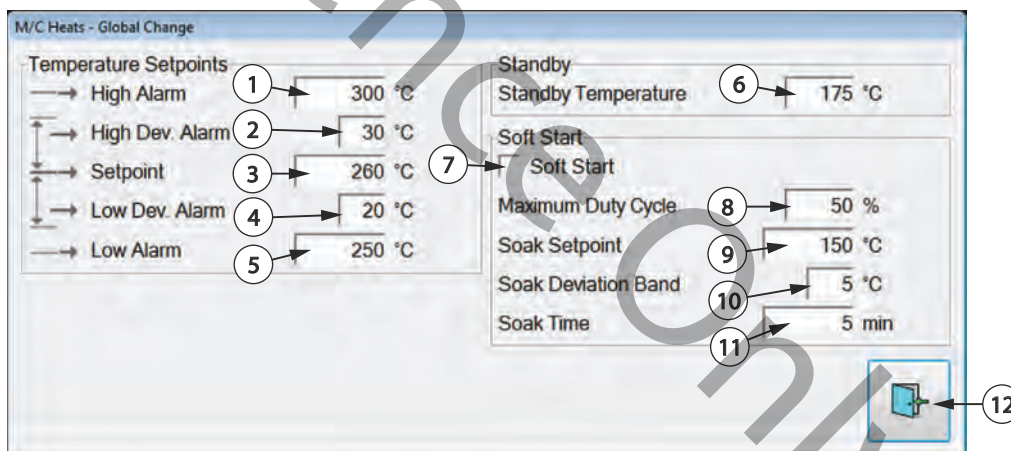


Figure 3-38: Global Change Dialog Box

1. High Alarm Field 2. High Dev. Alarm Field 3. Setpoint Field 4. Low Dev. Alarm Field
5. Low Alarm Field 6. Standby Temperature 7. Soft Start Check Box 8. Maximum Duty Cycle Field
9. Soak Setpoint Field 10. Soak Deviation Band Field 11. Soak Time Field 12. Exit Button

CAUTION!

Mechanical hazard – risk of damage to the hot runner. The manifold temperature must not exceed 320 °C (608 °F). Exceeding this temperature could result in component failure.

3. Touch each of the following fields and type a suitable value:

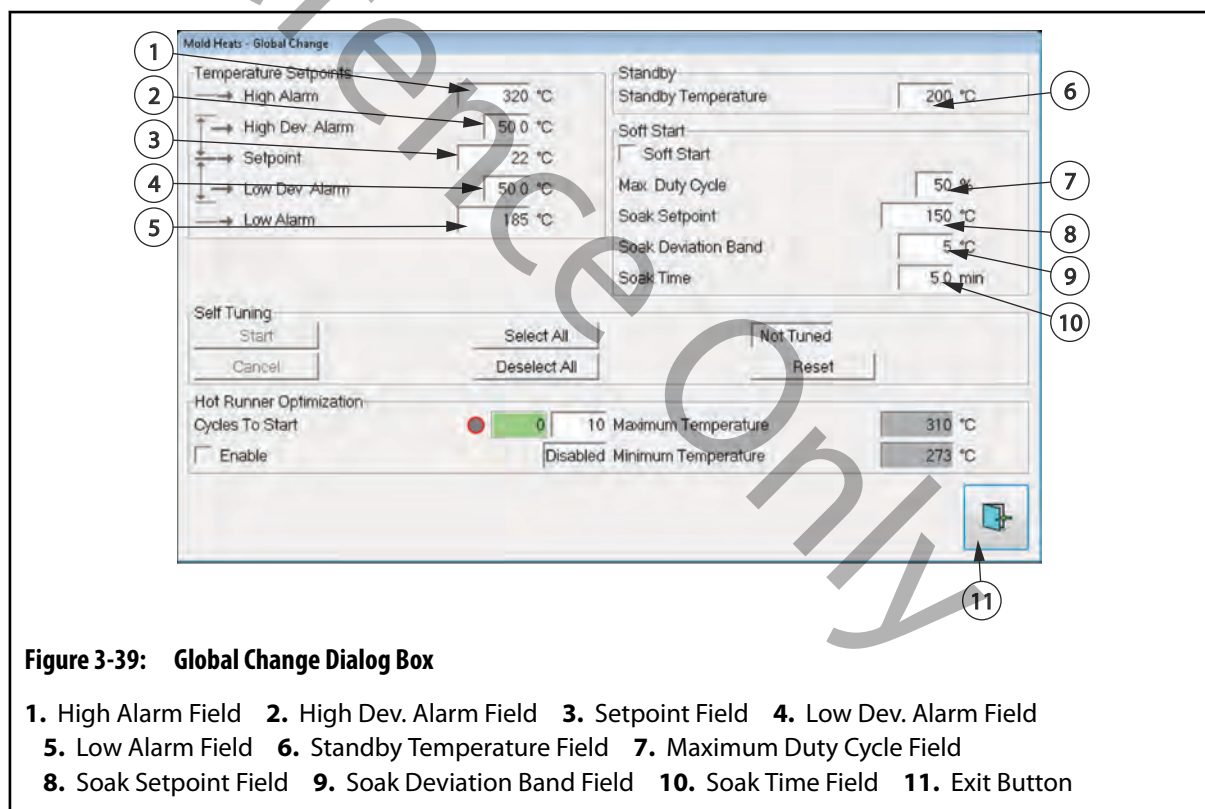
- **High Alarm**
- **High Dev. Alarm**
- **Setpoint**
- **Low Dev. Alarm**
- **Low Alarm**
- **Standby Temperature**
- **Maximum Duty Cycle**
- **Soak Setpoint**
- **Soak Deviation Band**
- **Soak Time**

4. Accept changes and touch the **Exit** button.

3.4.13.5 Configuring a Global Temperature Setpoint for Mold Heat Zones

To configure a global temperature setpoint for the mold heat zones, do the following:

1. On the HMI, press the **Heats** key and touch either the **Machine Heats** or **Mold Heats** tab to display the appropriate screen
2. Touch the **Global Change** button. The **Global Change** dialog box appears.



CAUTION!

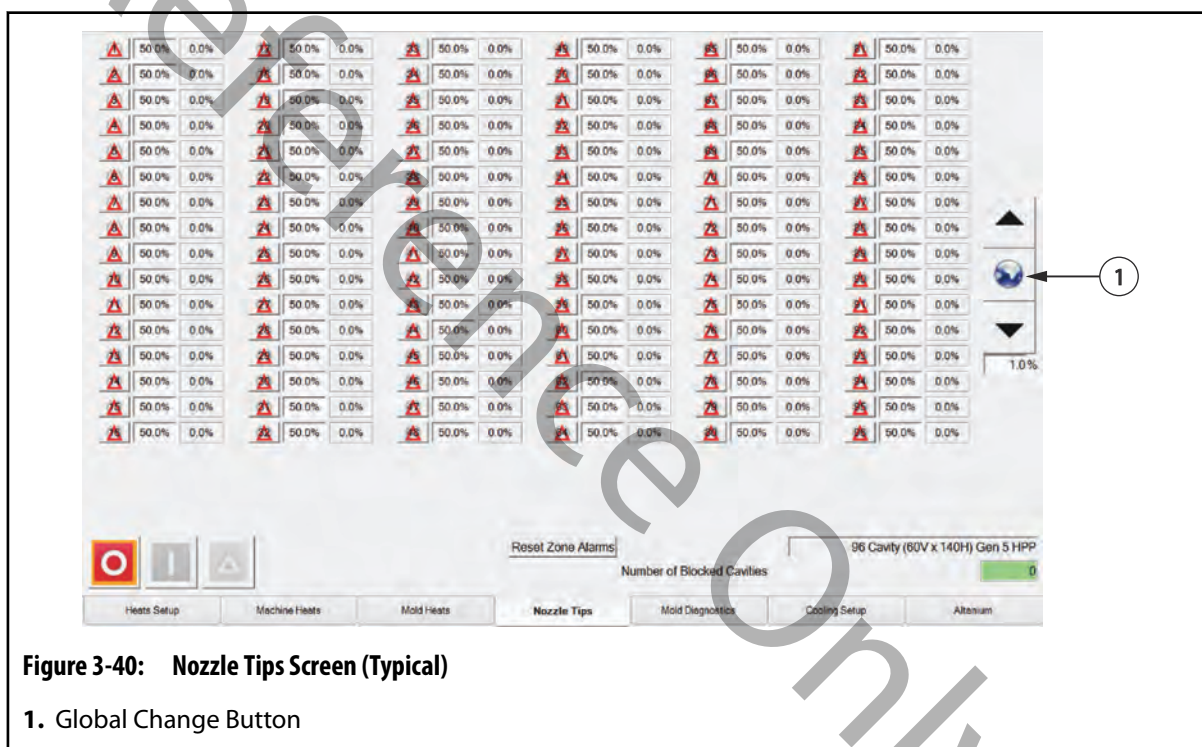
Mechanical hazard – risk of damage to the hot runner. The manifold temperature must not exceed 320 °C (608 °F) . Exceeding this temperature could result in component failure.

3. Touch each of the following fields and type a suitable value:
 - **High Alarm**
 - **High Dev. Alarm**
 - Setpoint
 - **Low Dev. Alarm**
 - **Low Alarm**
4. Touch the **Accept** button to apply the changes or touch the **Cancel** button to abort.

3.4.13.6 Configuring a Global Temperature Setpoint for Nozzle Tip Heat Zones

To configure a global temperature setpoint for the nozzle tip heat zones, do the following:

1. On the HMI, touch the **Heats** button and touch the **Nozzle Tips** tab to display the **Nozzle Tips** screen.



2. Touch the **Global Change** button. The **Global Change** dialog box appears.

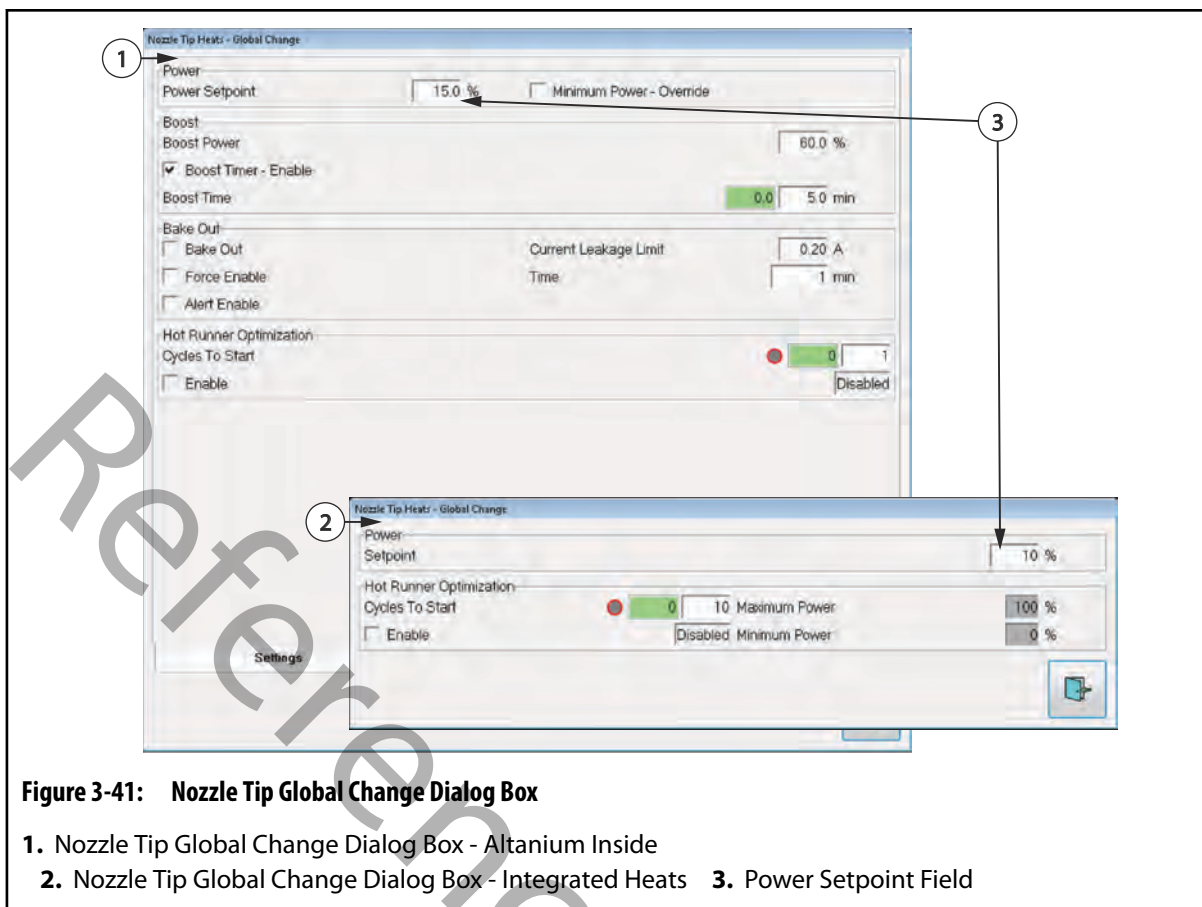


Figure 3-41: Nozzle Tip Global Change Dialog Box

1. Nozzle Tip Global Change Dialog Box - Altanium Inside
2. Nozzle Tip Global Change Dialog Box - Integrated Heats
3. Power Setpoint Field

3. Touch the **Power Setpoint** field and type a suitable value.

Mold Type	Suggested Temperature
HPP5 HPP5e HyPET5e	28 to 35%
HPP 4.0	36 to 40%
HyPET 4.0	36 to 40%
Other	60%

4. Touch the **Exit** button to apply the changes

3.4.14 Configuring the Mold Heats

At the end of the mold installation process, the temperature control for the mold heats must be optimized. This allows for greater thermal stability and faster warm up of the mold from room temperature.

To configure the mold heats for optimal performance, perform one of the following steps:

- If the mold has never been used in the machine, tune the mold heats. Refer to [Section 5.2.7](#) for more information.
- If the mold has been used in the machine previously, load the last saved mold setup file for the mold. Refer to [Section 4.20.3](#) for more information.

3.4.15 Setting Up the CoolPik DH2.2 (If Equipped)

The DH2.2 unit uses parameters configurable within the **CoolPik DH** screen.



IMPORTANT!

The following procedure covers configuring software parameters on the **CoolPik DH** screen on the HMI. There are also two hardware features on the machine to configure. Verify that the factory default settings are applied. Ensure that the DH return duct sliding gate is set to 1/2 open and the bypass valve opening is set to 1/3 open. These default settings should be changed only in exceptional circumstances.

1. On the HMI, touch the **Auxiliaries** button, and then touch the **Overview** tab to display the **Overview** screen.

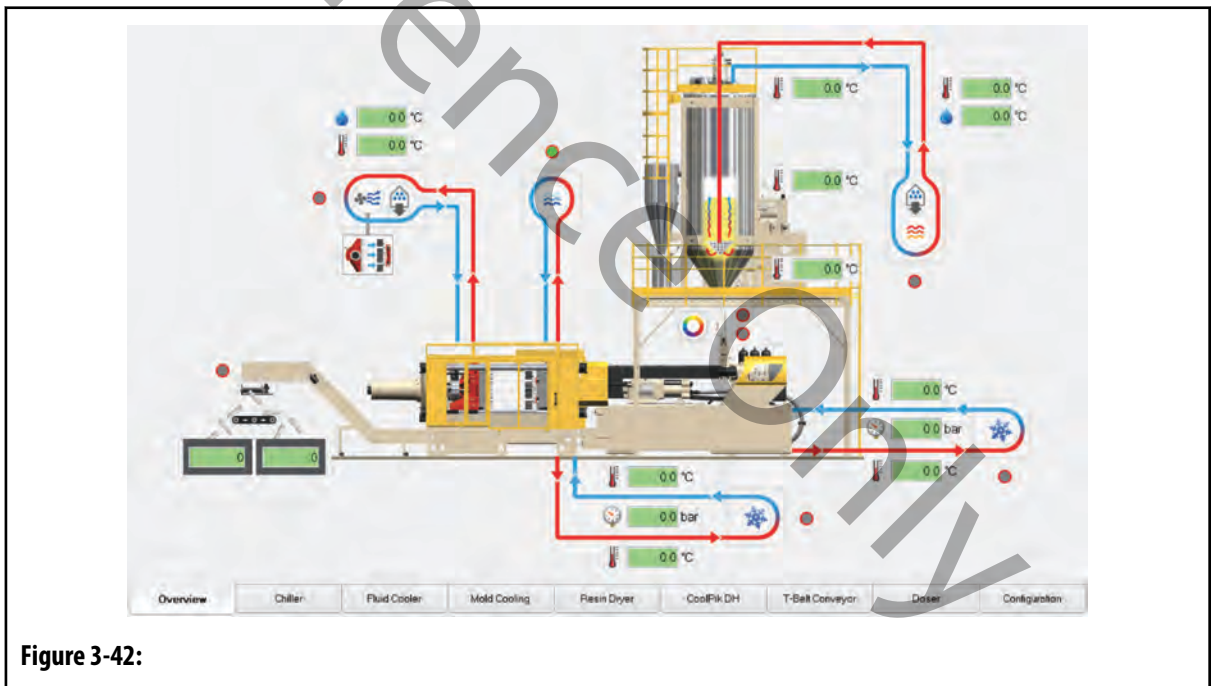


Figure 3-42:

2. Touch the **CoolPik DH** tab.

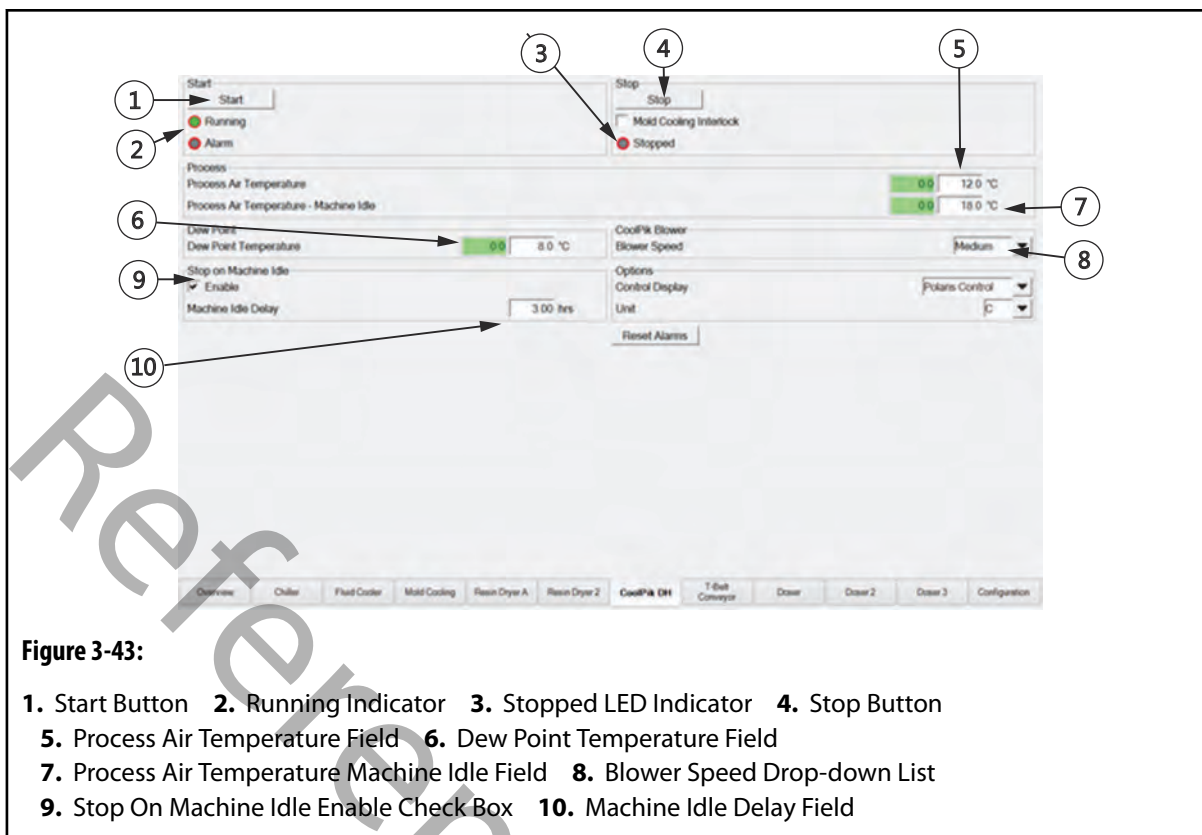


Figure 3-43:

1. Start Button 2. Running Indicator 3. Stopped LED Indicator 4. Stop Button
5. Process Air Temperature Field 6. Dew Point Temperature Field
7. Process Air Temperature Machine Idle Field 8. Blower Speed Drop-down List
9. Stop On Machine Idle Enable Check Box 10. Machine Idle Delay Field

3. In the **Dew Point** area, touch the **Dew Point Temperature** field and type a suitable value.

To avoid condensation, set the dew point temperature between 2 °C (36 °F) and 3 °C (37.5 °F) lower than the mold cooling temperature. For example, if mold cooling temperature is set at 12 °C (54 °F), the dew point temperature should be set to 9 °C (48 °F) to 10 °C (50 °F).

4. In the **Process** area:
 - a. Touch the **Process Air Temperature** field and type a suitable value. Set the temperature as close as possible to the dew point temperature setting.
 - b. Observe the **Process Air Temperature - Machine Idle** field. The default 18 °C (64.5 °F) Process Air Temperature – Machine Idle setting cannot be changed.
5. The DH unit machine idle mode is activated:
 - when machine is not in auto cycle/production mode, and
 - the **Cycle Start** button is not pressed for more than three minutes.

After additional three minutes standby time, the DH unit process air temperature automatically increases to 18 °C (64.5 °F), overriding the process air temperature set by the operator. This override is maintained as long as the **Cycle Start** button is not pressed, at which point the setting reverts to the operator setting.

6. In the **CoolPik Blower** area, touch the **Blower Speed** drop-down list and choose a suitable value.

Set the blower speed at the lowest possible setting that is capable of maintaining proper pressure while maintaining desired preform quality and cycle time. This is indicated by lack of moisture in the clamp enclosure and air flowing out of the enclosure through the enclosure gaps.

NOTE:

Available blower speed settings include Low, Medium and High. However, the High setting is only available when HPP5 molds are installed.

7. In the **Stop on Machine Idle** area:

- a.** Touch the **Enable** check box to enable the **Stop on Machine Idle** feature.

When enabled, the DH unit will stop operating after the set **Machine Idle Delay** time.

The DH unit will not stop operating, even with this feature enabled, if the **Mold Cooling Interlock** is set to ON.

- b.** Touch the **Machine Idle Delay** field and type a suitable value. The available range is 1-3 hours. The default setting is 3 hours.

3.4.16 Setting up Mold Maintenance Intervals

The mold configuration file will contain default mold maintenance intervals. Mold maintenance intervals are specified in the Mold Service Manuals. For some activities the intervals are provided as ranges. All mold maintenance activity intervals can be edited to meet needs of the Husky installed mold options and/or factory processes and conditions. Refer to [Section 5.2.1.2.1](#) for editing the mold maintenance intervals.

CAUTION!

Mechanical hazard – Failure to follow the recommended maintenance procedures, as specified in the Husky Mold and Machine Manuals or Service and Safety Bulletins may result in mold and/or machine damage and may void the warranty.

3.5 Setting Machine Protection Parameters

After the mold has been installed, machine protection parameters must be set to prevent collisions and damage to the machine, mold and product handling equipment.



DANGER!

High speed moving parts. Operator gate must remain open and all safety devices in place and functioning properly when entering the mold area. Entering the mold area during setup, service and maintenance requires shutoff and lockout of all sources of power in the mold area. Failure to do so will cause crushing injury or death.

CAUTION!

Impact hazard – risk of damage to equipment. Machine protection parameters should only be modified by trained personnel.

**IMPORTANT!**

The machine protection parameters setup can only be started when all of the following conditions are met:

- i. The mold is installed
- ii. The machine is in Mold Set mode

To set the machine protection parameters, do the following:

1. On the HMI, touch the **Production** button and touch the **Machine Protection** tab to display the **Machine Protection Parameters Setup** screen.



Figure 3-44: Machine Protection Parameters Setup Screen

1. Start Button

2. Touch the **Start** button to start the machine protection parameters on-screen guide. Follow all instructions on the screen.

3.6 Installing and Setting Up the Tooling Plate

When installing the tooling plate for the product handling equipment, perform the following procedures in order:

Step	Task Description	Reference
1	Install the tooling plate	Section 3.6.1
2	Set the tooling plate in or out positions	Section 3.6.2

Step	Task Description	Reference
3	Adjust the plenum casting position	Section 3.6.3

3.6.1 Installing the Tooling Plate

Refer to the mold *Service Manual* for complete instructions on installing the tooling plate.

3.6.2 Setting the Tooling Plate In and Out Positions

The In and Out positions must be defined for the tooling plate if it has never been used in the machine before. The In and Out positions can be defined automatically by the HMI (requires an initial setup).



IMPORTANT!

Do not set the In and Out positions if the tooling plate has been used in the machine before. Instead, recall the mold setup for the tooling plate through the HMI. Refer to [Section 4.20](#) for more information. Insert an alignment pin at the In position to verify correct setup.

To set the In and Out positions, perform the following procedures:

Procedure	Reference
Setting the In Positions	Section 3.6.2.1
Setting the Out Positions	Section 3.6.2.2

3.6.2.1 Setting the In Positions

The following procedure describes how to set the tooling plate In positions. This method requires only the In position for one stage to be set by the user. All other In positions are calculated automatically.

To set the In positions for the tooling plate, do the following:

1. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
2. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
3. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Mold Set** mode.
4. Press and hold the **Mold Open** key until the mold is open.
5. Using the **Tooling Plate In** and **Tooling Plate Out** keys, line up the alignment hole in the tooling plate with the alignment hole in the cavity plate.
6. Lock out and tag the machine.

7. Insert an alignment pin through the tooling plate into the cavity plate.
8. Remove all locks and tags.
9. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
10. Touch the **Product Handling** button and touch the **Setup** tab to display the **Setup** screen.

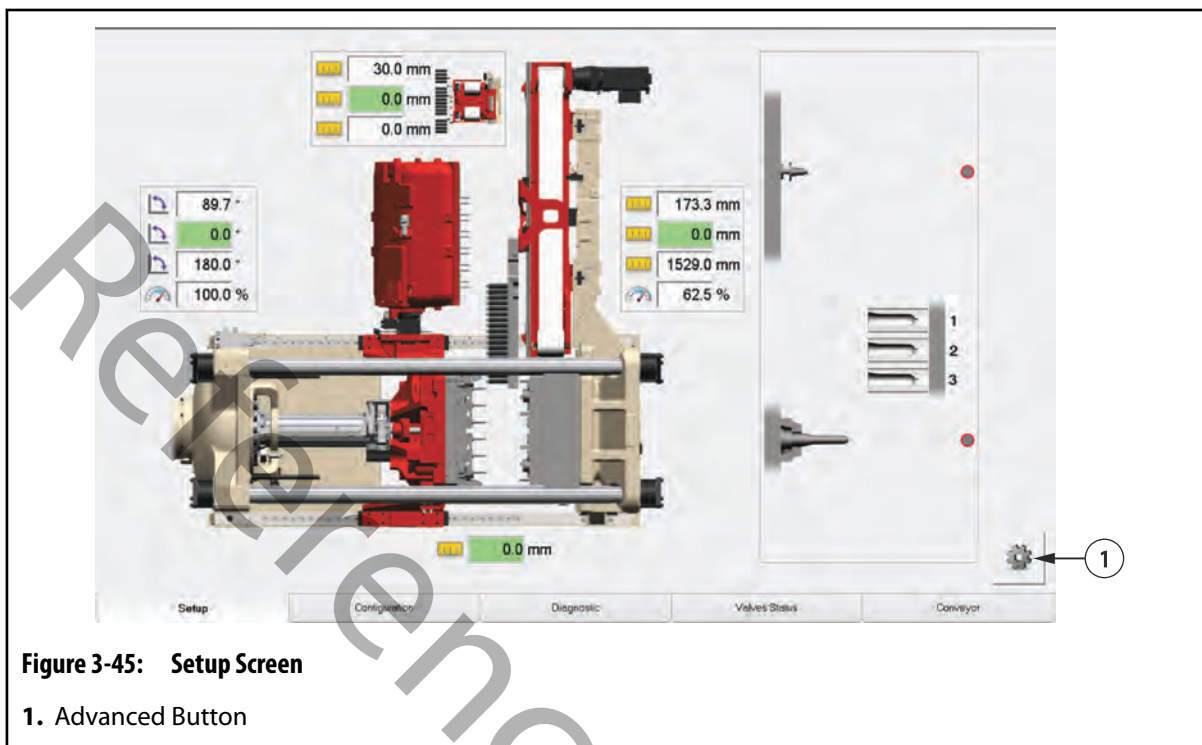
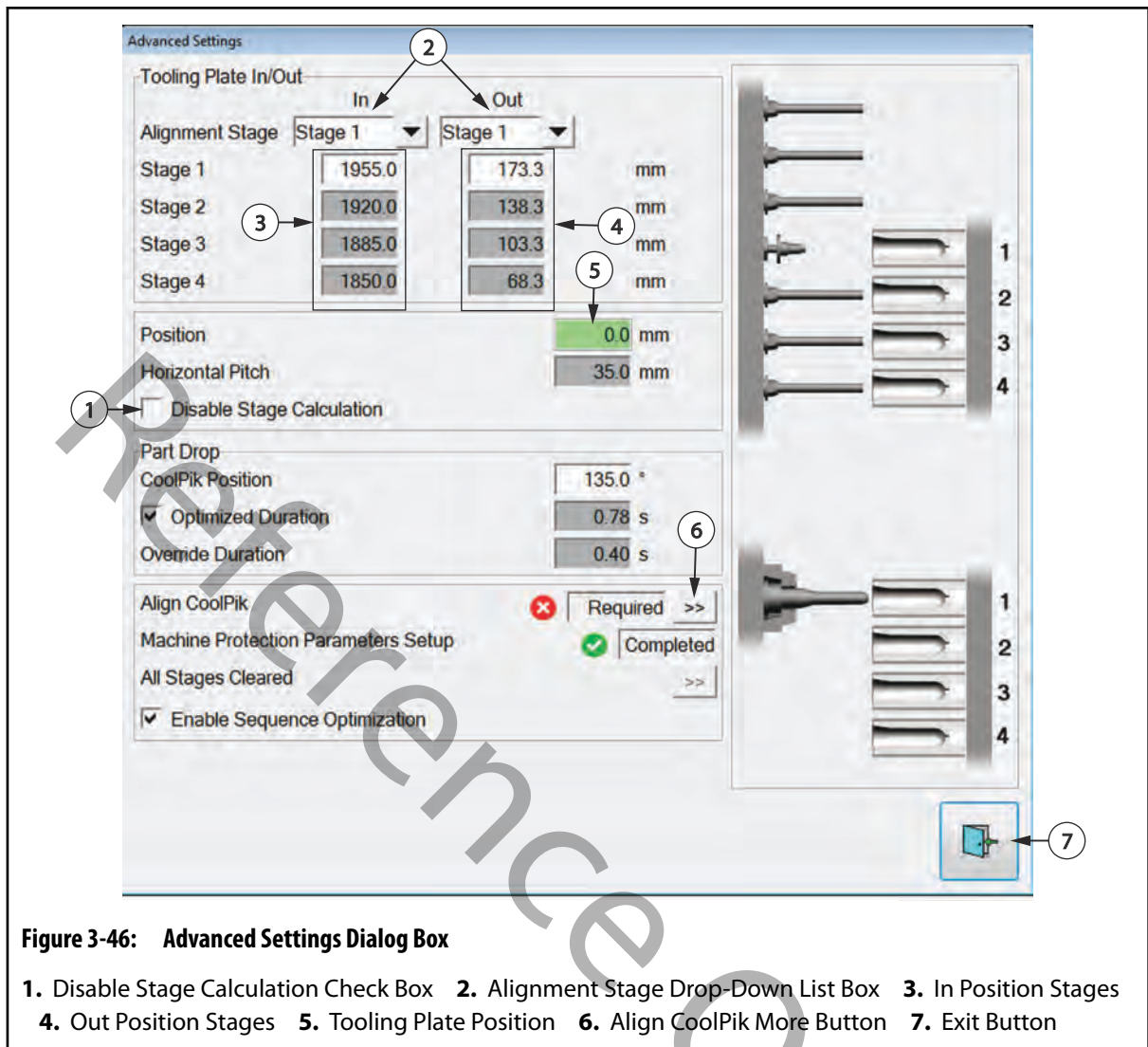


Figure 3-45: Setup Screen

1. Advanced Button

11. Verify the horizontal pitch of the tooling plate.
12. Touch the **Advanced** button to display the **Advanced Settings** dialog box.

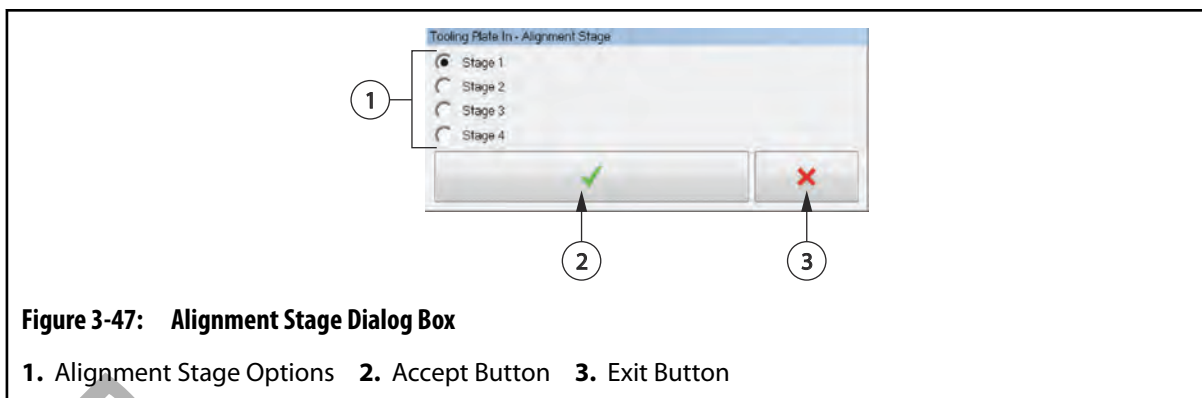


13. Make sure the **Disable Stage Calculation** check box is clear.

NOTE:

The **Alignment Stage** drop-down list box enables the appropriate field for the stage selected. All other fields are disabled (gray).

14. Touch the **Alignment Stage** drop-down list box for the In position stages and select the stage currently aligned with the cavity plate.



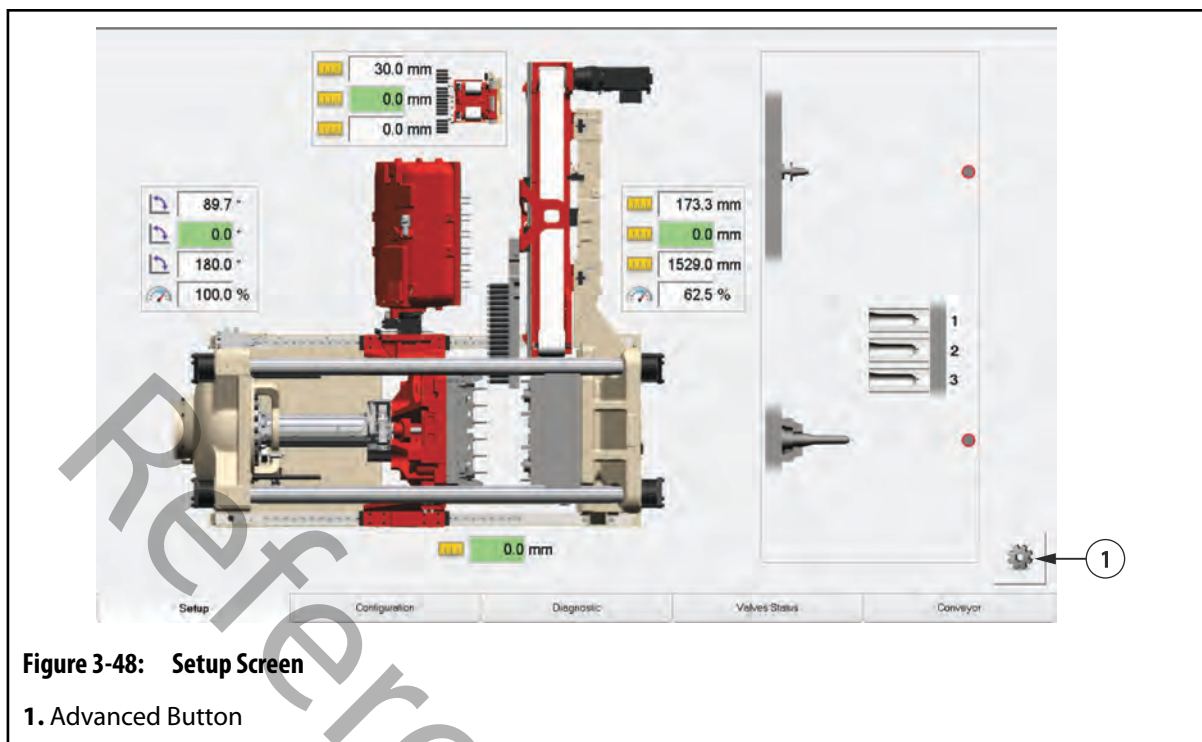
15. Touch the **Accept** button to select the option, or touch the **Cancel** button to abort.
16. Touch the **In Position** field for the stage currently aligned with the cavity plate and type the tooling plate actual value. All other In position values will be calculated automatically.
17. Lock out and tag the machine.
18. Remove the alignment pin from the tooling plate and cavity plate.
19. Remove all locks and tags.
20. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.

3.6.2.2 Setting the Out Positions

The following procedure describes how to set the tooling plate Out positions. This method requires only the Out position for one stage to be set by the user. All other Out positions are calculated automatically.

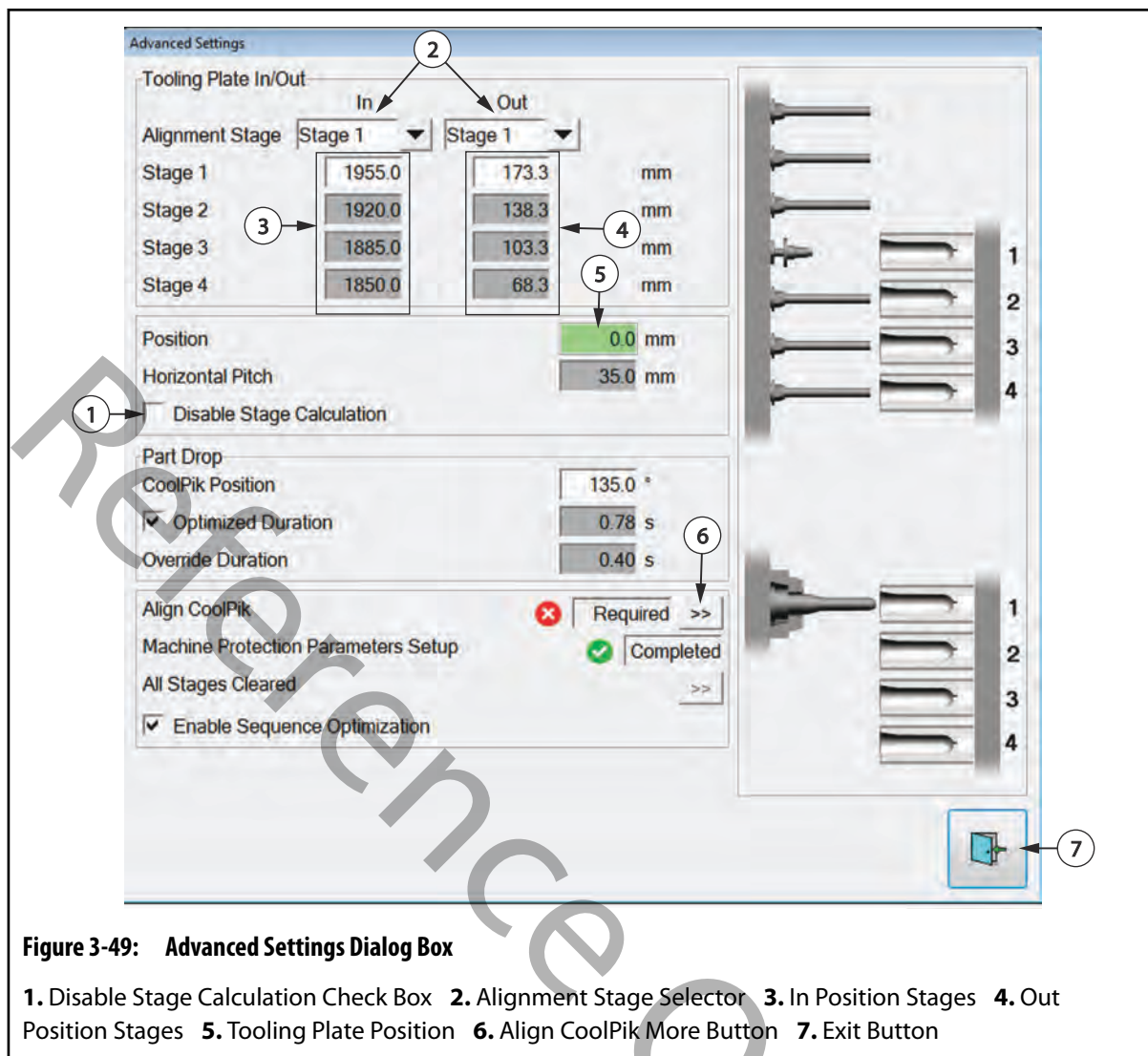
To set the Out positions for the tooling plate, do the following:

1. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
2. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
3. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Mold Set** mode.
4. Press and hold the **Mold Open** key until the mold is open.
5. Using the **Tooling Plate In** and **Tooling Plate Out** keys, line up the alignment hole in the tooling plate with the alignment hole in the CoolPik plate.
6. Lock out and tag the machine.
7. Insert an alignment pin through the tooling plate into the CoolPik plate.
8. Remove all locks and tags.
9. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
10. Touch the **Product Handling** button and touch the **Setup** tab to display the **Setup** screen.



11. Verify the horizontal pitch of the tooling plate.

12. Touch the **Advanced** button to display the **Advanced Settings** dialog box.

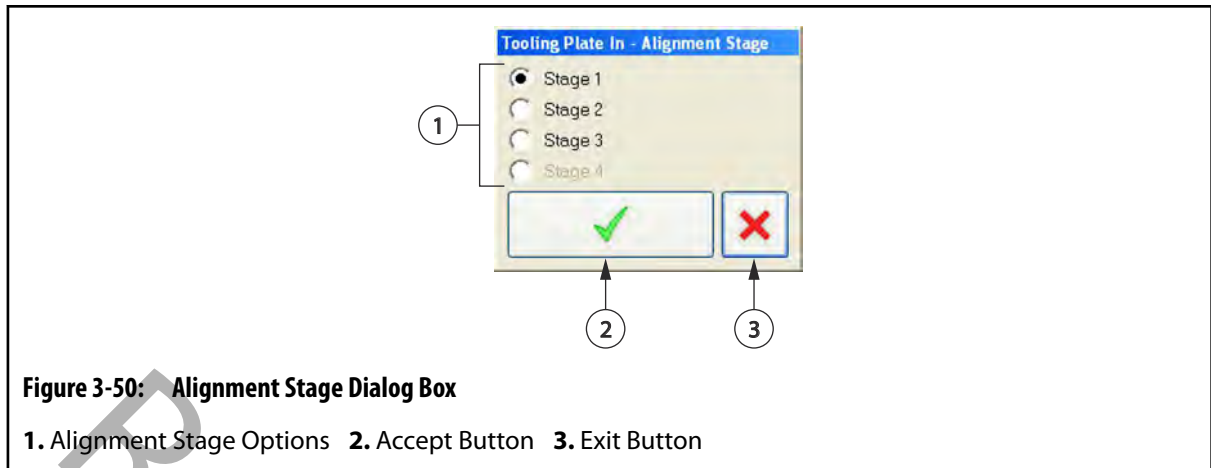


13. Make sure the **Disable Stage Calculation** check box is clear.

NOTE:

The **Alignment Stage Selector** enables the appropriate field for the stage selected. All other fields are disabled (gray).

14. Touch the **Alignment Stage Selector** for the Out position stages and select the stage currently aligned with the CoolPik plate.



15. Touch the **Accept** button to select the option, or touch the **Cancel** button to abort.
16. Touch the **Out Position** field for the stage currently aligned with the CoolPik plate and type the tooling plate actual value. All other Out position values will be calculated automatically.
17. Lock out and tag the machine.
18. Remove the alignment pin from the tooling plate and CoolPik plate.
19. Remove all locks and tags.
20. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
21. Touch the **Align CoolPik More** button to calibrate the vertical alignment of the CoolPik plate. For more information about calibrating the machine and product handling equipment, refer to [Section 5.10](#).

3.6.3 Adjusting the Plenum Casting Position

The following procedures describe how to adjust the horizontal and vertical position of the plenum casting.

3.6.3.1 Adjusting the Horizontal Position of the Plenum Casting

During the installation of the CoolPik plate, the distance between the plenum casting and CoolPik plate must be within 5 to 10 mm (0.2 to 0.4 in) when the mold is closed.

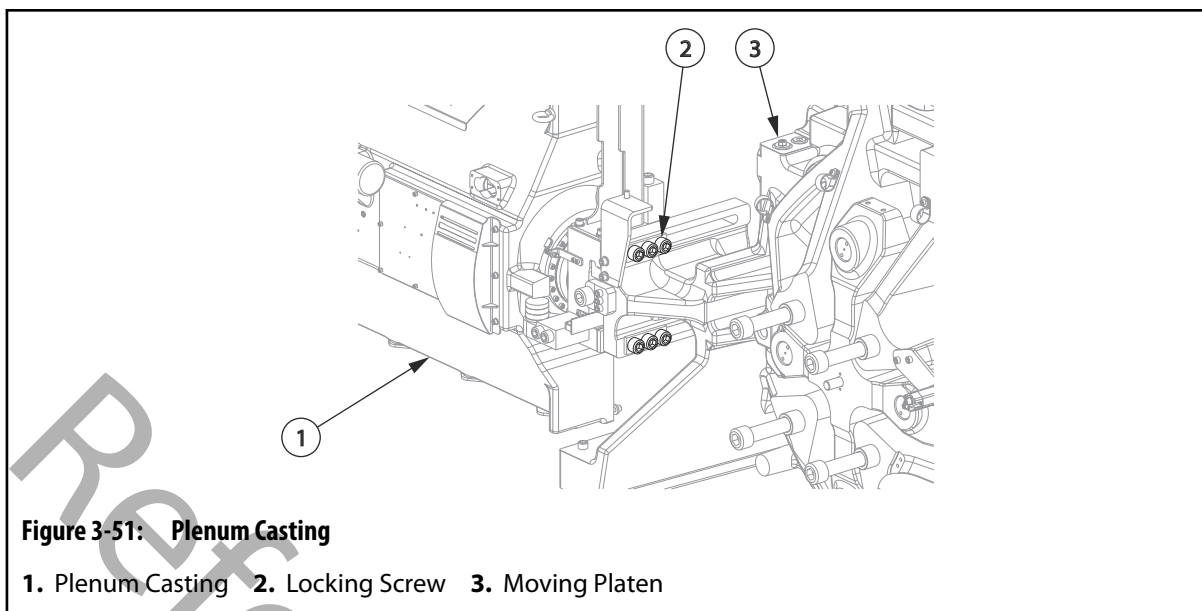
To adjust the distance between the plenum casting and the CoolPik plate, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.

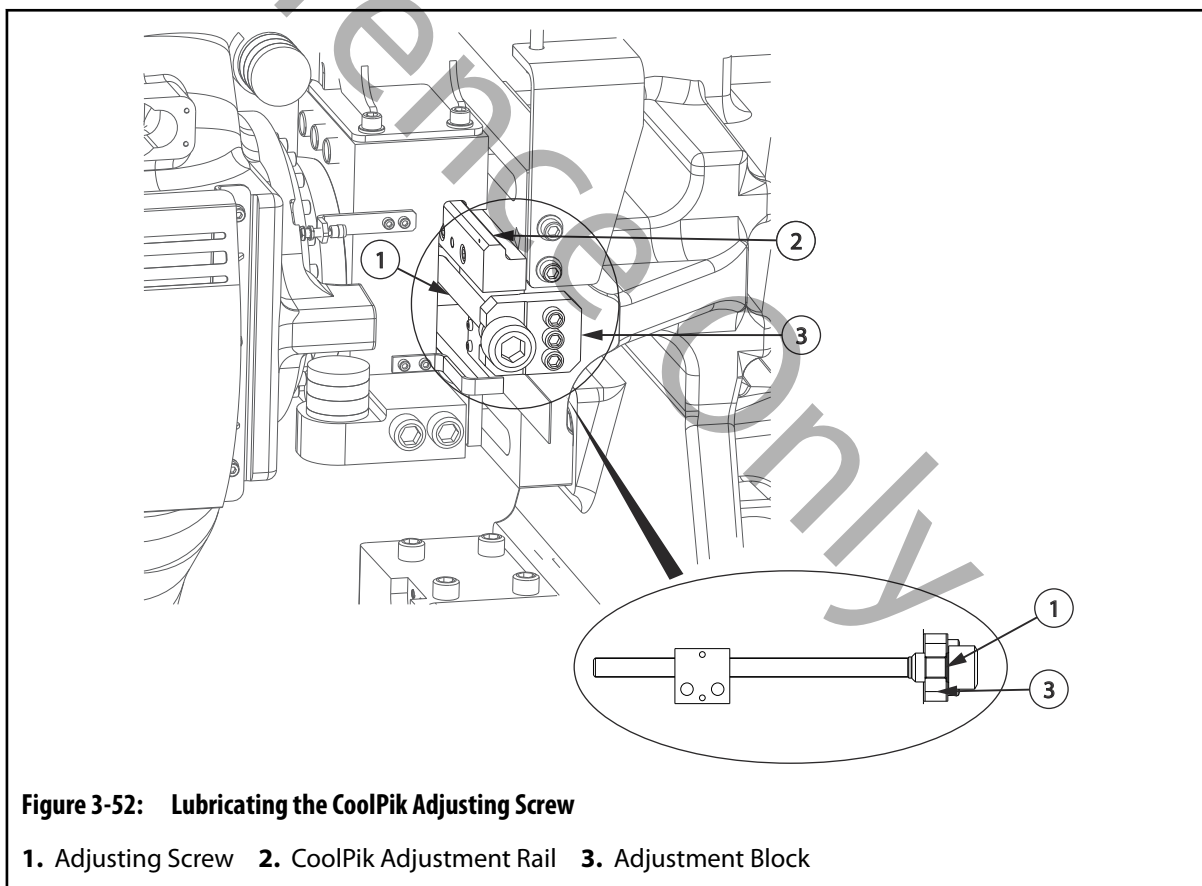
CAUTION!

Mechanical hazard – risk of damage to the machine. Do not use an overhead lifting device when adjusting the position of the CoolPik plenum. Damage to the gearbox could occur.

2. Loosen the screws that secure the CoolPik plenum to the moving platen.



3. Apply a light amount of food grade grease to the thread of the adjusting screw, contact surfaces between the adjusting screw and block, and on the CoolPik adjustment rail. Refer to [Section 7.9](#) for a list of recommended lubricants.



CAUTION!

Mechanical hazard – risk of damage to the machine. Turn the adjusting screw manually. Using an impact wrench or other power tools to turn the adjusting screw could cause damage to the adjusting screw and adjustment block.

4. Manually turn the adjusting screw to move the plenum casting towards or away from the tooling plate and CoolPik plate assembly. The distance between the plenum casting and CoolPik plate must be 5 to 10 mm (0.2 to 0.4 in) greater than the distance between the core and cavity plates.

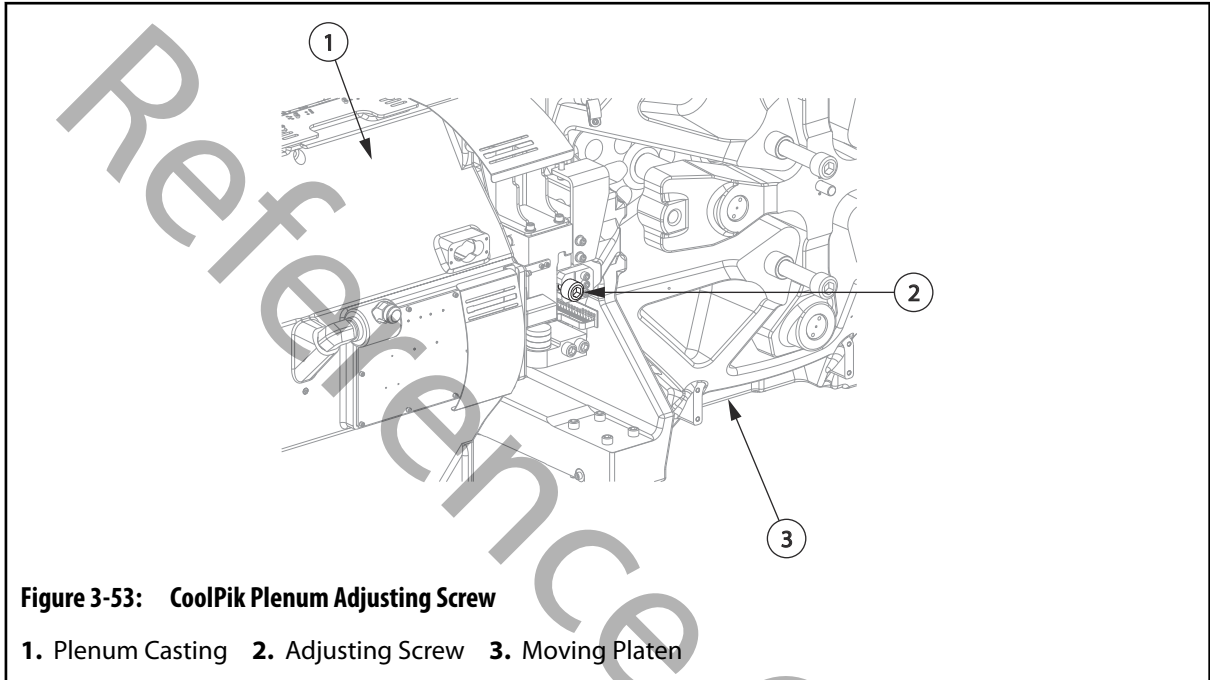


Figure 3-53: CoolPik Plenum Adjusting Screw

1. Plenum Casting 2. Adjusting Screw 3. Moving Platen

5. Remove all locks and tags.
6. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
7. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Mold Set** mode.
8. Press and hold the **Mold Close** key until the mold is closed.
9. Lock out and tag the machine.
10. Measure the distance between the back of the CoolPik plate and plenum casting. The distance should be between 5 to 10 mm (0.2 to 0.4 in) .

**IMPORTANT!**

A special plenum hex tool is available to torque the screws securing the plenum to the moving platen. For more information, refer to the *Site Preparation and Installation Manual*.

11. Once the horizontal position is set, torque all locking screws securing the CoolPik plenum to the moving platen. Refer to [Figure 3-51](#) for more information. For the specified torque value, refer to [Section 7.13](#) for standard torque specifications. If using the plenum hex tool, do not exceed the torque of 508 N·m (375 lbf·ft) .

3.6.3.2 Adjusting the Vertical Position of the Plenum Casting

During the installation of the CoolPik plate, the distance between the plenum casting and CoolPik plate must be 0.5 mm (0.02 in) or less at the top and bottom. If the distance at either the top or bottom is more than 0.5 mm (0.02 in), the vertical position of the plenum casting must be adjusted.

To adjust the vertical position of the plenum casting, do the following:

NOTE:

The following procedure should only be done when the CoolPik plate is attached to the tooling plate.

1. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
2. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
3. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Mold Set** mode.
4. Press and hold the **Mold Open** key until the mold is open.
5. Touch the **Product Handling** button and touch the **Setup** tab to display the **Setup** screen.

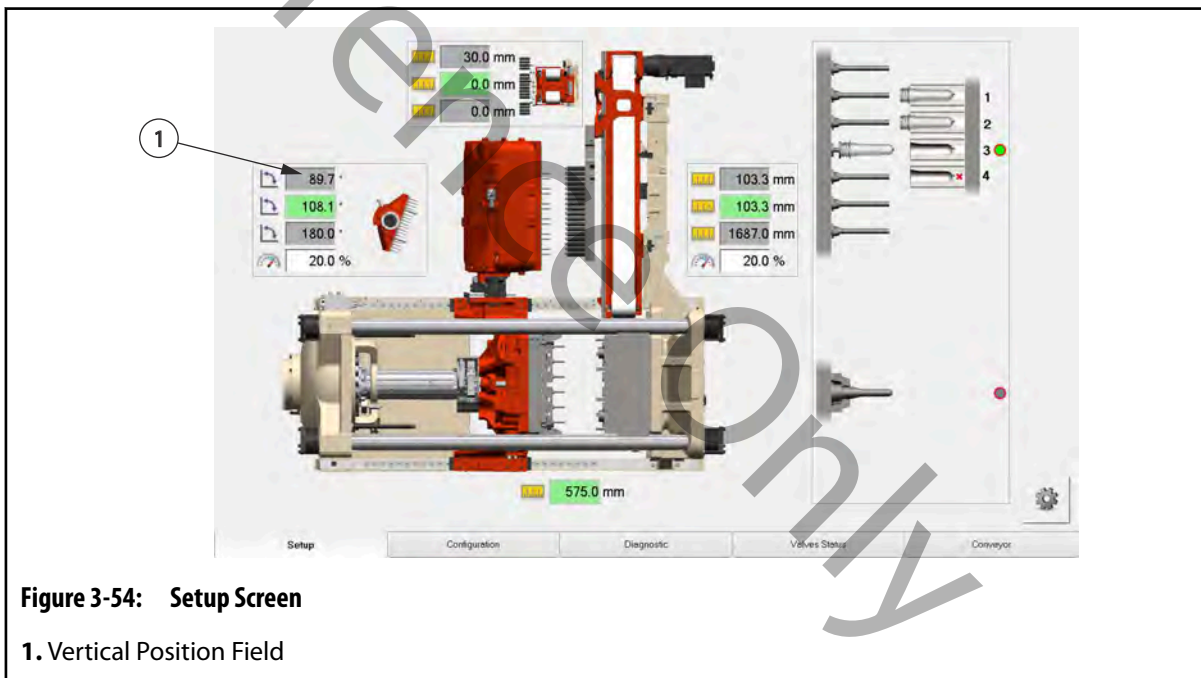


Figure 3-54: Setup Screen

1. Vertical Position Field

6. Under **CoolPik Rotation**, modify the value in the **Vertical Position** field. This sets the vertical position of the CoolPik unit.
7. Press the **CoolPik Horizontal** key to rotate the plenum casting forward to its horizontal position.
8. Press the **CoolPik Vertical** key to rotate the plenum casting back to its new vertical position.
9. Press and hold the **Mold Close** key until the mold is closed.
10. Lock out and tag the machine.

- 11.** Measure the distance between all four corners of the CoolPik Plate and the plenum casting. If these measurements vary by more than ± 0.5 mm (0.02 in), repeat [step 1](#) to [step 11](#).

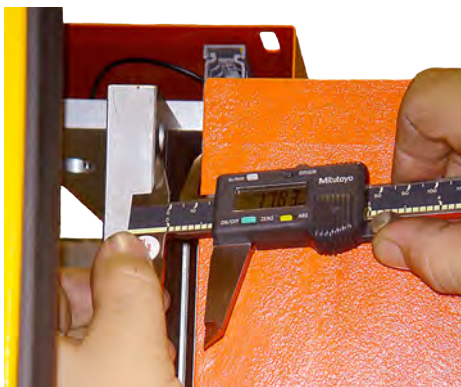


Figure 3-55: Measuring the CoolPik Plate to Plenum Casting Parallelism

Chapter 4 Operation

This chapter describes the basic features, functions and use of the Human Machine Interface (HMI). The HMI is used by the operator to control and monitor the machine. This chapter also describes the process for manually starting and stopping the injection molding machine.



IMPORTANT!

Access to select features of the HMI is controlled through user access rights set by an administrator. Some screens and features described in this chapter may not be exactly as displayed on the HMI for your machine.



IMPORTANT!

The procedures contained in this chapter were written for a standard machine and do not take special options into consideration.



Figure 4-1: Human Machine Interface (HMI)

4.1 Access Rights

Access to various HMI and machine functions is controlled through access rights assigned to individual users. Access rights are added and removed by personnel with Supervisor level profiles on the machine.

NOTE:

Some fields and buttons on the HMI screen will disappear or be greyed out if the user logged into the HMI has insufficient access rights.

4.2 Logging On

Access to the HMI and machine functions requires either a valid username and password, or a valid datakey. This section describes how to log on to the HMI using either method.

4.2.1 Logging On With a Datakey

Two datakeys are provided by Husky with each machine. One key is for administrators only, while the other is for operators. Data keys are used to save important user-specific information such as the user name, password, language setting and other configurations.

If a data key is available, insert it into the data key port on the HMI. You will be automatically logged in to the HMI and all configuration settings saved on the datakey will be applied.

NOTE:

The datakey must remain in the HMI to access machine functions. You will be logged out if the datakey is removed.



Figure 4-2: Datakey

4.2.2 Logging On With a User Name and Password

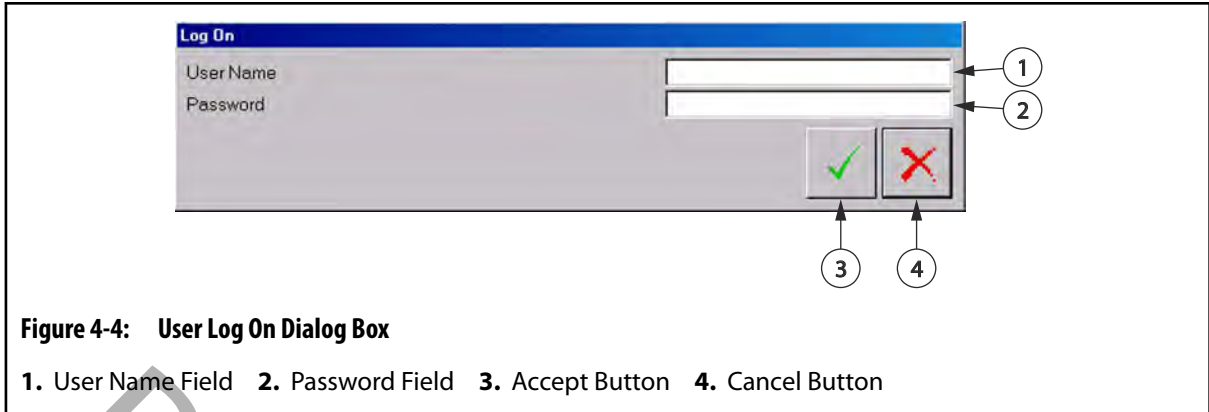
To login through the HMI, do the following:

1. Touch the **User Log On/Off** button on the toolbar at the top of the screen to open the **User Log On** dialog box.



Figure 4-3: User Log On and Off Button

1. User Log On/Off Button

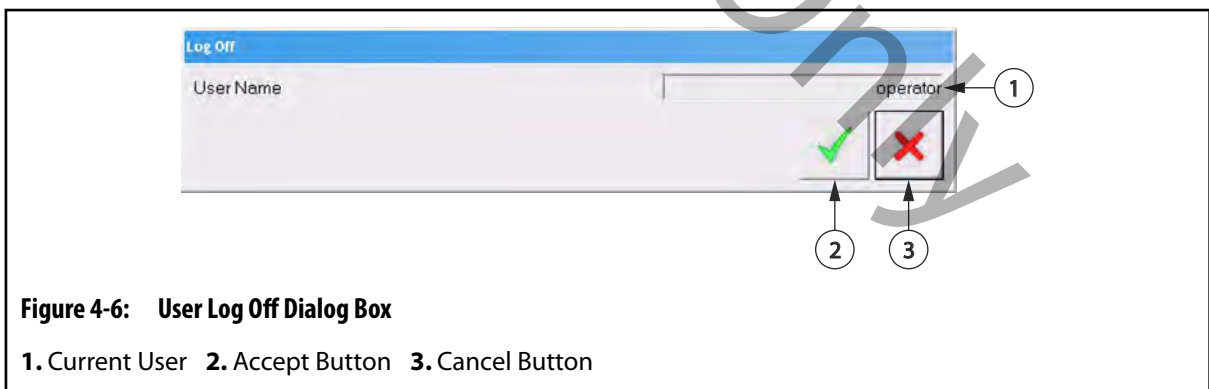
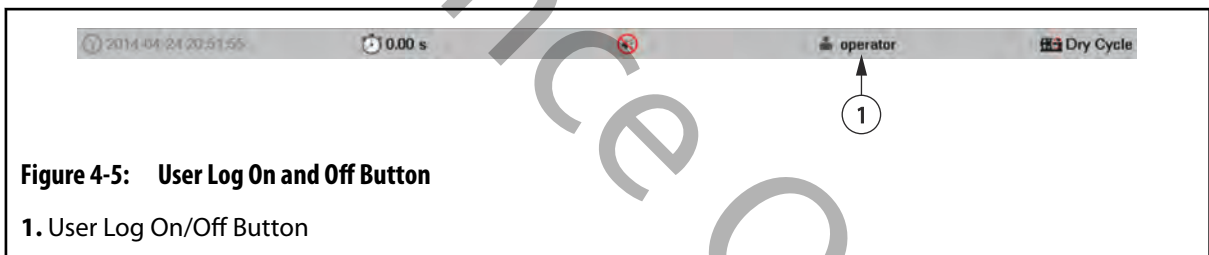


2. Touch the **User Name** field and type the user name.
3. Touch the **Password** field and type the password.
4. Touch the **Accept** button to log on or touch the **Cancel** button to abort.

4.3 Logging Off

To log off the HMI, do the following:

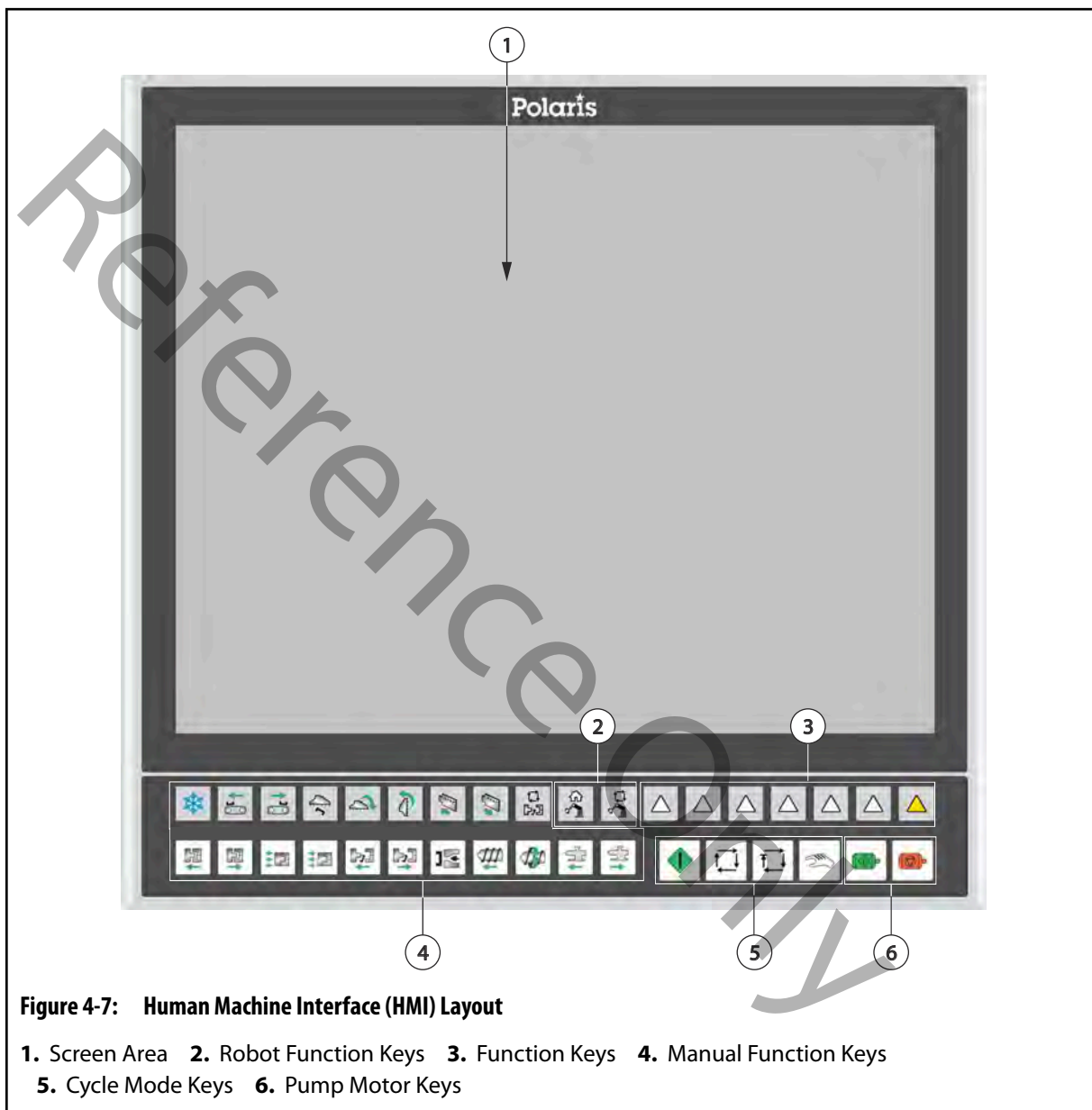
1. Touch the **User Log On/Off** button on the toolbar at the top of the screen. The **Log Off** dialog box appears.



2. Touch the **Accept** button to log off the HMI, or touch the **Cancel** button to abort.

4.4 General Layout

The front panel of the HMI consists of a touch-sensitive display screen and a series of control/function keys.

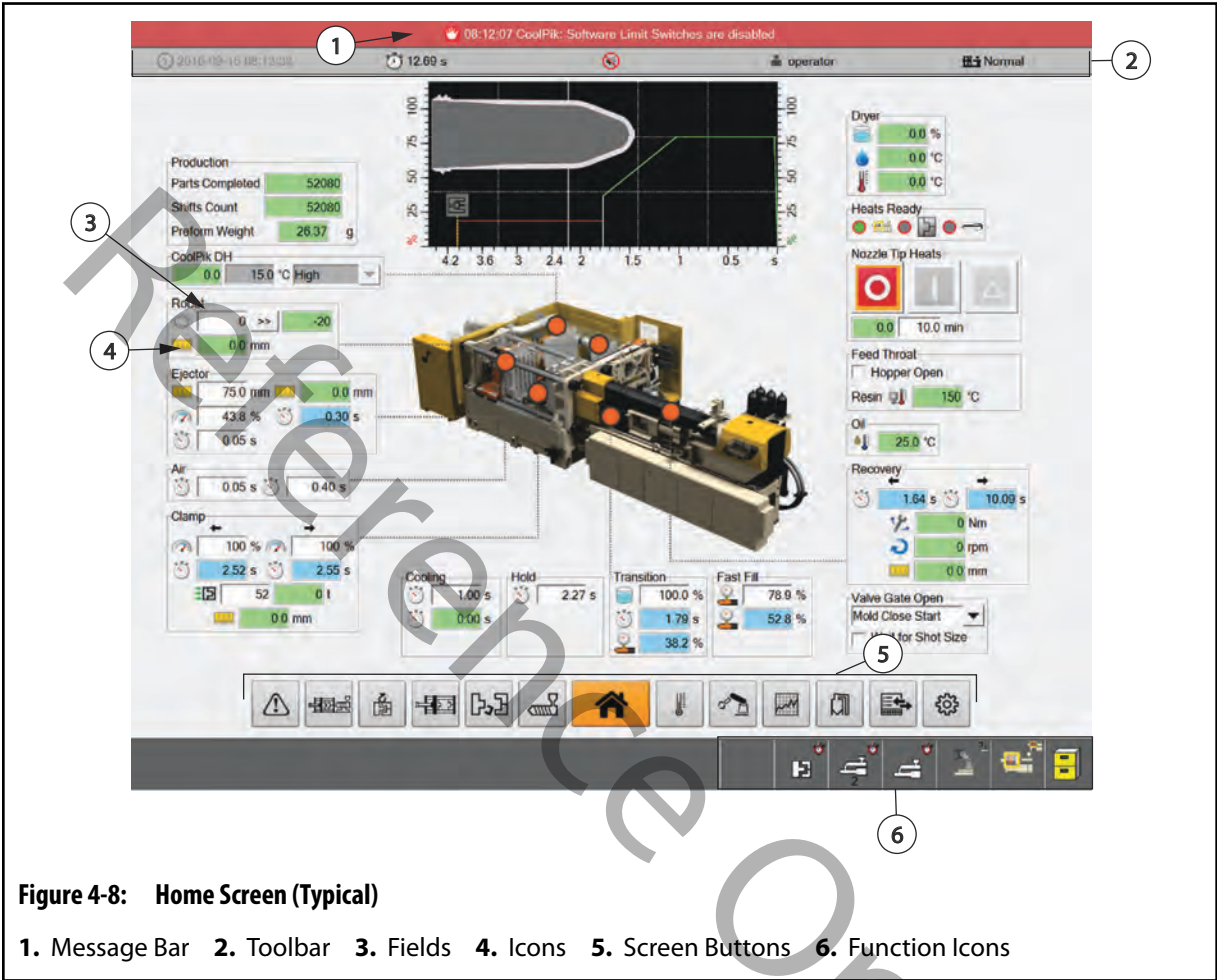


4.4.1 Home Screen

The Home screen is a touch-sensitive display panel used to monitor machine functions and modify operating parameters. The touch-sensitive feature allows the user to touch parts of the screen to navigate between screens, change values, select options and more.

NOTE:

Use the screen buttons to change the displayed screen group. Refer to [Section 4.4.2](#) for more information.



The screen area consists of the following parts:

- **Message Bar**

The message bar displays the most current alarm message.

- **Fields**

Each field on the screen is color coded to identify specific information.

	Datalog Field Displays the last recorded value.
	Numeric Field Displays the current value, such as position, pressure or tonnage.

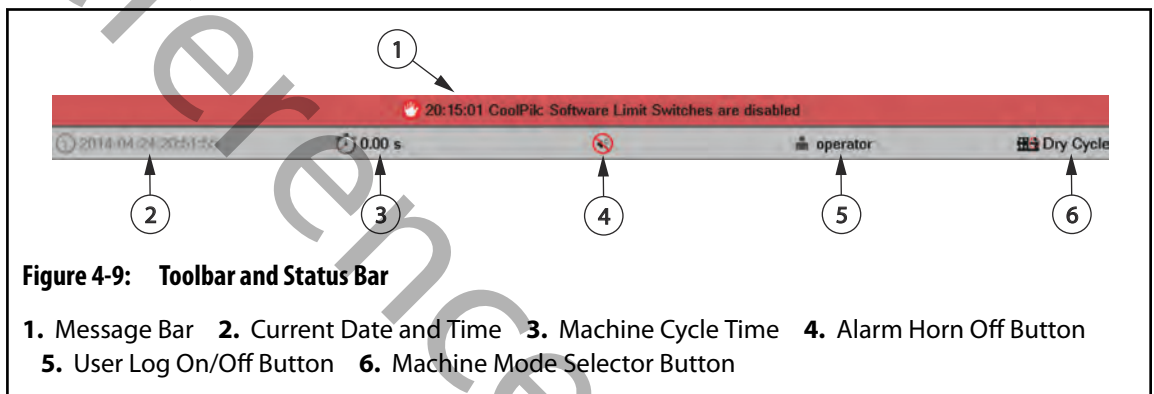
	Setpoint Field Displays the current setpoint value. Touch this field to change the value.
	Setpoint Field (Blocked) Displays the current setpoint value. The value cannot be changed until a related feature is enabled or a user with Supervisor level access rights logs in.

- **Icons**

Icons indicate the measurement type of a field. Touch an icon to display the name of the field.

- **Toolbar and Status Bar**

The toolbar displays icons for common administrative and control functions, as well as the icon for the currently displayed screen group. The status bar displays select machine status information for quick reference.



- **Tabs**

When selected, each tab displays a screen belonging to the screen group.

- **Screen Buttons**

The screen buttons display the various screen groups on the HMI. There are eleven main screen keys.

- **Function Icons**

The function on icons represent machine functions or process values. Refer to [Section 4.4.8](#) for more information.

4.4.2 Screen Buttons

The screen buttons display the various screen groups on the HMI. There are thirteen main screen buttons.

Each screen group can contain a series of screens, accessible by touching the tabs near the bottom of the screen.



Figure 4-10: HMI Screen Buttons

1. Alarms Button 2. Machine Button 3. Production Button 4. Clamp Button
5. Mold Function Button 6. Injection Button 7. Home Button 8. Heats Button
9. Product Handling Button 10. SPC Button 11. Auxiliaries Button 12. Utilities Button
13. Advanced Button

NOTE:

Some screen buttons are for optional equipment or software. The screen button will be disabled if the related option is not installed on the machine.

4.4.3 Cycle Mode Keys

The **Auto Cycle**, **Semi Cycle** and **Manual Cycle/Idle** keys are used to select one of three available cycle modes for the machine. The cycle modes include automatic, semi-automatic and manual.

Once automatic cycle or semi-auto cycle is selected, the **Cycle Start/Reset** key can be used to start the cycle.

NOTE:

The **Cycle Start/Reset** key is not required to run the machine in manual cycle mode.

Each key has an LED indicator in the top left corner that turns on when the cycle mode is selected.

Key	Name	Function
	Cycle Start/Reset	Starts the machine cycle after a cycle mode is selected. The LED indicator will flash when the machine is ready to start. The reset function is used to clear certain alarm conditions.
	Auto Cycle	Selects the automatic cycle mode. NOTE: The LED indicator will flash if an alarm is triggered that must be cleared before the machine can cycle.
	Semi Cycle	Selects the semi-automatic cycle mode. NOTE: The LED indicator will flash if an alarm is triggered that must be cleared before the machine can cycle.

Key	Name	Function
	Manual Cycle/ Idle	Selects the manual cycle mode. NOTE: The LED indicator will flash if the machine is in idle mode and the door is unlocked for a defined period of time.

NOTE:

On systems that have an integrated conveyor belt, the conveyor will run automatically when the **Auto Cycle** or **Semi Cycle** keys are pressed.

4.4.4 Robot Function Keys

If the machine is equipped with a product handling robot, the **Robot Home** and **Robot Enable** keys can be used to activate and control the position of the robot. A LED indicator in the top left corner of the keys will turn on when the keys are active.

Key	Name	Function
	Robot Home	Returns the robot to the home position.
	Robot Enable	Runs the robot during machine operation.

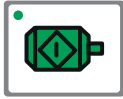
4.4.5 Ejector Function Key

The **Ejector Enable** keys can be used to activate the ejector to function automatically. A LED indicator in the top left corner of the key will turn on when the key is active.

Key	Name	Function
	Ejector Enable	Runs the ejector during machine operation.

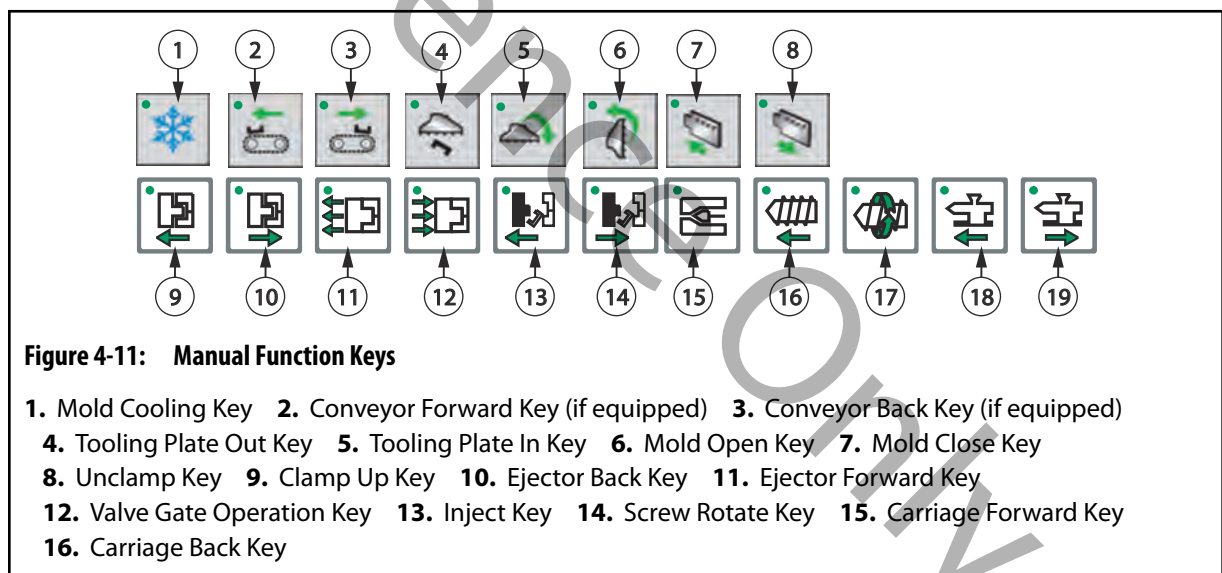
4.4.6 Pump Motor Keys

The **Pump Motor On** and **Pump Motor Off** keys start and stop the pump motor. An LED indicator in the top left corner of the keys will turn on when the keys are active.

Key	Name	Function
	Pump Motor On	Turns on the pump motor.
	Pump Motor Off	Turns off the pump motor.

4.4.7 Manual Function Keys

The manual function keys activate specific functions when the machine is in manual cycle mode. Each key must be pressed and held to enable a function.



Each manual function key has a LED indicator that turns on when the function is enabled. The LED indicator will flash when the function is completed.

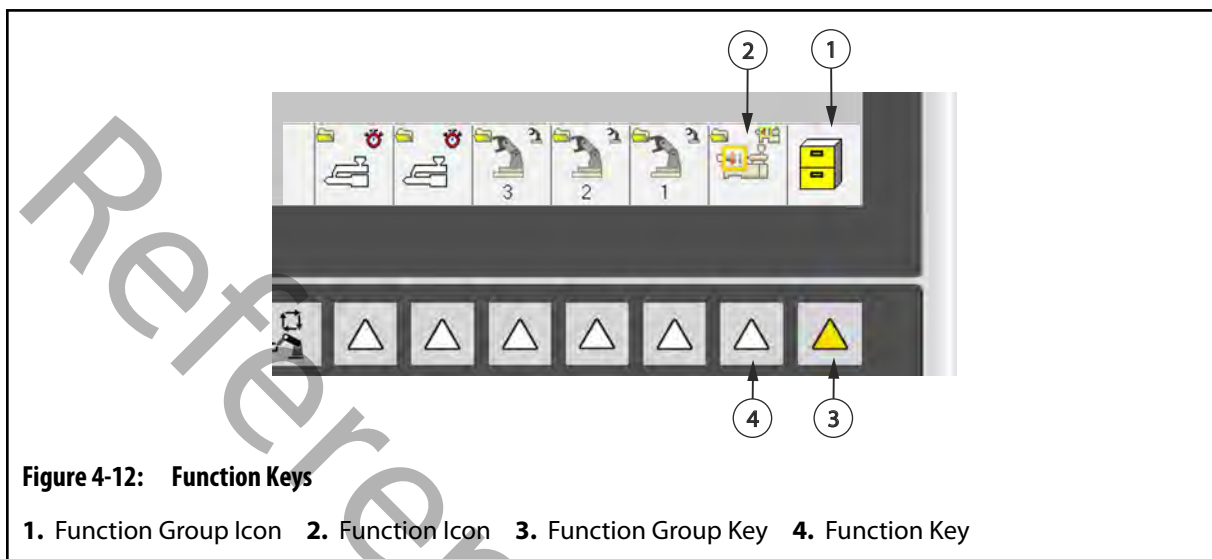
CAUTION!

Mechanical hazard – risk of damage to the machine. When using the Clamp Up key, make sure the mold is closed before applying tonnage.

4.4.8 Function Keys

The function keys are used to monitor process values and control select machine functions during operation. The keys are positioned the bottom of the HMI display screen.

The **Function Group** key selects the group of functions and process values that are displayed. The **Function** keys activate the individual functions within the group.



The functions display either process values or enable functions. Process value icons display real-time values during operation about a specific component, such as high or low values for electrical components. Function icons activate specific functions, such as opening an air gate or closing the mold.

4.4.8.1 Accessing the Function Groups

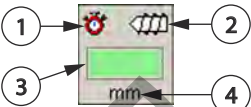
To display a function group, press the **Function Group** key until the icon for the function group appears. Alternatively, you can also scroll through the function groups until you find the **Function Group Selector** icon and then open the function group using the **Function** keys.

All related functions in a group are displayed next to the **Function** keys below the Function Group icon.

4.4.8.2 Function Group, Function and Process Value Icons Explained

The following is a description of basic function group, function and process value icons used in the sidebars.

Icon	Type	Description
	Function Group	Each function group icon shares the following characteristics: 1. A folder symbol 2. A symbol representing the function group type 3. A symbol representing the function type

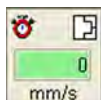
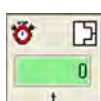
Icon	Type	Description
	Function	Each function icon shares the following characteristics: 1. A symbol that changes color when the function is active 2. A symbol representing the function group type 3. A symbol representing the function type 4. The function number
	Process Value	Each process value icon shares the following characteristics: 1. A process value symbol 2. A symbol representing the function group type 3. A numeric value that increases/decreases during machine operation 4. The unit of measure for the process value

4.4.8.3 Standard Function Groups and Function Icons

The following is a list of the standard function groups and their associated icons.

Function Groups		Functions	
All		Machine	
		Injection	
		Product Handling	
		Clamp Monitoring	

Function Groups		Functions	
Machine		Screen Capture	
		Air Auto	
		Air Manual	
Injection		Injection Position	
		Injection Speed	
		Injection Pressure	
		Screw Speed	
Product Handling		Tooling Plate Up	
		Tooling Plate Down	
		Tooling Plate Clear Parts	
		CoolPik Part Transfer	
		Tooling Plate Vacuum On	

Function Groups		Functions	
Clamp Monitoring		Stroke Position	
		Stroke Speed	
		Stroke Pressure	
		Clamp Tonnage	

4.4.9 Common Screen Elements

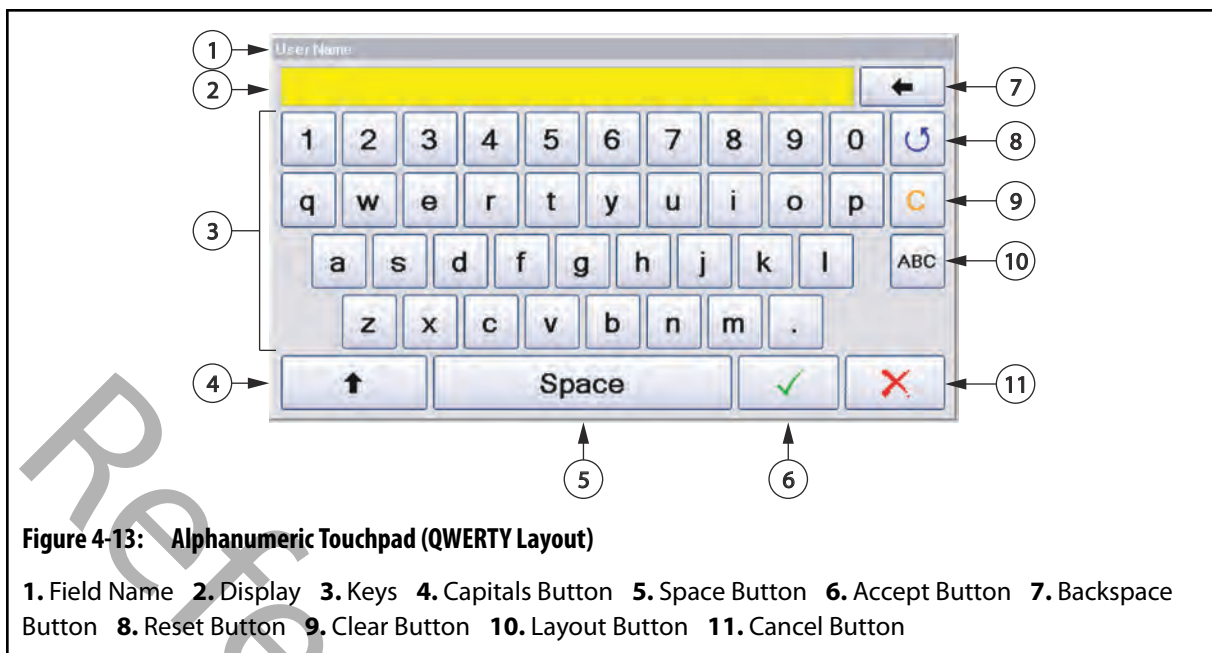
The following describes common tools and buttons that may be found on various screens.

4.4.9.1 Alphanumeric Touchpad

The alphanumeric touchpad is a touch-sensitive keyboard for entering text. It displays whenever the user presses an alphanumeric input field, such as those found in the logon screen.

The touchpad is used like a regular keyboard. Touch the numerals and characters as required and then touch the **Enter** key to apply the new text. The touchpad will close automatically once the value is entered.

Two layouts are available: standard QWERTY or alphabetical. The standard QWERTY layout is displayed by default. To switch to the alphabetical layout, touch the **Keyboard Layout** button.



4.4.9.2 Numeric Touchpad

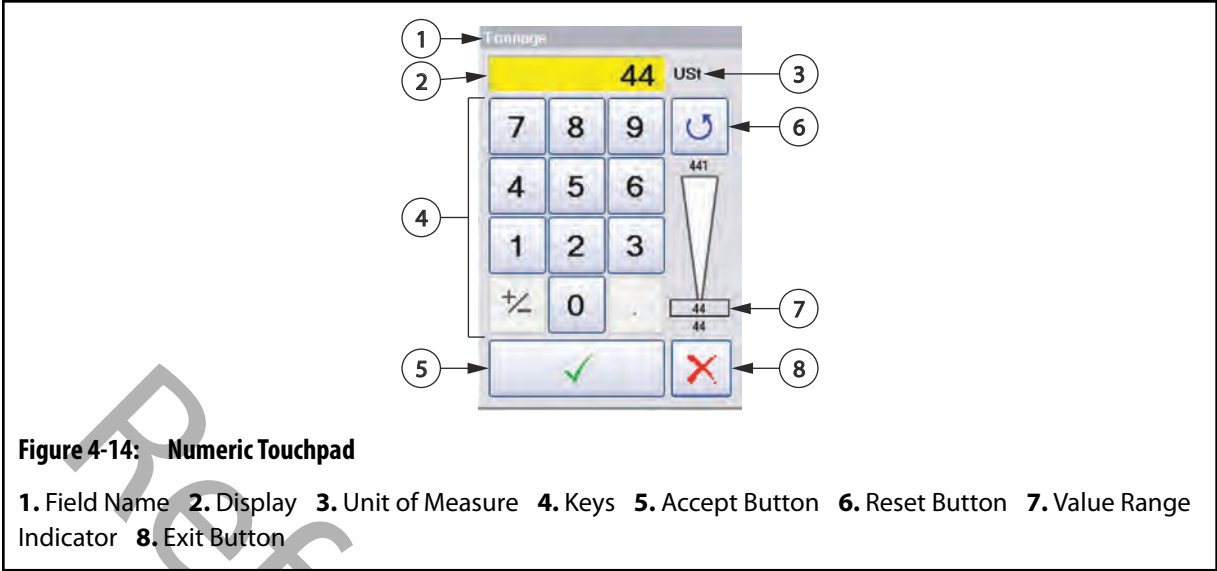
The numeric touchpad is a touch-sensitive keyboard for entering numeric values. It displays whenever the user presses a numeric input field.

The touchpad is used like a regular keyboard. Touch the numbers as required and then touch the **Enter** key to apply the new value.

Alternatively, the numeric value can be increased or decreased incrementally using the **Value Range Indicator**.

NOTE:

On the screen behind the numeric touchpad, the background of the numeric input field being changed will turn yellow to indicate it is the field being edited.



4.4.9.3 Common Buttons

Many HMI screens contain similar buttons that can be used to perform specific functions. The following is a list of common buttons and their general functions.

Button	Function
	The Exit button closes dialog boxes
	The Advanced button opens a dialog box containing advanced controls and values
	The More button opens a dialog box containing additional controls and values
	The Accept button is used to confirm changes made to the HMI
	The Cancel button is used to cancel changes made to the HMI

4.5 Setting the Machine Mode

The **Machine Mode Selector** button on the toolbar allows the user to set one of six modes for the machine. The modes allow the machine to operate with some functions enabled or disabled, depending on the type of operation being performed. Refer to [Table 4-1](#) for more information.

To select a function mode, do the following:

1. Touch the **Machine Mode Selector** button on the toolbar to display the function mode icons.

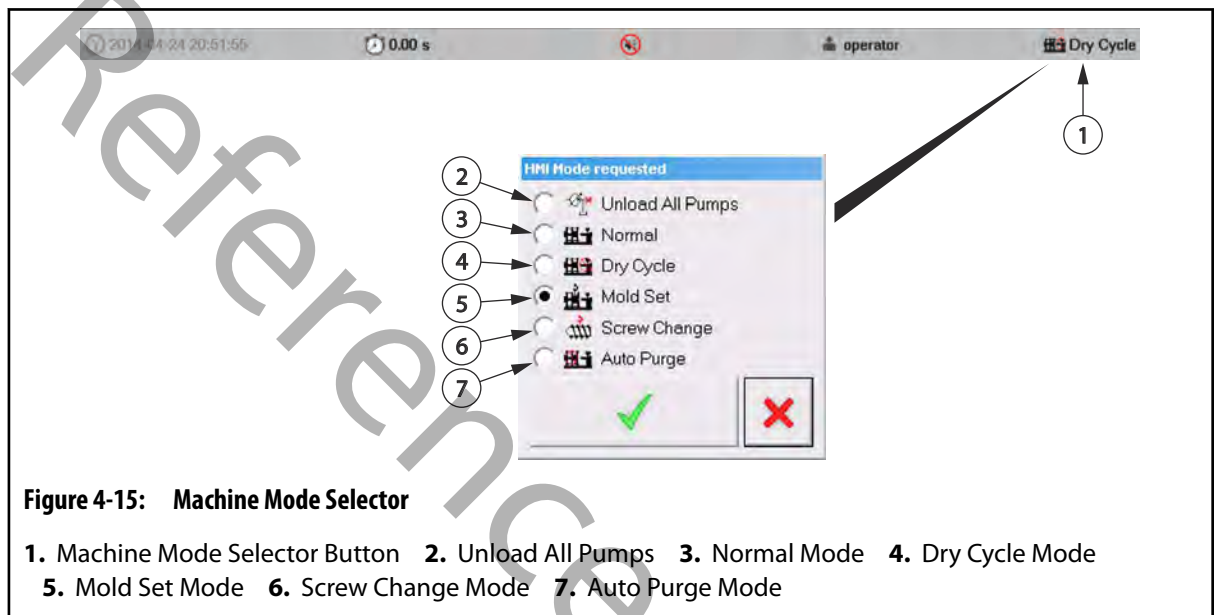


Figure 4-15: Machine Mode Selector

1. Machine Mode Selector Button 2. Unload All Pumps 3. Normal Mode 4. Dry Cycle Mode
5. Mold Set Mode 6. Screw Change Mode 7. Auto Purge Mode

2. Select the desired mode.

Table 4-1: Machine Cycle Modes

Mode	Icon	Description
Unload All Pumps		Use Unload All Pumps mode to direct flow from the hydraulic pumps to the hydraulic tank at low pressure. None of the cycle mode keys are functional when this mode is selected.
Normal		Use Normal mode to operate the machine under normal conditions. The Semi Cycle , Auto Cycle and Manual Cycle keys are functional when this mode is selected.
Dry Cycle		Use Dry Cycle mode to disable the injection unit and cycle the clamp. The Semi Cycle , Auto Cycle and Manual Cycle keys are functional when this mode is selected.
Mold Set		Use Mold Set mode to operate the machine at reduced speeds and pressures during mold installation. Only the Manual Cycle key is functional when this mode is selected.

Table 4-1: Machine Cycle Modes (Continued)

Mode	Icon	Description
Screw Change		Use Screw Change mode to operate the extruder motor/gearbox at reduced speed when removing the plasticizing screw from the injection barrel. Only the Manual Cycle key is functional when this mode is selected.
Auto Purge		Use Auto Purge mode to disable the clamp unit and automatically purge the injection barrel. The Semi Cycle , Auto Cycle and Manual Cycle keys are functional when this mode is selected.

3. Touch the **Accept** button to confirm the selection and close the **HMI Mode requested** dialog box.

4.6 Setting the Language

To convert the text displayed by the HMI on each screen to a different language, do the following:

1. Touch the **Advanced** button. The **Language** dialog box appears.



2. Select the desired language.
3. Touch the **Accept** button to apply the change.

4.7 Setting the Units of Measure

The units of measure next to each value in the HMI can be set to metric or imperial, depending on the users preference. The unit of measure can only be customized for specific types of values, such as distance and pressure.

Procedure	Reference
Changing the units of measure	Section 4.7.1
Customizing the units of measure	Section 4.7.2

4.7.1 Changing the Units of Measure

To change the units of measure displayed throughout the HMI, do the following:

1. Touch the **Advanced** button, and then touch the **Units** tab. The Machine Units screen appears.

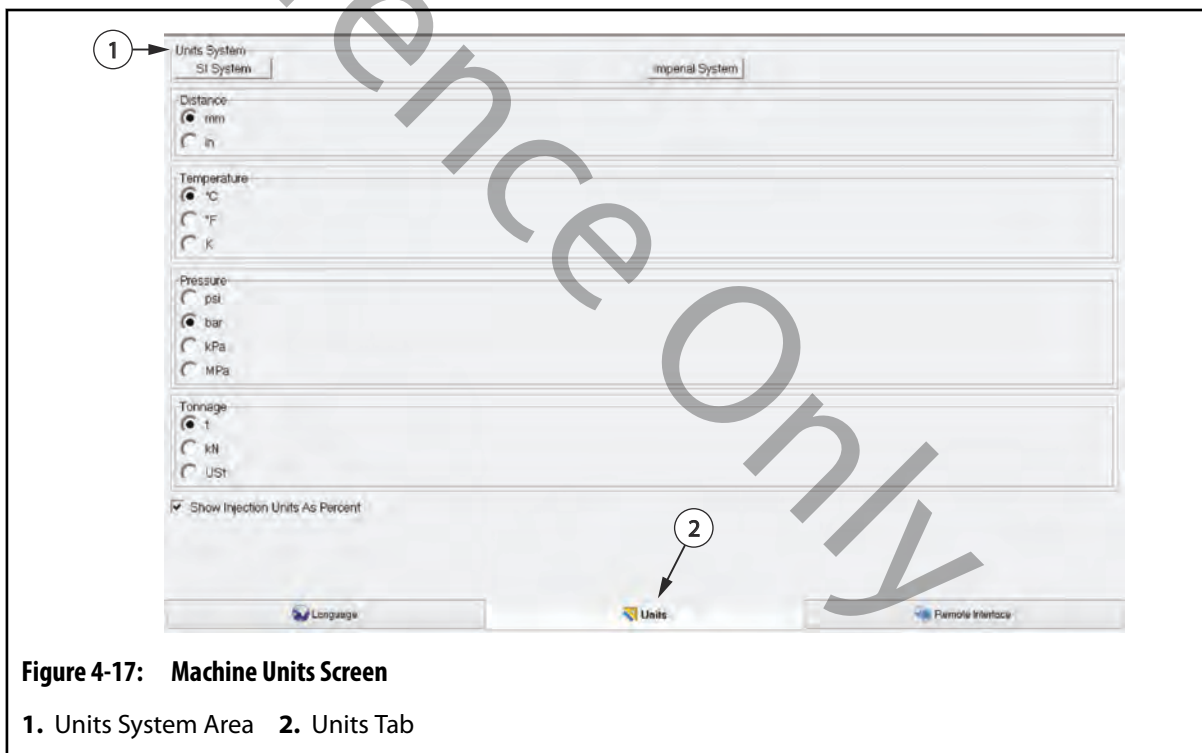


Figure 4-17: Machine Units Screen

1. Units System Area 2. Units Tab

2. In the **Units System** area, select either **SI System** for metric (System International) units or **Imperial System** for Imperial units.

All other fields and options will be disabled once either of these options are selected.

4.7.2 Customizing the Units of Measure

To customize the unit of measure displayed for each type of value, do the following:

1. Touch the **Advanced** button, and then touch the **Units** tab. The Machine Units screen appears.

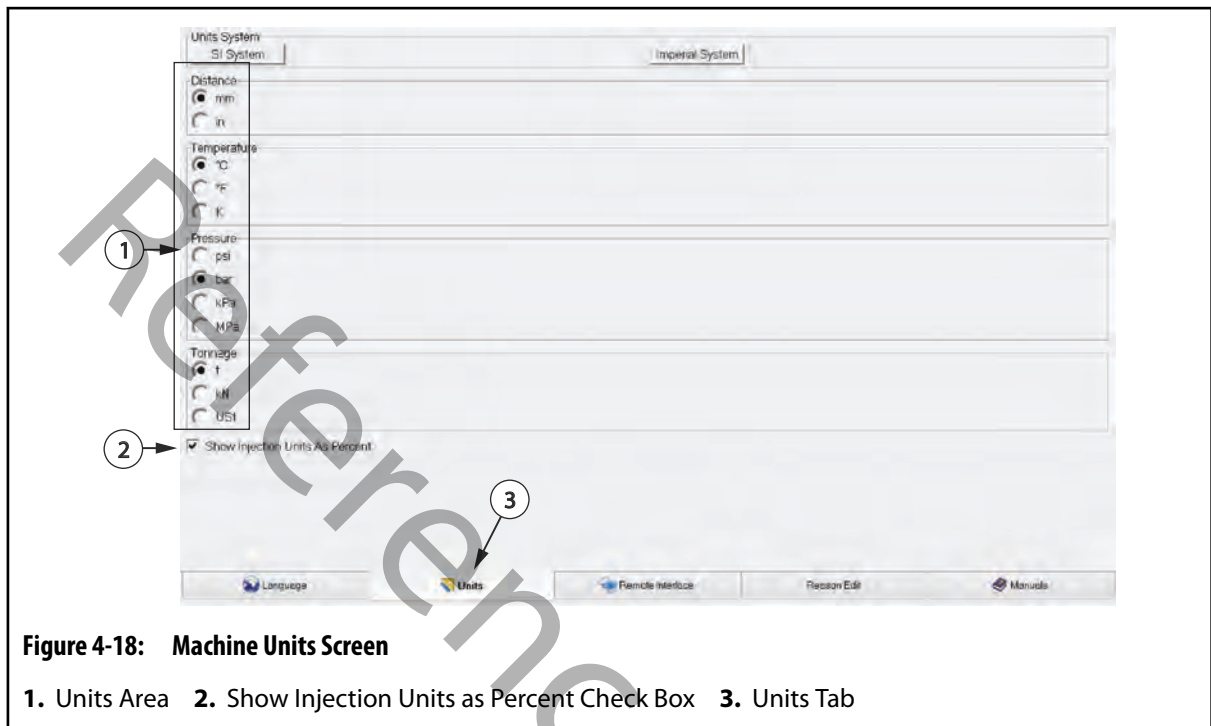


Figure 4-18: Machine Units Screen

1. Units Area 2. Show Injection Units as Percent Check Box 3. Units Tab

2. In the **Tonnage**, **Distance**, **Temperature** and **Pressure** units areas, select the desired units of measure to display.
3. If required, select the Show Injection Units As Percent check box. When selected the injections units are displayed as percent.

4.8 Viewing and Setting Configurable Outputs

The Configurable Outputs screen allows users to configure the operation of outputs based on events happening on the machine.

To navigate to the Configurable Outputs screen, do the following:

On the HMI, touch the Settings button, and then touch the Configurable Outputs tab. The Configurable Outputs screen appears.

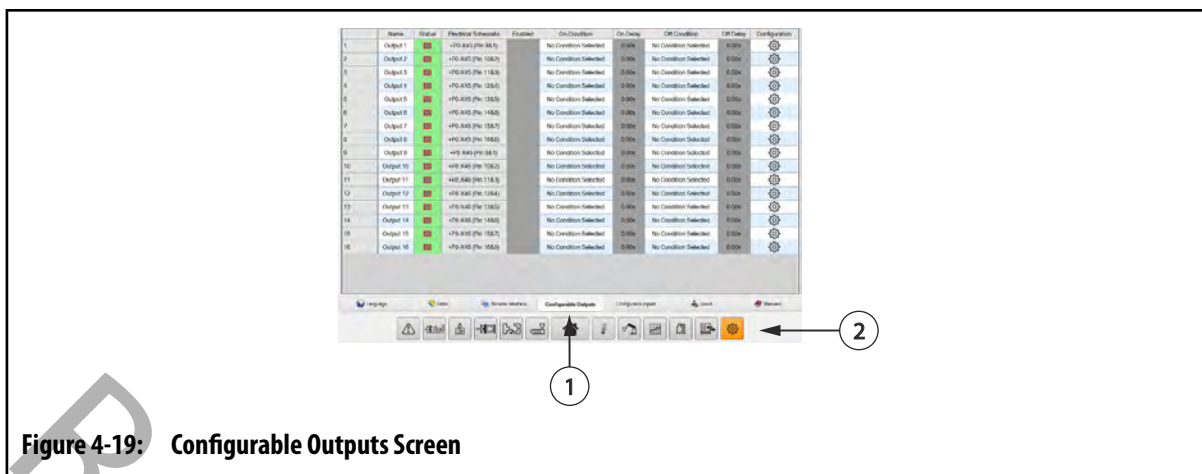


Figure 4-19: Configurable Outputs Screen

Table 4-2: Configurable Output Options

Column Name	Description
Name	Displays the output name
Status	Displays the output status
Electrical Schematic	Displays details about the electrical schematic
Enabled	Indicates if the output is currently enabled
On Condition	Displays the condition that must be met for the output to turn on
On Delay	Displays the delay, in seconds, before the output will turn on
Off Condition	Displays the condition that must be met for the output to turn off
Off Delay	Displays the delay, in seconds, before the output will turn off
Configuration	Displays the settings icon to access additional configuration settings

4.9 Viewing and Setting Configurable Inputs

The Configurable Inputs screen allows users to configure the operation (or action) of the machine based on input status.

To navigate to the Configurable Inputs screen, do the following:

On the HMI, touch the Settings button, and then touch the Configurable Inputs tab. The Configurable Inputs screen appears.

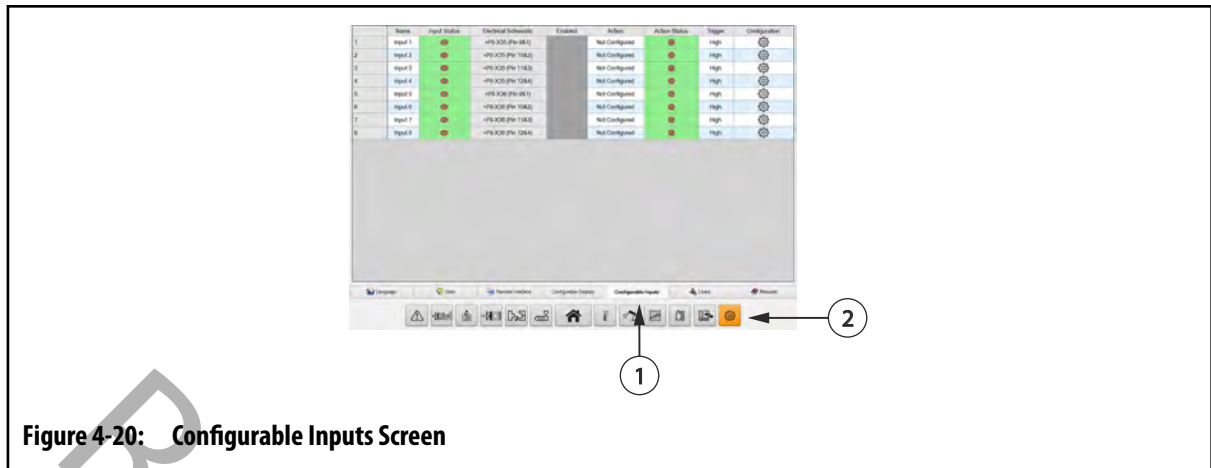


Figure 4-20: Configurable Inputs Screen

Table 4-3: Configurable Input Options

Column Name	Description
Name	Displays the input name
Input Status	Displays the input status
Electrical Schematic	Displays details about the electrical schematic
Enabled	Indicates if the output is currently enabled
Action	Displays the action to take place for the selected input
Action Status	Displays the status of the action
Trigger	Displays the trigger level of the input (high/low)
Configuration	Displays the settings icon to access additional configuration settings

4.10 Viewing and Configuring the Cycle Optimization Screen

The Cycle Optimization screen can be configured to show machine variables on the screen. The screen also includes the cycle breakdown chart and up to 4 graphs.

To view the Cycle Optimization screen, do the following:

- On the HMI, touch the **Machine** button and touch the **Cycle Optimization** tab to display the **Cycle Optimization** screen.

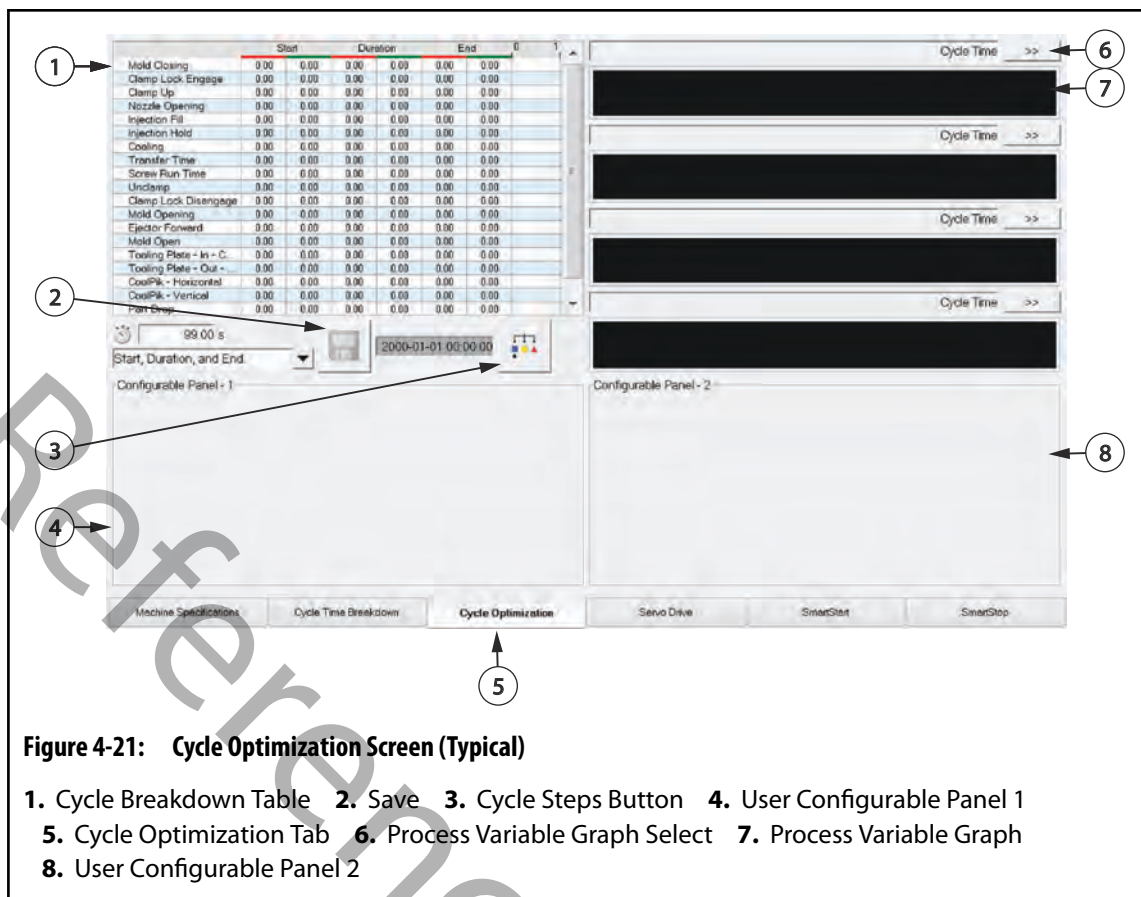


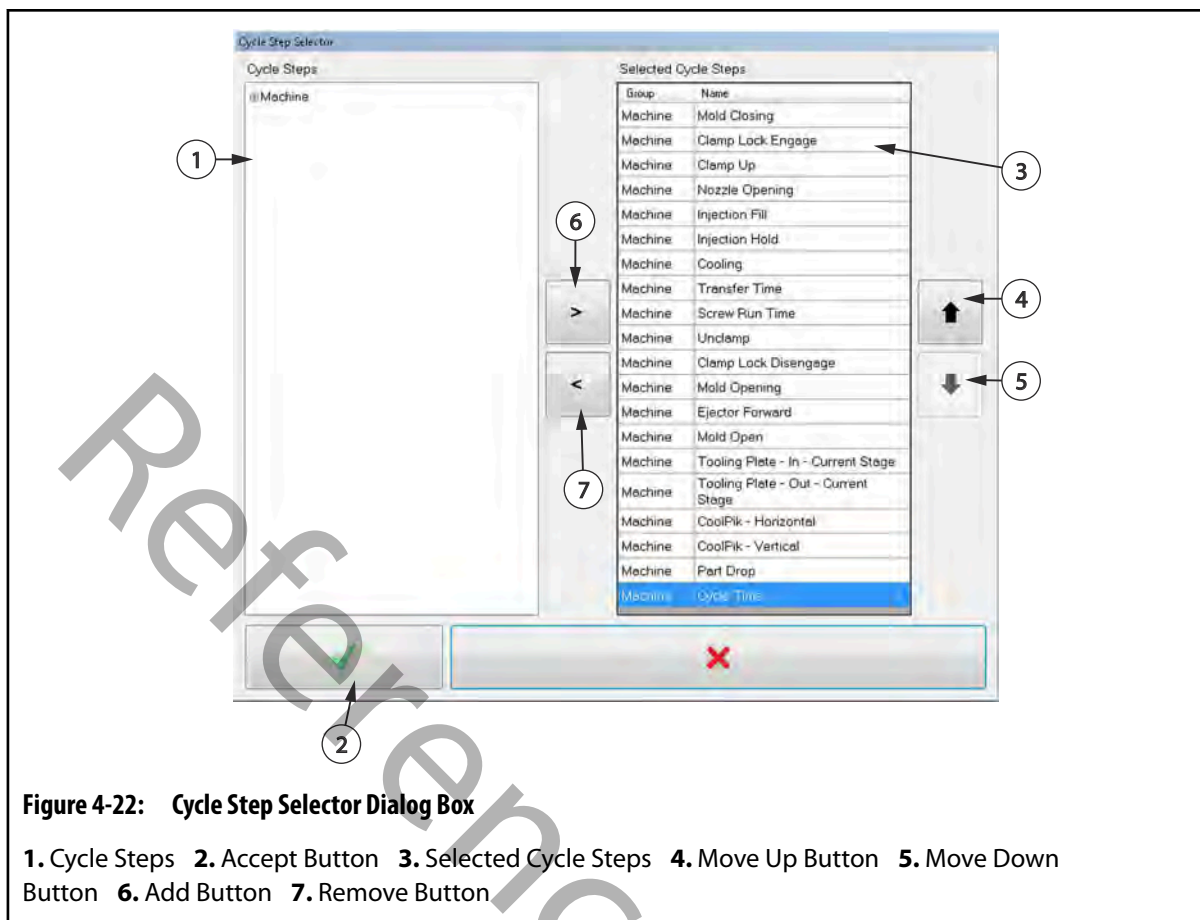
Figure 4-21: Cycle Optimization Screen (Typical)

1. Cycle Breakdown Table 2. Save 3. Cycle Steps Button 4. User Configurable Panel 1
 5. Cycle Optimization Tab 6. Process Variable Graph Select 7. Process Variable Graph
 8. User Configurable Panel 2

4.10.1 Selecting the Cycle Steps

To select the cycle steps, do the following:

1. On the HMI, touch the **Machine** button and touch the **Cycle Optimization** tab to display the **Cycle Optimization** screen.
2. Touch the **Cycle Steps** button. The **Cycle Steps Selector** dialog box appears.



3. In the **Cycle Steps** list, select the step to include.
4. Touch the **Add** button and the cycle step is added to the list.
5. Use the **Move Up** and **Move Down** buttons to position the step in the list.
6. Touch the **Accept** button.

4.10.2 Adding Cycle Optimization Screen Variables

The Cycle Optimization screen allows the supervisor to add and remove the machine variables from screen.

NOTE:

Only users with Supervisor level access rights are able to add user configurable panel variables.

To add cycle configurable panel variables, do the following:

1. Log into the HMI as a supervisor.
2. On the HMI, touch the **Machine** button and touch the **Cycle Optimization** tab to display the **Cycle Optimization** screen.
3. Select the **Screen Configuration Enable** check box, and then confirm enabling the feature.

4. Click on the more button next to the User Configurable Panel to edit. The **User Configurable Panel Variable Selector** dialog box appears.

NOTE:

There are two User Configurable Panels.

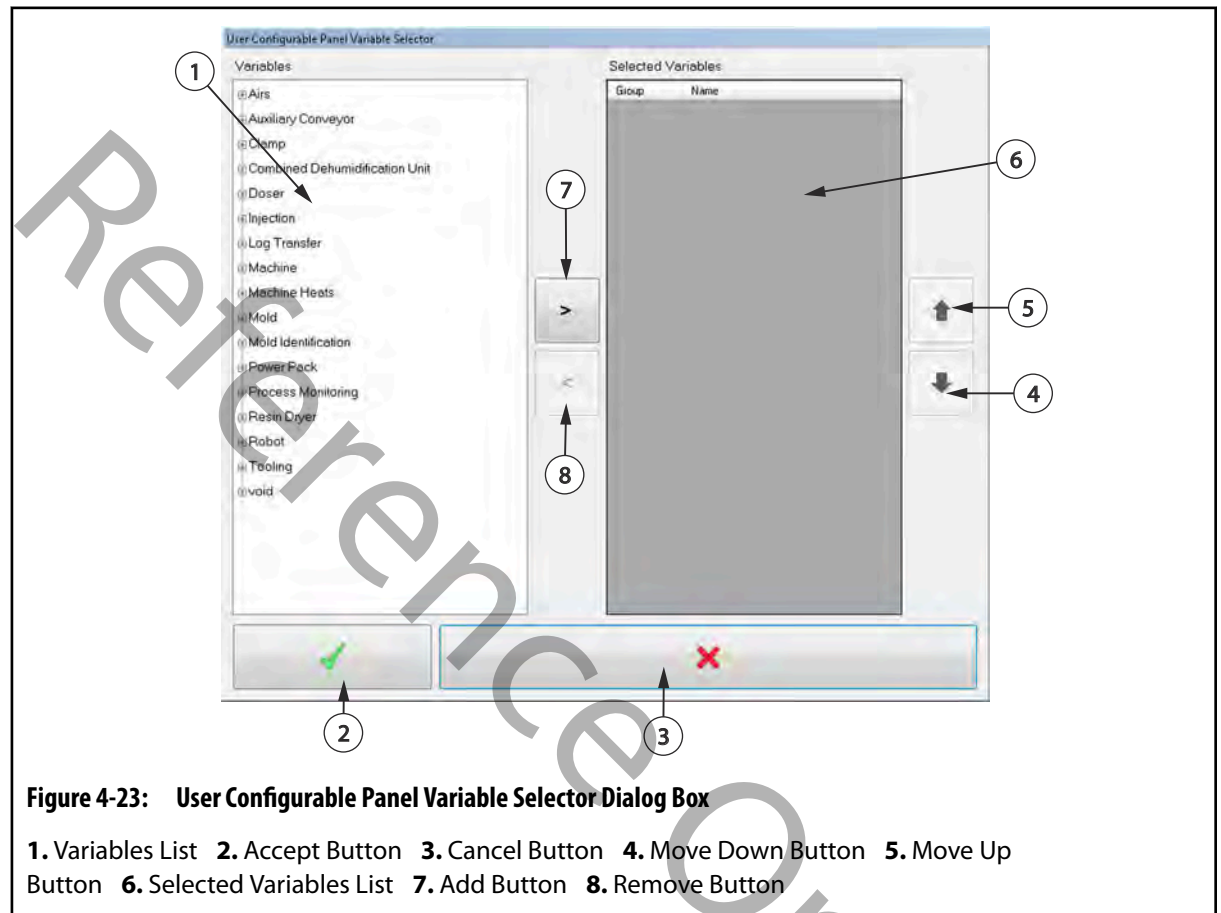


Figure 4-23: User Configurable Panel Variable Selector Dialog Box

1. Variables List 2. Accept Button 3. Cancel Button 4. Move Down Button 5. Move Up Button 6. Selected Variables List 7. Add Button 8. Remove Button

5. In the **Variables** list, select the variable to display on the **Cycle Optimization** screen.
6. Touch the **Add** button. The variable selected appears on the **Selected Variables** list.
7. Repeat [step 5](#) to [step 6](#) to add additional variables.
8. Touch the **Accept** button.

4.10.3 Removing Cycle Optimization Screen Variables

The Cycle Optimization screen allows the supervisor to add and remove the machine variables from screen.

NOTE:

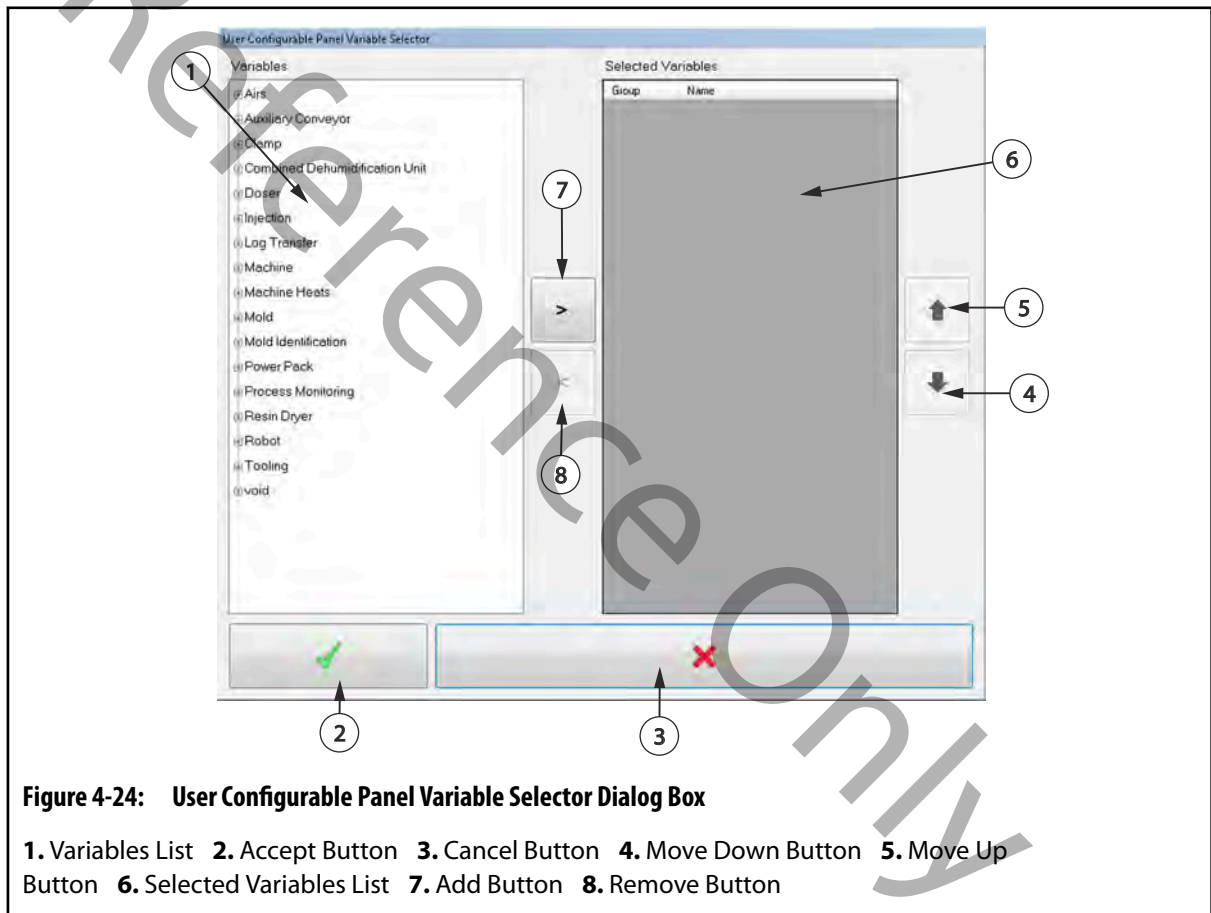
Only users with Supervisor level access rights are able to remove user configurable panel variables.

To remove cycle configurable panel variables, do the following:

1. Log into the HMI as a supervisor.
2. On the HMI, touch the **Machine** button and touch the **Cycle Optimization** tab to display the **Cycle Optimization** screen.
3. Select the **Screen Configuration Enable** check box.
4. Click on the more button next to the User Configurable Panel to edit. The **User Configurable Panel Variable Selector** dialog box appears.

NOTE:

There are two User Configurable Panels.



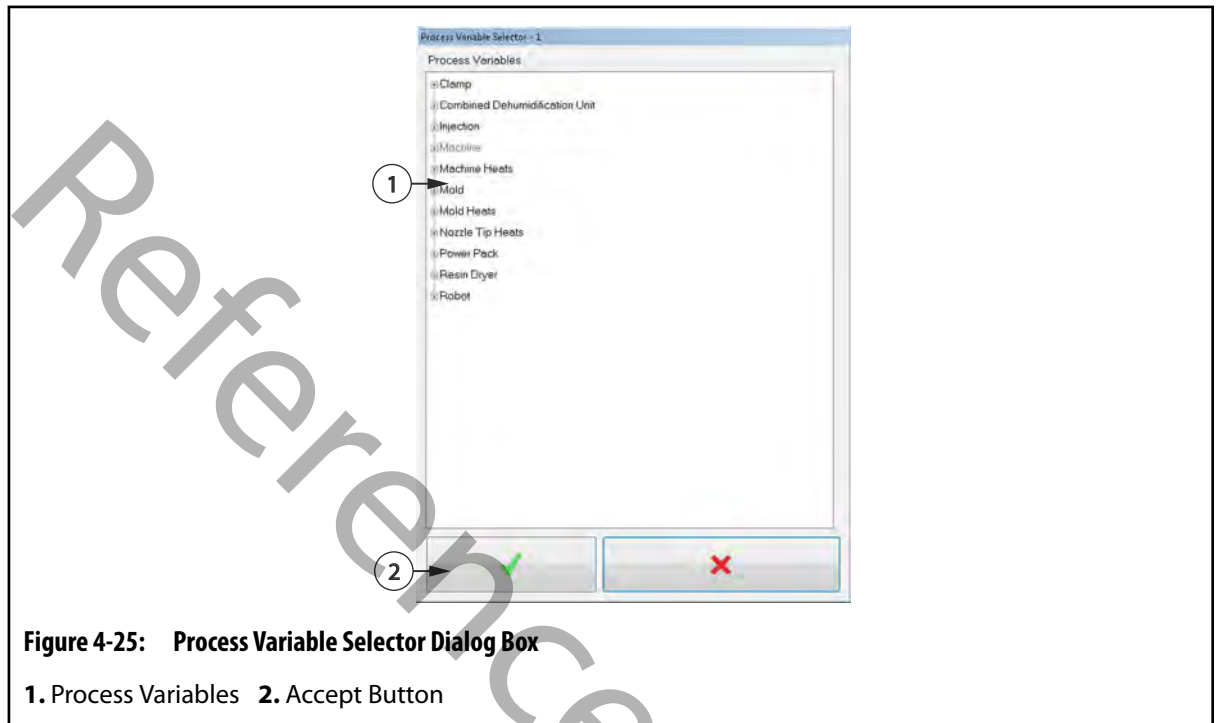
5. In the **Variables** list, select the variable to display on the **Cycle Optimization** screen.
6. Touch the **Remove** button. The variable selected is removed from the Selected Variables list.
7. Repeat [step 5](#) to [step 6](#) to remove additional variables.
8. Touch the **Accept** button.

4.10.4 Selecting Cycle Optimization Screen Process Variable Graphs

The Cycle Optimization screen allows the selection of the Process Variable Graphs for display on screen. Up to four graphs can be displayed.

To select the process variable graphs, do the following:

1. Log into the HMI as a supervisor.
2. On the HMI, touch the **Machine** button and touch the **Cycle Optimization** tab to display the **Cycle Optimization** screen.
3. Click on the more button next to the Process Variable Graph. The **Process Variable Selector** dialog box appears.



4. In the **Variables** list, select the variable to display on the **Cycle Optimization** screen.
5. Touch the **Accept** button.

4.11 Machine Specifications

The **Machine Specifications** screen allows users to view various machine operational parameters, and general performance in graphical form.



IMPORTANT!

The machine performance indicators will be displayed if the machine is equipped with the feature and only when HyPET HPP5 tooling is installed in the machine and the mold configuration file has been updated. The Mold ID will trigger to show or hide these indicators from the operator depending on what tool is installed.

Four performance indicators are used to track:

- Cavitation

- Cycle Time
- Energy Consumption
- Auto Cycle Hours (uptime)

Each indicator (except Auto Cycle Hours) displays the status as an icon underneath to help identify which need attention. The target for each indicator is the middle line, except for the Auto Cycle Hours which has no target. The value indicator of each bar gauge can go beyond the edges of the gauge to show that the machine has significantly exceeded the upper and/or lower limits.

A Help button is available to assist in achieving machine performance targets.

To navigate to the **Machine Specifications** screen do the following:

On the HMI, touch the **Machine** button, and then touch the **Machine Specifications** tab.
The **Machine Specifications** screen appears.

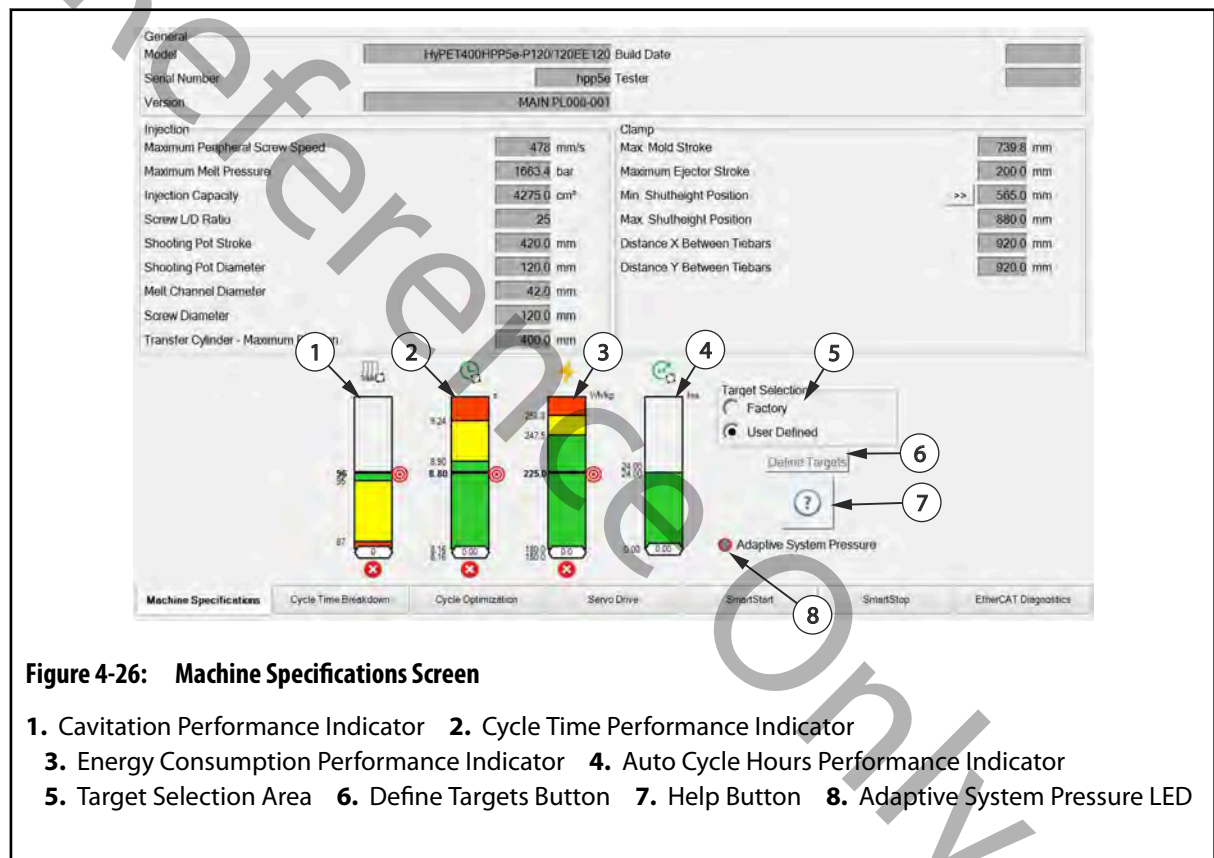


Figure 4-26: Machine Specifications Screen

1. Cavitation Performance Indicator
2. Cycle Time Performance Indicator
3. Energy Consumption Performance Indicator
4. Auto Cycle Hours Performance Indicator
5. Target Selection Area
6. Define Targets Button
7. Help Button
8. Adaptive System Pressure LED

Field	Description
Serial Number	Displays the machine serial number
Build Date	Displays the physical machine date
Tester	Displays the name of the Husky personnel who tested the machine
Version	Displays the HMI software version number currently installed on the machine

Field	Description
Maximum Peripheral Screw Speed	Displays the maximum screw speed
Maximum Melt Pressure	Displays the maximum plastic pressure
Injection Capacity	Displays the maximum volume that can be injected by the shooting pot at maximum stroke
Screw L/D Ratio	Displays the length to diameter ratio of the screw
Shooting Pot Stroke	Displays the maximum allowable shooting pot position
Shooting Pot Diameter	Displays the shooting pot diameter
Melt Channel Diameter	Displays the melt channel diameter
Screw Diameter	Displays the screw diameter
Transfer Cylinder - Maximum Position	Maximum screw back position
Maximum Mold Stroke	Displays the maximum mold open position. This value varies depending on the mold shutheight
Maximum Ejector Stroke	Displays the maximum ejector stroke value
Minimum Shutheight Position	Displays the minimum mold shutheight
Maximum Shutheight Position	Displays the maximum mold shutheight
Distance X Between Tiebars	Displays the horizontal distance between tiebars
Distance Y Between Tiebars	Displays the vertical distance between tiebars

4.11.1 Defining Performance Targets (If Equipped)

There are two types of performance targets:

- Factory targets: these targets are in the mold configuration file.
- User defined targets: these targets are defined by the user.

The following are the options for selecting type of the performance targets:

- the mold ID sequence is not performed. The factory targets option is disabled but the user defined targets can be configured.
- the mold ID sequence is performed but no performance targets exist in the mold configuration file. The factory targets option is disabled but the user defined targets can be configured.
- the mold ID sequence is performed and performance targets exist in the mold configuration file, the factory targets option or the user defined option can be selected.

To define the user defined performance targets, do the following:



IMPORTANT!

Administrator rights are required to define performance targets.

1. On the HMI, touch the **Production** key.
2. Touch the **Machine Specifications** tab. The Machine Specifications screen appears.

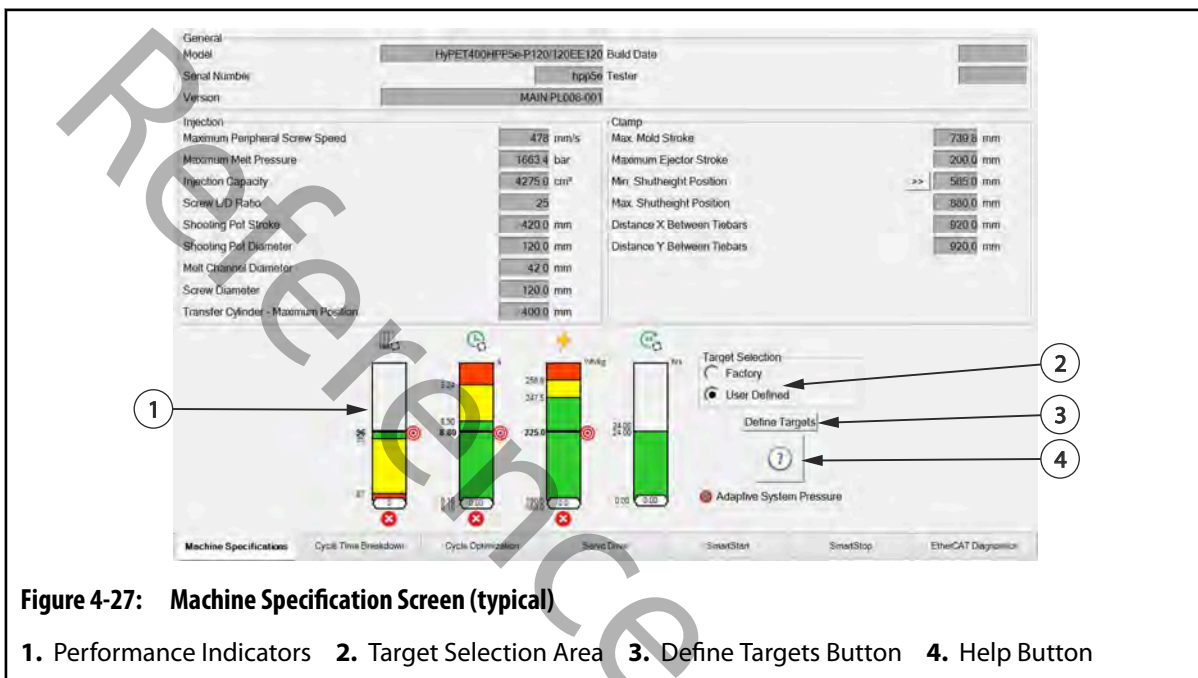


Figure 4-27: Machine Specification Screen (typical)

1. Performance Indicators 2. Target Selection Area 3. Define Targets Button 4. Help Button

3. In the **Target Selection** area, select **User Defined**.
4. Touch the **Define Targets** button. The Machine Performance Indicators - Define Targets dialog box appears.



Figure 4-28: Machine Performance Indicators - Define Targets Dialog Box

5. Enter the desired target values.
6. Touch the **Set Target** button.

4.12 Online Documentation

Operator and Service Manuals for the machine and mold can be viewed on the HMI.

NOTE:

If the manuals are not available on the HMI, the update files on the Documentation CD/USB for the machine or mold need to be uploaded. Refer to [Section 4.13](#) for more information.

To view the manuals, do the following:

1. On the HMI, touch the **Advanced** screen button.
2. Touch the **Manuals** tab.
3. On the **Online Documentation** screen, touch the title of the manual. The PDF file of the manual opens.

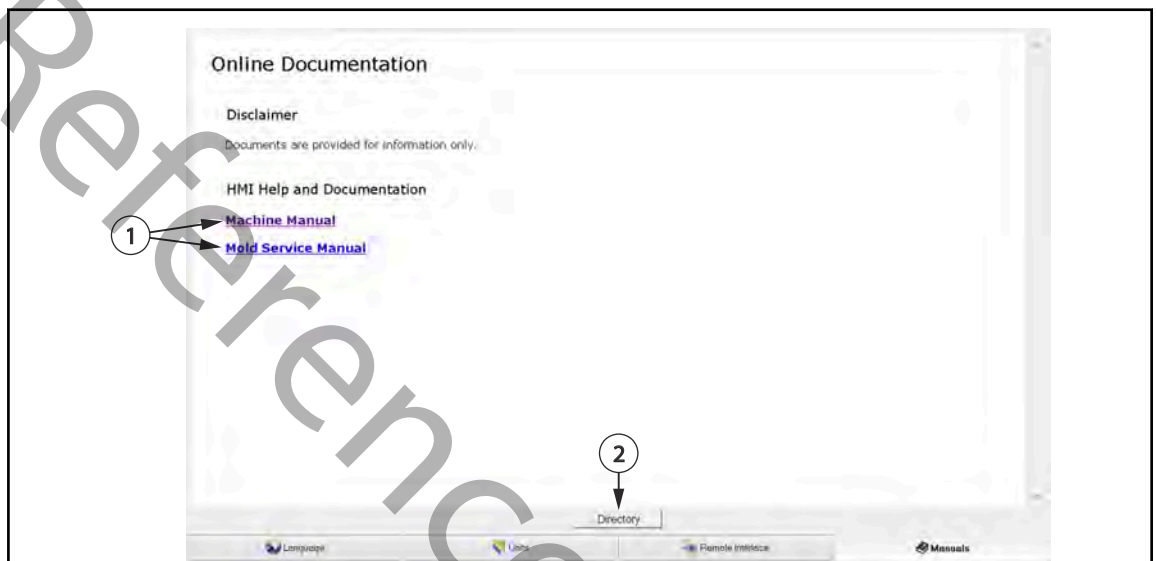


Figure 4-29: Online Documentation Screen

1. Title of Manual 2. Directory Button

NOTE:

If the PDF file is open, touch the **Directory** button to open the **Online Documentation** screen.

4.13 Loading Updates

The **Updates** screen on the HMI allows users to upload important updates for the HMI software. These updates may include online documentation, mold configuration files, or important software updates.

Updates are typically provided on the Documentation CD or USB for the machine and/or mold. Each Documentation CD/USB and update is specific to the machine or mold it was shipped with.

To upload available update files to the HMI, do the following:

NOTE:

Only users with Supervisor level access rights are able to upload available update files.

NOTE:

A USB drive is recommended for uploading update files to the HMI. However, if the machine is connected to a local area network, the update files can be placed on the network.

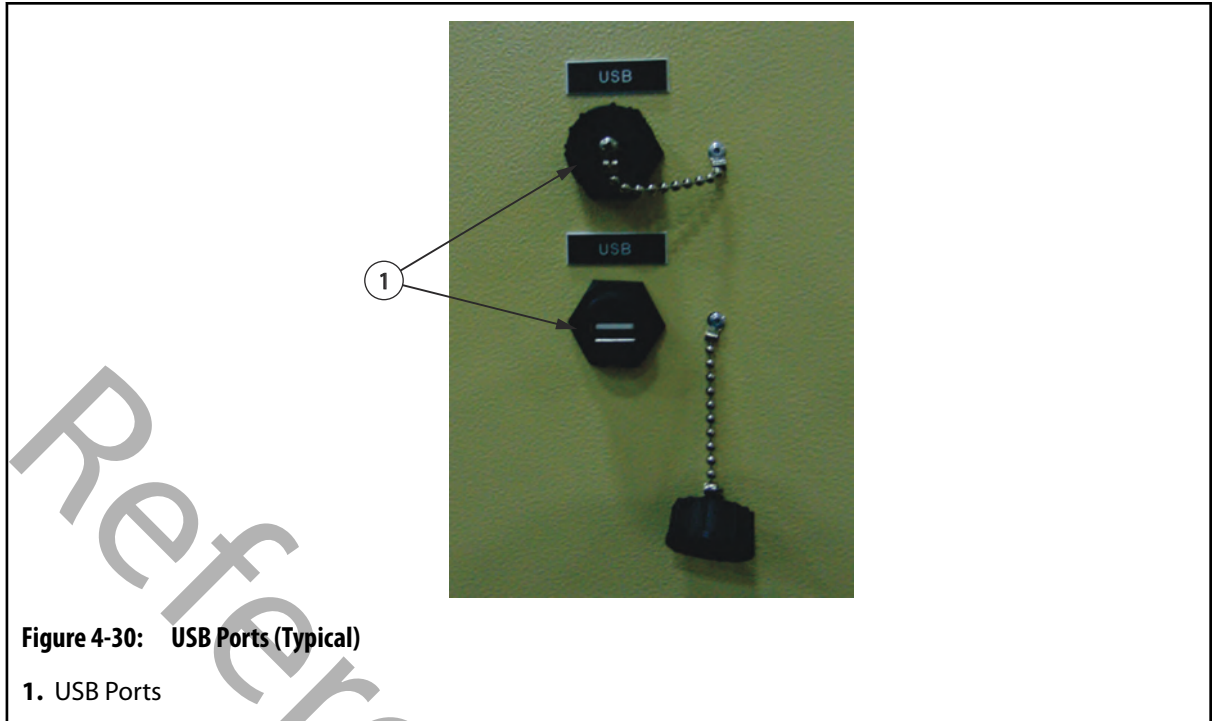
**IMPORTANT!**

Each Documentation CD/USB provided by Husky is created specifically for the machine or mold it was shipped with. Refer to the project or serial number on the CD/USB label to make sure the correct CD/USB is being used.

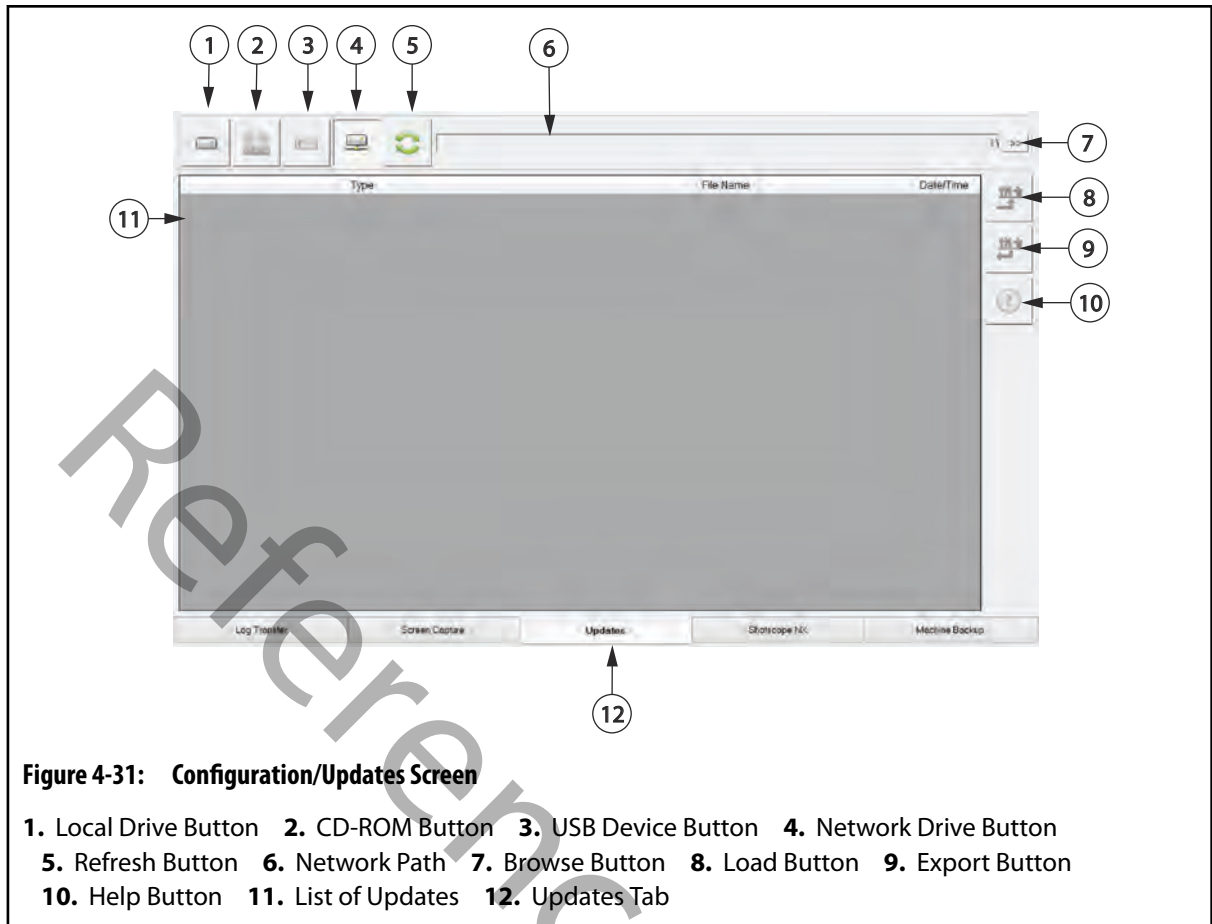
1. If a Documentation CD is provided do the following :

If the Documentation is provided on a USB, then proceed to [step](#) .

- a. Insert a blank USB drive into a laptop or personal computer.
 - b. Insert the Documentation CD for the machine or mold into a CD-ROM and navigate to the root directory of the CD.
 - c. Open the folder containing the update file(s).
 - d. Copy all files from the folder to the network or USB drive.
 - e. Safely remove the USB drive from the laptop or personal computer.
2. Log in as Supervisor. Refer to [Section 4.2](#) for more information.
 3. Insert the USB drive into one of the USB ports.



4. On the HMI, touch the **Utilities** button to display the **Utilities** screen.
5. Touch the **Updates** tab to display the **Updates** screen. Manuals, mold ID configuration files and other types of updates currently loaded on the HMI are listed.



6. Touch the **USB Device** button. The version date for each update available on the USB will be displayed in the New column.
7. Select the update type to load.



IMPORTANT!

When loading updates, a confirmation message may appear if the HMI contains files similar to those being added by a specific update. Review the message and confirm whether to overwrite the files on the HMI or cancel the update.

In the case of online documentation, it is *always* recommended that the files on the HMI be overwritten by the update. This will make sure the manuals on the HMI are the correct manuals for the machine or mold.

8. Touch the **Load** button to begin loading the update from the USB drive.
9. Repeat [step 7](#) to [step 8](#) until all updates are loaded.
10. In case the backup image of the Industrial Personal Computer (IPC) needs to be restored in the future, backup the IPC image to make sure the update(s) is already installed. Contact Husky for more information.

4.14 Exporting Mold ID Configuration Files

The mold ID configuration file can be copied to a USB drive and moved to another machine as needed. This may be required when installing the mold in another machine.

To copy the mold ID configuration file, do the following:

NOTE:

Only users with Supervisor level access rights are able export files.

1. Insert the USB drive into the general USB port.



2. Log in as Supervisor. Refer to [Section 4.2](#) for more information.
3. On the HMI, touch the **Utilities** button and touch the **Updates** tab to display the **Updates** screen. Manuals, mold ID configuration files and other types of updates currently loaded on the HMI are listed.

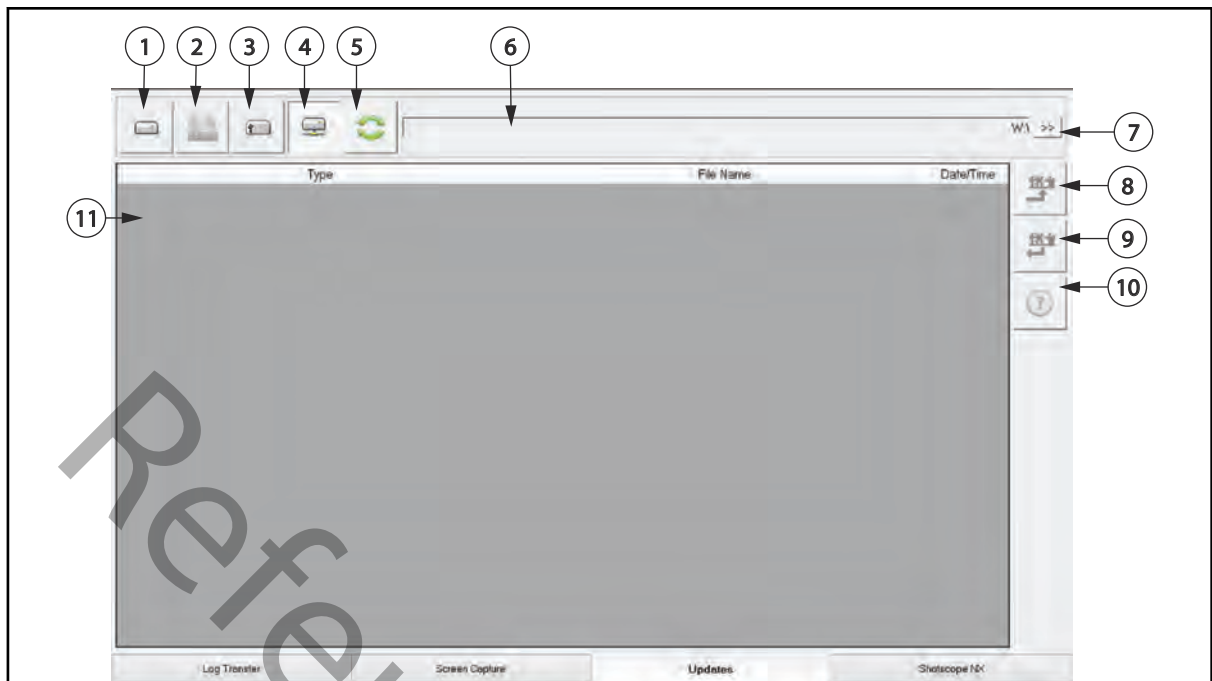


Figure 4-33: Updates Screen

1. Local Drive Button 2. CD-ROM Button 3. USB Device Button 4. Network Drive Button 5. Refresh Button 6. Network Path 7. Browse Button 8. Load Button 9. Export Button 10. Help Button 11. List of Updates

4. Select **Mold ID** from the list of updates.
5. Touch the **Export** button. The **Export** dialog box appears.

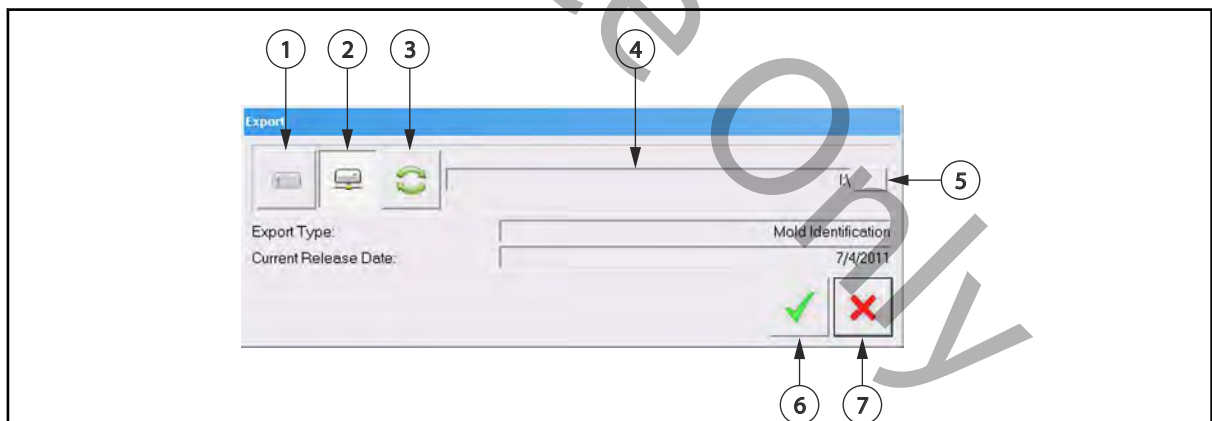


Figure 4-34: Export Dialog Box

1. USB Device Button 2. Network Drive Button 3. Refresh Button 4. Network Path 5. Browse Button 6. Accept Button 7. Cancel Button

6. Touch the **USB Device** button.
7. If necessary, touch the **Browse** button and select the destination folder on the USB device.
8. Touch the **Accept** button to copy the mold ID configuration file to the USB device, or touch **Cancel** to abort.

4.15 Using the Screen Capture Utility

Values, graphs, parameters and other elements displayed on the HMI screen can be saved or printed for future reference. Screen captures are a useful tool when communicating with service personnel and Husky's technical support services.

4.15.1 Capturing All Screens

The Capture All Screens function creates a screen capture of all screens and dialog boxes and saves them in a zip file. When the contents of the zip file is extracted a navigable version of the screens and dialog boxes is available. Refer to [Section 4.15.2](#) for more information.

NOTE:

Some screen content that is dynamic or part of a wizard is not captured (for example, the calibration screens).

To capture all screens, do the following:

1. On the HMI, touch the **Utilities** button and touch the **Screen Capture** tab to display the **Screen Capture** screen.
2. Touch the **Capture All Screens** button. The Screen Capture dialog box appears.

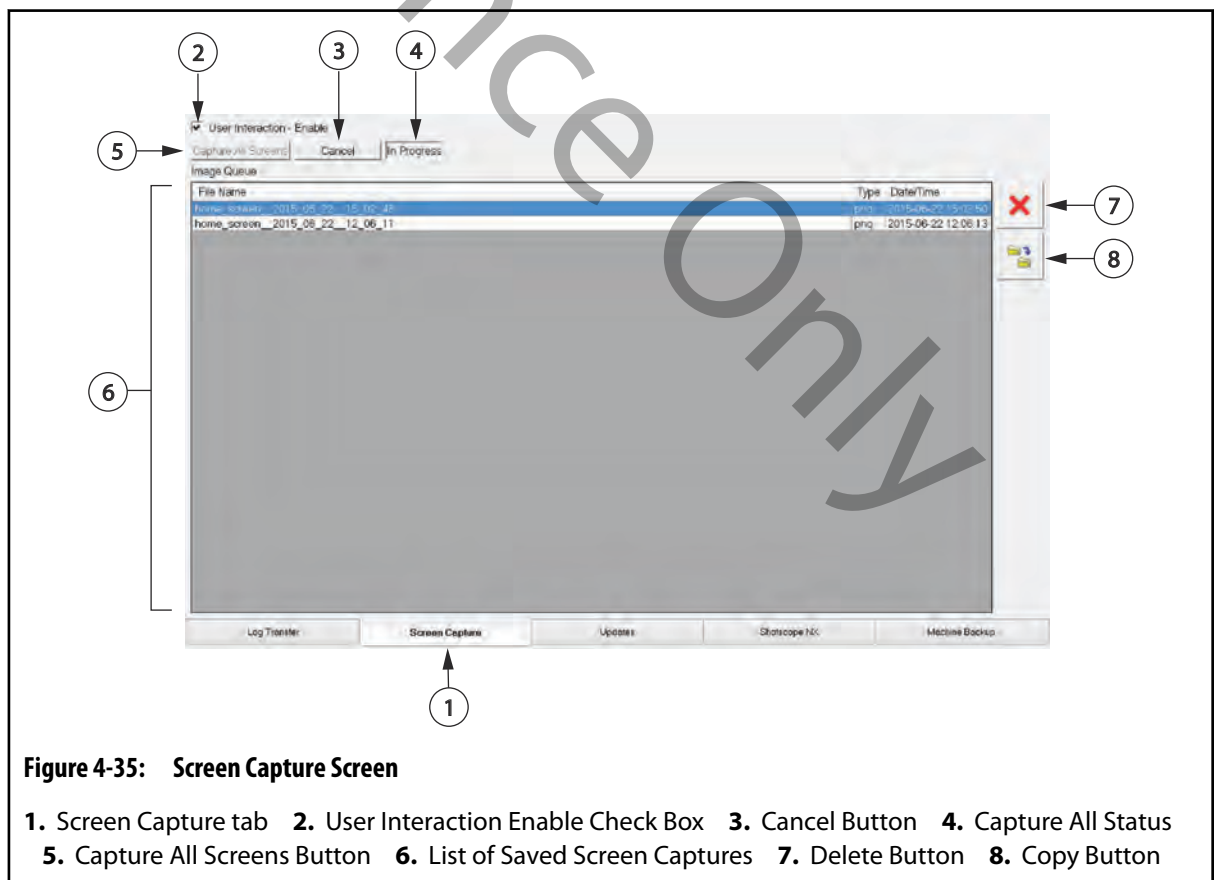
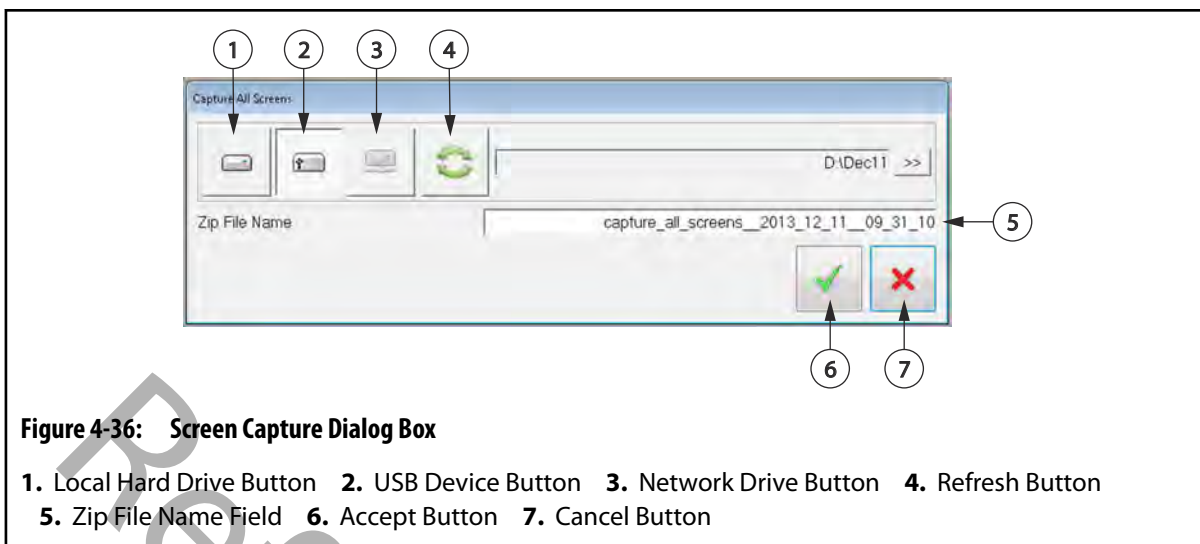


Figure 4-35: Screen Capture Screen

1. Screen Capture tab 2. User Interaction Enable Check Box 3. Cancel Button 4. Capture All Status
5. Capture All Screens Button 6. List of Saved Screen Captures 7. Delete Button 8. Copy Button



3. Select the device where the screen capture will be saved.
4. If necessary, select the **Zip File Name** field and type a suitable name for the screen capture.
5. Touch the **Accept** button to save the screen capture.

4.15.2 Viewing Capture All Screens

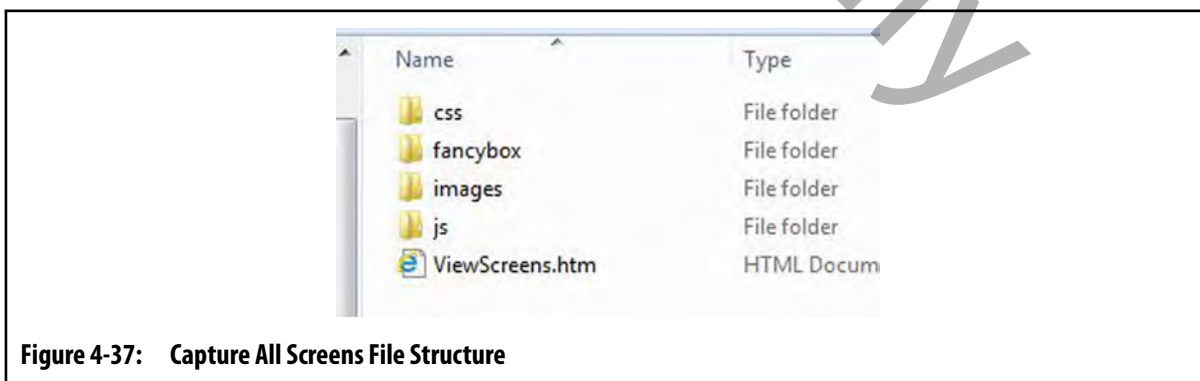
When capturing all screens a zip file is created. The extracted zip file contents creates a navigable view of the screens.

To view the navigable version of the screen captures:

1. Capture all screens. Refer to [Section 4.15.1](#) for more information.
2. If required, copy the zip file to a network or another computer. Refer to [Section 4.15.4](#) for information on copying files.
3. Extract all contents from the zip file.

NOTE:

The navigable version does not function unless all the files are extracted from the zip file.



4. Double-click on the **ViewScreens.htm** file. The HMI screens will open in the browser.

NOTE:

Depending on the computer security, an active X message may appear. Click the **Allowed Block Content** button to view the content.



Figure 4-38: Capture All Screens Output (typical)

5. Click to navigate through the screens. The navigation is the same as for the HMI including the dialog boxes.

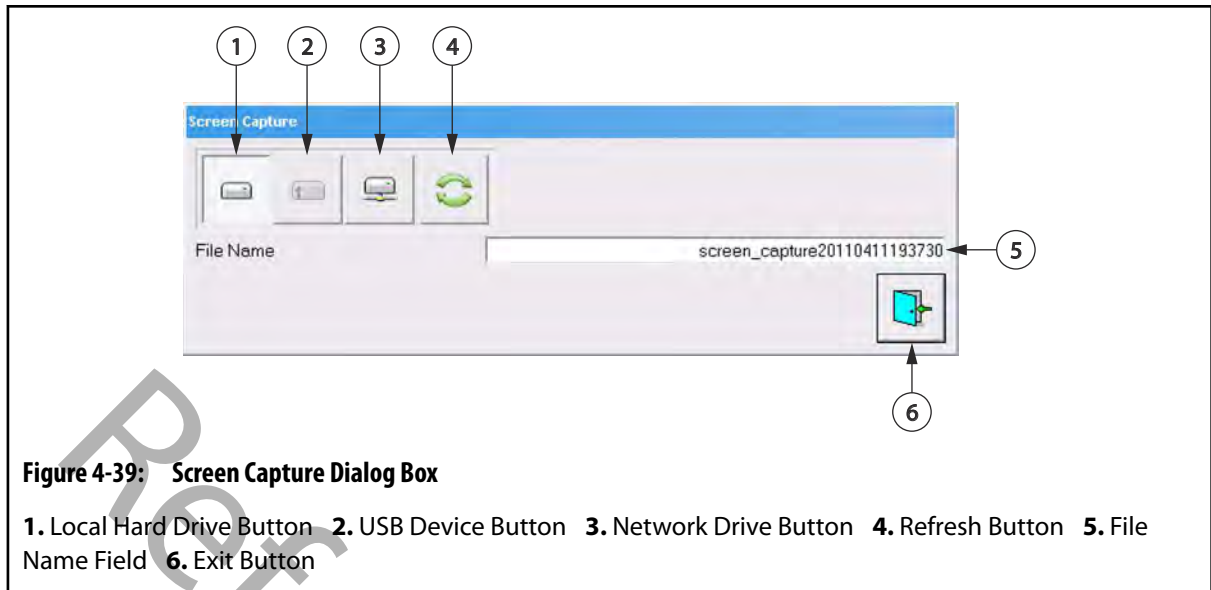
4.15.3 Taking Individual Screen Captures

To take a screen capture, do the following:

NOTE:

All screen captures are automatically saved locally on the HMI.

1. On the HMI, press one of the **Function Group** keys to display the **Machine** icons.
2. Press the **Screen Capture** function key to take a screen capture of the current screen. The Screen Capture dialog box appears.



3. Select the device where the screen capture will be saved.
4. If necessary, select the **File Name** field and type a suitable name for the screen capture.
5. Touch the **Exit** button to save the screen capture.

4.15.4 Copying Screen Captures

To copy a screen capture to a portable storage device or network, do the following:

1. On the HMI, touch the **Utilities** button and touch the **Screen Capture** tab to display the **Screen Capture** screen.

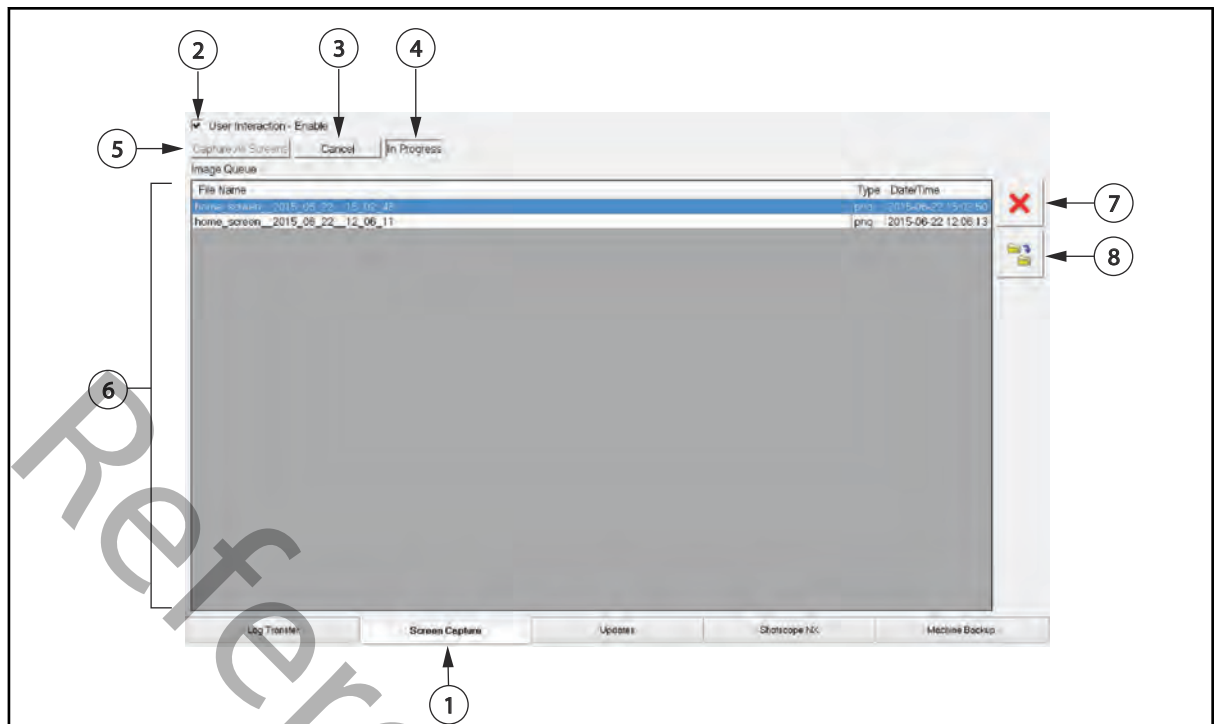


Figure 4-40: Screen Capture Screen

1. Screen Capture Tab 2. User Interaction Enable Check Box 3. Cancel Button 4. Capture All Status 5. Capture All Screens Button 6. List of Saved Screen Captures 7. Delete Button 8. Copy Button

2. Select the screen capture to export from the list.
3. Touch the **Copy** button. The **Image Queue - Copy** dialog box appears.

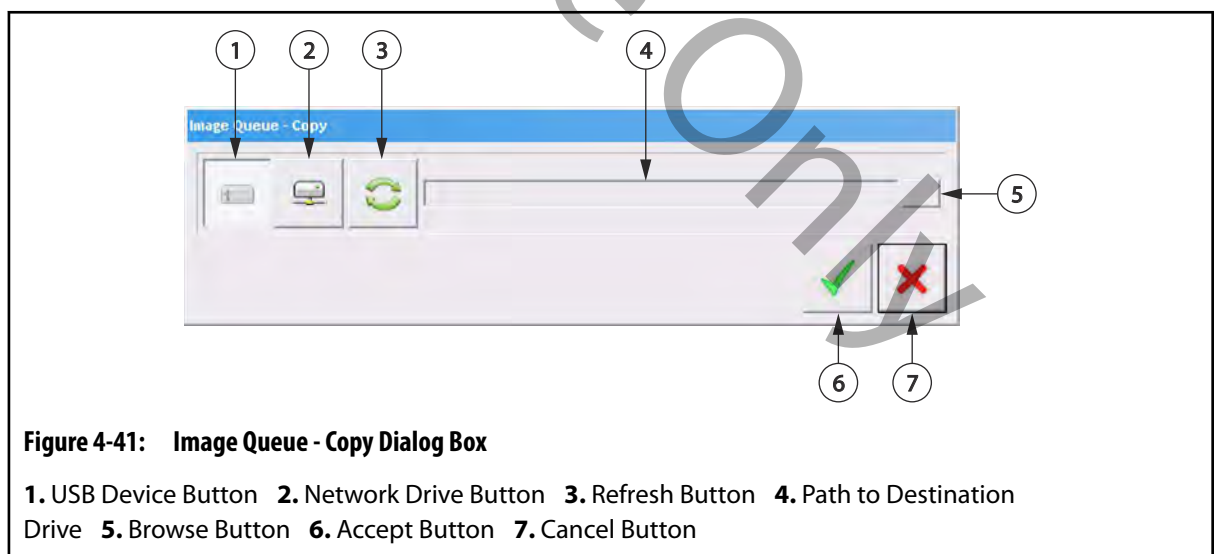


Figure 4-41: Image Queue - Copy Dialog Box

1. USB Device Button 2. Network Drive Button 3. Refresh Button 4. Path to Destination Drive 5. Browse Button 6. Accept Button 7. Cancel Button

4. Touch the **Accept** button to copy the image to the destination drive, or touch the **Cancel** button to exit without saving changes.

4.15.5 Deleting Screen Captures

To delete a screen capture, do the following:

1. On the HMI, touch the **Utilities** button and touch the **Screen Capture** tab to display the **Screen Capture** screen.



2. Select the screen capture to delete from the list.
3. Touch the **Delete** button. A dialog box appears to confirm the screen capture has been deleted.

4.16 Connecting External Devices

Modems and other external devices, such as a keyboard, mouse, printer or storage device, can be connected to the machine using the USB ports located on the electrical cabinet.

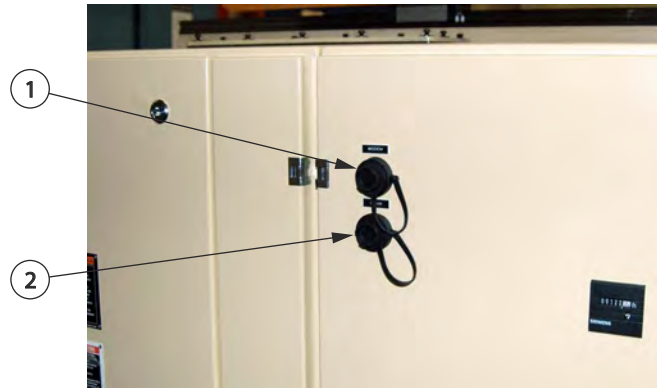


Figure 4-43: USB Ports (Typical)

1. Modem Port 2. General USB Port

4.17 Managing User Accounts

The following procedures describe how to create, change and delete user accounts. Only users with Supervisor level access rights are able to perform these procedures.

4.17.1 Creating a User Account

To create a new user account, do the following:

NOTE:

Only users with Supervisor level access rights are able to create new user accounts.

1. Log in as Supervisor. Refer to [Section 4.2](#) for more information.
2. On the HMI, touch the **Utilities** button.
3. Touch the **Users** tab to display the **Users** screen.

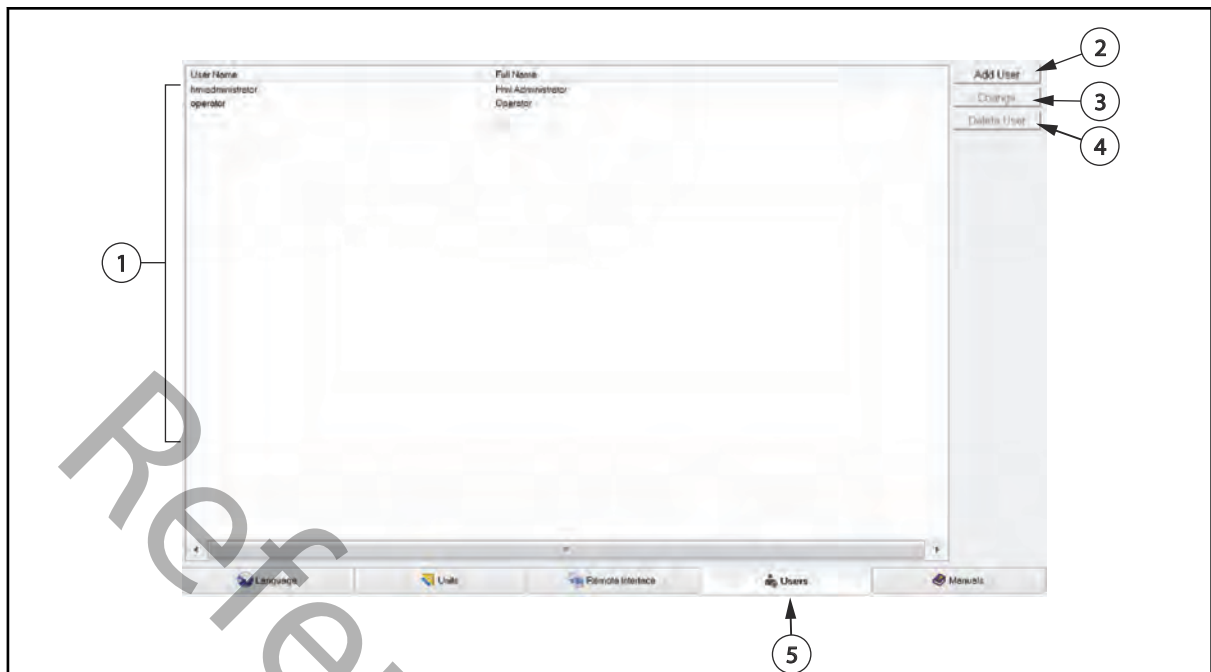


Figure 4-44: Users Screen

1. List of User Profiles 2. Add User Button 3. Change Button 4. Delete User Button 5. Users Tab

4. Touch the **Add User** button. The **Add User** dialog box appears.

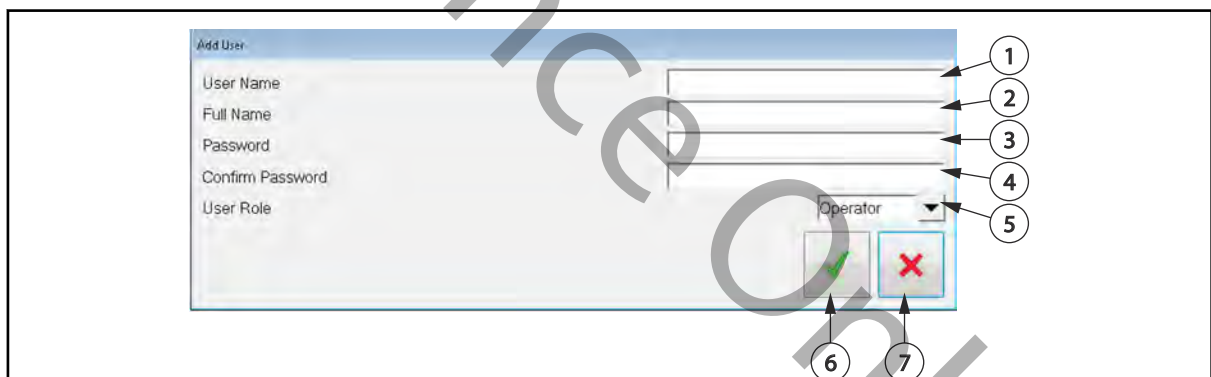


Figure 4-45: Add User Dialog Box

1. User Name Field 2. Full Name Field 3. Password Field 4. Confirm Password Field 5. User Role Field 6. Accept Button 7. Cancel Button

5. Touch the **User Name** field and type a user name to quickly identify the user.
6. Touch the **Full Name** field and type the users first and last name.
7. Touch the **Password** field and type the users password.
8. Touch the **Confirm Password** field and type the users password again.
9. Touch the **User Role** field. The **User Role** dialog box appears.

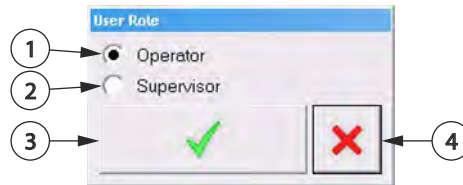


Figure 4-46: User Role Dialog Box

1. Operator Option 2. Supervisor Option 3. Accept Button 4. Cancel Button

10. Select **Operator** or **Supervisor**, and then touch the **Accept** button.

11. Touch the **Accept** button on the **Add User** dialog box to create the new user account.

4.17.2 Changing User Settings

To change a users settings, do the following:

NOTE:

Only users with Supervisor level access rights are able to change an existing user account.

1. Log in as Supervisor. Refer to [Section 4.2](#) for more information.
2. On the HMI, touch the **Utilities** button.
3. Touch the **Users** tab to display the **Users** screen.



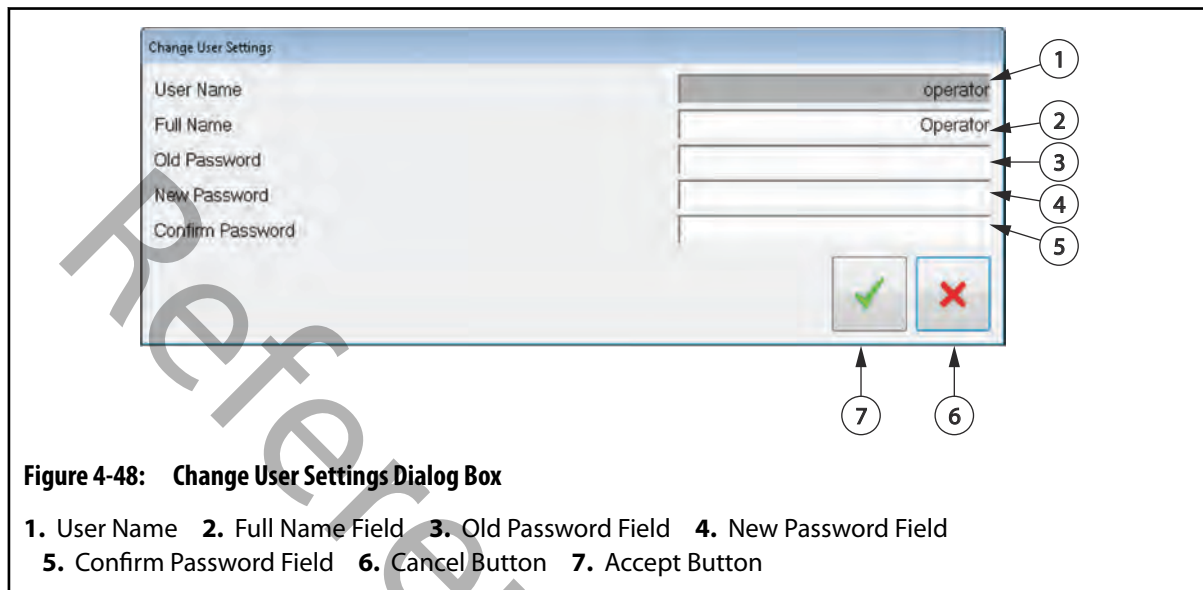
Figure 4-47: Users Screen

1. Users Tab 2. Add User Button 3. Change Button 4. Delete User Button 5. Configuration Tab

NOTE:

If the user account is stored on a data key, make sure the data key is inserted into the HMI.

4. Select a user account from the list and touch the **Change** button. The **Change User Settings** dialog box appears.



5. Modify the user name, full name, password and/or user role as necessary.
6. Press the **Accept** button to save the changes or press the **Cancel** button to exit without saving changes.

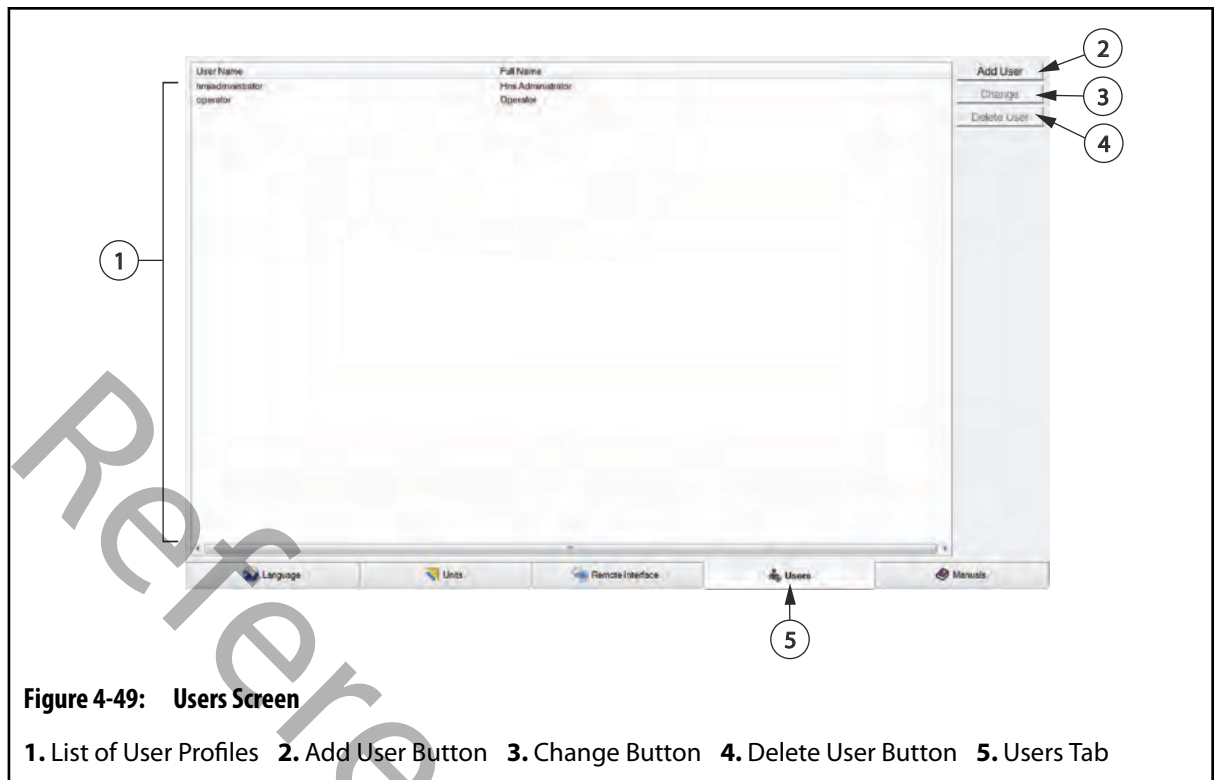
4.17.3 Deleting a User Account

To delete a user account, do the following:

NOTE:

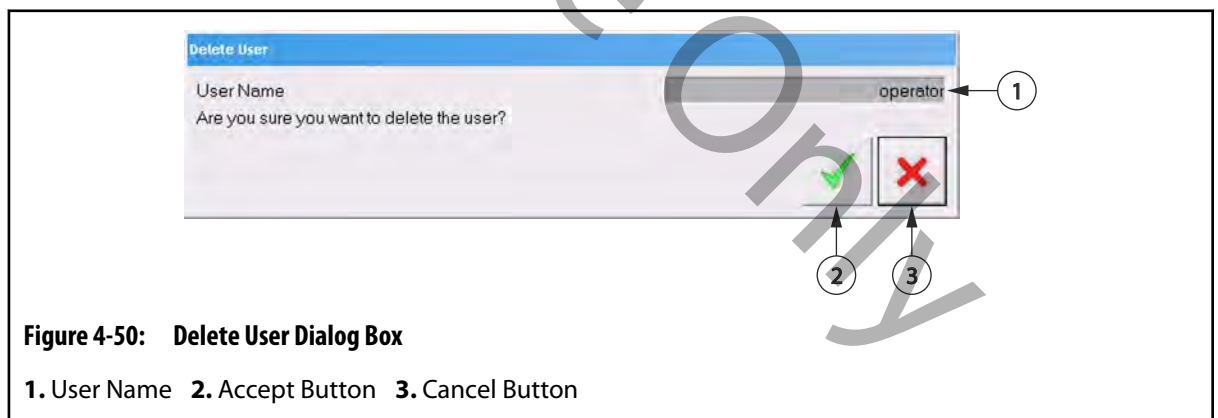
Only users with Supervisor level access rights are able to delete a user account.

1. Log in as Supervisor. Refer to [Section 4.2](#) for more information.
2. On the HMI, touch the **Utilities** button.
3. Touch the **Users** tab to display the **Users** screen.

**NOTE:**

If the user account is stored on a data key, make sure the data key is inserted into the HMI.

4. Select a user account from the list and touch the **Delete** button. The **Delete User** dialog box appears.



5. Press the **Accept** button to delete the user account or press the **Cancel** button to abort.

4.18 Connecting the Machine to the Host System Using the Husky Host Interface

The following procedures describe how to connect a customer-supplied host computer system to the machine using the Husky host interface.

To connect the machine to the host system, perform the following procedures in the order listed.

Step	Task Description	Reference
1	Connect the LAN cable	Section 4.18.1
2	Enable the host system on the machine HMI	Section 4.18.2
3	Enter the machine IP address onto the host system	Section 4.18.3

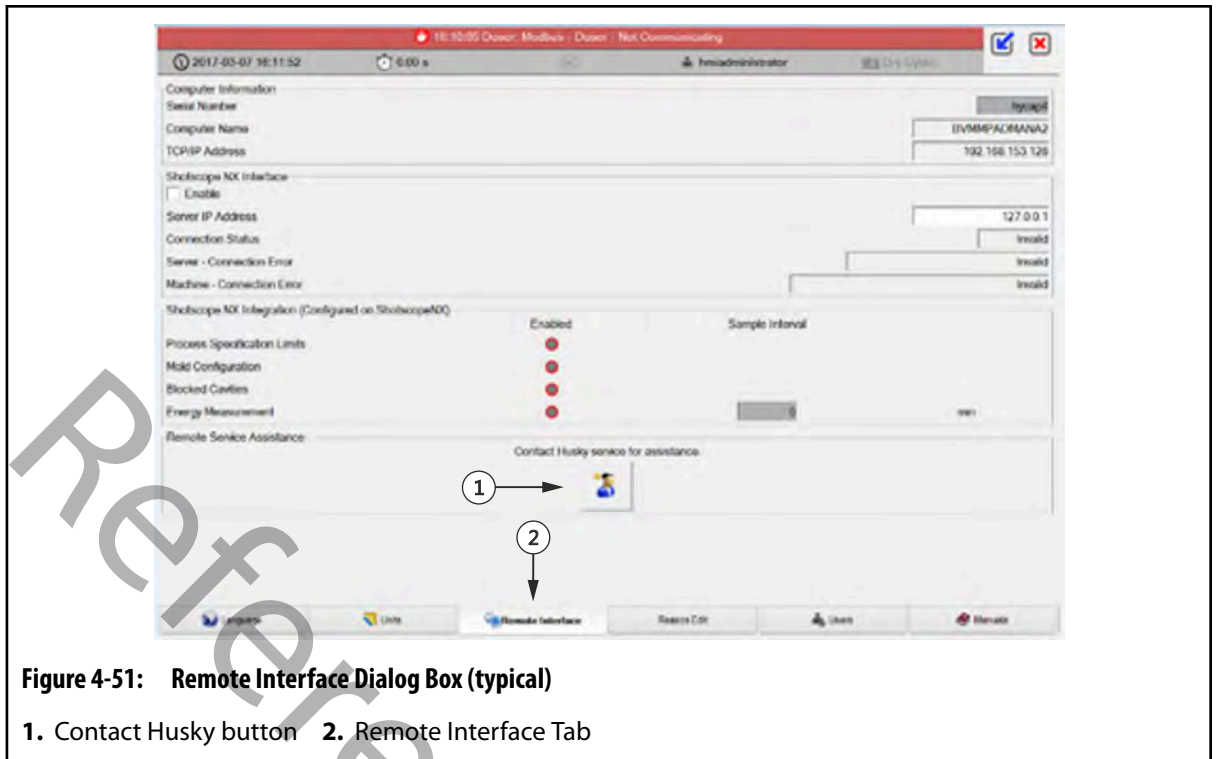
4.18.1 Connecting the LAN Cable

Make sure the ethernet cable is connected to the **PLANT LAN** port. Refer to the electrical schematic for more information.

4.18.2 Enabling the Host System on the Machine HMI (if Equipped)

To enable the host system on the machine HMI, do the following:

1. On the toolbar, touch the **Advanced** button.
2. Touch the **Remote Interface** tab.

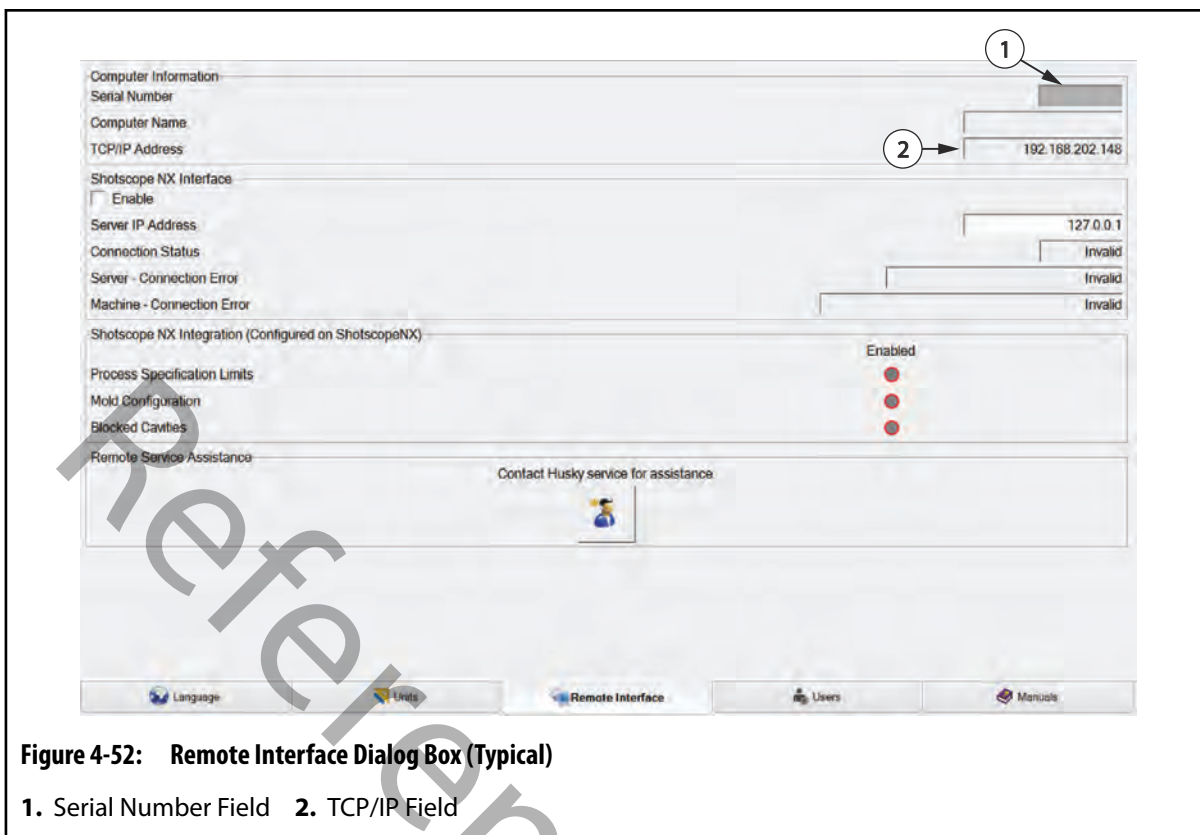


3. Click the "Contact Husky service for assistance" button (may be 30 second wait). You must be logged in as HMI administrator.
4. A Husky customer support person will walk you through the procedure for granting them remote access to your machine over the phone.

4.18.3 Entering the Machine IP Address onto the Host System

To enter the machine IP address onto the host system, do the following:

1. On the toolbar, touch the **Advanced** button.
2. On the HMI, touch the **Remote Interface** tab.
3. Under **Computer Information**, record the following information:
 - **Serial Number**
 - **TCP/IP Address**



4. On the host computer, enter the **Serial Number** and the **TCP/IP** information recorded in [step 3](#).

4.19 Backing Up HMI Data

The data backup function creates a backup of HMI databases, PLC control software, and user files (for example: mold setup files). The backup is written to a USB drive.



IMPORTANT!

The USB drive must have at least 4GB of available space. Do not use a Windows 8 Compatible USB flash drive (branded with the Windows 8 Compatible logo) as the IPC will not recognize it.

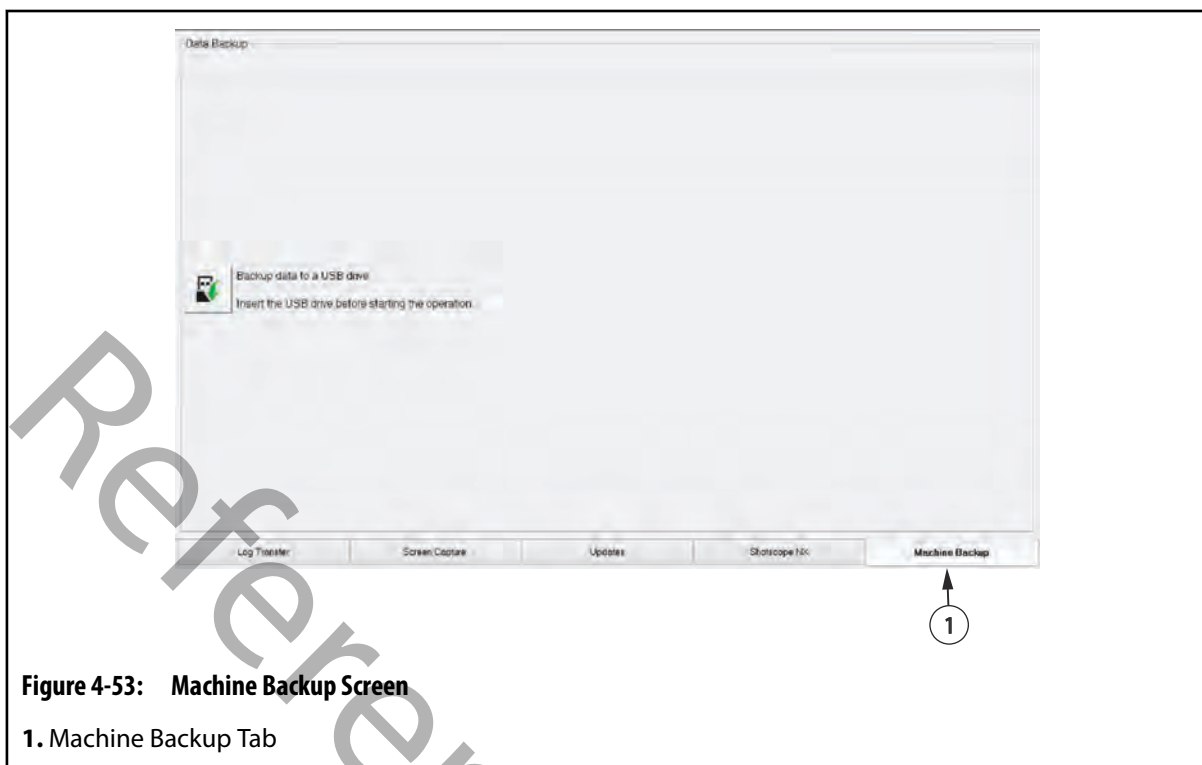
To back up HMI data, do the following:

NOTE:

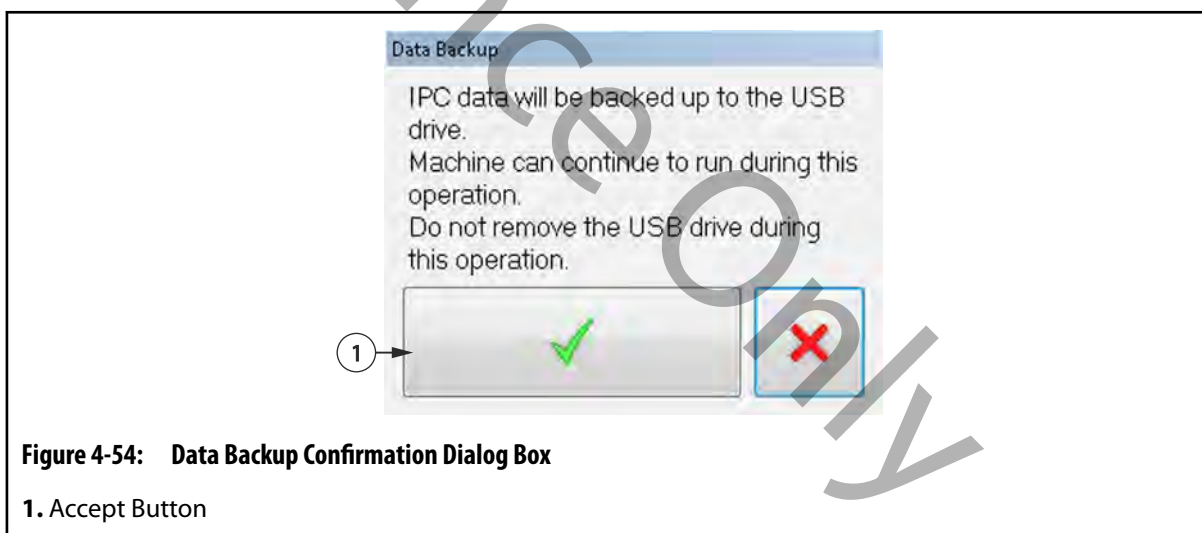
Data backup can be done at any time, even while the machine is cycling.

1. Insert a USB drive into the USB port.
2. On the HMI, touch the **Utilities** button.

3. Touch the **Machine Backup** tab to display the **Machine Backup** screen.



4. Touch the **Data Backup** button. A confirmation dialog box appears.



5. Touch the **Accept** button. The process dialog box appears.

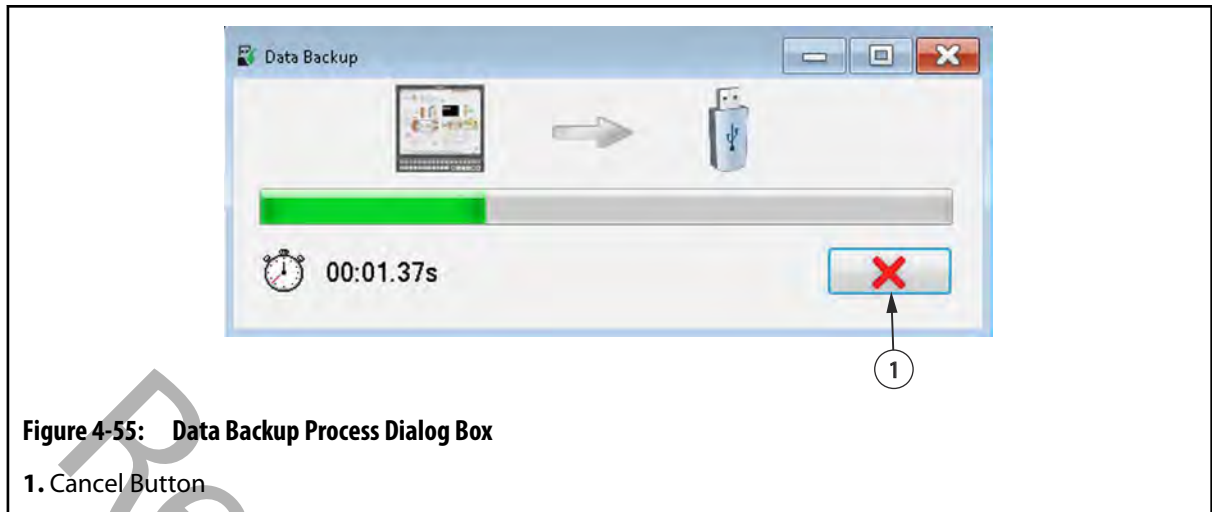


Figure 4-55: Data Backup Process Dialog Box

1. Cancel Button

When the data backup is complete the **Accept** button will appear in the **Data Backup** dialog box.

NOTE:

If the **Cancel** button is selected, a message box appears with the following message: **Backup is in progress. Are you sure you want to exit?** Touch **Yes** to cancel the backup or **No** to continue with the backup.

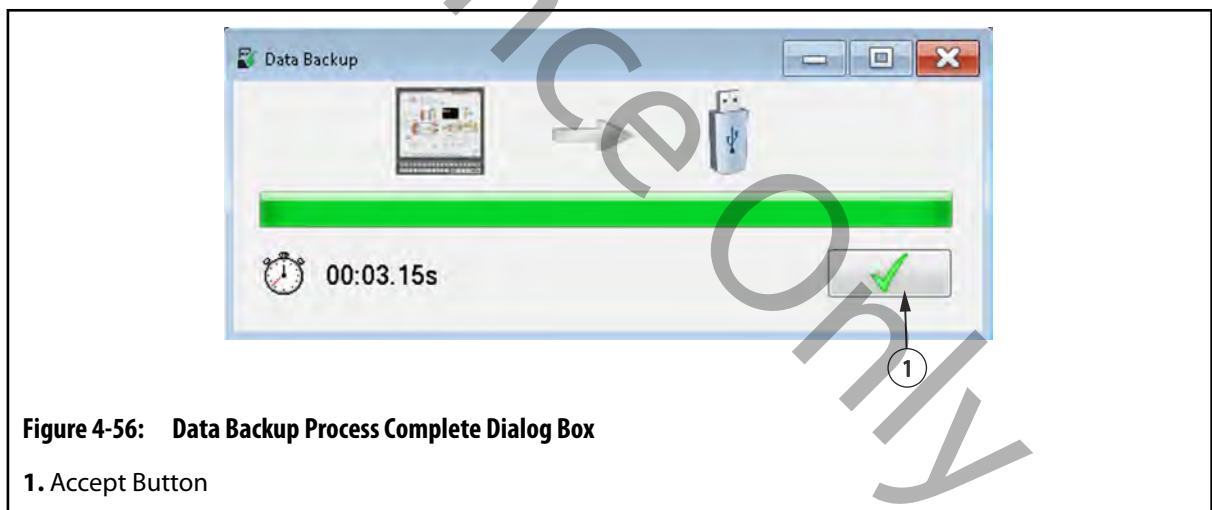


Figure 4-56: Data Backup Process Complete Dialog Box

1. Accept Button

6. Touch the **Accept** button, and then remove the USB drive.

4.20 Managing Mold Setup Files

The following procedures describe how to create, save, load, copy or delete mold setup files. Mold setup files contain machine setup parameters and SPC settings (if applicable).

The host drive acts like a local transfer folder/drive where it can be used as a source or destination for mold setup files only if the Husky Host Interface is enabled and the machine is connected to the host computer. When a mold setup file is saved or copied to the host drive, it is transferred to the host computer. The host computer is used to transfer mold setup files to the host drive before they can be loaded onto the machine or copied to another location.

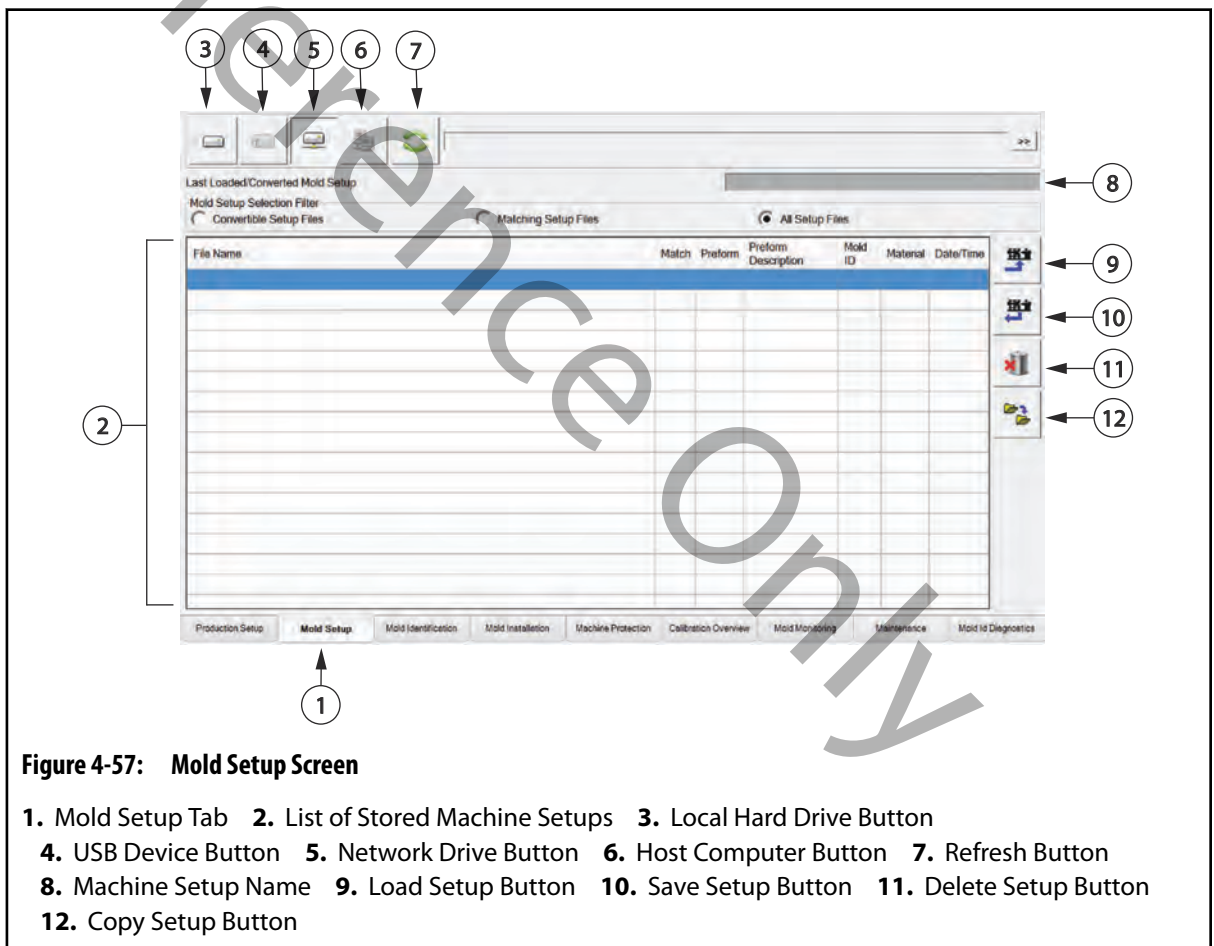
NOTE:

When the host computer issues a start of job command, all mold setup files are deleted from the host drive.

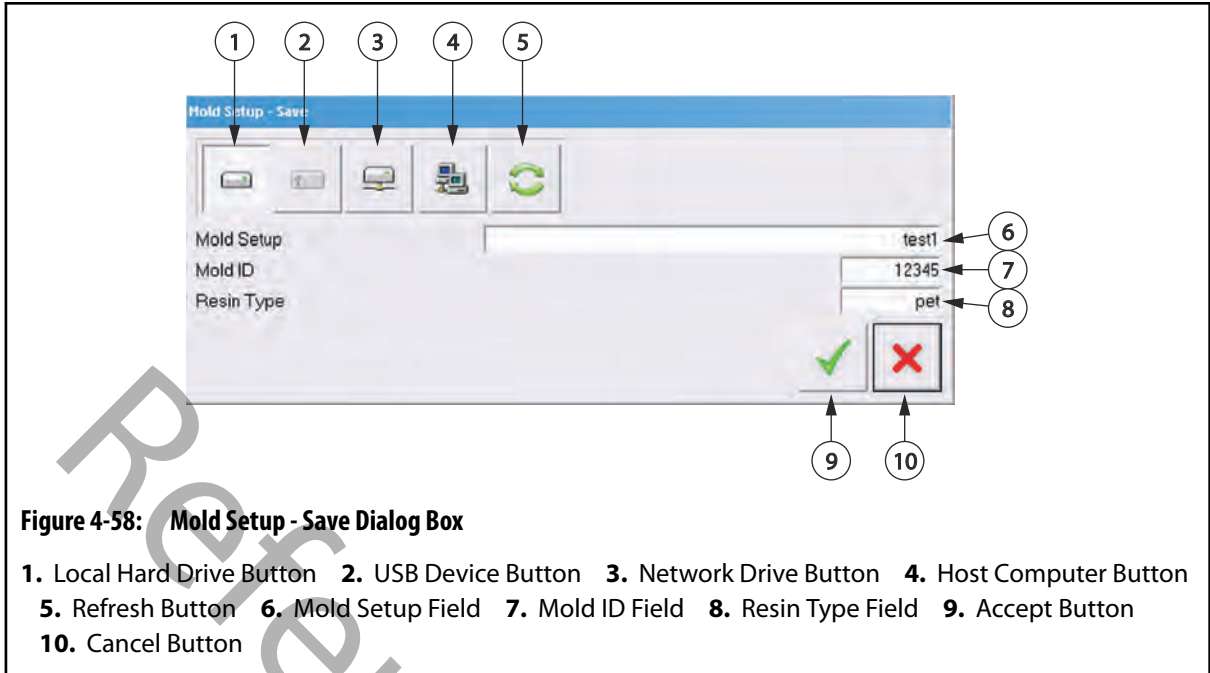
4.20.1 Creating and Saving a Mold Setup File

To create or save a mold setup file, do the following:

1. On the HMI, touch the **Production** button, and then touch the **Mold Setup** tab to display the **Mold Setup** screen.



2. If necessary, touch an existing mold setup in the list to overwrite it with the active mold setup file. Otherwise, continue to [step 3](#).
3. Touch the **Save Setup** button. The **Mold Setup - Save** dialog box appears.



4. Select the device where the mold setup file will be saved.



IMPORTANT!

Each mold setup file must have a unique name. Attempting to save a mold setup file to the same storage device as an existing mold setup file with the same name may overwrite the original file. The HMI will ask for confirmation before overwriting existing files.

5. If necessary, touch the **Mold Setup** field and type a new name for the mold setup.
6. Touch the **Mold ID** field and type the mold project number. The project number is listed on the mold nameplate.
7. Touch the **Resin Type** field and type the resin type.

NOTE:

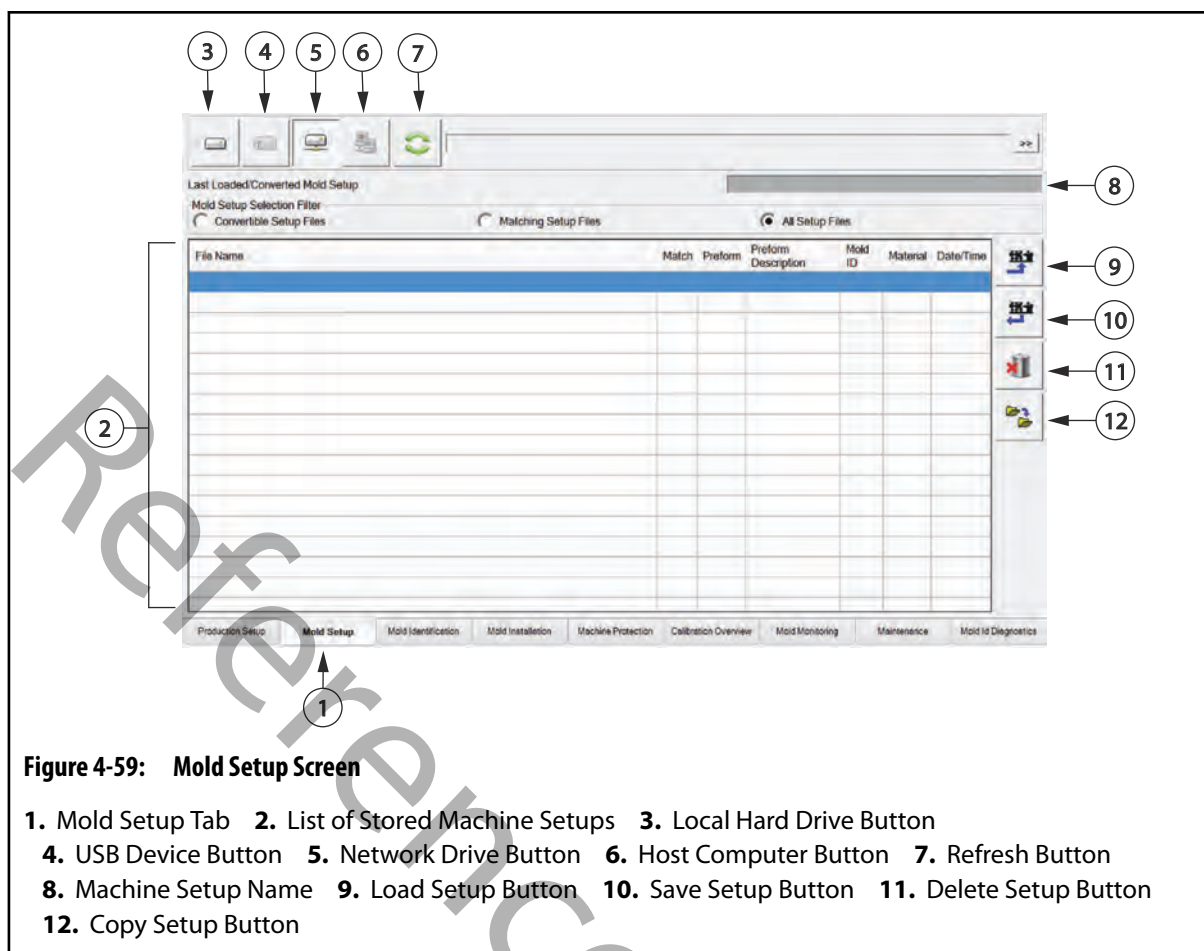
If a mold setup with the same file name exists on the hard drive, a confirmation message will be displayed. Touch **Yes** to overwrite the existing mold setup file with the active mold setup, or touch **No** to abort.

8. Touch the **Accept** button to save the mold setup and close the **Save Mold Setup** dialog box. Otherwise, touch **Cancel** to abort.

4.20.2 Copying Mold Setup Files

To copy one or more mold setup files, do the following:

1. On the HMI, touch the **Production** button and touch the **Mold Setup** tab to display the **Mold Setup** screen.



2. Select the mold setup file to copy from the list.
3. Touch the **Copy Setup** button. The **Mold Setup - Copy** dialog box appears.

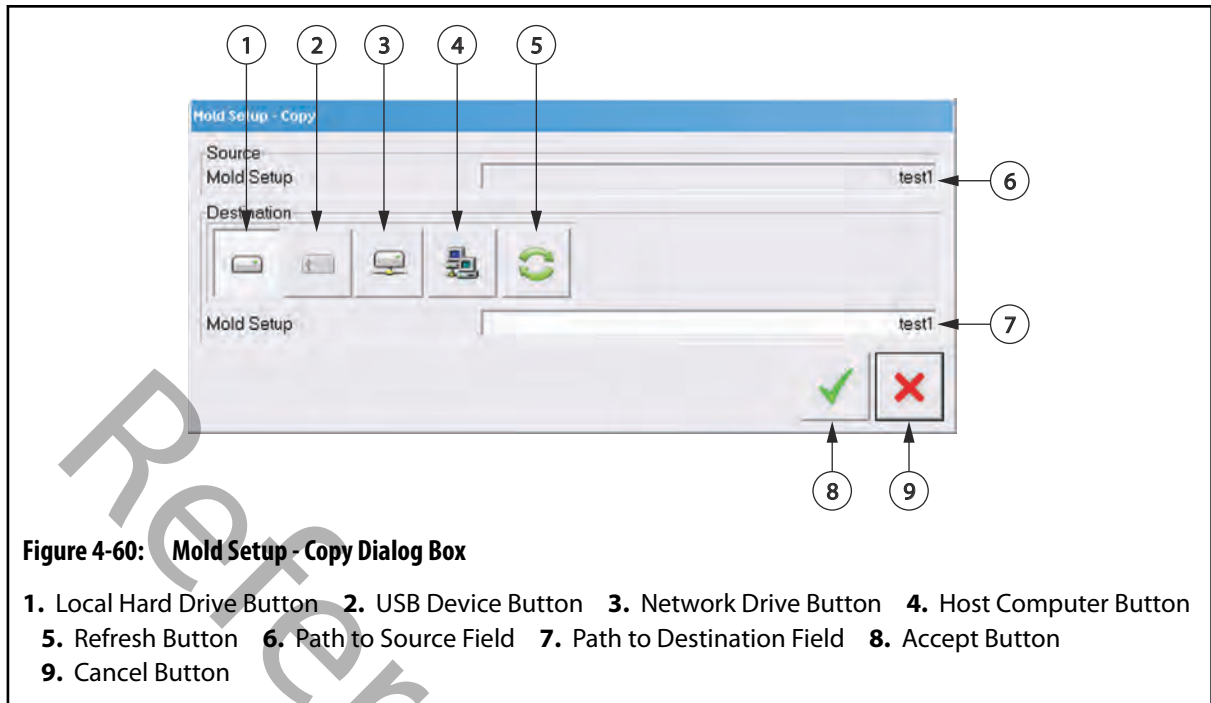


Figure 4-60: Mold Setup - Copy Dialog Box

1. Local Hard Drive Button 2. USB Device Button 3. Network Drive Button 4. Host Computer Button
5. Refresh Button 6. Path to Source Field 7. Path to Destination Field 8. Accept Button
9. Cancel Button

4. In the **Destination** area, select the storage device where a copy of the mold setup file will be saved.



IMPORTANT!

Each mold setup file must have a unique name. Attempting to save a mold setup file to the same storage device as an existing mold setup file with the same name may overwrite the original file. The HMI will ask for confirmation before overwriting existing files.

5. Touch the **Accept** button to save a copy of the mold setup file to the destination storage device, or touch **Cancel** to abort.

4.20.3 Loading a Mold Setup File

To load a mold setup file, do the following:

1. On the HMI, touch the **Production** button and touch the **Mold Setup** tab to display the **Mold Setup** screen.

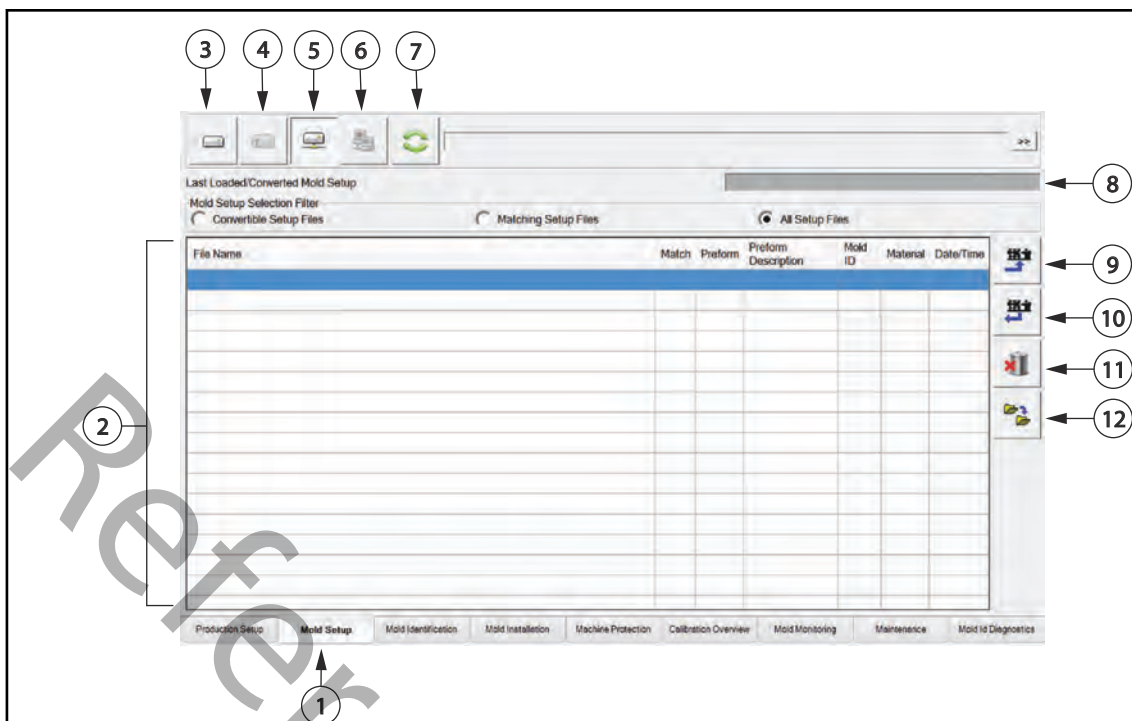


Figure 4-61: Mold Setup Screen

1. Mold Setup Tab 2. List of Stored Machine Setups 3. Local Hard Drive Button 4. USB Device Button 5. Network Drive Button 6. Host Computer Button 7. Refresh Button 8. Machine Setup Name 9. Load Setup Button 10. Save Setup Button 11. Delete Setup Button 12. Copy Setup Button



IMPORTANT!

The active mold setup file will be overwritten when another mold setup is loaded. Make sure the active mold setup is saved to retain the setup parameters for future use.

2. If necessary, save the active mold setup. Refer to [Section 4.20.1](#) for more information.
3. Select a mold setup file from the list and touch the **Load Setup** button. The **Mold Setup - Load** dialog box appears.

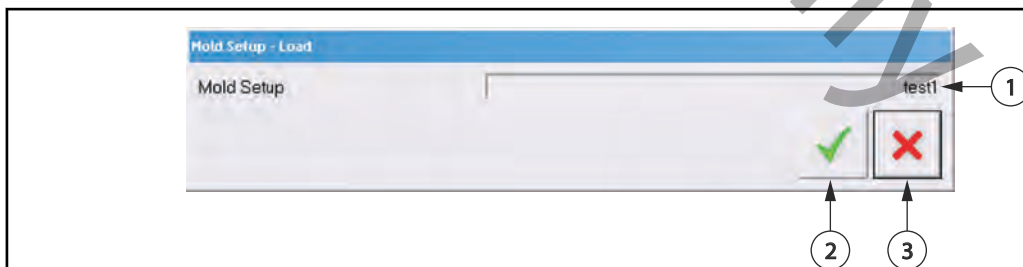


Figure 4-62: Mold Setup - Load Dialog Box

1. Selected Mold Setup File 2. Accept Button 3. Cancel Button

4. Touch the **Accept** button to load the selected mold setup file, or touch the **Cancel** button to abort.

5. Calibrate the clamp. Refer to [Section 5.10](#) for more information.

4.20.4 Deleting Mold Setup Files

To delete one or more mold setup files, do the following:

1. On the HMI, touch the **Production** button and touch the **Mold Setup** tab to display the **Mold Setup** screen.

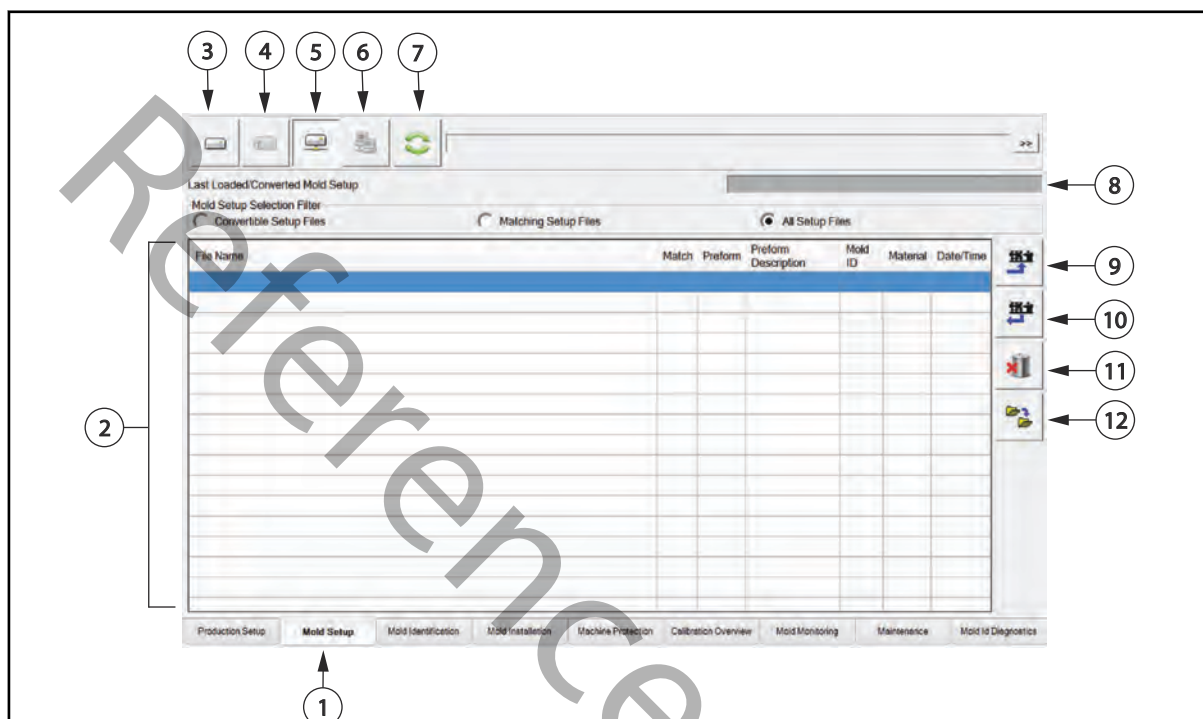


Figure 4-63: Mold Setup Screen

1. Mold Setup Tab
2. List of Stored Machine Setups
3. Local Hard Drive Button
4. USB Device Button
5. Network Drive Button
6. Host Computer Button
7. Refresh Button
8. Machine Setup Name
9. Load Setup Button
10. Save Setup Button
11. Delete Setup Button
12. Copy Setup Button

2. Select the mold setup file to delete from the list.
3. Touch the **Delete Setup** button. The **Mold Setup - Delete** dialog box appears.

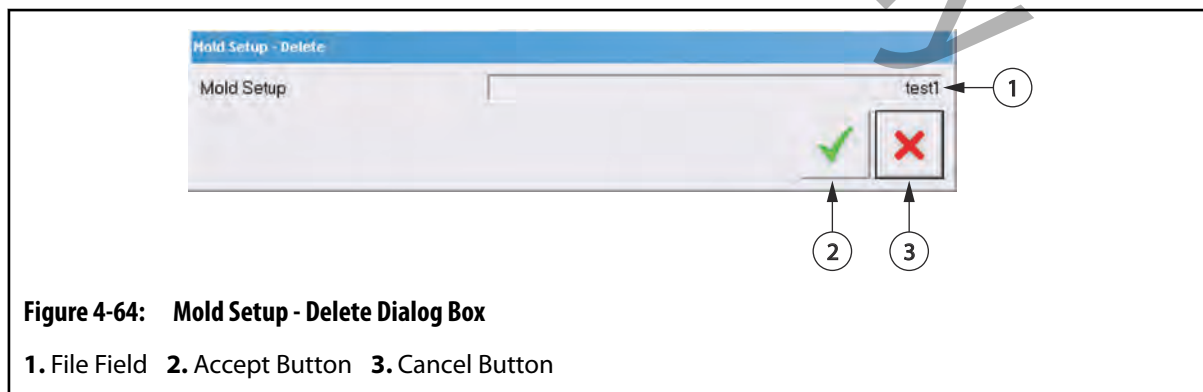


Figure 4-64: Mold Setup - Delete Dialog Box

1. File Field
2. Accept Button
3. Cancel Button

4. Touch the **Accept** button to delete the selected mold setup file, or touch **Cancel** to abort.

4.21 Connecting to ServiceLink

ServiceLink is a remote diagnostic service that allows Husky technical support specialists to communicate directly with the machine. It is used to apply important warranty software updates and perform diagnostics during troubleshooting. For more information about ServiceLink, contact Husky or visit www.husky.co.

To connect the machine to ServiceLink, do the following:

NOTE:

Once ServiceLink is connected to the machine, contact Husky for further instructions.

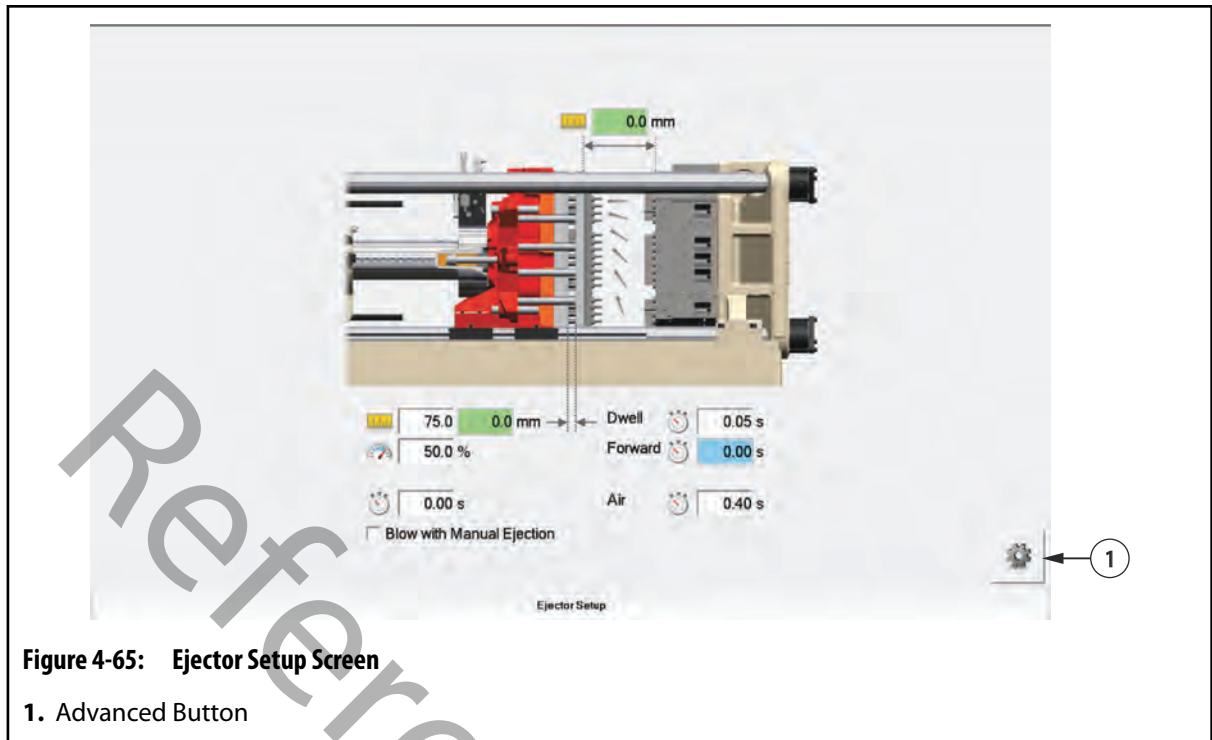
1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Open the electrical cabinet and locate the Industrial Personal Computer (IPC).
3. Connect a network cable from the facility to the network port located on the back of the IPC. Alternatively, connect a wireless adaptor to the USB port on the outside of the electrical cabinet. Do not connect the wireless adaptor to the USB port on the inside of the electrical cabinet.
4. Close the electrical cabinet, making sure to not pinch the network cable.
5. Remove all locks and tags.
6. Power up the machine and log on to the HMI.
7. Contact Husky for instructions to connect to ServiceLink.

4.22 Enabling and Disabling the Booster Cylinders

The booster cylinders provide additional force during production to remove preforms from the cores. The booster cylinders can be set to automatically turn off after a desired number of cycles, otherwise the booster cylinders should be disabled once the process is stabilized.

To enable or disable the booster cylinders, do the following:

1. On the HMI, touch the **Mold Function** button and touch the **Ejector Setup** tab to display the **Ejector Setup** screen.



2. Touch the **Advanced** button. The **Advanced Settings** dialog box appears.
3. Select the **Booster Enable** check box to enable the booster cylinders, or clear the check box to disable the booster cylinders.
4. In the **Number of Cycles** field, enter the number of cycles the booster will remain enabled in Auto Cycle mode.

NOTE:

If the **Booster Enable** check box is selected the boosters will be active during Semi and Manual Cycle mode. The LED is lit when the booster is active.

4.23 Enabling and Disabling Partial Ejection

To enable or disable the partial ejection, do the following:

1. On the HMI, touch the **Mold Function** button and touch the **Ejector Setup** tab to display the **Ejector Setup** screen.

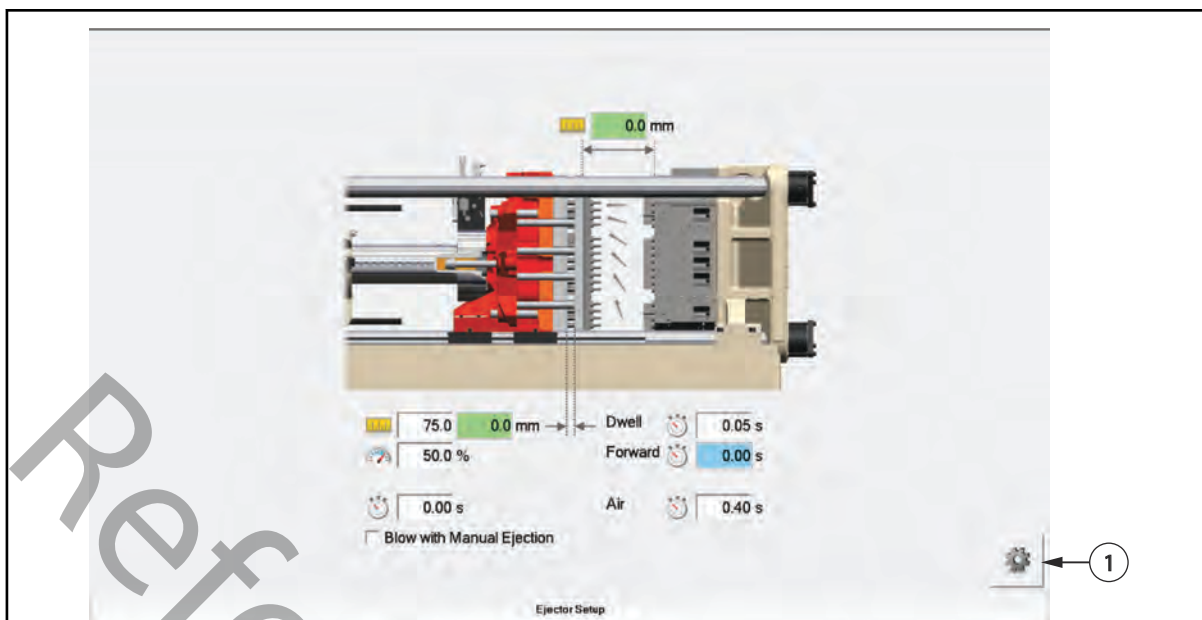


Figure 4-66: Ejector Setup Screen

1. Advanced Button

2. Touch the **Advanced** button. The **Advanced Settings** dialog box appears.

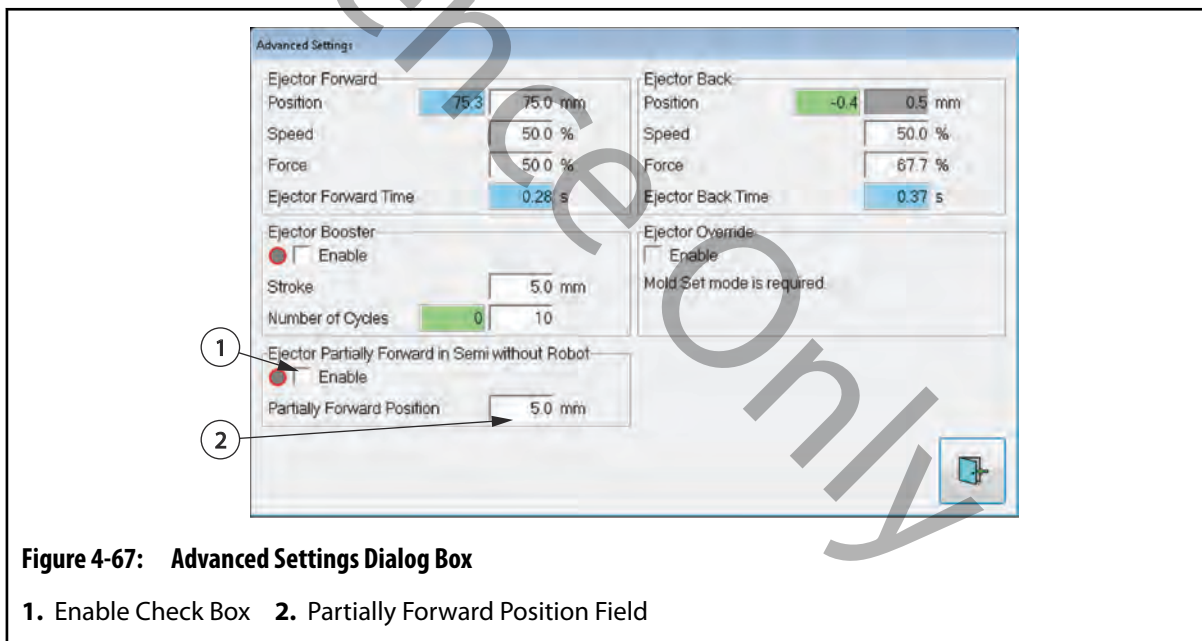


Figure 4-67: Advanced Settings Dialog Box

1. Enable Check Box 2. Partially Forward Position Field

3. In the **Ejector Partially Forward in Semi without Robot** area, select the **Enable** check box to enable the ejectors to move partially forward, or clear the check box to disable the ejectors from moving partially forward.
4. In the **Partially Forward Position** field, enter a value for the partially forward position for the ejectors.

4.24 **Setting Up SmartStart and SmartStop (If Equipped)**

The following procedures describe how to setup SmartStart and SmartStop. Once configured, these tools automate the startup and shutdown sequence for the machine, which can reduce the overall startup/shutdown time and minimize the risk of possible errors.

Procedure	Reference
Setting up SmartStart	Section 4.24.1
Setting up SmartStop	Section 4.24.2



IMPORTANT!

SmartStart must be initiated by the operator. For information about starting the machine using SmartStart, refer to [Section 4.26.2](#).

4.24.1 **Setting Up SmartStart**

SmartStart is a semi-automatic tool that performs predetermined steps in the startup process with minimal operator assistance. The tool uses parameters defined on the **SmartStart Setup** screen during the startup sequence, and then switches to normal settings once the sequence is completed. This reduces overall startup time and possible errors during startup.

To setup SmartStart, do the following:

1. On the HMI, touch the **Machine** button and touch the **SmartStart** tab to display the **SmartStart** screen.

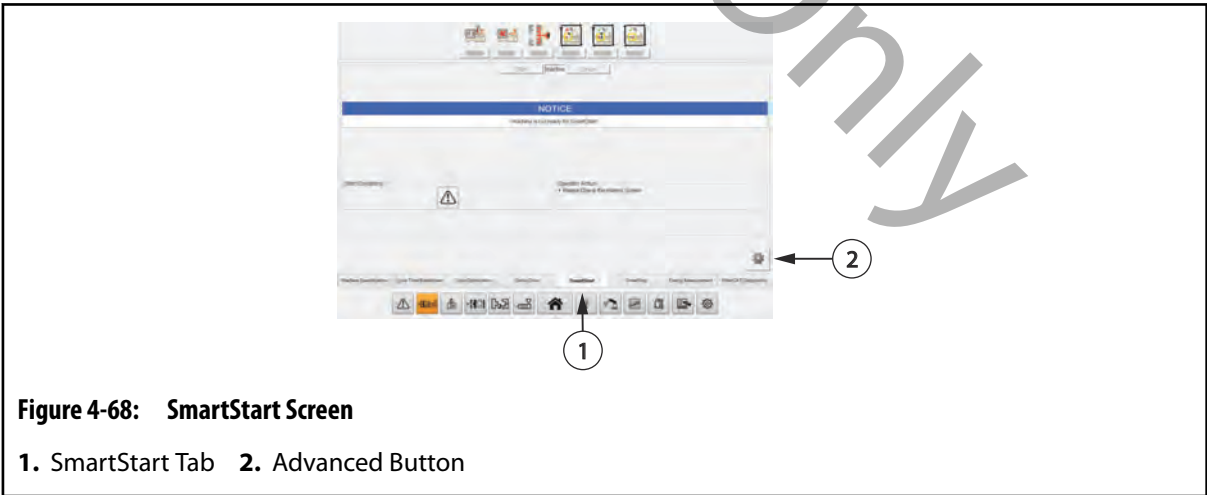
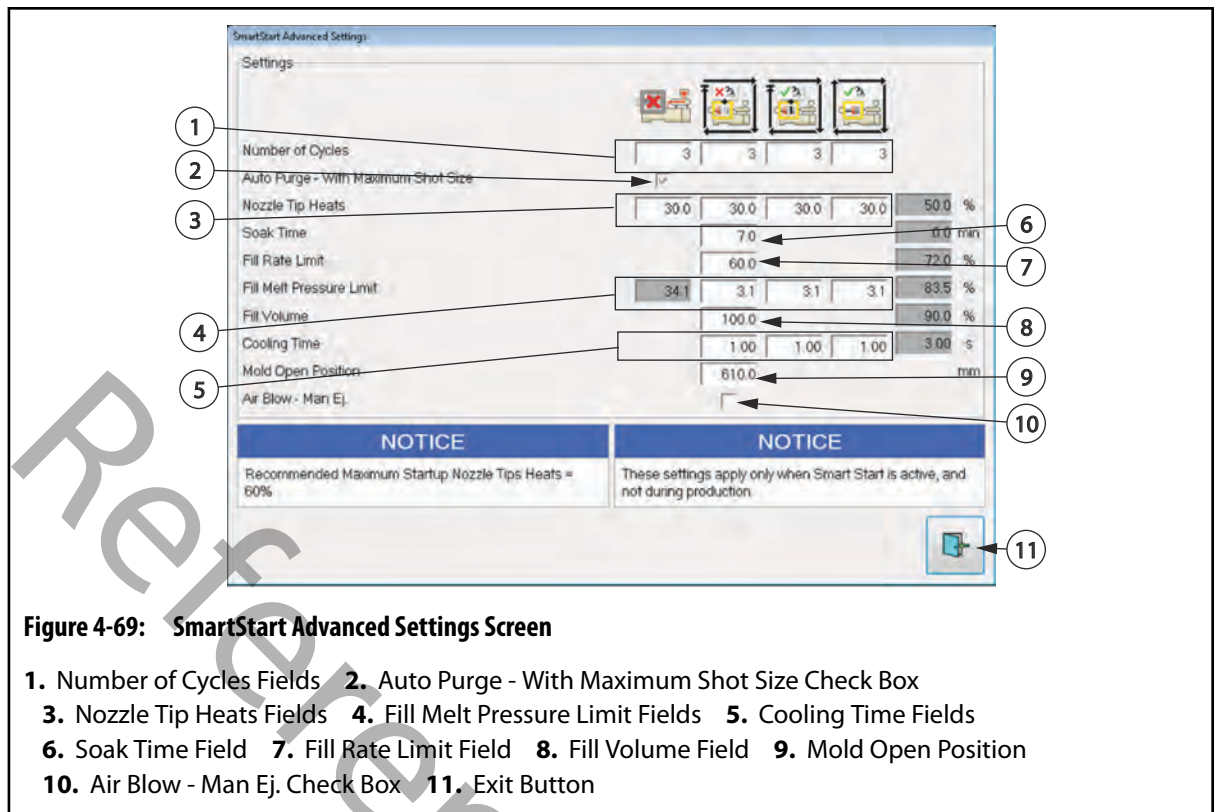


Figure 4-68: SmartStart Screen

1. SmartStart Tab 2. Advanced Button

2. Touch the **Advanced** button. The **SmartStart Advanced Settings** dialog box appears.



3. Touch each **Number of Cycles** field and type a suitable value. These fields represent the number of purge cycles, semi cycles and auto cycles to automatically complete during specific stages in the startup process.
4. Select the **Auto Purge - With Maximum Shot Size** check box to use the maximum shot size while auto purging in the startup process.
5. Touch each **Nozzle Tip Heats** field and type a suitable value. These fields represent the percentage to manually increase the nozzle tip temperature by during specific stages in the startup process.
6. Touch the **Soak Time** field and type a suitable value. This field represents the nozzle tip soak time during Semi Cycle with no robot enabled in the startup process.
7. Touch the **Fill Rate Limit** field and type a suitable value. This field represents the fill rate limit during Semi Cycle with no robot enabled in the startup process.
8. Touch each **Fill Melt Pressure Limit** field and type a suitable value. These fields represent the maximum fill pressure that can be applied during specific stages in the startup process.
9. Touch the **Fill Volume** field and type a suitable value. This field represents the fill volume during Semi Cycle with no robot enabled in the startup process.
10. Touch each **Cooling Time** field and type a suitable value. These fields represent the time the mold halves remain together during specific stages in the startup process.
11. Select the **Air Blow Man. Ej.** check box to enable air during ejection during Semi Cycle with no robot enabled in the startup process.
12. Touch the **Exit** button to close the dialog box.

4.24.2 Setting Up SmartStop

The SmartStop sequence eliminates the need for operator intervention, provides a safe way to shut down the machine in an emergency, reduces the risk of errors during shutdown, and makes subsequent startups smoother and easier.



IMPORTANT!

The machine must be running in auto cycle mode for a minimum of 2 minutes before SmartStop activates.

The following procedures describe how to setup SmartStop to shut down the machine based on specific events.



IMPORTANT!

The SmartStop sequence can be aborted by switching the machine to manual mode, or by clearing the appropriate **Enable** check box on the **SmartStop** screen in the **Machine** screen group.

4.24.2.1 Stopping on a Critical Machine Fault

To setup SmartStop to shut down the machine when a critical machine fault occurs, do the following:

1. On the HMI, touch the **Machine** button and touch the **SmartStop** tab to display the **SmartStop** screen.

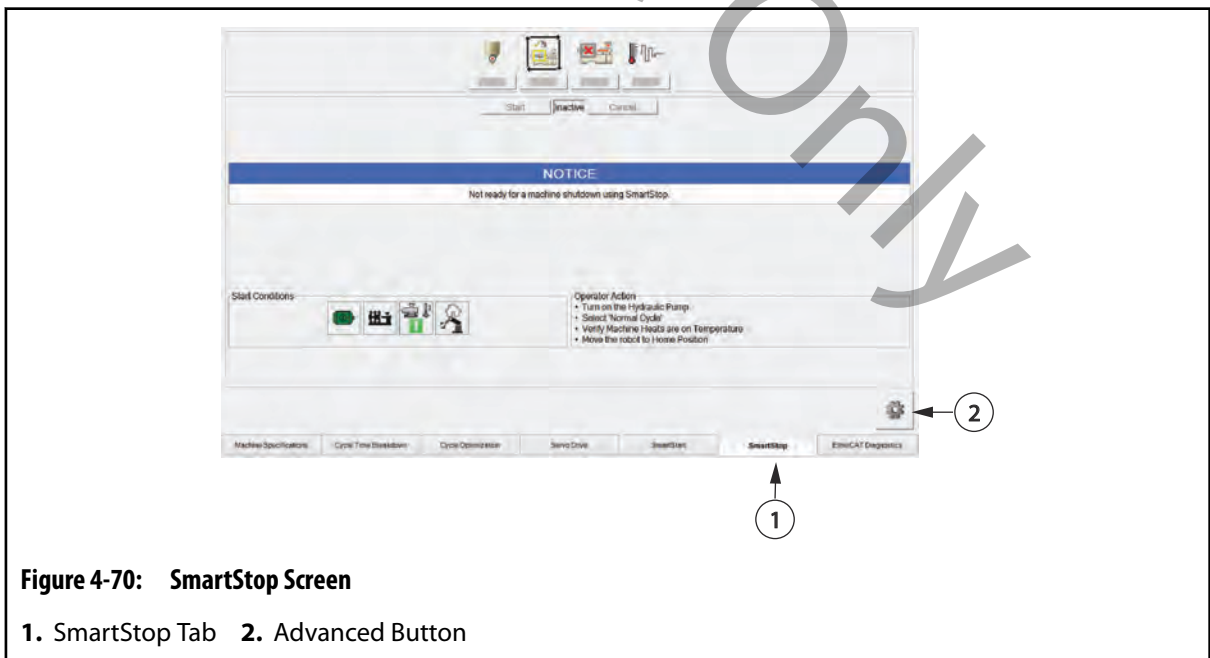
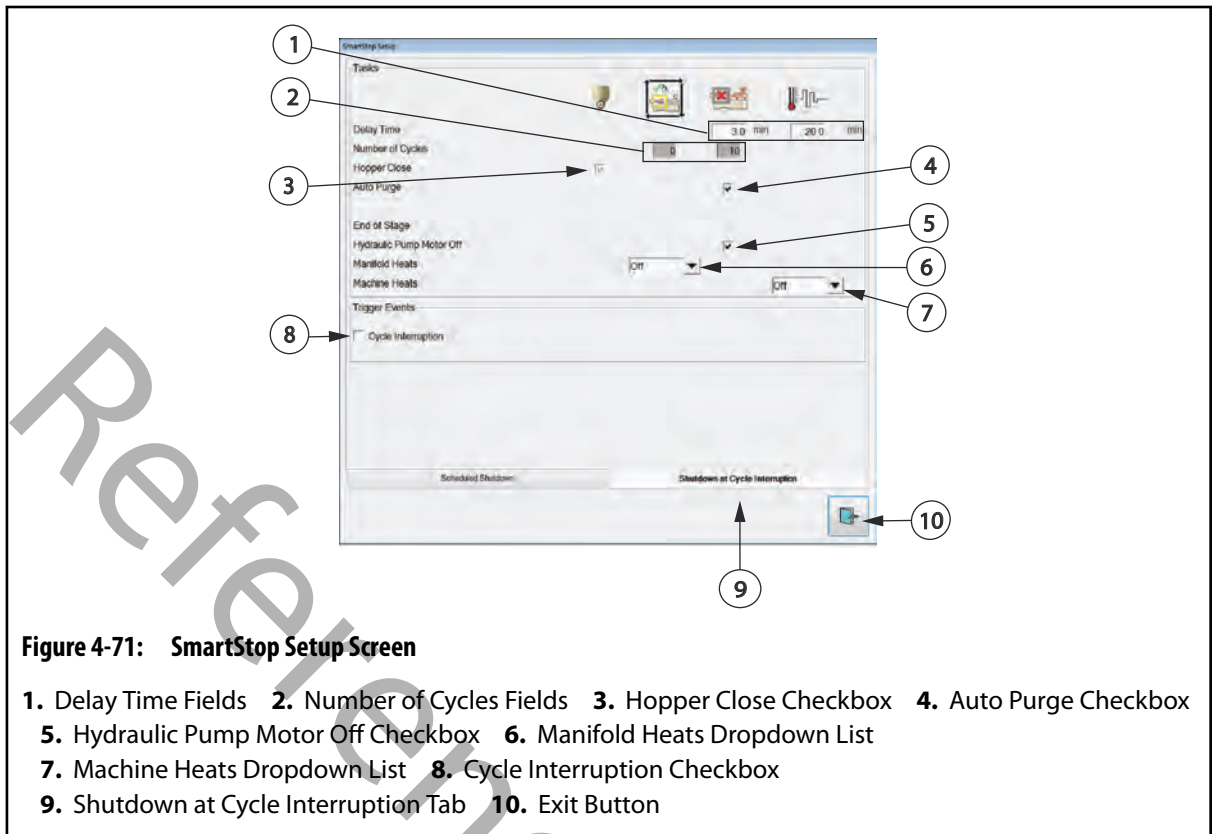


Figure 4-70: SmartStop Screen

1. SmartStop Tab 2. Advanced Button

2. Touch the **Advanced** button to display the **SmartStop Setup** screen.



3. Touch the **Shutdown at Cycle Interruption** tab to access the appropriate fields and checkboxes.
4. Touch the **Delay Time** fields and type the amount of time that should elapse, during the indicated process steps, after a critical machine fault before the SmartStop sequence begins.
5. Touch the **Number of Cycles** fields and type the number of machine cycles that should elapse, during the indicated process steps, after a critical machine fault before the SmartStop sequence begins.
6. Select **Auto Purge** to activate the automatic purging function during the purge process stage.
7. In the **End of Stage** screen area:
 - a. Select **Hydraulic Pump Motor Off** to automatically shut off the hydraulic pump motor at the end of the purge process stage.
 - b. Touch the **Manifold Heats** dropdown arrow and select which state to leave the manifold heats at the end of the pre-shutdown process stage.
 - c. Touch the **Machine A Heats** dropdown arrow and select which state to leave the machine heats at the end of the preparation process stage.
8. In the **Trigger Events** screen area, select **Cycle Interruption**.
9. Touch the **Exit** button to exit the **SmartStop Setup** screen.

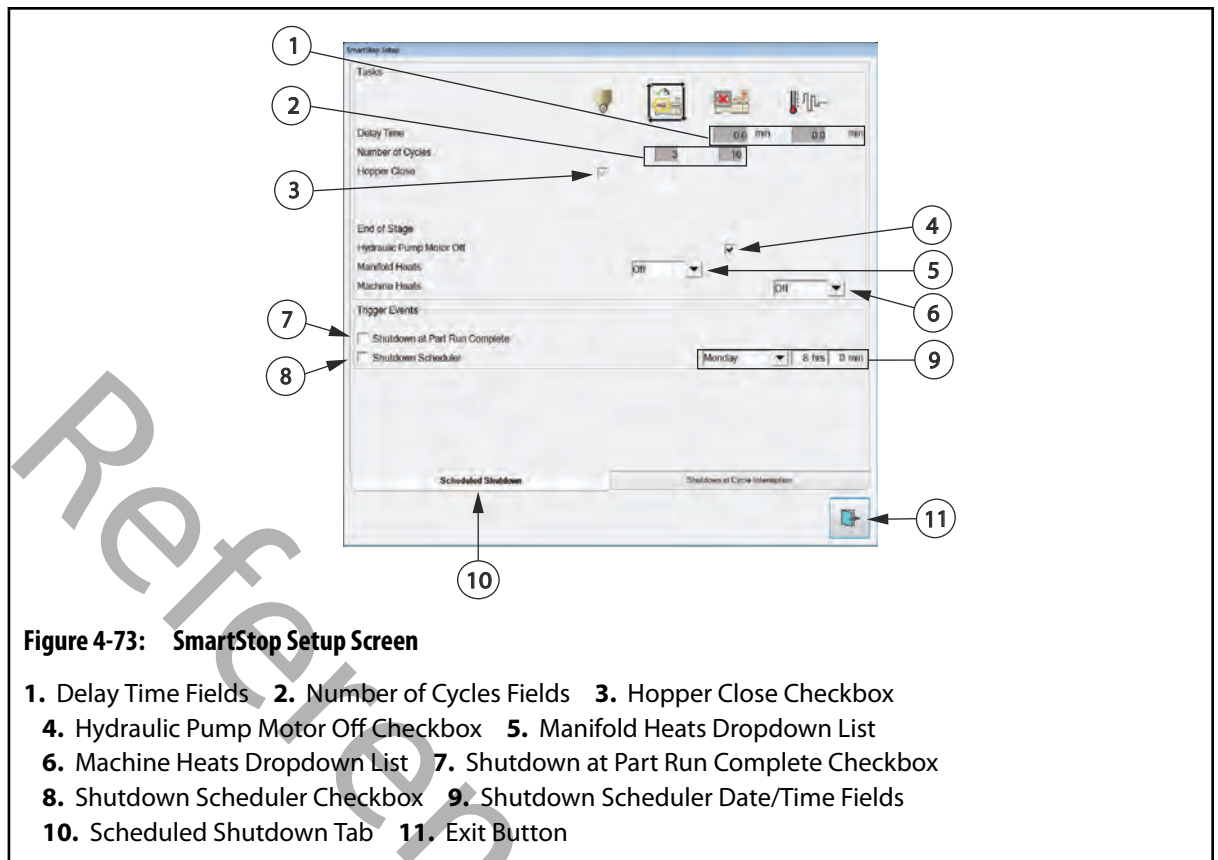
4.24.2.2 Stopping After Completing Production

To setup SmartStop to shut down the machine after a set number of parts have been produced, do the following:

1. On the HMI, touch the **Machine** button and touch the **SmartStop** tab to display the **SmartStop** screen.



2. Touch the **Advanced** button to display the **SmartStop Setup** screen.



3. Touch the **Scheduled Shutdown** tab to access the appropriate fields and checkboxes.
4. In the **End of Stage** screen area:
 - a. Select **Hydraulic Pump Motor Off** to automatically shut off the hydraulic pump motor at the end of the purge process stage.
 - b. Touch the **Manifold Heats** dropdown arrow and select which state to leave the manifold heats at the end of the pre-shutdown process stage.
 - c. Touch the **Machine Heats** dropdown arrow and select which state to leave the machine heats at the end of the preparation process stage.
5. In the **Trigger Events** screen area, select **Shutdown at Part Run Complete**.
6. Touch the **Exit** button to exit the **SmartStop Setup** screen.

4.24.2.3 Stopping on a Specific Day and Time

To setup SmartStop to shut down the machine on a specific day and time, do the following:

1. On the HMI, touch the **Machine** button and touch the **SmartStop** tab to display the **SmartStop** screen.

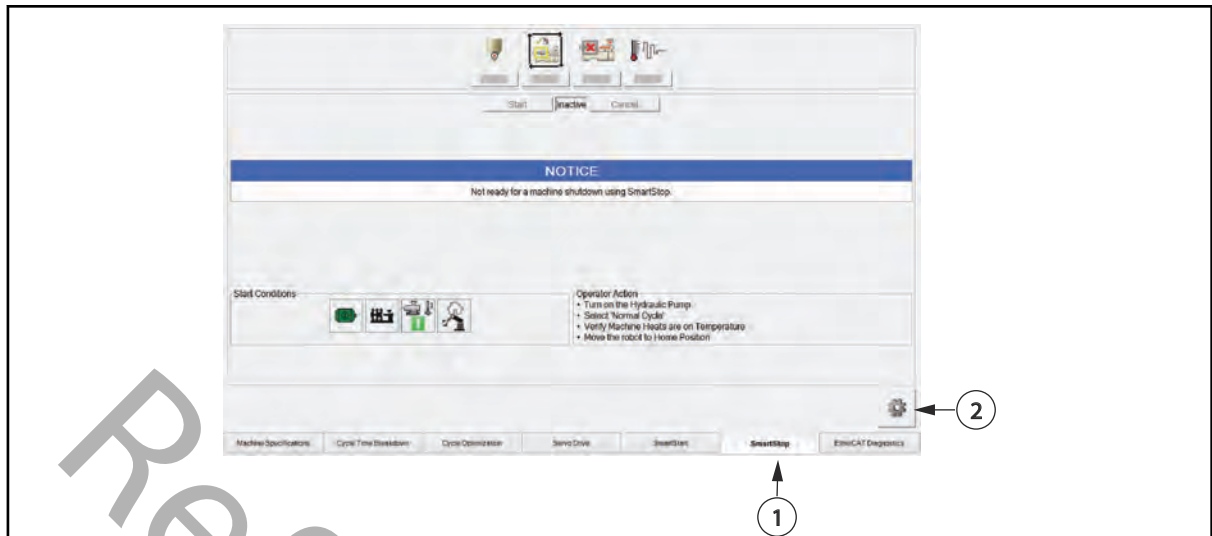


Figure 4-74: SmartStop Screen

1. SmartStop Tab 2. Advanced Button

2. Touch the **Advanced** button to display the **SmartStop Setup** screen.

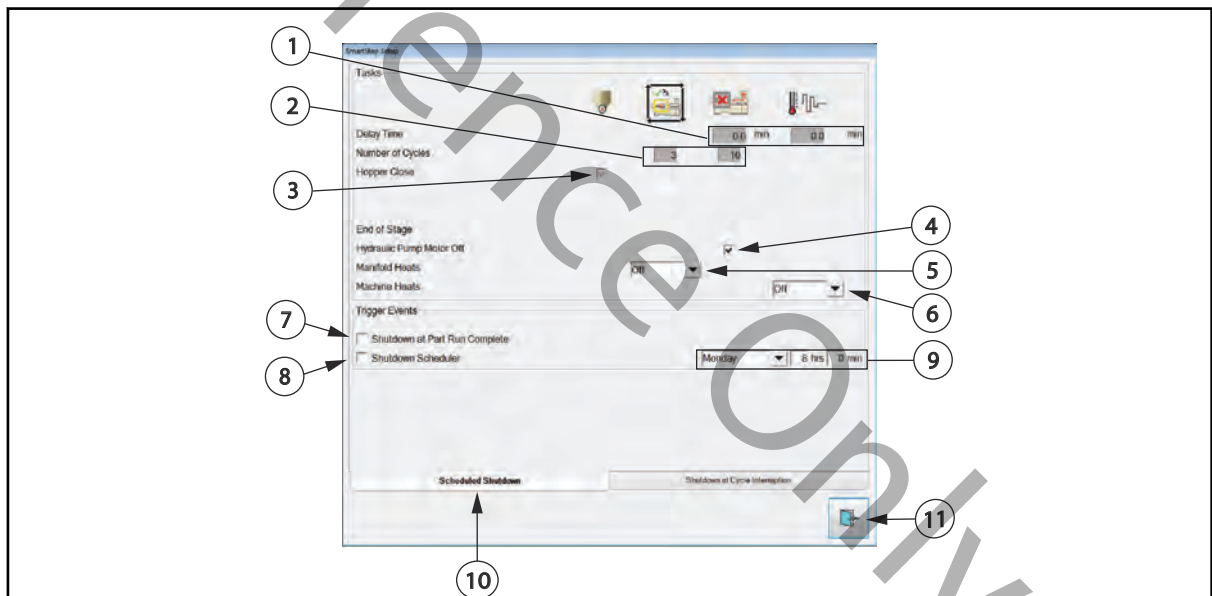


Figure 4-75: SmartStop Setup Screen

1. Delay Time Fields 2. Number of Cycles Fields 3. Hopper Close Checkbox
4. Hydraulic Pump Motor Off Checkbox 5. Manifold Heats Dropdown List
6. Machine Heats Dropdown List 7. Shutdown at Part Run Complete Checkbox
8. Shutdown Scheduler Checkbox 9. Shutdown Scheduler Date/Time Fields
10. Scheduled Shutdown Tab 11. Exit Button

3. Touch the **Scheduled Shutdown** tab to access the appropriate fields and checkboxes.

4. In the **End of Stage** screen area:

- a. Select **Hydraulic Pump Motor Off** to automatically shut off the hydraulic pump motor at the end of the purge process stage.
 - b. Touch the **Manifold Heats** dropdown arrow and select which state to leave the manifold heats at the end of the pre-shutdown process stage.
 - c. Touch the **Machine Heats** dropdown arrow and select which state to leave the machine heats at the end of the preparation process stage.
5. In the **Trigger Events** screen area, select **Shutdown Scheduler**.
6. Touch the **Day** dropdown arrow and select which day to activate SmartStop.
7. Touch the **Hour** field and type the hour.
8. Touch the **Minutes** field and type the number of minutes.
9. Touch the **Exit** button to exit the **SmartStop Setup** screen.

4.25 Setting Up Statistical Process Control (If Equipped)

The options for statistical process control features can vary based on the machine type and the options ordered. This section describes the all features that may be available.

The Statistical Process Control (SPC) program does the following:

- Monitors machine processes to assist in troubleshooting quality and productivity problems.
- Uses basic statistical analysis to monitor machine performance and detects deviations from the process standard. A process deviates from the standard when one or more monitored variables are outside the specified operating range.
- Consists of seven HMI screens that display real-time or historical SPC data in tables or graphs.
- Can be setup to respond automatically to deviations from the process standard by turning on an SPC alarm light, stopping the machine, or turning on an auxiliary output.

4.25.1 Monitoring and Configuring the Cycle Table Screen

The SPC **Cycle Table** allows the user to monitor and configure the following:

- View an updating history of selected and current SPC process variables for each cycle and see when a process variable is going out of specification limits.
- Add and remove process variables to the screen.
- View the number of the current machine cycles for a variable.
- View the current Process Capability Index (Cpk) value and status for variables. Cpk determines how far away a current process variable is from the specification limits. If the Cpk value is below the Cpk warning threshold parameter, the value will be highlighted in yellow.
- View the Upper Specification Limits (USL) and Lower Specification Limits (LSL) list the upper and lower specification limits for each process variable:
 - If both USL and LSL are zero for a variable, the limit values are greyed out.
 - If the value of a variable is greater than its USL, then its USL value turns red.
 - If the value of a variable is less than its LSL, then its LSL value turns red.
- View status icons at the left of the screen which indicate whether a variable is inside or outside of specification limits. Refer to [Table 4-4](#).

- View the condition indicators that give the current status of the machine and auxiliary devices for SPC variables:
 - M/C Stop** — Machine Stop indicator turns on when SPC alarms stop the machine
 - Light** — SPC Alarm Light indicator turns on when the machine/auxiliary devices are out of the specification limits
 - Aux.** — Auxiliary outputs indicator turns on when the auxiliary devices are out of the specification limits

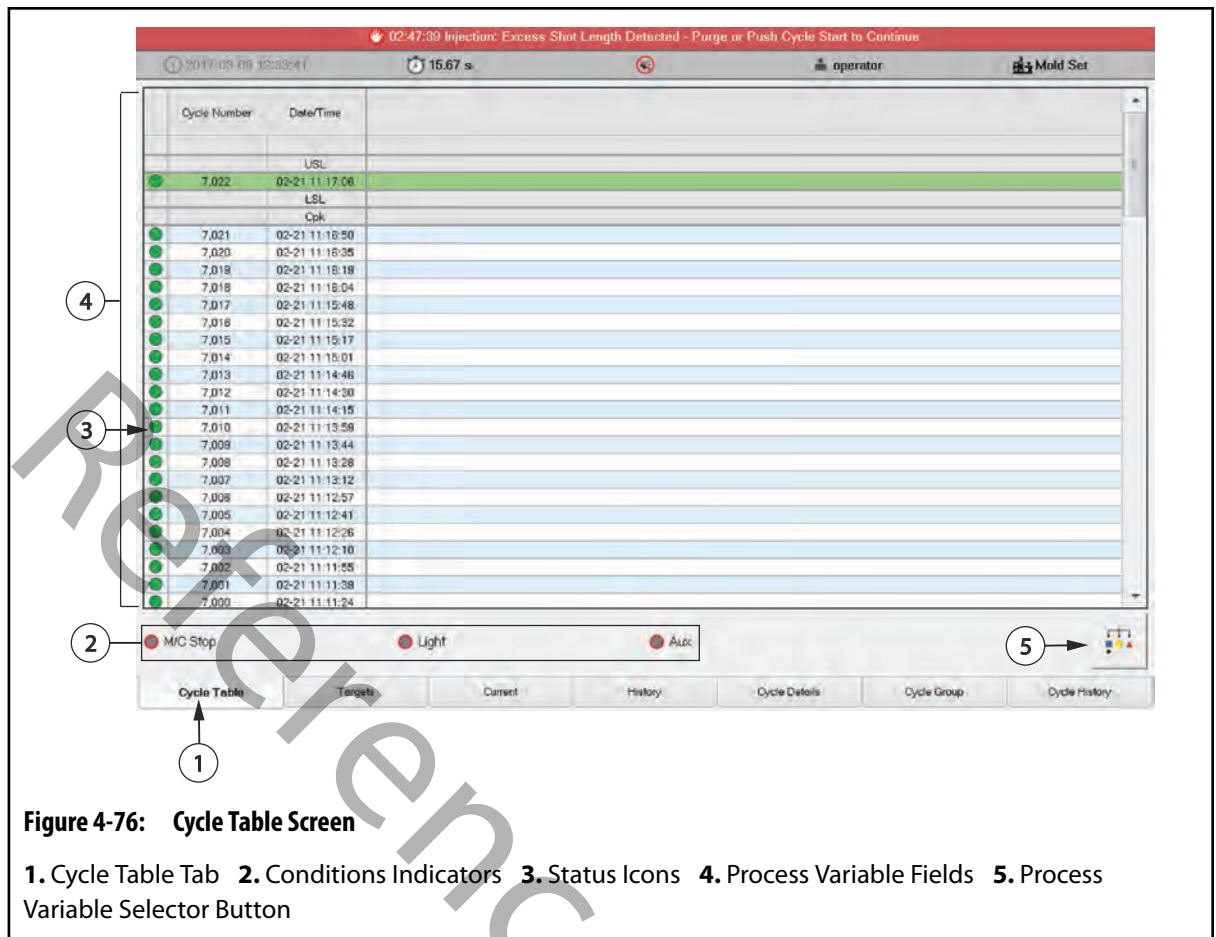
Table 4-4: Status Icons on Cycle Table Screen

Status Icon	Description
	Process variable is within the specification limits
	Process variable is out of the warning limit but in the specification limit
	Critical process variable is out of the warning limit but within the specification limit
	Process variable is out of the specification limits
	Critical process variable is out of the specification limits

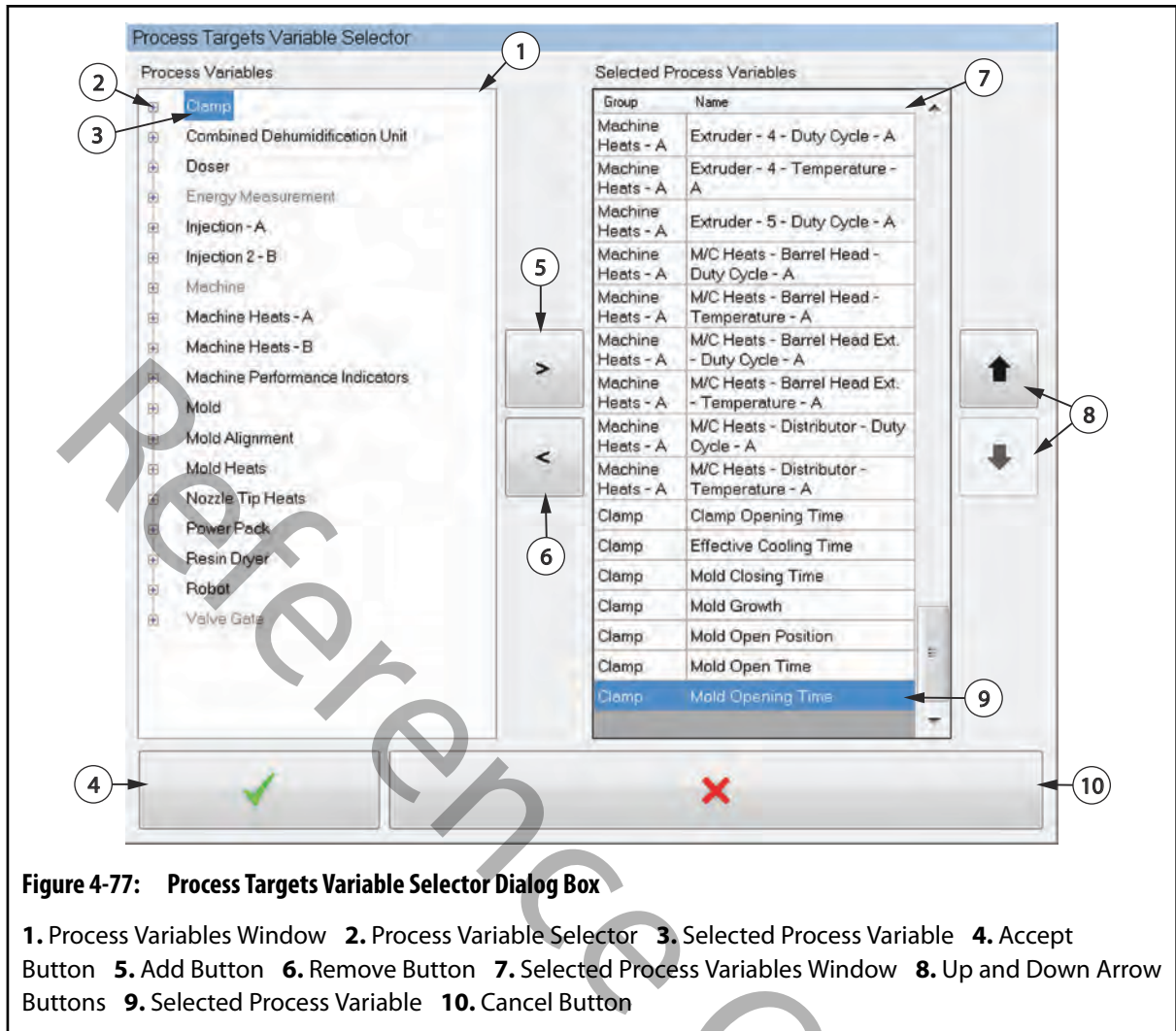
4.25.1.1 Selecting Process Variables for the Cycle Table Screen

To select SPC process variables for the **Cycle Table** screen, do the following:

- On the HMI, touch the **SPC** button and touch the **Cycle Table** tab to display the **Cycle Table** screen.



2. Touch the **Process Variable Selector** button to open the **Process Targets Variable Selector** dialog box. Refer to [Figure 4-77](#) for more information.
3. In the **Process Variables** window, touch the plus sign next to the required process variable to expand it.
4. From the expanded list, select the check box next to the desired process variable.
5. Select the **Add** button to move the selected process variable to the **Selected Process Variables** window.
6. If required, select a process variable in the **Selected Process Variables** window and touch the **Remove** button to move the selected process variable back to the **Process Variables** window.
7. If required, touch the **Up** or **Down Arrow** buttons to move the selected variable up or down the list of variables in the **Selected Process Variables** window.
8. Select the **Accept** button on the **Process Targets Variable Selector** dialog box.



4.25.2 Monitoring and Configuring the Targets Screen

The SPC **Targets** screen allows the user to monitor and configure the following:

- Enable an SPC process variable for monitoring and set it as critical.
- Set the threshold, USL and LSL values for the a process variable.
- Set the warning specification limit to activate a warning at that limit.
- Set the conditions that will stop the machine, trigger the alarm light, or trigger the auxiliary output.
- Set the number of cycles to be scraped.
- Set the Cpk warning condition, low Cpk threshold and desired Cpk value when learning limits.
- Set the sample size and period.

4.25.2.1 Adding and Removing Process Target Variables

To add or remove SPC process target variables to and from the **Targets** screen, do the following:

1. On the HMI, touch the **SPC** button and touch the **Targets** tab to display the **Targets** screen.

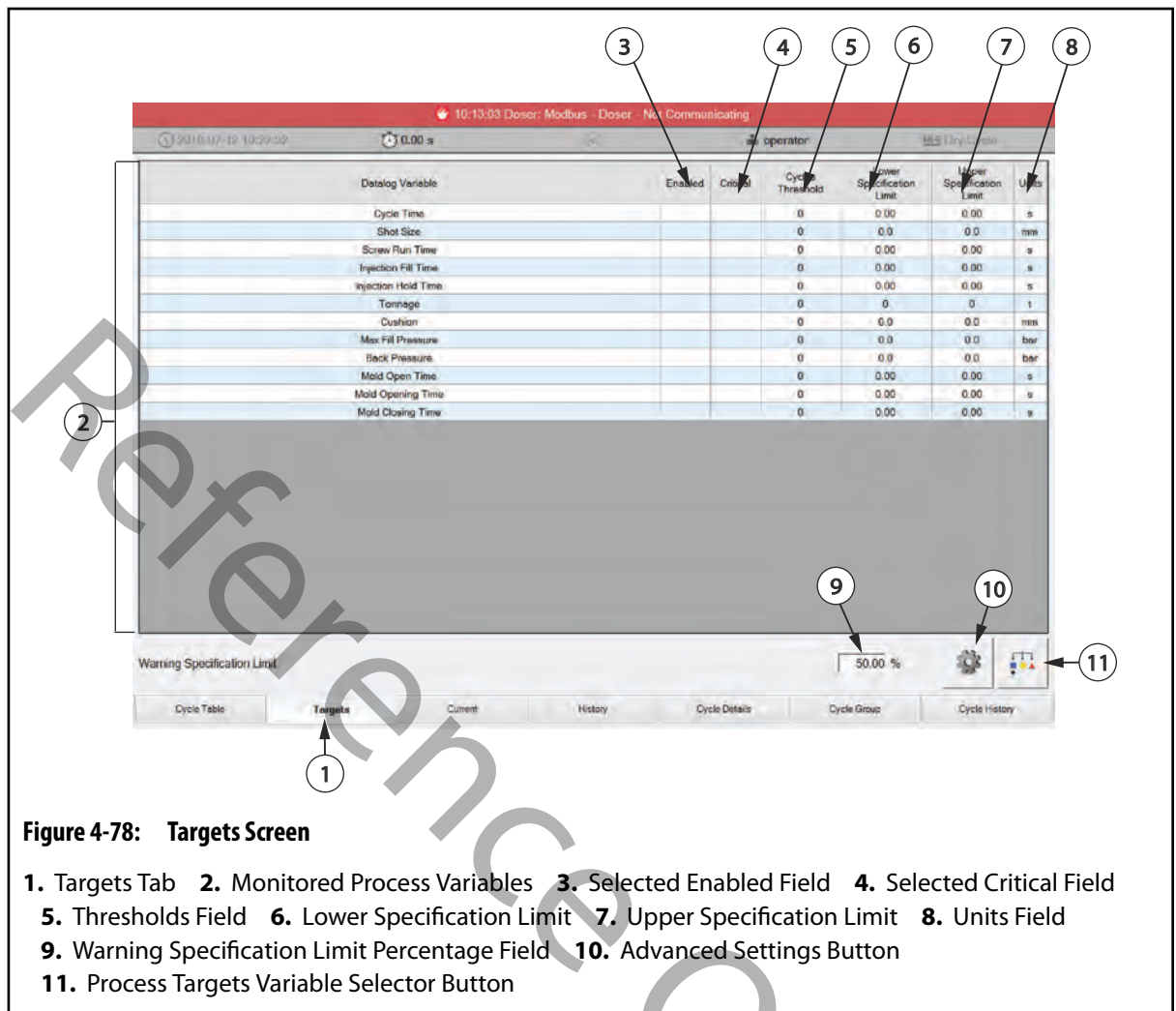
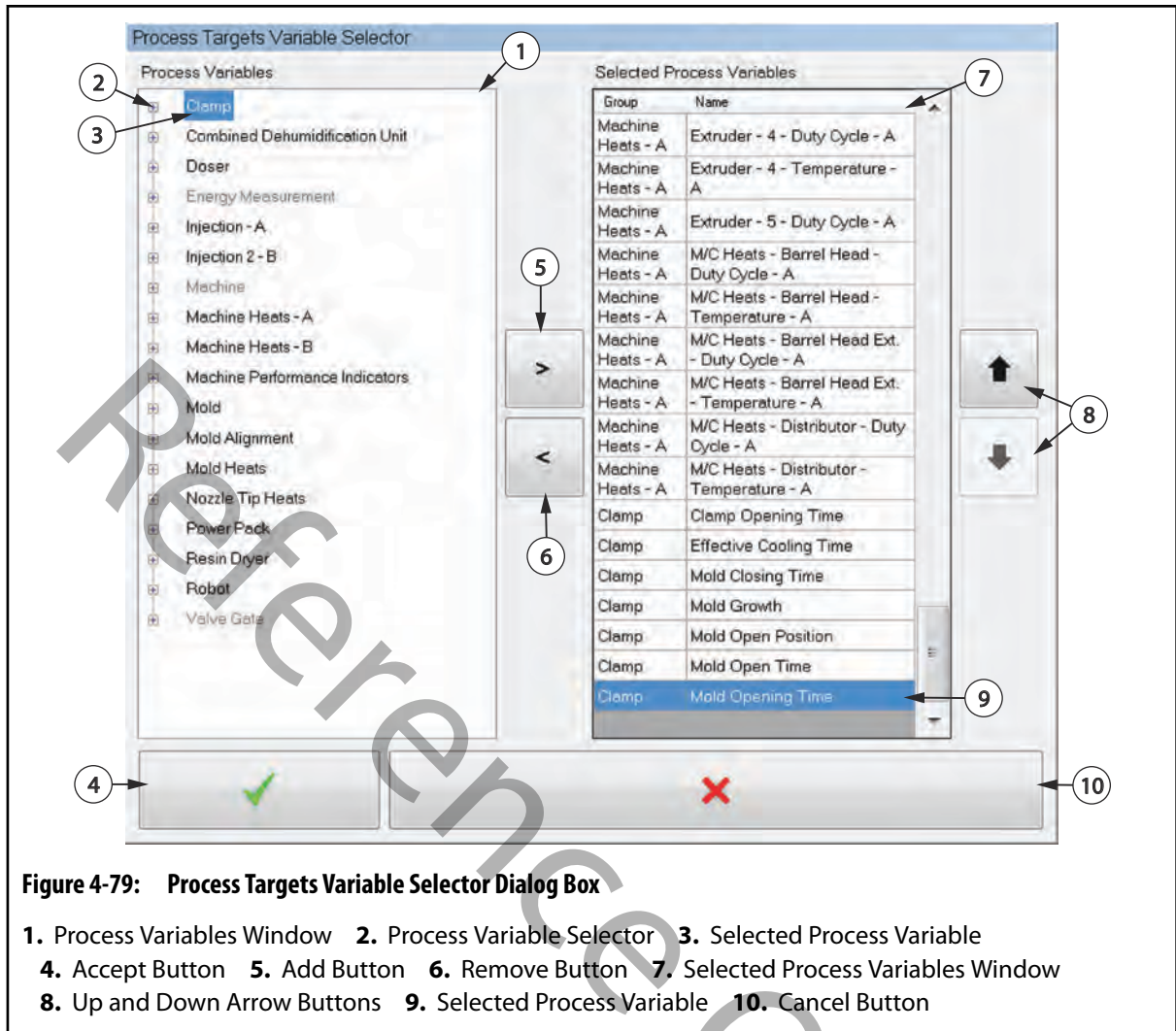


Figure 4-78: Targets Screen

1. Targets Tab
 2. Monitored Process Variables
 3. Selected Enabled Field
 4. Selected Critical Field
 5. Thresholds Field
 6. Lower Specification Limit
 7. Upper Specification Limit
 8. Units Field
 9. Warning Specification Limit Percentage Field
 10. Advanced Settings Button
 11. Process Targets Variable Selector Button
2. From the Targets screen, touch the **Process Variable Selector** button to open the **Process Targets Variable Selector** dialog box.
 3. In the **Process Variables** window, touch the plus sign next to the required process variable to expand it.
 4. From the expanded list, select the check box next to the required process variable.
 5. Select the **Add** button to move the selected process variable to the **Selected Process Variables** window.
 6. If required, touch the **Up** or **Down Arrow** buttons to move the selected variable up or down the list of variables in the **Selected Process Variables** window.
 7. If required, move the selected process variable back to the **Process Variables** window by selecting it in the **Selected Process Variables** window and touching the **Remove** button.
 8. Select the **Accept** button on the **Process Targets Variable Selector** dialog box.



4.25.2.2 Enabling and Setting Process Variables as Critical

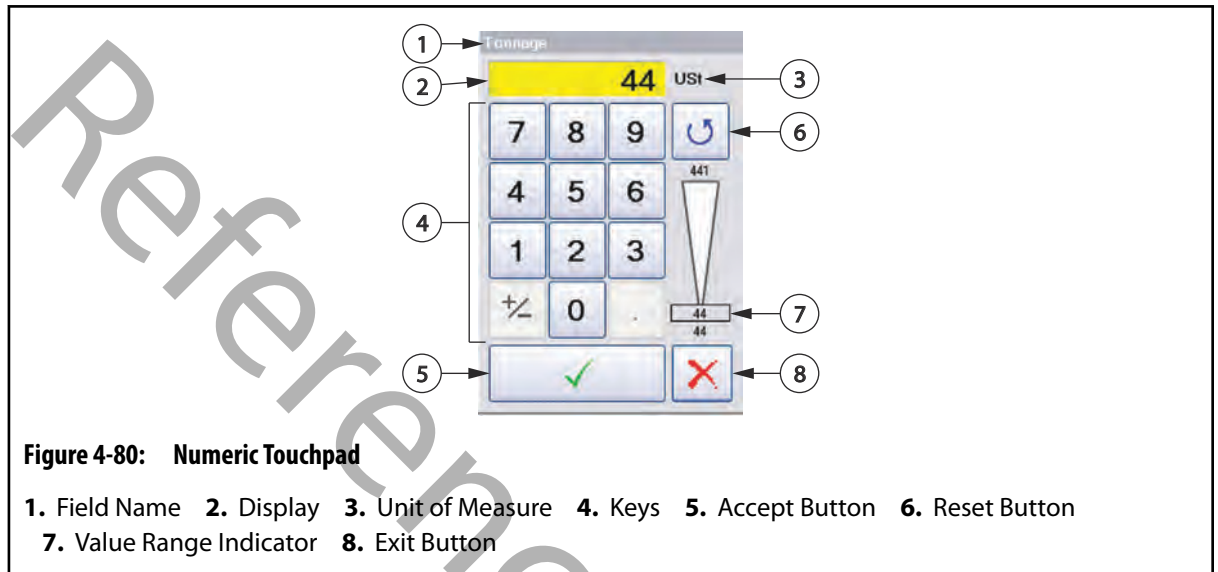
To enable SPC process variables and set them as critical, do the following:

1. On the HMI, touch the **SPC** key and then touch the **Targets** tab to display the **Targets** screen.
2. Enable monitoring for a variable by touching the blank **Enabled** field next to the required variable. Touch the **Accept** button on the confirmation message.
3. If required, disable monitoring for a variable by touching the selected **Enabled** field next to the required variable. Touch the **Accept** button on the confirmation message.
4. Select a variable as critical by touching the **Critical** field next to the required process variable. Touch the **Accept** button on the confirmation message.
5. Clear a variable as critical by touching the selected **Critical** field next to the required process variable. Touch the **Accept** button on the confirmation message.

4.25.2.3 Setting the Warning Specification Limit

To set the warning specification limit that activates a warning when the selected process reaches that limit, do the following:

1. On the HMI, touch the **SPC** key and touch the **Targets** tab to display the **Targets** screen.
2. Touch the **Warning Specification Limit** field to display a numeric touchpad.
3. Touch the touchpad and enter a percentage value (0% - 50%) for the warning limit.
4. Touch the **Accept** button on the touchpad.



4.25.2.4 Setting the Cycles Threshold, Lower and Upper Specification Limit

To set the cycles threshold, lower specification limit and upper specification limit, do the following:

1. On the HMI, touch the **SPC** key and touch the **Targets** tab to display the **Targets** screen.
2. Touch the following fields next to the required variable to display a numeric touchpad:
 - **Threshold** field – how many times in a row the process variable is outside specification limits before an alarm activates.
 - **Lower Specification Limit** field – lower limit the process variable should not go under to remain in control
 - **Upper Specification Limit** field – upper limit the process variable should not go over to remain in control
3. Touch the touchpad and enter a value for each field.
4. Touch the **Accept** button on the touchpad.

4.25.2.5 Selecting Conditions for Process Variables

To select conditions for SPC process variables, do the following:

1. From the **Targets** screen, touch the **Advanced Settings** button to open the **Advanced Settings** dialog box.

2. From the **Stop Machine** area, touch the drop-down arrow next to the **Condition** field to display a dialog box with a list of conditions.
3. Select the **Option** button next to the condition that will stop the machine.
4. From the **Alarm Light On** area, touch the drop-down arrow next to the **Condition** field to display a dialog box with a list of conditions.
5. Select the **Option** button next to the required condition that will activate the alarm light.
6. Touch the **On Time** field to open a numeric touchpad and enter the length of time the alarm light remains on after the condition is met.
7. Touch the **Accept** button on the touchpad.
8. From the **Auxiliary Output On** area, touch the drop-down arrows next to each of the **Condition** fields to display a dialog box with a list of conditions. A maximum of three conditions can be set.
9. Select the **Option** button next to the required condition that turns on the auxiliary output.
10. Touch the **On Time** field to display a numeric touchpad and enter the length of time the auxiliary output remains on after the condition is met.
11. Touch the **Accept** button on the touchpad.
12. Touch the **Exit** button on the **Advanced Settings** dialog box.

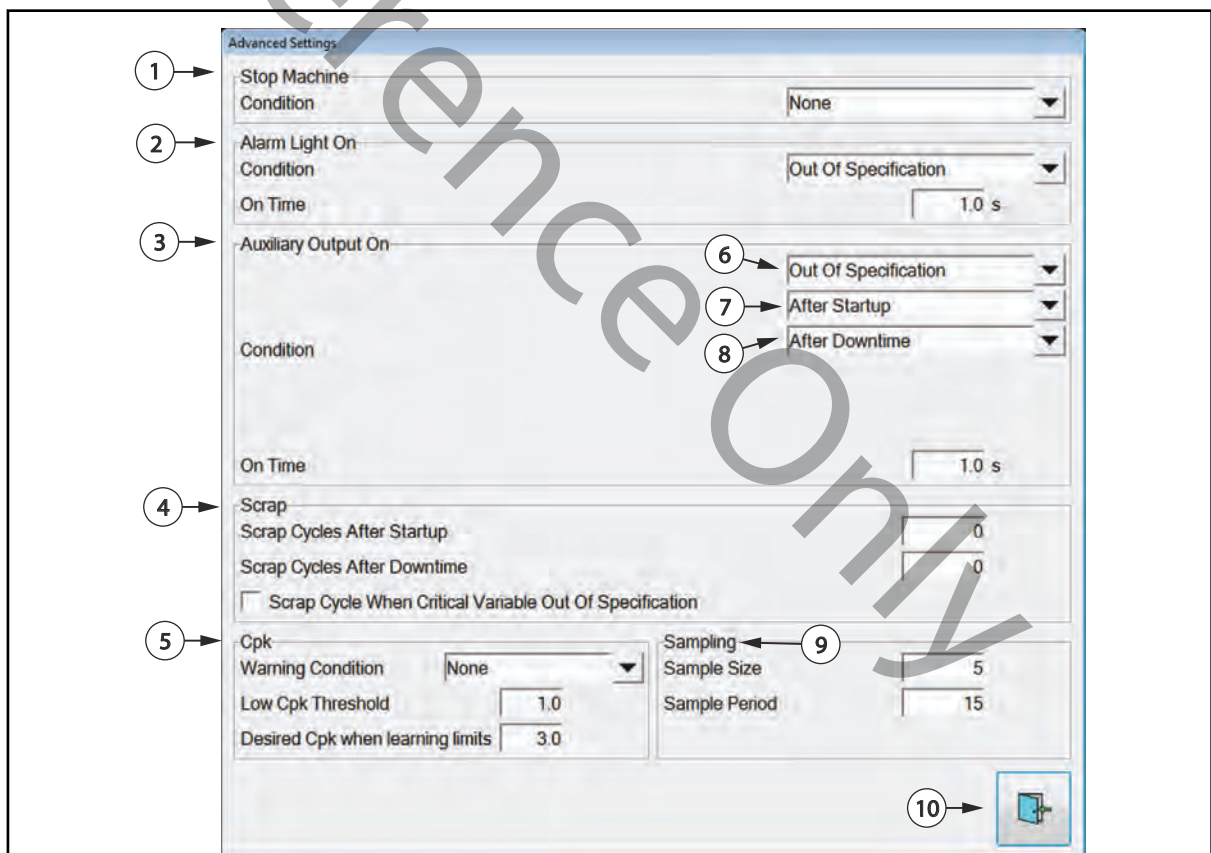


Figure 4-81: Advanced Settings Dialog Box

1. Stop Machine Area 2. Alarm Light Area 3. Auxiliary Output On Area 4. Scrap Area 5. Cpk Area
 6. Auxiliary Output On Condition One 7. Auxiliary Output On Condition Two
 8. Auxiliary Output On Condition Three 9. Sampling Area 10. Exit Button

4.25.2.6 Selecting Scrap Cycles

To select the scrap cycles after startup, after downtime, or when a variable is out of specification, do the following:

1. From the **Targets** screen, touch the **Advanced Settings** button to open the **Advanced Settings** dialog box.
2. From the **Scrap** area, touch the **Scrap Cycles After Startup** field to display a numeric touchpad and set the number of cycles to be scraped after machine start to run production for a new job.
3. Touch the **Accept** button on the touchpad.

NOTE:

If the "After Startup" is selected in the **Condition** field for **Auxiliary Output On**, then the auxiliary output bit (a digital output) will be on during the scraped cycles to enable operators to connect the digital output to other hardware to handle scrap.

-
4. Touch the **Scrap Cycles After Downtime** field to display a numeric touchpad and set the number of cycles to be scraped after machine downtime and machine starts again.
 5. Touch the **Accept** button on the touchpad.

NOTE:

If "After Downtime" is selected in the **Condition** field for **Auxiliary Output On**, then the auxiliary output bit (a digital output) will be on during the scraped cycles to enable operators to connect the digital output to other hardware to handle scrap.

-
6. Select the **Scrap Cycle When Critical Variable Out of Specification** check box to scrap cycles every time a critical variable is out of specification.
 7. Touch the **Accept** button on the confirmation message. The check box is selected.
 8. To turn off scrap cycles every time a critical variable is out of specification, touch the selected **Scrap Cycle When Critical Variable Out of Specification** check box. The check box clears.
 9. Touch the **Accept** button on the confirmation message.

NOTE:

If "Critical Variable Out of Specification" is selected in the **Condition** field for **Auxiliary Output On**, then the auxiliary digital output will be on during the scraped cycles so operators can connect the digital output to other hardware to handle scrap.

-
10. Touch the **Exit** button on the **Advanced Settings** dialog box.

4.25.2.7 Setting Cpk Warning Conditions, Low Cpk Threshold and Learning Limits

To set the Cpk warning conditions, low Cpk threshold and learning limits, do the following:

1. From the **Targets** screen, touch the **Advanced Settings** button to open the **Advanced Settings** dialog box.
2. From the **Cpk** area, touch the drop-down arrow next to the **Warning Condition** field to display a dialog box with a list of warning conditions.

3. Select the **Option** button next to the required warning condition to warn of a low Cpk threshold.
4. Touch the **Desired Cpk when learning limits** field to display a numeric touchpad. Touch the number pad and enter a value to set specification limits to generate a Cpk at this value.
5. Touch the **Accept** button on the touchpad.
6. Touch the **Low Cpk Threshold** field to display a numeric touchpad. Touch the number pad and enter a numeric value in the top field to activate the warning condition set in [step 2](#) when the threshold is reached.
7. Touch the **Accept** button on the touchpad.
8. Touch the **Exit** button on the **Advanced Settings** dialog box.

4.25.2.8 Setting Sample Size and Period

To set the sample size and period, do the following:

1. From the **Targets** screen, touch the **Advanced Settings** button to open the **Advanced Settings** dialog box.
2. From the **Sampling** area, touch the **Sample Size** field to display a numeric touchpad. Touch the number pad and enter a value for the number of consecutive machine cycles that make up a sample.
3. Touch the **Accept** button on the touchpad.
4. Touch the **Sample Period** field to display a numeric touchpad. Touch the number pad and enter a value for the rate a sample is taken.
5. Touch the **Accept** button on the touchpad.
6. Touch the **Exit** button to close the **Advanced Settings** dialog box.

4.25.3 Monitoring and Configuring the Current Screen

The SPC **Current** screen allows the user to monitor and configure the following:

- Configure up to 10 current process variables within the last 1, 2, 8, 12, 24 hour(s).
- The screen automatically updates every two minutes with the latest available data.

NOTE:

The **Current** Screen does not display data from every captured cycle. It only displays a resolution of every two minutes. If a higher resolution is required, use the **Cycle Group** or **Cycle History** Screen.

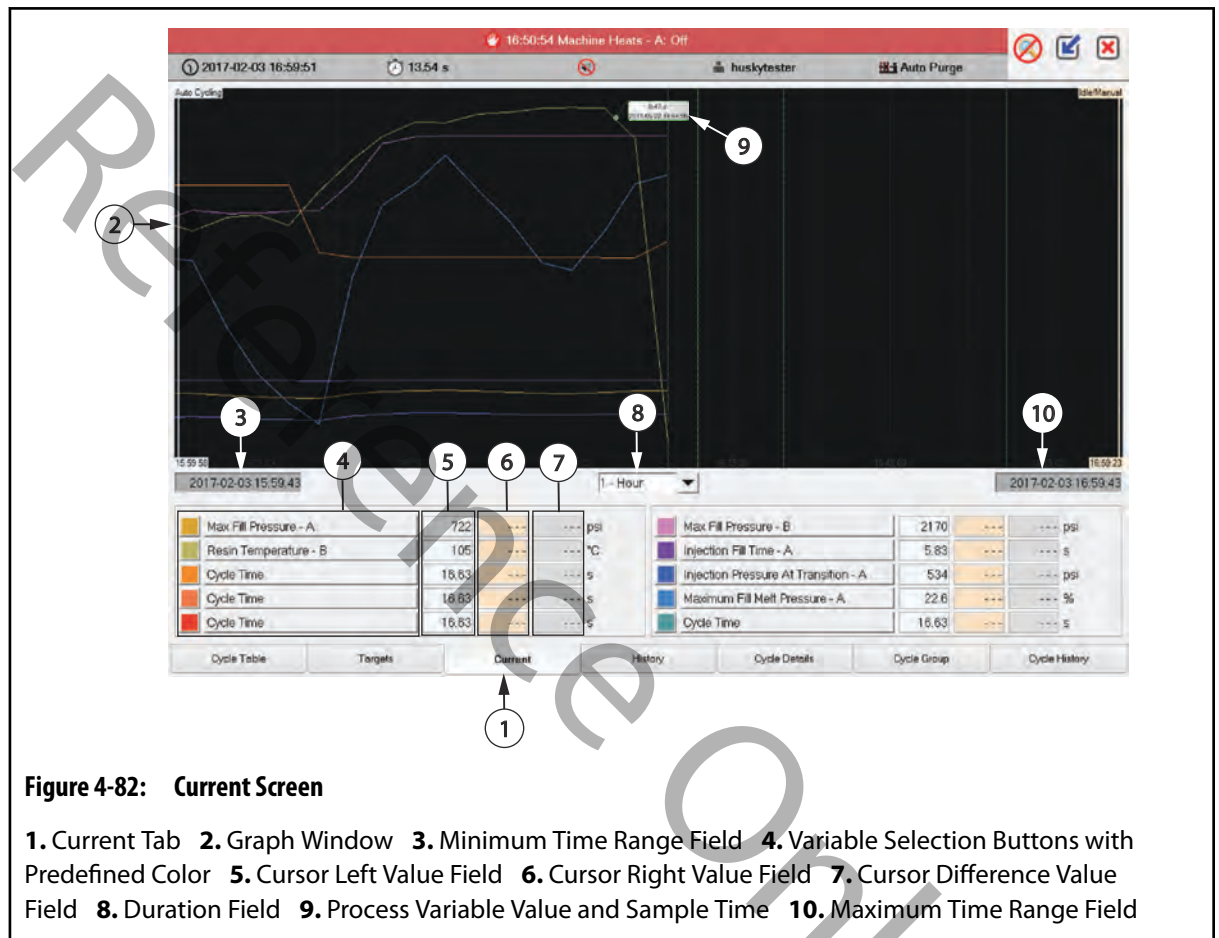
- Each variable has a predefined color next to it that matches the color of its graph line.
- Machine state/state change displays as a green dotted vertical line.
- Cursor left and right value fields indicate the value of the cursor at the position of left or right cursor. The cursor difference value field represents the difference between the right and left cursor values. The left cursor is blue and the right cursor is tan.
- Touch a graph line representing a variable at any point to display the sample value and time.
- View the minimum and maximum time range values for the displayed process variables, which are dependent on duration setting.

- Touch and drag the left and right cursors on the screen closer to or further from each other. The machine state text displays at the top of the screen and the precise time of cursor positions displays on the bottom.

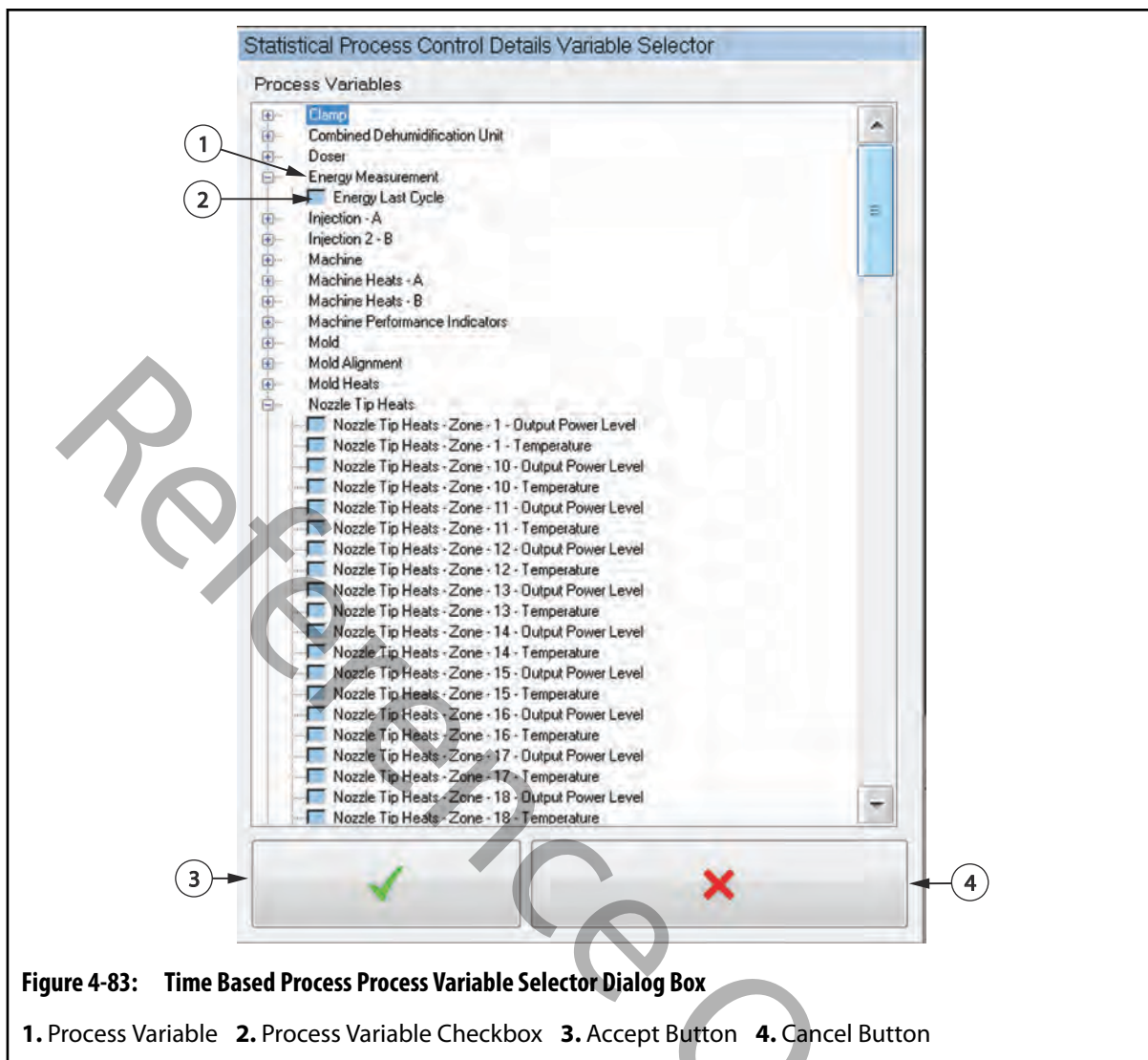
4.25.3.1 Adding and Modifying Process Variables from the Current Screen

To add or modify process variables on the **Current** screen, do the following:

1. On the HMI, press the **SPC** button and touch the **Current** tab to display the **Current** screen.



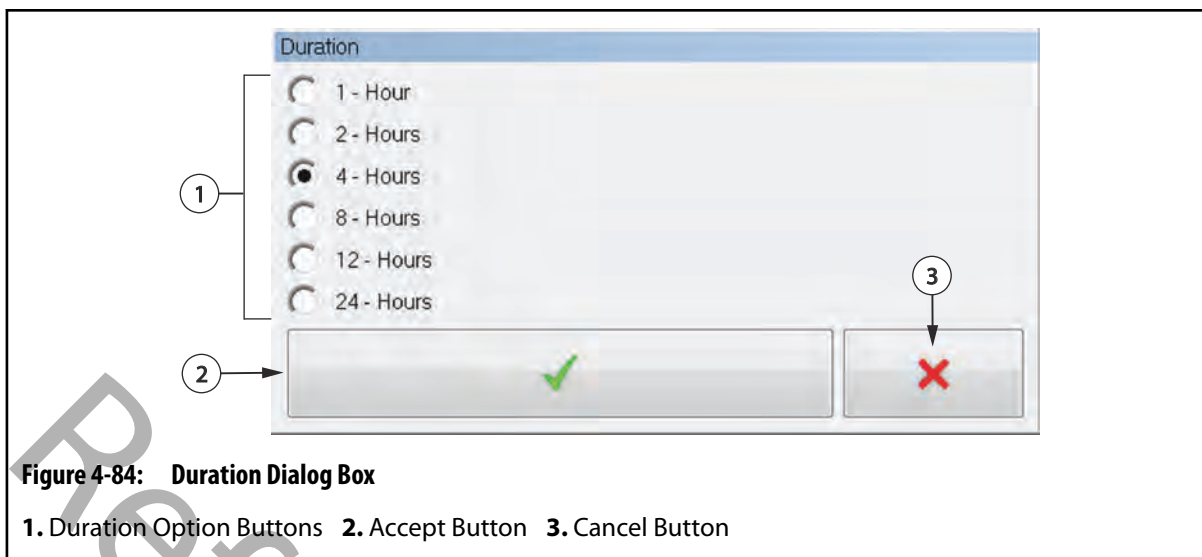
2. To select a variable to be monitored, touch one of the 10 **Variable Selection** buttons to open the **Time Based Process Variable Selector** dialog box.
3. From the **Time Based Process Variables** window, touch the plus sign next to the desired process variable to expand it.
4. From the expanded list, select the checkbox next to the required process variable(s).
5. Touch the **Accept** button.
6. Repeat [step 2](#) to [step 5](#) to add other required variables to be monitored.
7. If required, on the **Graph** window, touch a point on the graph line that represents a process variable to display the process value and the sample time.



4.25.3.2 Setting the Time Duration for Process Variables

To set the time duration to retrieve and display SPC process variables, do the following:

1. From the **Current** screen, touch the drop-down arrow next to the **Duration Selection** field to open the **Duration** dialog box.



2. Touch the **Option** button next to the required duration to select it. The duration can be 1, 2, 4, 8, 12, or 24 hour(s) long.
3. Touch the **Accept** button.

4.25.4 Monitoring and Configuring the History Screen

The SPC **History** screen allows the user to monitor and configure the following:

- View an updating history of selected current SPC process variables in graph format up to 24 hours.
- Configure up to 12 historical process variables within the last 1, 2, 8, 12, 24 hour(s), or compare a set of six variables with a different time range.
- The screen automatically updates every two minutes with the latest available data.
- Each selected process variable has a predefined color next to it that matches the color of its graph line.
- View the machine state/state change on the graph (green dotted vertical line).
- View the cursor values:
 - The cursor left value (blue) indicates the value of the cursor at the position of the left cursor.
 - The cursor right value (tan) indicates the value of the cursor at the position of the right cursor.
 - The cursor difference value indicates the difference between the right and left cursor values.
- Touch the screen and drag the left and right cursors on the screen closer to or farther from each other. The machine state text displays at the top of the screen and the precise time of cursor positions displays on the bottom.
- Touch a process variable graph line at any point to display the sample value and time of that variable.
- Set the duration to retrieve and display data.

- Scroll to move the graph to newer or older historical data by the time amount displayed in the **Duration Selection** field. Also, scroll to the earliest date/time available and the latest date/time available.
- View the minimum and maximum time range values for the displayed process variables dependent on duration setting.

4.25.4.1 Adding and Modifying Process Variables from the History Screen

To add or modify SPC process variables that will be viewed on the **History** screen, do the following:

1. On the HMI, press the **SPC** button and touch the **History** tab to display the **History** screen.

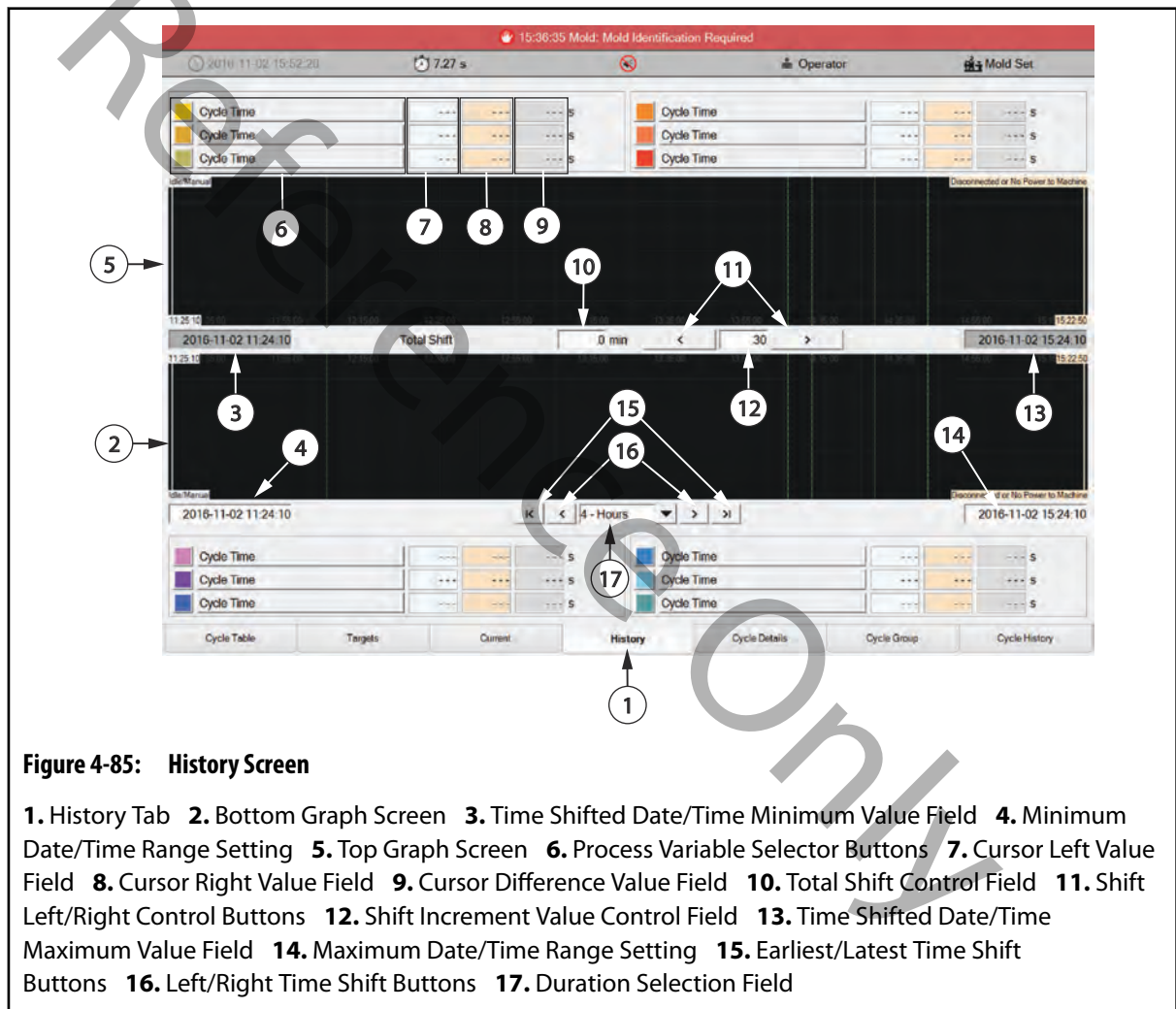


Figure 4-85: History Screen

1. History Tab
 2. Bottom Graph Screen
 3. Time Shifted Date/Time Minimum Value Field
 4. Minimum Date/Time Range Setting
 5. Top Graph Screen
 6. Process Variable Selector Buttons
 7. Cursor Left Value Field
 8. Cursor Right Value Field
 9. Cursor Difference Value Field
 10. Total Shift Control Field
 11. Shift Left/Right Control Buttons
 12. Shift Increment Value Control Field
 13. Time Shifted Date/Time Maximum Value Field
 14. Maximum Date/Time Range Setting
 15. Earliest/Latest Time Shift Buttons
 16. Left/Right Time Shift Buttons
 17. Duration Selection Field
2. To select a process variable to be monitored, touch one of the **Variable Selection** buttons to open the **Process Variable Selector** dialog box. Refer to [Section 4.25.7.1](#).
 3. From the **Process Variables** window, touch the plus sign next to the required process variable to expand it.
 4. From the expanded list, select the check box next to the required subprocess variable.
 5. Select the **Accept** button.

6. Repeat [step 2](#) to [step 5](#) to add other required variables to be monitored on the History screen.

4.25.4.2 Setting and Using Time Shifting for the Graph Display

To set and use time shifting for the **History** screen graph display, do the following:

1. From the **History** Screen, touch the **Total Shift Control** field to display a numeric touchpad.
2. Touch the touchpad and enter the total number of minutes the top graph can shift.

NOTE:

The number entered must be a negative since only shifting into the past is possible.

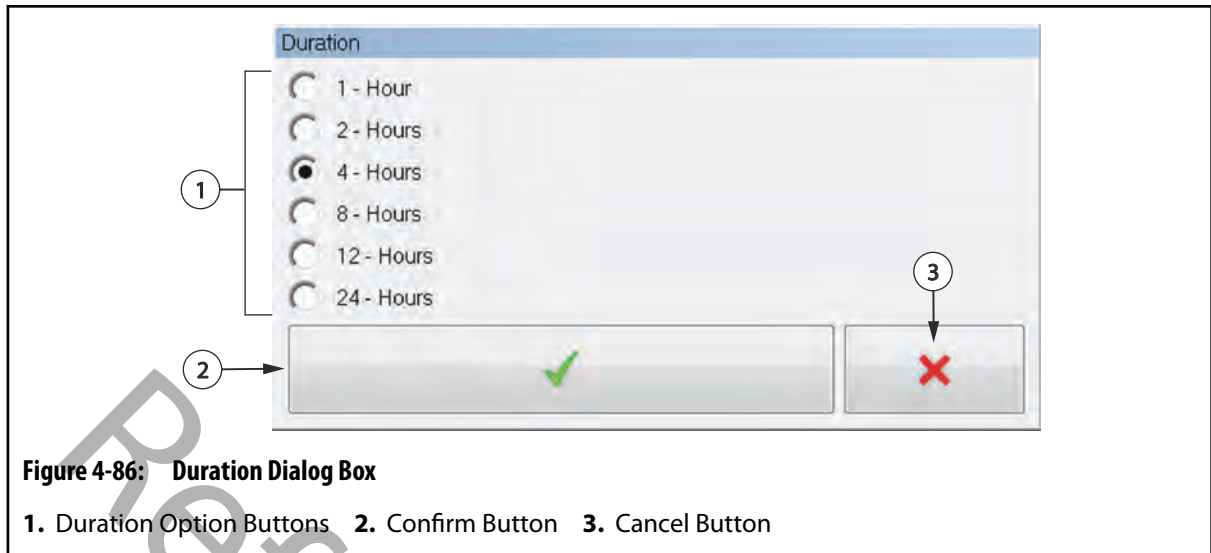
3. Touch the **Accept** button on the touchpad.
4. Touch the **Shift Increment Value Control** field to display a numeric touchpad.
5. Touch the number pad and enter the number of minutes the top graph will shift in time when the left and right shift controls are used.
6. Touch the **Accept** button on the touchpad.
7. To shift the top graph by the number of minutes entered in the **Shift Increment Value Control** field:
 - Touch the **Shift Left Control** button to negatively shift the top graph by the set increment.
 - Touch the **Shift Right Control** button to positively shift the top graph by the set increment.

The date and time in the minimum and maximum value fields change as the shift left and right control buttons are touched.

4.25.4.3 Setting the Time Duration for the History Screen Graph Display

To set the time duration for the graph, do the following:

1. From the **History** screen, touch the drop-down arrow next to the **Duration Selection** field to open the **Duration** dialog box.



2. Touch the **Option** button next to the required duration to select it. The duration can be 1, 2, 4, 8, 12, 24 hour(s) long.
3. Touch the **Accept** button.

4.25.4.4 Shifting the History Screen Graph Display by the Hour Duration

To shift the graph display by the time set in the **Duration Selection** field, do the following:

1. From the **History** Screen:
 - Touch the **Left Time Shift** button to the left of the **Duration Selection** field to shift the graph view to the minimum date/time setting by the value in the **Duration Selection** field divided by two.

NOTE:

As an example, if the value in the **Duration Selection** field is set to 1 hour, touching this button will shift the range by 30 minutes.

- Touch the **Right Time Shift** button to the right of the **Duration Selection** field to shift the graph view to the maximum date/time setting by the value in the **Duration Selection** field divided by two.

NOTE:

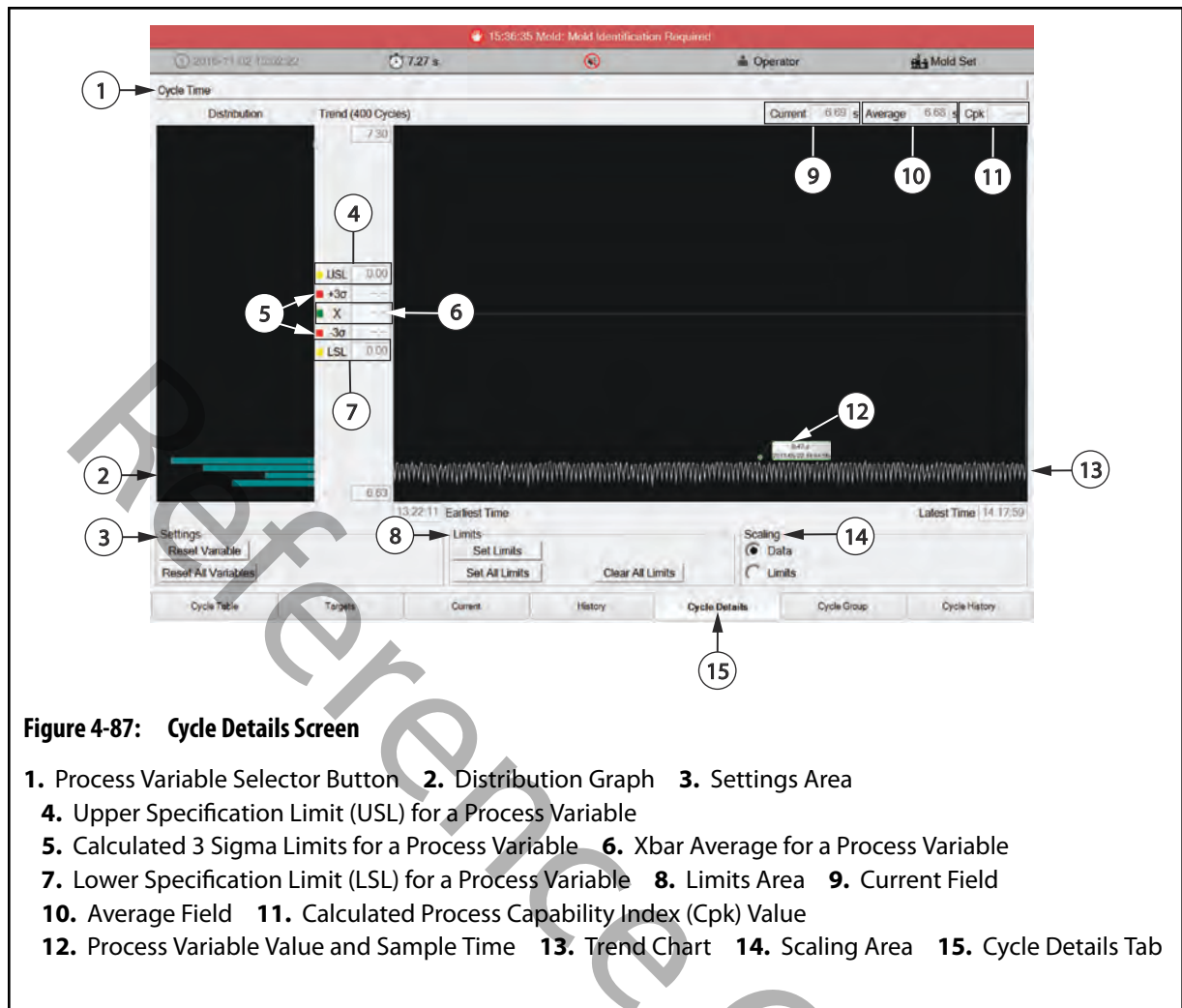
As an example, if the value in the **Duration Selection** field is set to 1 hour, touching this button will shift the range by 30 minutes.

- Touch the **Earliest Time Shift** button to the left of the **Duration Selection** field to automatically change the minimum date/time range setting to the earliest recorded time.
- Touch the **Latest Time Shift** button to the right of the **Duration Selection** field to automatically change the maximum date/time range setting to the latest recorded time.

4.25.5 Monitoring and Configuring the Cycle Details Screen

The **Cycle Details** screen allows the user to monitor and do the following:

- Monitor and configure SPC data for a single process variable and display it as a graph.
- View the most recent process variable value and the average process variable value.
- View the calculated process capability index (Cpk) value for the displayed process variable.
- View the statistical distribution for the process variable (last 400 cycles) as a graph.
- View the trend chart (last 400 cycles) for the selected process variable as a graph. The horizontal axis represents machine cycles, and the vertical axis represents range of process values.
- View the Upper Specification Limit (USL) and Lower Specification Limit (LSL) for a process variable.
- View the calculated 3 sigma limits for the process window.
- View the calculated xbar average for the process window.
- Reset the displayed process variable and restart sampling of all variables.
- Set the specification limits for the current displayed process variable or all monitored process variables.
- Clear all specification limits for all monitored process variables.
- Vertically scale the chart by data or by specification limits.
- From the **Trend Chart**, touch a graph line that represents a variable at any point to display the sample value and time.



4.25.5.1 Adding and Modifying a Process Variable

To add or modify a single SPC process variable on the **Cycle Details** screen, do the following:

1. On the HMI, press the **SPC** button and touch the **Cycle Details** tab to display the **Cycle Details** screen.
2. To select a variable to be monitored, touch the **Variable Selection** button to open the **Process Variable Selector** dialog box.
3. From the **Process Variables** window, touch the plus sign next to the desired process variable to expand it.
4. From the expanded list, select the check box next to the required process variable.
5. Touch the **Accept** button.

4.25.5.2 Resetting Process Variables

1. On the HMI, press the **SPC** button and touch the **Cycle Details** tab to display the **Cycle Details** screen.

2. If required, in the **Settings** area, touch the **Reset Variable** button to reset the displayed monitored variable and restart the sampling of the variable. The trend chart and any active alarms are cleared.
3. If required, in the **Settings** area, touch the **Reset All Variables** button to reset all monitored variables and restart the sampling of all variables.
4. Touch the **Accept** button on the confirmation message.

4.25.5.3 Setting the Limits for Process Variables

1. On the HMI, press the **SPC** button and touch the **Cycle Details** tab to display the **Cycle Details** screen.
2. If required, in the **Limits** area, touch the **Set Limits** button to automatically determine specification limits for the current displayed process variable based on its current trend.
3. If required, in the **Limits** area, touch the **Set All Limits** button to set limits for all monitored process variables. These limits are based on the Cpk value.
4. Touch the **Accept** button on the confirmation message.

4.25.5.4 Clearing and Resetting All Process Variables

To clear and reset all process variables, do the following

1. On the HMI, press the **SPC** button and touch the **Cycle Details** tab to display the **Cycle Details** screen.
2. If required, in the **Settings** area, touch the **Clear All Variables** button to clear all specification limits and set them to zero.

NOTE:

Use this function after installing a new mold to clear specifications from previous runs with a different mold.

3. Touch the **Accept** button on the confirmation message.
4. If required, in the **Settings** area, touch the **Reset All Variables** button to reset all monitored variables and restart the sampling of all variables.

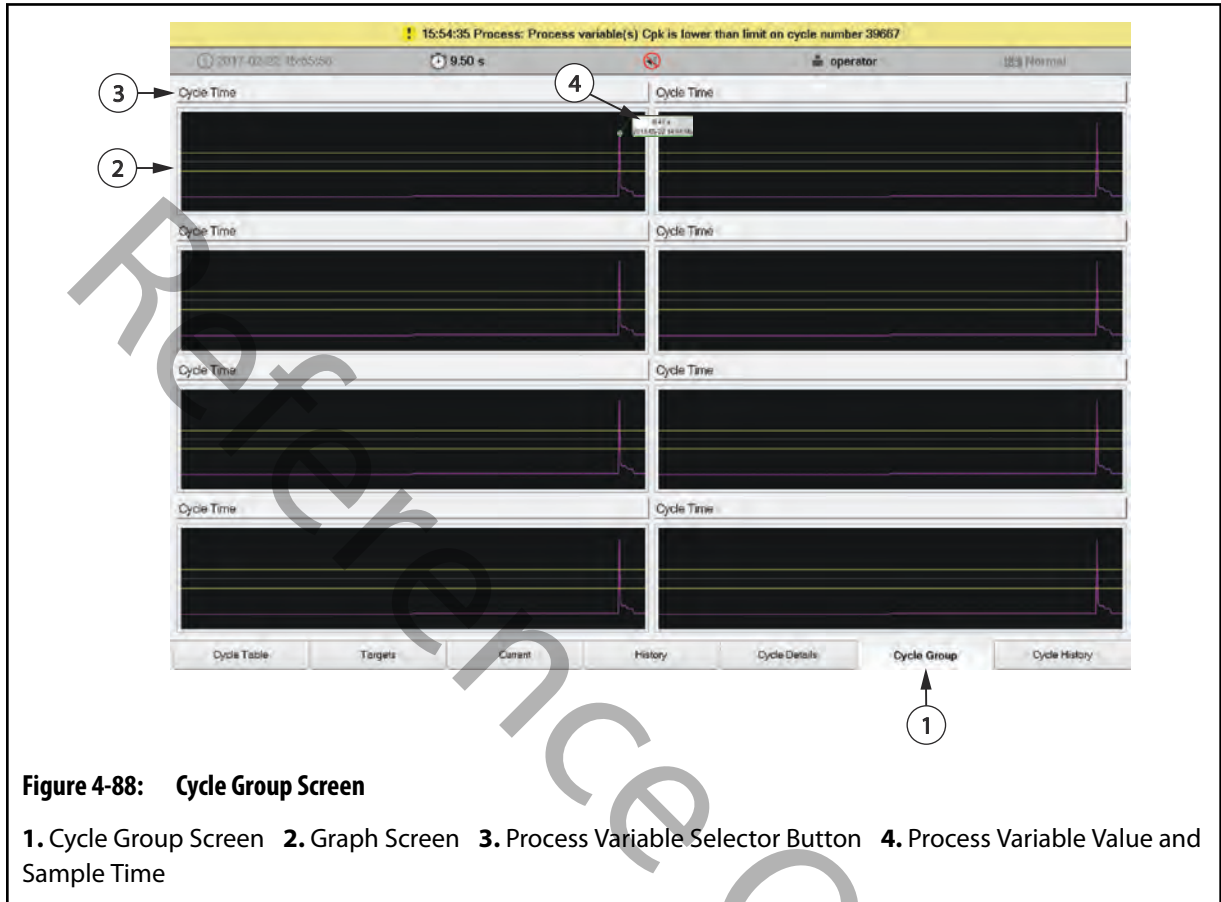
4.25.5.5 Scaling the Chart

To vertically scale the chart, do the following:

1. On the HMI, press the **SPC** button and touch the **Cycle Details** tab to display the **Cycle Details** screen.
2. If required, in the **Scaling** area, select an option button to vertically scale the chart:
 - **Data** — Fit all data in the chart
 - **Limits** — Fit the limits in the chart (outliers may be outside the vertical scale of the chart)

4.25.6 Monitoring and Configuring the Cycle Group Screen

Use the SPC **Cycle Group** screen to monitor and configure up to eight monitored process variables in graph format to check for any correlations.



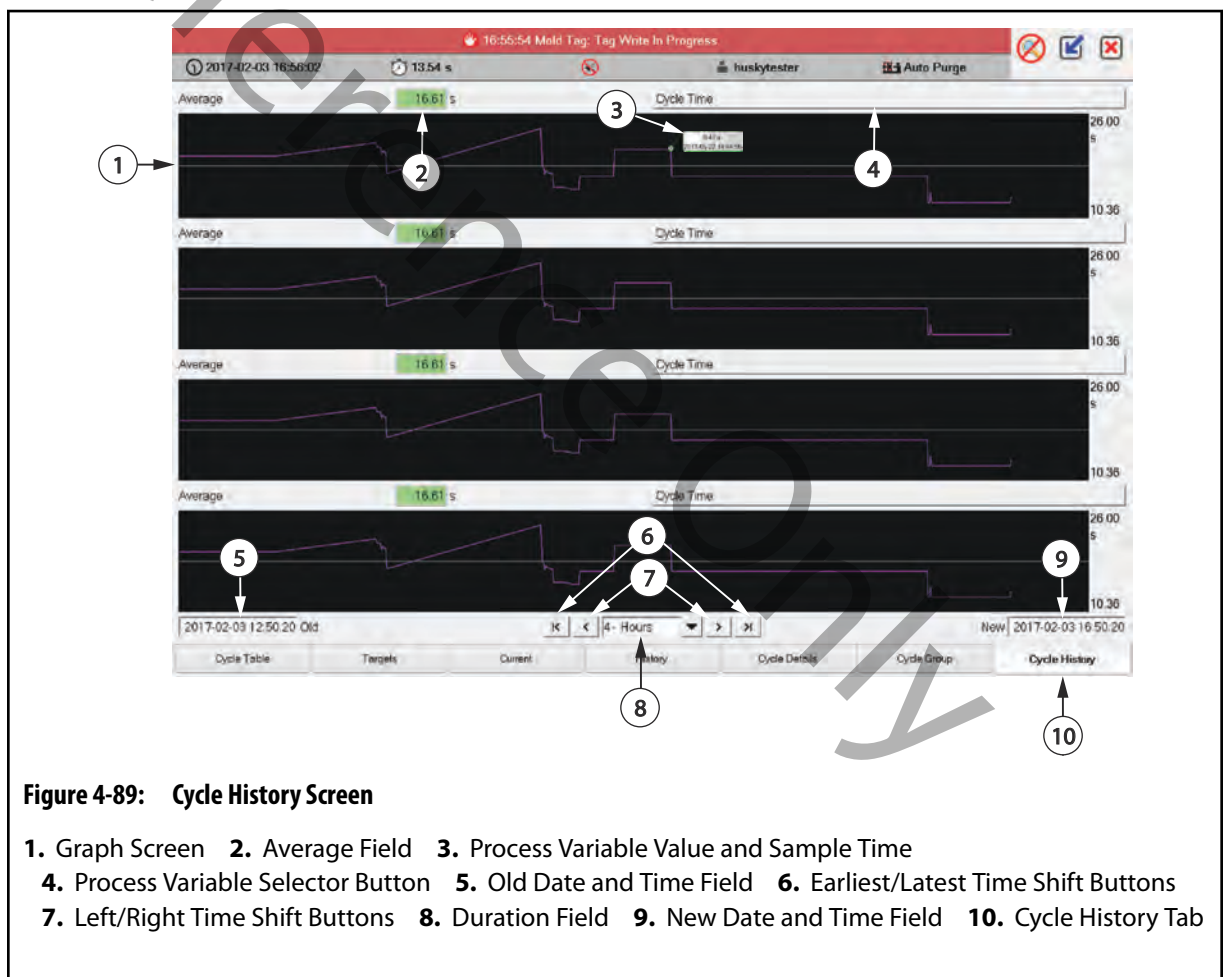
To configure multiple process variables from the **Cycle Group** screen, do the following:

1. On the HMI, press the **SPC** key and touch the **Cycle Group** tab to display the **Cycle Group** screen.
2. To select a variable to be monitored, touch one of the eight **Variable Selection** buttons to open the **Time Based Process Variable Selector** dialog box.
3. From the **Time Based Process Variables** window, touch the plus sign next to the desired process variable to expand it.
4. From the expanded list, select the checkbox next to the required process variable(s).
5. Touch the **Accept** button.
6. Repeat [step 3](#) to [step 5](#) to add other required variables to be monitored on the **Current** screen.
7. If required, on a **Graph** window, touch a point on the graph line that represents a process variable to display the process value and the sample time.

4.25.7 Monitoring and Configuring the Cycle History Screen

Use the SPC **Cycle History** screen to monitor and configure the following:

- Configure and monitor the cycle history for up to four process variables at one time in graph format. The data is read from data and event logs. The event log contains the previous 20,000 events. The data log contains SPC process variable values for the previous 10,000 cycles. The duration of this data depends on the cycle time.
- Set the duration to retrieve and display data.
- Scroll to move the graph to newer or older historical data by the time amount displayed in the **Duration Selection** field. Also, scroll to the earliest date/time of the reporting period and the latest date/time of the reporting period.
- Change the date/time of the graph displays.
- View the average value for each selected process variable.
- Touch a graph line that represents a variable at any point to display the sample value and time for that variable.



4.25.7.1 Adding and Modifying the Cycle history for a Process Variable

To add or modify the cycle history for a process variable, do the following:

1. On the HMI, press the **SPC** button and touch the **Cycle History** tab to display the **Cycle History** screen.
2. To select a variable to be monitored, touch one of the four **Process Variable Selector** buttons to open the **SPC History - Process Variable Selector** dialog box.

NOTE:

The same variable can be viewed in the other graphs.

3. From the **Process Variables** window, touch the plus sign next to the desired process variable to expand it.
4. From the expanded list, select the check box next to the required process variable(s).
5. Touch the **Accept** button.
6. Repeat [step 3](#) to [step 5](#) to add other required variables to be monitored on the **Cycle History** screen.
7. If required, on a **Graph** window, touch a point on a graph line that represents a process variable to display the process value and the sample time for that variable.

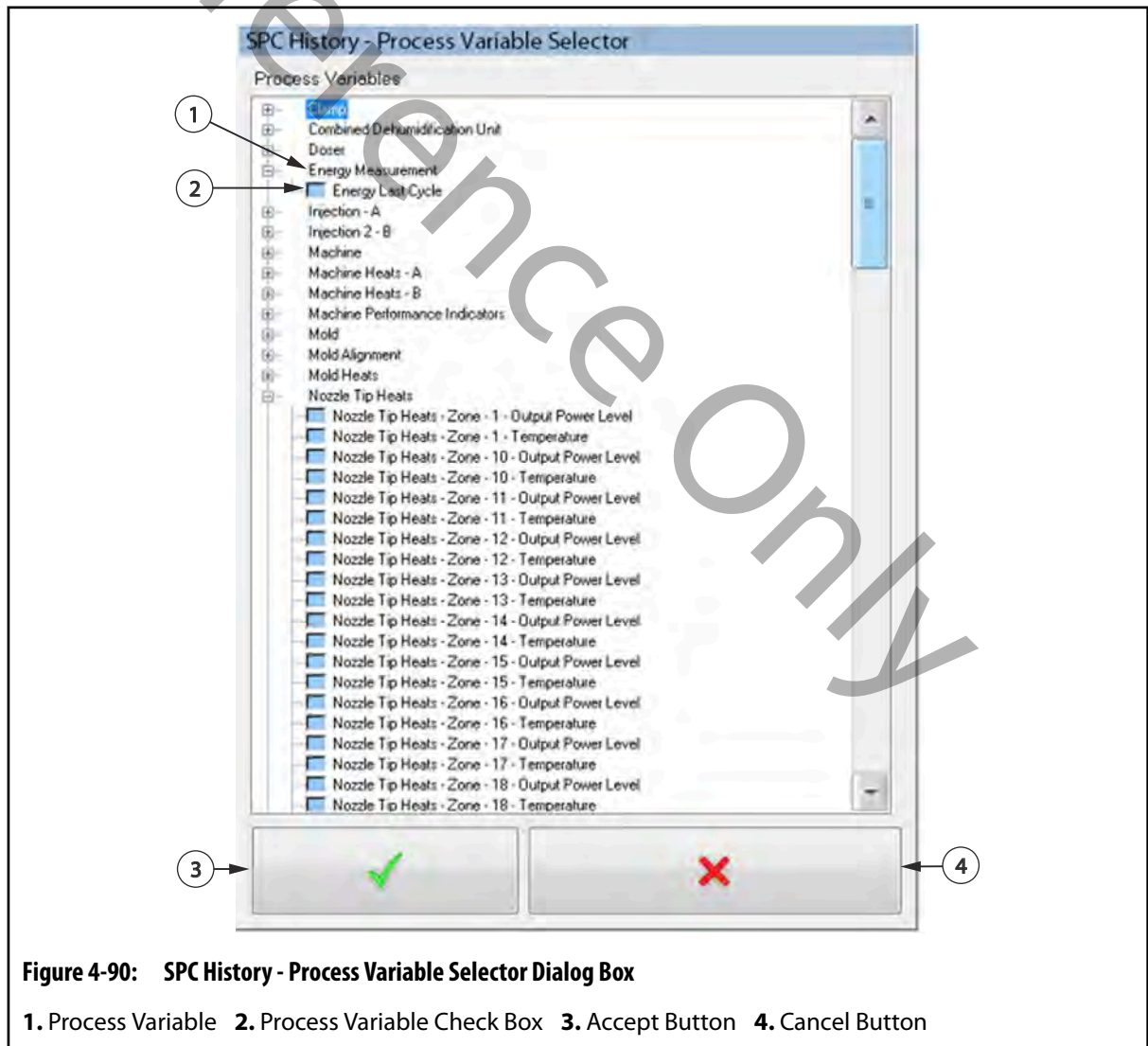


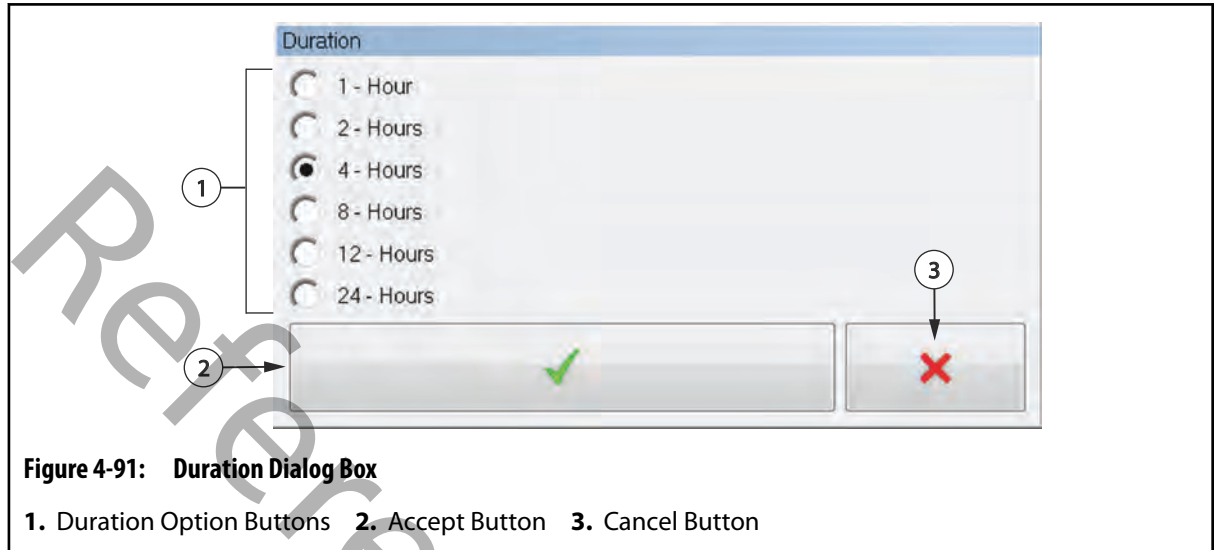
Figure 4-90: SPC History - Process Variable Selector Dialog Box

1. Process Variable 2. Process Variable Check Box 3. Accept Button 4. Cancel Button

4.25.7.2 Setting the Time Duration for the Cycle History Screen Graph Display

To set the time duration for the graph and use the time shift increment controls, do the following:

1. From the **Cycle History** screen, touch the drop-down arrow next to the **Duration Selection** field to open the **Duration** dialog box.



2. Touch the **Option** button next to the required duration to select it. The duration can be 1, 2, 4, 8, 12, 24 hour(s) long.
3. Touch the **Accept** button.

4.25.7.3 Shifting the Cycle History Screen Graph Display by the Hour Duration

To shift the graph display by the time set in the **Duration Selection** field, do the following:

1. From the **Cycle History** Screen:
 - Touch the **Left Time Shift** button to the left of the **Duration Selection** field to shift the graph view to the minimum date/time setting by the value in the Duration Selection field.
 - Touch the **Right Time Shift** button to the right of the **Duration Selection** field to shift the graph view to the maximum date/time setting by the value in the **Duration Selection** field.
 - Touch the **Earliest Time Shift** button to the left of the **Duration Selection** field to automatically change the minimum date/time range setting to the earliest recorded time.
 - Touch the **Latest Time Shift** button to the right of the **Duration Selection** field to automatically change the maximum date/time range setting to the latest recorded time.

4.25.7.4 Changing the Date and Time of the Graph Displays

To change the date and time of the graph displays, do the following:

NOTE:

The date/time change is limited to a 24 hour period.

1. To change the date and time to a new date and time, touch the **New** field. A calendar dialog box appears.
2. Touch the calendar date numbers and enter a new date to view the process variables on the graph displays.
3. Touch the touchpad and enter a new time to view the process variables on the graph displays.
4. Touch the **Accept** button on the calendar dialog box.
5. To change the date and time to an old date and time, touch the **Old** field. A calendar appears.
6. Touch the calendar date numbers and enter an old date to view the process variables on the graph displays.
7. Touch the touchpad and enter an old time to view the process variables on the graph displays.
8. Touch the **Accept** button on the calendar dialog box.

4.26 Starting the Machine

This section describes the process for starting the injection molding machine. Startup can be performed manually or using SmartStart.

Procedure	Reference
Starting the machine manually	Section 4.26.1
Starting the machine using SmartStart	Section 4.26.2

NOTE:

HMI screens are representative and may not be identical to the ones on your machine.

**IMPORTANT!**

The procedures contained in this chapter were written for a standard machine and do not take special options into consideration.

4.26.1 Starting the Machine Manually

To startup the machine manually, perform the following procedures in order:

Step	Procedure	Reference
1	Inspect the machine	Section 4.26.1.1
2	Power up the machine	Section 4.26.1.2
3	Start the resin dryer, if equipped	Section 4.26.1.8
4	Turn on the air supply	Section 4.26.1.3
5	Log on to the HMI	Section 4.26.1.4
6	Check the safety devices	Section 4.26.1.5
7	Check the hydraulic oil	Section 4.26.1.6
8	Check and reset alarms	Section 4.26.1.7
9	Warm up the hydraulic oil	Section 4.26.1.9
10	Check the machine functions	Section 4.26.1.10
11	Check the product handling functions	Section 4.26.1.11
12	Check the mold functions	Section 4.26.1.12
13	Cycling the machine and product handling unit	Section 4.26.1.13
14	Turn on the heats	Section 4.26.1.14
15	Prepare the process material feed	Section 4.26.1.15
16	Purge the injection unit	Section 4.26.1.16
17	Clean the injection nozzle tip	Section 4.26.1.17
18	Empty the process material disposal bins	Section 4.26.1.18
19	Inspect the mold	Section 4.26.1.19
20	Precharge the hot runner	Section 4.26.1.20
21	Start the CoolPik auxiliaries and mold dehumidifier (if equipped)	Section 4.26.1.21
22	Produce test parts	Section 4.26.1.22
23	Start production	Section 4.26.1.23

4.26.1.1 Inspecting the Machine

Before powering up the machine for production, inspect the machine and surrounding area to make sure it is ready for operation. During the inspection, do the following:

- Make sure all rust inhibitor is removed from all exposed or unpainted machine surfaces.
- Make sure the floor is clean.

- Make sure there are no fluid leaks.
- Make sure all hoses and cables are connected and properly secured.
- Make sure there are no missing parts.
- Make sure all safety labels are installed.
- Make sure there is no on-going maintenance.
- Make sure all guards and gates are installed.
- Make sure all personnel are clear of the machine.
- Make sure all tools are clear of the machine.
- Make sure all trip hazards are removed.
- Make sure all emergency stop buttons are accessible.
- Make sure the machine and auxiliary equipment (if equipped) is free of damage.

Make sure all problems are corrected before powering up the machine.

4.26.1.2 Powering Up the Machine

To power up the machine, do the following:

1. If equipped, make sure the mold enclosure de-humidifier (if equipped), compressed air and water chiller are enabled.
2. Make sure the water chiller is adjusted to the proper operating temperature.
3. If a direct feed system is equipped, make sure the dryer is loaded and adjusted to the proper operating temperature.
4. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
5. Make sure the main power switch from the factory is in the ON position.

CAUTION!

Electrical hazard – risk of component damage. When powering up the machine, switch on the Q1M breaker handle before switching on the Q3M or Q2M breaker handles. Failure to do so could result in unnecessary wear on the components and lead to premature failure.

6. Move the Q1M breaker handle to the ON position. This turns on power to the machine including the HMI and all other machine functions.

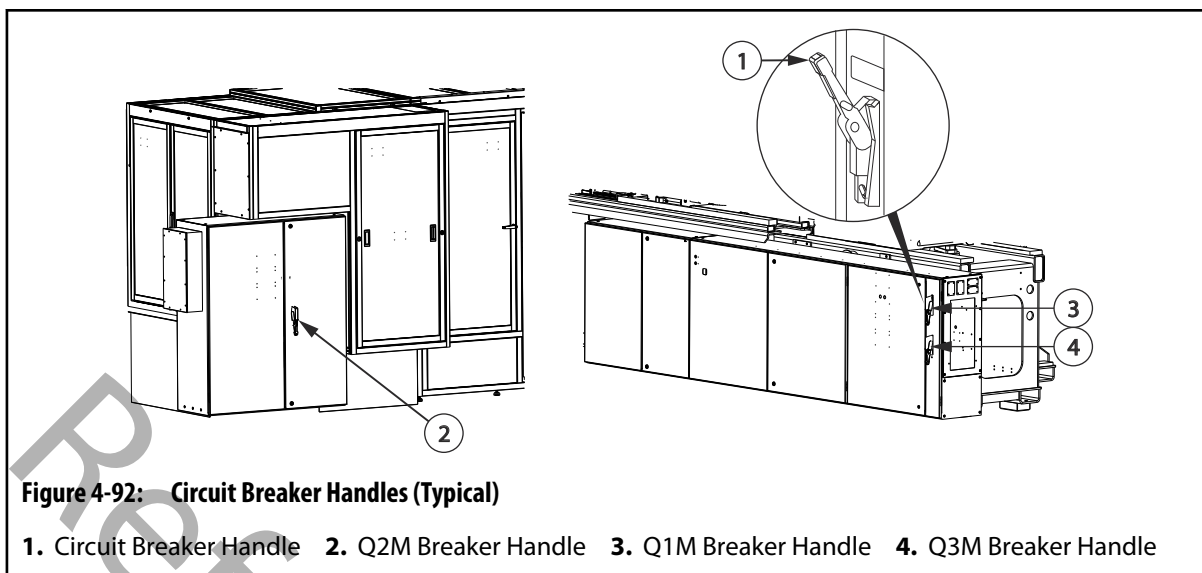


Figure 4-92: Circuit Breaker Handles (Typical)

1. Circuit Breaker Handle 2. Q2M Breaker Handle 3. Q1M Breaker Handle 4. Q3M Breaker Handle

7. Move the Q2M breaker handle to the ON position. This turns on power to the integrated mold heats.
8. If equipped, move the Q3M breaker handle to the ON position. This turns on power to motion control.
9. Wait for the patent screen to appear on the HMI.
10. On the HMI, touch the **Start HMI** button.

4.26.1.3 Turning On the Air Supply

To turn on the air supply for the pneumatic system, do the following:

1. Rotate shutoff switch on the air regulator to turn on the compressed air supply.

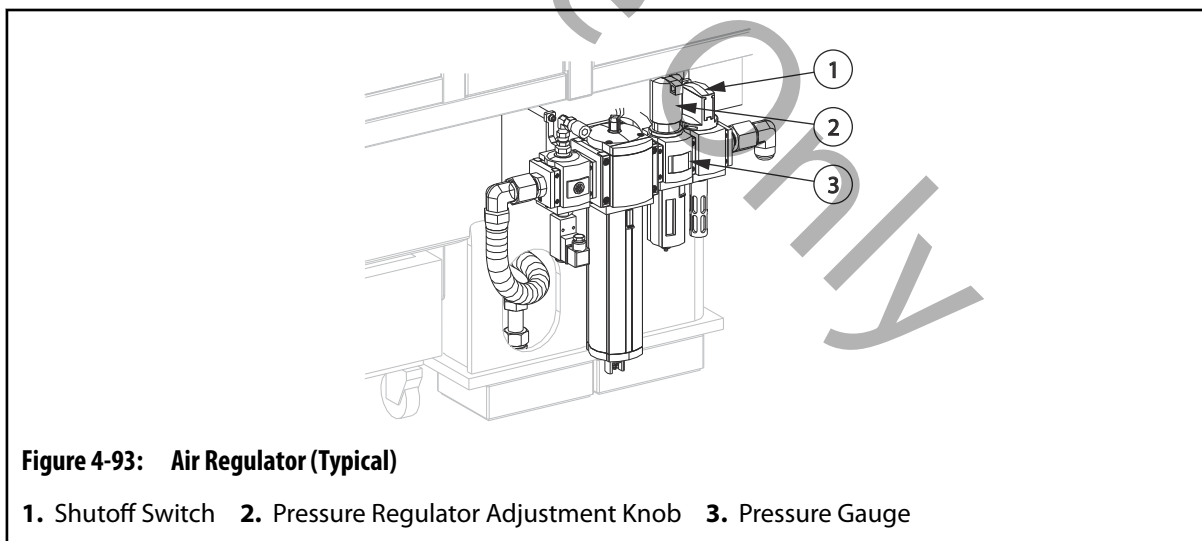


Figure 4-93: Air Regulator (Typical)

1. Shutoff Switch 2. Pressure Regulator Adjustment Knob 3. Pressure Gauge

2. If necessary, adjust the air pressure by turning the pressure regulator adjustment knob. Refer to [Chapter 7—Specifications](#) for the required setting.

4.26.1.4 Logging On to the HMI

Log on to the Human Machine Interface (HMI). Refer to [Section 4.2](#) for more information.

NOTE:

Access to the HMI requires a valid user name and password, or a datakey.

4.26.1.5 Checking the Safety Devices

The functionality of all safety devices on the machine must be checked before production begins. If any safety device is not functioning as described, do not operate the machine. Contact Husky for assistance. To confirm the functionality of these devices, perform the procedures in the following sections.

4.26.1.5.1 Checking the Emergency Stop Buttons

The machine is equipped with emergency stop buttons located on the operator and non-operator sides of the machine.

To check the emergency stop buttons, do the following:

1. On the HMI, press the **Pump Motor On** key to start the pump motor.
2. Push one of the emergency stop buttons to shut down the machine.
3. Check that the pump motor stops and all machine motion stops when the button is pressed.
4. Press the **Alarms** key and touch the **Alarms** tab to display the **Alarms** screen. The *Emergency Stop* alarm should be active (red).

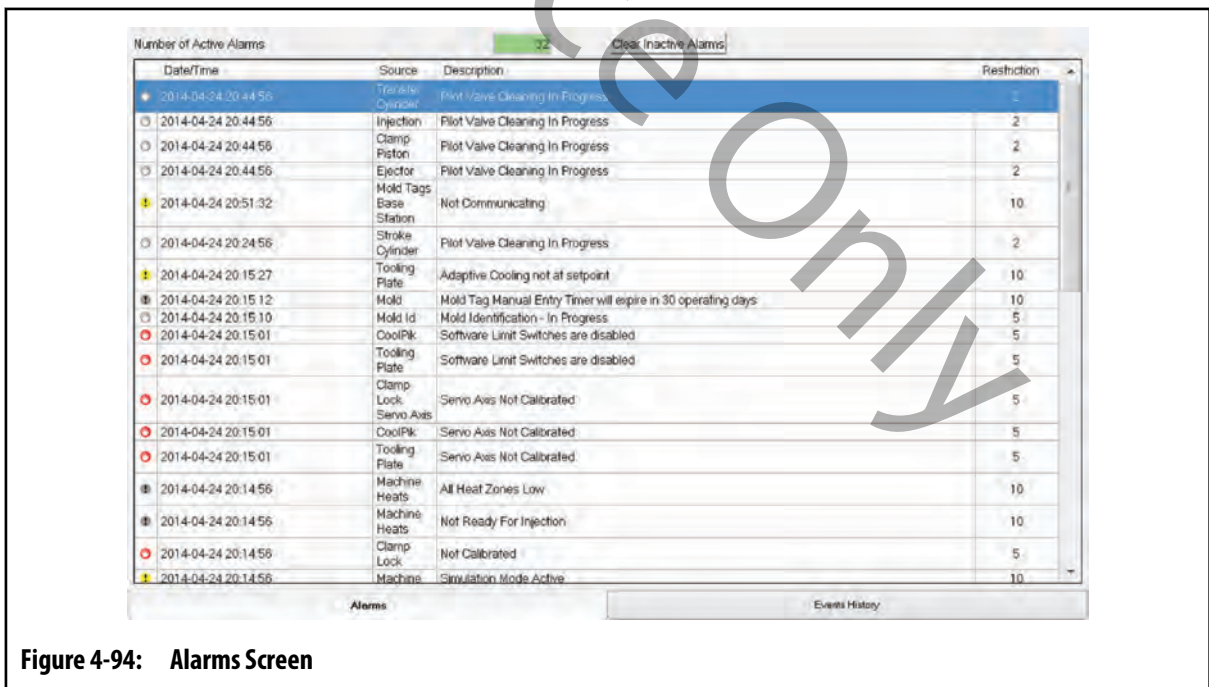


Figure 4-94: Alarms Screen

5. Pull out the emergency stop button to reset the machine.
6. Check that the *Emergency Stop* alarm is inactive (grey) in the **Alarms** screen.

7. Repeat [step 2](#) to [step 6](#) to test the other emergency stop button.

4.26.1.5.2 Checking the Safety Gates

The safety gate switches trigger an alarm when any safety gate is opened. The alarm will stop and prevent all machine motion to protect personnel from potential injuries.

To check the functionality of the safety gate switches, do the following:



IMPORTANT!

Opening any product handling compartment gate triggers an alarm on the HMI, preventing the injection molding machine from operating. Press the gate reset button after closing the gates to dismiss the alarm.

1. On the HMI, touch the **Alarms** button and touch the **Alarms** tab to display the **Alarms** screen.

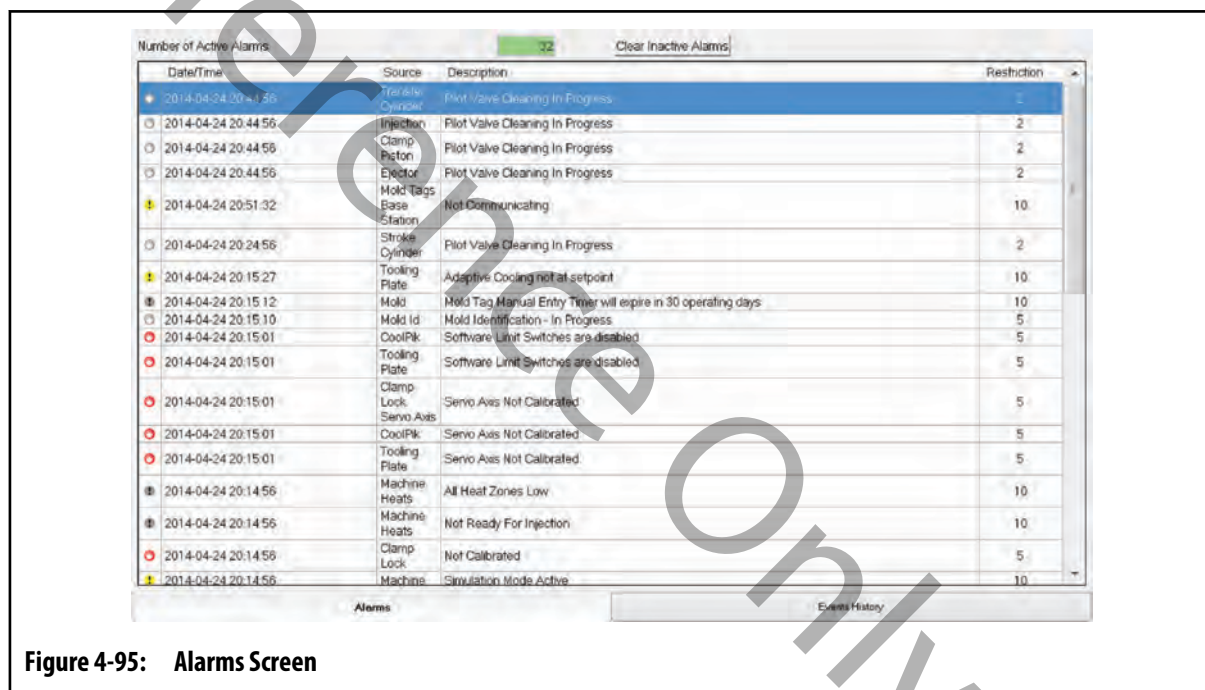


Figure 4-95: Alarms Screen

2. Open the front gate.

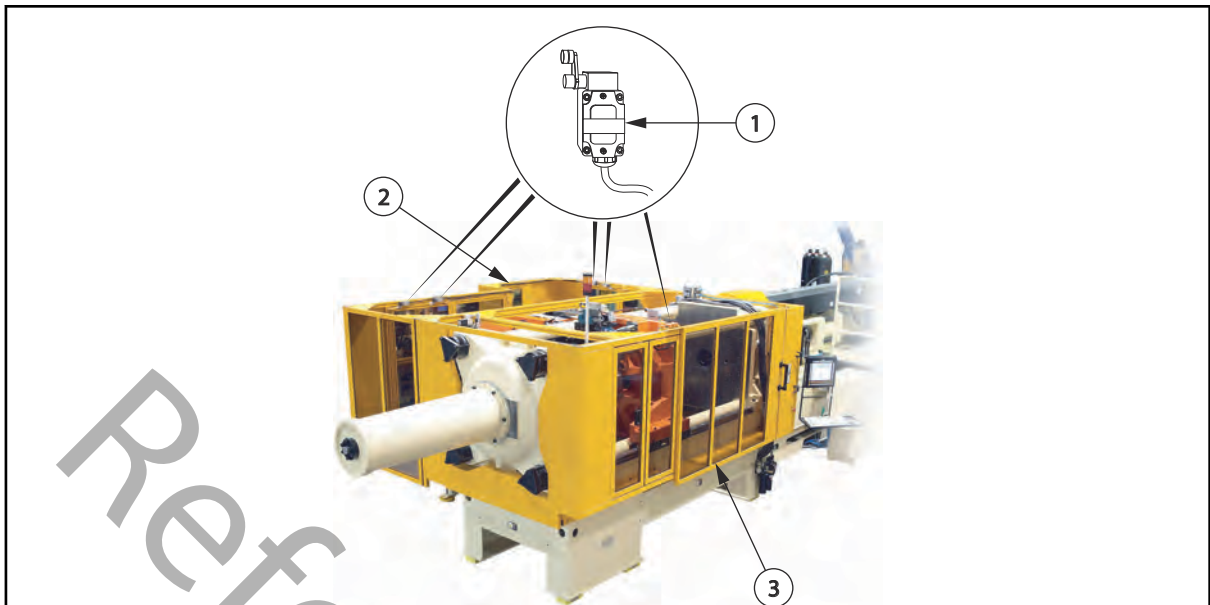


Figure 4-96: Safety Gates (Typical)

1. Limit Switch (Typical) 2. Product Handling Gate 3. Front Gate

3. Check the **Alarms** screen for active (red) *Gate Open* alarm.
4. Close the front gate.
5. Check the **Alarms** screen again. The *Gate Open* alarm should be inactive (grey).
6. Repeat procedure for all gates.



IMPORTANT!

Opening any product handling compartment gate triggers an alarm on the HMI, preventing the injection molding machine from operating. Press the gate reset button immediately after closing the gates to dismiss the alarm.

7. Press the **Gate Reset** button on the non-operator side of the machine.

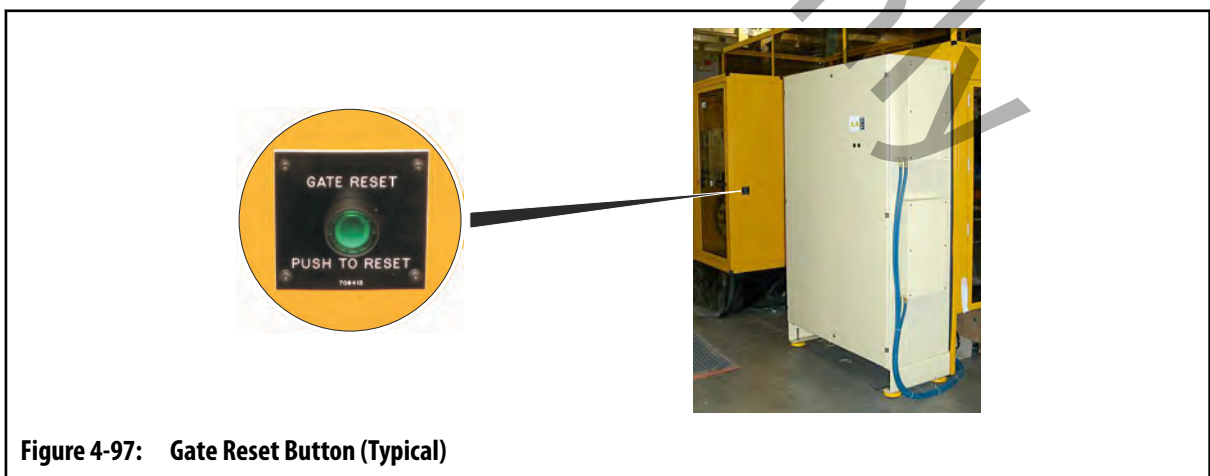
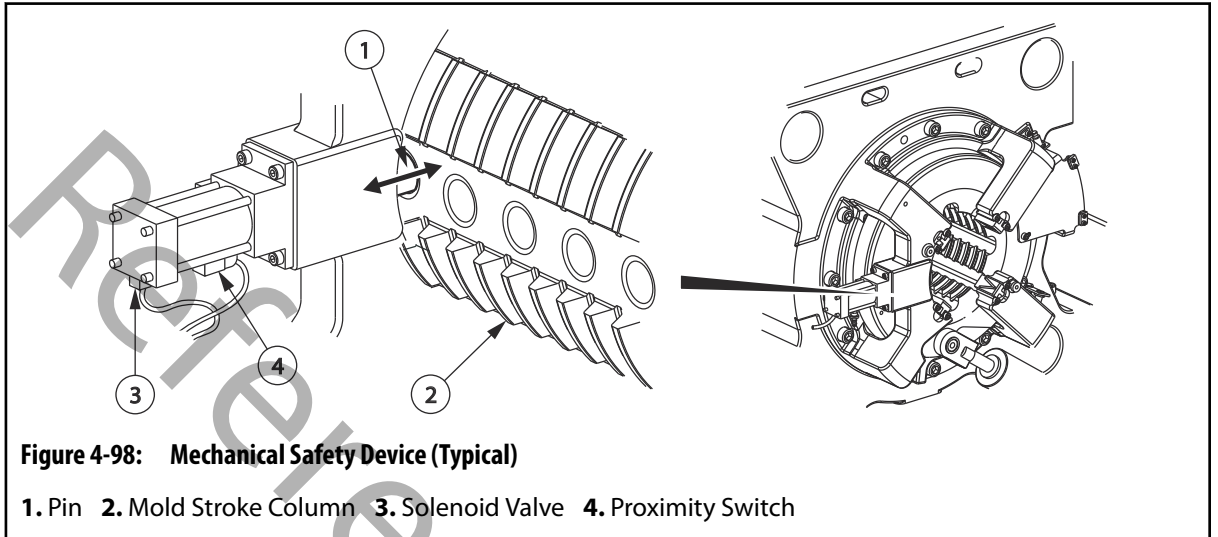


Figure 4-97: Gate Reset Button (Typical)

4.26.1.5.3 Checking the Mechanical Safety Device (If Equipped)

To check the mechanical safety device, do the following:

1. Open the front gate.
2. Inspect the mechanical safety device. The pin should be extended, contacting the clamp column or protruding in one of the holes in the clamp column.



3. Close the front gate.
4. Inspect the mechanical safety device. The pin should be retracted.

4.26.1.5.4 Checking the Purge Guard

The purge guard protects the operator from molten resin spraying from the injection nozzle. To warn the operator when the purge guard has been opened during operation, a limit switch monitors the purge guard and activates an alarm when the guard is opened.

To check the limit switch for the purge guard, do the following:

1. On the HMI, touch the **Alarms** button and touch the **Alarms** tab to display the **Alarms** screen.

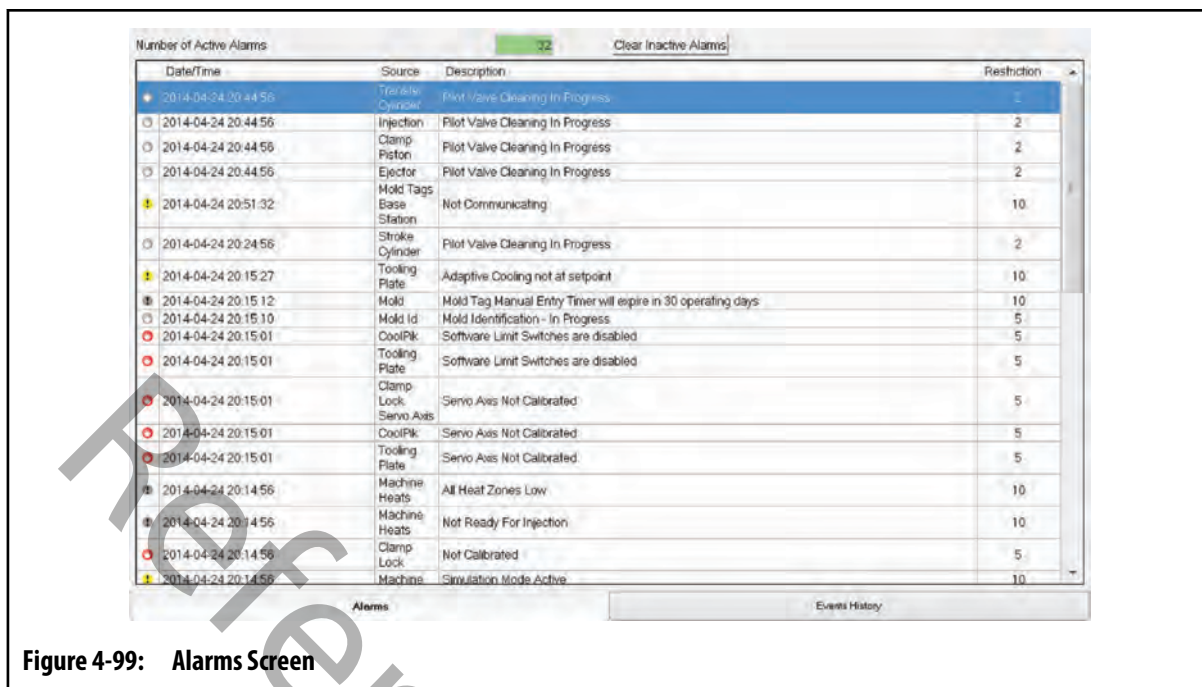


Figure 4-99: Alarms Screen

2. Open the purge guard and check the **Alarms** screen. The *Purge Guard Open* alarm should be active (red).
3. Close the purge guard and confirm the message is inactive (grey) in the **Alarms** screen.

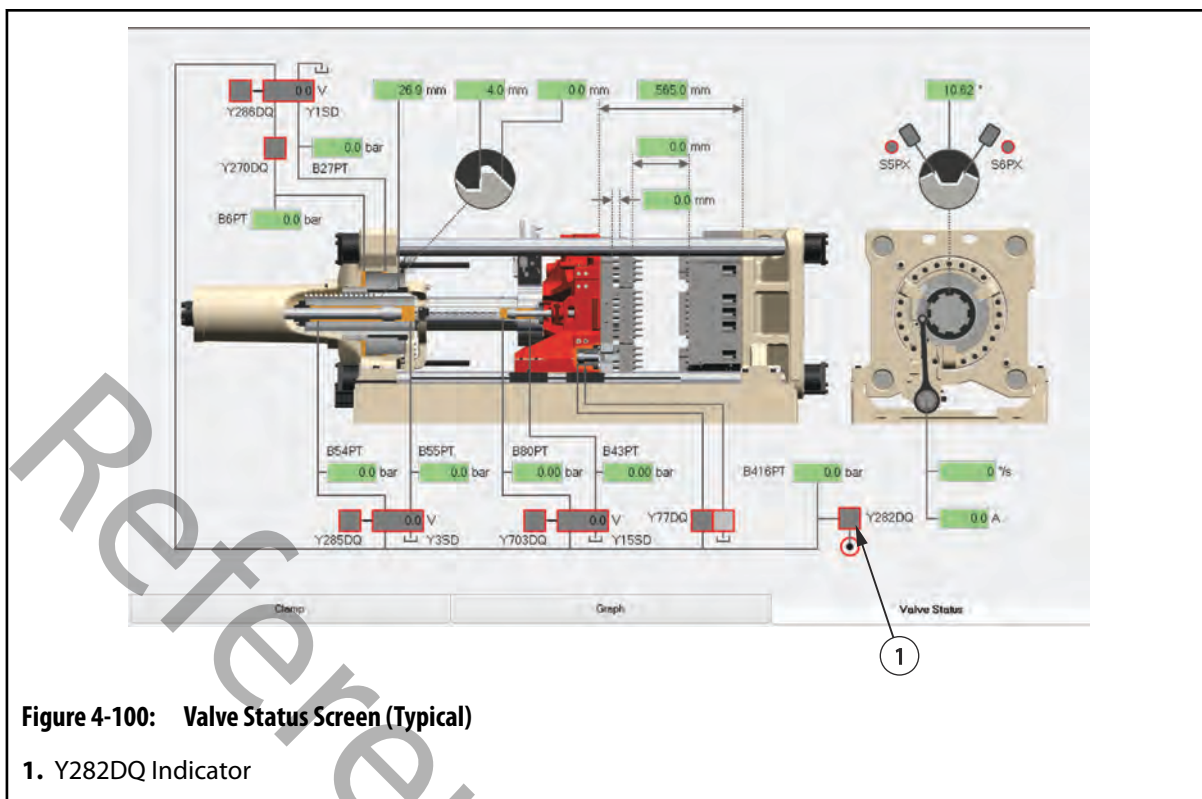
If the *Purge Guard Open* alarm remains active (red), check the alignment of the purge guard switch and the switch actuator. For more information, refer to [Section 5.2.6.10](#).

4.26.1.5.5 Checking the CEN Valve using the HMI

The CEN valve prevents clamp motion when the front gate is open.

To check the functionality of the CEN valve, do the following:

1. Press the **Pump Motor On** key to start the pump motor.
2. On the HMI, touch the **Clamp** button and touch the **Valve Status** tab to display the **Valve Status** screen.



3. Open the front gate.
The Y282DQ indicator should turn off.
4. Close the front gate.
The Y282DQ indicator should turn on.
5. Press the **Pump Motor Off** key to stop the pump motor.

4.26.1.6 Checking the Hydraulic Oil

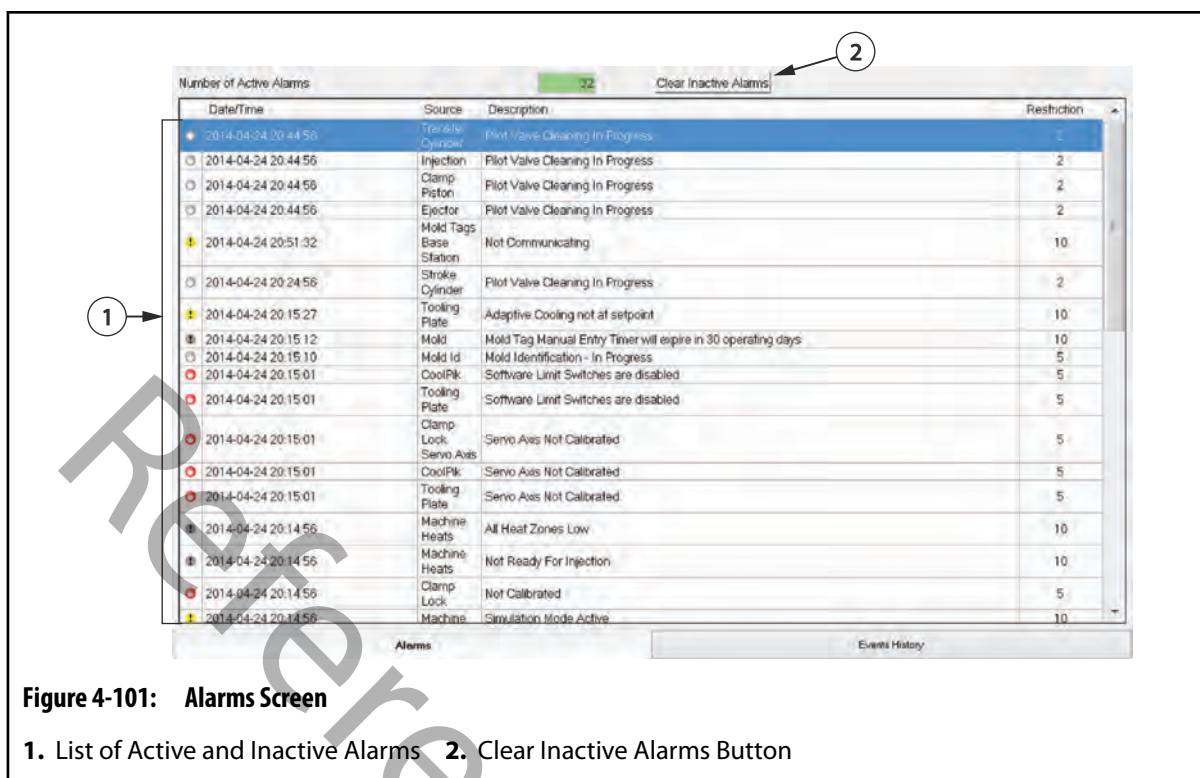
Check the oil level in the hydraulic tank. Refer to [Section 5.6.6](#) for more information.

4.26.1.7 Checking and Resetting Alarms

The machine will generate alarms during initial startup. Although some alarms will clear automatically as the startup process is completed, others restrict machine functions until they are resolved.

To check for and reset alarms, do the following:

1. On the HMI, touch the **Alarms** button and touch the **Alarms** tab to display the **Alarms** screen.
2. Touch the **Clear Inactive Alarms** button to clear all inactive alarms.



3. Check the alarms list for alarms that automatically reset during startup.

The following is a list of alarms that reset automatically:

Alarm	Resolution
Machine Heats Off	Deactivates after the machine heats are enabled.
Machine Heats Low Temperature Deviation	Deactivates after the machine heats are enabled and machine temperatures reach the setpoint values.
Oil Temperature Low	Deactivates after the oil temperature rises above 47 °C (117 °F) .
Accumulator Charging in Progress	Deactivates a few seconds after the Pump Motor On key is pressed, when the accumulator(s) is fully charged.

4. Check the alarms list for alarms that prevent machine operation and resolve the alarm.

The following is a list of some alarms that prevent machine operation:

NOTE:

The following list of alarms is not meant to be comprehensive.

Possible Alarm	Resolution
Hydraulic Pump Motor Off	Press the Pump Motor On key to resolve the alarm.

Possible Alarm	Resolution
Front Gate Open	Open and close the front gate to resolve the alarm. NOTE: The limit switch must be tripped before the alarm can be reset.
Rear Gate Open	Open and close the rear gate to resolve the alarm. NOTE: The limit switch must be tripped before the alarm can be reset.
Purge Guard Open	Close the purge guard to resolve the alarm.
Front Gate Opening Check Required	Open and close the front gate to resolve the alarm. NOTE: The limit switch must be tripped before the alarm can be reset.
Rear Gate Opening Check Required	Open and close the rear gate to resolve the alarm. NOTE: The limit switch must be tripped before the alarm can be reset.
Drop Bar Failure	Open and close the front gate and make sure the air supply is turned on. NOTE: The limit switch must be tripped before the alarm can be reset.

4.26.1.8 Starting the Resin Dryer (If Equipped)

The resin dryer can be started using the Main screen or using SmartStart (if equipped). Refer to the Resin Dryer Manual for instructions about resin drying settings and procedures.

NOTE:

The resin dryer HMI screens may differ depending on which model of resin dryer is installed.

4.26.1.8.1 Starting the Resin Dryer using the Main Screen

When using the Main screen to start the resin dryer, the user must manually control the temperature during the drying.

To start the resin dryer, do the following:

1. On the HMI, touch the **Auxiliaries** button, and then touch the **Overview** tab to display the **Overview** screen.

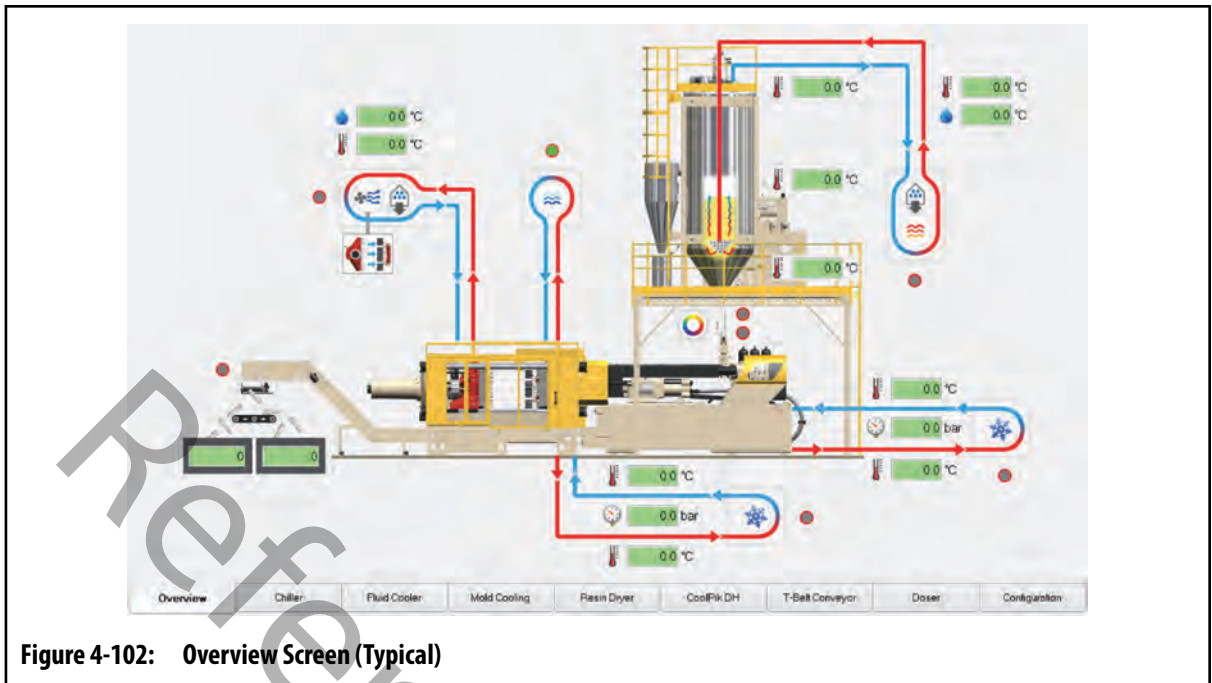


Figure 4-102: Overview Screen (Typical)

2. Touch the **Resin Dryer** tab.

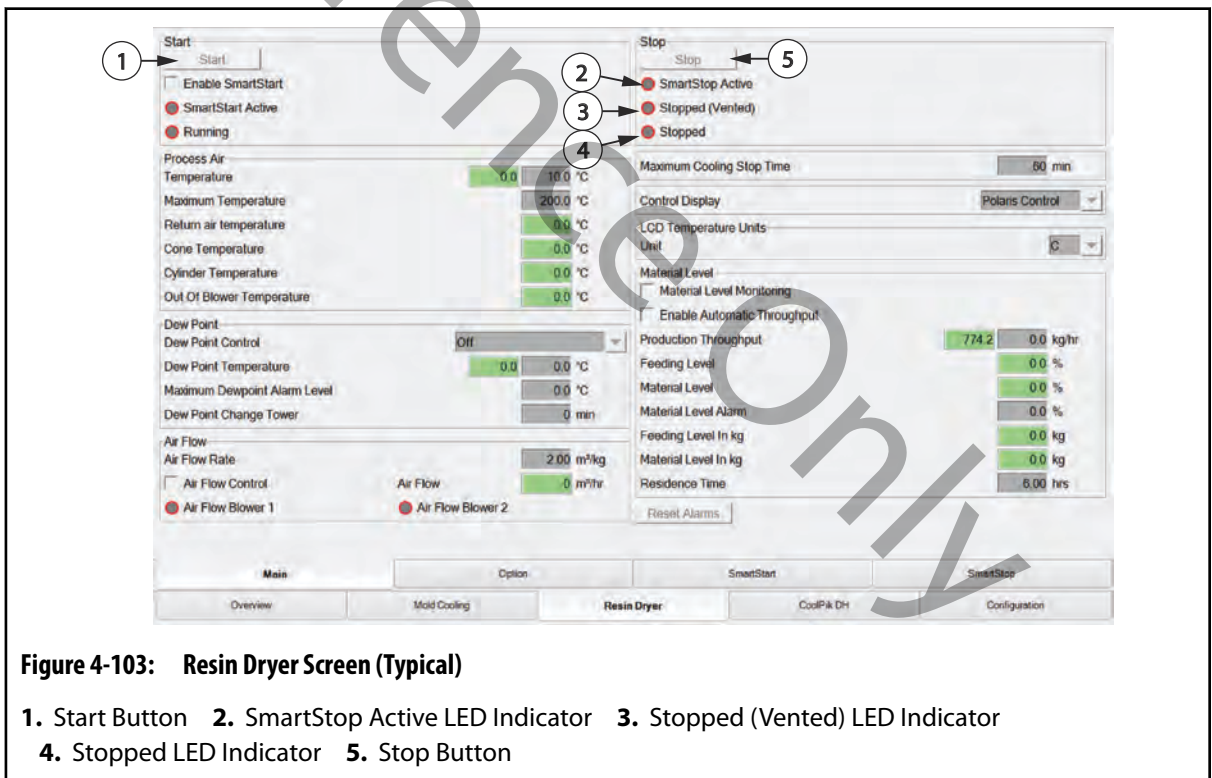


Figure 4-103: Resin Dryer Screen (Typical)

1. Start Button 2. SmartStop Active LED Indicator 3. Stopped (Vented) LED Indicator
4. Stopped LED Indicator 5. Stop Button

3. Touch the **Start** button.

4.26.1.8.2 Starting the Resin Dryer using SmartStart (If Equipped)

When using the resin dryer SmartStart screen, a profile is created and used when starting the dryer. The dryer can be started using a scheduled date and time or immediately.

To start the resin dryer using SmartStart, do the following:

1. On the HMI, touch the **Auxiliaries** button, and then touch the **Overview** tab to display the **Overview** screen. Refer to [Figure 4-102](#) for details.
2. Touch the **Resin Dryer** tab, then the **Main** tab.
3. Check the **Enable SmartStart** check box.

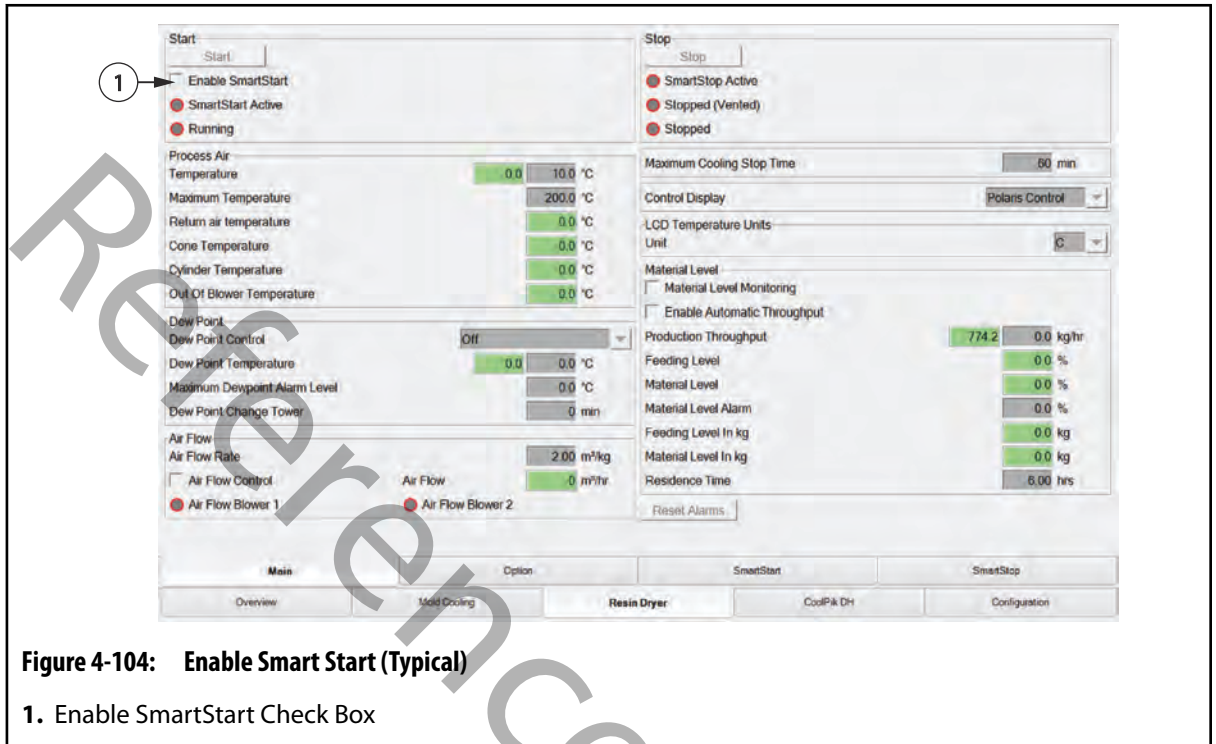


Figure 4-104: Enable Smart Start (Typical)

1. Enable SmartStart Check Box
4. Touch the **Smart Start** tab.

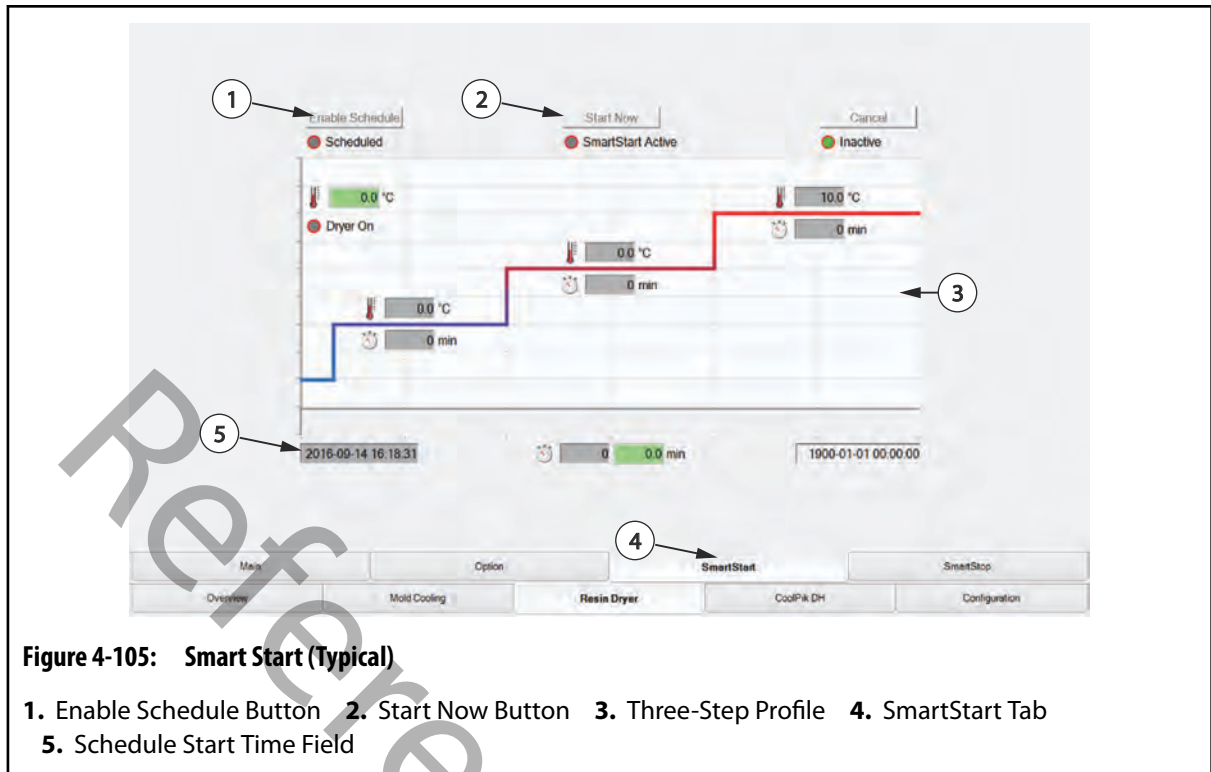


Figure 4-105: Smart Start (Typical)

1. Enable Schedule Button 2. Start Now Button 3. Three-Step Profile 4. SmartStart Tab
5. Schedule Start Time Field

5. Set up the three step profile data based on the processing requirements.
6. If required, set up the dryer to start using a schedule:
 - a. Touch the **Schedule Start Time** field.
 - b. Enter the date and time for the resin dryer to be started.
7. Select the method to start the dryer.
 - To start the resin dryer immediately, touch the **Start Now** button. The resin dryer starts immediately. The resin dryer will use the profile defined.
 - To start the resin dryer using a schedule, touch the **Enable Schedule** button. The resin dryer will use the profile defined.

4.26.1.9 Warming the Hydraulic Oil

The hydraulic oil must be at a suitable operating temperature before the machine can operate. Operating the machine when the hydraulic oil is cold can cause excessive wear or damage.

To warm up the hydraulic oil in the machine, do the following:

1. Press the **Pump Motor On** key to start the pump motor. The motor and attached hydraulic pump are unloaded until the oil temperature is above 47 °C (116 °F) .

NOTE:

The safety gates must be closed for the hydraulic pumps to run.

2. Check the oil temperature on the **Home** screen and refer to [Table 4-5](#) to determine any action required.

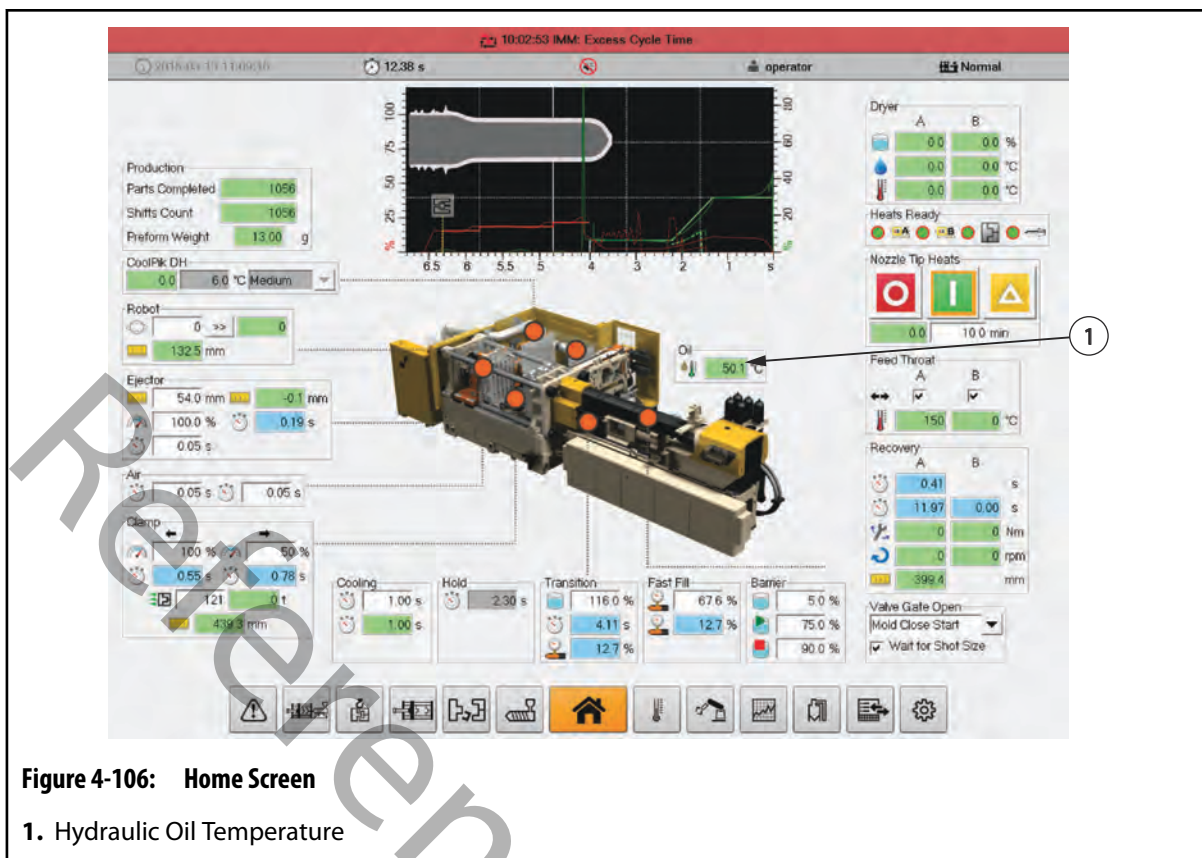


Table 4-5: Oil Temperature Conditions and Required Action

Temperature	Screen Message	Required Operator Action
> 60 °C (140 °F)	Oil Temperature Too High for Operation – Pump Off	Turn off the machine heats, mold heats, and mold cooling. Troubleshoot and correct the fault.
58-60 °C (136-140 °F) for five minutes	Oil Temperature Too High for Auto Cycle	Purge the machine. Turn off the machine heats, mold heats, and mold cooling. Troubleshoot and correct the fault.
58-60 °C (136-140 °F)	Oil Temperature High – Auto Cycle Disabled in 5 Minutes	
55-58 °C (130-136 °F) for 30 minutes	Oil Temperature Too High for Auto Cycle	Purge the machine. Turn off the machine heats, mold heats, and mold cooling. Troubleshoot and correct the fault.
55-58 °C (130-136 °F)	Oil Temperature High – Auto Cycle Disabled in 30 Minutes	Stop production within 30 minutes. Troubleshoot and correct the fault.
53-55 °C (127-130 °F)	Oil Temperature High	None.

Table 4-5: Oil Temperature Conditions and Required Action (Continued)

Temperature	Screen Message	Required Operator Action
47-53 °C (116-127 °F)	None	None.
45-47 °C (113-116 °F)	Oil Temperature Low	Allow the hydraulic oil to warm in Manual mode.
5-45 °C (41-113 °F)	Oil Temperature Too Low – in Oil Warming	
< 5 °C (40 °F)	Oil Temperature Too Low to Start Pump Motor	Pump motor cannot be started.

4.26.1.10 Checking Machine Functions

To check the clamp and injection functions, do the following:

1. Make sure the motor is running and the **Manual** key is enabled.
2. Make sure the machine is in **Mold Set** mode.
3. Press and hold the **Mold Open** key to open the mold.
4. Press and hold the **Mold Close** key to close the mold.

NOTE:

If the mold will not close, check and reset all mold function-related alarms. Refer to [Section 4.26.1.7](#) for more information.

5. Press and hold the **Carriage Forward** key to move the injection carriage forward.
6. Press and hold the **Carriage Back** key to move the injection carriage back.

NOTE:

If the injection carriage does not move, it may need to be calibrated. Refer to [Section 5.10](#) for more information about calibration.

7. Check all hydraulic hoses, cylinders and manifolds for leaks.

4.26.1.11 Checking Product Handling Functions

To check the product handling functions, do the following:

1. Make sure the pump motor is running and the **Manual** key is enabled.
2. Make sure the machine is in **Mold Set** mode.
3. On the HMI, press the **Robot Enable** key to enable the product handling equipment.
4. Make sure the mold is at its maximum shutheight position by pressing and holding the **Mold Open** key until the mold is fully open.
5. Press and hold the **Tooling Plate In** key. The tooling plate should enter the mold area.
6. Press and hold the **Tooling Plate Out** key. The tooling plate should exit the mold area.

7. If equipped, with the tooling plate at the home position, press and hold the **Tooling Plate Up** function key. The tooling plate should move to the up position.
8. If equipped, with the tooling plate at the home position, press and hold the **Tooling Plate Down** function key. The tooling plate should move to the down position.
9. Press and hold the **CoolPik Horizontal** key. The CoolPik should rotate until the CoolPik plate is parallel with the conveyor.
10. Press and hold the **CoolPik Vertical** key. The CoolPik should rotate until the CoolPik plate is parallel with the tooling plate.
11. Press the **Conveyor Forward** key. The conveyor should start moving towards the chute exit.
12. Press the **Conveyor Backward** key. The conveyor should start moving in the opposite direction of the chute exit.
13. Press the **Conveyor Backward** key to turn off the conveyor.

4.26.1.12 Checking the Mold Functions

To make sure the mold functions are enabled, do the following:

1. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Dry Cycle** mode.
2. Make sure the mold is open. If necessary, press and hold the **Mold Open** key to open the mold.
3. Press the **Ejector Auto** key to enable the ejectors. A green light in the corner of the icon indicates the function is enabled.

NOTE:

If the ejector does not move, check the list of active alarms. Refer to [Section 4.26.1.7](#) for more information.

-
4. Press and hold the **Ejector Forward** key to move the ejector forward.
 5. Press and hold the **Ejector Back** key to move the ejector back.
 6. Display the **Machine Function** group. Refer to [Section 4.4.8](#) for more information.
 7. Press and hold the **Air Manual** function key. Air should blow through the mold.
 8. If necessary, press the **Air Auto** function key to enable the compressed air supply for the mold. A green light in the corner of the icon indicates the function is enabled.

4.26.1.13 Cycling the Machine and Product Handling Unit

To make sure the system functions as required, do the following:

1. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Dry Cycle** mode.
2. Press the **Semi Cycle** key followed by the **Cycle Start/Reset** key to cycle the clamp.
3. If necessary, adjust the clamp, mold function and production handling settings.

4.26.1.14 Turning on the Heats

The following procedures describe how to turn on the machine, mold and nozzle tip heats.



IMPORTANT!

If for any reason the startup process is interrupted, all heaters must be turned off to avoid overheating the resin



IMPORTANT!

Make sure all rust inhibitor is removed from all exposed or unpainted machine surfaces.

4.26.1.14.1 Turning on the Machine, Mold and Nozzle Tip Heats

To turn on the machine, mold and nozzle tip heats, do the following:

1. On the HMI, touch the **Machine Mode Selector** button on the tool bar and select **Mold Set** mode.
2. If the mold is closed, press and hold the **Mold Open** key to open the mold.
3. Touch the **Injection** button, and then touch the **Advanced** button to display the **Advanced Settings** screen.
4. Make sure the **Disable Valve Gate** check box is clear.
5. Touch the **Exit** button.
6. Touch the **Heats** button and touch the **Heats Setup** tab to display the **Heats Setup** screen.



Figure 4-107: Setup Screen (Typical)

1. Machine Heats Start Button 2. Mold Heats Start Button 3. Nozzle Tips Heats Start Button

CAUTION!

Mechanical hazard – risk of damage to the mold. Turn mold cooling on before turning on the mold heats.

-
7. Press the **Mold Cooling** key to start the mold cooling system.
 8. If necessary, enable Soft Start for either the machine or mold heats. Refer to [Section 3.4.12](#) for more information.
 9. If necessary, adjust the individual or global setpoint temperatures for the machine, mold and nozzle tip heats. Refer to [Section 3.4.13](#) for information about changing the global setpoint temperatures.
-

**WARNING!**

Hot resin spray hazard – risk of serious injury. Overheated resin can generate pressurized gas that when suddenly released could cause material to spray out. Do not allow resin to overheat. If the startup process is interrupted, turn off all machine heaters and retract the injection unit to allow the mold to vent between the machine nozzle and the sprue bushing. For extended delays, refer to [Section 4.27](#) for information about pausing or shutting down the machine.

CAUTION!

Burn hazard – risk of resin degradation. Do not enable all heats at the same time. Some heats require more or less time than others to reach and soak sufficiently at operating temperature. Enabling a specific heat set for too long can cause the resin to overheat and degrade.

CAUTION!

Burn hazard – risk of resin degradation. Do not allow nozzle tips to stay energized for more than 10 minutes. Resin residing in the nozzle tip area can degrade.

10. Touch the **Machine Heats Start**, **Mold Heats Start** and **Nozzle Heats Start** buttons at the appropriate time before production is scheduled to begin

The following table lists the recommended time to allow the heats to reach operating temperature before production begins:

NOTE:

For the machine, mold and product handling parameters, refer to the *Mold Setup Guide*. For non-Husky molds and hot runners, always check the manufacturer's documentation to determine how much time is required to pre-heat the mold or hot runner before production.

NOTE:

Some resins may degrade when subjected to high heats for an extended period of time. Refer to the resin supplier's documentation for specifications and restrictions.

NOTE:

The time required for the heats to reach operating temperature varies depending on the mold or machine size.

Heats	Time Required to Reach Operating Temperature
Machine	45 to 90 minutes ^[1]
Mold	20 to 40 minutes ^[1]
Nozzle Tips	6 minutes

^[1] Includes the additional soak time required after reaching operating temperature.

4.26.1.15 Preparing the Process Material Feed

The machine can be fed process material through a hopper or a direct feed system. To prepare the process material, do the following:



WARNING!

Slip, trip, or fall hazard – risk of death or serious injury. Do not climb on the machine surfaces to access the hopper or direct feed system. Always use a safe platform.

1. Fill the hopper with process material or connect the direct feed hose securely to the injection unit.

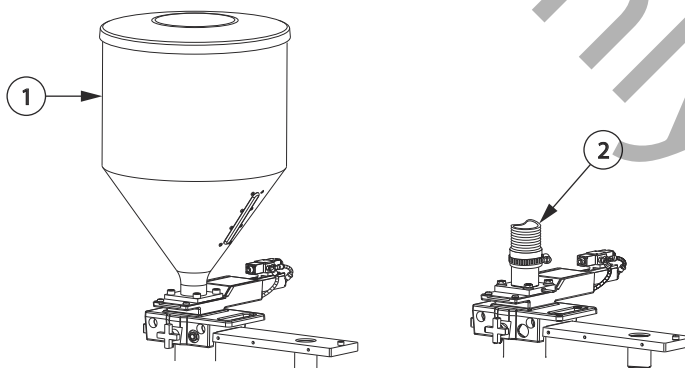


Figure 4-108: Process Material Feed Shutoff Systems

1. Hopper 2. Direct Feed System

**WARNING!**

Burn hazard – risk of serious injury. Machine surfaces could be hot. Wear personal protective equipment.

2. If the machine is equipped with a direct feed system, open the feed lines to the machine.
3. Open the process material feed manual or auto-shutoff.
 - If an auto-shutoff is equipped, refer to [Section 4.26.1.15.2](#)
4. If the machine is equipped with an optional magnet drawer, open the drawer. Refer to [Section 4.26.1.15.3](#) for more information.

4.26.1.15.1 Opening the Process Material Feed Manual Shutoff (If Equipped)

To open the process material feed manual shutoff, do the following:

1. Lift the pivot handle and push the assembly until the pivot point locks into the slot before the feed throat. Make sure the feed throat opening is covered.

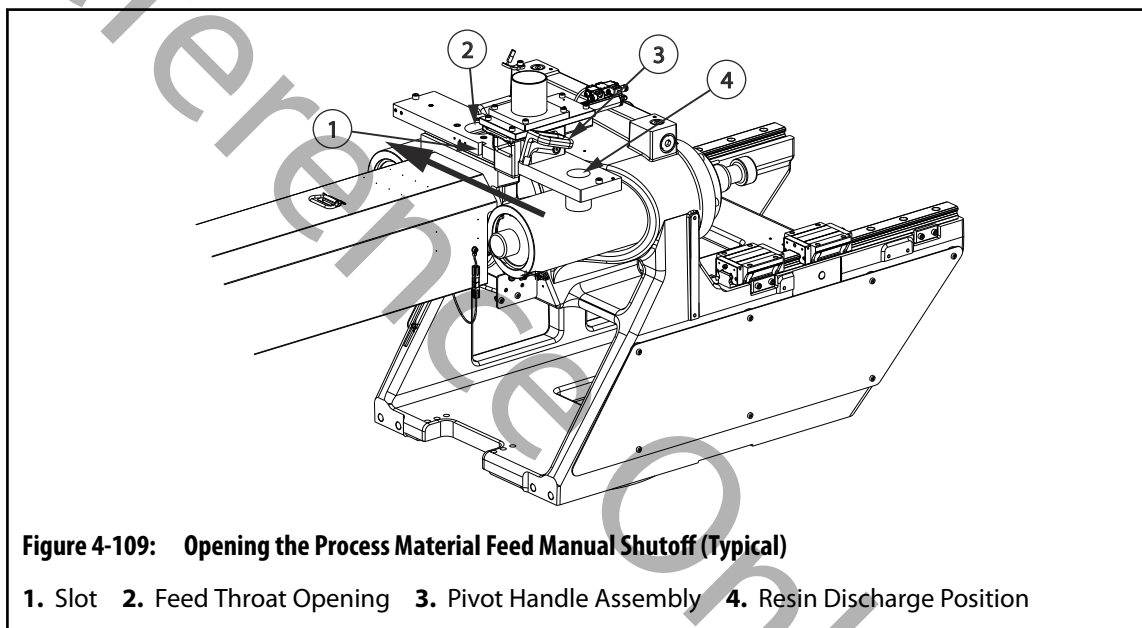


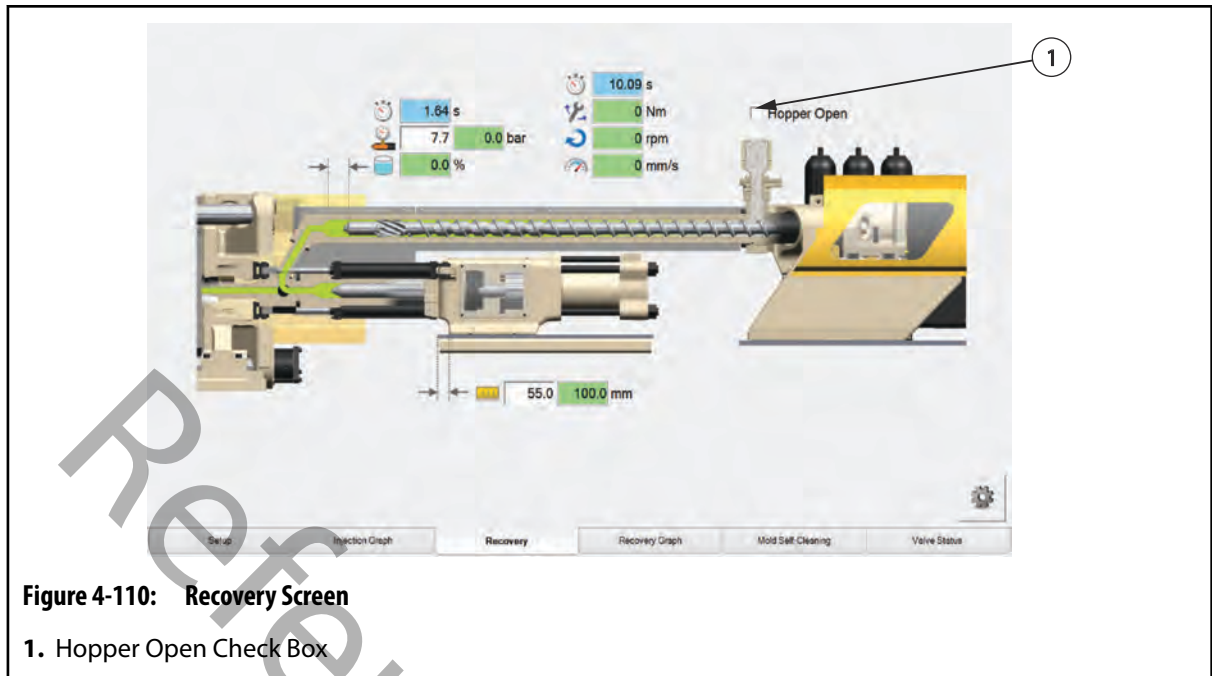
Figure 4-109: Opening the Process Material Feed Manual Shutoff (Typical)

1. Slot 2. Feed Throat Opening 3. Pivot Handle Assembly 4. Resin Discharge Position

4.26.1.15.2 Opening the Process Material Feed Auto-Shutoff (If Equipped)

To open the process material feed auto-shutoff, do the following:

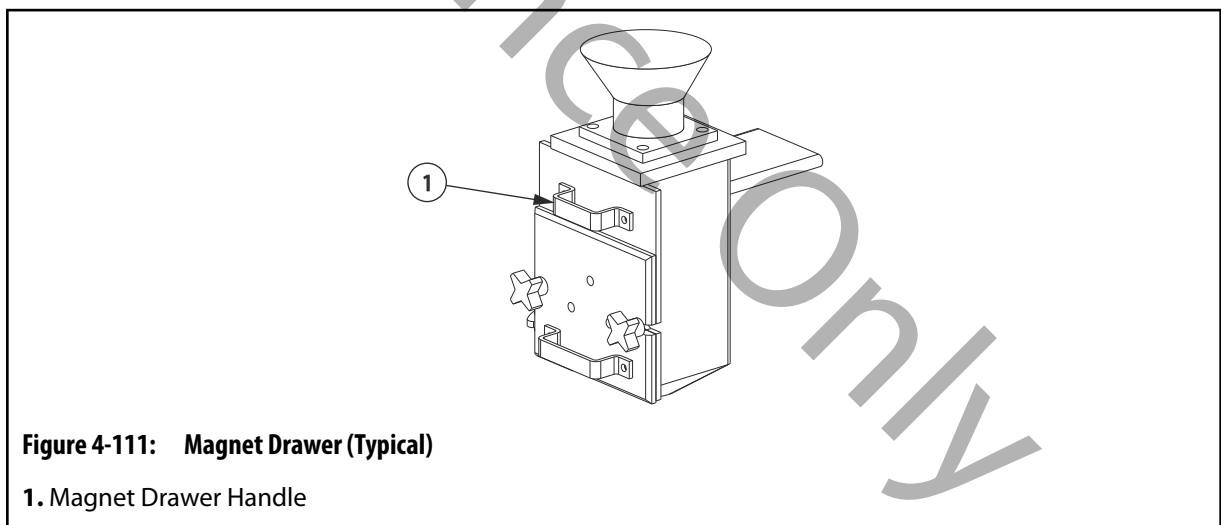
1. On the HMI, touch the **Injection** button and touch the **Recovery** tab to display the **Recovery** screen.



2. Select the **Hopper Open** check box.

4.26.1.15.3 Opening the Magnet Drawer

Push the magnet drawer handle in all the way to open the process material feed.



4.26.1.16 Purging the Injection Unit(s) Before Production

Purge the injection unit(s) until the quality of the plasticized material is acceptable. Refer to [Section 5.4.18](#) for more information.

Purging the injection unit removes any dirt, obstructions or processed material that can affect production. The process is also used to transition from one color and/or type of resin to another.

4.26.1.17 Cleaning the Injection Nozzle Tip

To clean the injection nozzle tip, do the following:



WARNING!

Explosion hazard – risk of serious injury. Molten material at high pressure could be present. Wear personal protective equipment and use a mirror to look into the nozzle opening.



WARNING!

Burn hazard – risk of serious injury. Machine surfaces and molten process material can be hot. Wear personal protective equipment.

CAUTION!

Mechanical hazard – risk of damage to the nozzle tip. Only use brass tools to remove process material buildup.

1. On the HMI, press and hold the **Carriage Back** key to move the injection carriage away from the clamp.
 2. Open the purge guard.
 3. Use a brass tool to carefully remove all molten or solidified process material from the nozzle tip.
 4. Close the purge guard.
 5. Press and hold the **Carriage Forward** key until the nozzle tip is firmly seated against the mold sprue.
-



WARNING!

Burn hazard – risk of serious injury. Wear personal protective equipment when handling molten process material.

6. After cleaning, discard the process material into a suitable metal container.
-

4.26.1.18 Emptying the Process Material Disposal Bins

The process material disposal bins must be checked and emptied regularly at startup and at intervals specified in the maintenance schedule.

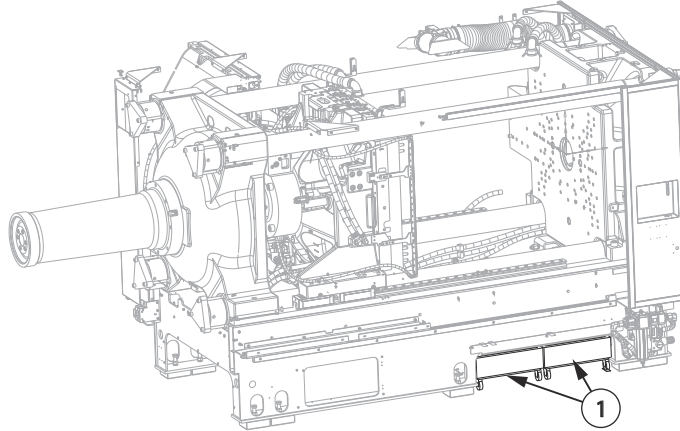


Figure 4-112: Process Material Disposal Bins

1. Process Material Disposal Bins

4.26.1.19 Inspecting the Mold

To inspect the mold, do the following:

1. Make sure the machine is in **Mold Set** mode.
2. For safety, ensure that valve gates are closed before inspecting the mold.
3. If the mold is closed, on the HMI, press and hold the **Mold Open** key to open the mold.
4. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
5. Open the front gate.



WARNING!

Hot resin spray hazard – risk of serious injury. Residual pressure may be present in the hot runner and could cause hot resin to spray from the nozzle tips if released. Do not push on the valve stems when cleaning cavities and wear personal protective equipment consisting of a heat-resistant coat, heat-resistant gloves and a full face shield over safety glasses to avoid injury.

6. Using a telescopic mirror, check the cavities on the cavity plate for drool.
7. If drool is present on the cavities, use brass tools to clean the cavities.
8. Make sure the tapers on the mold are greased. Refer to the mold *Service Manual* for a list of recommended lubricants.
9. Inspect the cams and leader pin bushings for debris. Clean the cams and bushings if necessary.
10. Inspect the mold for loose connections and hardware.
11. Close the front gate.
12. Remove all locks and tags.

4.26.1.20 Precharging the Hot Runner

To precharge the hot runner with plastic, do the following:

1. On the HMI, touch the **Injection** button, and then touch the **Advanced** button to display the **Advanced Settings** screen.

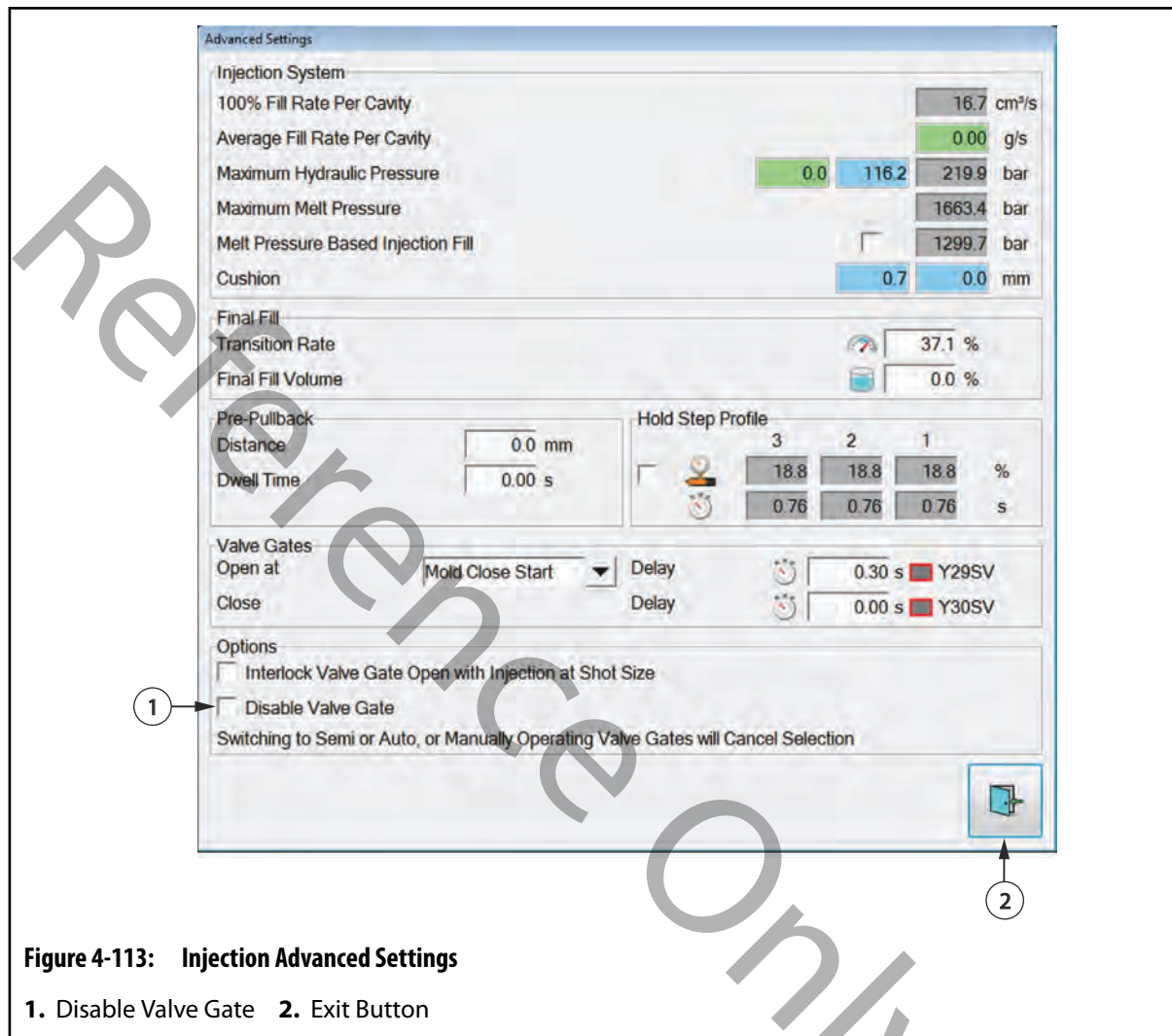
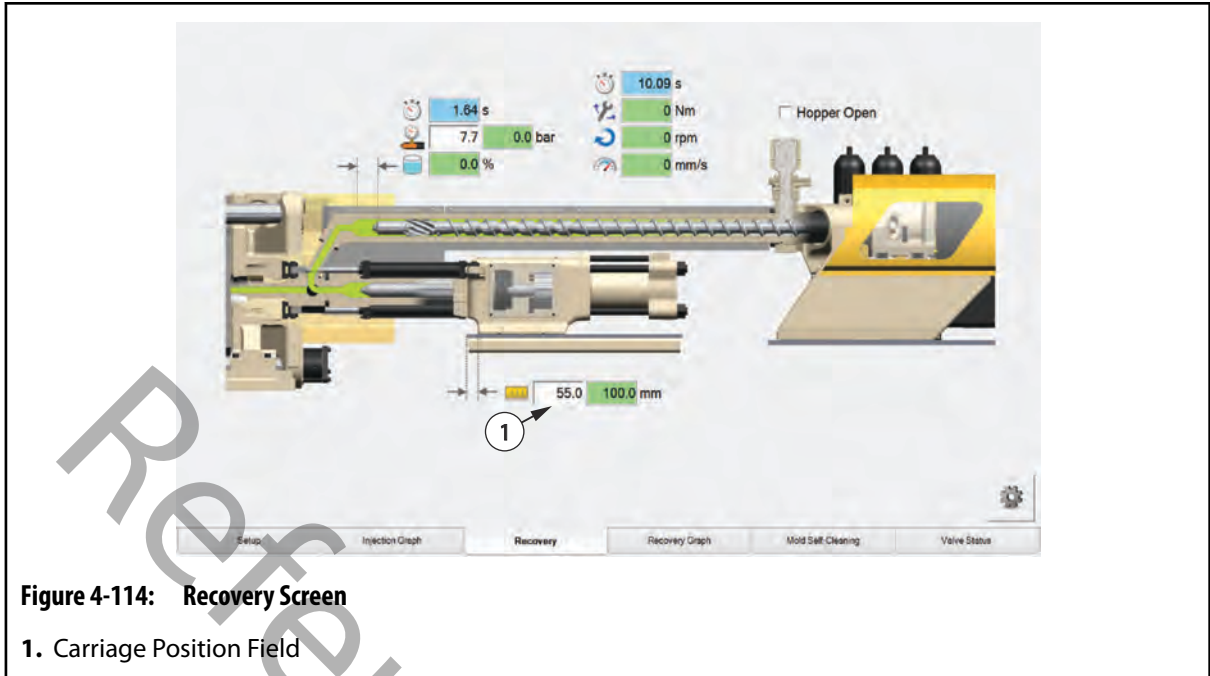


Figure 4-113: Injection Advanced Settings

1. Disable Valve Gate 2. Exit Button

2. Make sure the **Disable Valve Gate** check box is clear.
3. Make sure that the valve gates are closed before precharging the hot runner.
4. Touch the **Exit** Button.
5. Make sure the machine is in **Mold Set** mode.
6. Press and hold the **Mold Close** key to close the mold.
7. Press the **Clamp Up** key to apply tonnage to the mold.
8. Touch the **Injection** button, and then touch the **Recovery** tab to display the **Recovery** screen.



9. Press and hold the **Carriage Forward** key until the nozzle tip is firmly seated against the mold sprue. Refer to the **Carriage Position** field to verify.
10. Press and hold the **Inject** key to precharge the hot runner manifold(s) with resin. Release the **Inject** key once the piston slows down.
11. Press the **Screw Rotate** key to retract the screw.
12. Press the **Unclamp** key to release tonnage to the mold.
13. Press and hold the **Mold Open** key to open the mold.
14. Press the **Carriage Back** key to move the carriage back.
15. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
16. Remove all locks and tags.

4.26.1.21 Starting the CoolPik Auxiliaries and Mold Dehumidifier (If Equipped)

The procedure to start the CoolPik auxiliaries can vary based on the model installed. Make sure to follow the instructions for the product installed.

For additional instructions refer to the manufacturer's manual for additional setup or procedures.

The auxiliaries are accessed through the auxiliaries **Overview** screen.

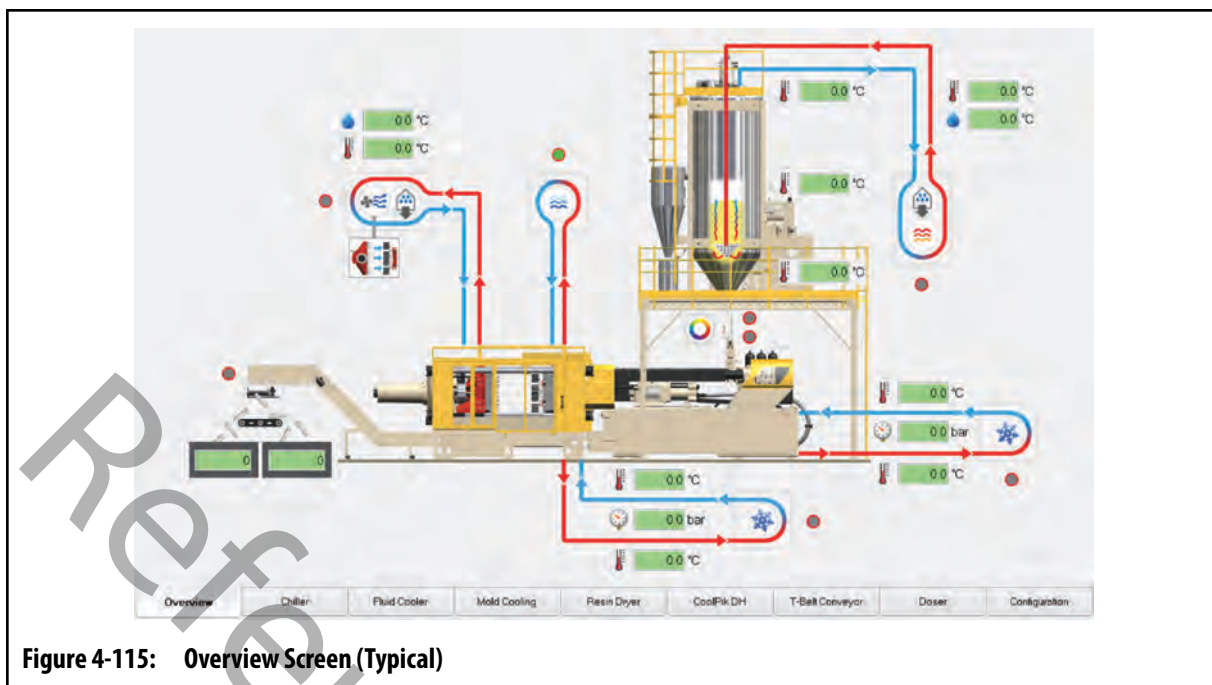


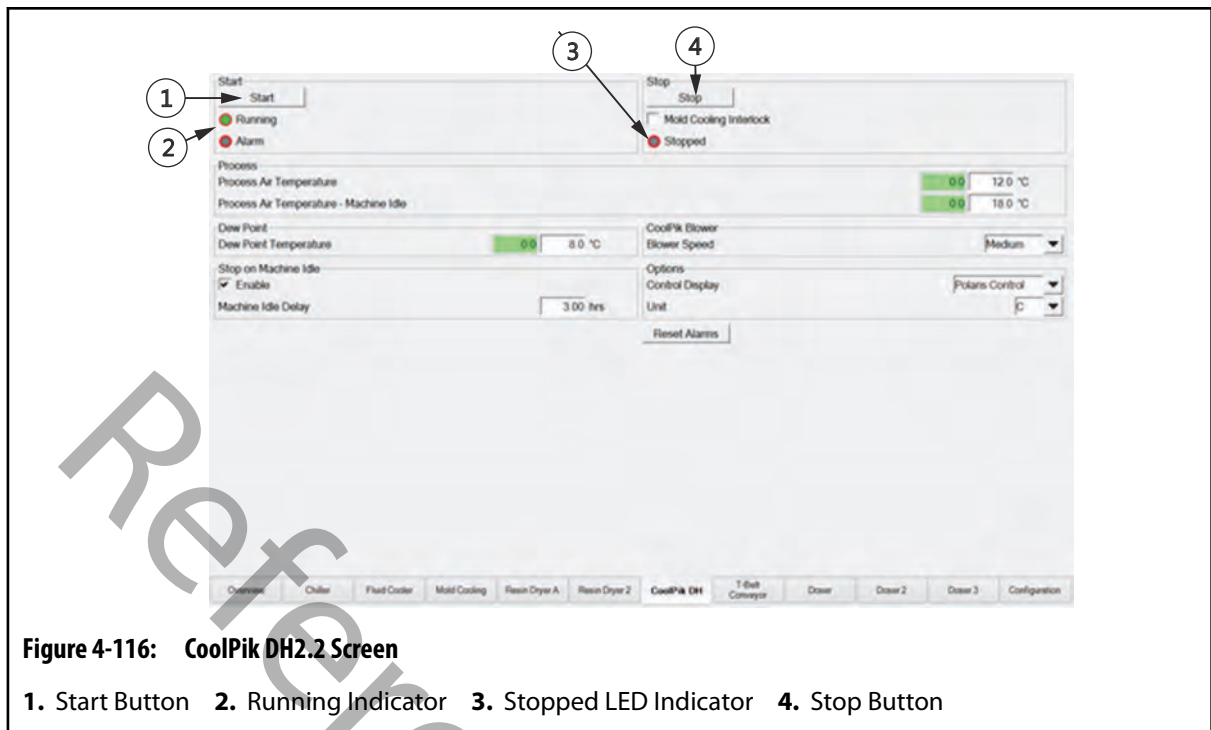
Figure 4-115: Overview Screen (Typical)

4.26.1.21.1 Starting the CoolPik DH2.2 (If Equipped)

For setup instructions refer to [Section 3.4.15](#). For additional settings and procedures refer to the CoolPik DH2.2 manual.

To start the CoolPik DH2.2, do the following:

1. On the HMI, touch the **Auxiliaries** button, and then touch the **Overview** tab to display the **Overview** screen. Refer to [Figure 4-115](#).
2. Touch the **CoolPik DH** tab.
3. Touch the **Start** button.



4.26.1.21.2 Starting the CoolPik DH (If Equipped)

Refer to the CoolPik DH manual for instructions about settings and additional procedures.

To start the CoolPik DH, do the following:

1. On the HMI, touch the **Auxiliaries** button, and then touch the **Overview** tab to display the **Overview** screen. Refer to [Figure 4-115](#).
2. Touch the **CoolPik DH** tab.
3. Touch the **Start** button.

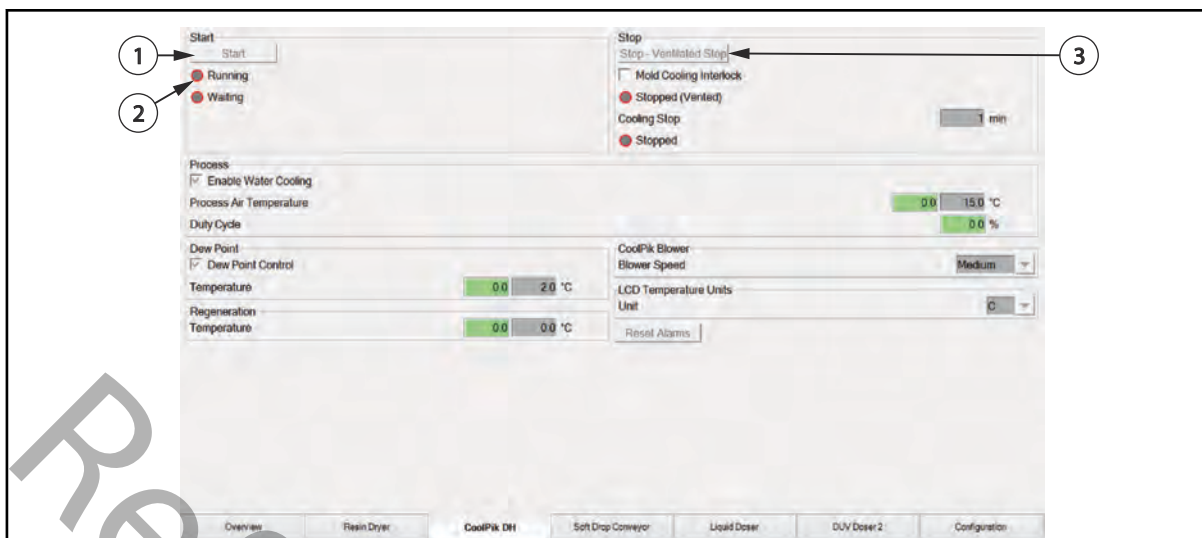


Figure 4-117: CoolPik DH Screen

1. Start Button 2. Running Indicator 3. Stop Button

4.26.1.21.3 Starting the CoolPik Blower (If Equipped)

Refer to the CoolPik Blower Manual for instructions about settings and additional procedures.

To start the CoolPik Blower, do the following:

1. On the HMI, touch the **Auxiliaries** button, and then touch the **Overview** tab to display the **Overview** screen. Refer to [Figure 4-115](#).
2. Touch the **CoolPik Blower** tab.
3. Touch the **Start** button.

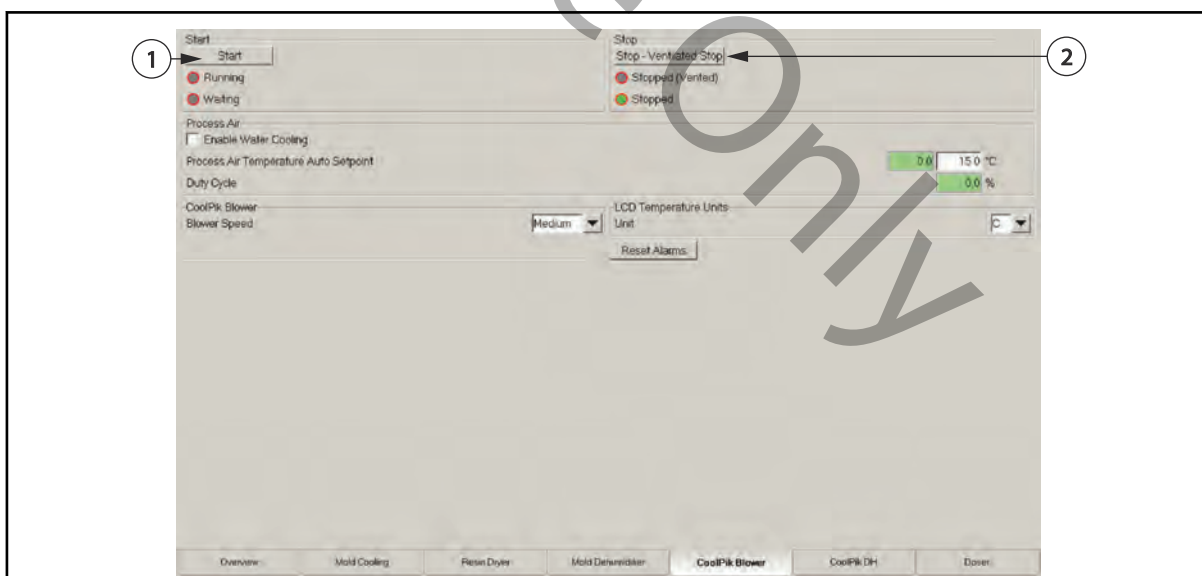


Figure 4-118: CoolPik Blower Screen

1. Start Button 2. Stop -Ventilated Stop Button

4.26.1.21.4 Starting the Mold Dehumidifier

Refer to the Mold Dehumidifier Manual for instructions about settings and additional procedures.

To start the Mold Dehumidifier, do the following:

1. On the HMI, touch the **Auxiliaries** button, and then touch the **Overview** tab to display the **Overview** screen.
2. Touch the **Mold Dehumidifier** tab.
3. Touch the **Start** button.

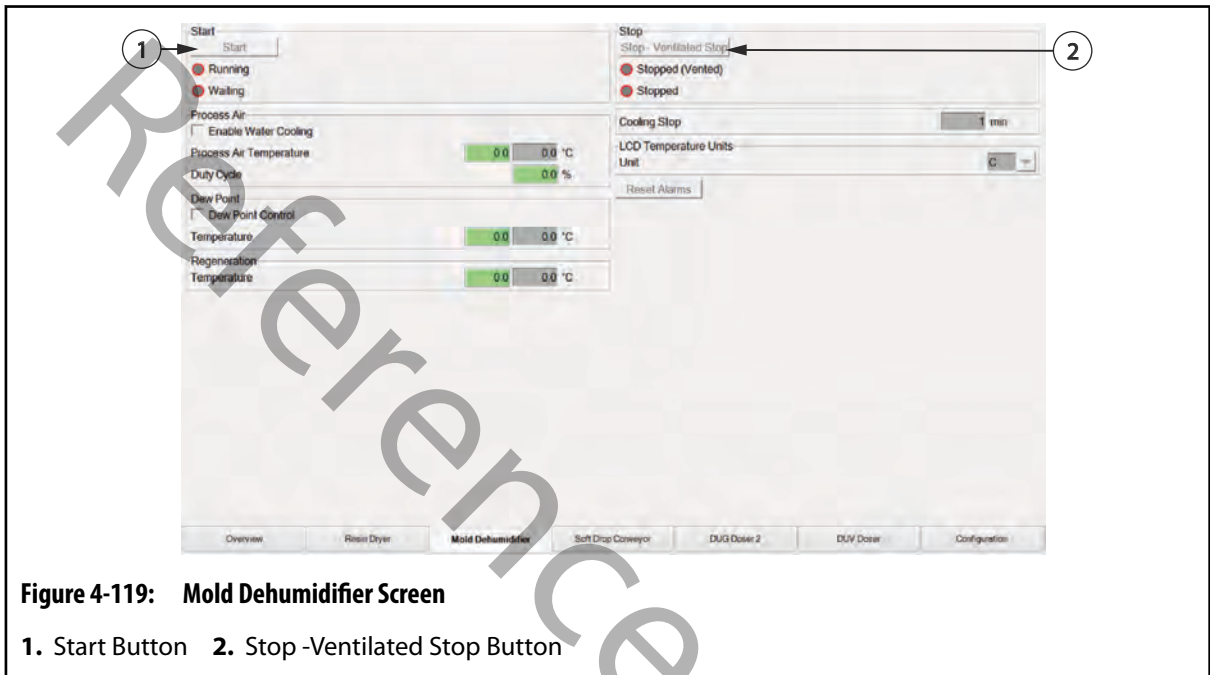


Figure 4-119: Mold Dehumidifier Screen

1. Start Button 2. Stop -Ventilated Stop Button

4.26.1.22 Producing Test Parts

To produce a set of test parts, do the following:

1. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Normal** mode.
2. Press the **Robot Enable** key to disable the product handling equipment. An LED indicator in the top left corner of the key will flash.
3. Press the **Manual Cycle** key.
4. Adjust all machine functions, as required.
5. Display the **Machine Function** function group. Refer to [Section 4.4.8.1](#) for more information.
6. Press the **Ejector Auto** key to disable the ejectors.
7. Reduce the **Fill Pressure Limit** value.
8. Press the **Semi Cycle** key followed by the **Cycle Start** key to cycle the machine once.
9. Press the **Manual Cycle** key.
10. Press and hold the **Ejector Forward** key until the parts are ejected.
11. Press and hold the **Ejector Back** key until the ejectors move to the back position.

12. Inspect the parts to verify the number and quality is satisfactory. If necessary, repeat [step 8](#) to [step 11](#) a minimum of five times, or until the part quality meets the required specifications.
13. Press the **Ejector Auto** key to enable the ejectors. A green light in the corner of the icon indicates the function is enabled.
14. Set the value in the **Fill Pressure Limit** field to the value recorded before precharging the hot runner. Refer to [Section 4.26.1.20](#) for more information.
15. Press the **Robot Enable** key to enable the product handling equipment.
16. Press the **Semi Cycle** key followed by the **Cycle Start** key to cycle the machine once. Make sure all parts properly transfer to the product handling equipment. Repeat this step to test all stages used in the product handling unit for complete ejection.
17. Adjust all machine functions, as required.

4.26.1.23 Starting Production

To start production, do the following:

1. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Normal** mode.
2. Adjust the global setpoint temperature for all nozzle tip heats to a temperature suitable for production. Refer to [Section 3.4.13](#) for information about changing the global setpoint temperature.
3. Press the **Auto Cycle** key followed by the **Cycle Start** key to start production.

4.26.2 Starting the Machine Using SmartStart

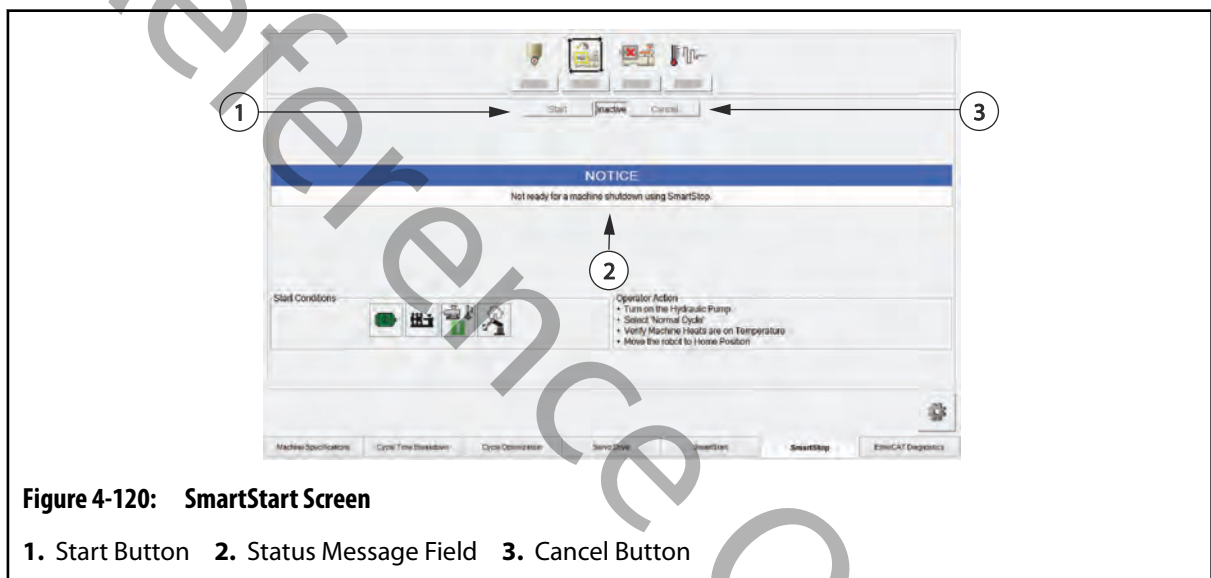
To start the machine using SmartStart, do the following:

1. Perform the following procedures in order:

Step	Procedure	Reference
1	Inspect the machine	Section 4.26.1.1
2	Power up the machine	Section 4.26.1.2
3	Turn on the air supply	Section 4.26.1.3
4	Log on to the HMI	Section 4.26.1.4
5	Check the safety devices	Section 4.26.1.5
6	Check the hydraulic oil level	Section 4.26.1.6
7	Check and reset alarms	Section 4.26.1.7
8	Start the resin dryer, if equipped	Section 4.26.1.8
9	Check the machine functions	Section 4.26.1.10
10	Check the product handling functions	Section 4.26.1.11

Step	Procedure	Reference
11	Check the mold functions	Section 4.26.1.12
12	Start the CoolPik auxiliaries or mold dehumidifier	Section 4.26.1.21
13	Cycling the machine and product handling unit	Section 4.26.1.13
14	Prepare the process material feed	Section 4.26.1.15

2. If necessary, enable the booster cylinders. Refer to [Section 4.22](#) for more information.
3. Make sure SmartStart is properly configured. Refer to [Section 4.24.1](#) for more information.
4. On the HMI, touch the **Machine** button and touch the **SmartStart** tab to display the **SmartStart** screen.



5. Touch the **Start** button and follow all on-screen instructions.

When the SmartStart sequence is completed, the message *Machine is not ready for SmartStart* will be displayed in the **Status Message** field.

NOTE:

SmartStart will automatically pause if an alarm occurs during the SmartStart sequence. The sequence will only resume once the alarm condition is cleared. Refer to the **Status Message** field for instructions.

NOTE:

The SmartStart sequence can be aborted at any time by pressing the **Cancel** button on the **SmartStart** screen. SmartStart will stop once the current stage in the sequence is completed.

6. If necessary, disable the booster cylinders once the process has stabilized. Refer to [Section 4.22](#) for more information.

4.27 Stopping the Machine

The machine is considered stopped when all motions stop and all stored energy is discharged. The machine is *not* considered stopped if one of these conditions is not met.

For example, the machine is not considered stopped if the operator opens a safety gate. The safety gate interlocks will only stop machine motions, not de-energize the machine.

NOTE:

Some procedures in this section may refer to controls on the Human Machine Interface (HMI). For more information about the HMI, refer to earlier sections in this chapter.

This section discusses ways to stop the machine and unexpected machine stoppages.

There are four different ways to stop the machine:

1. Stopping the machine in an emergency
2. Pausing the machine
3. Stopping the machine manually
4. Stopping the machine using SmartStop

Handling unexpected machine stoppages is also discussed.

4.27.1 Stopping the Machine in an Emergency

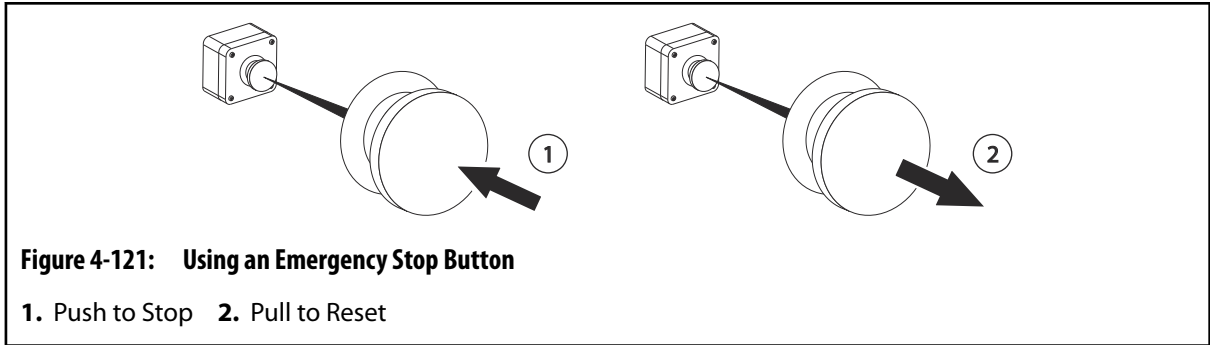
The emergency stop button allows the operator to quickly stop the machine in an emergency. All machine motions will stop, the pump motor(s) will stop, and the hydraulic system pressure will be discharged when the emergency stop button is pressed.

CAUTION!

Mechanical hazard – risk of damage to the machine. The emergency stop button should not be used to stop the machine in non-emergency situations. The method described in should be used instead to avoid damaging the machine.

To stop the machine in an emergency, do the following:

1. Push either the front gate or product handling gate emergency stop buttons to stop the machine.



2. Correct all problems on the machine.
3. Pull the emergency stop button out to restart the machine.

4.27.2 Pausing the Machine

To pause the machine for a short period of time, do the following:



WARNING!

Explosion hazard – risk of death or serious injury. Pressure can build up in a nozzle or feed throat area and could cause some process material to explode. To prevent pressure build up, purge the injection unit if the machine will be paused for longer than 90 seconds. Refer to [Section 4.26.1.16](#) for further instructions.

1. On the HMI, press the **Semi Cycle** key to activate the semi-auto cycle mode. The machine will complete one cycle and then stop.
2. Touch the **Heats** button and touch the **Heats Setup** tab to display the **Heats Setup** screen.

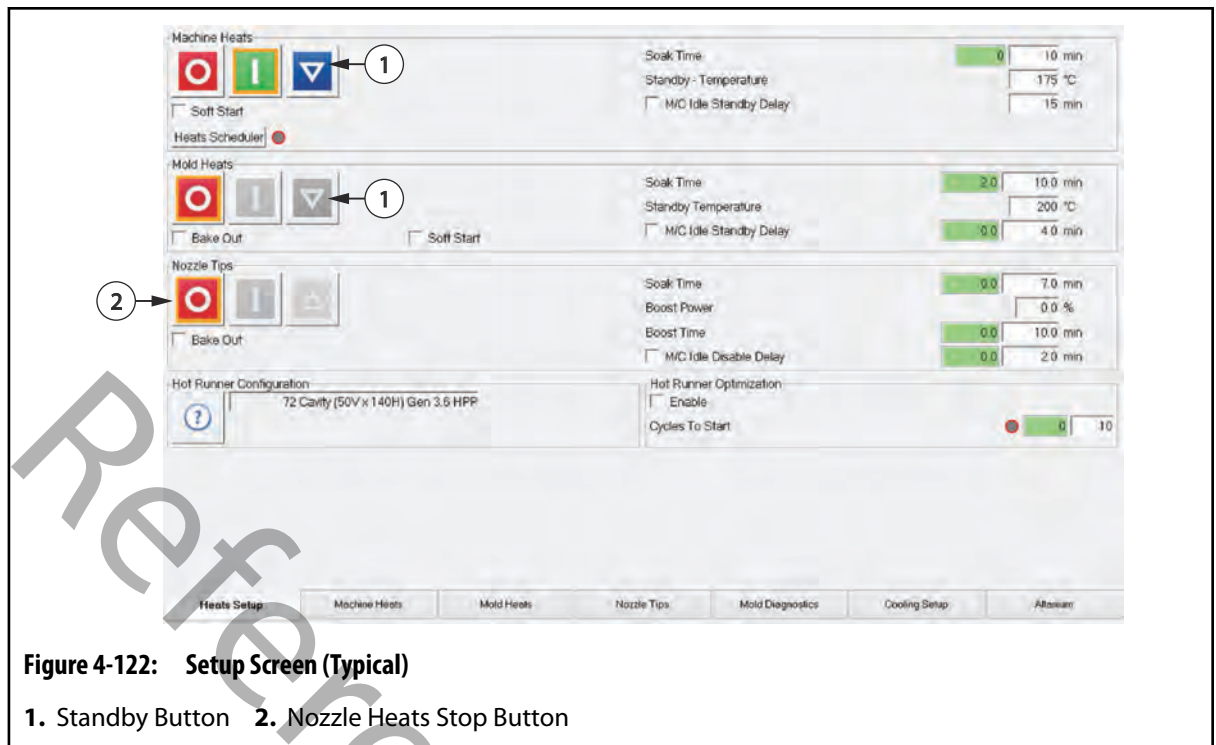


Figure 4-122: Setup Screen (Typical)

1. Standby Button 2. Nozzle Heats Stop Button

3. In the **Machine Heats** area, do the following:
 - a. Touch the **Standby - Temperature** field and type a suitable value.
 - b. Touch the **Standby** button.
4. In the **Mold Heats** area, do the following:
 - a. Touch the **Standby - Temperature** field and type a suitable value.
 - b. Touch the **Standby** button.
5. Touch the **Nozzle Heats Stop** button to reduce the temperature setting for the nozzle tip heats

4.27.3 Stopping the Machine Manually

When stopping the machine at the end of a production cycle or for an extended period of time, perform the following procedures in order:

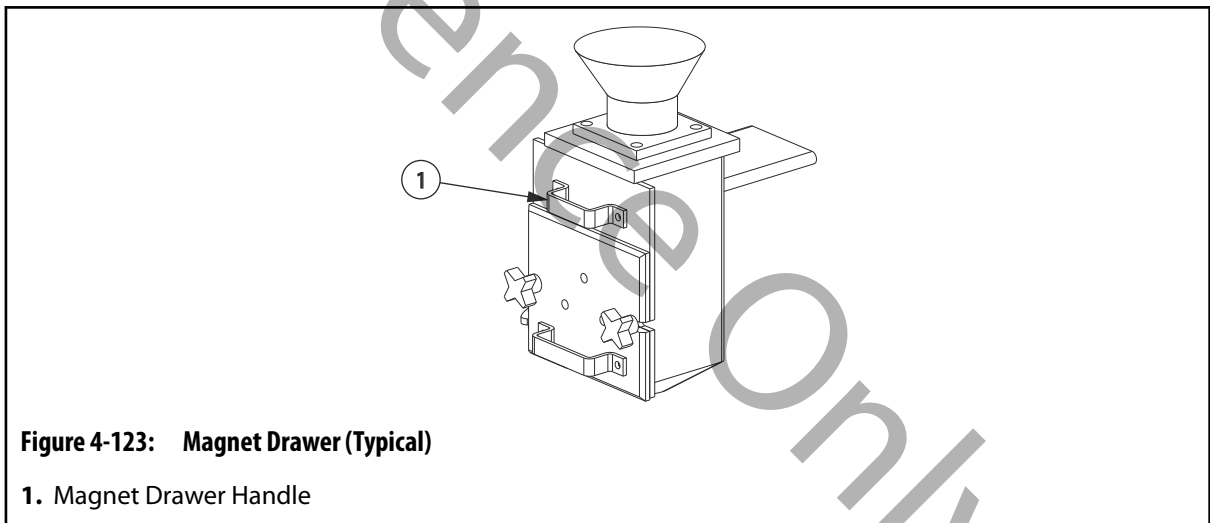
Step	Procedure	Reference
1	Turn off the process material feed	Section 4.27.3.1
2	Stop production	Section 4.27.3.2
3	Purge the injection unit	Section 4.27.3.3
4	Clean the nozzle tip, stationary platen and purge guard	Section 4.27.3.4
5	Empty the hopper (optional)	Section 4.27.3.5
6	Turn off all heats	Section 4.27.3.6

Step	Procedure	Reference
7	Turn off the mold cooling system (optional)	Section 4.27.3.7
8	Turn off the CoolPik auxiliaries and the mold dehumidifier	Section 4.27.3.8
9	Turn off the resin dryer, if equipped	Section 4.27.3.9
10	Clean the mold	Section 4.27.3.10
11	Turn off the pump motor	Section 4.27.3.11
12	Turn off the air supply (optional)	Section 4.27.3.12
13	Power down the machine (optional)	Section 4.27.3.13

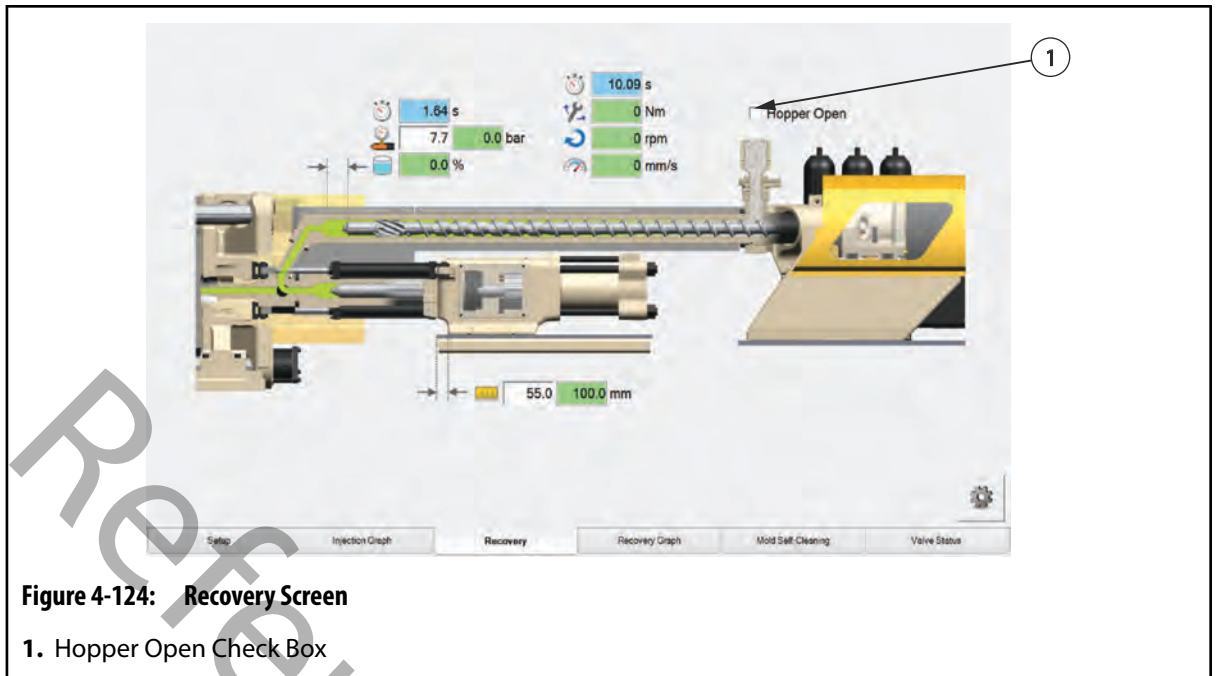
4.27.3.1 Turning Off the Process Material Feed

To turn off the process material feed, do the following:

1. If the machine is equipped with an optional magnet drawer, pull the handle out to turn off the process material feed.

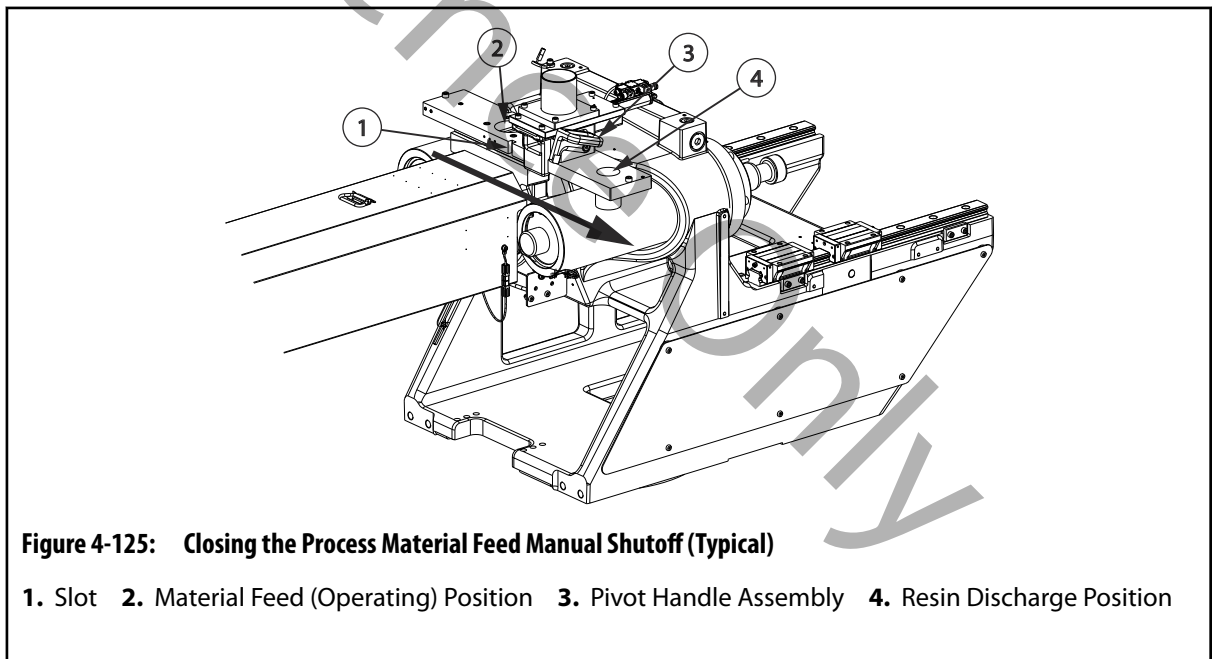


2. Turn off the external process material supply to the hopper or direct feed tube.
3. If the machine is equipped with an optional feed auto-shutoff system, do the following:
 - a. On the HMI, touch the **Injection** button on the HMI and touch the **Recovery** tab to display the **Recovery** screen.



b. Clear the **Hopper Open** check box.

4. On the manual shutoff system, lift the pivot handle and pull the assembly towards you to a closed position in between the material feed and the resin discharge position.



4.27.3.2 Stopping Production

To stop the production cycle, press the **Semi Cycle** key to take the machine out of automatic cycle mode. The machine will complete one complete cycle and then stop.

4.27.3.3 Purging the Injection Unit After Production

Purge the injection unit until the plasticized material is depleted from the barrel. Refer to [Section 5.4.18](#) for more information.

4.27.3.4 Cleaning the Nozzle Tip, Stationary Platen and Purge Guard

Refer to [Section 5.4.2](#) for more information about cleaning the nozzle tip, stationary platen and purge guard.

4.27.3.5 Emptying the Hopper and Direct Feed Tube (Optional)

To empty the hopper or direct feed tube, do the following:

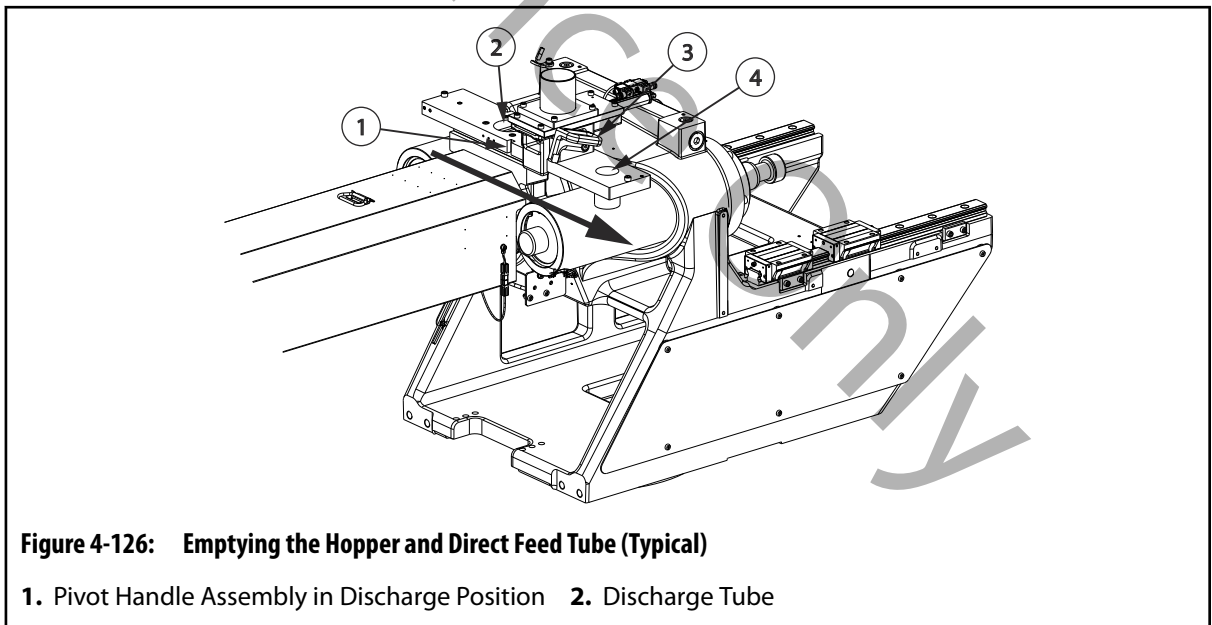
1. If the machine is equipped with an external process material supply, check that the supply to the hopper or direct feed tube is shut off.



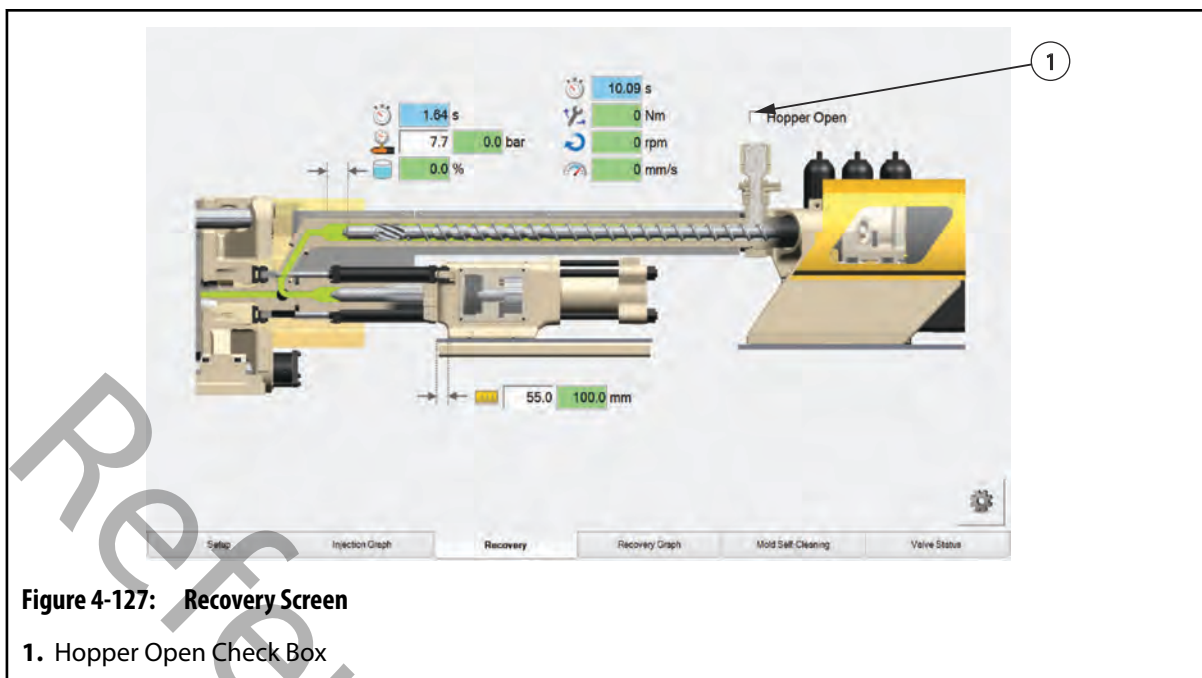
WARNING!

Burn hazard – risk of serious injury. Machine surfaces can be hot and could cause serious injury. Wear appropriate personal protective equipment.

2. Place a container under the discharge tube on the manual shutoff.
3. Lift the pivot handle and pull the assembly until it reaches the discharge position. Empty all process material through the discharge tube.

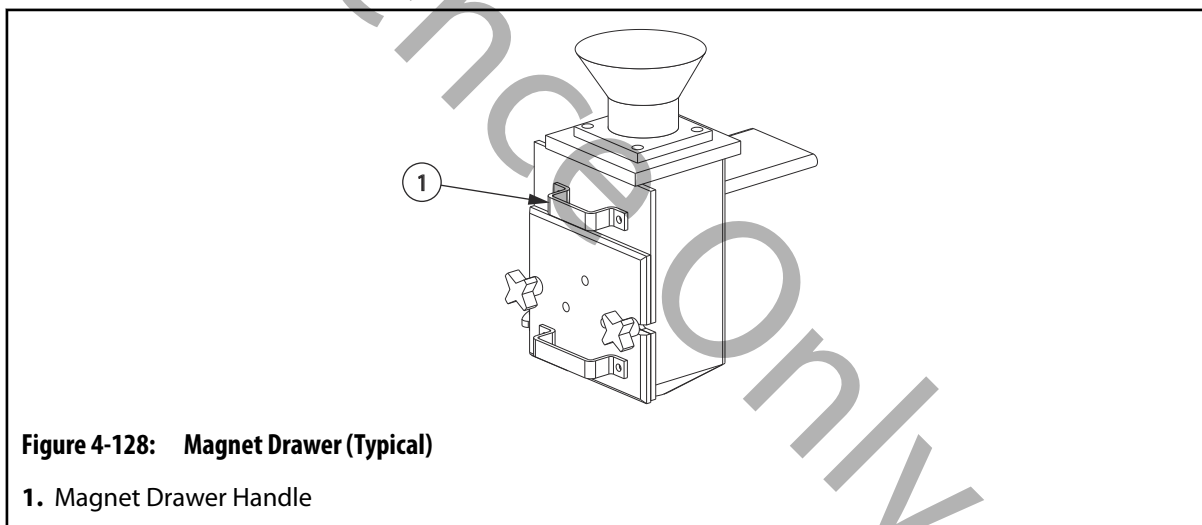


4. If the machine is equipped with an optional feed auto-shutoff system, do the following:
 - a. On the HMI, touch the **Injection** button on the HMI and touch the **Recovery** tab to display the **Recovery** screen.



b. Select the **Hopper Open** check box.

5. If the machine is equipped with an optional magnet drawer, push the handle in to open the process material feed.



6. After emptying the hopper or direct feed tube of all process material, lift the pivot handle and push the assembly until the pivot point locks into the slot before the feed throat. Make sure the feed throat opening is covered.
7. If the machine is equipped with an optional magnet drawer, pull the handle to shut off the process material feed.

4.27.3.6 Turning Off the Heats

To turn off the machine, mold and nozzle tip heats, do the following:

1. On the HMI, touch the **Heats** button and touch the **Heats Setup** tab to display the **Heats Setup** screen.

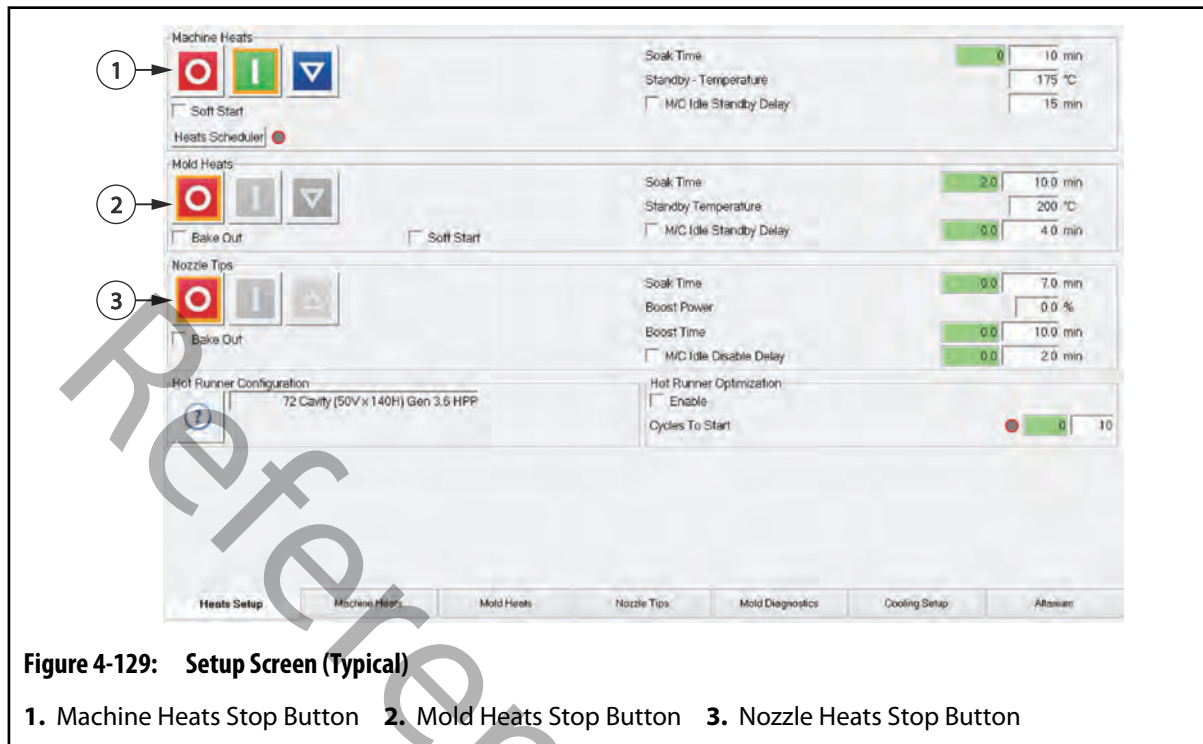


Figure 4-129: Setup Screen (Typical)

1. Machine Heats Stop Button
2. Mold Heats Stop Button
3. Nozzle Heats Stop Button

2. Touch the **Machine Heats Stop**, **Mold Heats Stop** and **Nozzle Heats Stop** buttons.

CAUTION!

Mechanical hazard – risk of damage to the mold and hot runner. Reducing the temperature of the mold and hot runner too quickly could damage the assembly. Cool the mold gradually using the mold cooling system before turning off the mold heats.

3. Allow the mold and hot runner to cool to 37 °C (100 °F) .

4.27.3.7 Turning Off Mold Cooling

CAUTION!

Mechanical hazard – risk of damage to the mold. Leave mold cooling on until the mold cools to 37 °C (100 °F) .

Press the **Mold Cooling** key on the HMI to turn off the mold cooling system.

4.27.3.8 Turning Off the CoolPik Auxiliaries and the Mold Dehumidifier (If Equipped)

The procedure to turn off the CoolPik auxiliaries can vary based on the model installed. Make sure to follow the instructions for the product installed.

For additional instructions refer to the manufacturer's manual for additional setup or procedures. The auxiliaries are accessed through the auxiliaries **Overview** screen.

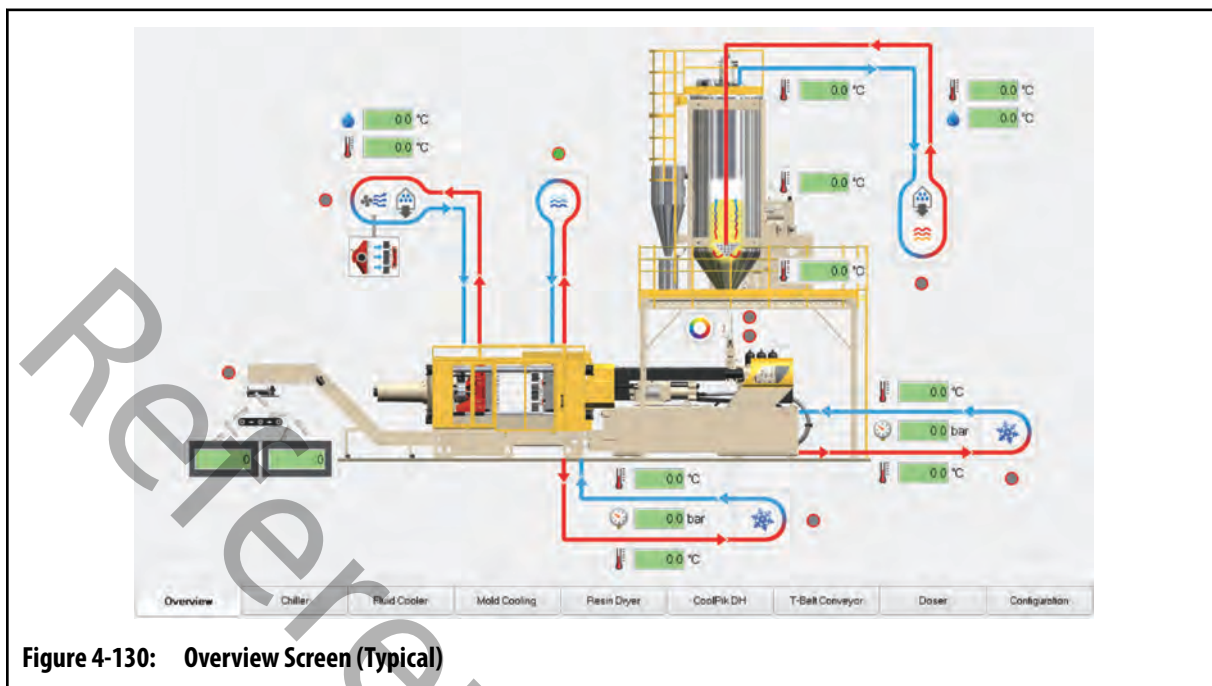


Figure 4-130: Overview Screen (Typical)

4.27.3.8.1 Turning Off the CoolPik DH2.2 (If Equipped)

To turn off the CoolPik DH2.2, do the following:

1. On the HMI, press the **Auxiliaries** button, and then touch the **Overview** tab to open the **Overview** screen. Refer to [Figure 4-130](#).
2. Touch the **CoolPik DH** tab.
3. Touch the **Stop** button.

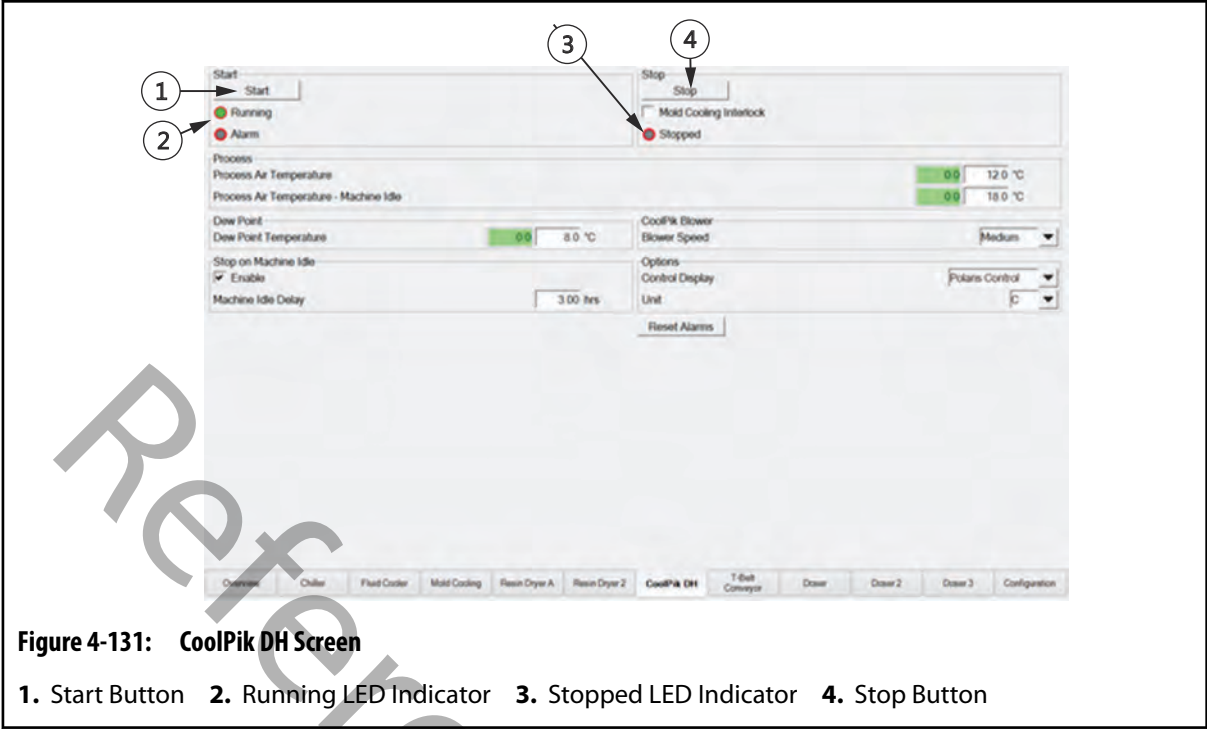


Figure 4-131: CoolPik DH Screen

1. Start Button 2. Running LED Indicator 3. Stopped LED Indicator 4. Stop Button

4.27.3.8.2 Turning Off the CoolPik DH (If Equipped)

To turn off the CoolPik DH, do the following:
Two methods are available for turning off the CoolPik DH.

Stopped (Vented)	Stopped
Press the Stop button once and a predetermined period of time will lapse before the CoolPik DH turns off. The stopped (vented) method is recommended by Husky.	Press the Stop button twice and the CoolPik DH turns off immediately. CAUTION! Mechanical hazard – risk of equipment damage. Using the Stopped method to immediately stop the CoolPik DH could result in nuisance alarms and overheat the desiccant material. Husky recommends using the Stopped (vented) method. Use the stopped method under the following conditions: • If the operator starts the CoolPik DH accidentally and wants to turn it off immediately. • If the operator knows that the regeneration circuit was ineffective because the ambient DP temperature was very low.

1. On the HMI, press the **Auxiliaries** button, and then touch the **Overview** tab to open the **Overview** screen. Refer to [Figure 4-130](#).
2. Touch the **CoolPik DH** tab.
3. Touch the **Stop** button.

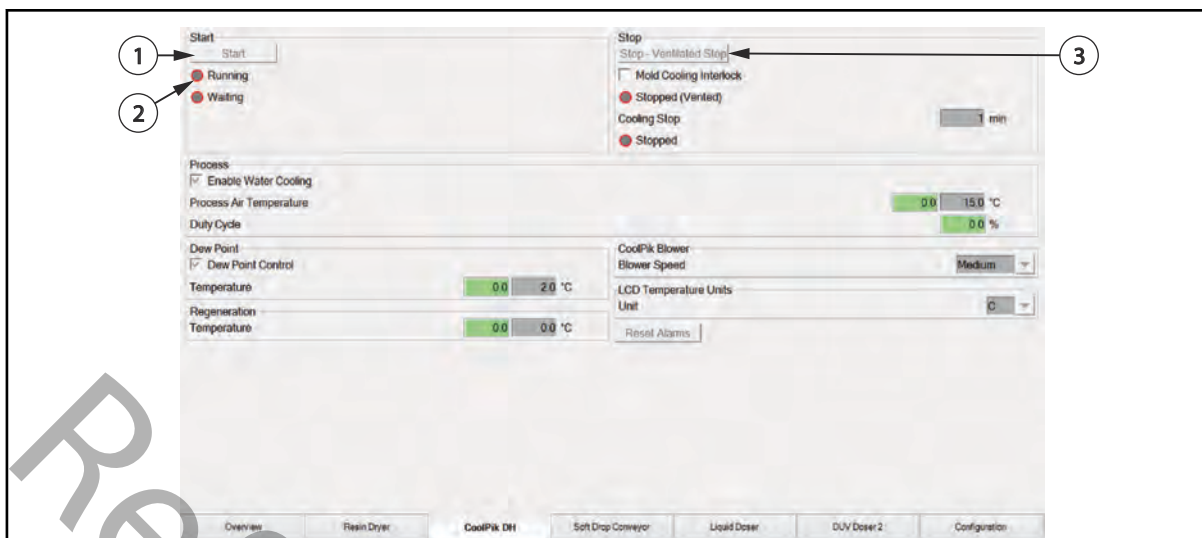


Figure 4-132: CoolPik DH Screen

1. Start Button 2. Running LED Indicator 3. Stop-Ventilated Stop Button

4.27.3.8.3 Turning Off the CoolPik Blower (If Equipped)

Refer to the CoolPik Blower Manual for instructions about settings and additional procedures. To turn off the CoolPik Blower, do the following:

1. On the HMI, press the **Auxiliaries** button, and then touch the **Overview** tab to open the **Overview** screen. Refer to [Figure 4-130](#).
2. Touch the **CoolPik Blower** tab.
3. In the **Stop** section, touch the **Stop-Ventilated Stop** button twice.

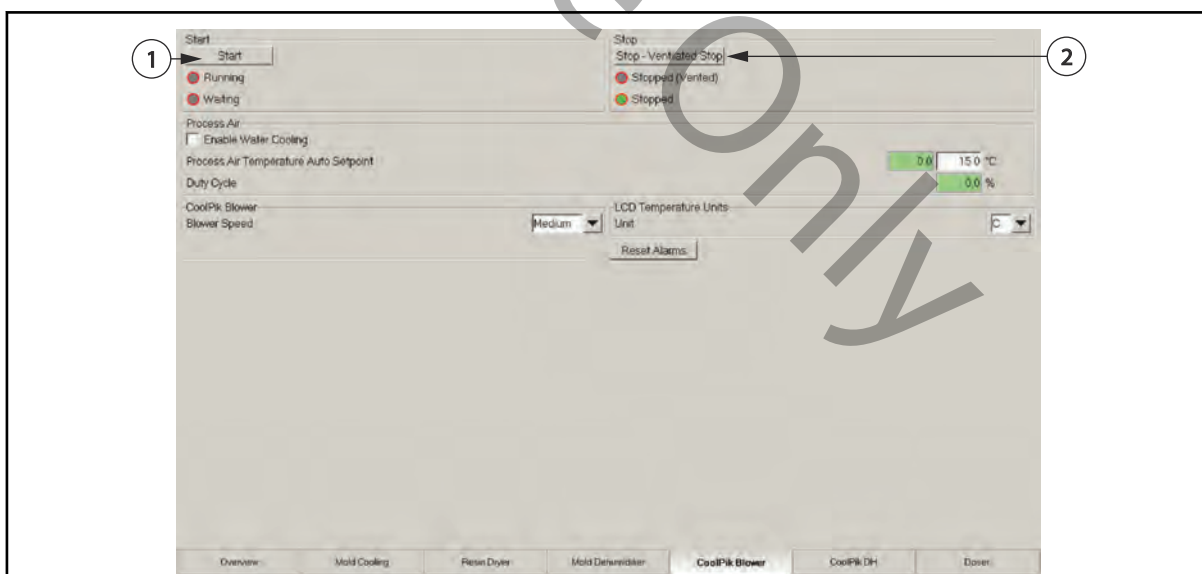


Figure 4-133: CoolPik Blower Screen

1. Start Button 2. Stop-Ventilated Stop Button

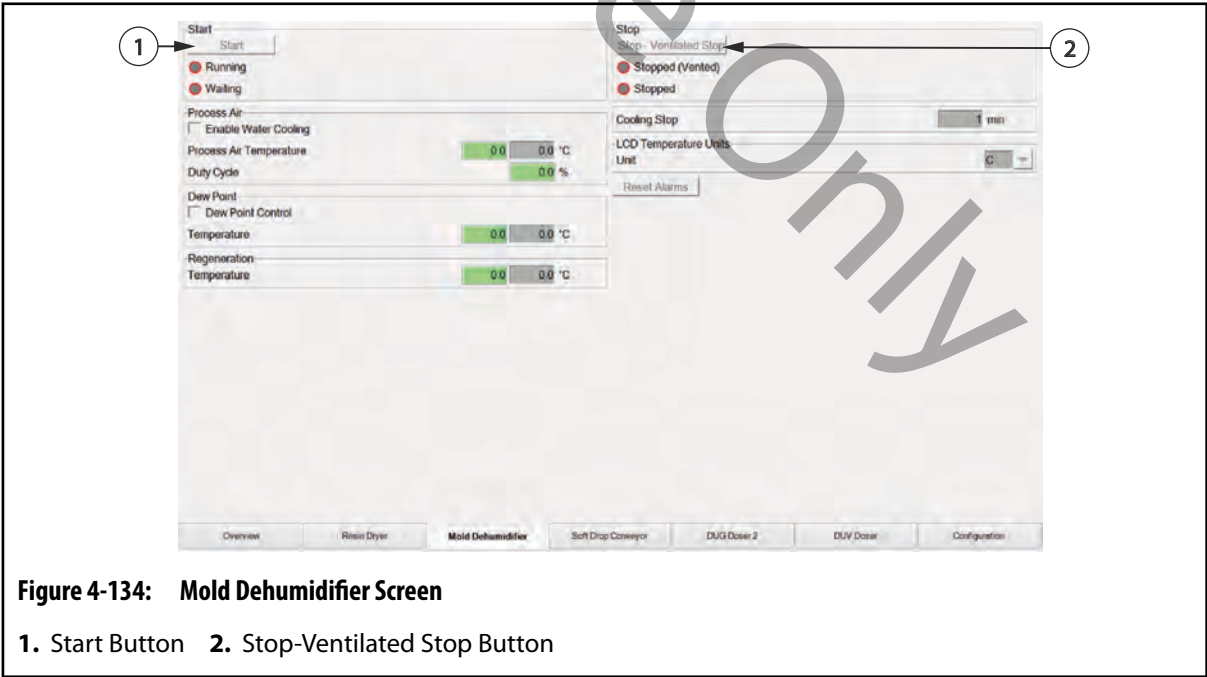
4.27.3.8.4 Turning Off the Mold Dehumidifier (If Equipped)

To turn off the mold dehumidifier, do the following

Two methods are available for turning off the mold dehumidifier.

Stopped (Vented)	Stopped
Press the Stop button once and a predetermined period of time will lapse before the mold dehumidifier turns off The stopped (vented) method is recommended by Husky.	Press the Stop button twice and the mold dehumidifier turns off immediately. CAUTION! Mechanical hazard – risk of equipment damage. Using the Stopped method to immediately stop the mold dehumidifier could result in nuisance alarms and overheat the desiccant material. Husky recommends using the Stopped (vented) method. Use the stopped method under the following conditions: - If the operator starts the mold dehumidifier accidentally and wants to turn it off immediately. - If the operator knows that the regeneration circuit was ineffective because the ambient DP temperature was very low.

- On the HMI, press the **Auxiliaries** button, and then touch the **Overview** tab to open the **Overview** screen.
- Touch the **Mold Dehumidifier** tab.
- In the **Stop** section, touch the **Stop-Ventilated Stop** button twice.



4.27.3.9 Turning Off the Resin Dryer (If Equipped)

The resin dryer can be turned off using the Main screen or using SmartStop (if equipped). Refer to the Resin Dryer Manual for instructions about resin drying settings and additional procedures.

NOTE:

The resin dryer HMI screens may differ depending on which model of resin dryer is installed.

4.27.3.9.1 Turning Off the Resin Dryer

There are two methods available for turning off the resin dryer.

Stopped (Vented)	Stopped
Press the Stop button once and a predetermined period of time will lapse before the resin dryer turns off. The stopped (vented) method is recommended by Husky.	Press the Stop button twice and the resin dryer turns off immediately. CAUTION! Mechanical hazard – risk of equipment damage. Using the Stopped method to immediately stop the resin dryer could result in nuisance alarms and overheat the resin and heating components. Husky recommends using the Stopped (vented) method. Use the stopped method under the following conditions: • If the operator starts the resin dryer accidentally and wants to turn it off immediately.

To turn off the resin dryer, do the following:

1. On the HMI, touch the **Auxiliaries** button, and then touch the **Overview** tab to display the **Overview** screen.

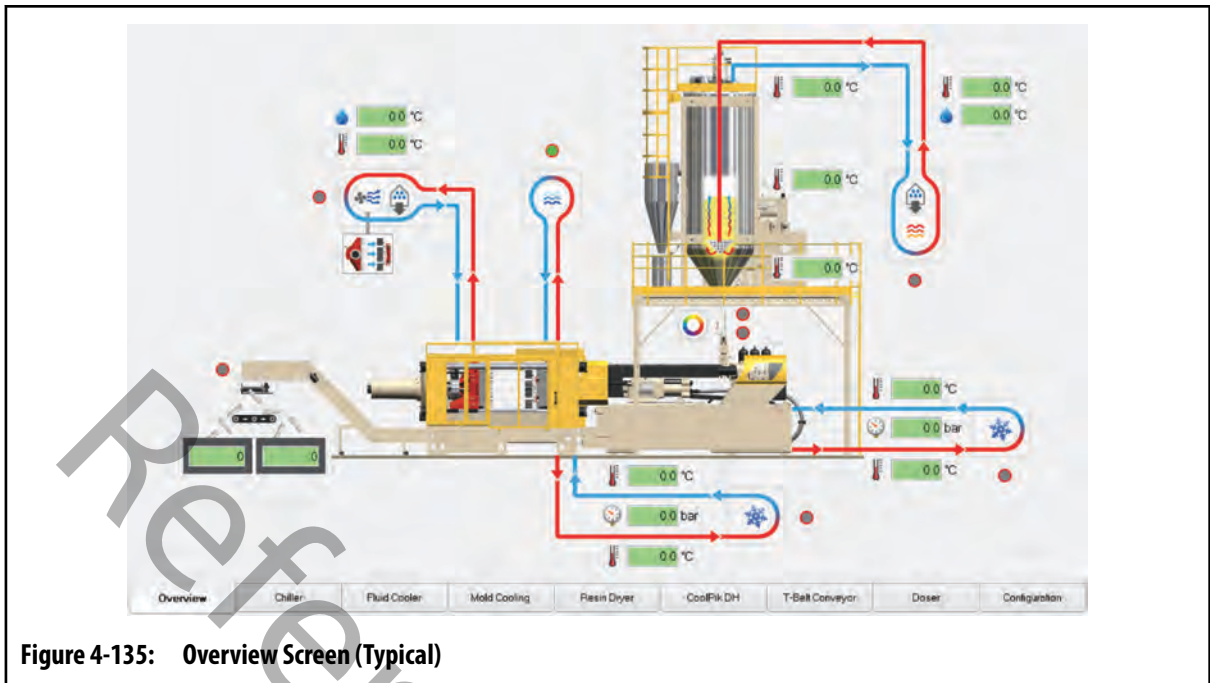


Figure 4-135: Overview Screen (Typical)

2. Touch the **Resin Dryer** tab.
3. In the **Stop** area, touch the **Stop** button twice.

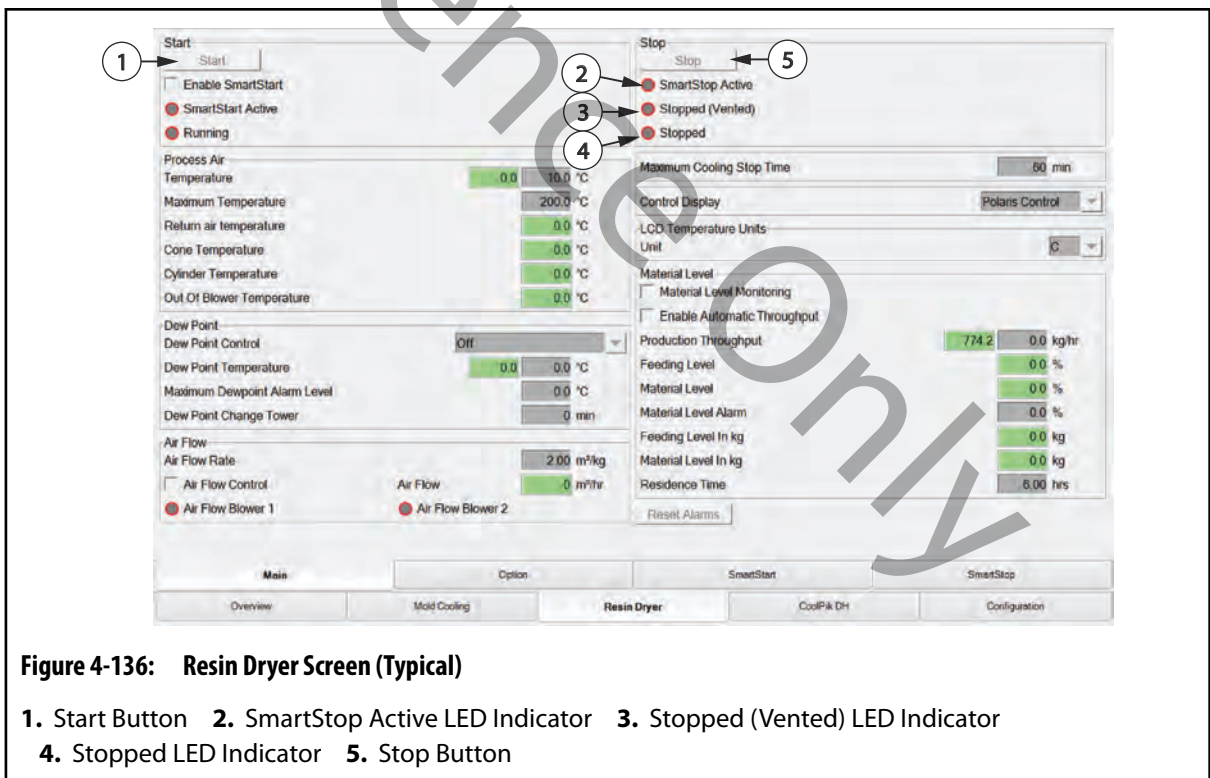


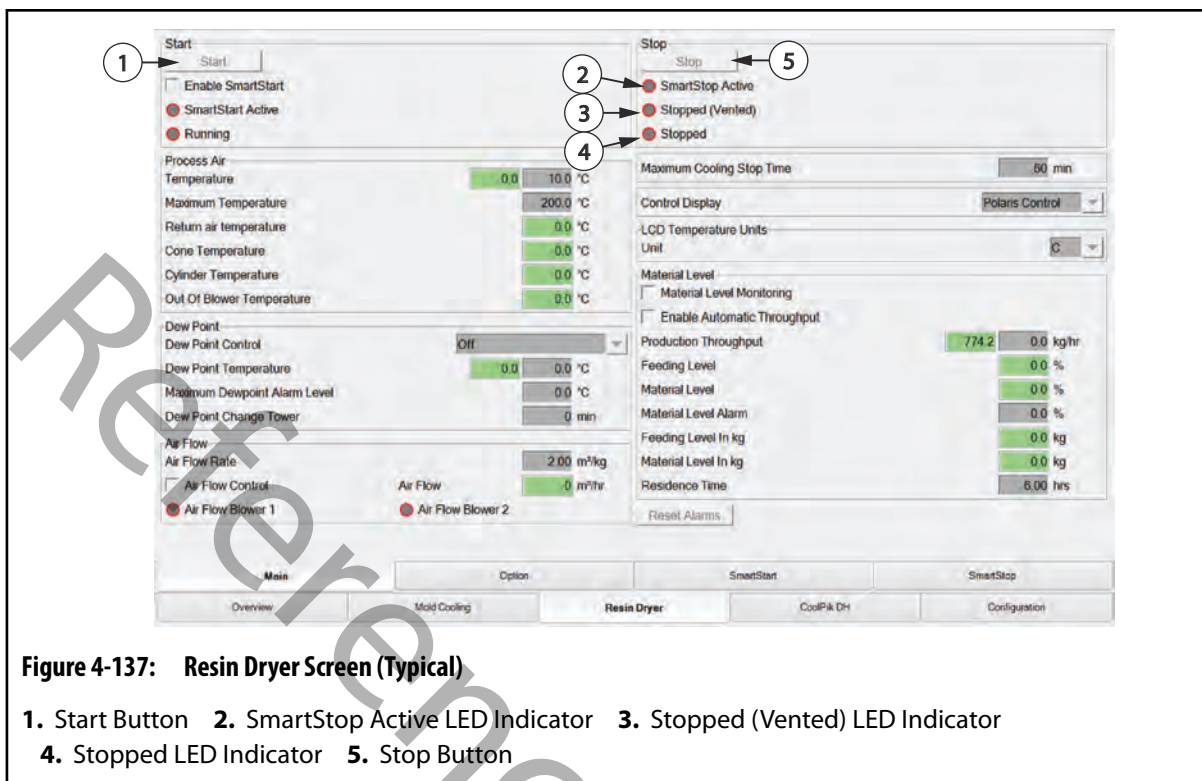
Figure 4-136: Resin Dryer Screen (Typical)

1. Start Button 2. SmartStop Active LED Indicator 3. Stopped (Vented) LED Indicator
4. Stopped LED Indicator 5. Stop Button

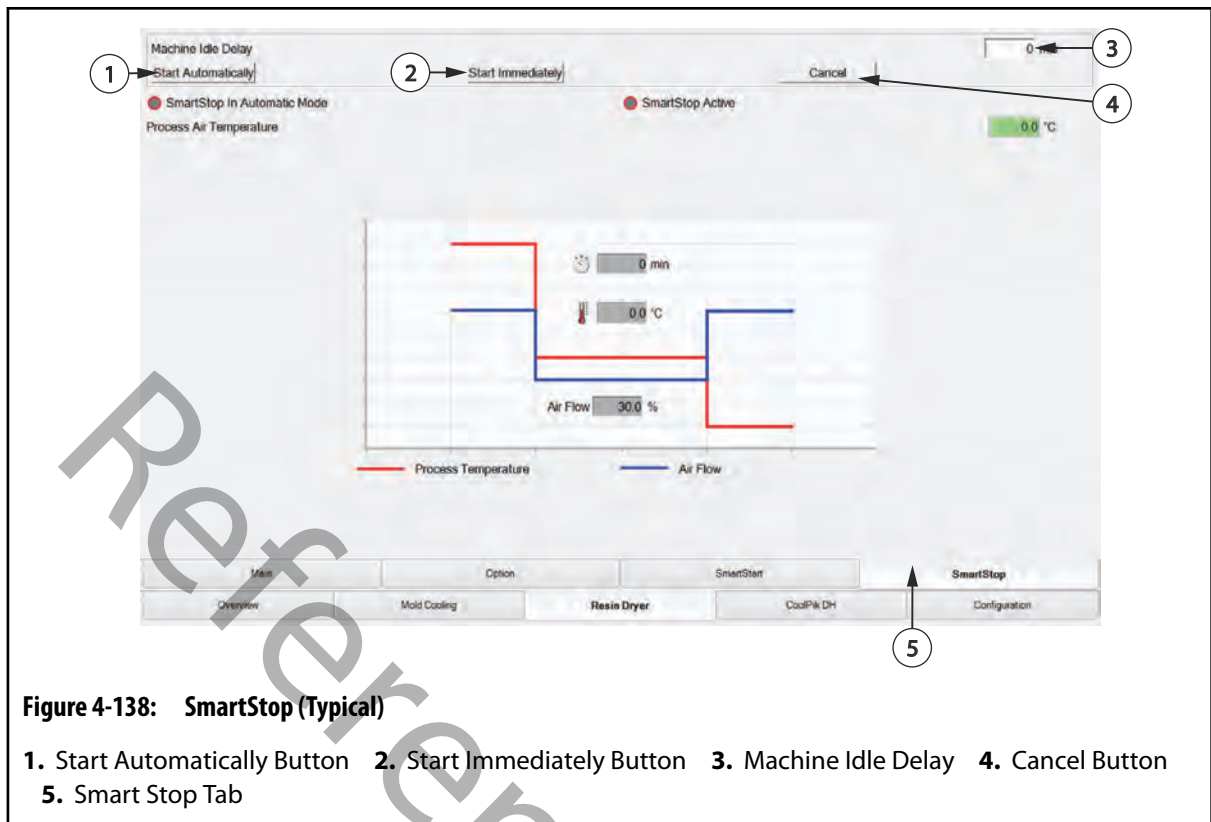
4.27.3.9.2 Stopping the Resin Dryer using SmartStop (If Equipped)

To stop the resin dryer using SmartStop, do the following:

1. On the HMI, touch the **Auxiliaries** button, and then touch the **Overview** tab to display the **Overview** screen. Refer to [Figure 4-135](#).
2. Touch the **Resin Dryer** tab.



3. Touch the **Smart Stop** tab.



4. Stop the resin dryer using two methods:
 - To start SmartStop immediately, go to [step 5](#)
 - To start SmartStop automatically, go to [step 6](#)
5. Touch the **Start Immediately** button to start SmartStop and shut down the resin dryer using the profile defined.
6. To stop the dryer automatically, do the following:
 - a. In the **Machine Idle Delay** field, enter the delay time.
 - b. Touch the **Start Automatically** button. Once the machine is idle for the delay time specified the Smart Stop shutdown process will start using the profile defined.

4.27.3.10 Cleaning the Mold

Refer to the mold *Service Manual* for the full procedure on how to clean the mold.

After cleaning the mold, do the following:

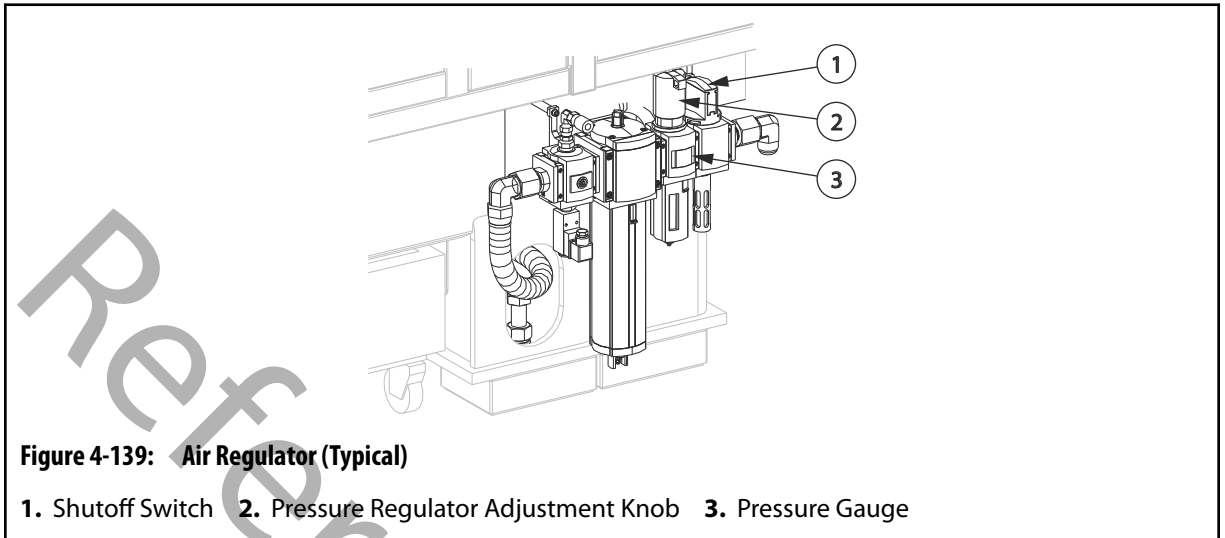
1. On the HMI, press the **Manual Cycle/Idle** key.
2. Touch the **Machine Mode Selector** button on the toolbar and select **Mold Set** mode.
3. Press and hold the **Mold Close** key until there is a gap of approximately 5 mm (0.2 in) between the mold halves.

4.27.3.11 Turning Off the Pump Motor

On the HMI, press the **Pump Motor Off** key to turn off the pump motor.

4.27.3.12 Turning Off the Air Supply

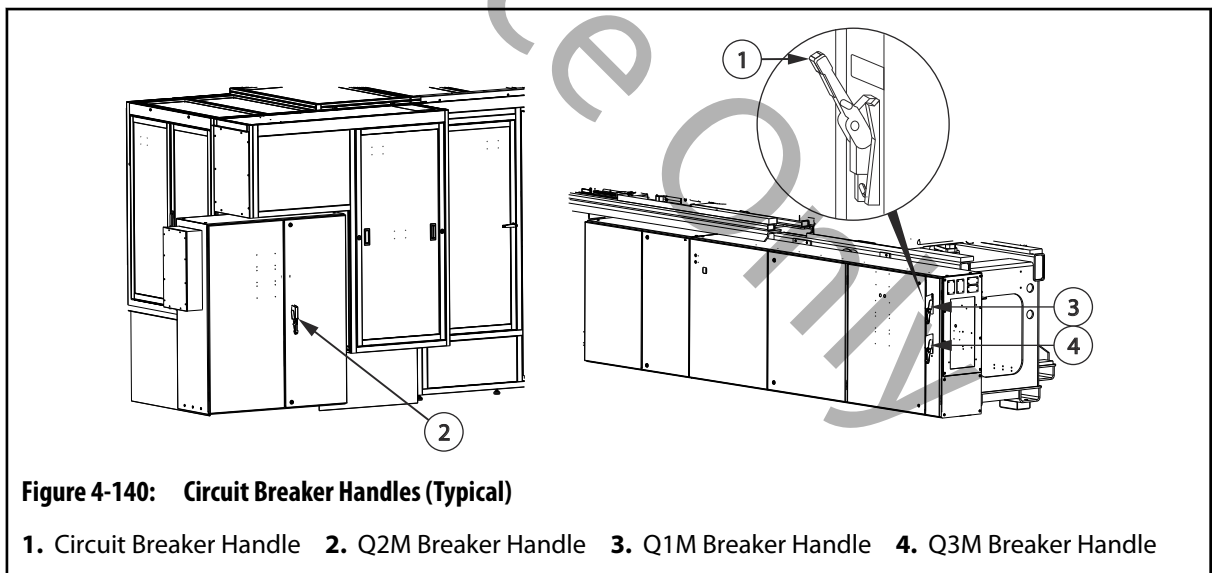
Turn off the air supply for the pneumatic system by rotating the shutoff switch on the air regulator.



4.27.3.13 Powering Down the Machine

To power down the machine, do the following:

1. If equipped, move the Q3M breaker handle to the OFF position. This turns off power to motion control.



2. Move the Q2M breaker handle to the OFF position. This turns off power to the integrated mold heats.

CAUTION!

Electrical hazard – risk of component damage. When powering down the machine, switch off the Q3M and Q2M breaker handles before switching off the Q1M breaker handle. Failure to do so could result in unnecessary wear on components and lead to premature failure.

3. Move the Q1M breaker handle to the OFF position. This turns off power to the machine including the HMI and all other machine functions.
4. Perform all daily maintenance procedures. Refer to [Chapter 5–Maintenance](#) for more information.

4.27.4 Stopping the Machine Using SmartStop

When SmartStop is enabled, the machine will automatically complete a preset power down sequence when any of the following criteria is met:

- After a critical machine fault
 - After a specified number of extra parts are produced
 - After completing production
 - On a specified day and time
1. If necessary, disable the booster cylinders. Refer to [Section 4.22](#) for more information.
 2. Make sure SmartStop is properly configured. Refer to [Section 4.24.2](#) for more information.
 3. On the HMI, touch the **Machine** button and touch the **SmartStop** tab to display the **SmartStop** screen.

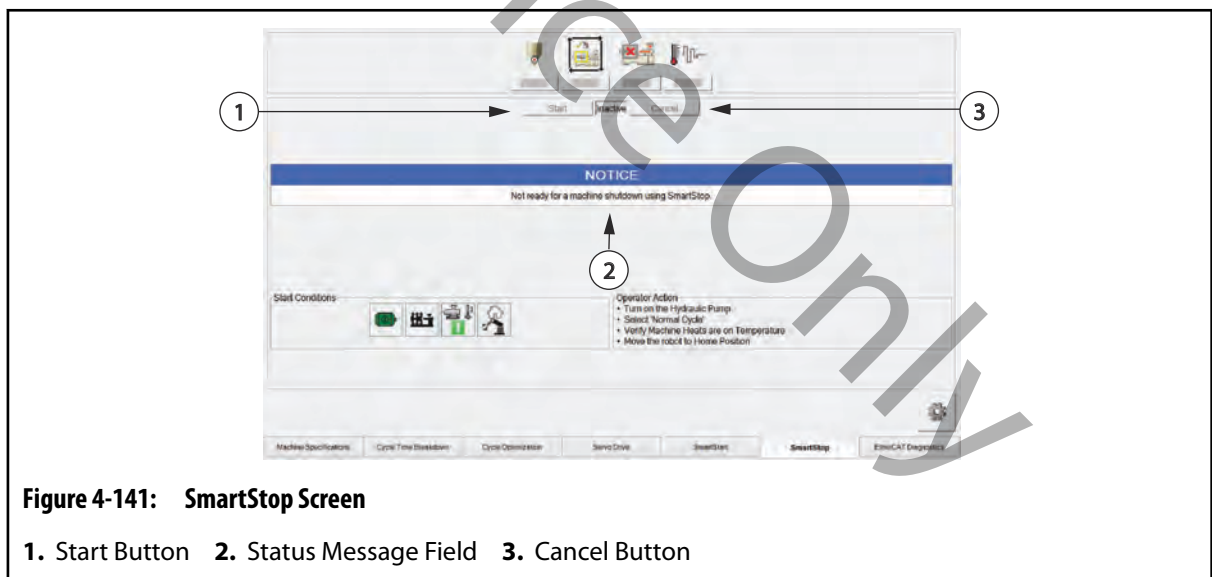


Figure 4-141: SmartStop Screen

1. Start Button 2. Status Message Field 3. Cancel Button

4. Touch the **Start** button and follow all on-screen instructions.

When the SmartStop sequence is completed, the message *Not ready for a machine shutdown using SmartStop* will be displayed in the **Status Message** field.

NOTE:

SmartStop will automatically pause if an alarm occurs during the SmartStop sequence. The sequence will only resume once the alarm condition is cleared. Refer to the **Status Message** field for instructions.

NOTE:

The SmartStop sequence can be aborted at any time by pressing the **Cancel** button on the **SmartStop** screen. SmartStop will stop once the current stage in the sequence is completed.

Additional steps must be taken to power down the machine completely.

To power down the machine completely after SmartStop has completed, perform the following procedures in order:

Step	Procedure	Reference
1	Empty the hopper (optional)	Section 4.27.3.5
2	Turn off the resin dryer, if equipped	Section 4.27.3.9
3	Turn off the CoolPik auxiliaries and mold dehumidifier	Section 4.27.3.8
4	Clean the mold	Section 4.27.3.10
5	Turn off the pump motor	Section 4.27.3.11
6	Turn off the air supply (optional)	Section 4.27.3.12
7	Power down the machine (optional)	Section 4.27.3.13

NOTE:

For information about setting up SmartStop, refer to [Section 4.24.2](#).

4.27.5 Unexpected Machine Stoppage

The machine can stop unexpectedly when certain alarms occur or if there is a power failure.

If an alarm occurs, follow the instructions in the alarm message and then restart the machine as usual.

If there is a power failure, start the machine according to the instructions in .

NOTE:

The z-axis drive belts in the product handling unit must be thoroughly inspected if machine motion has been brought to a sudden stop. Refer to [Section 5.9.14](#) for more information.

CAUTION!

Mechanical hazard - risk of damage to the machine. Failure to follow the alarm solution text instructions could cause serious equipment damage.

If the tooling plate and carriage assembly hits the bumpers, an alarm is raised on the HMI. The bumpers must be replaced and other parts must be inspected for damage. Refer to the alarm solution text for more information.

4.28 Part Sampling

Part sampling allows for parts to be accessed at the midpoint of the machine for the purpose of retrieving part samples for quality control inspection. The part sampling system is compatible with a vision system, if equipped.

Part sampling works as follows:

- When the part sampling button is pressed, the robot conveyor changes from forward to reverse when next **Mold Open** cycle starts. A status message "Part Sampling Active" displays on the HMI.

NOTE:

The part sampling cycles or time are configurable in the HMI. Refer to [Section 4.28.2](#) for more information.

- Parts travel the opposite direction on the conveyor and past the active sorter flap (prevents part jamming).
- Parts fall into the reverse chute, and then drop into a part sampling bin (removable tray) located below.
- Once the part sampling cycle is complete, the conveyor resumes forward direction.

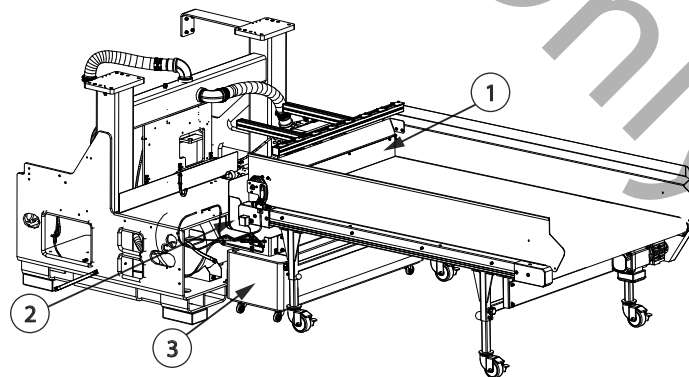


Figure 4-142: Part Sampling System Hardware

1. Active Sorter Flap 2. Reverse Chute 3. Part Sampling Bin

4.28.1 Retrieving Part Samples for Quality Control

Parts may be accessed at the midpoint of the machine for the purpose of retrieving part samples for quality control inspection.

To retrieve part samples from the machine, do the following:

1. Press the part sampling button located on the side of the robot electrical cabinet.

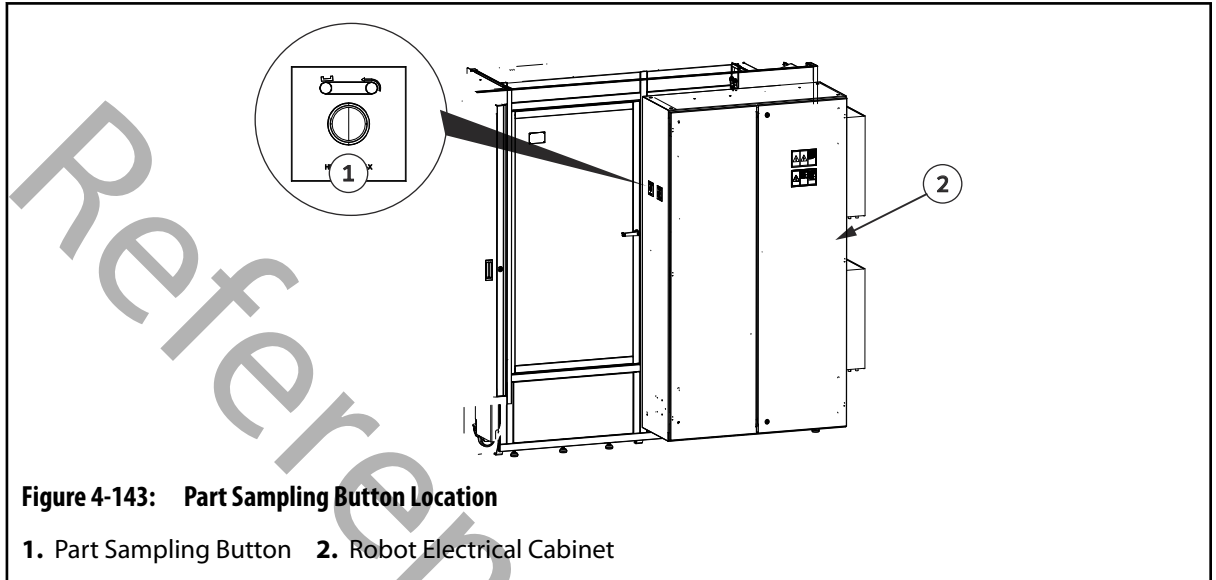


Figure 4-143: Part Sampling Button Location

1. Part Sampling Button 2. Robot Electrical Cabinet

When the next **Mold Open** cycle starts, the conveyor changes from forward to reverse direction and a status message “Part Sampling – Active” displays on the HMI. Parts fall into the reverse chute, and then drop into a part sampling bin (removable tray) located below the conveyor.

The machine counts the number of cycles to be collected, as configured by the user. Part sampling cycle is complete once the number of cycles sampled matches the configured setpoint, the conveyor resumes forward direction. The “Part Sampling – Active” message disappears from the HMI display. Refer to [Figure 4-142](#) for details.

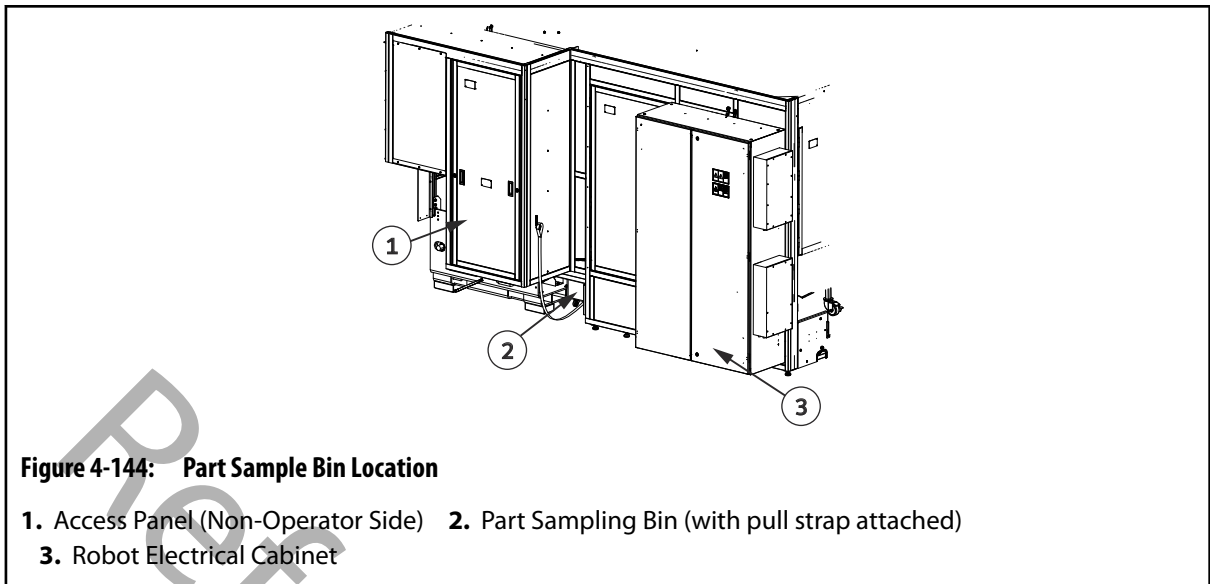
NOTE:

The part sampling bin has a limited capacity and should be configured and emptied accordingly. A photo eye sensor monitors bin overfill. When the photo eye is blocked, a warning message “Conveyor: Photo Eye Blocked” displays on the HMI.

-
2. Remove the part sampling bin by grasping the attached pull strap and pulling the bin outward from beneath the conveyor.

NOTE:

The part sampling bin rolls on caster wheels to reduce the effort to move it.



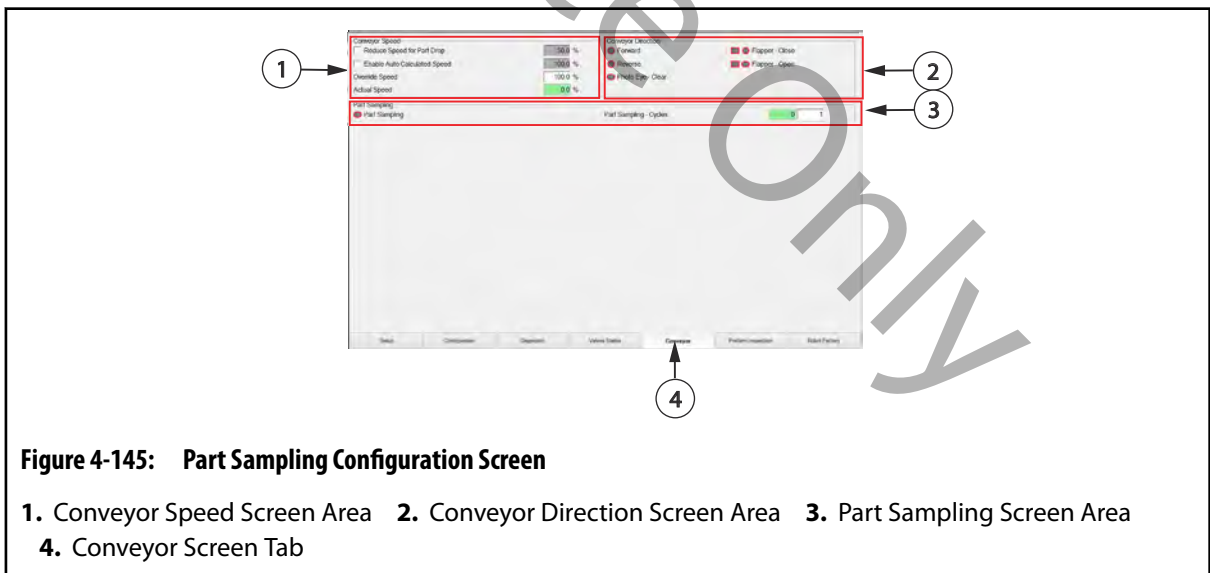
3. Retrieve the parts from the part sampling bin and then place the empty bin back into position.

4.28.2 Configuring the Conveyor for Part Sampling

The part sampling system can be monitored and configured to operate for specified cycles or time within the HMI.

To configure the conveyor for part sampling, do the following:

1. On the HMI home screen, touch the **Robot** icon button then touch the **Conveyor** tab.



2. Set and monitor the conveyor speed in the **Conveyor Speed** screen area.
 - a. Select the **Reduce Speed for Part Drop** checkbox. A warning dialog box appears:

NOTE:

When conveyor runs in reverse direction, it always runs at 100% speed to ensure that parts sampled and scrapped are clear of conveyor before switching to forward direction. When reduce speed for part drop is selected, the conveyor can be set to run in reverse direction as slow as 50% during part drop. It then automatically changes back to 100% after the parts drop.

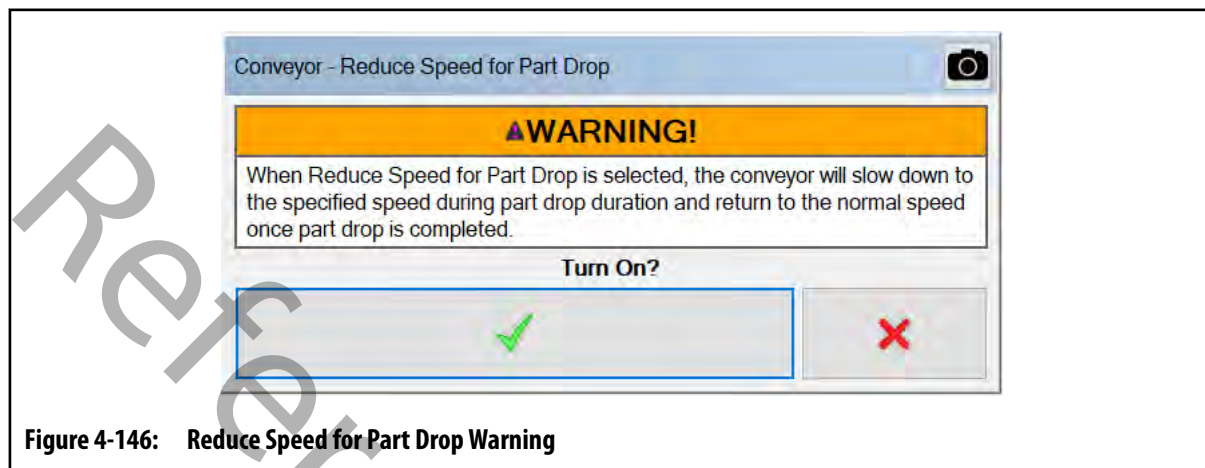


Figure 4-146: Reduce Speed for Part Drop Warning

- b. Touch the “√” button on the **Reduce Speed for Part Drop** warning dialog box. A keypad appears. Type the desired value to edit the part drop speed. Touch the “√” button to apply the setpoint or “X” to cancel the change.

NOTE:

The setpoint value equals a percentage of the conveyor full speed. The minimum set point is 50%. The conveyor will slow down to the specified speed setting setpoint.

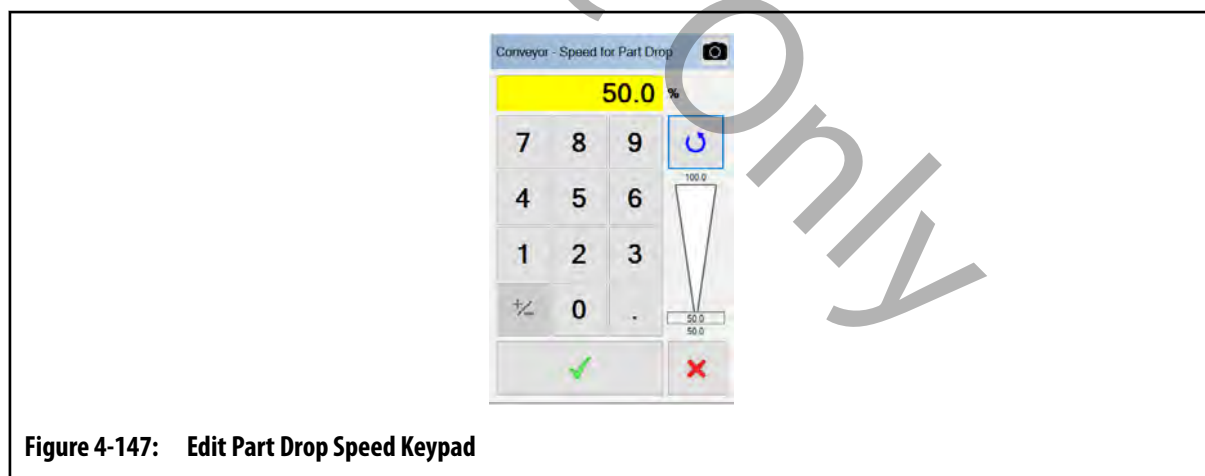


Figure 4-147: Edit Part Drop Speed Keypad

- c. If the **Enable Auto Calculated Speed** checkbox is checked (enabled), de-select the check box to disable it, if desired. A warning dialog box appears:

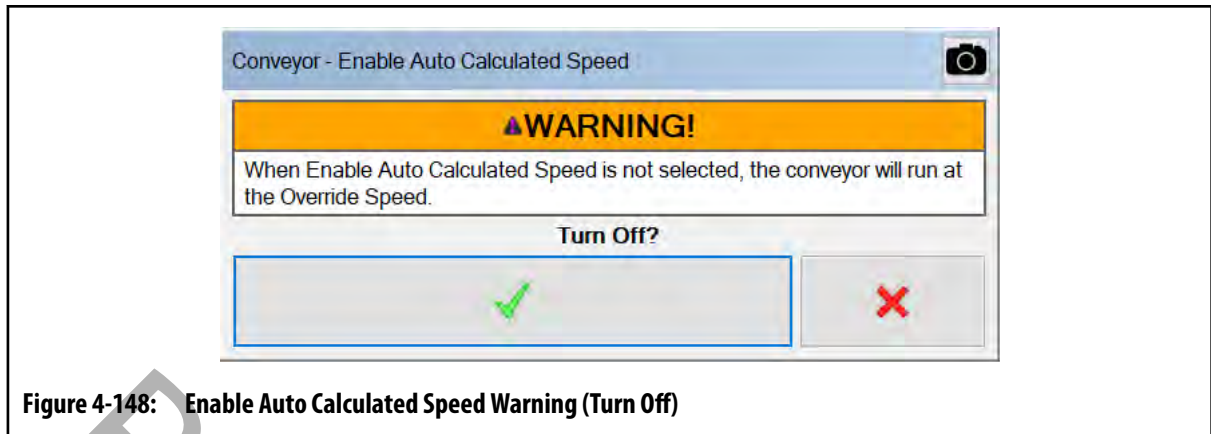


Figure 4-148: Enable Auto Calculated Speed Warning (Turn Off)

- d. Touch the "✓" button on the **Enable Auto Calculated Speed Warning** warning dialog box to disable auto calculated speed or touch the "✗" to cancel the change.

NOTE:

The conveyor runs in override speed mode when enable auto calculated speed mode is not selected. Disabling auto calculated speed enables the override speed.

- e. If the **Enable Auto Calculated Speed** checkbox is not checked (disabled), select the check box to enable it, if desired. A warning dialog box appears:

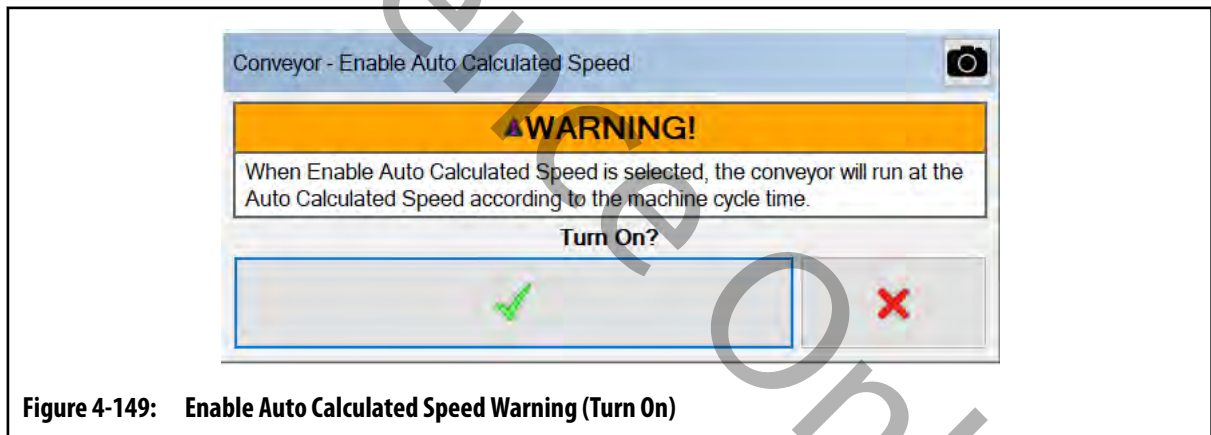


Figure 4-149: Enable Auto Calculated Speed Warning (Turn On)

- f. Touch the "✓" button on the **Enable Auto Calculated Speed Warning** warning dialog box to enable auto calculated speed or touch the "✗" to cancel the change.

NOTE:

The conveyor runs in auto calculated speed mode when enable auto calculated speed mode is selected. Enabling auto calculated speed disables the override speed.

3. Monitor the following outputs in the **Conveyor Direction screen area:**

- Conveyor forward direction
- Conveyor reverse direction
- Photo eye clear - clear
- Flapper close
- Flapper open

4. Set and monitor part sampling cycles in the **Part Sampling** screen area.
 - a. Type a suitable value in the **Part Sampling - Cycles** field.

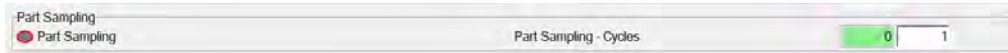


Figure 4-150: Part Sampling - Cycles Field

When part sampling mode is initiated, the machine uses the value entered into this field to count the number of cycles to be collected in the part sampling bin. Once the number of cycles sampled matches this value, the part sampling cycle is complete and the conveyor resumes forward direction. The part sampling bin has a limited capacity and should be configured and emptied accordingly. A photo eye sensor monitors bin overfill. When the photo eye is blocked, a warning message "Conveyor: Photo Eye Blocked" displays on the HMI.

Reference Only

Reference Only

Chapter 5 Maintenance

NOTE:

Some procedures in this chapter may refer to controls on the Human Machine Interface (HMI). For more information about the HMI, refer to [Chapter 4–Operation](#).

**WARNING!**

Risk of injury. When entering the molding area, personal protective equipment must be worn to guard against burns, abrasions, hearing, foot, eye, and face hazards and any other procedure specific hazards listed in the manual.

**WARNING!**

Chemical hazard - Some of the chemicals used when servicing or maintaining Husky equipment are potentially hazardous and may cause injury and illness. Before storing, handling, or working with any chemical or hazardous material, thoroughly read and understand each applicable Material Safety Data Sheet (MSDS), use recommended personal protective equipment and follow the manufacturer's instructions.

**IMPORTANT!**

The procedures contained in this chapter were written for a standard machine and do not take special options into consideration. Special options are documented, when available, in the *Additional Information* section on the documentation CD.

**IMPORTANT!**

This chapter does not detail the maintenance tasks required for all auxiliary equipment. Refer to the manufacturer's documentation for more information about required maintenance.

5.1 Maintenance Schedule

Throughout the life of the machine, various systems and components will need to be inspected and serviced on a scheduled or non-scheduled basis.

There are three types of maintenance procedures:

- Commissioning procedures are performed after the machine has been installed

- Preventive procedures are performed at scheduled intervals
- Service procedures are performed when required

5.1.1 Initial Maintenance

The following procedures are to be performed after the commissioning and initial startup of the machine.

Interval (OperatingHrs.)	Procedure	Reference
160	Check the quality of the hydraulic oil	Section 5.6.5
320	Inspect the Z-axis drive belt	Section 5.9.14

5.1.2 Preventive Maintenance

Maintenance must be performed at the operating hours or cycles, whichever comes first. The procedures are repeated at multiples of the interval; for example every 160 hours or every 125,000 cycles.

Program	Interval Between Maintenance ^[1]		Procedure	Reference
	Operating Hours	Cycles		
A	160	125,000	Inspect the hydraulic tank desiccant breather cartridge	Section 5.6.16.1
			Check the conveyor belt operation	Section 5.9.1
			Empty the process material bins	Section 4.26.1.18
B	320	250,000	Drain water in the air regulator	Section 5.8.1

Program	Interval Between Maintenance ^[1]		Procedure	Reference
	Operating Hours	Cycles		
C	2,500	500,000	Check the oil level in the hydraulic tank	Section 5.6.6
			Check the quality of the hydraulic oil	Section 5.6.5
			Inspect and clean the hopper	Section 5.4.4
			Inspect and clean the magnet drawer	Section 5.4.5
			Inspect the conveyor belt and drive chain	Section 5.9.2
			Clean the machine exterior and HMI	Section 5.2.2
			Clean the machine interior and HMI	Section 5.2.3
			Clean the nozzle tip, stationary platen and purge guard	Section 5.4.2
			Check the hydraulic system pressure	Section 5.6.12
			Check the automatic dump valve	Section 5.6.13
			Check the CEN Valve	Section 5.6.14
			Check the alignment of the purge guard switch and the switch actuator	Section 5.2.6.10
			Inspect all cooling water components	Section 5.7.1
			Inspect all electrical components	Section 5.5.1
			Inspect all hydraulic cylinders, valves and manifolds	Section 5.6.10
			Inspect all hydraulic hoses	Section 5.6.11.1
			Inspect all pneumatic hoses	Section 5.8.4.1
			Inspect the electric clamp lock piston oil reservoir level	Section 5.3.7
			Inspect the vacuum pump inlet air filter	Section 5.9.5
D	2,500	500,000	Lubricate the mold stroke column guide bushings	Section 5.3.3
			Inspect the Z-axis linear bearings	Section 5.9.12
			Lubricate the Z-axis linear bearings	Section 5.9.13

Program	Interval Between Maintenance ^[1]		Procedure	Reference
	Operating Hours	Cycles		
E	2,500	1,500,000	Check the drive housing oil level	Section 5.4.7
			Check the bladder accumulator precharge pressure	Section 5.6.2.2
			Check the gearbox oil level	Section 5.4.10
			Inspect gearbox oil color in sight glass	Section 5.4.9
			Check the vacuum pump oil level	Section 5.9.8
			Inspect the electric pump motor	Section 5.5.5
			Inspect the mold stroke column guide bushings	Section 5.3.4
			Inspect the vacuum silencer(s)	Section 5.9.10
			Inspect the Z-axis drive belt	Section 5.9.14
			Inspecting the direct shutoff system	Section 5.4.20
			Lubricate the injection unit (extruder linear bearings) and inspect the rails	Section 5.4.6
			Inspect the Y-axis bushings and rod eye	Section 5.9.19.3
			Lubricate the Y-axis bushings and rod eye	Section 5.9.19.4
			Replace the coalescing filter and silencer on the oil recovery unit	Section 5.6.9
F	2,500	2,000,000	Lubricate the moving platen linear bearings	Section 5.3.5
			Lubricate the mold positioning device lifting wedge	Section 5.3.6
G	5,000	4,000,000	Adjust the conveyor drive chain tension	Section 5.9.3
			Check the piston accumulator precharge pressure	Section 5.6.3.2
			Check the quality of the hydraulic oil ^[2]	Section 5.6.5
			Inspect the carriage cylinder bushings and pins	Section 5.4.16
			Replace the vacuum silencer(s)	Section 5.9.11

Program	Interval Between Maintenance ^[1]		Procedure	Reference
	Operating Hours	Cycles		
H	7,500	6,000,000	Level the machine and adjust nozzle concentricity	Section 5.2.6
			Replace the air regulator filter elements	Section 5.8.2
			Replace the electric clamp lock piston oil ^[3]	Section 5.3.8
			Replace the hydraulic tank breather cap	Section 5.6.15
			Replace the injection housing and gearbox breather cap	Section 5.4.13
			Replace the transfer cylinder breather cap	Section 5.4.14
			Replace the oil retrieval filter element	Section 5.6.18
			Replace the vacuum pump inlet air filter	Section 5.9.6
			Replace the vacuum pump oil ^[4]	Section 5.9.9
			Replace the gearbox oil (mineral oil only) ^[5]	Section 5.4.12
			Torque the DC bus bar screws	Section 5.5.3
			Drain water from the air storage tank(s)	Section 5.8.3
I	8,000	6,000,000	In the absence of regular quarterly oil analysis, it is recommended to replace oil every 8,000 hours	Section 5.6.7
J	12,500	10,000,000	Clean the vacuum pump ^[6]	Section 5.9.7
K	15000	12,000,000	Replace the drive housing oil	Section 5.4.8
L	24,000	18,000,000	It is recommended to replace the hydraulic oil every 24,000 hours of operation, with a complete reservoir cleaning	Section 5.6.7
M	25000	18,000,000	Replace the hydraulic hoses	Section 5.6.11.2
			Replace the pneumatic hoses	Section 5.8.4.2
N	32,500	24,000,000	Replace the Uninterruptable Power Supply (UPS) Battery	Section 5.5.4

^[1] Maintenance is performed at the number or cycles or operating hours, whichever comes first.

^[2] This check must be performed every 4,000,000 cycles or every 5000 machine hours, whichever comes first.

^[3] Perform every 6,000,000 cycles or every 7,500 machine hours, whichever comes first.

^[4] Perform every 6,000,000 cycles or every 7,500 machine hours, whichever comes first.

^[5] Replace the gearbox oil every 6,000,000 cycles or every 7,500 machine hours, whichever comes first.

^[6] In extremely dusty conditions, the vacuum pump should be cleaned every six months.

5.1.3 Service Procedures

The following procedures are to be performed only when needed.

Procedure	Reference
Adjusting the conveyor belt tension	Section 5.9.4
Adjusting the conveyor drive chain tension	Section 5.9.3
Adjusting the Z-axis drive belt tension	Section 5.9.16
Calibrating machine components	Section 5.10
Calibrating the mold	Section 5.11
Changing the air tank operating mode (if equipped)	Section 5.8.5
Changing the resin color	Section 5.4.19
Checking all safety devices ^[7]	Section 2.11
Checking the oil recovery unit	Section 5.6.8
Checking, Adjusting, Charging, and Discharging Accumulators	Section 5.6.2 Section 5.6.3
Cleaning the heat exchanger	Section 5.7.3
Disconnecting the machine cooling water supply	Section 5.7.4
Replacing the leveling mounts	Section 5.2.5
Lowering the Y-axis manually by releasing trapped pressure	Section 5.9.19.1
Measuring servo valve data	Section 5.6.20
Measuring the Z-axis drive belt tension	Section 5.9.15
Priming the hydraulic pumps	Section 5.6.17
Replacing the pressure filter element	Section 5.6.19
Priming the mold cooling circuit	Section 5.7.5
Purging the injection unit	Section 4.26.1.16
Removing air from the hydraulic system	Section 5.6.1
Removing fixed guards with retentive bolts	Section 5.2.8
Removing and installing the fingersafe covers	Section 5.5.2
Removing and installing the plasticizing screw	Section 5.4.24.1
Removing and installing the water saver valve	Section 5.7.2.1

Procedure	Reference
Replacing a heater band	Section 5.4.17
Replacing the barrel head cartridge heaters	Section 5.4.23
Replacing the direct shutoff bushing	Section 5.4.21
Replacing the direct shutoff cartridge heaters	Section 5.4.22
Replacing the hydraulic oil	Section 5.6.7
Replacing the servo valve seals	Section 5.6.21
Replacing the Z-axis drive belt	Section 5.9.17
Retracting the robot locking pin manually	Section 5.9.19.2
Tuning the heats	Section 5.2.7

^[7] This check must be performed before productions begins and after upgrading software or performing maintenance on an interlock component.

5.2 General Maintenance

The following procedures are specifically for general machine maintenance.

5.2.1 Maintenance Screens

Maintenance screens display the recommended initial and preventive maintenance tasks and intervals that should be performed for the machine and mold (if applicable). Instructions for the maintenance tasks can be found in the [Section 5.1](#) for the machine or the *Mold Service Manual*.

Task	Reference
Viewing maintenance screens	Section 5.2.1.1
Marking a maintenance task as complete	Section 5.2.1.3
Editing mold maintenance intervals	Section 5.2.1.2.1
Canceling or starting initial maintenance	Section 5.2.1.5
Enabling or disabling maintenance programs	Section 5.2.1.5
Enabling or disabling maintenance warning messages and lights	Section 5.2.1.6

5.2.1.1 Viewing Machine Maintenance Screens

To view the maintenance screens, do the following:

1. On the HMI, touch the **Production** button and touch the **Maintenance** tab to display the Maintenance screen.

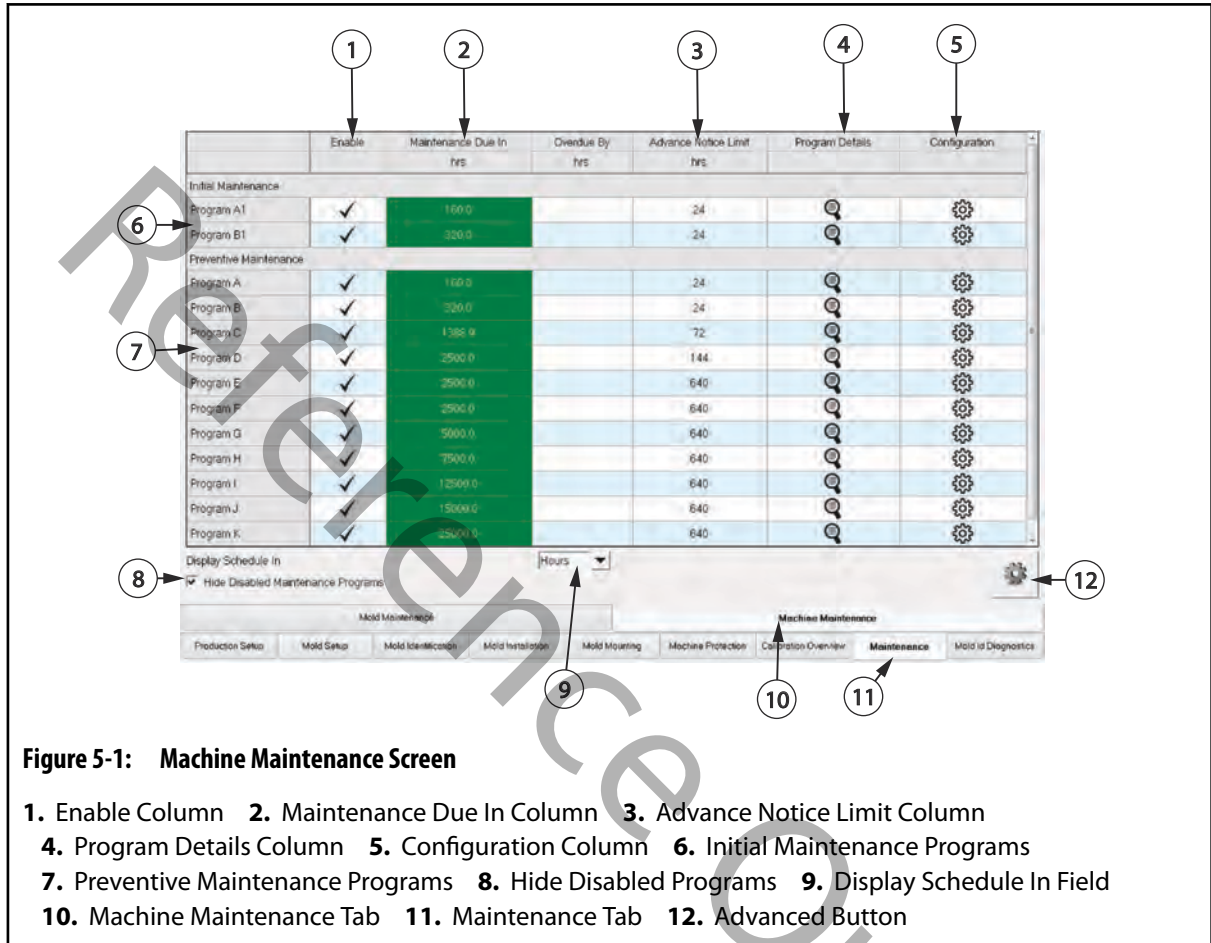


Figure 5-1: Machine Maintenance Screen

1. Enable Column 2. Maintenance Due In Column 3. Advance Notice Limit Column
 4. Program Details Column 5. Configuration Column 6. Initial Maintenance Programs
 7. Preventive Maintenance Programs 8. Hide Disabled Programs 9. Display Schedule In Field
 10. Machine Maintenance Tab 11. Maintenance Tab 12. Advanced Button
2. Touch the **Machine Maintenance** tab to display the Machine Maintenance screen.
 3. Using the Display Schedule In field, select the units to display (hours or cycles).
 4. If required, in the **Program Details** column, touch the cell for a program. The Maintenance Program details dialog box is displayed. The dialog box displays the tasks required for the program selected.

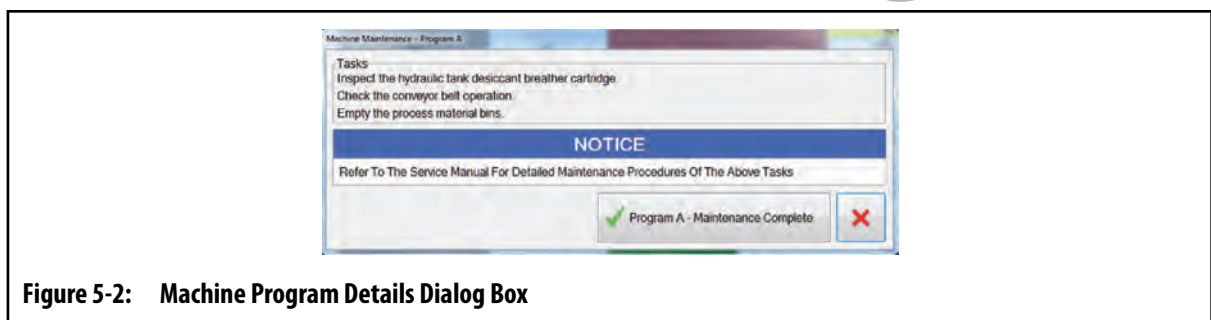


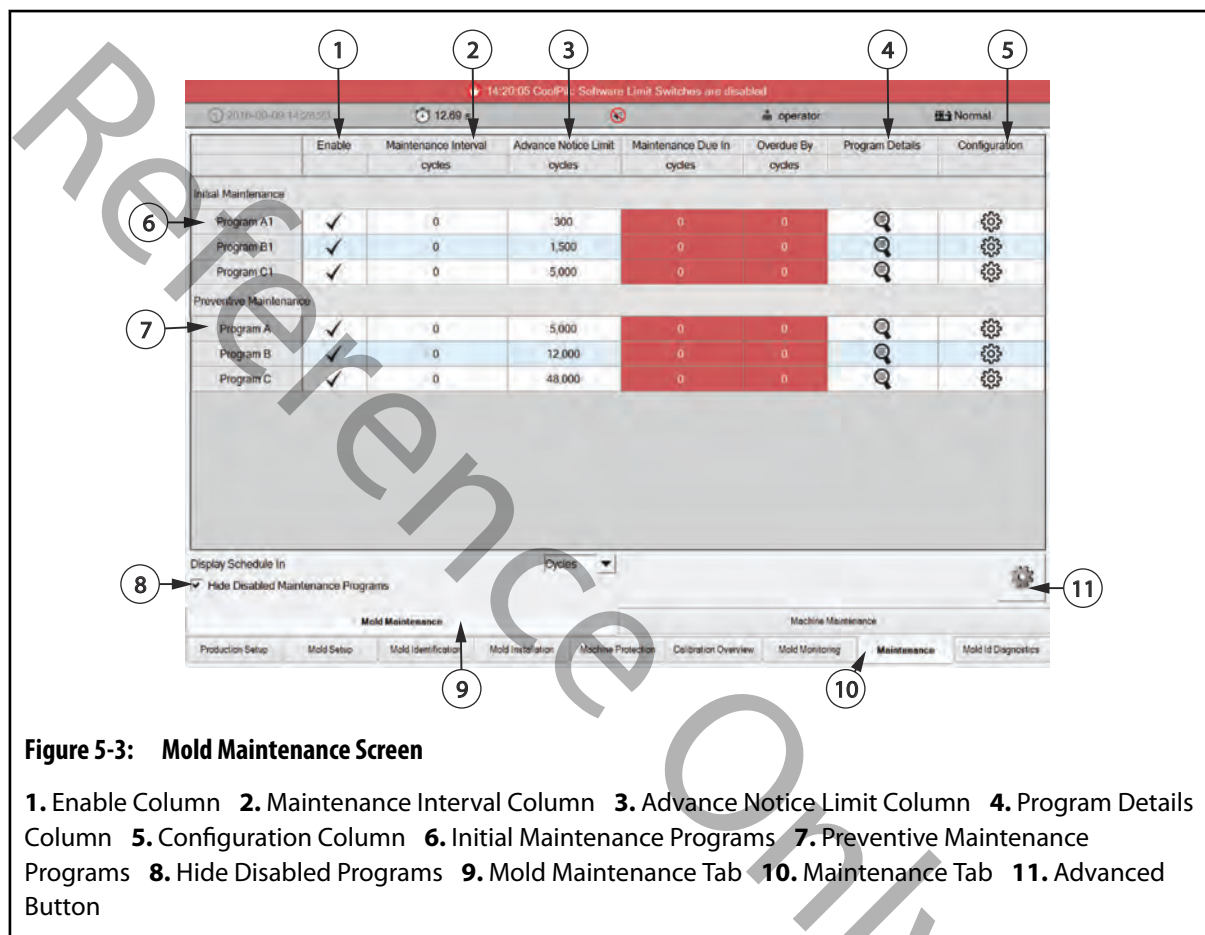
Figure 5-2: Machine Program Details Dialog Box

5. If required, touch the **Program - Maintenance Complete** button to confirm the maintenance for the program has been complete. This removes the message and restarts the counter.

5.2.1.2 Viewing Mold Maintenance Screens

To view the maintenance screens, do the following:

1. On the HMI, touch the **Production** button and touch the **Maintenance** tab to display the Maintenance screen.



2. Touch the **Mold Maintenance** tab to display the Mold Maintenance screen.
3. If required, in the **Program Details** column, touch the cell for the desired program. The Maintenance Program details dialog box is displayed. The dialog box displays the tasks required for the program selected.



4. If required, touch the **Program - Maintenance Complete** button to confirm the maintenance for the program has been complete. This removes the message and restarts the counter.

5.2.1.2.1 Editing Maintenance Intervals

The mold maintenance intervals can be edited to meet needs of the Husky installed mold options and/or factory processes and conditions.

CAUTION!

Mechanical hazard - Failure to follow the recommended maintenance procedures, as specified in the Husky Mold Manual or Service and Safety Bulletins may result in mold damage and may void the warranty.

To edit the mold maintenance intervals, do the following:

1. On the HMI, touch the **Production** button and touch the **Maintenance** tab to display the Maintenance screen.
2. Touch the **Mold Maintenance** tab to display the Mold Maintenance screen.

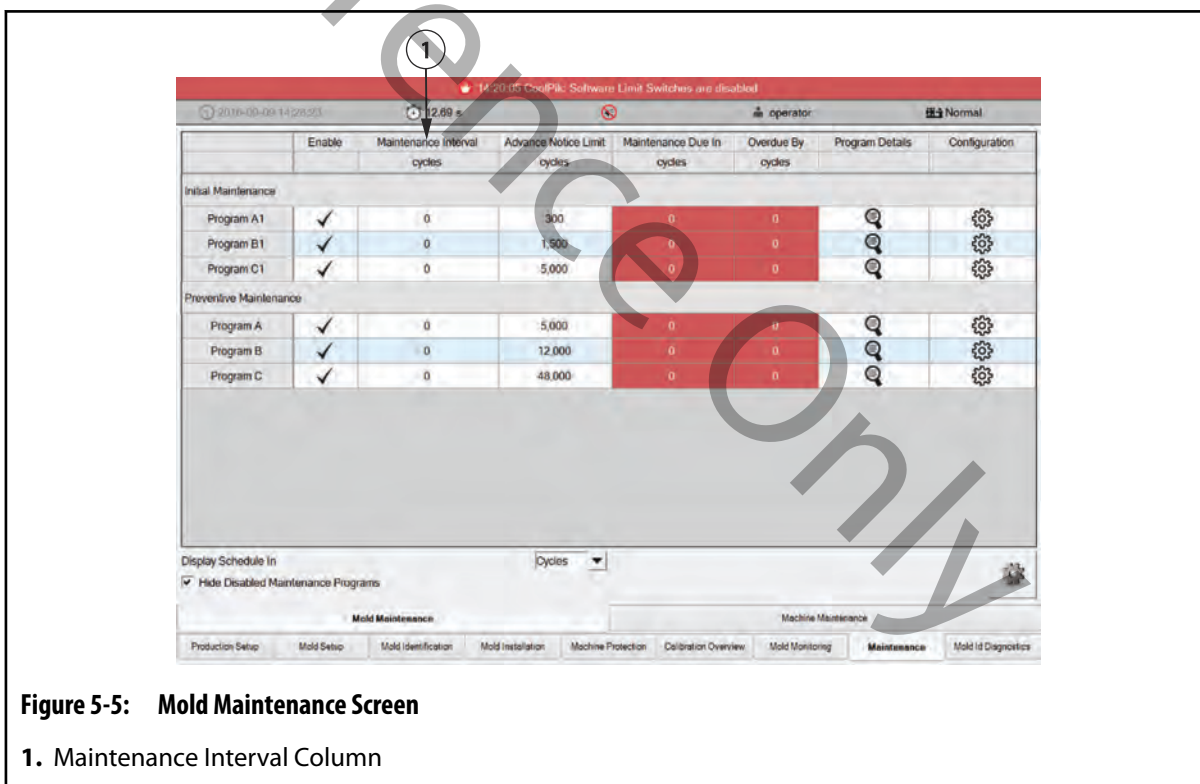


Figure 5-5: Mold Maintenance Screen

1. Maintenance Interval Column

3. Touch the **Maintenance Interval** field to be edited. The numeric keypad is displayed.

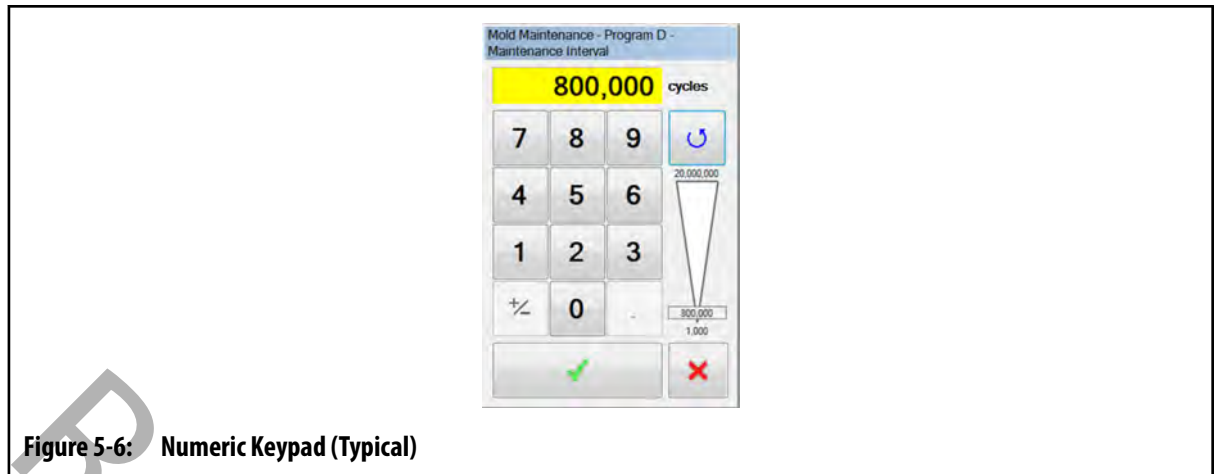


Figure 5-6: Numeric Keypad (Typical)

4. Enter the desired value for the maintenance interval.
5. Touch the **Accept** button. The new value is displayed on screen.

5.2.1.3 Marking Machine Maintenance Tasks as Complete

Once a machine maintenance task is completed, the task should be marked as complete in the software.

To mark a machine maintenance task as complete, do the following:

1. View the Machine Maintenance screen. Refer to [Section 5.2.1.1](#).
2. In the **Program Details** column, touch the cell for the desired program. The Maintenance Program details dialog box is displayed. The dialog box displays the tasks required for the program selected.

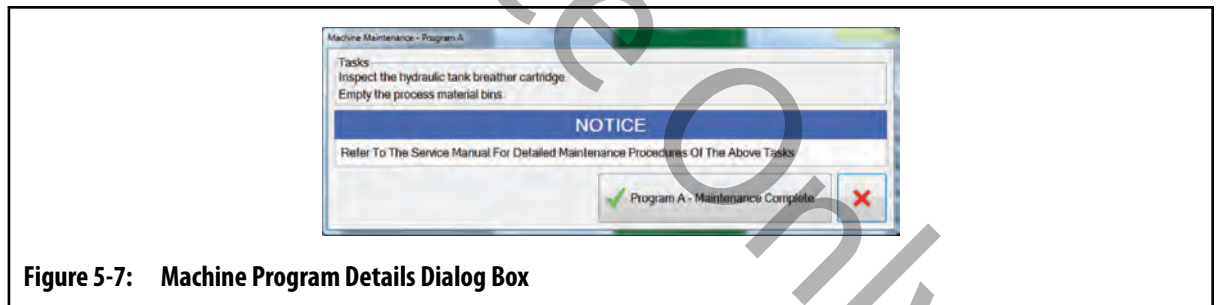


Figure 5-7: Machine Program Details Dialog Box

3. Touch the **Program - Maintenance Complete** button to confirm the maintenance for the program has been complete. This removes the message and restarts the counter.

5.2.1.4 Canceling or Starting Initial Maintenance

Once initial maintenance is complete, it is no longer displayed. If required the mold or machine initial maintenance can be canceled or started.

To cancel or start the initial maintenance, do the following:

1. On the HMI, touch the **Production** button and touch the **Maintenance** tab to display the Maintenance screen.
2. Touch the **Mold Maintenance** tab to display the Mold Maintenance screen or touch the **Machine Maintenance** tab to display the Machine Maintenance screen.

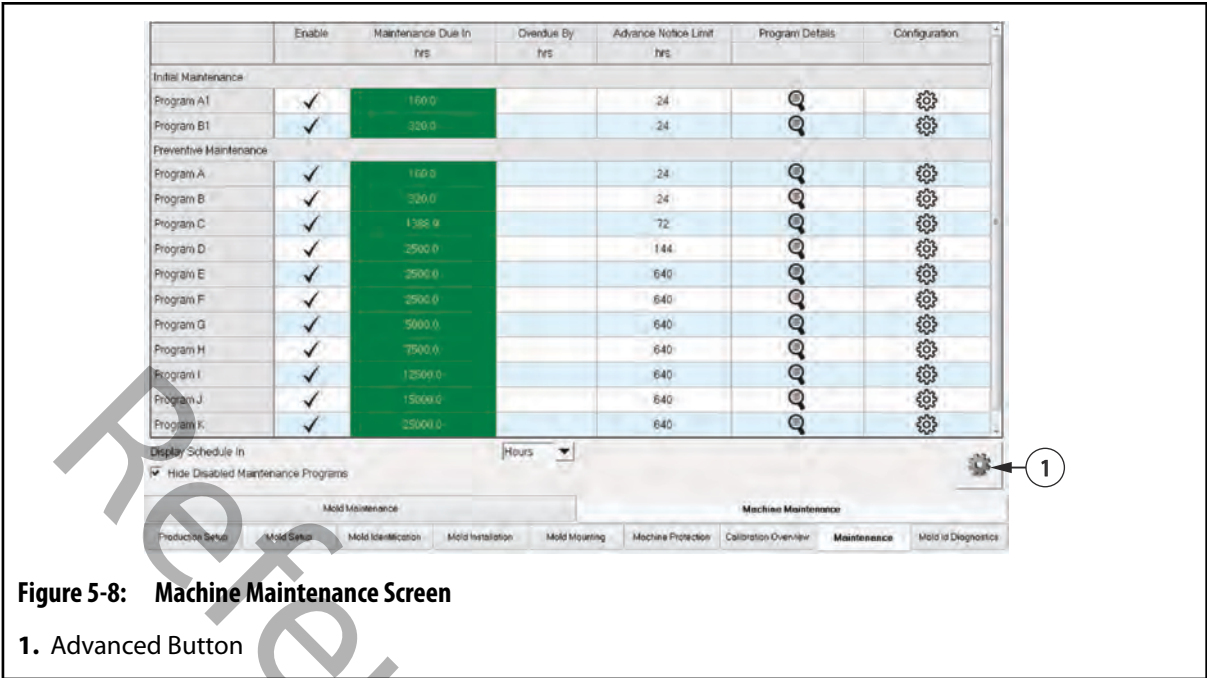


Figure 5-8: Machine Maintenance Screen

1. Advanced Button

3. Touch the **Advanced** button.

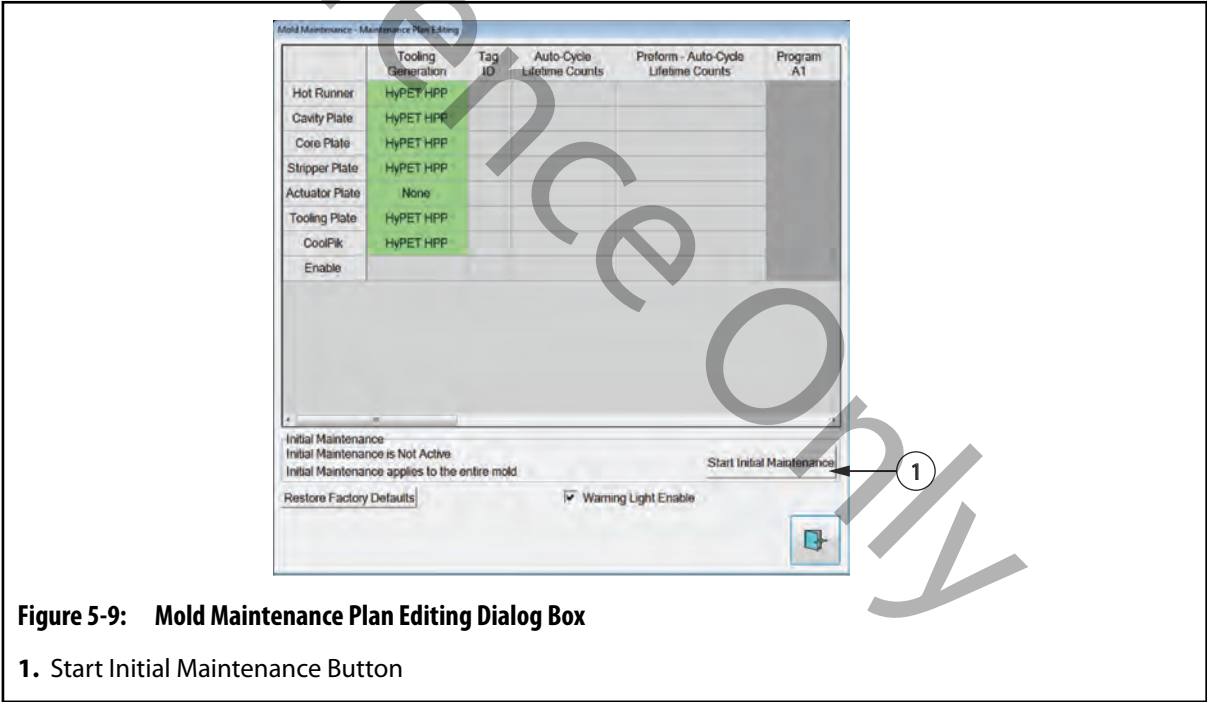


Figure 5-9: Mold Maintenance Plan Editing Dialog Box

1. Start Initial Maintenance Button

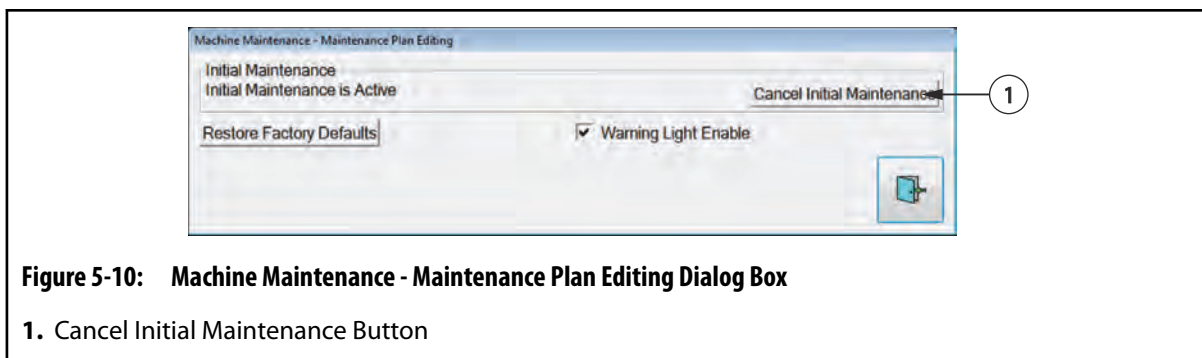


Figure 5-10: Machine Maintenance - Maintenance Plan Editing Dialog Box

1. Cancel Initial Maintenance Button

4. To cancel initial maintenance:

- Touch the **Cancel Initial Maintenance** button. The initial maintenance is canceled and the **Cancel Initial Maintenance** button changes to **Start Initial Maintenance**.

To start initial maintenance:

- Touch the **Start Initial Maintenance** button. The initial maintenance is started and the **Start Initial Maintenance** button changes to **Cancel Initial Maintenance**.

5.2.1.5 Enabling and Disabling Maintenance Programs

Programs can be enabled and disabled on the maintenance screens. Disabled programs are not tracked and can be hidden from view. All maintenance must still be performed.

CAUTION!

Mechanical hazard - Failure to follow the recommended maintenance procedures, as specified in the Husky Mold and Machine Manuals or Service and Safety Bulletins may result in mold and/or machine damage and may void the warranty.

To enable or disable maintenance programs, do the following:

1. On the HMI, touch the **Production** button and touch the **Maintenance** tab to display the Maintenance screen.
2. Touch the **Mold Maintenance** tab to display the Mold Maintenance screen or touch the **Machine Maintenance** tab to display the Machine Maintenance screen.
3. In the **Enable** column, select the cell for the program to enable or disable. A confirmatory dialog box appears.

Enabled programs have a check mark in the cell, disabled programs cells are empty.

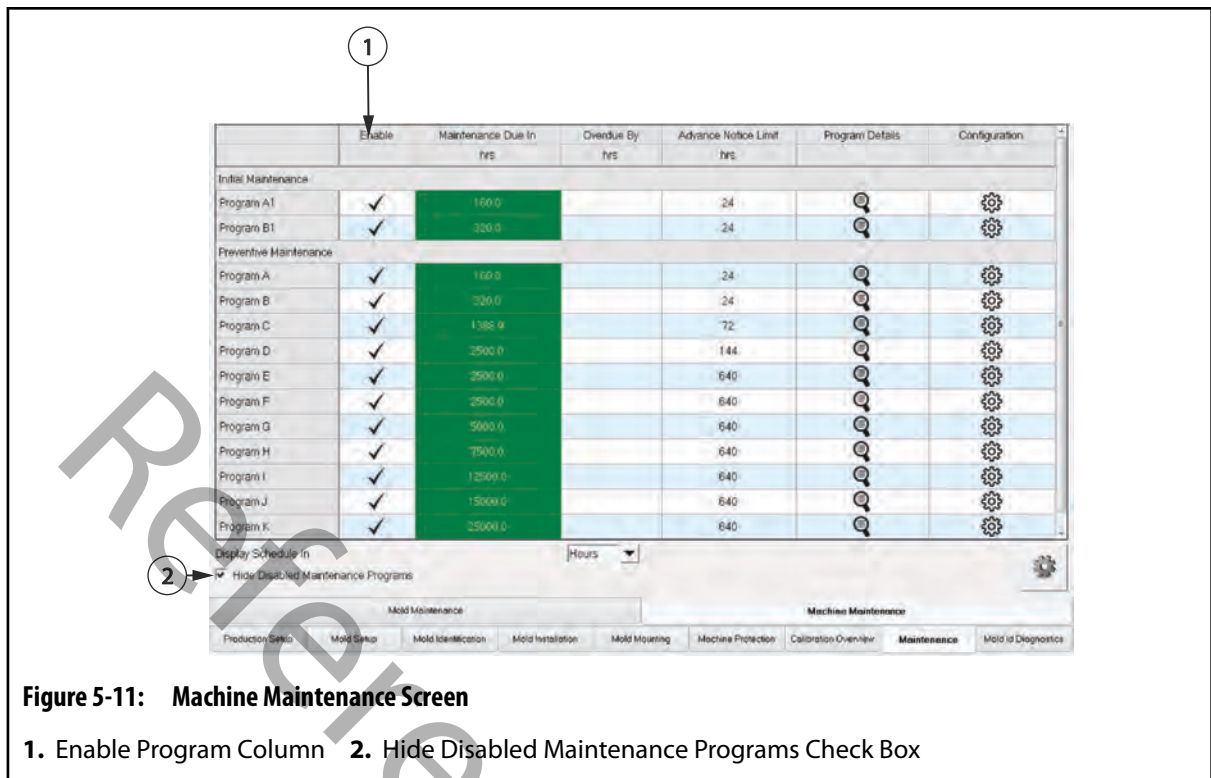


Figure 5-11: Machine Maintenance Screen

1. Enable Program Column 2. Hide Disabled Maintenance Programs Check Box

4. Confirm the change.
5. If required, select the **Hide Disabled Maintenance Programs** check box to remove the program from the maintenance screen.

To view hidden programs, clear the **Hide Disabled Maintenance Programs** check box.

5.2.1.6 Disabling and Enabling Maintenance Warning Messages and Lights

Warning lights and messages can be enabled or disabled on the machine. This only turns on or off the messaging, it does not stop the maintenance tracking.

To enable or disable maintenance warning lights and messages, do the following:

1. On the HMI, touch the **Production** button and touch the **Mold Maintenance** tab or the **Machine Maintenance** tab to display the Maintenance screen.
2. Touch the **Configuration** button for the desired program.

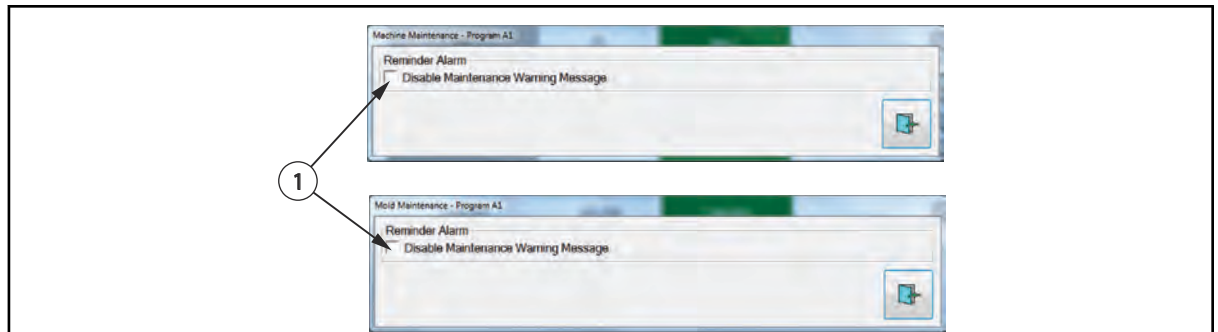


Figure 5-12: Machine and Mold Program Configuration Dialog Boxes

1. Disable Maintenance Warning Message Check Box

3. Select the **Disable Maintenance Warning Message** check box to turn off warning messages for the selected program.

Clear the **Disable Maintenance Warning Message** check box to enable the warning messages.

4. Touch the **Exit** button.
5. Touch the **Advanced** button. The Maintenance Plan Editing dialog box appears.

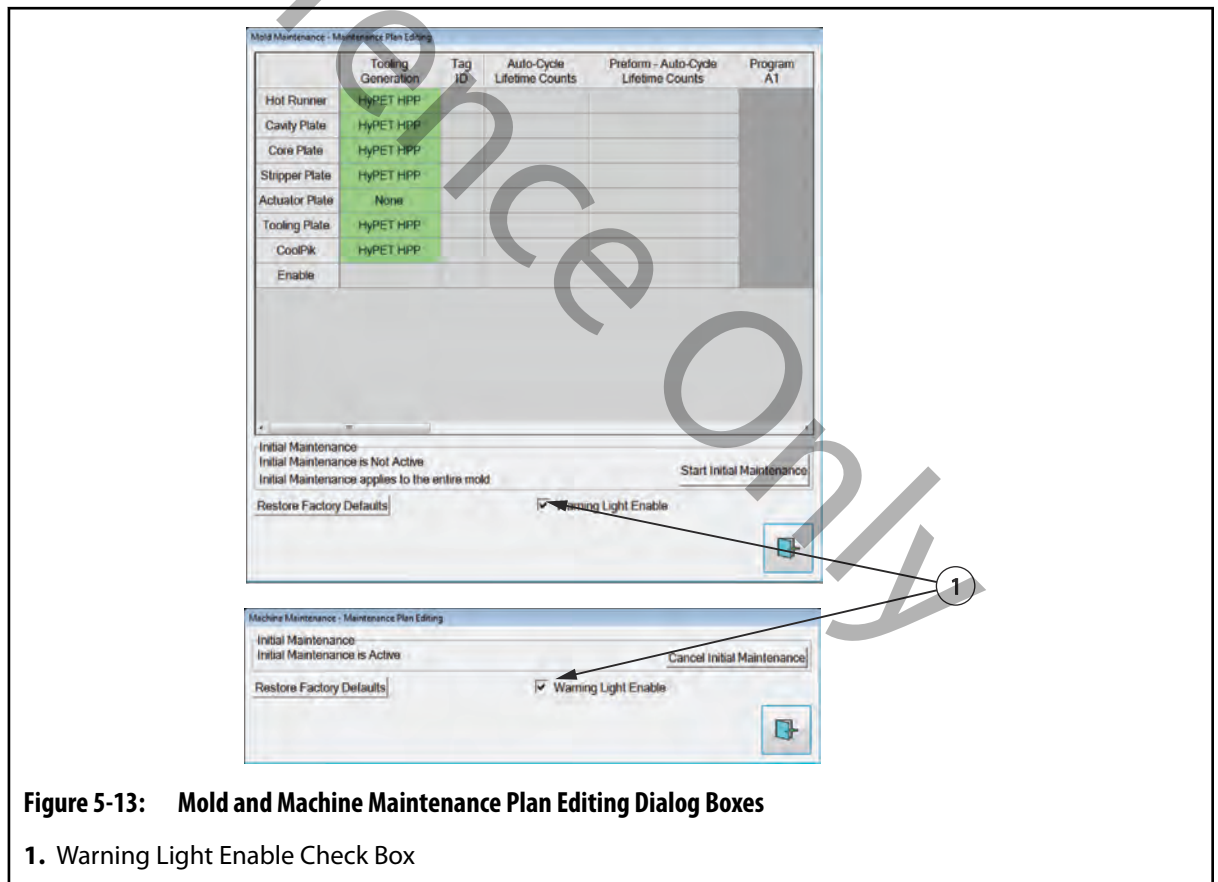


Figure 5-13: Mold and Machine Maintenance Plan Editing Dialog Boxes

1. Warning Light Enable Check Box

6. Select the **Warning Light Enable** check box to turn on the warning light when a warning message appears.

Clear the **Warning Light Enable** check box to stop the warning light from illuminating if a warning message appears.

NOTE:

If warning messages are disabled the light will not illuminate.

5.2.2 Cleaning the Machine Exterior and HMI

To clean the machine exterior and the Human Machine Interface (HMI) screen, do the following:

1. Clean up any oil, dirt, grease or process material around the machine.
2. Using a clean cloth and a cleaning solution made up of 70% denatured alcohol and 30% water, clean the HMI screen and membrane keys.
3. Using a mild detergent, water and a lint-free cloth, clean all exterior windows.

5.2.3 Cleaning the Machine Interior, Exterior and HMI

To clean the machine and the Human Machine Interface (HMI) screen, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.

CAUTION!

Mechanical hazard – risk of damage to the machine. Do not use solvents or abrasive materials to clean the machine or the HMI. Solvents and abrasive materials may cause corrosion or damage.



DANGER!

Electrical hazard – risk of death, serious injury or damage to the machine. Make sure water does not make contact with any electrical components during cleaning.

2. Clean up any oil, dirt, grease or process material in and around the machine.
3. Using a clean cloth and a cleaning solution made up of 70% denatured alcohol and 30% water, clean the HMI screen and membrane keys.
4. Using a mild detergent, water and a lint-free cloth, clean all windows.
5. Using a soft bristle brush and a vacuum cleaner, clean all pumps and motors accessible from outside the machine.
6. Clean all ventilation intakes and cooling fans.
7. Remove all locks and tags.

5.2.4 Performing Mold Self-Cleaning (If Equipped)

Machines and molds equipped with the Self-Cleaning Mold option can perform mold self-cleaning.

5.2.4.1 Setting Up Mold Self-Cleaning Parameters

To set up the parameters to perform mold self-cleaning, do the following:

1. Log into the HMI as a supervisor.
2. Touch the **Injection** button, and then touch the **Mold Self-Cleaning** tab.

Initial mold self-cleaning injection parameters are loaded when the mold is first installed.

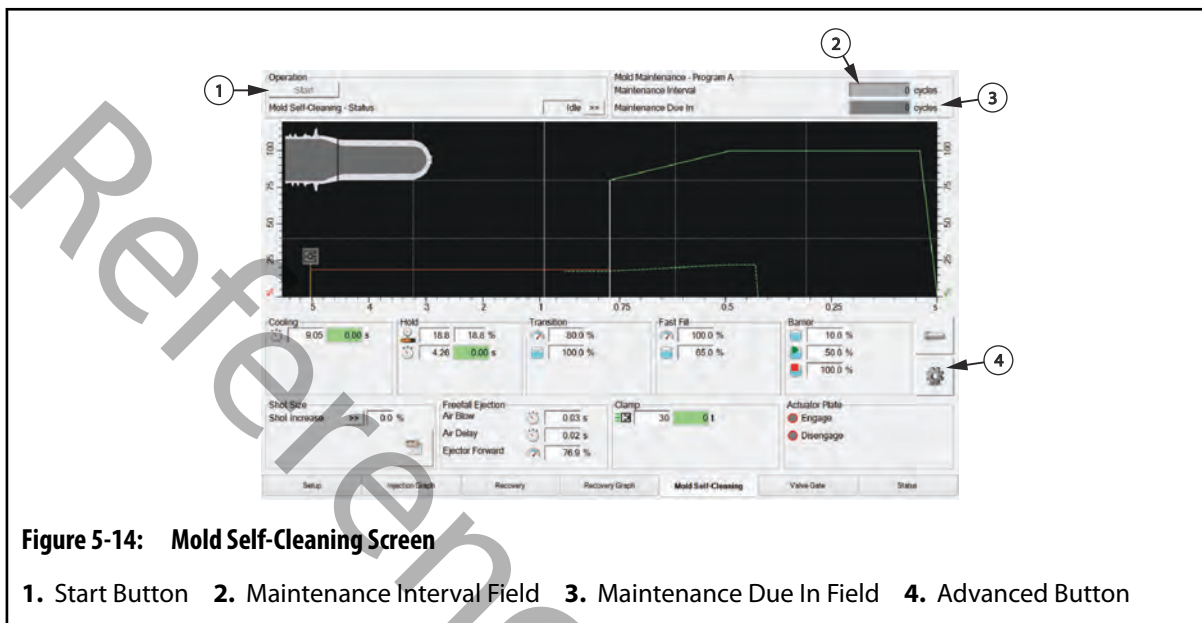


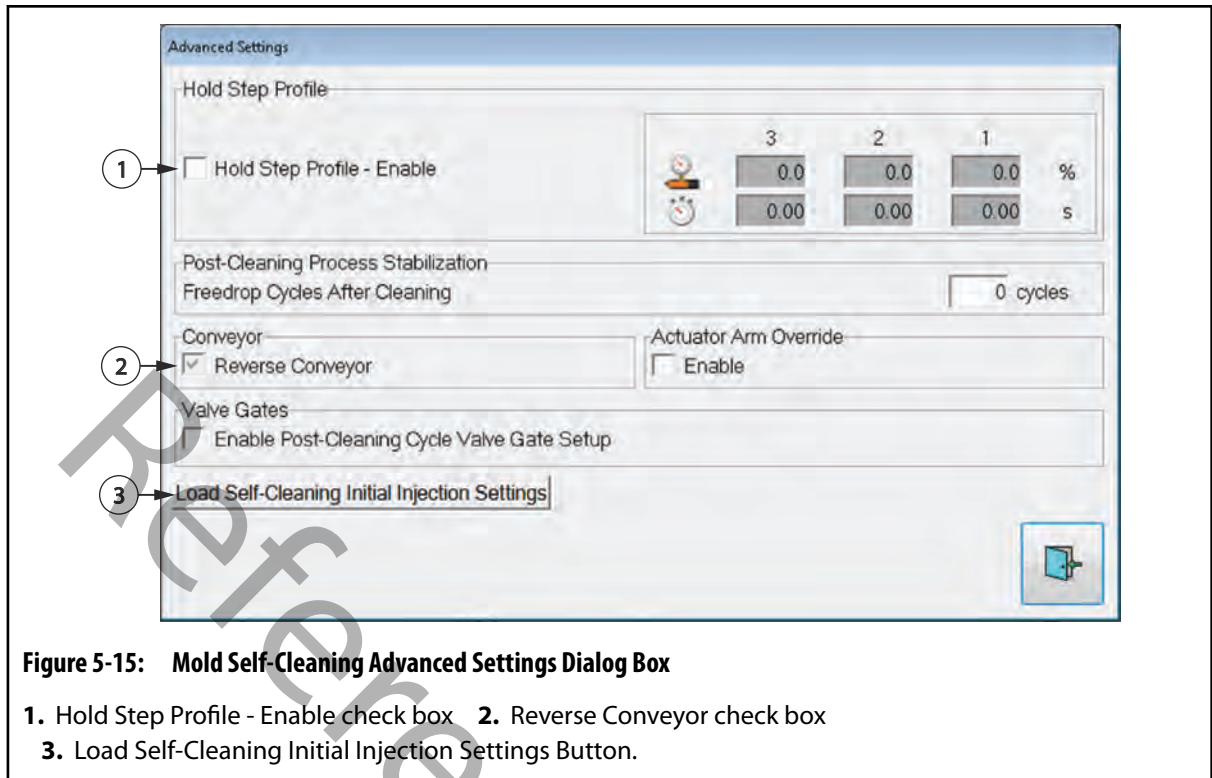
Figure 5-14: Mold Self-Cleaning Screen

1. Start Button 2. Maintenance Interval Field 3. Maintenance Due In Field 4. Advanced Button

3. Adjust the injection mold self-cleaning parameters as needed.
4. Touch the **Maintenance Interval** field, and enter the number of cycles until the next mold self-cleaning. This changes only the interval for the self-cleaning and does not change the interval for all the mold maintenance procedures in Program A.

The **Maintenance Due In** field indicates the number of cycles remaining until the next mold self-cleaning.

5. Touch the **Advanced** button.

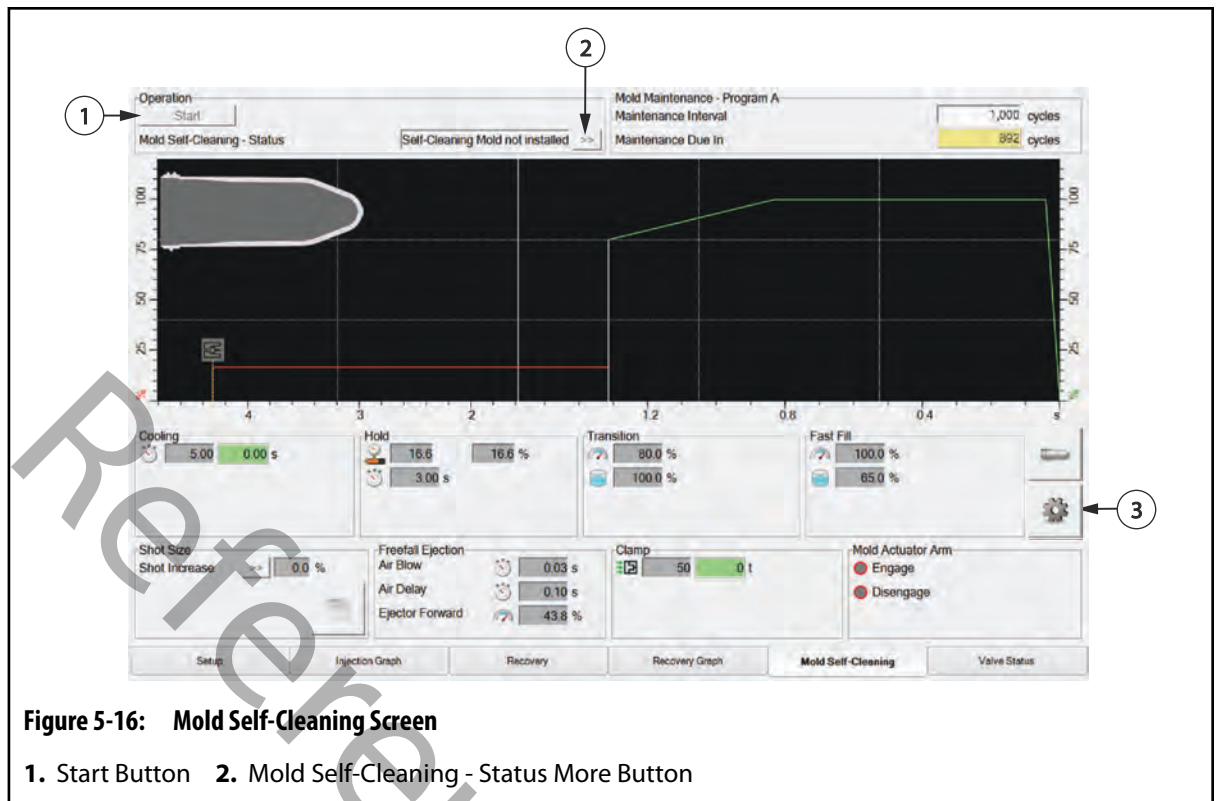


6. If required, select the **Reverse Conveyor** check box to run the conveyor in reverse during the self-cleaning cycle.
7. If required, select the **Hold Step Profile - Enable** check box to run a three step profile.
8. If required, touch the **Load Self-Cleaning Initial Injection Settings** button to set the injection parameters to initial settings.

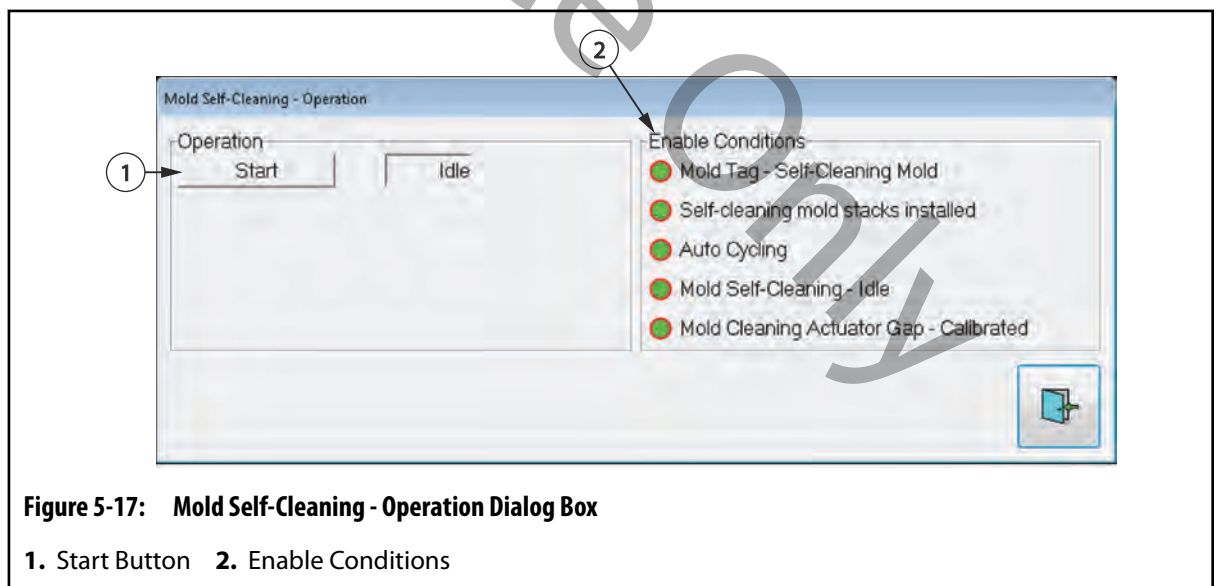
5.2.4.2 Performing Mold Self-Cleaning

To perform mold self-cleaning, do the following:

1. Touch the **Injection** button, and then touch the **Mold Self-Cleaning** tab.



2. Touch the **Start** button. The self-cleaning cycle will run based on the parameters selected.
3. If the **Start** button is greyed out or disabled:
 - a. Touch the **Mold Self-Cleaning -Status More** button. The Mold Self-Cleaning - Operation dialog box appears.



- b. Make sure all the **Enable Conditions** are met before starting the cleaning cycle operation.
- c. Touch the **Start** button.

5.2.5 Replacing the Leveling Mounts

The following procedures describe how to replace leveling mounts on the clamp, injection and product handling bases.



IMPORTANT!

Under static load, the rubber molecules in new leveling mounts gradually change from a round to elongated shape between 12 and 72 hours. The machine level and parallelism values should be rechecked at this time and adjusted if necessary. Refer to [Section 5.2.6](#) for more information



IMPORTANT!

Refer to the installation drawing for the number and location of leveling mounts for the machine and product handling unit.

5.2.5.1 Replacing the Clamp or Injection Base Leveling Mounts

To replace the leveling mounts on the clamp or injection base, do the following:

1. If necessary, remove the air regulator. On some clamp bases, the air regulator is installed over the access port to a leveling mount to allow the mold heat cables to be routed.

CAUTION!

Mechanical hazard - risk of damage to the machine. Before removing the leveling mounts the clamp and injection bases must be disconnected. Failure to disconnect the units may cause bending or twisting of the bases when the unit is lifted.

2. Disconnect the clamp and injection bases to allow the bases to move separately. Refer to the machine *Site Preparation Manual* or *Site Preparation and Installation Manual* for more information about lifting the machine.



IMPORTANT!

It is recommended the base be lifted from above using a suitable overhead lifting device. Do not exceed the rated capacity of the lifting equipment.

3. Lift the clamp or injection base 100 mm (4 in) off the floor.



WARNING!

Crushing hazard – risk of death or serious injury. Do not work under a suspended load. Install safety blocks to prevent injury.

4. Position safety blocks under the base and then lower the base onto the safety blocks.

5. Remove the old leveling mount.

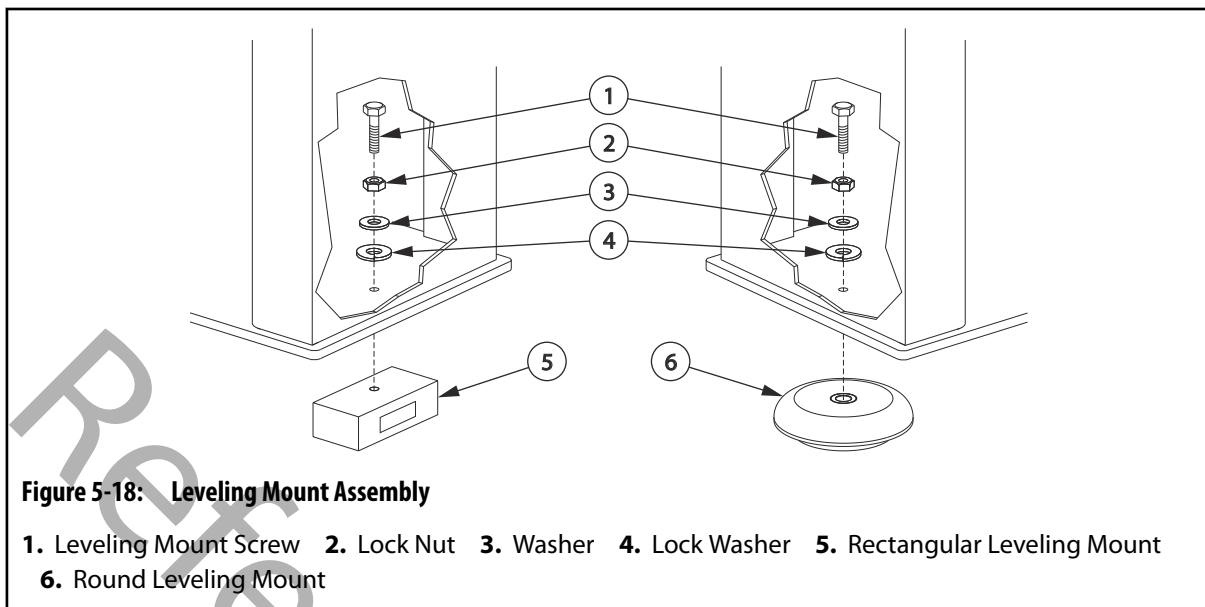


Figure 5-18: Leveling Mount Assembly

1. Leveling Mount Screw 2. Lock Nut 3. Washer 4. Lock Washer 5. Rectangular Leveling Mount
6. Round Leveling Mount

6. Clean the underside of the base where it will make contact with the new leveling mount.
7. Make sure the new leveling mount is properly threaded by fully threading the leveling mount screw into the mount.
8. Remove the leveling mount screw.
9. Apply a lubricant to the threads of the leveling mounts and screws. Refer to [Section 7.9](#) for a list of recommended lubricants.
10. Position the leveling mount under the base.
If the leveling mount is rectangular, make sure it is aligned with the outer edge of the base and the label faces outwards.
11. Secure the new leveling mount to the base using the leveling mount screw, lock nut, washer and lock washer. Hand-tighten the screw until the leveling mount makes contact with the base.



WARNING!

Crushing hazard – risk of death or serious injury. Do not work under a suspended load. Install safety blocks to prevent injury.

12. Lift the base and remove the safety blocks.
13. Carefully lower the base to the floor.
14. Connect the base to the clamp or injection unit and make sure it is level. Refer to [Section 5.2.6](#) for more information.
15. If removed previously, install the air regulator on the clamp base.

5.2.5.2 Replacing the Product Handling Leveling Mounts

To replace the leveling mounts on the product handling unit, do the following:

1. Disconnect and separate the product handling unit from the clamp unit. Refer to the machine *Site Preparation Manual* or *Site Preparation and Installation Manual* for more information about lifting the product handling unit.



IMPORTANT!

It is recommended the base be lifted from above using a suitable overhead lifting device. Do not exceed the rated capacity of the lifting equipment.

2. Lift the product handling base 100 mm (4 in) off the floor.



WARNING!

Crushing hazard – risk of death or serious injury. Do not work under a suspended load. Install safety blocks to prevent injury.

3. Position safety blocks under the base and then lower the base onto the safety blocks.
4. Remove the old leveling mount.
5. Clean the underside of the base where it will make contact with the new leveling mount.
6. Make sure the new leveling mount is properly threaded by fully threading the leveling mount screw into the mount.
7. Remove the leveling mount screw.
8. Apply a lubricant to the threads of the leveling mounts and screws. Refer to [Section 7.9](#) for a list of recommended lubricants.
9. Position the leveling mount under the base.
10. Secure the new leveling mount to the base using the leveling mount screw, lock nut, washer and lock washer. Hand-tighten the screw until the leveling mount makes contact with the base.



WARNING!

Crushing hazard – risk of death or serious injury. Do not work under a suspended load. Install safety blocks to prevent injury.

11. Lift the base and remove the safety blocks.
12. Carefully lower the base to the floor.
13. Connect the product handling unit to the clamp unit and make sure it is level. Refer to [Section 5.2.6](#) for more information.

5.2.6 Leveling the Machine and Adjusting Nozzle Concentricity

To prevent excess wear and extend the life of the machine and mold, it is important to make sure the machine is level and the injection nozzle is concentric with the mold sprue.

This check must be done at intervals specified in the maintenance schedule. It should also be performed whenever molds or product handling equipment are installed.

To check the level of the machine and make sure the injection nozzle is concentric with the mold sprue, perform the following procedures in the order listed.

Step	Task Description	Reference
1	Prepare the machine and product handling unit	Section 5.2.6.2
2	Level the clamp unit	Section 5.2.6.4
3	Level the injection unit	Section 5.2.6.5
4	Measure the platen parallelism	Section 5.2.6.6
5	Level the CoolPik plenum	Section 5.2.6.7
6	Level the Z-axis beam	Section 5.2.6.8
7	Check the nozzle concentricity	Section 5.2.6.9
8	Check the alignment of the purge guard switch and the switch actuator	Section 5.2.6.10
9	Level the machine electrical cabinet	Section 5.2.6.11
10	Level the product handling electrical cabinet	Section 5.2.6.12
11	Verify the overall level of the machine	Section 5.2.6.13



IMPORTANT!

All final leveling, parallelism and concentricity measurements should be recorded for future reference. If leveling, parallelism and concentricity cannot be brought within tolerance, the recorded values will help Husky identify potential problems.



IMPORTANT!

Be aware of the following while leveling the machine:

- Clamp legs that have two or more leveling mounts in close proximity to each other must be adjusted equally.
- Bows or bends in the clamp base can be eliminated by adjusting the leveling mount(s) in the middle of the clamp, if available.
- Make sure there is weight on each leveling mount.



IMPORTANT!

Make sure all precision levels are accurate and properly calibrated before use. Failure to do so will result in incorrect readings.

To test the accuracy of a precision level, do the following:

- i. Place the precision level on a machined surface and note the measurement value. If a machined surface is not available, place the precision level on a flat surface.
- ii. Rotate the precision level 180° and note the measurement value. If the measurement values are different, calibrate the level according to the manufacturer's instructions.

5.2.6.1 Suggested Tools

The following tools may be needed when performing this procedure.

NOTE:

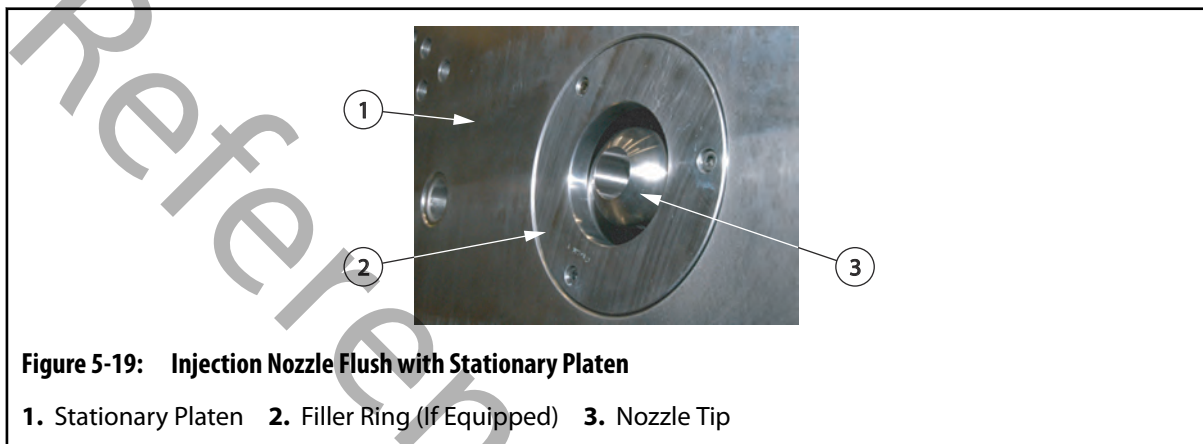
All tools listed are available through your nearest Husky Parts Distribution Center.

Part Number	Quantity	Description
3171808	1	150 mm Precision Box Level (1 Division = 0.05 mm/m)
6305760	1	100 mm Precision Level (1 Division = 0.05 mm/m)
3171813	3 to 5	150 mm Precision Level (1 Division = 0.05 mm/m)
3248986	1	150 mm Precision Level (1 Division = 0.3 mm/m)
3171818	2	Vee Blocks
4757140	1	Inside Micrometer (200 mm to 1000 mm)
2521393	1	Precision Spacer Block
3148723	1	Feeler Gauges (Set)
2604680	1	1.35 m Precision Parallel Bar (HyPET 225 and HyPET 300)
2604683	1	1.7 m Precision Parallel Bar (HyPET 400 and HyPET 500)
3249044	1	Precision Square (36 in)
3249047	1	Precision Square Case (36 in)
3262537	1	Pancake Jack (30 t or 33 tn)
3262581	1	Hose for connecting a pancake jack to a hand pump
3262584	1	Hand Pump

5.2.6.2 Preparing the Machine and Product Handling Unit

To prepare the machine for leveling, parallelism and concentricity checks, do the following:

1. On the HMI, touch the **Clamp** button and touch the **Clamp** tab to display the **Clamp** screen.
2. Touch the **Machine Mode Selector** button on the toolbar and select **Mold Set** mode.
3. Monitor the **Shutheight Position** field and press the **Mold Close** key. Move the moving platen to simulate the mold close position.
4. If equipped, remove the filler ring from the stationary platen.
5. Press and hold the **Carriage Forward** key until the injection nozzle is flush with the face of the stationary platen.



6. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
7. On some clamp bases, the air regulator is installed over the access port to a leveling mount to allow the mold heat cables to be routed. If necessary, remove the air regulator to access this leveling mount.
8. Remove the tooling plate and CoolPik plate, if equipped. Refer to the mold *Service Manual* for more information.

CAUTION!

Make sure the product handling unit is positioned correctly by verifying the Z-axis beam is parallel to the stationary platen. If the product handling unit is not positioned correctly it could negatively impact the platen parallelism.

9. Loosen the screws on the Z-axis beam that attach the product handling unit to the stationary platen.

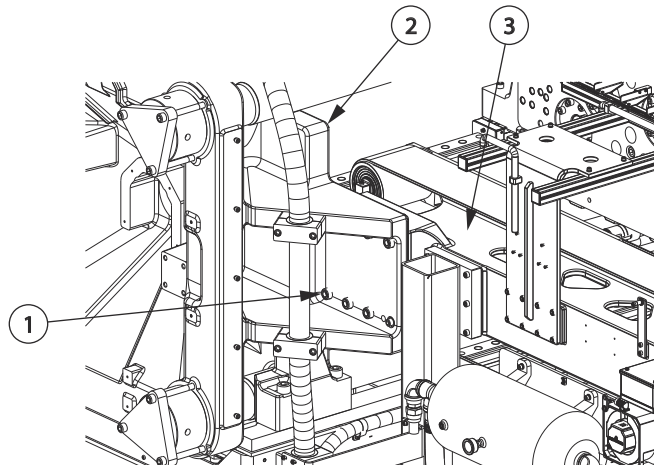


Figure 5-20: Z-Axis to Stationary Platen Screws

1. Screws 2. Stationary Platen 3. Z-Axis

10. Loosen the screws that hold the injection and clamp bases together.
11. Make sure the leveling mounts and surrounding areas are clear of any oil, grease or wax buildup. Heavily coated areas should be scraped or sanded back to bare concrete.
12. If the leveling mounts are rectangular, make sure they are parallel to the tie bars and the label faces out from the machine.
13. Loosen the leveling mount screw on the base and product handling leveling mounts.

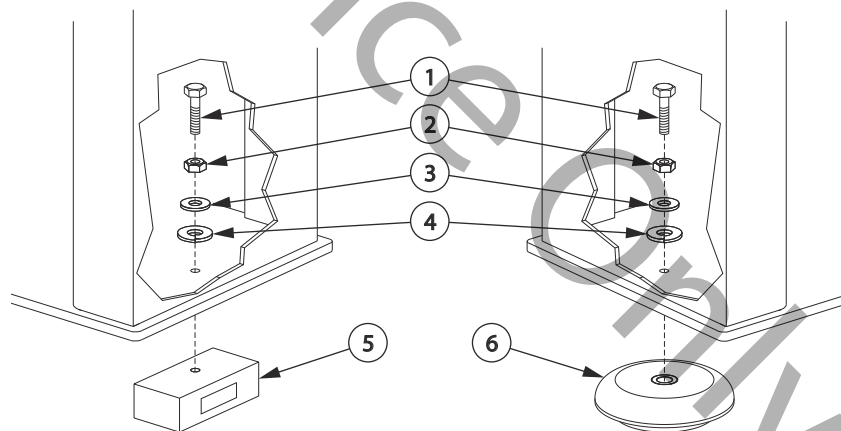


Figure 5-21: Leveling Mount Installation

1. Leveling Mount Screw 2. Lock Nut 3. Lock Washer 4. Washer 5. Rectangular Leveling Mount
6. Round Leveling Mount

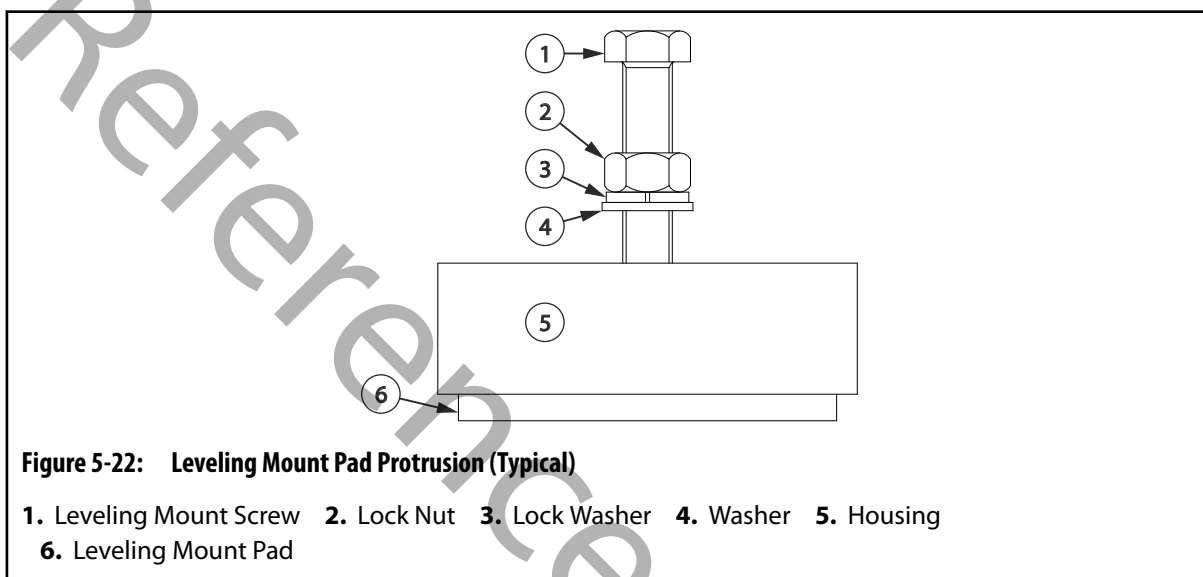
**IMPORTANT!**

The leveling pads should protrude a minimum of 3 mm (0.125 in) from the bottom of the mount housing.

For uneven floors, add shims as required between the leveling mount and the bottom of the base to avoid exceeding the adjustment range.

- 14.** Make sure the leveling mount pad protrudes no less than 3 mm (0.125 in) from the bottom of the leveling mount housing.

Make sure the leveling mount pad protrudes no more than 12 mm (0.472 in) from the bottom of the leveling mount housing.

**IMPORTANT!**

Regardless of the leveling mount pad manufacturer's protrusion range, make sure the leveling mount pad does not protrude more than 12 mm (0.472 in) . For maximum performance, Husky recommends that the leveling mount pad protrusion be set to no less than 3 mm (0.125 in) and no more than 12 mm (0.472 in) .

- 15.** Remove the mold. Refer to the mold *Service Manual* for instructions about removing a mold.

**IMPORTANT!**

For proper leveling, the hydraulic tank and resin handling equipment must be filled before leveling measurements are taken. If the machine is leveled with the hydraulic tank and/or resin handling equipment empty, all leveling values must be rechecked and adjusted as necessary once these containers are filled.

- 16.** Fill the hydraulic tank with oil. Refer to [Section 5.6.7](#) for more information.
- 17.** Install and fill any additional resin handling equipment on the feed throat of the machine.

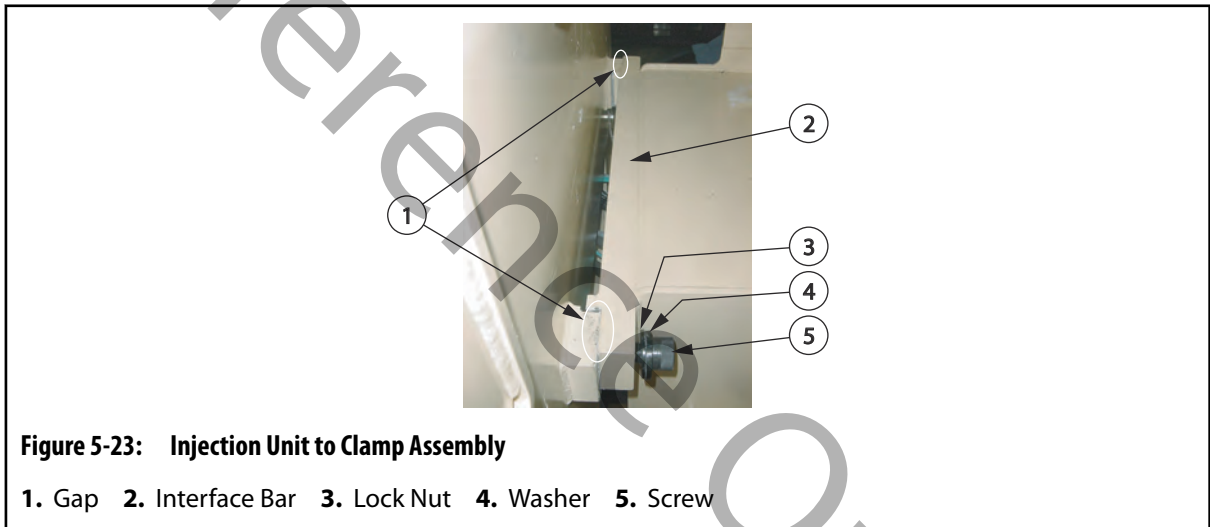
18. Using a feeler gauge, measure the gap between the clamp and injection bases on the operator and non-operator sides of the machine at the top and bottom of the interface bar. Make sure the measurements are ≤ 0.05 mm (0.002 in) on both sides.

If the gap is greater than 0.05 mm (0.002 in) , do the following:

CAUTION!

Mechanical hazard – risk of damage to the machine. Do not force the bases together using the screws.

- a. Tighten the screws that attach the injection base to the clamp base. Refer to [Section 7.13](#) for standard torque specifications.
- b. Lift the clamp at the stationary platen end with a suitable overhead lifting device and lifting slings.
- c. Lower the machine and loosen the screws.



CAUTION!

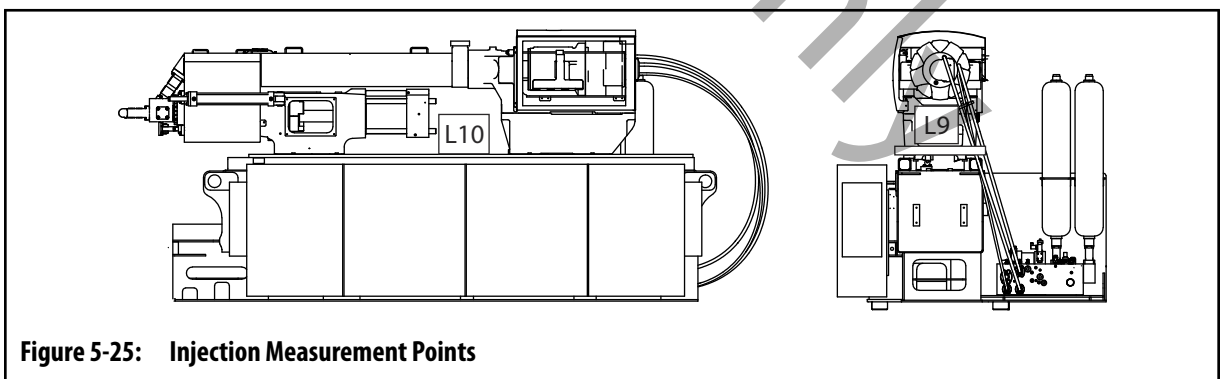
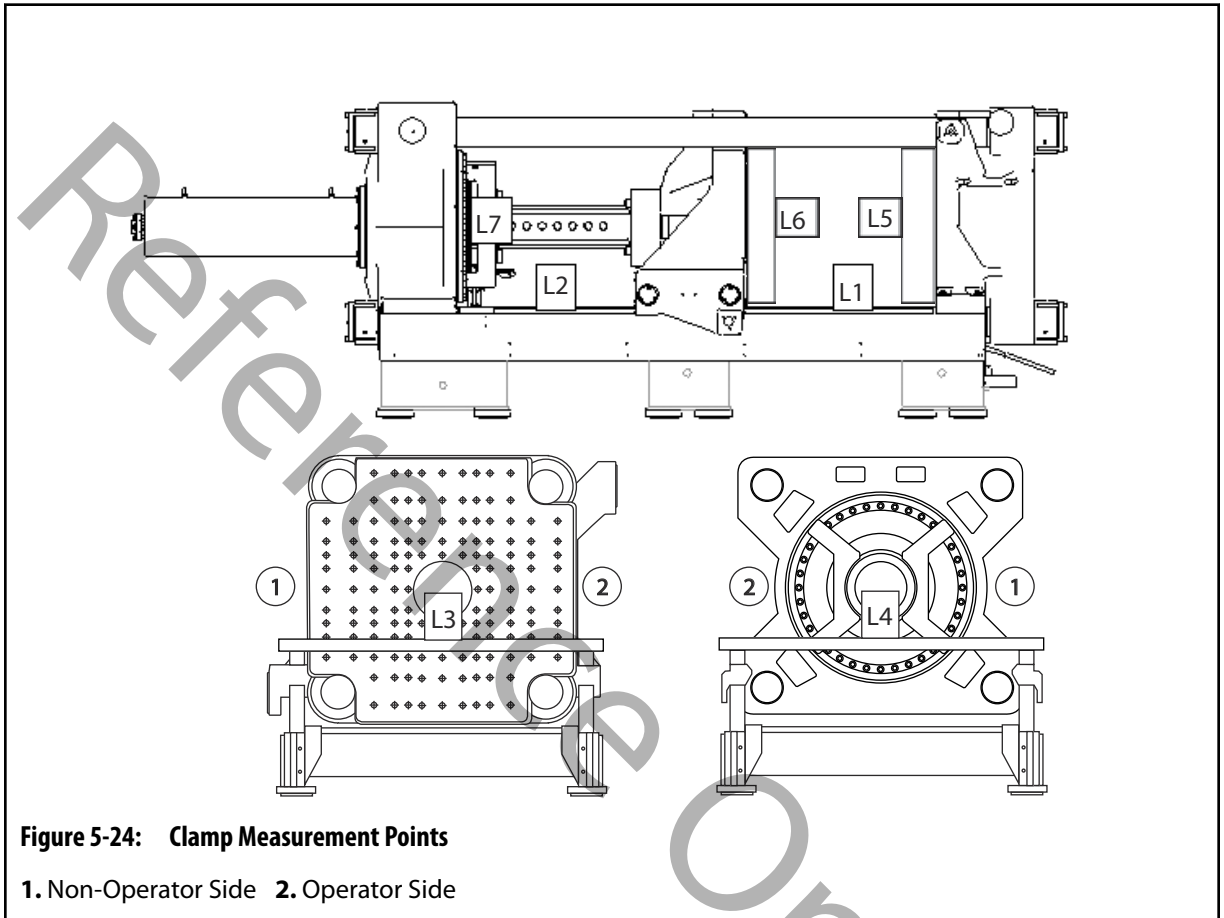
Mechanical hazard – risk of damage to the machine. The measurement on either the operator or non operator side (top and bottom of interface bar) should not be greater than 0.05 mm. Failure to make sure the gaps are less than or equal to 0.05 mm (0.002 in) could result in machine misalignment.

- d. Measure the gap between the injection base and the clamp base. If the gaps are not ≤ 0.05 mm (0.002 in) , repeat [step 18a](#) through [step 18d](#).
19. Record the final gap measurements for future reference.

5.2.6.3 Leveling Measurement Points

Before placing the levels, prepare the surface by cleaning debris /grease with alcohol. if the surface is oxidized and or damaged, use a fine oil stone (HPN 237401) to create a clean, flat surface.

The following are the leveling points for the machine and product handling unit.



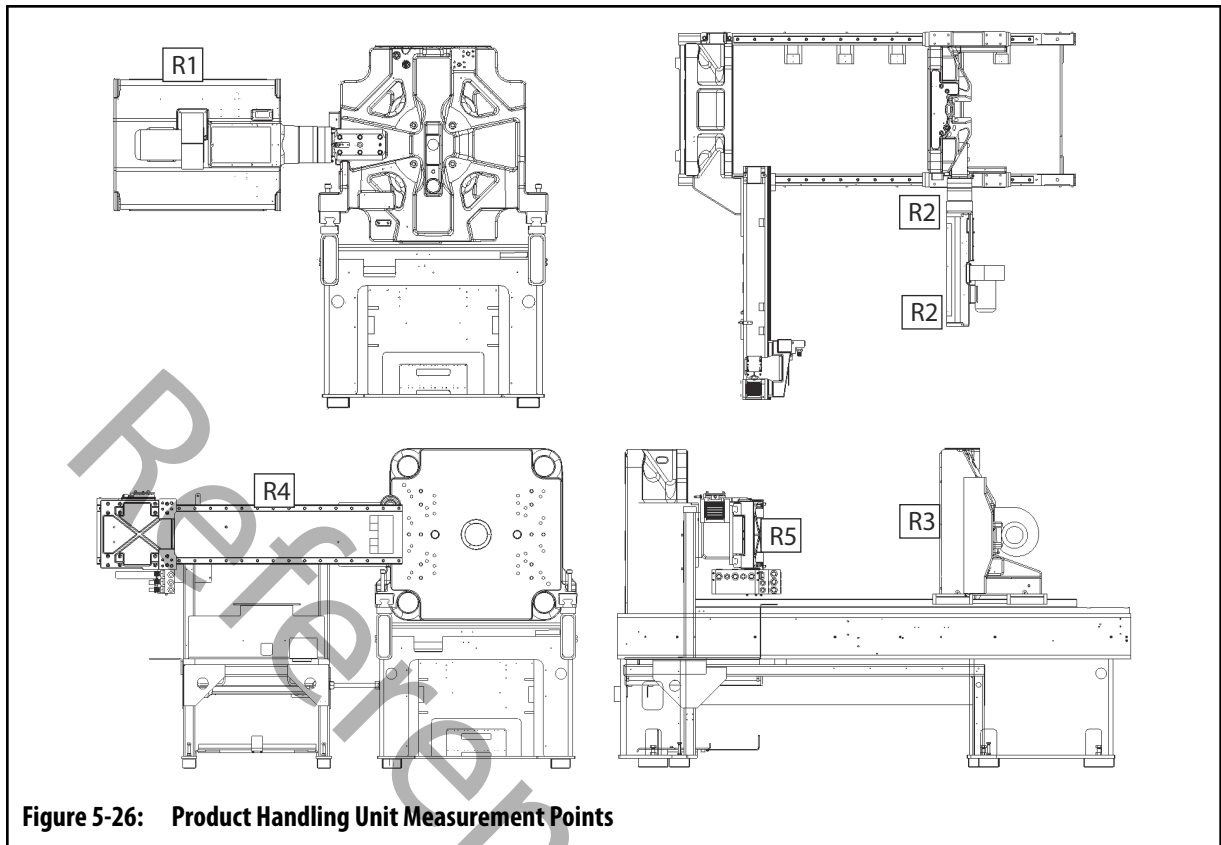


Figure 5-26: Product Handling Unit Measurement Points

5.2.6.4 Leveling the Clamp Unit

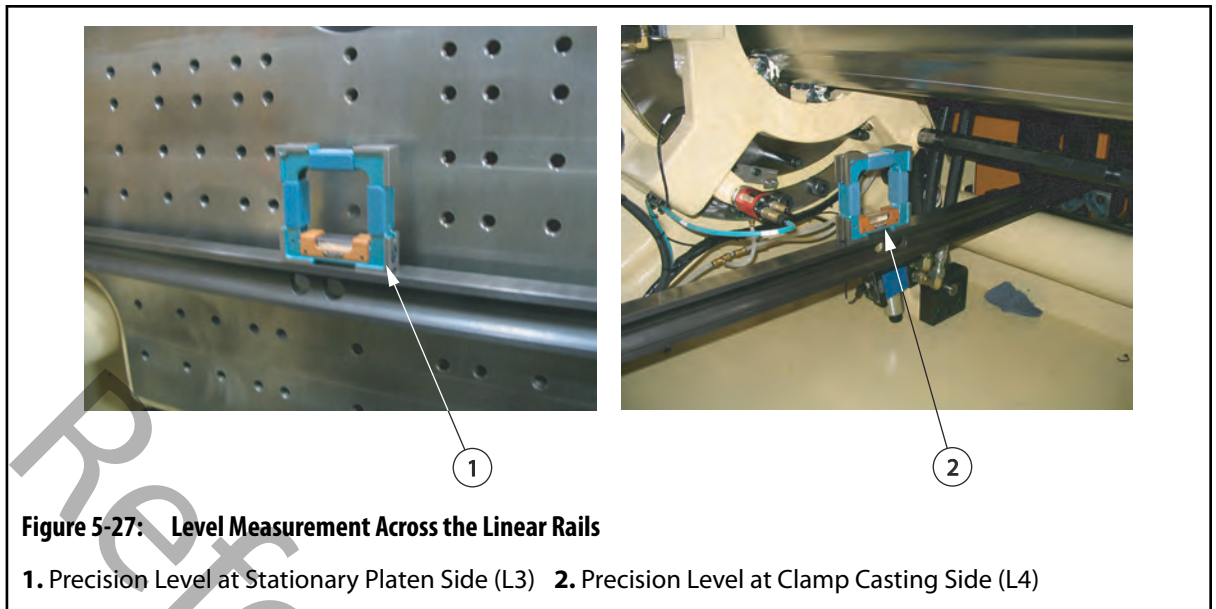
To level the clamp, do the following:

CAUTION!

Mechanical hazard – risk of damage to the machine and mold. The clamp unit must be level to within the specified tolerances. Failure to level the clamp unit to the specified tolerances could impair machine and mold performance and increase component wear.

Each measurement may be within tolerance but bowing or bending can be caused diagonally if the tolerance is high or low on both corners.

1. Place the precision parallel bar on the machined level pads on the robot Z-axis. Place the precision level on the precision parallel bar. If machined pads do not exist, place the 100 mm level on the rail of the robot Z-axis.
2. Check the robot Z-axis to find out if it is high or low relative to the clamp base.
If the robot Z-axis is lower than the clamp base, raise the clamp at the non-operator side stationary platen leg using the leveling mounts until the robot is no longer lower at the clamp side.
3. Place Vee-blocks and a precision parallel bar on the platen rails near the stationary platen and clamp casting.



- 4.** Position a precision level in the center of each precision parallel bar. Make sure the measurements are within 0.15 mm/m (0.0015 in/10 in).

If the measurements are not within tolerance, do the following:

NOTE:

Heavily loaded leveling mount positions may require the use of a pancake jack and a hand pump to take the pressure off the leveling mount screw to enable it to be turned more easily.

- a.** Determine which side of the machine requires adjustment based on the precision levels at L3 and L4.
 - b.** On the side of the machine that requires adjustment, adjust all the leveling mounts along the entire length of the machine.
 - c.** Check the precision levels at L3 and L4 to determine if the base is within tolerance. Adjust as necessary.
 - d.** Adjust the leveling mounts on the opposite side of the machine as necessary.
 - e.** Check the precision levels at L3 and L4 again to make sure the base is still within tolerance.
- 5.** Place a precision level on the operator and non-operator side linear rails between the moving and stationary platens. Make sure the precision levels are not positioned over leveling mounts.

NOTE:

The precision levels must be centered between the stationary and moving platen.

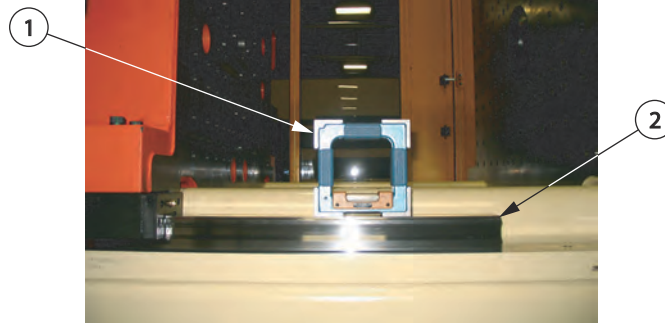


Figure 5-28: Level Measurement Between Platens

1. Precision Level 2. Linear Rail (Operator Side Shown)

6. Place a precision level on the operator and non-operator side linear rails between the moving platen and clamp casting. Make sure the precision levels are not positioned over leveling mounts.

NOTE:

The precision levels must be centered between the moving platen and clamp casting.

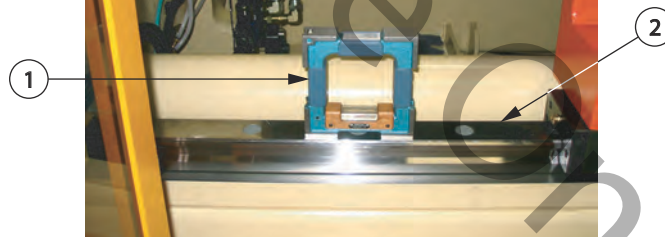


Figure 5-29: Level Measurement Between the Moving Platen and Clamp Casting

1. Precision Level 2. Linear Rail (Operator Side Shown)

7. Make sure the measurements taken at L1 and L2 are centered in the precision levels and are within 0.15 mm/m (0.0015 in/10 in). Adjust the height of the leveling mounts around the machine, as necessary.
8. Check the gap between the injection unit and clamp unit bases making sure it is still within tolerance.

5.2.6.5 Leveling the Injection Unit

To level the injection unit, do the following:

1. Verify the injection nozzle is centered (left and right) within the stationary platen opening.

2. Position a precision level lengthwise on each operator and non-operator carriage rail. Make sure the precision levels are in the center of the carriage rails.

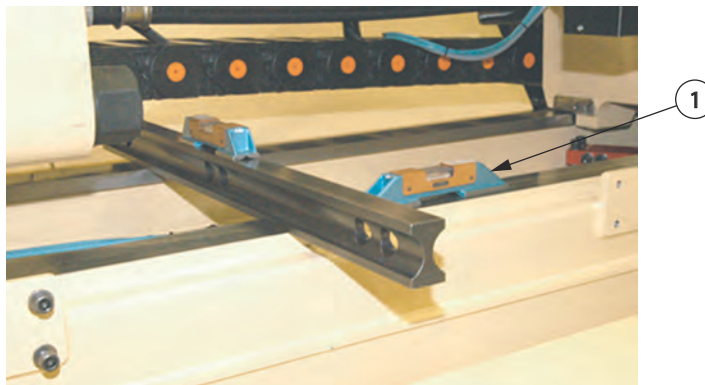


Figure 5-30: Injection Unit Level Position L10

1. Precision Level on Rails (L10, Non-Operator Side Not Shown)

3. Place a precision level and straight bar between the operator and non-operator carriage rails on the injection unit.

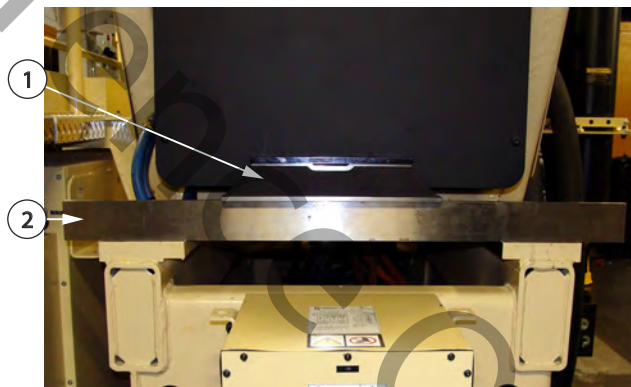


Figure 5-31: Injection Unit Level Position L9

1. Precision Level Across Rails (L9) 2. Straight Bar

4. Make sure the level measurements are centered in the precision levels and within 0.8 mm/m (0.008 in/10 in).

If the measurements are not within tolerance, do the following:

NOTE:

Heavily loaded leveling mount positions may require the use of a pancake jack and a hand pump to take the pressure off the leveling mount screw to enable it to be turned more easily.

- a. Determine which side of the injection unit requires adjustment based on the precision levels at L9 and L10.
- b. On the side of the injection unit that requires adjustment, adjust all the leveling mounts along the entire length of the injection unit.

- c. Check the precision levels at L9 and L10 to determine if the injection base is within tolerance. Adjust as necessary.
 - d. Adjust the leveling mounts on the opposite side of the injection unit as necessary.
 - e. Check the precision levels at L9 and L10 again to make sure the injection base is still within tolerance.
5. Make sure the screws that secure the clamp and injection units together can be moved freely and the gap between the units are ≤ 0.05 mm (0.002 in).

5.2.6.6 Measuring the Platen Parallelism



IMPORTANT!

Before placing the levels, prepare the surface by cleaning debris /grease with alcohol. if the surface is oxidized and or damaged, use a fine oil stone (HPN 237401) to create a clean, flat surface.

To measure the parallelism between the moving and stationary platen, do the following:

1. Make sure the mold is not installed.
2. Measure the gap between all four tie bar nuts and the retaining plates on the clamp casting end. Depending on the machine size, the gap should be as follows:

Clamp Size	Gap Dimension
120 to 500	3 mm (0.12 in)

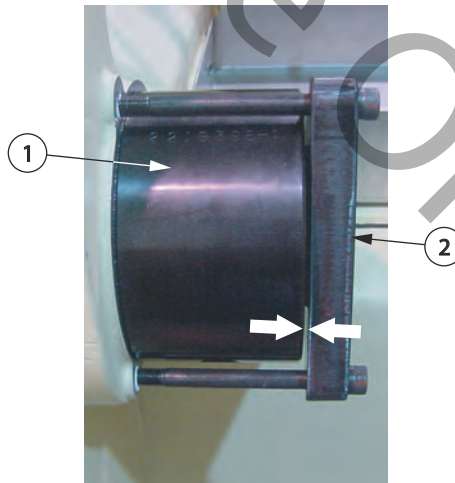


Figure 5-32: Tie Bar Nut Gap

1. Tie Bar Nut 2. Retaining Plate

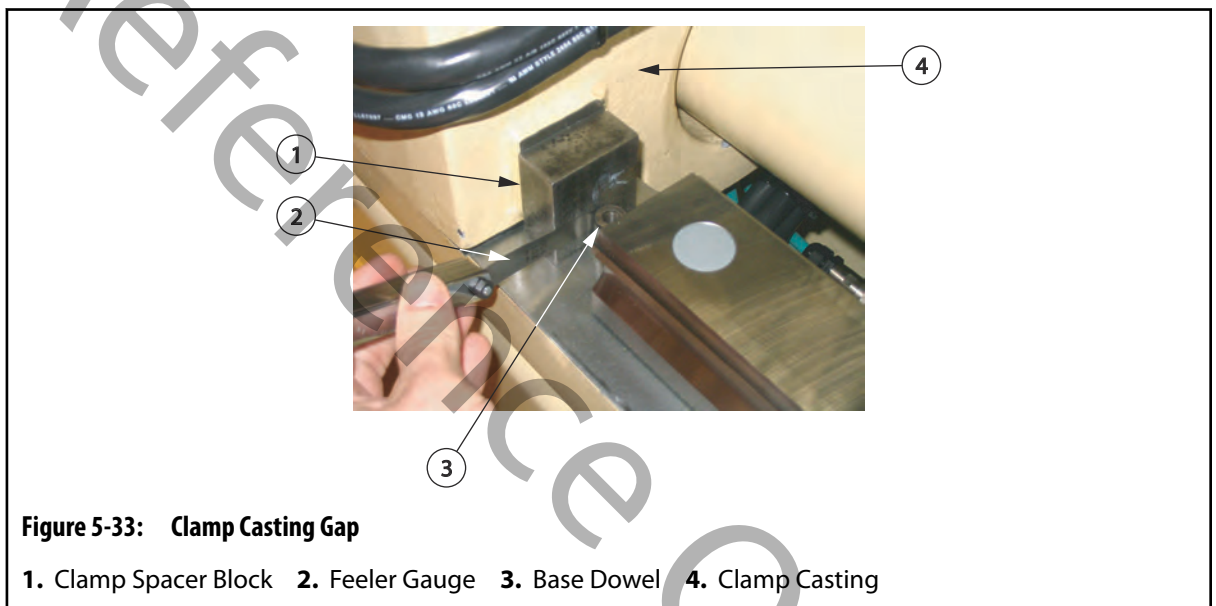
3. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
4. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
5. Make sure the clamp is in the mold close position.

6. Lock out and tag the machine.

CAUTION!

Mechanical hazard - risk of damage or wear to the mold or machine. If the spacer block cannot move freely or a greater than 0.1 mm (0.004 in) feeler gauge can be inserted, the clamp casting is out of position and may cause damage or wear to the mold and machine. Contact Husky for assistance.

7. On the operator side of the machine, insert a clamp spacer block (P/N 2521393) between the base dowel pin and the clamp casting. Make sure the block can move freely, but a 0.1 mm (0.004 in) feeler gauge cannot be inserted between it and the base dowel pin. If the measurement is greater than 0.1 mm (0.004 in), record the values and contact Husky for assistance.



8. Remove the clamp spacer block.
9. Repeat [step 7](#) to [step 8](#) for the non-operator side of the machine.
10. Remove all locks and tags.
11. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
12. On the HMI, touch the **Clamp** button, and then touch the **Clamp** tab to display the **Clamp** screen.
13. Touch the **Machine Mode Selector** button on the toolbar and select **Mold Set** mode.
14. Monitor the **Shutheight Position** field and press either the **Mold Close** or **Mold Open** keys to move the moving platen to the maximum daylight position.
Refer to [Section 7.2](#) for the maximum daylight value.
15. Press and hold the **Mold Open** key to move the moving platen enough to provide access to the clamp column guide bushings.
16. Clean the guide bushings area and check the guide bushings thickness. Refer to [Section 5.3.4](#).

17. Use a 0.050 mm (0.002 in) feeler gauge to make sure there is a gap between the column guide bushings and the clamp column. If the gap is greater than 0.3 mm (0.012 in), inspect the thickness of the column guide bushings to see if they need to be replaced. Refer to [Section 5.3.4](#).

Record the measurements for future reference.



18. Lock out and tag the machine.

CAUTION!

Mechanical hazard – risk of damage to the machine. Make sure the precision box level is accurate and calibrated. Failure to do so could result in incorrect readings. For accuracy, use the same level for all measurements.

19. Position the precision box level against the mounting face of the stationary platen on the operator and non-operator sides of the machine. Verify the stationary platen is perpendicular to the base within tolerance.

Table 5-1: Perpendicularity Tolerances for the Stationary Platen

Platen Tilt	Without a Mold Installed	With a Mold Installed
Toward Moving Platen	0.1 mm/m (0.001 in/10 in)	0.15 mm/m (0.0015 in/10 in)
Away from Moving Platen	0.2 mm/m (0.002 in/10 in)	0.15 mm/m (0.0015 in/10 in)

CAUTION!

Mechanical hazard - risk of damage or wear to the machine and mold. If the perpendicularity tolerances are not achievable without the mold installed, do not install the mold. Contact Husky for assistance. Installing the mold if the perpendicularity tolerances are not met could cause wear or damage.



Figure 5-35: Box Level Measurement on Stationary Platen (L5)

20. Position the precision box level against the mounting face of the moving platen on the operator and non-operator sides of the machine. Verify the moving platen is perpendicular to the base within tolerance.

Table 5-2: Perpendicularity Tolerances for the Moving Platen

Platen Tilt	Without a Mold Installed	With a Mold Installed
Toward Stationary Platen	0.1 mm/m (0.001 in/10 in)	0.15 mm/m (0.0015 in/10 in)
Away from Stationary Platen	0.15 mm/m (0.0015 in/10 in)	0.15 mm/m (0.0015 in/10 in)

CAUTION!

Mechanical hazard - risk of damage or wear to the machine and mold. If the perpendicularity tolerances are not achievable without the mold installed, do not install the mold. Contact Husky for assistance. Installing the mold if the perpendicularity tolerances are not met could cause wear or damage.

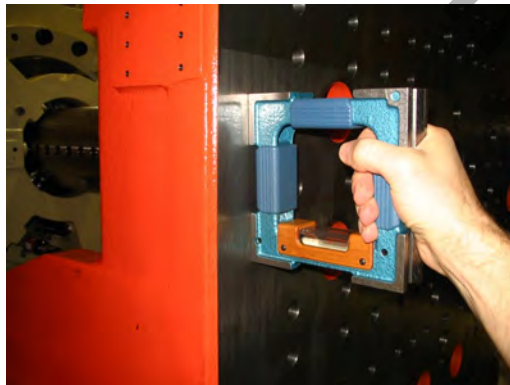


Figure 5-36: Box Level Measurement on Moving Platen (L6)

21. Position the precision box level against the machined surface on the clamp casting on the operator side of the machine. Verify the clamp casting is perpendicular to the base within 0.15 mm/m (0.0015 in/10 in).



Figure 5-37: Box Level Measurement on Clamp Casting (L7)

22. Using an inside micrometer, measure between all four corners of the stationary platen to the adjacent corners of the moving platen. Take the bottom measurements from just above the tie bars (for example 75 mm), and take the top measurements from below (for example 75 mm) the tie bars. Mark the measurement location for future reference.



Figure 5-38: Measuring Parallelism Between Stationary and Moving Platen

Compare all measurements and make sure they are within tolerance.

23. Remove all locks and tags.
24. Perform nozzle concentricity. Refer to [Section 5.2.6.9](#) for more information.
25. Torque the screws connecting the injection unit to the clamp unit.
26. Install a mold or test block in the machine. Refer to the mold *Service Manual* for instructions on installing a mold.
27. Lock out and tag the machine.
28. Repeat [step 19](#) to [step 21](#) with the mold installed.
29. Remove locks and tags.
30. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
31. Open the mold to the position where the leader pins are flush with the cavity plate.

32. Lock out and tag the machine.
33. Using an inside micrometer, measure between all four corners of the stationary platen to the adjacent corners of the moving platen or a minimum of three points if access is restricted. Take the bottom measurements from just above the tie bars, and take the top measurements from below the tie bars. Use the same measurement points used in [step 22](#).
34. Repeat [step 29](#) to [step 33](#) with the mold open with 2 to 5 mm (0.07 to 0.19 in) of daylight. The measurements in leader pins flush and 2 to 5 mm (0.07 to 0.19 in) daylight must be within 0.03 mm. If the values are greater than 0.03 mm (0.001 in) call Husky.

5.2.6.7 Leveling the CoolPik Plenum

To level the CoolPik plenum, do the following:

1. Place a parallel bar on the outer machined surfaces on the CoolPik plenum.

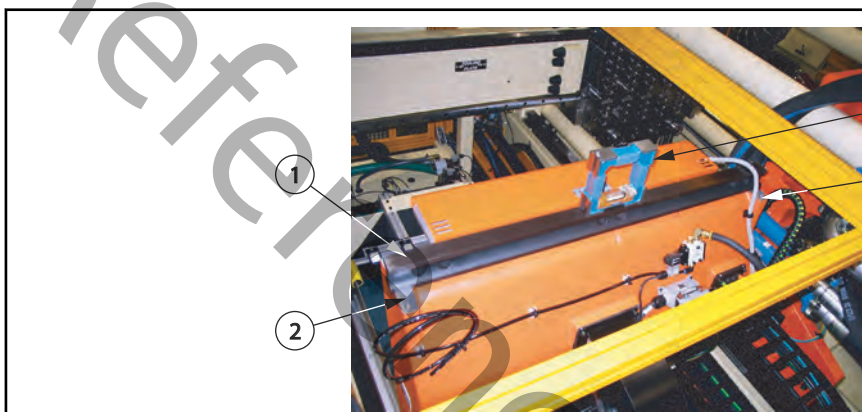


Figure 5-39: Box Level Measurement on CoolPik Plenum (R1)

1. Parallel Bar 2. Machine Surfaces 3. Precision Box Level

2. Position a precision box level in the center of the parallel bar. Verify the CoolPik plenum is level with the clamp base (L4) within 0.5 mm/m (0.005 in/10 in).

NOTE:

If the tolerance cannot be achieved, check the connection to the moving platen. Refer to [Section 5.2.6.6](#) for more information.

3. Position a precision box level against the CoolPik plate mounting surface on the non-operator side of the CoolPik plenum. Verify the CoolPik plenum is perpendicular to the base within 0.3 mm/m (0.003 in/10 in).

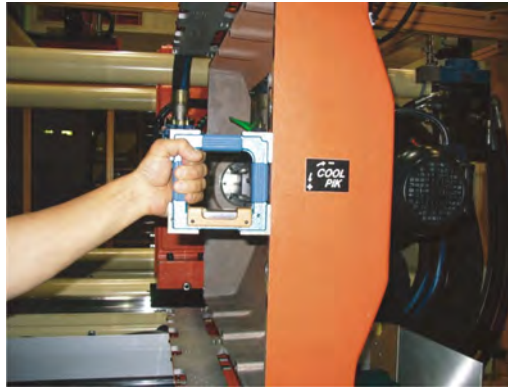


Figure 5-40: Box Level Measurement on CoolPik Plate Mounting Surface (R3)

4. On the non-operator side of the clamp base, position two Vee blocks next to the linear rail on the CoolPik side. Make sure the Vee blocks are 381 mm (15 in) apart.

CAUTION!

Mechanical hazard – risk of damage to the machine. Failure to install protective plates could damage the linear rail and linear bearing.

5. Clamp the Vee blocks to the linear rail, making sure to place protective plates against the Vee blocks and on the opposite side of the linear rail.



Figure 5-41: Securing the Vee Blocks

1. Vee Blocks 2. Protective plates 3. Clamp

6. Place a 36 inch parallel bar against the Vee blocks and slide the bar until there is a minimum 0.1 mm (0.004 in) clearance between the bar and the CoolPik plate horizontal mounting surface along the entire edge.
7. Clamp the bar to the Vee blocks.



Figure 5-42: Securing the Square Level

1. Bar 2. Gap

8. Using a feeler gauge, measure the gaps between the bar and the CoolPik plate horizontal mounting surface. The distance between the gaps must not exceed 0.25 mm (0.01 in) .
9. After the CoolPik and tooling plate are installed, verify the parallelism between the two plates in all four corners with an inside micrometer.

5.2.6.8 Leveling the Z-Axis Beam

To level the Z-axis beam, do the following:

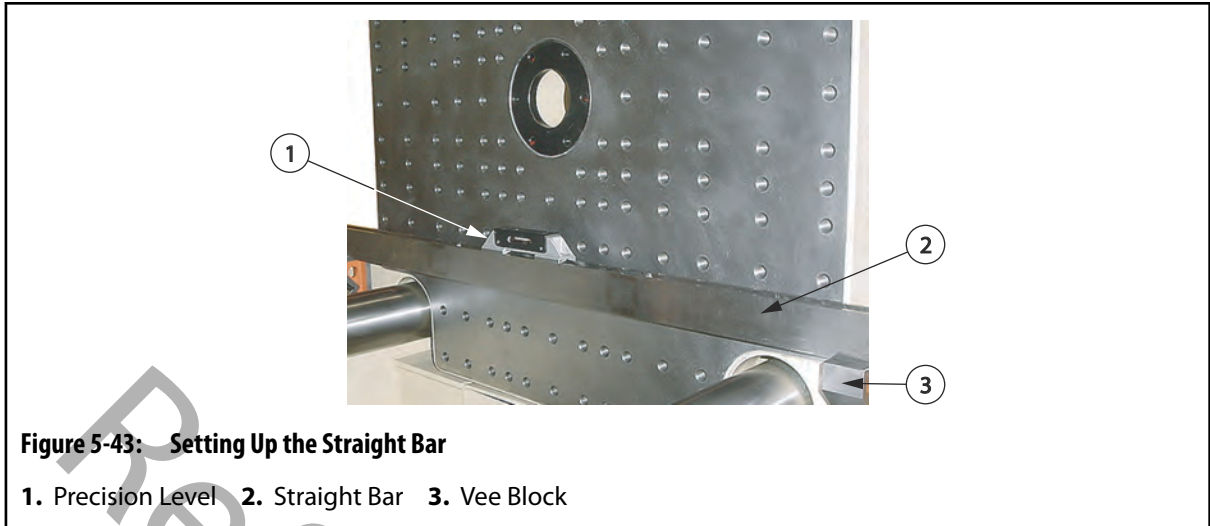
CAUTION!

Make sure the product handling unit is positioned correctly by verifying the Z-axis beam is parallel to the stationary platen. If the product handling unit is not positioned correctly could negatively impact the platen parallelism.

NOTE:

Proper installation of the Z-Axis beam should not change leveling and parallelism values achieved during machine leveling.

1. Move the tooling plate carriage into the clamp area.
2. Place a precision level, Vee-blocks and a straight bar on the linear rails near the stationary platen.



3. On the Z-axis beam, place a second precision level on the machine surface nearest to the Z-axis motor(s).



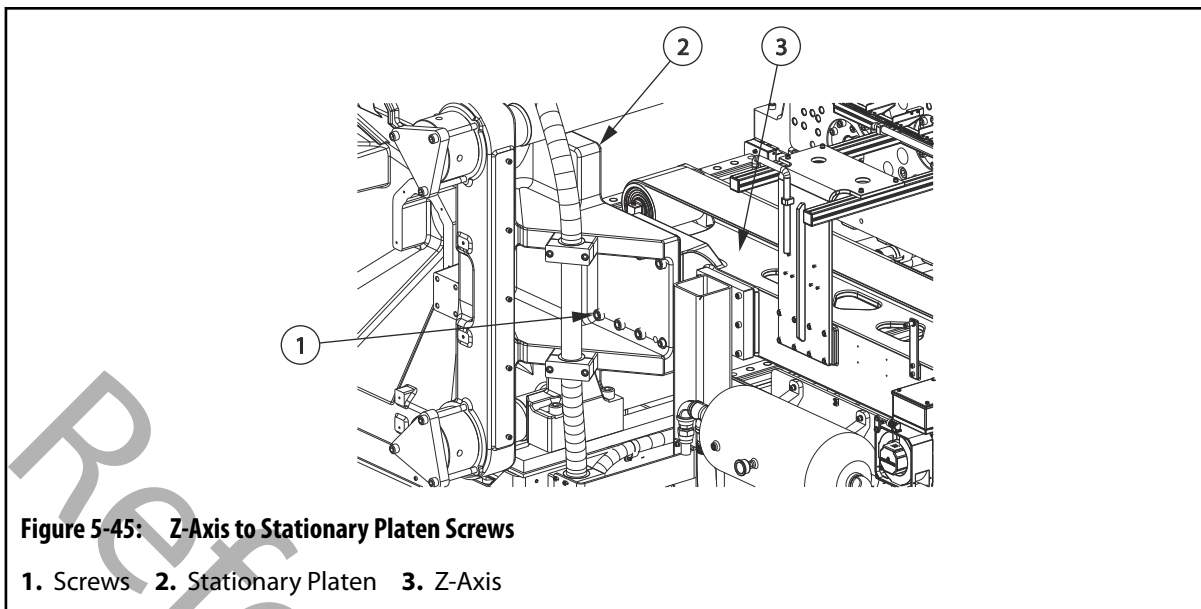
4. Compare the level measurements from the clamp unit and Z-axis beam. If the Z-axis beam is not level with the clamp unit, adjust the product handling leveling mounts as required. Turn the leveling mount screw to raise or lower the product handling unit.
5. Tighten all lock nuts on the leveling mounts.



IMPORTANT!

The moving and stationary platens should remain parallel after leveling the product handling unit. If platen parallelism is not within the specified tolerances, do not attempt to correct the platens. Contact the Husky for more information.

6. Verify the platens remain parallel. Refer to [Section 5.2.6.6](#) for more information.
7. Torque the screws that secure the Z-axis beam to the stationary platen. Refer to [Section 7.13](#) for standard torque specifications.



5.2.6.9 Checking the Nozzle Concentricity

To avoid wear or damage over time, the injection nozzle must be concentric with the platen bore in the stationary platen. The following procedures describe how to measure nozzle concentricity.

To check the horizontal and vertical concentricity of the injection nozzle, do the following:

1. Make sure the mold is removed to allow access to the stationary platen. Refer to the mold *Service Manual* for more information.
2. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
3. If required, lock out and tag the air regulator.
4. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.



IMPORTANT!

Nozzle concentricity must be measured when the machine heats are at operating temperature to account for thermal expansion.

5. Turn on the machine heats. Refer to [Section 4.26.1.14](#) for instructions.

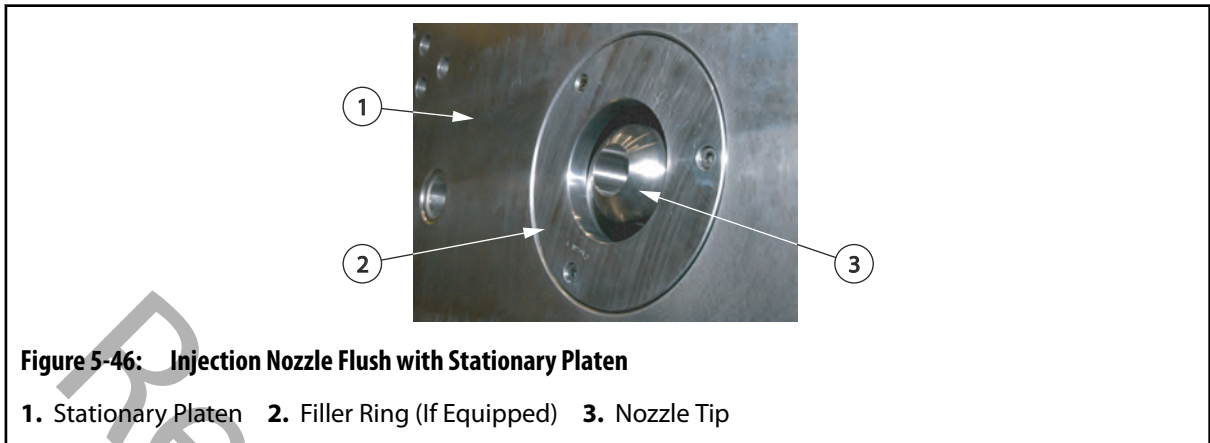


WARNING!

Burn or explosion hazard – risk of death or serious injury. Molten process material at high pressure can be present. Purge the injection unit to minimize the potential for any pressure build-up. Wear personal protective equipment while purging the injection unit.

6. Purge the injection unit. Refer to [Section 4.26.1.16](#) for more information.
7. On the HMI, press and hold the **Carriage Forward** and **Carriage Back** keys to move the carriage back and forth three or four times.

8. Press and hold the **Carriage Forward** key until the injection nozzle is flush with the face of the stationary platen.



9. Lock out and tag the machine.

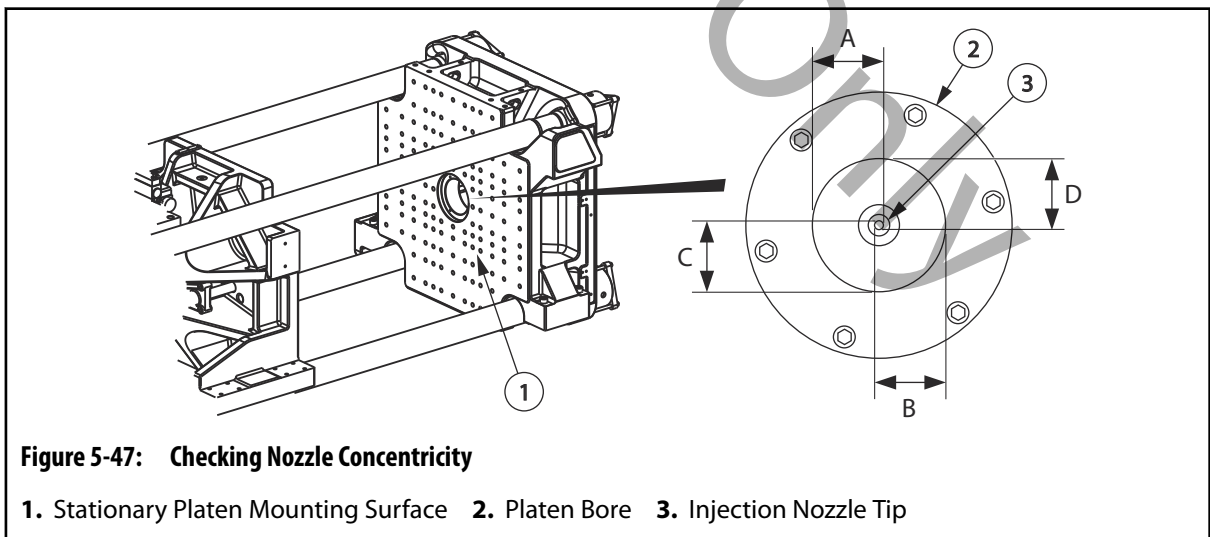


WARNING!

Burn or explosion hazard – risk of death or serious injury. Molten process material at high pressure can be present. Wear personal protective equipment while measuring nozzle concentricity. Do not stand in front of the nozzle.

10. Remove the filler ring.
11. Using a vernier caliper, measure the horizontal distances (A and B) between the injection nozzle tip and the platen bore. The difference between the two horizontal measurements must not exceed 0.5 mm (0.02 in) .

If the horizontal concentricity measurements exceed the specified tolerances, adjust the nozzle concentricity. Refer to [Section 5.4.1.2](#) for more information.



12. Using a vernier caliper, measure the vertical distances (C and D) between the injection nozzle tip and the platen bore. The difference between the two vertical measurements must not exceed 0.5 mm (0.02 in) .

If the vertical concentricity measurements exceed the specified tolerances, adjust the vertical nozzle concentricity. Refer to [Section 5.4.1.3](#) for more information.

5.2.6.10 Checking the Alignment of the Purge Guard Switch and the Switch Actuator

To check the alignment of the purge guard switch and switch actuator, do the following:

1. Replace any missing or damaged bumpers from the front of the purge guard.
2. Make sure the rivets fastening the switch actuator to the machine are not loose. Replace all loose rivets.
3. Make sure the switch actuator does not have any visible bends. If any bends are visible, replace the switch actuator.

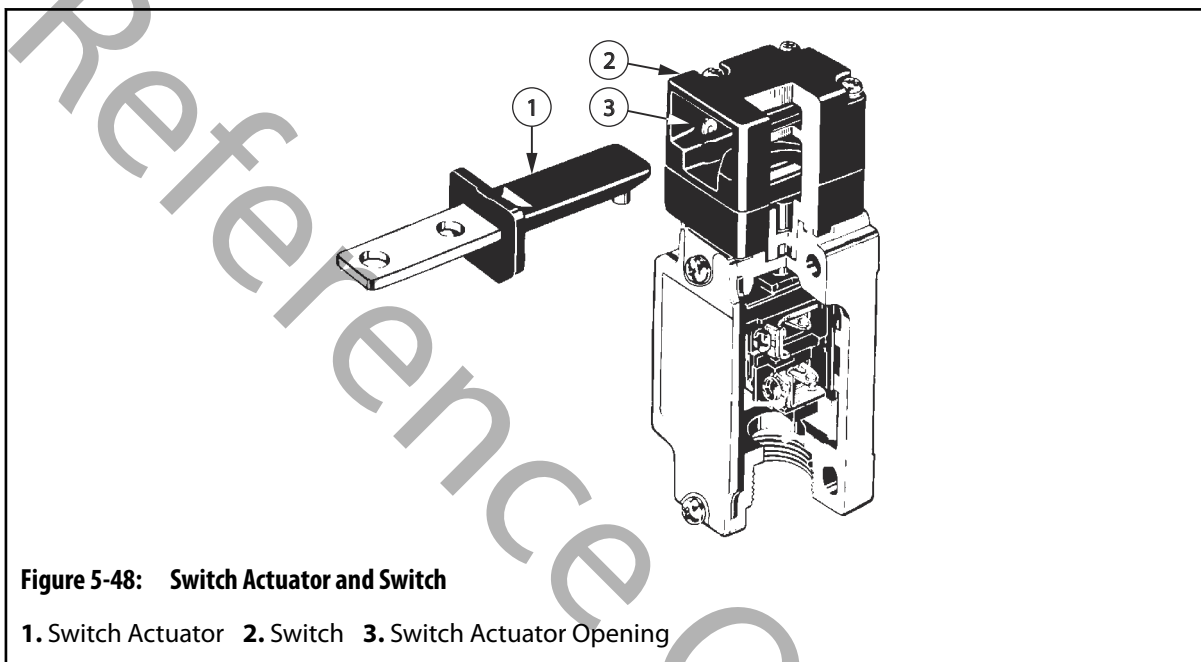


Figure 5-48: Switch Actuator and Switch

1. Switch Actuator 2. Switch 3. Switch Actuator Opening

4. With the purge guard closed, measure the gap between the switch actuator and the switch. Make sure the gap is 1-4 mm (0.039-0.157 in). If the gap is too large or too small, proceed to [step 7](#) for instructions about how to adjust the position of the switch.

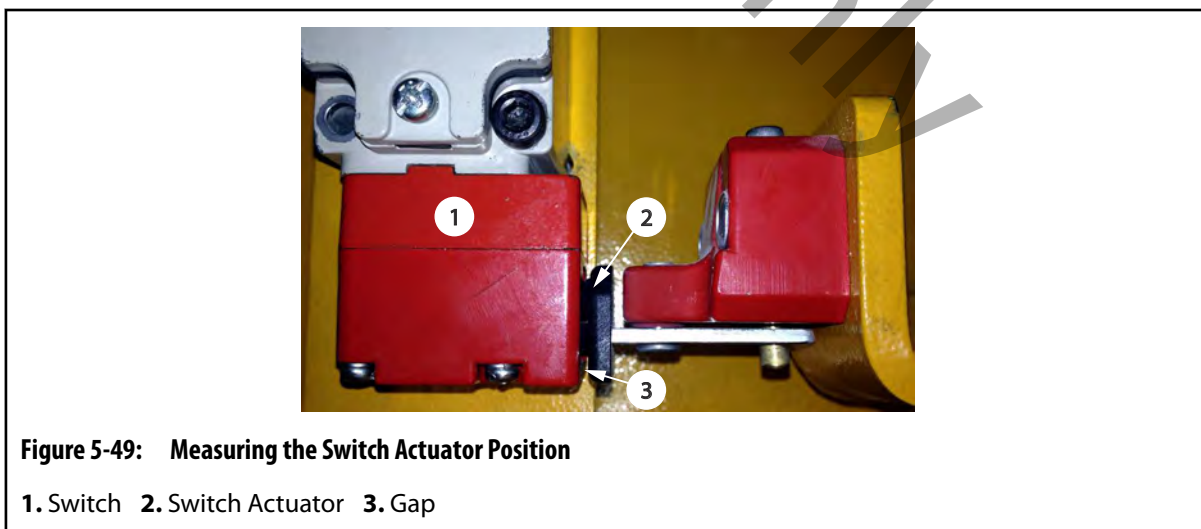
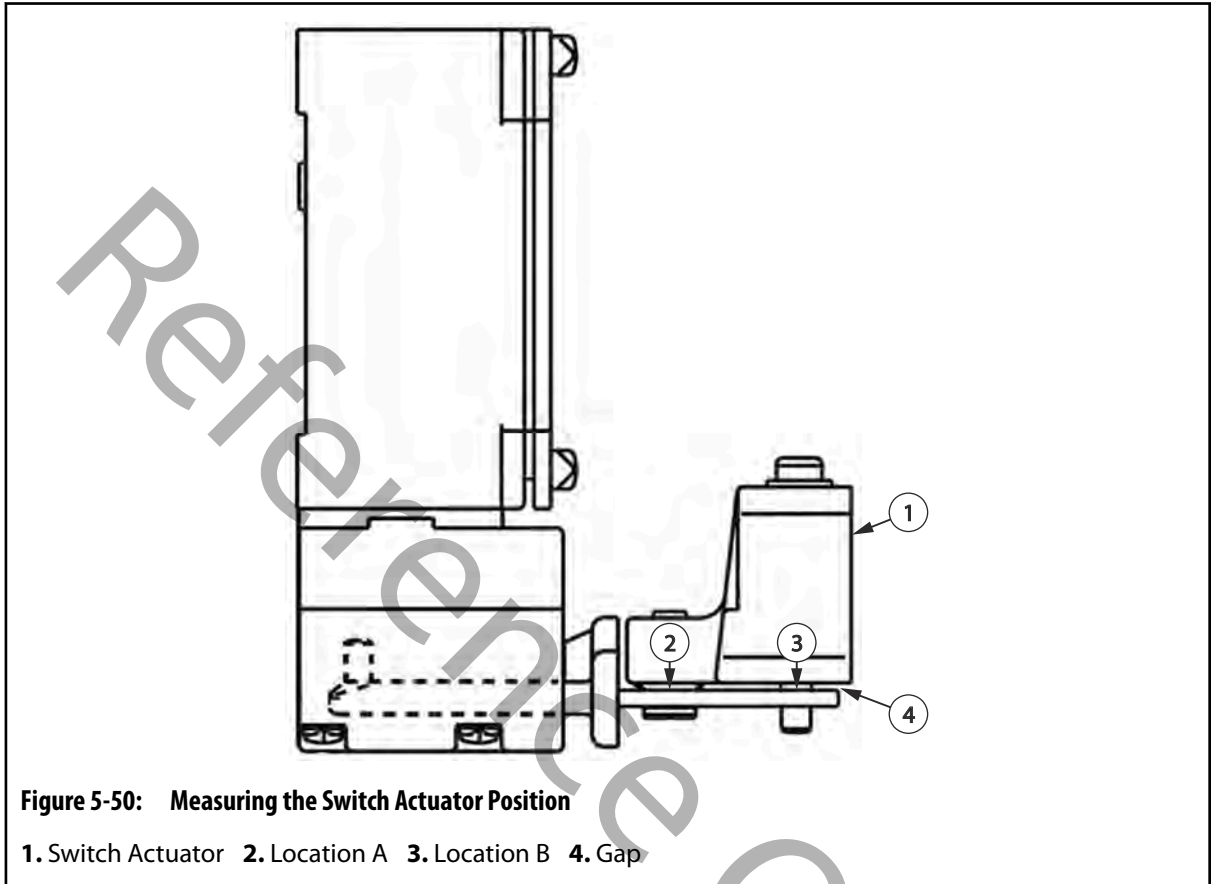


Figure 5-49: Measuring the Switch Actuator Position

1. Switch 2. Switch Actuator 3. Gap

5. With the purge guard closed, measure the gap height at Location A and Location B. Make sure of the following:
 - The height measurements are approximately 1 mm (0.039 in).
 - The height measurements are equal within ± 0.25 mm (0.009 in).



If the gap height at Location A or Location B is incorrect, proceed to [step 7](#) for instructions about how to adjust the position of the switch.

6. Close the purge guard and make sure the switch actuator moves slightly in the upward, downward, left and right direction.

If the switch actuator does not move in one or more directions, proceed to [step 7](#) for instructions about how to adjust the position of the switch.

If the switch actuator moves slightly in all four directions, the switch actuator is correctly aligned and the procedure is complete.

7. To adjust the position of the switch, do the following:
 - a. Close the purge guard.
 - b. Loosen the 2 bolts that fasten the switch to the stationary platen (or purge guard backing plate).
 - c. Position the switch to make sure the actuator is aligned with the switch opening.

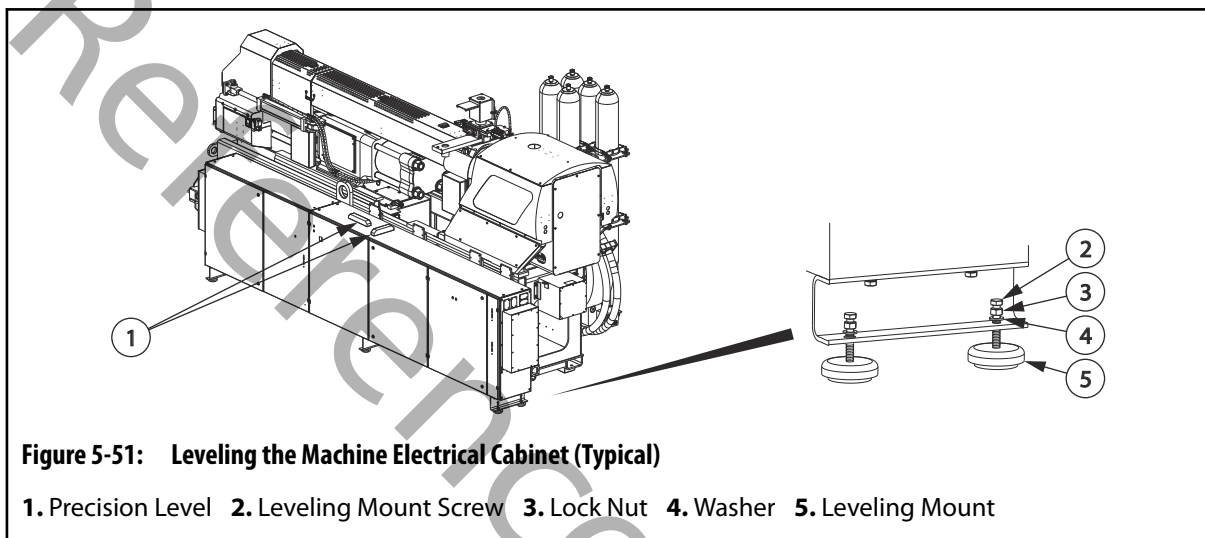
If the switch cannot be positioned to successfully align the switch actuator with the switch opening, contact your nearest Husky Regional Service and Sales office.

- d. Repeat [step 4](#).
- e. Repeat [step 5](#).
- f. Torque the 2 bolts that fasten the switch to the stationary platen (or purge guard backing plate). Refer to [Section 7.13](#) for standard torque specifications.
- g. Repeat [step 6](#).

5.2.6.11 Leveling the Machine Electrical Cabinet

To level the electrical cabinet, do the following:

1. Disconnect the restraining cables.
2. Place a precision level on the top surface of the electrical cabinet.



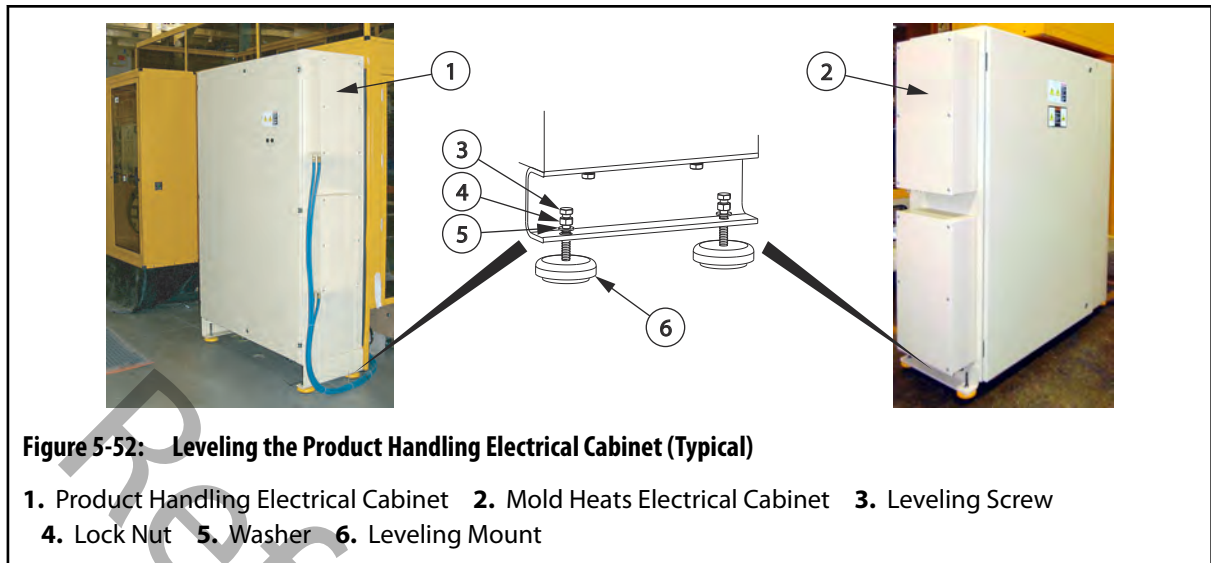
3. Adjust the leveling mounts depending on where the precision level indicates the most deviation. Turn the leveling mount screw to raise or lower the electrical cabinet.
4. Tighten all lock nuts on the leveling mounts.
5. Attach the restraining cables to the machine to secure the electrical cabinet.

5.2.6.12 Leveling the Product Handling Electrical Cabinet

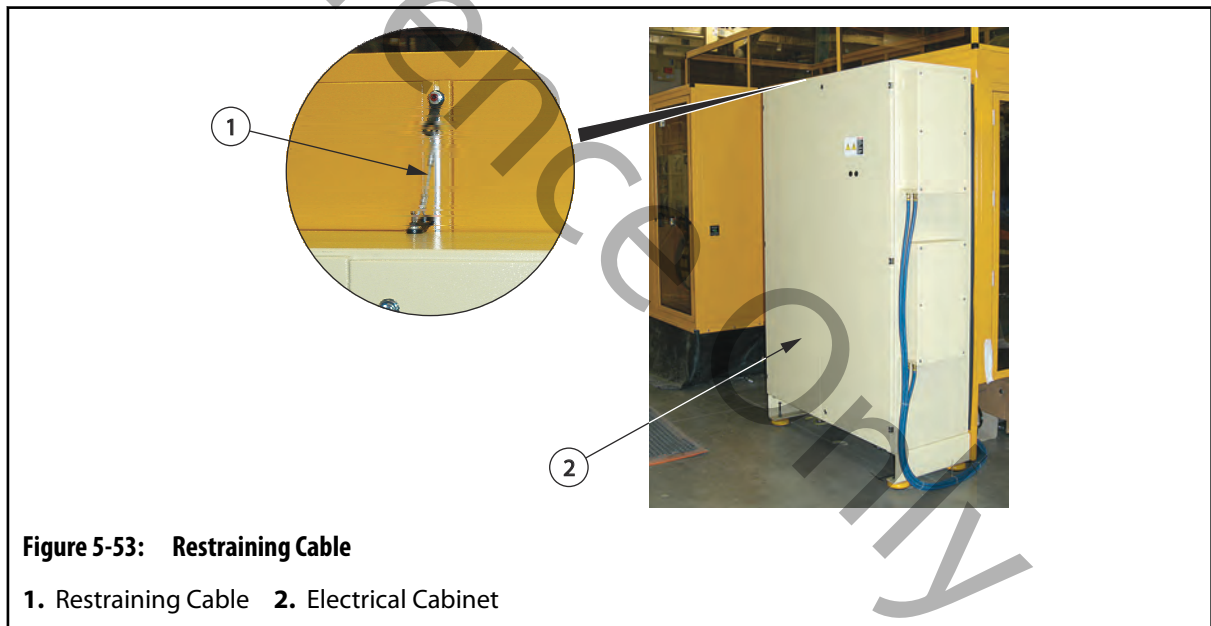
To level the product handling electrical cabinet, do the following:

1. Disconnect the restraining cables.
2. For the Mold Heats electrical cabinet, place a precision level on the heat exchanger.

For the Product Handling electrical cabinet, place a precision level on the top surface of the electrical cabinet.



3. Adjust the leveling mounts depending on where the precision level indicates the most deviation. Turn the leveling mount screw to raise or lower the electrical cabinet.
4. Tighten all lock nuts on the leveling mounts.
5. Attach the restraining cables to the machine to secure the electrical cabinet.



5.2.6.13 Verifying the Overall Level of the Machine

After leveling the machine, setting the platen parallelism and confirming the nozzle concentricity, the overall level of the machine must be measured and recorded.

To check the overall level of the machine, do the following:

1. Verify the machine and product handling unit are level by repeating the following procedures:
2. Tighten all lock nuts on the leveling mounts.

3. Make sure the screws that secure the clamp and injection units together can be moved freely and the gap between the units are within 0.05 mm (0.002 in) .
4. Tighten the screws that secure the clamp and injection units together. Torque the screws to the specified value. Refer to [Section 7.13](#) for standard torque values.
5. Cycle the machine for one hour and then recheck the level and parallelism. Make adjustment as required.
6. Check the level and parallelism after 12 hours of operation. Due to settling of the leveling pads under dynamic loading, adjustment may be required.

5.2.7 Tuning the Heats

Temperature control for the mold heats can be optimized using the tuning feature. Tuning allows for greater thermal stability and faster warm up of the mold from room temperature.

The following procedures describe how to start and stop the tuning process.

Procedure	Reference
Tuning the mold heats	Section 5.2.7.1
Stopping the tuning process	Section 5.2.7.2

NOTE:

The tuning process can take up to one hour to complete.



IMPORTANT!

Typically, heat zones that are physically adjacent to one another should be tuned together.



IMPORTANT!

If the temperature control remains unacceptable during processing, repeat the tuning procedure. However, if the temperature control is still unacceptable after repeating the procedure, use the default parameters.

The default parameters can be recalled by doing the following:

For integrated heats:

1. On the HMI, touch the **Heats** button and then touch the **Heats Setup** tab.
2. Start the tuning procedure.
3. Clear the **Hot Runner Optimization Enable** check box.
4. Restart the machine and clear any related alarms.
5. Repeat the tuning procedure.

5.2.7.1 Tuning the Mold Heats

To start the tuning process for the mold heats, do the following:



IMPORTANT!

Tuning should be performed if the mold has never been used in the machine before. If the mold has been used in the machine previously, load the last saved mold setup file for the mold. Refer to [Section 4.20.3](#) for more information.

1. Make sure the machine is not cycling.
2. On the HMI, press the **Mold Cooling** key to turn on the mold cooling system.
3. Make sure the Q2M breaker handle is in the ON position.
4. Clear all active alarms related to the heats and mold cooling circuits.
5. Touch the **Heats** button and touch the **Heats Setup** tab to display the **Heats Setup** screen.

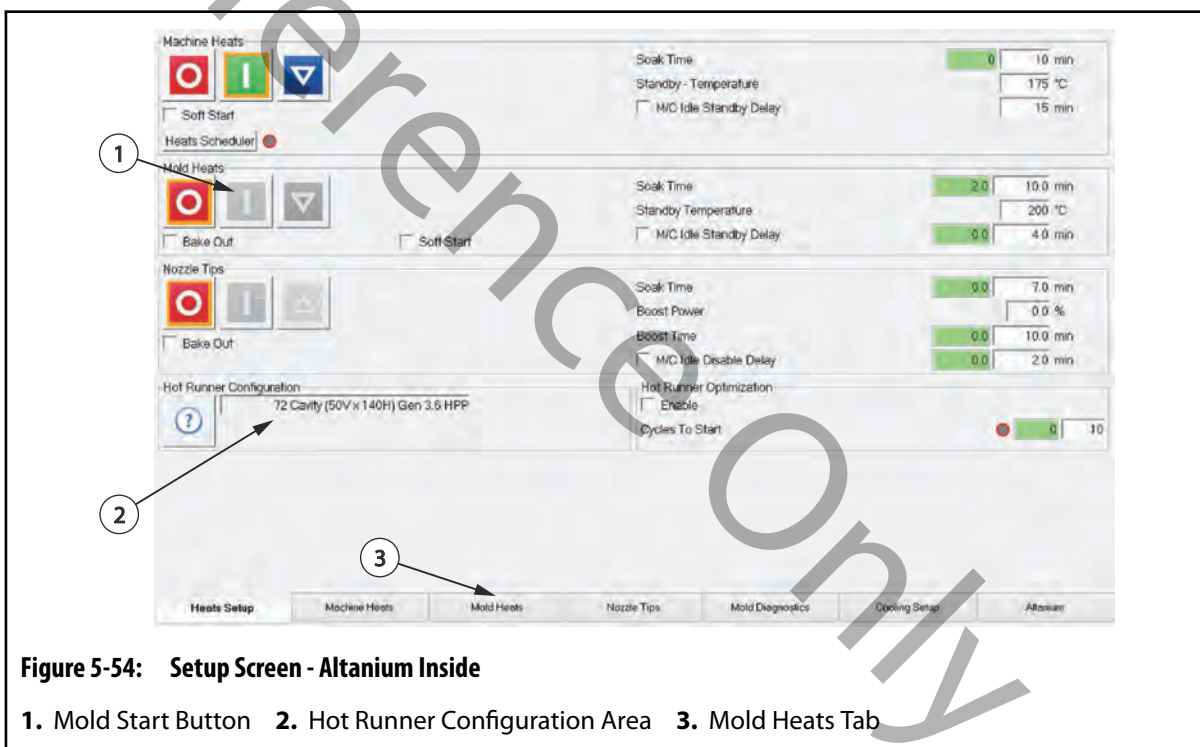
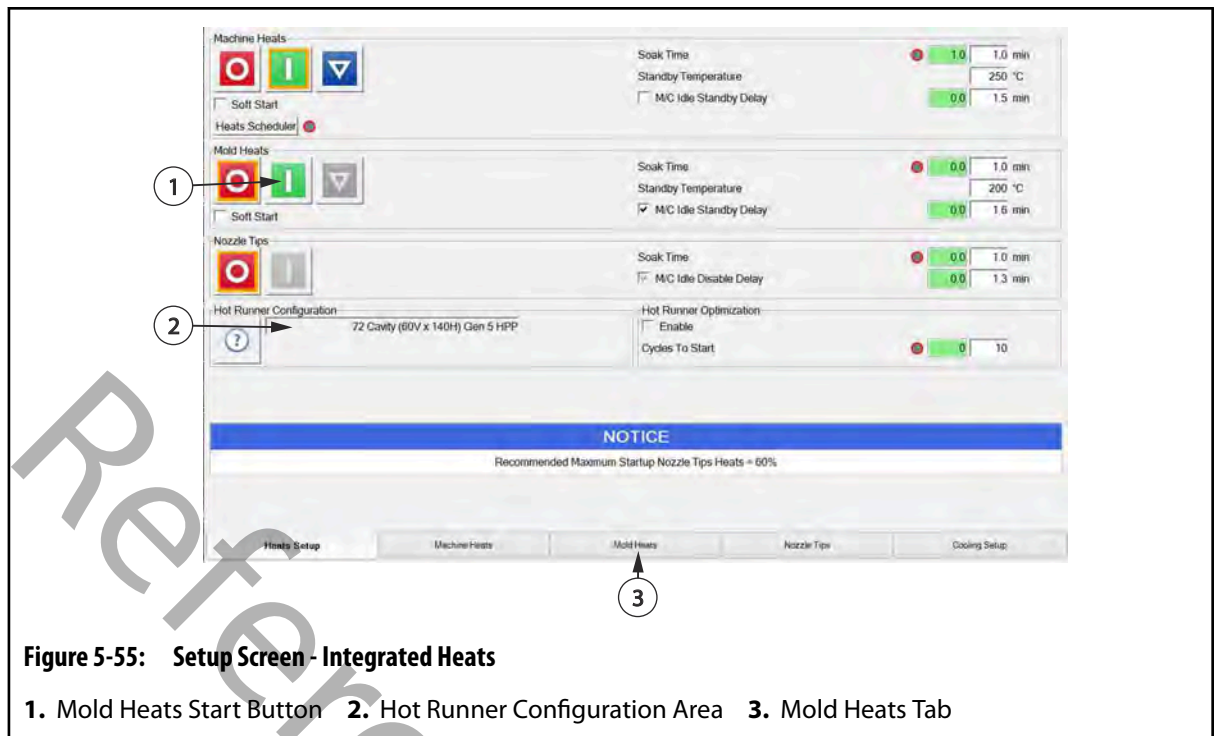
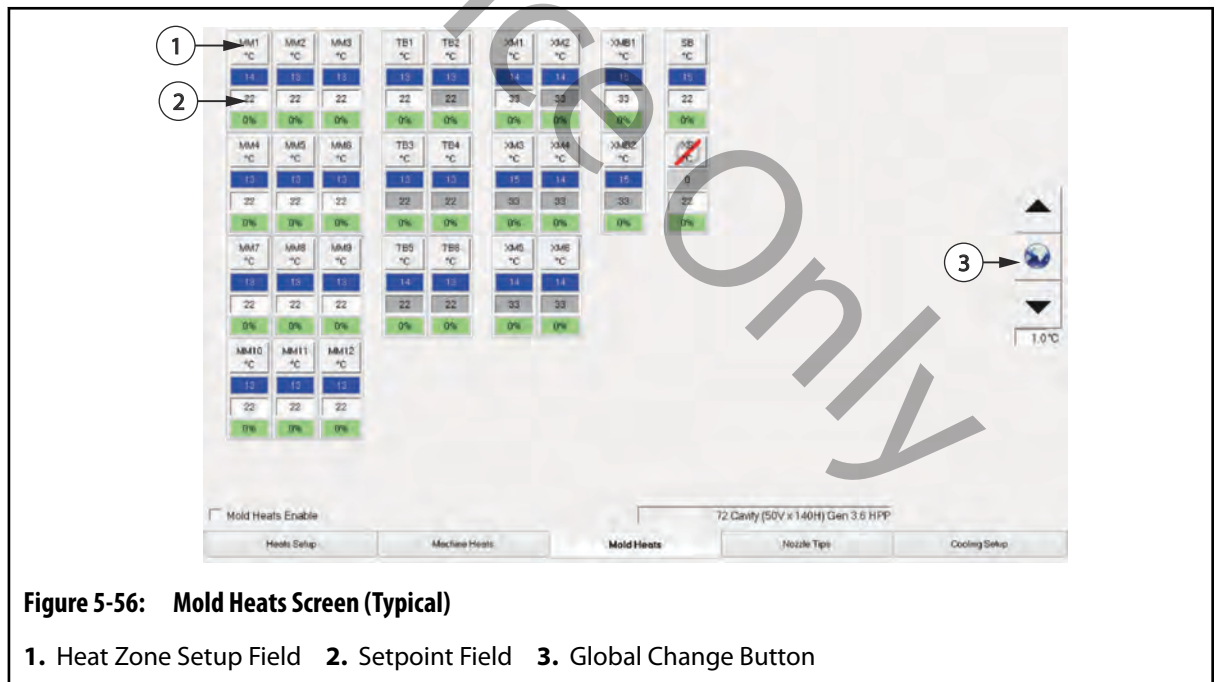


Figure 5-54: Setup Screen - Altanium Inside

1. Mold Start Button 2. Hot Runner Configuration Area 3. Mold Heats Tab



6. In the **Hot Runner Configuration** area, verify the mold type specified.
7. Select the **Mold Heats Start** button to turn on the mold heats.
8. Touch the **Mold Heats** tab to display the **Mold Heats** screen.

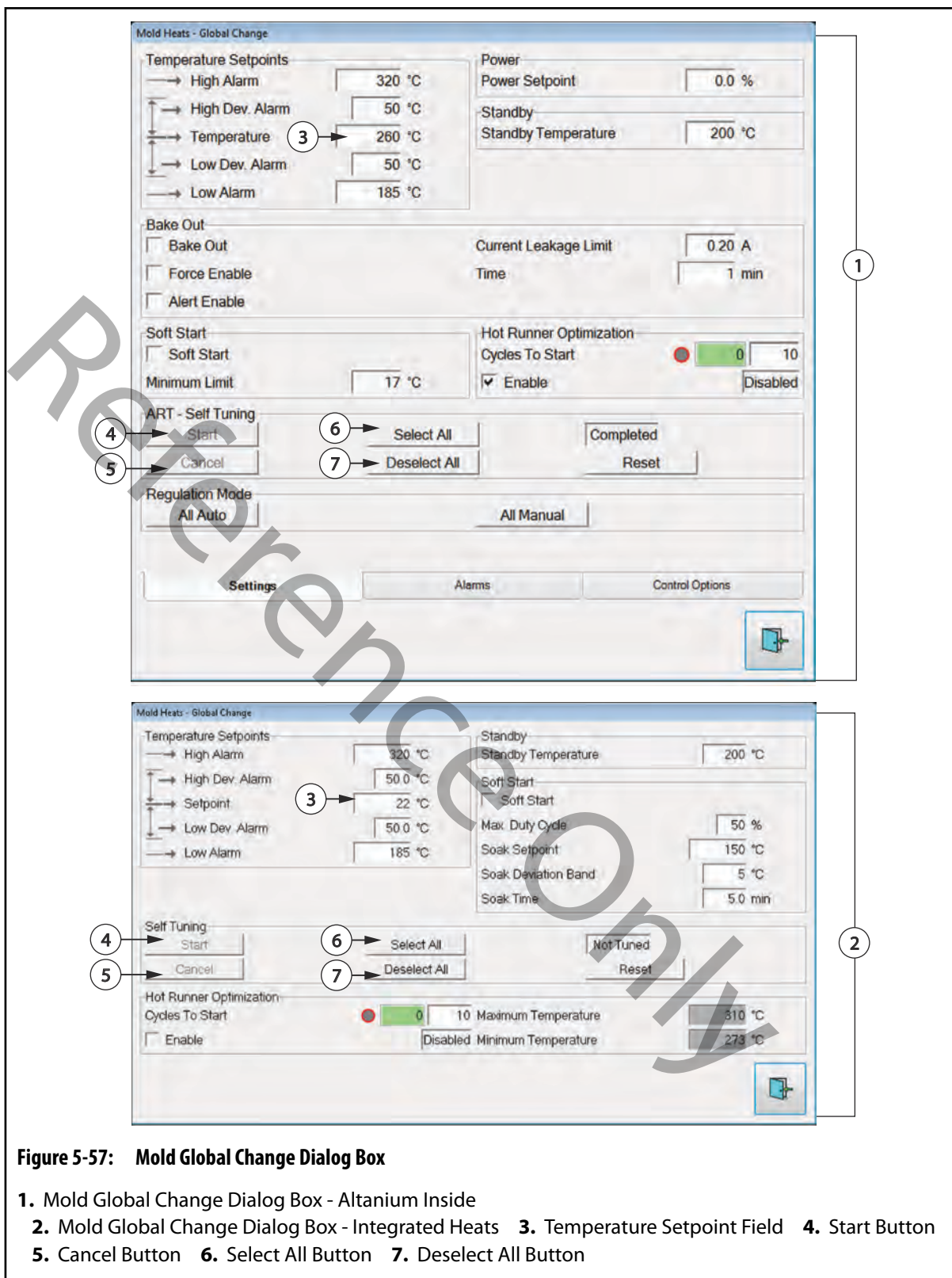


**IMPORTANT!**

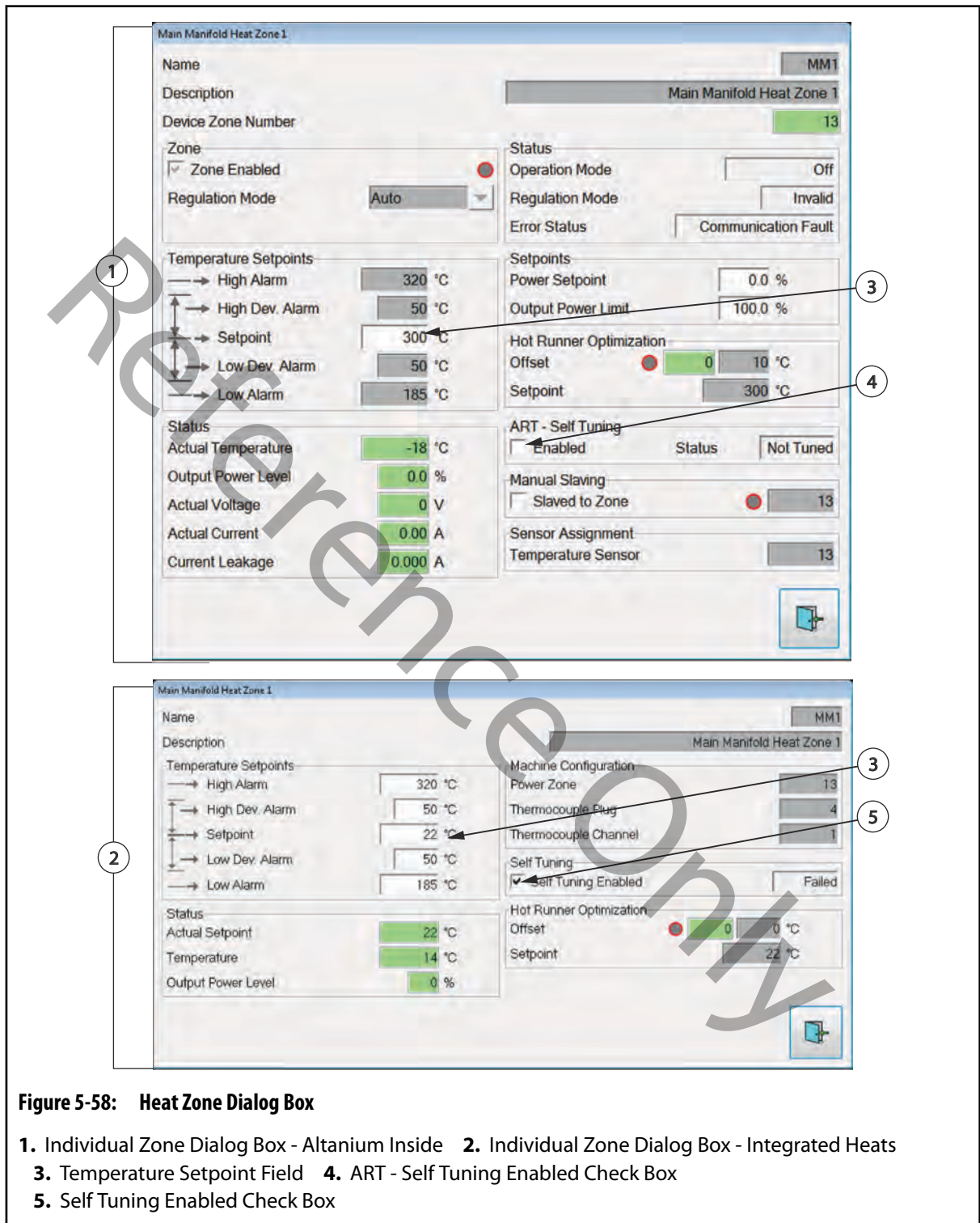
Before starting the tuning procedure, all enabled zones must be functioning properly. Any zones not functioning properly will cause faulty parameters.

-
9. To tune an individual heat zone, do the following:
 - a. Touch the **Global Change** button. A dialog box will open.

Reference Only



- c. On the **Mold Heats** screen, touch the desired heat zone setup field to open the **Heat Zone** dialog box.



- d. Touch the **Temperature Setpoint** value and type an appropriate processing temperature value.
- e. Select the **Self Tuning Enabled** or **ART - Self Tuning Enabled** check box.

- f. Touch the **Exit** button to close the dialog box.
 - g. On the **Mold Heats** screen, touch the **Global Change** button to open the dialog box.
 - h. Touch **Start**. The tuning process will begin for the selected heat zone.
 - i. Touch the **Exit** button to close the dialog box.
 10. To tune all zones, do the following:
 - a. Touch the **Global Change** button. A dialog box will open.
 - b. Touch the **Setpoints Temperature** value and type an appropriate processing temperature value.
 - c. Touch the **Select All** button.
 - d. Touch the **Start** button. The tuning process will begin for all heat zones.
 - e. Touch the **Exit** button to close the dialog box.

5.2.7.2 Stopping the Tuning Process

To stop the heats tuning process at any time after it has begun, do the following:

1. Touch the **Global Change** button to open the dialog box.
2. Touch the **Cancel** button.
3. Touch the **Exit** button to close the dialog box.

5.2.8 Removing Fixed Guards with Retentive Bolts

Some fixed guards are installed using retentive bolts. These guards include, but are not restricted to the following:

- Barrel cover
- Injection housing panels
- Clamp base operate and non-operator side well guards
- Conveyor gate panel

CAUTION!

Mechanical hazard – risk of damage to the machine. Do not loosen the retentive bolts on at a time. Damage to the fixed guard will occur.

To remove a fixed guard installed with retentive bolts, incrementally loosen all bolts in a sequential pattern until the guard can be removed.

NOTE:

If a push nut is dislodged or damaged, a replacement must be installed.

5.3 Clamp Unit Maintenance

The following procedures are specifically for components in the clamp unit area of the machine.

5.3.1 Removing and Installing the Clamp Hood Assembly

The following procedures describe how to remove and install the clamp hood assembly.

5.3.1.1 Installing the Clamp Hood Assembly

To install the clamp hood assembly, do the following:



WARNING!

Crushing hazard - risk of death or serious injury. Inadequate lifting equipment can fail and could cause injury or death. Make sure all lifting equipment is rated for the load and in safe operating condition.

1. If the clamp hood is unfolded, proceed to [step 3](#).

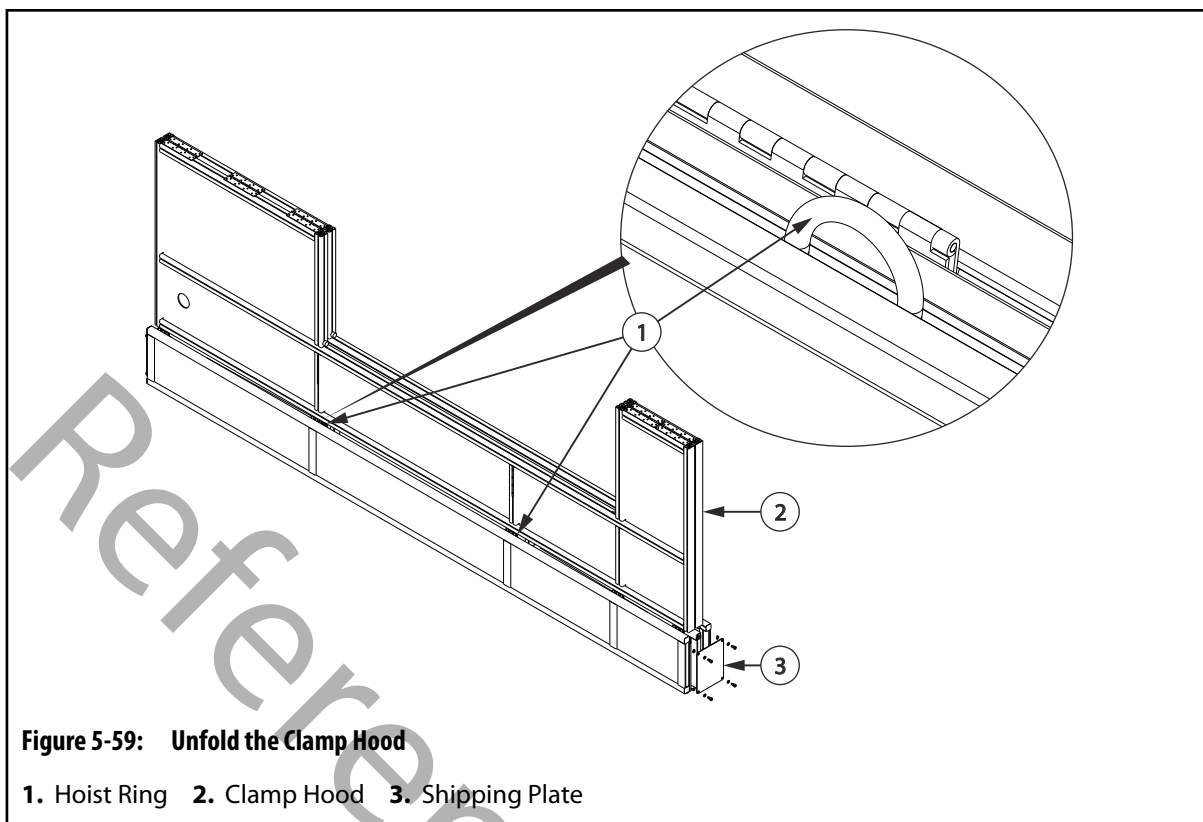
To unfold the clamp hood, do the following:



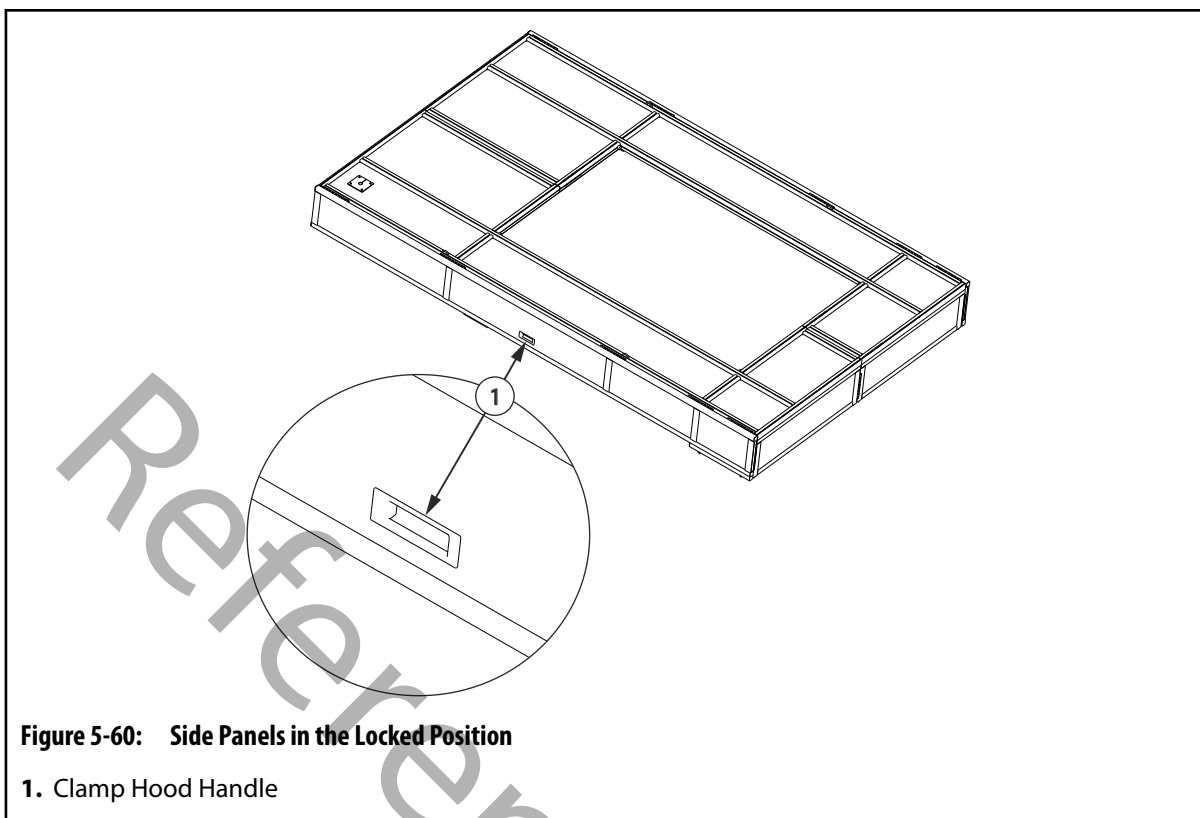
WARNING!

Crushing hazard – risk of death or serious injury. Use suitable lifting equipment to lift the clamp hood. Exceeding the rated capacity of lifting equipment could cause injury or death.

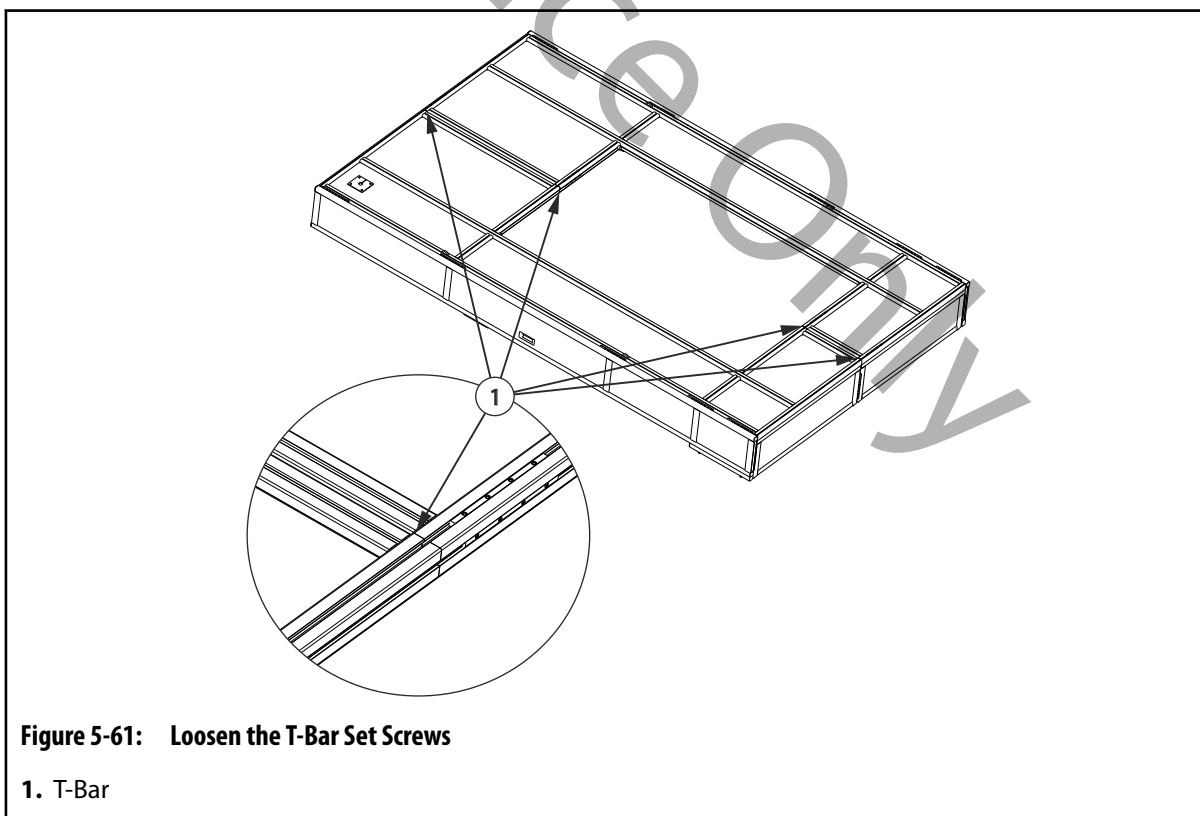
- a. Attach suitable lifting equipment to two opposing hoist rings on the clamp hood.



- b.** Using the lifting equipment, lift the clamp hood approximately three feet off the floor.
- c.** Remove the shipping plates, if installed.
- d.** With team members on opposite sides of the clamp hood, pull the clamp hood handles until the side panels lock into position.



- e. Using a suitable lifting device, lower the clamp hood to the floor.
- f. Loosen the T-Bar set screws.



- g. Make sure each T-Bar drops into its corresponding channel. If required, lightly tap the T-Bar to drop the T-Bar into the channel.
- h. Slide the T-Bar until it is evenly positioned between the two hinged points.

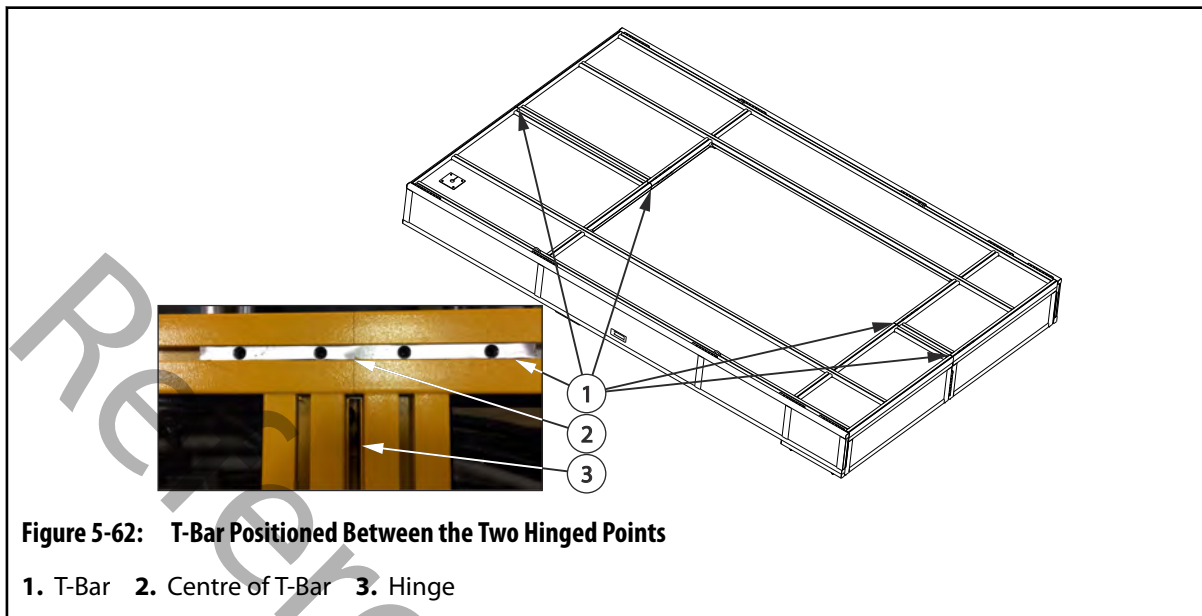


Figure 5-62: T-Bar Positioned Between the Two Hinged Points

1. T-Bar 2. Centre of T-Bar 3. Hinge

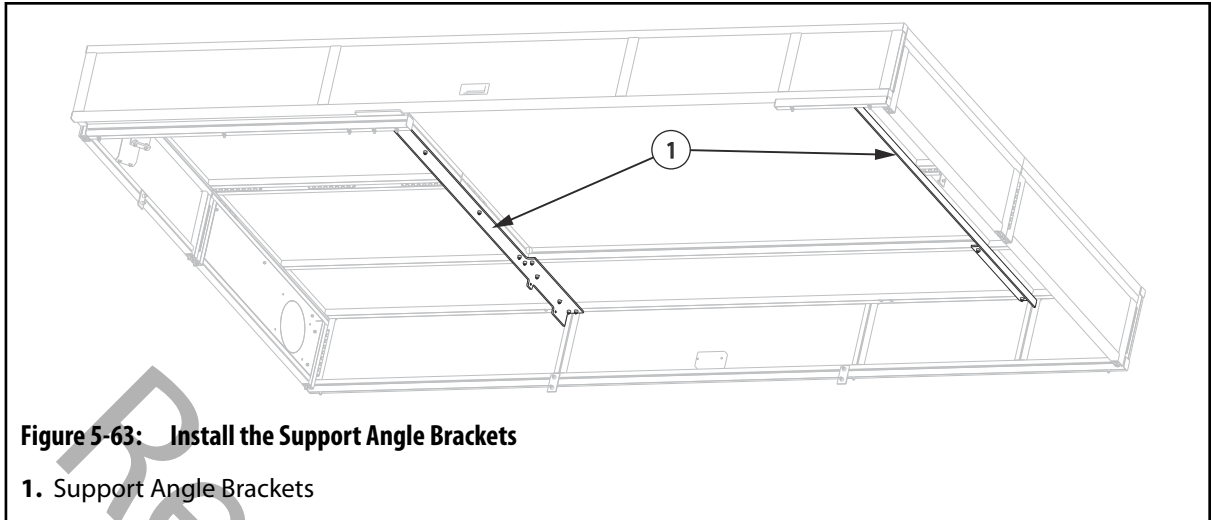
- i. Tighten the T-Bar set screws to lock the T-bars in the channel.
2. Attach suitable lifting equipment to one hoist ring on the clamp hood.
- If the lifting equipment is attached to two hoist rings, use suitable lifting equipment to lower the clamp hood to the floor and disconnect the lifting equipment from one hoist ring.



WARNING!

Crushing hazard – risk of serious injury or damage to the clamp hood. Do not remove the lifting equipment that supports the clamp hood on its side. Removing the lifting equipment could result in serious injury or equipment damage if the clamp hood tips and falls.

- 3. Using the lifting equipment, lift the clamp hood assembly onto its side. To prevent the clamp hood from tipping, do not remove the lifting equipment.
- 4. Install the support angle brackets.



5. Using the lifting equipment, lower the clamp hood to the floor.



WARNING!

Crushing hazard – risk of death or serious injury. Use suitable lifting equipment to lift the clamp hood. Exceeding the rated capacity of lifting equipment could cause injury or death.

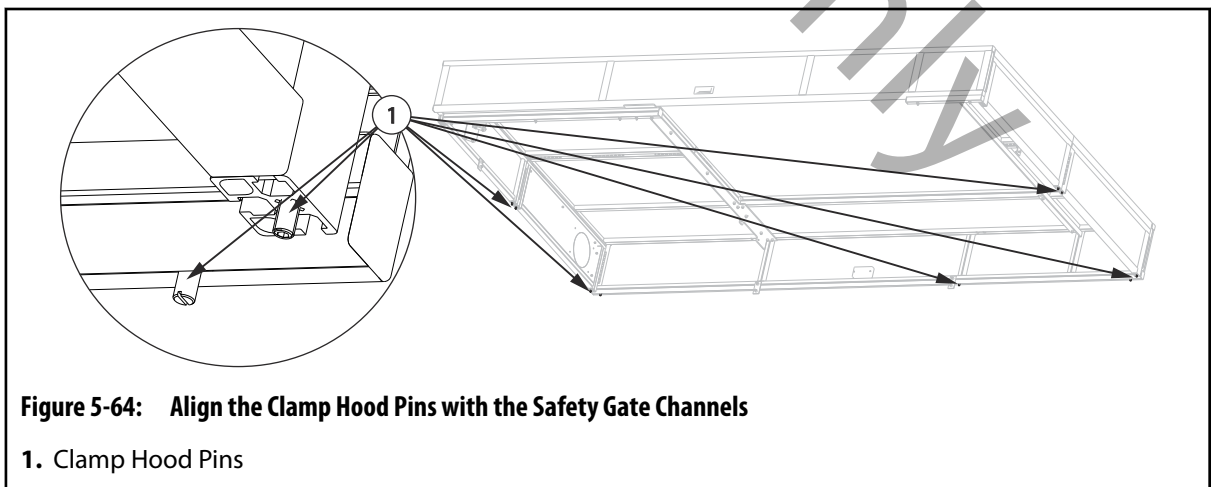
6. Attach suitable lifting equipment to four hoist rings on the clamp hood.



WARNING!

Complete the Lockout/Tag out of all energy sources in accordance with applicable local codes before performing maintenance activities. Failure to do so could result in serious injury or death.

7. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
8. Using a suitable lifting device, move the clamp hood onto the safety gates. Make sure to align the clamp hood pins with the safety gate channels.



9. Using the lifting equipment, lower the clamp hood into position.

**WARNING!**

Crushing hazard – risk of serious injury or damage to the equipment. Disconnecting the lifting equipment before the clamp hood is supported and secured could cause serious injury or damage to the equipment. Make sure the clamp hood is secured before disconnecting the lifting equipment.

10. To secure the clamp hood to the safety gates, install the four connecting brackets and bolts.

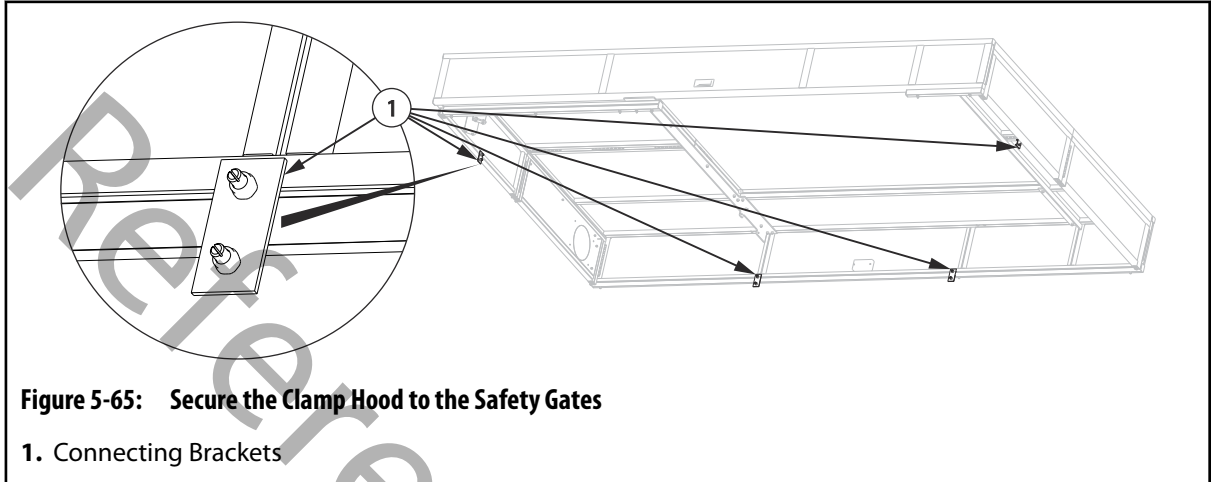


Figure 5-65: Secure the Clamp Hood to the Safety Gates

1. Connecting Brackets

11. Disconnect the lifting equipment from the clamp hood.
12. Remove all locks and tags.

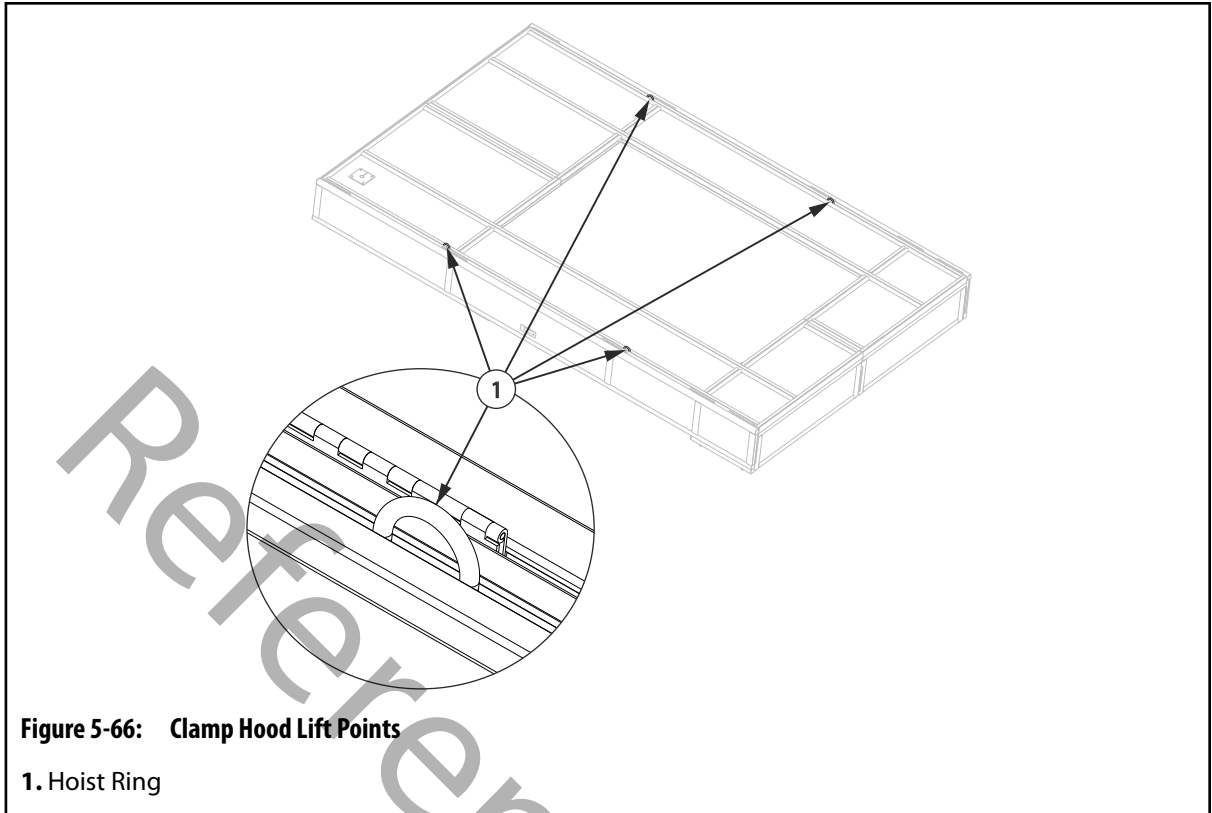
5.3.1.2 Removing the Clamp Hood Assembly

To remove the clamp hood assembly, do the following:

**WARNING!**

Complete the Lockout/Tag out of all energy sources in accordance with applicable local codes before performing maintenance activities. Failure to do so could result in serious injury or death.

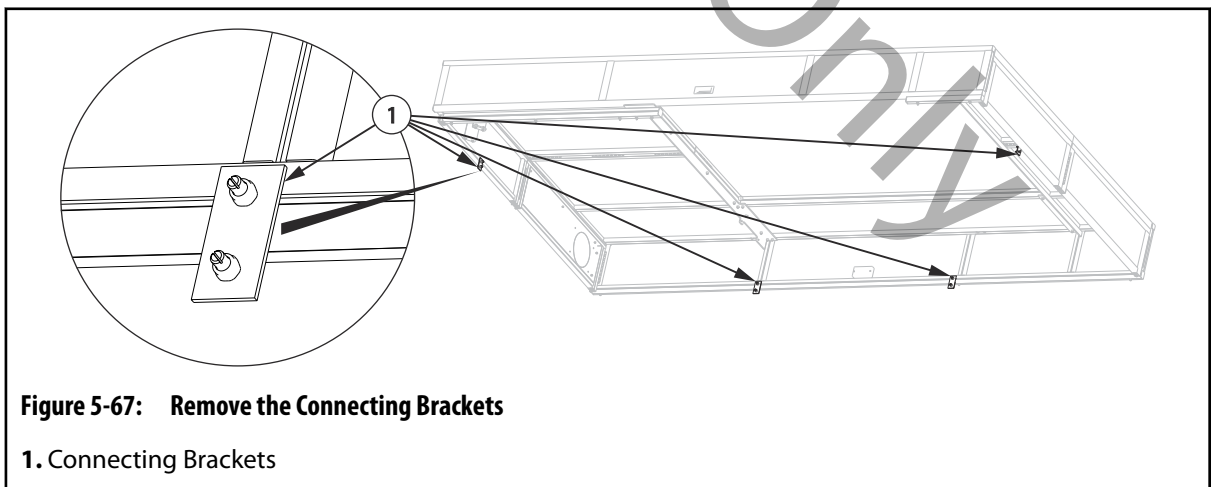
1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



WARNING!

Crushing hazard – risk of death or serious injury. Use suitable lifting equipment to lift the clamp hood. Exceeding the rated capacity of lifting equipment could cause injury or death.

2. Attach suitable lifting equipment to four hoist rings on the clamp hood.
3. Remove the four connecting brackets and bolts.



**WARNING!**

Crushing hazard - risk of death or serious injury. Inadequate lifting equipment can fail and could cause injury or death. Make sure all lifting equipment is rated for the load and in safe operating condition.

4. Using a suitable lifting device, lift the clamp hood and place it in a safe location.
5. Remove all locks and tags.

5.3.2 Mold Area Maintenance Light

An overhead light is located inside the safety gates to assist when performing maintenance activities inside the mold area. The light is controlled via the HMI.

To turn on or turn off the light do the following:

1. In the **Clamp** screen area of the **Home** screen, touch the **Mold Area Light** check box. Click the **Accept** button to turn on or turn off the light.

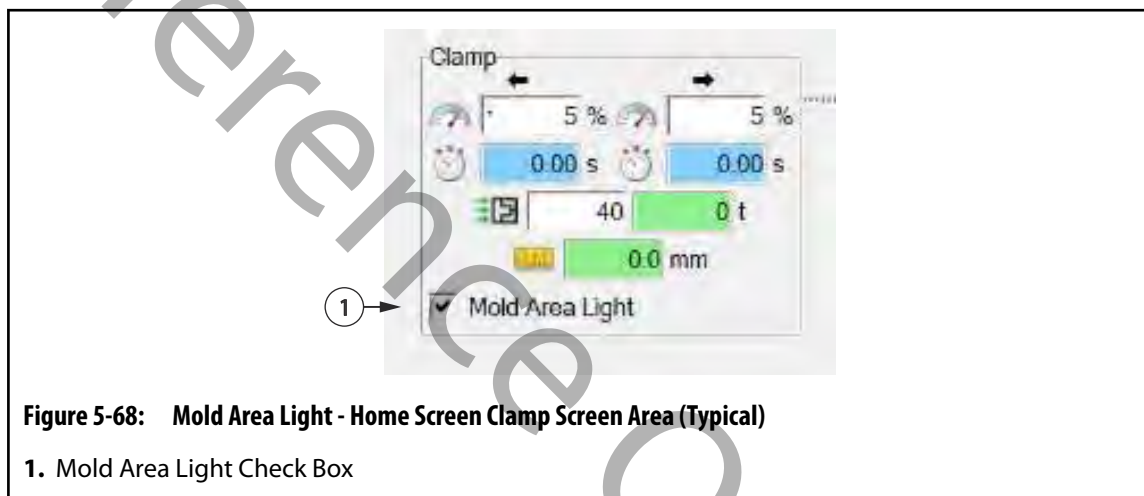


Figure 5-68: Mold Area Light - Home Screen Clamp Screen Area (Typical)

1. Mold Area Light Check Box

NOTE:

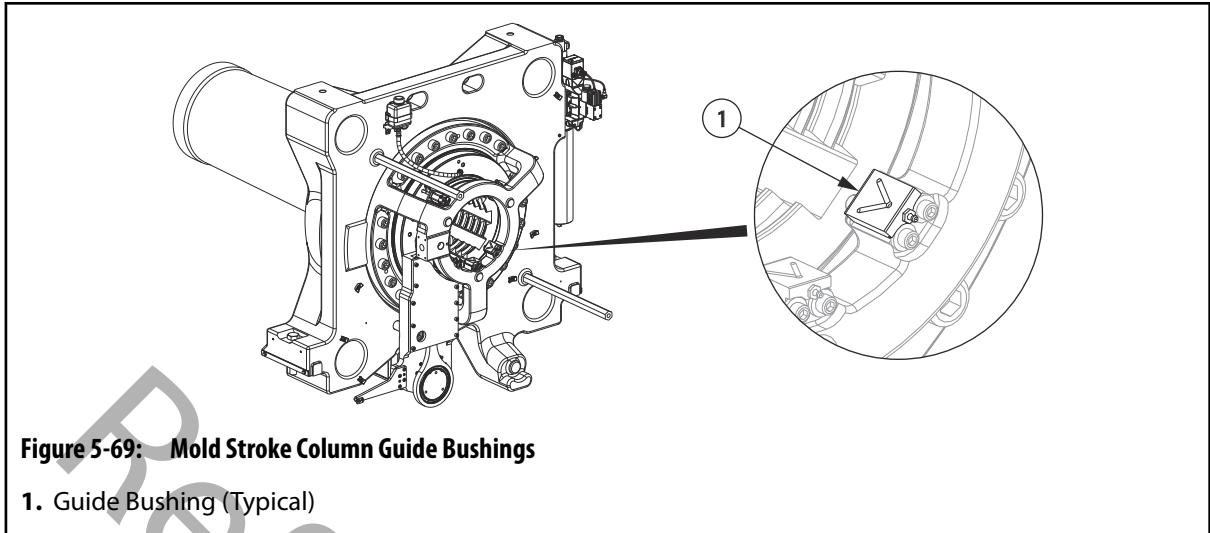
The mold area light control checkbox may also be accessed by touching the **Clamp** button and then touching the **Advanced** button to display the **Advanced Settings** screen.

5.3.3 Lubricating the Mold Stroke Column Guide Bushings

The mold stroke column guide bushings must be lubricated at intervals specified in the maintenance schedule.

To lubricate the mold stroke column guide bushings, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Wipe the grease fittings on the three guide bushings with a clean cloth.



3. Apply a food grade grease to the grease fittings. Do not over-lubricate the fittings.
Refer to [Section 7.9](#) for a list of recommended lubricants.
4. Remove any excess grease on the grease fittings with a clean cloth.
5. Remove all locks and tags.

5.3.4 Inspecting the Mold Stroke Column Guide Bushings

To inspect the mold stroke column guide bushings, do the following:



WARNING!

Hazardous voltages, high pressure fluids, crushing or impact hazards – risk of death or serious injury. Before working in the clamp area of the machine, lock out and tag the machine in accordance with local codes.

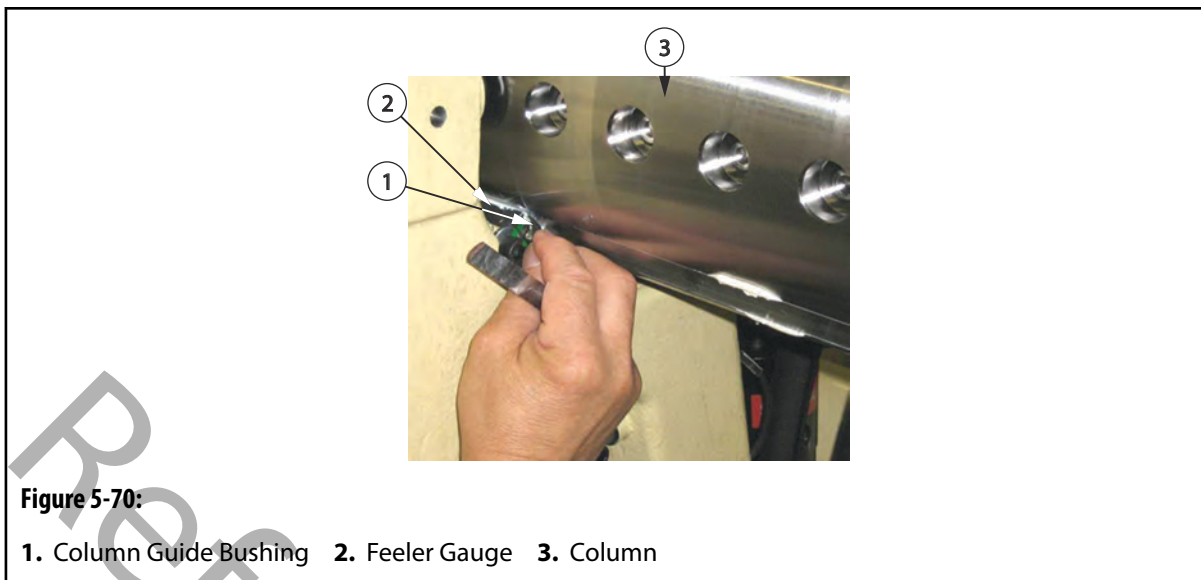
Only qualified personnel should lock out and tag the machine.



IMPORTANT!

Platen parallelism, machine level, and alignment must be within specification before inspecting the column guide bushings. Refer to [Section 5.2.6](#) for more information.

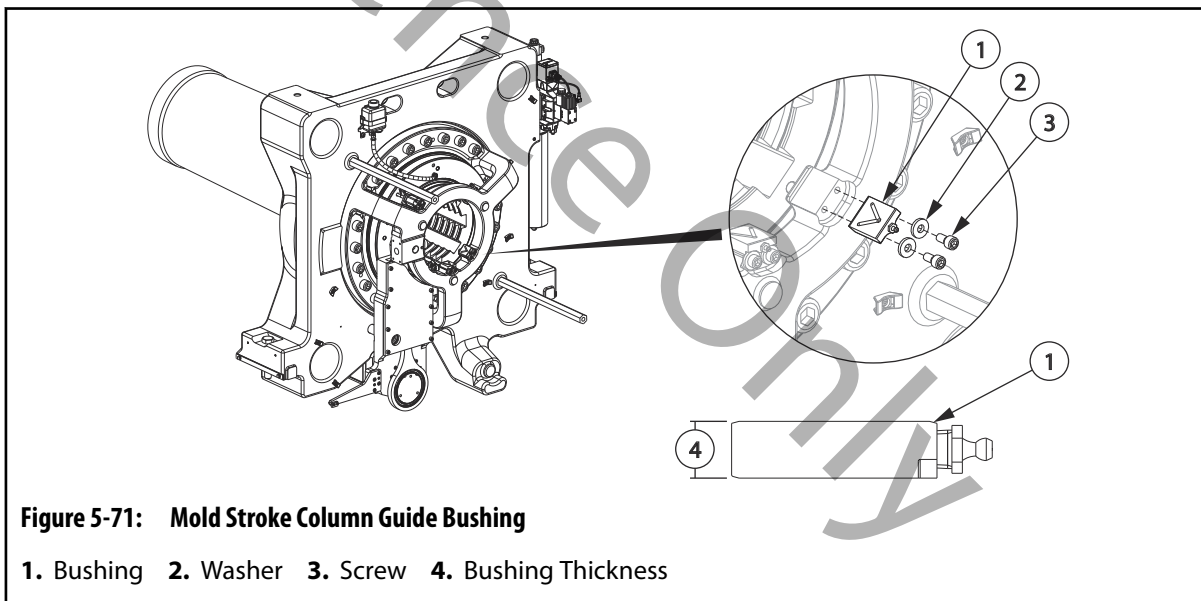
1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Move the moving platen to 100 mm (3.9 in) from the maximum daylight position. For maximum daylight positions, refer to [Section 7.2](#).
3. Using a feeler gauge, measure the gap between the column and all column guide bushings. Record the gap measurement.



If gap is between 0.05 mm (0.002 in) and 0.3 mm (0.01 in) , the column guide bushings are with the acceptable range.

If gap measurement is outside acceptable range after all alignment and parallelism checks have been made, proceed to [step 4](#).

4. Remove the two retaining screws at the front of the column guide bushing.



5. Remove the column guide bushings and then measure column guide bushing thickness.
6. Calculate the value for X.

$$X = \text{gap measurement} + \text{column guide bushing thickness}$$

Consult the following table to determine which column guide bushing to order.
7. Install the replacement column guide bushing and secure with screws.
8. Remove all locks and tags.

5.3.5 Lubricating the Moving Platen Linear Bearings

The moving platen linear bearings must be lubricated at intervals specified in the maintenance schedule. The linear bearings are lubricated using a three-step application. The total quantity of grease is divided by three and applied to the linear bearings in three applications. The quantity of grease applied to the linear bearings should never exceed the Total Grease Quantity Per Linear Bearing Block column in .

To lubricate the moving platen linear bearings, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Wipe the grease fittings on the moving platen linear bearings with a clean cloth. It is not necessary to wipe the linear rails clean but they should be free from debris.

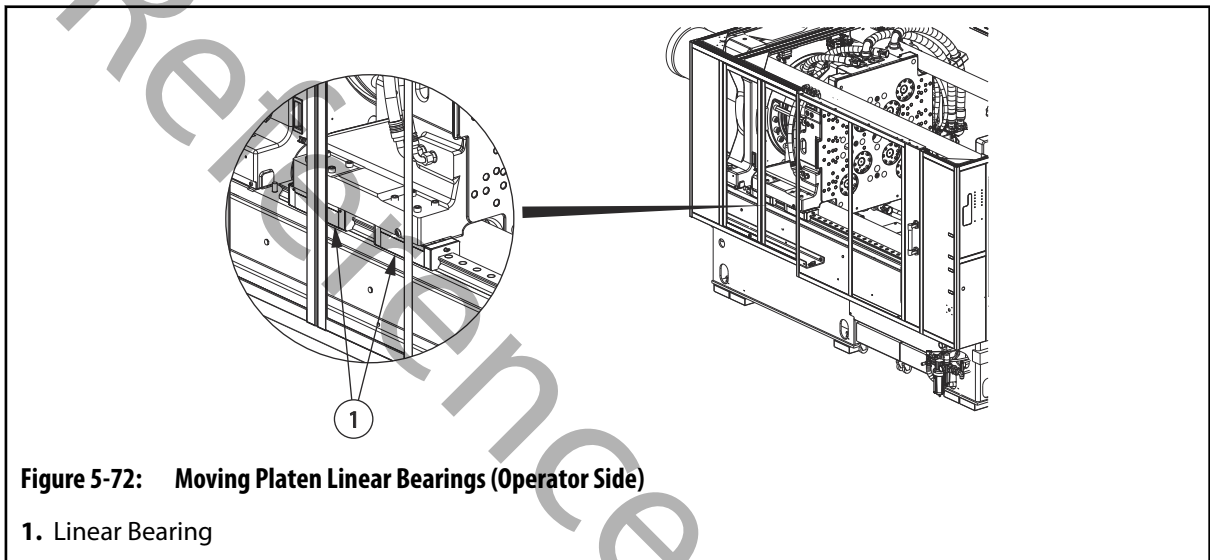


Figure 5-72: Moving Platen Linear Bearings (Operator Side)

1. Linear Bearing

CAUTION!

Mechanical hazard – risk of damage to the machine. Do not over-lubricate the linear bearings. Use lubricant quantities specified. Also, do not mix different types of lubricants.

-
3. Prepare or load the hand-powered grease gun with grease and calculate the required number of strokes based on the application amount delivered per stroke for your grease gun.

Refer to [Section 7.9](#) for a list of recommended lubricants.

CAUTION!

Risk of damage to the linear bearings. Powered grease guns should not be used.

Grease gun discharge pressure must not exceed 196 bar (2843 psi) .

-
4. Apply the first application of grease to each grease fitting, according to the Three-Step Grease Application Quantity Per Linear Bearing Block column in . Do not over-lubricate the bearings.

5. Move the linear bearing block(s) one full block length ± 25 mm (1 in) along the rail.
 - a. Remove all locks and tags.
 - b. Power on the machine and log onto the HMI.
 - c. Put the machine in **Mold Set** mode.
 - d. Using the **Mold Close** or **Mold Open** buttons move the linear bearing block one full block length ± 25 mm (1 in) along the rail.
 - e. Lock out and tag the machine.
6. Apply the second application of grease to each grease fitting, according to the Three-Step Grease Application Quantity Per Linear Bearing Block column in . Do not over-lubricate the bearings.
7. Repeat [step 5](#) to move the linear bearing block(s) at least one full block length ± 25 mm (1 in) along the rail.
8. Apply the third application of grease to each grease fitting, according to the Three-Step Grease Application Quantity Per Linear Bearing Block column in . Do not over-lubricate the bearings.
9. Remove any excess grease on the grease fittings with a clean cloth.
10. Remove all locks and tags.

5.3.6 Lubricating the Mold Positioning Device Lifting Wedge (if equipped)

The mold positioning device lifting wedge must be lubricated at intervals specified in the maintenance schedule.

To lubricate the mold positioning device lifting wedge, do the following:



WARNING!

Crushing hazard – risk of death or serious injury. Perform the lockout/tagout procedure according to local codes before working in the clamp area of the machine.

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. At the top of the moving platen, wipe the grease fitting on the mold positioning device lifting wedge with a clean cloth.

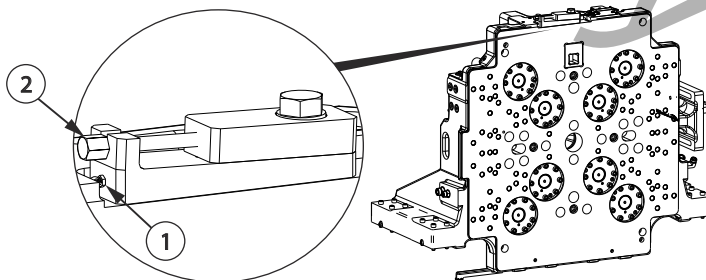


Figure 5-73: Mold Positioning Device Lifting Wedge

1. Grease Fitting 2. Adjusting Bolt

3. Apply food grade grease to the grease fitting and under the adjusting bolt. Make sure to coat the threads with grease. Do not over-lubricate the grease fitting.
Refer to [Section 7.9.2](#) for a list of recommended lubricants.
4. Remove any excess grease on the grease fitting with a clean cloth.
5. Remove all locks and tags.

5.3.7 Inspecting the Electric Clamp Lock Piston Oil Reservoir Level

The oil level in the electric clamp lock piston oil reservoir must be inspected at intervals specified in the maintenance schedule.

To inspect the oil level in the reservoir, do the following:

NOTE:

The oil level in the reservoir will fluctuate during machine operation. Check the oil level only when the machine is idle.

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Inspect the oil reservoir mounted to the clamp casting. If the oil reservoir is half empty or less, do the following:

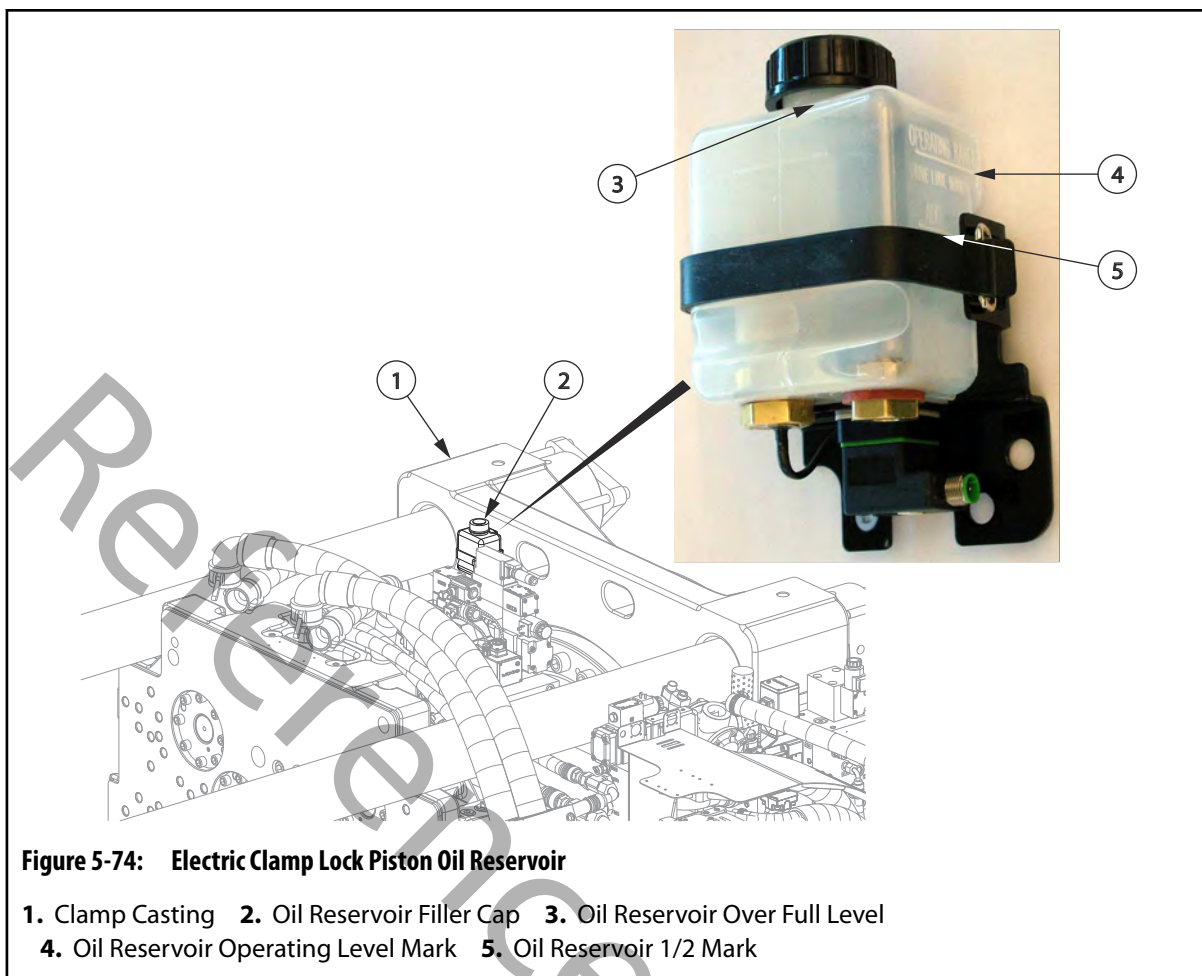


IMPORTANT!

Do not overfill the oil reservoir.

- If the machine is cold (has been shut down for more than four hours), open the oil reservoir filler cap and add oil to between the oil reservoir 1/2 mark and the operating level mark.
- If the machine is warm (has been shut down for less than four hours), open the oil reservoir filler cap and add oil to the oil reservoir operating level mark.

For a list of recommended oils, refer to [Section 7.9.1](#).



3. Remove all locks and tags.

5.3.8 Replacing the Electric Clamp Lock Piston Oil

The oil in the electric clamp lock piston must be replaced at intervals specified in the maintenance schedule.

The following procedures describe how to drain and fill the clamp lock piston with oil.

Procedure	Reference
Draining the electric clamp lock piston oil	Section 5.3.8.1
Filling the electric clamp lock piston with oil	Section 5.3.8.2

5.3.8.1 Draining the Electric Clamp Lock Piston Oil

It is recommended to drain the electric clamp lock piston oil when the machine is warm and has been shut down for a maximum of four hours.

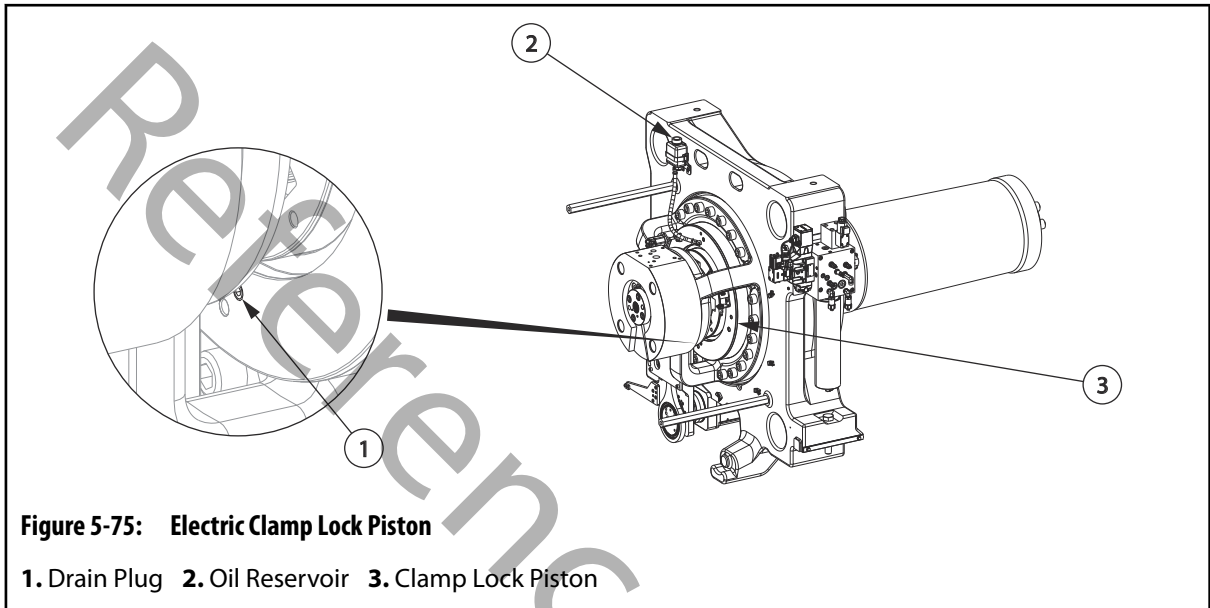
To drain the oil from the electric clamp lock piston, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.

CAUTION!

Contamination hazard – risk of oil contamination. The oil supply is exposed to dirt, debris and other foreign materials when ports are opened. Make sure the area around the port is cleaned before removing the plug or disconnecting the hose.

2. Clean the area around the cap on the oil reservoir.



3. Remove the cap on the oil reservoir.

CAUTION!

Contamination hazard – risk of oil contamination. The oil supply is exposed to dirt, debris and other foreign materials when ports are opened. Make sure the area around the port is cleaned before removing the plug or disconnecting the hose.

4. Clean the area around the drain plug at the bottom of the electric clamp lock piston.
5. Hold a container under the drain plug that can contain 4 L (1 U.S. gal) of oil.



WARNING!

Burn hazard – contact with hot oil can cause severe burns. To avoid injury while draining or handling oil, wear personal protective equipment and make sure the oil temperature is less than 60 °C (140 °F).

6. Remove the drain plug and allow the oil to drain completely into the container.
7. Install the drain plug.

CAUTION!

Corrosion hazard – risk of damage to the machine. To prevent corrosion damage to the inside of the clamp lock piston, always refill the clamp lock piston after draining the oil.

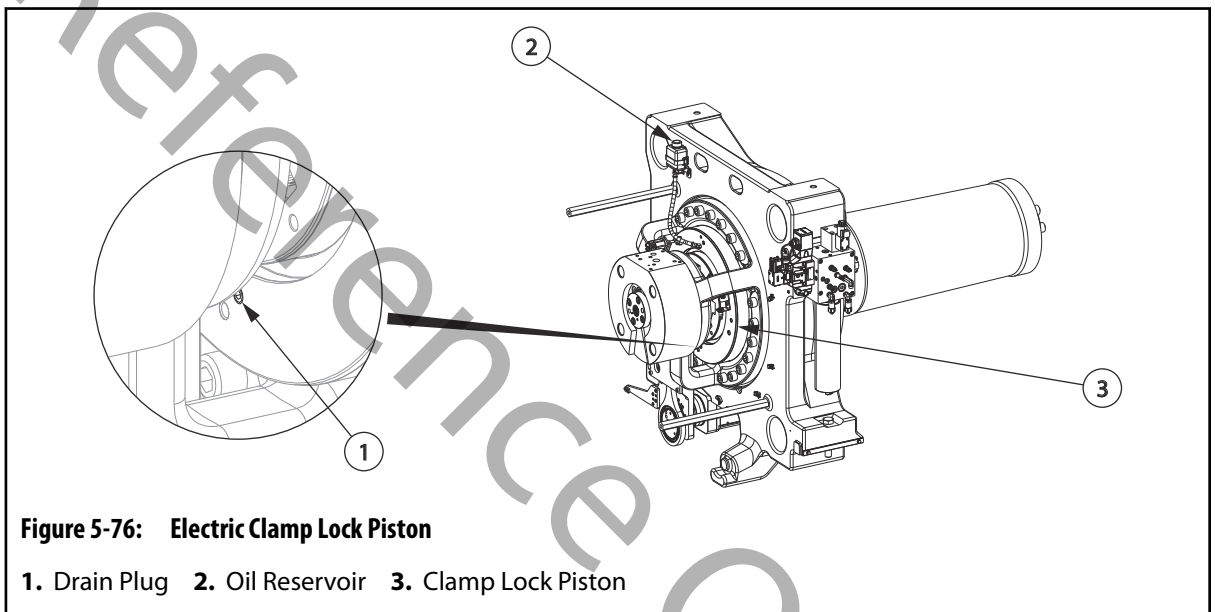
8. Fill the electric clamp lock piston with new oil. Refer to [Section 5.3.8.2](#) for more information.

5.3.8.2 Filling the Electric Clamp Lock Piston with Oil

Before filling the electric clamp lock piston with oil, make sure it is drained. Refer to [Section 5.3.8.1](#) for more information.

To fill the electric clamp lock piston with new oil, do the following:

1. Make sure the cap for the oil reservoir is removed.



2. Fill a clean, hand operated gear oil pump with the recommended oil.
For a list of recommended oils, refer to [Section 7.9.1](#).
3. Connect the gear oil pump to the drain port.
4. Pump new oil into the electric clamp lock piston until the oil reservoir is full to the operating level.
5. Install the oil reservoir filler cap.
6. Disconnect the gear oil pump from the drain port and install the drain plug. Torque the plug to the specified torque value. For standard torque specifications, refer to [Section 7.13](#).
7. Clean up all spilled oil.
8. Remove all locks and tags. Refer to [Section 2.6](#) for more information.

5.3.9 Adjusting the Clamp Casting Position

Over time, the clamp casting position may need to be adjusted to improve parallelism between the moving and stationary platens.

To adjust the position of the clamp casting, do the following:

1. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
2. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
3. On the HMI, touch the **Clamp** button and touch the **Clamp** tab to display the **Clamp** screen.
4. Touch the **Machine Mode Selector** button on the toolbar and select **Mold Set** mode.
5. Monitor the **Shutheight Position** field and press either the **Mold Close** or **Mold Open** keys to move the moving platen to the minimum shut height position. This will reduce the load on the clamp casting end of the machine.
6. Lock out and tag the machine.
7. Lift the clamp unit. Refer to the machine *Site Preparation and Installation Manual* for more information.
8. Lower the clamp unit, disconnect the overhead lifting device and remove the lifting slings.
9. Remove the shipping screws.
10. Remove all locks and tags.
11. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
12. Cycle the machine and apply tonnage.
13. Repeat to [step 7](#) to make sure the clamp casting is centered on the base.

5.4 Injection Unit Maintenance

The following procedures are specifically for components in the injection unit area of the machine.

5.4.1 Adjusting the Nozzle Concentricity

To avoid wear or damage over time, the injection nozzle must be concentric with the platen bore in the stationary platen. To measure nozzle concentricity, refer to [Section 5.2.6.9](#) for more information.

Perform the following procedures to adjust the nozzle concentricity.

Procedure	Reference
Preparing the machine for nozzle concentricity adjustment	Section 5.4.1.1
Adjusting the horizontal nozzle concentricity	Section 5.4.1.2
Adjusting the vertical nozzle concentricity	Section 5.4.1.3

5.4.1.1 Preparing the Machine for Nozzle Concentricity Adjustment

To prepare the machine to adjust the nozzle concentricity, do the following:

1. Remove all locks and tags. Refer to [Section 2.6](#) for more information.

2. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
3. On the HMI, touch the **Heats** button and touch the **Machine Heats** tab to display the **Machine Heats** screen.

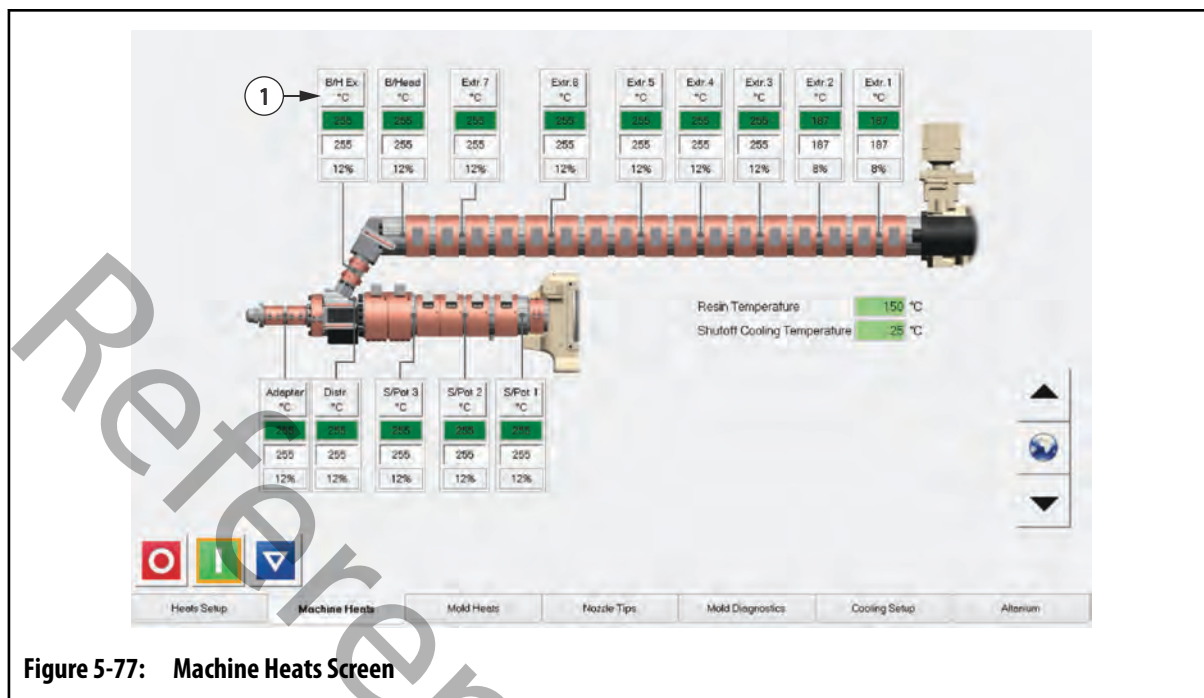


Figure 5-77: Machine Heats Screen

4. Make sure the injection unit is up to operating temperature.



WARNING!

Burn or explosion hazard – risk of death or serious injury. Molten process material at high pressure could be present. Purge the injection unit to minimize the potential for any pressure build-up. Wear personal protective equipment while purging the injection unit.

5. Purge the injection unit. Refer to [Section 4.26.1.16](#) for more information.
6. Make sure the injection nozzle tip is flush with the mounting surface of the stationary platen.
7. Lock out and tag the machine.

5.4.1.2 Adjusting the Horizontal Nozzle Concentricity

To adjust the horizontal concentricity of the injection nozzle, do the following:

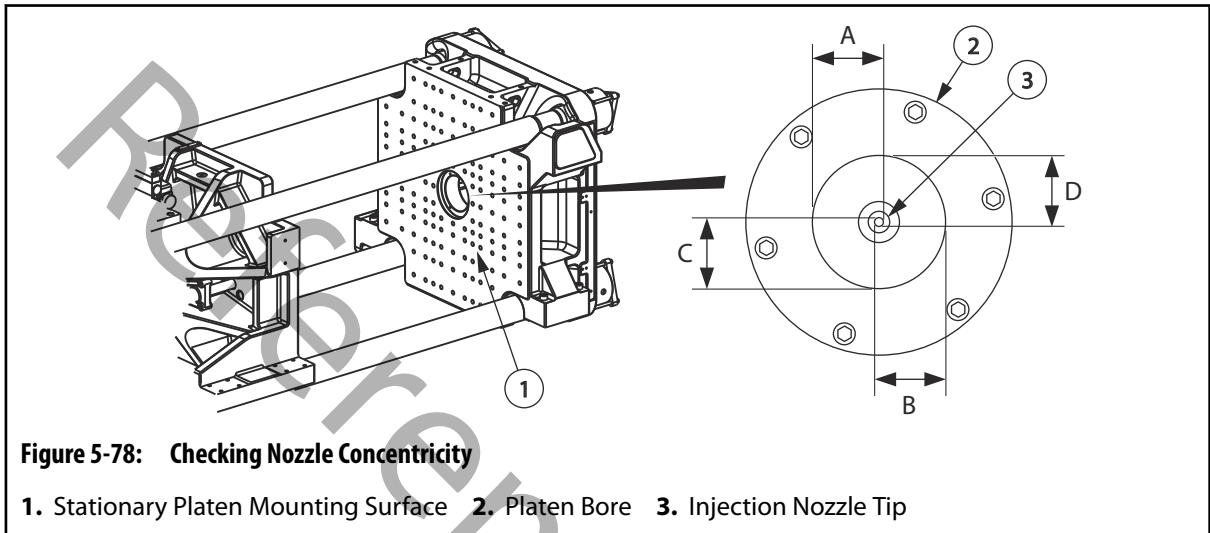
1. Prepare the machine for nozzle concentricity. Refer to [Section 5.4.1.1](#) for more information.
2. Make sure the machine is locked and tagged.
3. Loosen the screws that connect the injection and clamp units.
4. Adjust the horizontal position of the nozzle by raising or lowering the leveling mounts on the operator and/or non-operator side of the injection unit. The injection unit must maintain the leveling tolerance of ± 0.5 mm per 1000 mm (0.005 in per 12 in).



WARNING!

Burn or explosion hazard – risk of death or serious injury. Molten process material at high pressure can be present. Wear personal protective equipment while measuring nozzle concentricity. Do not stand in front of the nozzle.

5. Using a vernier caliper, measure the horizontal distances (A and B) between the injection nozzle tip and the platen bore. The difference between the two horizontal measurements must not exceed 0.5 mm (0.02 in) . Refer to the following figure.



6. If necessary, continue to raise or lower the injection unit base until horizontal concentricity is achieved.

NOTE:

If the concentricity measurement still exceeds 0.5 mm (0.02 in) , contact your nearest Husky Regional Service and Sales office for assistance.

7. Tighten the screws that connect the injection and clamp units to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.

5.4.1.3 Adjusting the Vertical Nozzle Concentricity

To adjust the vertical concentricity of the injection nozzle, do the following:

NOTE:

If adjustments are required on both the horizontal and vertical concentricity, adjust the horizontal adjustments first.

1. Prepare the machine for nozzle concentricity. Refer to [Section 5.4.1.1](#) for more information.
2. Make sure the machine is locked and tagged.
3. Loosen the screws that connect the injection and clamp units.

**WARNING!**

Burn or explosion hazard – risk of death or serious injury. Molten process material at high pressure can be present. Wear personal protective equipment while measuring nozzle concentricity. Do not stand in front of the nozzle.

CAUTION!

Mechanical hazard – risk of damage to the machine. Do not use the barrel support to adjust the vertical concentricity of the barrel. Damage to the barrel could occur.

4. Adjust the vertical position of the nozzle by raising or lowering the leveling mounts at the end of the injection unit. The injection unit must maintain the leveling tolerance of ± 0.5 mm per 1000 mm (0.005 in per 12 in).

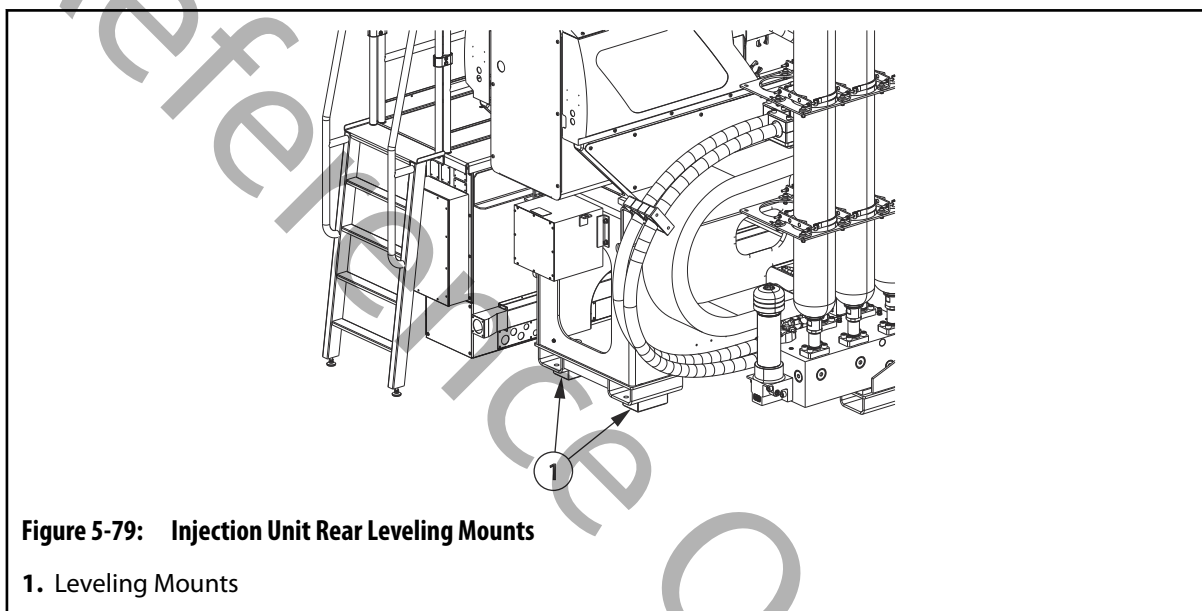
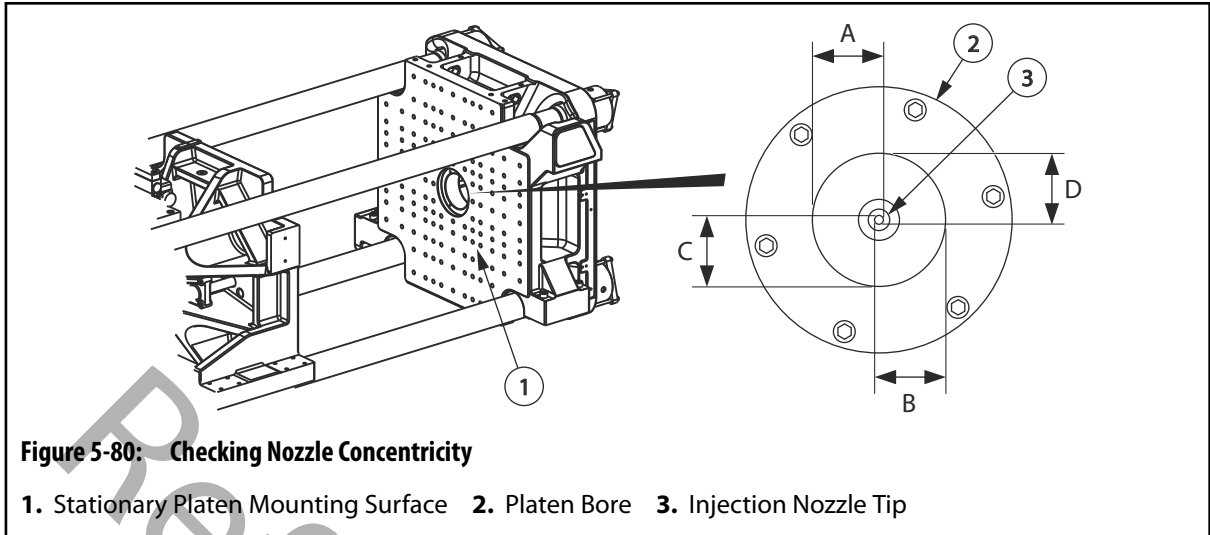


Figure 5-79: Injection Unit Rear Leveling Mounts

1. Leveling Mounts

5. Using a vernier caliper, measure the vertical distances (C and D) between the injection nozzle tip and the platen bore. The difference between the two vertical measurements must not exceed 0.5 mm (0.02 in) . Refer to [Figure 5-80](#).



6. If necessary, continue to raise or lower the injection unit end until vertical concentricity is achieved.

NOTE:

If the concentricity measurement still exceeds 0.5 mm (0.02 in) , contact your nearest Husky Regional Service and Sales office for assistance.

7. Tighten the screws that connect the injection and clamp units to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.

5.4.2 Cleaning the Nozzle Tip, Stationary Platen and Purge Guard

To clean the nozzle tip, stationary platen and purge guard, do the following:



WARNING!

Explosion hazard – risk of serious injury. Molten material at high pressure can be present. Wear personal protective equipment and use a mirror to look into the nozzle opening.



WARNING!

Burn hazard – risk of serious injury. Machine surfaces and molten process material can be hot. Wear personal protective equipment.

CAUTION!

Mechanical hazard - risk of damage to the nozzle tip. Only use brass tools to remove process material buildup.

1. On the HMI, press and hold the **Carriage Back** key to move the injection carriage away from the clamp.
2. Open the purge guard.
3. Use a brass tool to carefully remove all molten or solidified process material from the nozzle tip, stationary platen and purge guard.
4. Close the purge guard.
5. Press and hold the **Carriage Forward** key until the nozzle tip is firmly seated against the mold sprue.

**WARNING!**

Burn hazard – risk of serious injury. Wear personal protective equipment when handling molten process material.

6. After cleaning, discard the process material into a suitable metal container.

5.4.3 Clearing the Feed Throat

To clear the material feed throat of process material, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#).

**WARNING!**

Burn or explosion hazard – risk of death or serious injury. Molten process material at high pressure can be present. Wear personal protective equipment and keep your face and body away from the feed throat area.

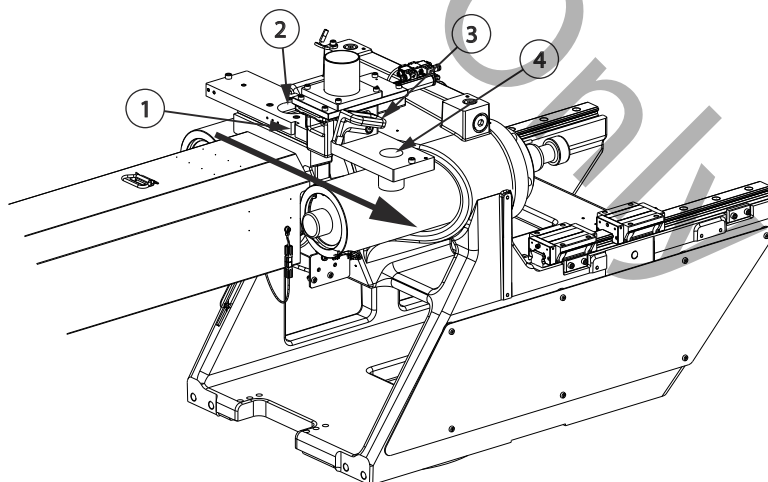


Figure 5-81: Cleaning the Feed Throat (Typical)

1. Slot 2. Feed Throat Opening 3. Pivot Handle Assembly 4. Resin Discharge Position

2. Lift the pivot handle and pull the assembly towards you to a closed position in between the feed throat opening and the resin discharge position.
3. Keeping your face away from the feed throat area, vacuum out any process material pellets in the feed throat.

NOTE:

If the screw is not clearly visible through the feed throat opening, process material may have solidified in the feed throat.

CAUTION!

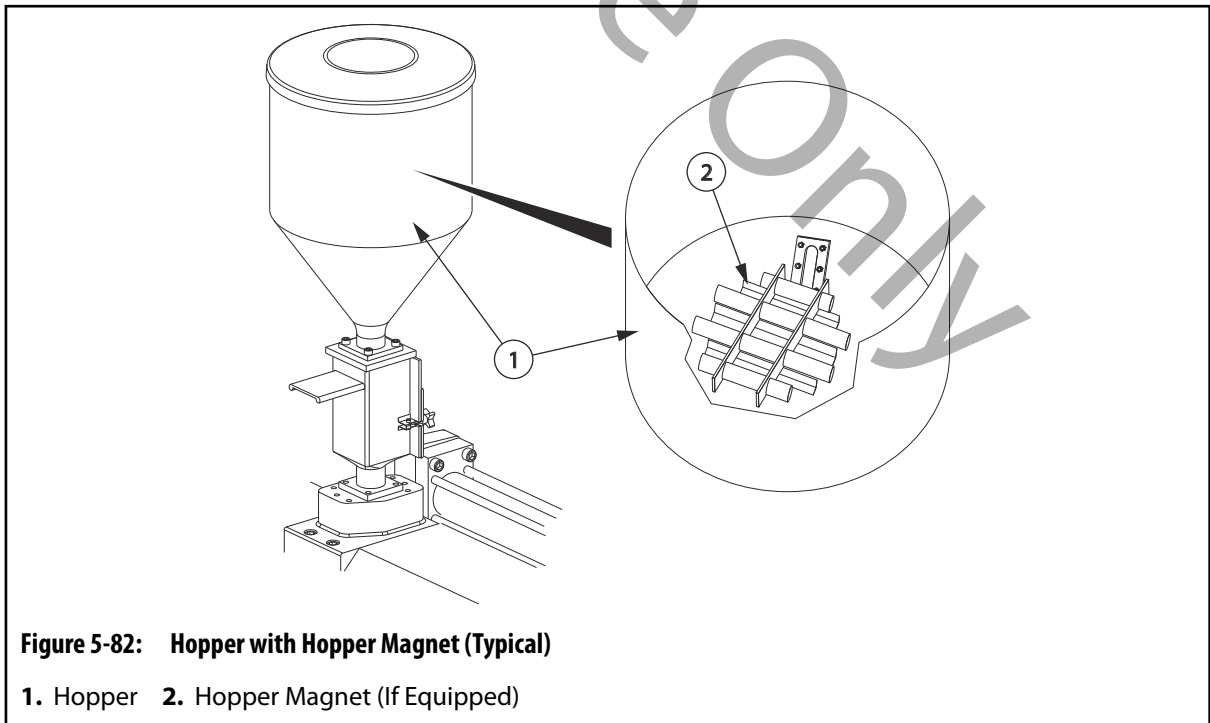
Mechanical hazard – risk of damage to the machine. Use only brass tools to dislodge solidified process material.

4. Using extreme caution, keep your face away from the feed throat area and carefully remove the solidified process material using a brass chisel and a hammer.
5. Vacuum out all process material in the feed throat.
6. Lift the pivot handle and push the assembly until the pivot point locks into the slot before the feed throat. Make sure the feed throat opening is covered.
7. Remove all locks and tags.

5.4.4 Inspecting and Cleaning the Hopper

To inspect and clean the hopper, do the following:

1. Remove the hopper lid and clean the inside of the hopper with a clean cloth.

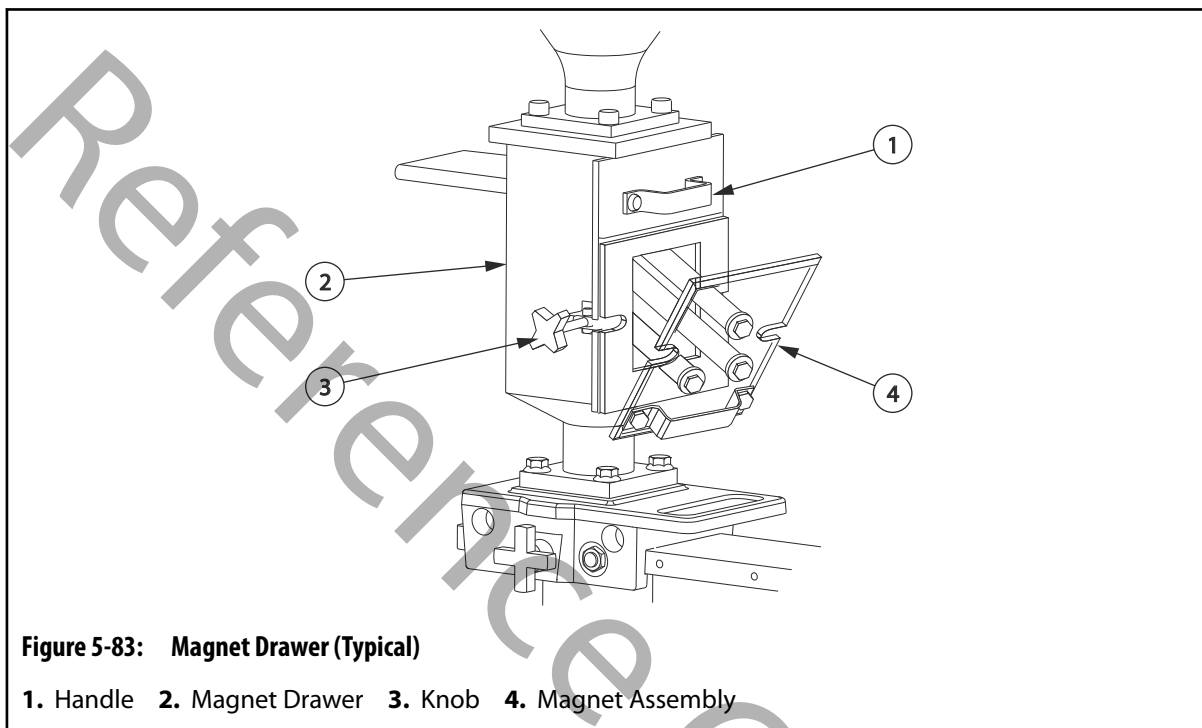


2. If the hopper is equipped with an optional hopper magnet, remove any metal objects from the magnet and wipe it with a clean cloth.
3. Replace the hopper magnet and install the lid.

5.4.5 Inspecting and Cleaning the Magnet Drawer (If Equipped)

To inspect and clean the magnet drawer, do the following:

1. Pull the handle to shut off the flow of process material into the magnet drawer.



2. Empty all process material from the magnet drawer.
3. Loosen the knobs and swivel them to the side.
4. Remove the magnet assembly.
5. Wipe the magnets with a clean cloth.
6. Install the magnet assembly and tighten the knobs.

5.4.6 Lubricating the Injection Unit

To lubricate the grease points (extruder linear bearings) and inspect the rails on the injection unit, do the following:

1. On the HMI, press the **Manual Cycle** key.
2. Press and hold the **Carriage Back** key until the unit is fully retracted.
3. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
4. At the gear box end of the machine, wipe the grease fittings on both sides of the gear box with a clean cloth.

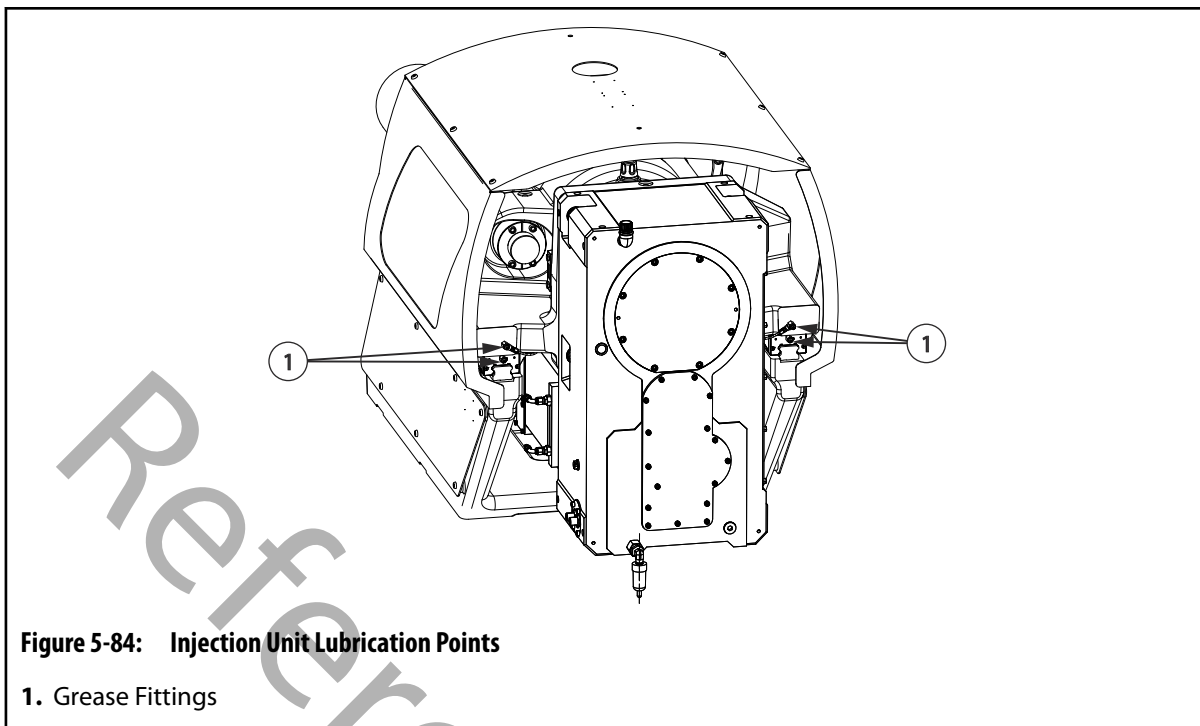


Figure 5-84: Injection Unit Lubrication Points

1. Grease Fittings

5. Apply food grade grease to each grease fitting. Do not over-lubricate the bearings.

Refer to [Table 5-3](#) for the required quantity.

Refer to [Section 7.9.2](#) for a list of recommended lubricants.

6. Remove any excess grease on the grease fitting with a clean cloth.

Table 5-3: Grease Quantity for Injection Piston Linear Bearings

Grease Gun	Number of Strokes
473 ml (16 oz) Grease Gun ^[8]	3
500 ml (17 oz) Grease Gun ^[9]	3
710 ml (24 oz) Grease Gun ^[10]	2

^[8] A standard 670 bar (10000 psi) , 473 ml (16 oz) grease gun delivers approximately 1.2 ml (0.04 oz) of grease with each stroke of the hand pump.

^[9] A standard 400 bar (5800 psi) , 500 ml (17 oz) grease gun delivers approximately 1.4 ml (0.05 oz) of grease with each stroke of the hand pump.

^[10] A standard 670 bar (10000 psi) , 710 ml (24 oz) grease gun delivers approximately 1.8 ml (0.06 oz) of grease with each stroke of the hand pump

7. Visually inspect extruder rails. Look for irregularities on rail's bearing surface, such as dents.
8. Remove all locks and tags.

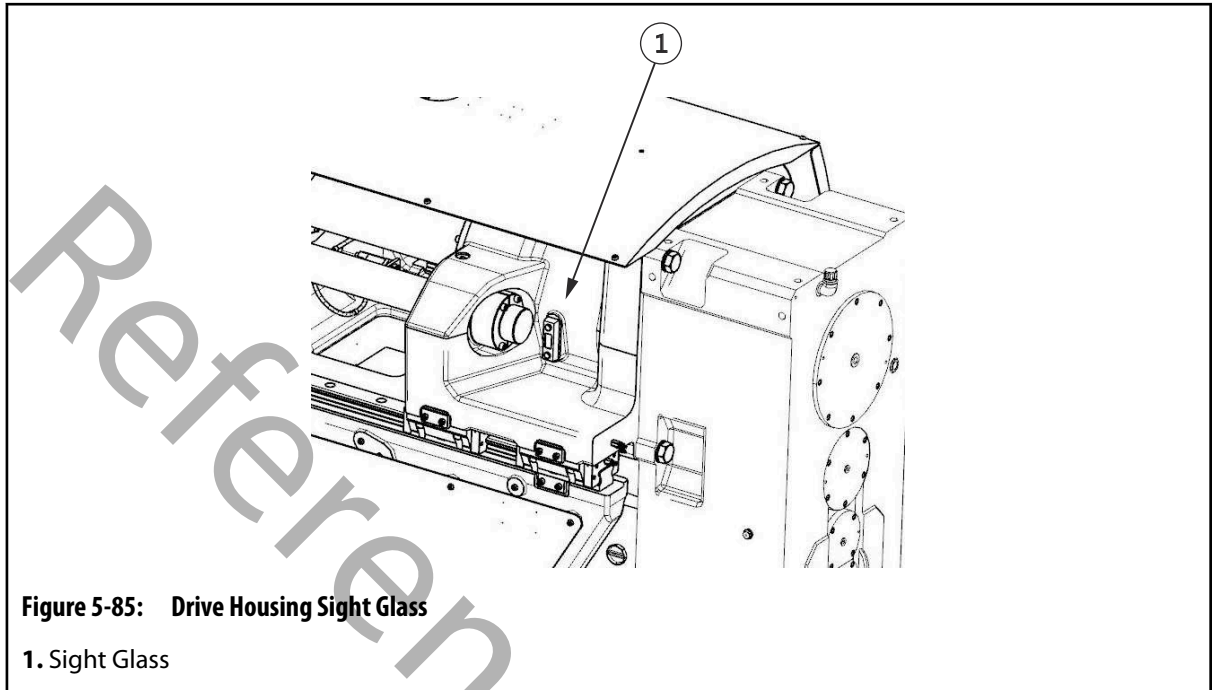
5.4.7 Checking the Drive Housing Oil Level

To check the oil level in the drive housing, do the following:

1. Stop the machine from cycling.

2. Turn off the pumps and then wait 10 minutes.
3. Inspect the sight glass on the operator side of the machine. The oil level should be at the middle mark on the sight glass.

If the oil level is low, drain and replenish the oil. Refer to [Section 5.4.8](#) for more information.



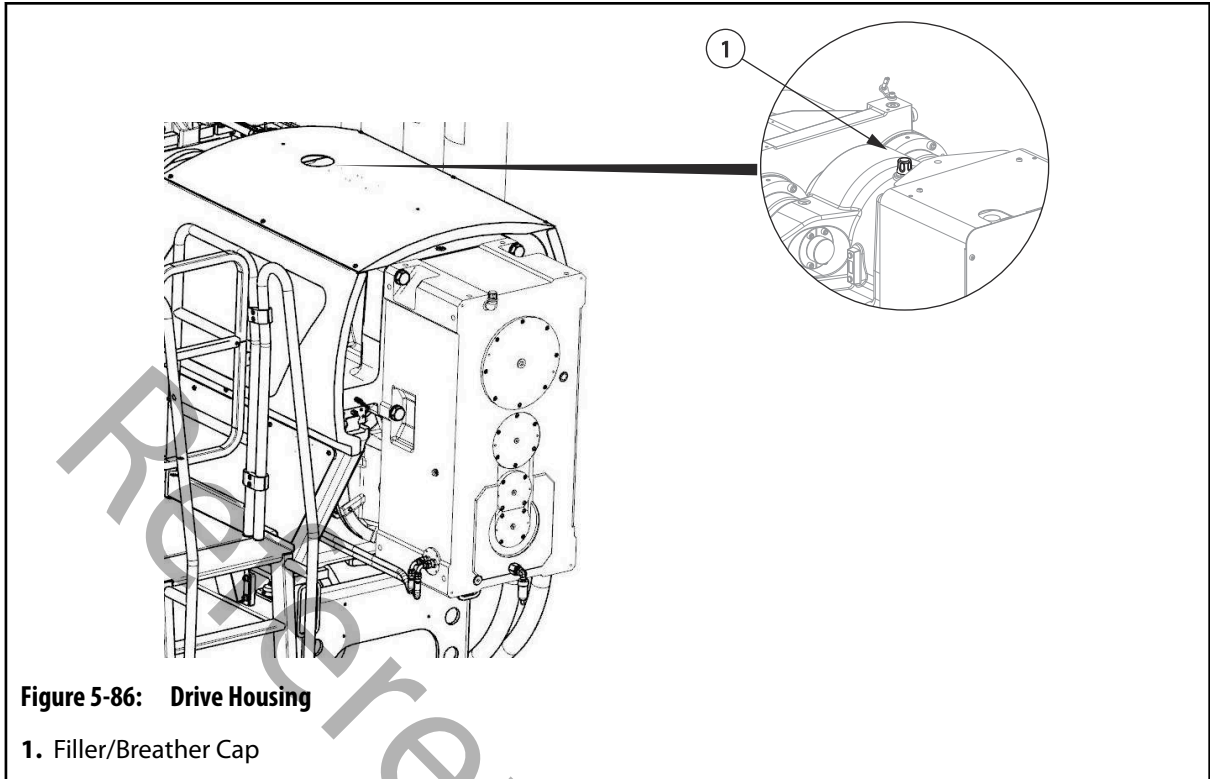
5.4.8 Replacing the Drive Housing Oil

The following procedures describe how to drain and fill the drive housing with oil.

5.4.8.1 Draining the Drive Housing Oil

To drain oil from the drive housing, do the following:

1. On the HMI, press the **Manual Cycle** key
2. Press and hold the **Carriage Forward** key until the gear box is fully forward and the filler/breather cap is accessible through the top opening in the injection housing guard.



3. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.

CAUTION!

Contamination hazard – risk of oil contamination. The oil supply is exposed to dirt, debris and other foreign materials when ports are opened. Make sure the area around the port is cleaned before removing the plug or disconnecting the hose.

4. Clean the area around the filler/breather cap.
5. Remove the filler/breather cap.
6. Hold a container under the drive housing that can contain the full volume of oil in the drive housing. Refer to [Section 7.9.5](#) for the drive housing oil capacity.



WARNING!

Burn hazard – contact with hot oil could cause severe burns. To avoid injury while draining or handling oil, wear personal protective equipment and make sure the oil temperature is less than 60 °C (140 °F) .

7. Remove the drain plug from the underside of the drive housing and allow the oil to drain completely into the container.
8. Install the drain plug.

CAUTION!

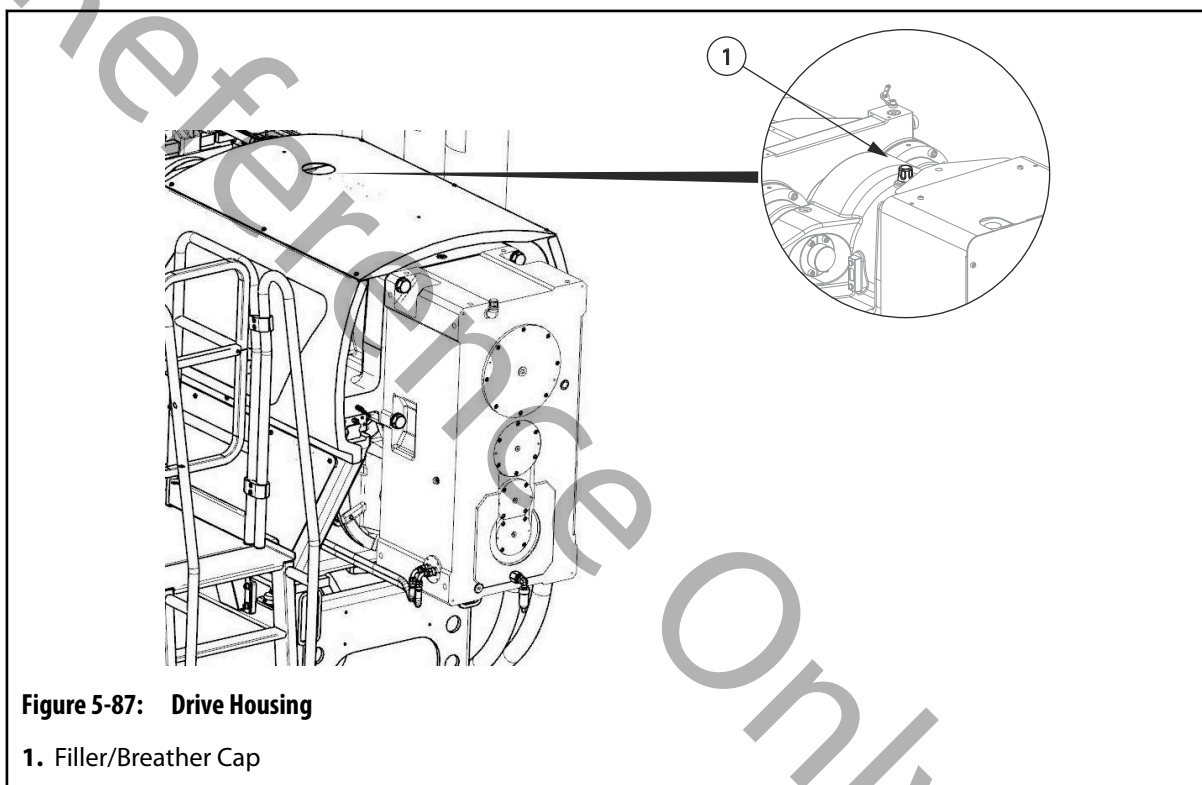
Corrosion hazard – risk of damage to the machine. To prevent corrosion damage to the inside of the drive housing, always refill the drive housing after draining the oil.

9. Fill the drive housing with new oil. Refer to [Section 5.4.8.2](#) for more information.

5.4.8.2 Filling the Drive Housing with Oil

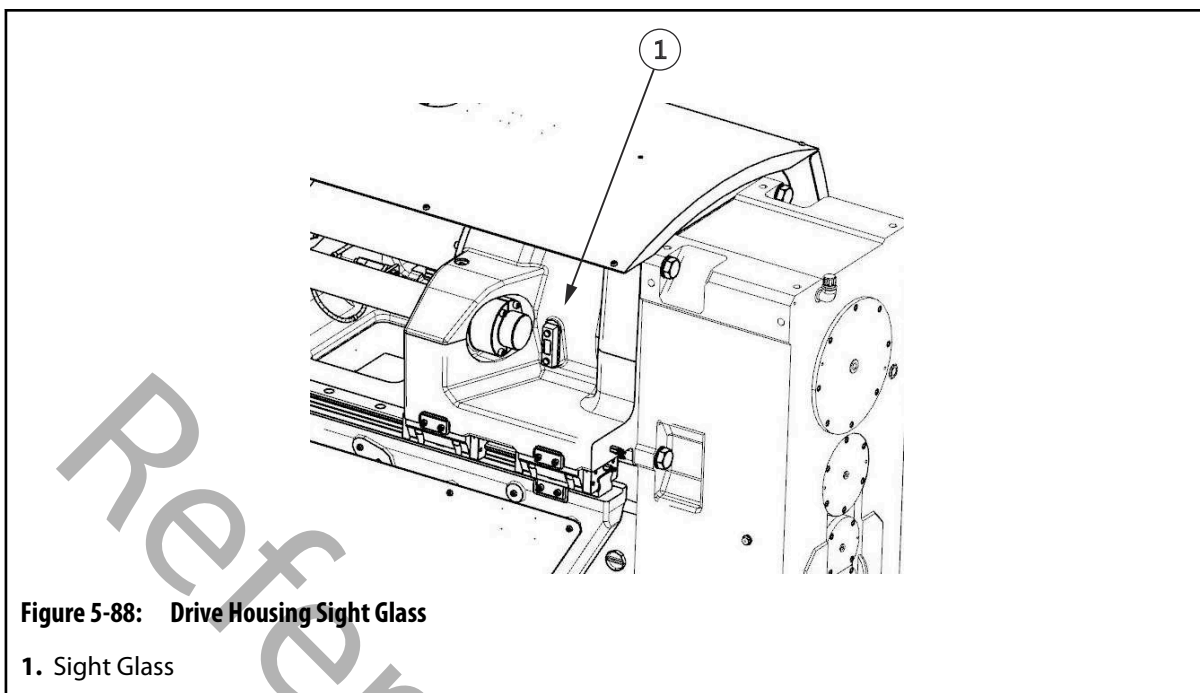
To fill the drive housing with oil, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Make sure the drain plug is installed.
3. Make sure the filler/breather cap is removed.

**CAUTION!**

Mechanical hazard – risk of damage to the machine. Overfilling the drive housing could cause seal failure. Monitor the sight gauge closely while filling the motor.

4. Add oil through the breather port until the oil level reaches the middle of the sight glass. Refer to [Section 7.9](#) for oil capacities and specifications.



5. Install the filler/breather cap.
6. Clean up all spilled oil.
7. Remove all locks and tags.

5.4.9 Inspecting the Gearbox Oil Color in Sight Glass



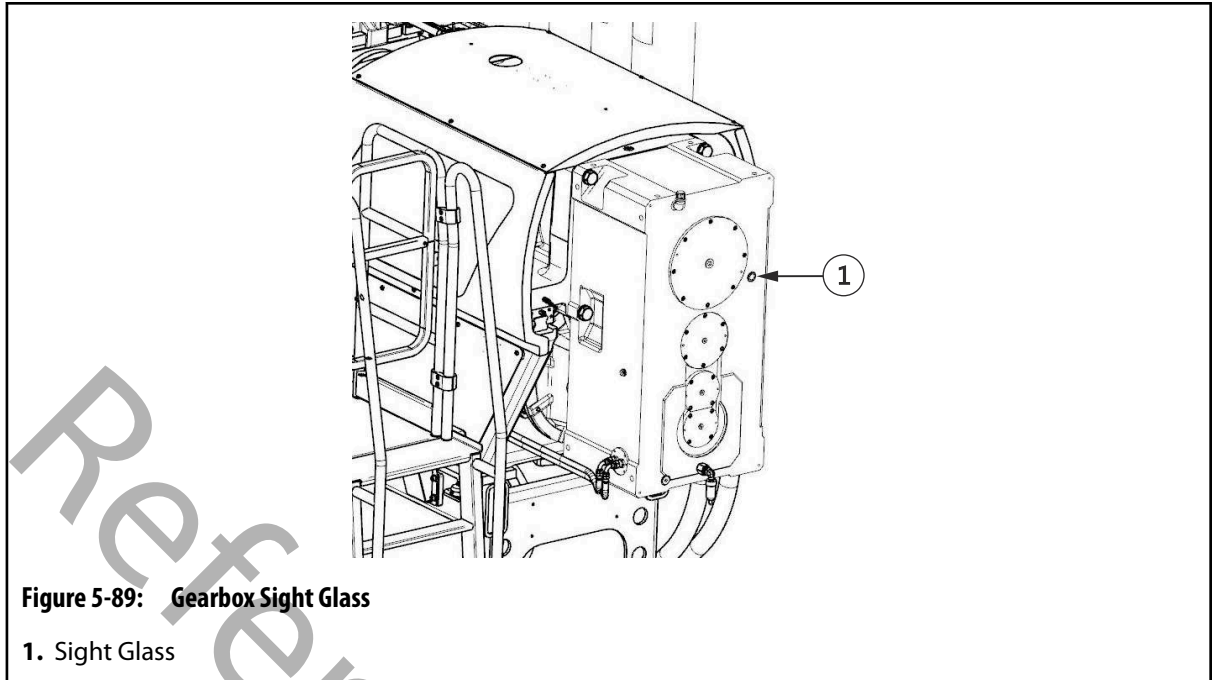
IMPORTANT!

Oil maintenance is essential for optimum machine performance and dependability. Perform oil maintenance at intervals specified in the maintenance schedule.

To inspect the gearbox oil, do the following:

1. Visually inspect the gearbox oil through the sight glass at the rear of the machine. Compare the oil color with the following table:

Oil Color	Oil Condition	Action
Light yellow, clear	New	Change the oil at the scheduled maintenance interval.
Honey brown	Normal	Change the oil at the scheduled maintenance interval.
Black	Oil change required	Drain, flush and refill the oil. Check and clean the magnetic screw.



2. If the oil is black, change oil. Refer to [Section 5.4.12](#) for more information.
3. Run the machine and continue to monitor the oil color. If the problem persists, contact Husky.

5.4.10 Checking the Gearbox Oil Level

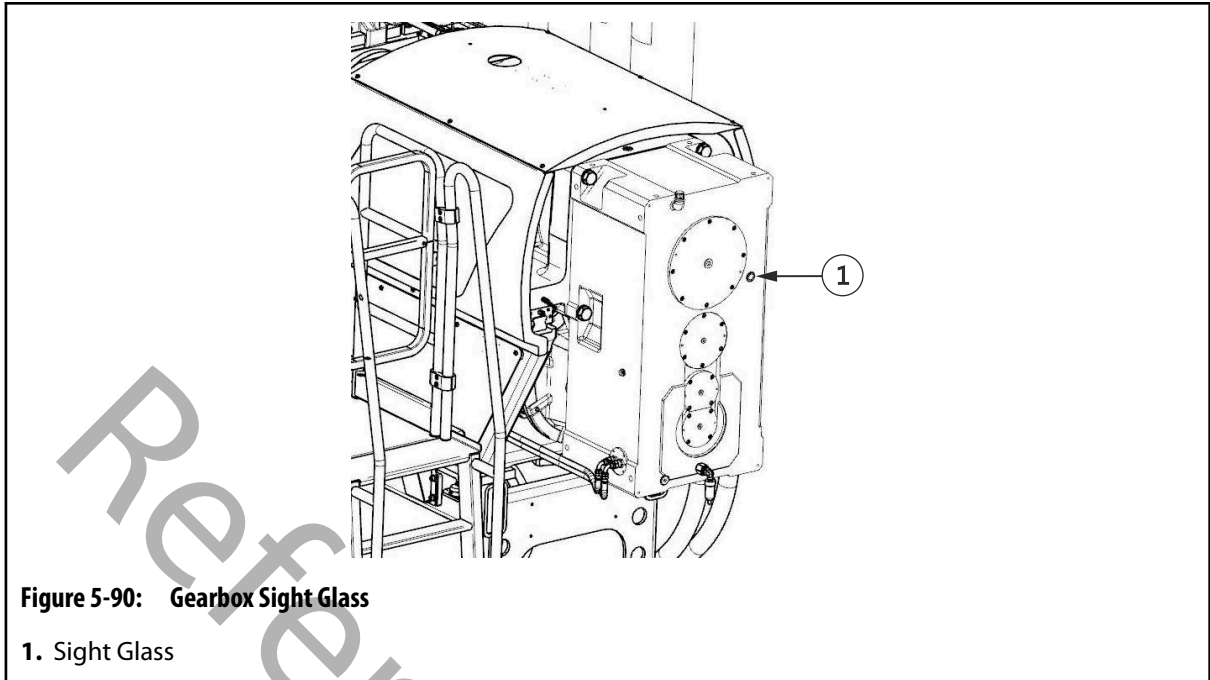


IMPORTANT!

Oil maintenance is essential for optimum machine performance and dependability. Perform oil maintenance at intervals specified in the maintenance schedule.

To check the oil level in the gearbox, do the following:

1. Inspect the sight glass at the rear of the machine. The ideal oil level is between the $\frac{1}{4}$ and $\frac{3}{4}$ mark on the sight glass with the target at the $\frac{3}{4}$ mark. If the oil level goes below the $\frac{1}{4}$ mark then the oil should be replenished.



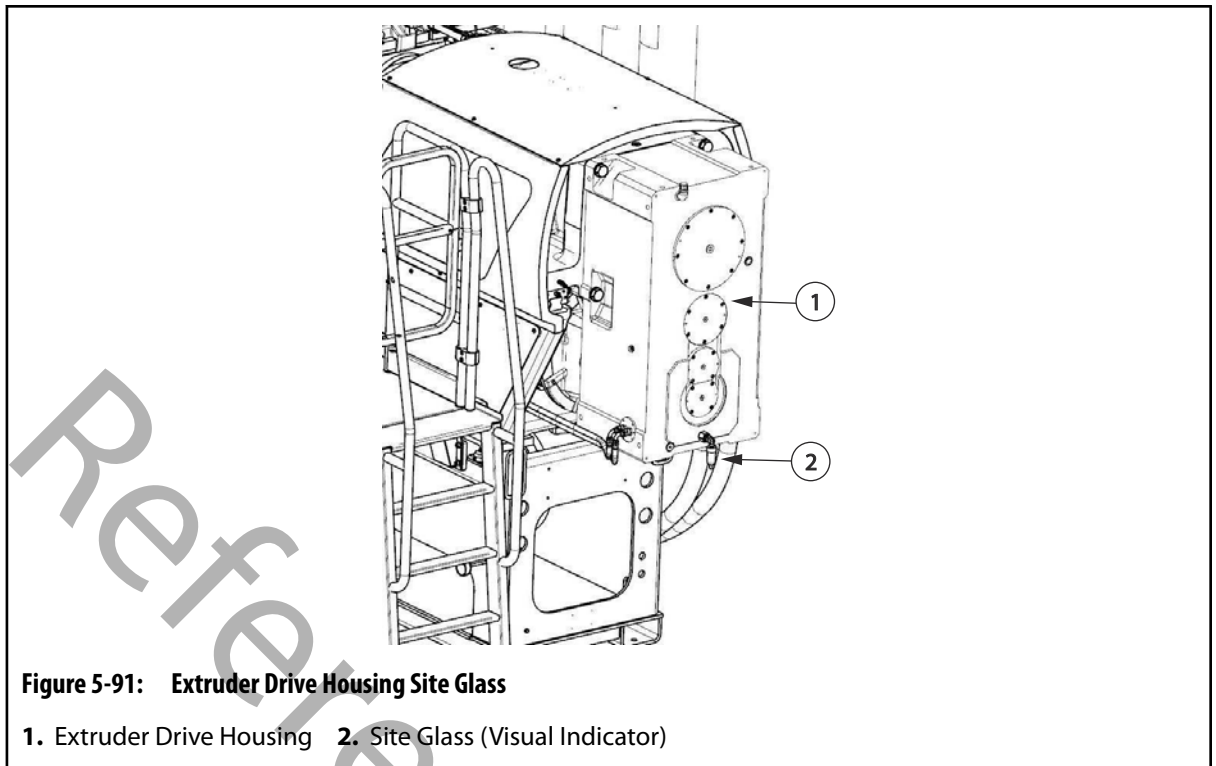
2. If the oil level is low, drain and replenish the oil. Refer to [Section 5.4.12](#) for more information.

5.4.11 Checking the Gearbox Input Shaft Leakage

Leakage of the extruder gearbox input shaft seal should not exceed specified values. The extruder gearbox is equipped with an input shaft seal oil drain visual indicator/collection bottle allowing monitoring of the amount of seal leakage.

To check the amount of gearbox input shaft leakage, do the following:

1. Check that the input shaft seal oil drain visual indicator/collection bottle for the presence of oil.



2. If the collection bottle is full of oil, empty the bottle and observe the rate of leakage.
3. Replace the gearbox input shaft seal if the leakage exceeds the values listed in the following table.

Extruder Size	Permissible Oil Loss	Oil Collection Bottle Volume	Permissible Operating Hours to Fill One Bottle
EE85	1 L (.26 U.S. gal)	50 ml (1.7 oz)	388
EE100 - 120	1.6 L (.26 U.S. gal)	50 ml (1.7 oz)	244
EE140	2.3 L (.61 U.S. gal)	50 ml (1.7 oz)	176
EE140L	2.3 L (.61 U.S. gal)	50 ml (1.7 oz)	176
EE155L	3.5 L (.92 U.S. gal)	50 ml (1.7 oz)	115

Permissible oil loss from the gearbox must be less than $\frac{1}{2}$ the sight gauge level within 8000 operating hours.

5.4.12 Replacing the Gearbox Oil

The following procedures describe how to drain and fill the gearbox with oil.

5.4.12.1 Draining the Gearbox Oil

To drain oil from the gearbox, do the following:

1. On the HMI, press the **Manual Cycle** key.
2. Press and hold the **Carriage Back** key until the gear box is fully retracted.
3. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.

CAUTION!

Contamination hazard – risk of oil contamination. The oil supply is exposed to dirt, debris and other foreign materials when ports are opened. Make sure the area around the port is cleaned before removing the plug or disconnecting the hose.

4. Clean the areas around the breather cap and drain plug.

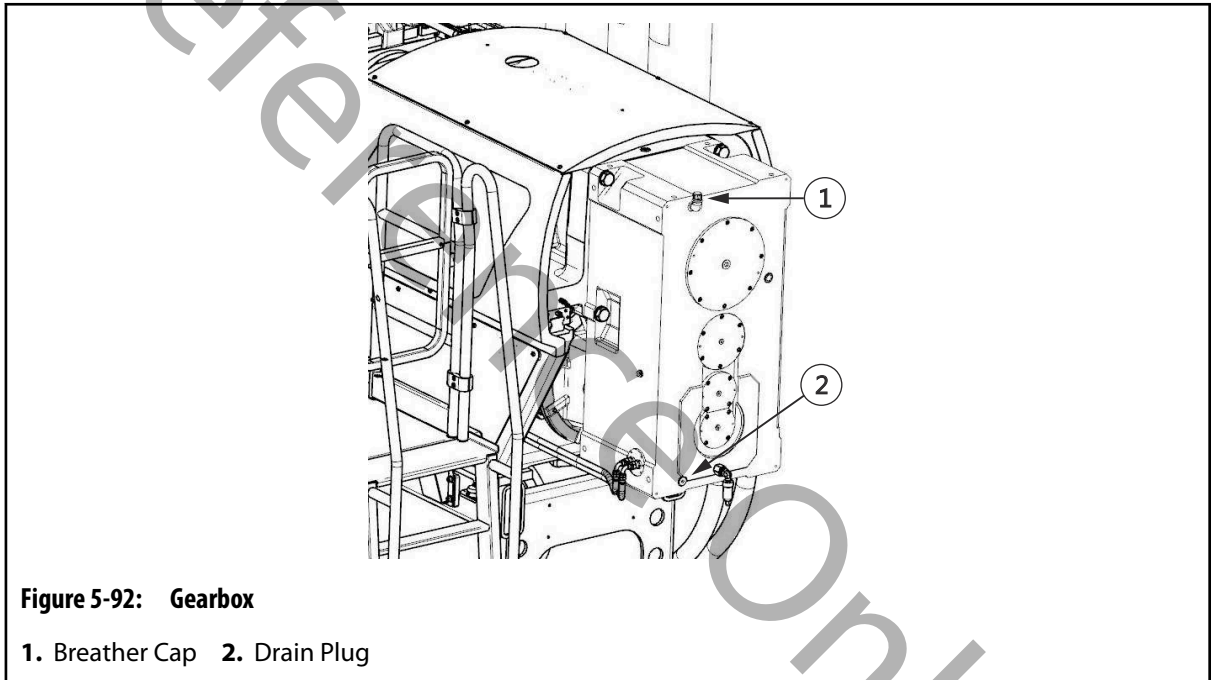


Figure 5-92: Gearbox

1. Breather Cap 2. Drain Plug

5. Remove the breather cap.
6. Hold a container under the gearbox that can contain the full volume of oil in the gearbox. Refer to [Section 7.9.5](#) for the gearbox oil capacity.



WARNING!

Burn hazard – contact with hot oil could cause severe burns. To avoid injury while draining or handling oil, wear personal protective equipment and make sure the oil temperature is less than 60 °C (140 °F) .

7. Remove the drain plug and allow the gearbox to drain completely into the container.

NOTE:

One plug drains oil from the gearbox, and the other plug drains from the leakage container. The leakage container may or may not contain any oil. Refer to [Section 5.4.11](#) for more information.

8. Clean the magnetic screw of any metal particles if present.
9. Install the drain plugs.
10. Install the insulation (if equipped) and rear cover.

CAUTION!

Corrosion hazard – risk of damage to the machine. To prevent corrosion damage to the inside of the gearbox, always refill the gearbox after draining the oil.

11. Fill the gearbox with new oil. Refer to [Section 5.4.12.2](#) for more information.

5.4.12.2 Filling the Gearbox with Oil

To fill the gearbox with oil, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Make sure the breather cap is removed.

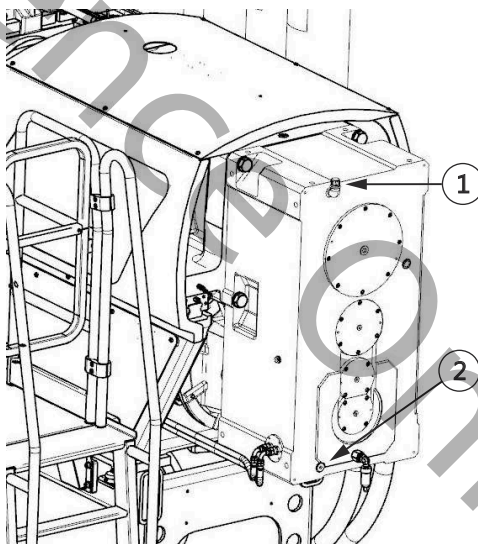


Figure 5-93: Gearbox

1. Breather Cap 2. Drain Plug

CAUTION!

Mechanical hazard – risk of damage to the machine. Overfilling the gearbox could cause seal failure. Monitor the sight glass closely while filling the motor.

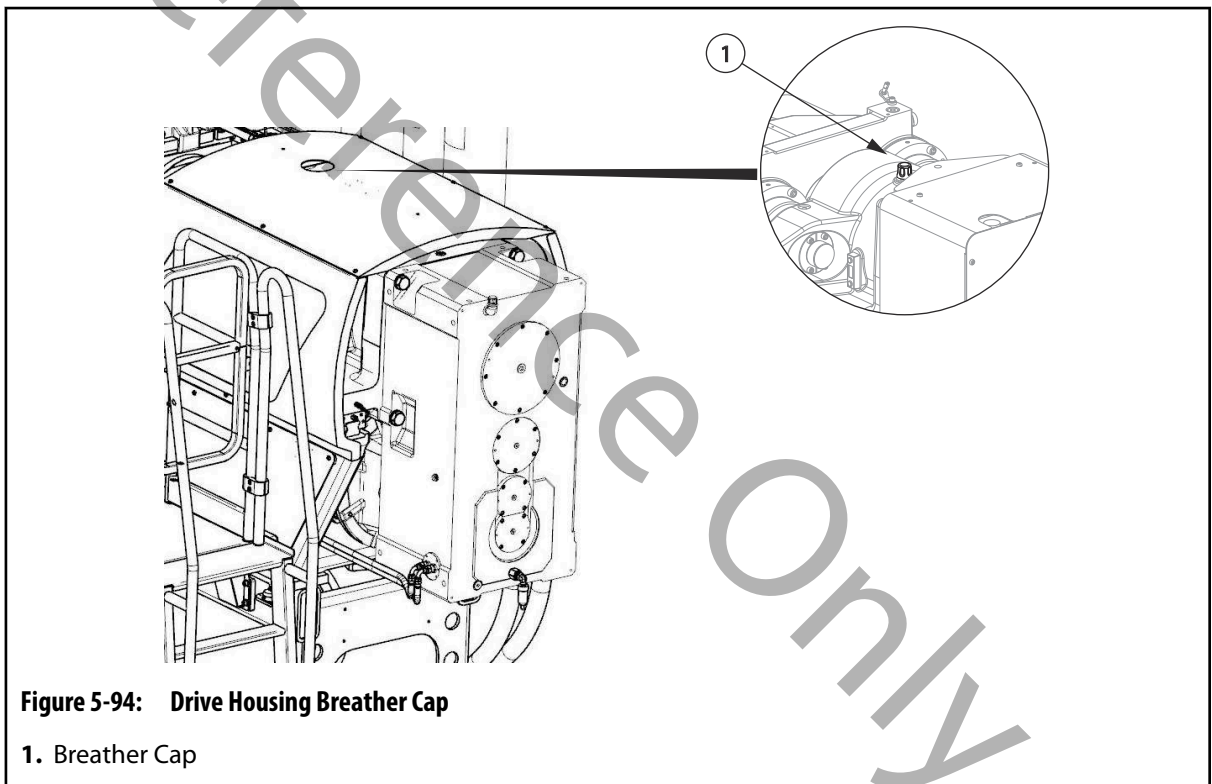
3. Add oil through the breather port until the oil level reaches the one-quarter (1/4) mark on the sight glass. Refer to [Section 7.9](#) for the oil capacity and recommended oils.
4. Install the breather cap.
5. Clean up all spilled oil.
6. Remove all locks and tags.

5.4.13 Replacing the Gearbox and Drive Housing Breather Caps

The breather caps on the gearbox and the drive housing should be replaced based on the maintenance schedule.

To replace the breather cap on the gearbox and/or the drive housing, do the following:

1. If replacing the drive housing breather cap, move the transfer cylinder forward to access the drive housing breather cap through the guard. This requires molten plastic in the barrel and be able to transfer and then stop the machine at the end of transfer.



2. On the HMI, press the **Pump Motor Off** key to stop the pump motor.

CAUTION!

Contamination hazard – risk of damage to the machine. The hydraulic system is exposed to contaminants whenever a hydraulic component is removed. To avoid consequential damage during maintenance, absolute cleanliness must prevail.

3. Clean the area around the breather cap.

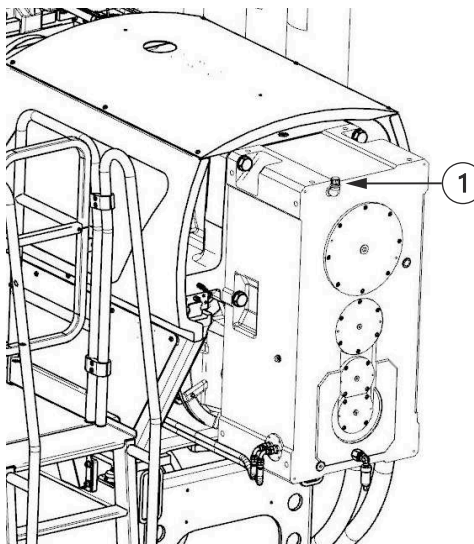


Figure 5-95: Gearbox Breather Cylinder (Typical)

1. Breather Cap

4. Turn the breather cap counter-clockwise and remove it.
5. Install a new breather cap and hand tighten the cap.

5.4.14 Replacing the Transfer Cylinder Breather Cap

To replace the breather cap on a transfer cylinder, do the following:

1. On the HMI, press the **Pump Motor Off** key to stop the pump motor.

CAUTION!

Contamination hazard – risk of damage to the machine. The hydraulic system is exposed to contaminants whenever a hydraulic component is removed. To avoid consequential damage during maintenance, absolute cleanliness must prevail.

2. Clean the area around the breather cap

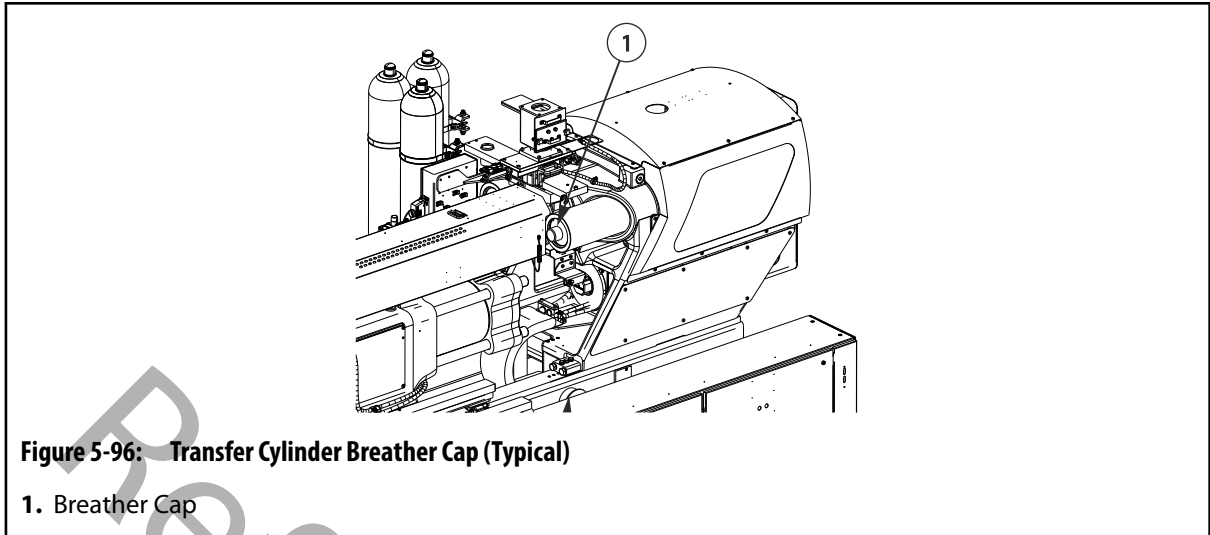


Figure 5-96: Transfer Cylinder Breather Cap (Typical)

1. Breather Cap

3. Turn the breather cap counter-clockwise and remove it.
4. Apply thread-locker to the breather cap threads. Refer to [Section 7.9](#) for a recommended lubricants.
5. Install a new breather cap and hand tighten the cap.

5.4.15 Changing the Nozzle Adaptor

The following procedures describe how to remove and install a new nozzle adaptor.

5.4.15.1 Removing the Nozzle Adaptor

To remove the nozzle adaptor, do the following:



WARNING!

Burn or explosion hazard – risk of death or serious injury. Molten process material at high pressure could be present. Purge the injection unit to minimize the potential for any pressure build-up. Wear personal protective equipment while purging the injection unit.

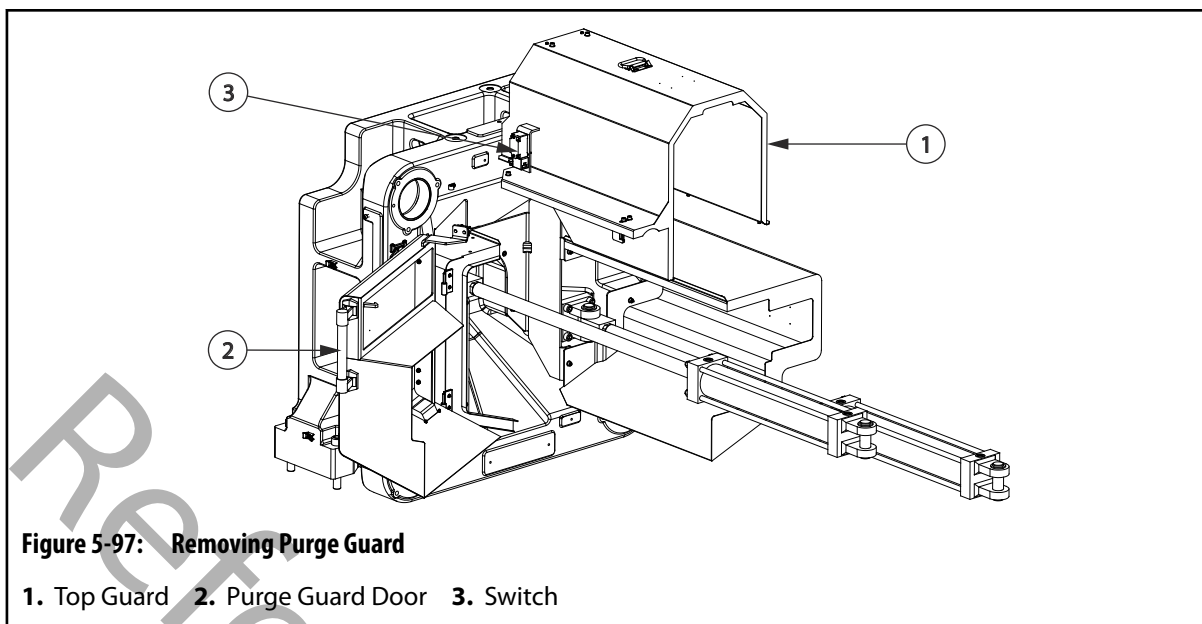
1. Purge the injection unit. Refer to [Section 5.4.18](#) for more information.
2. On the HMI, press and hold the **Carriage Back** key to move the injection carriage away from the clamp.
3. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



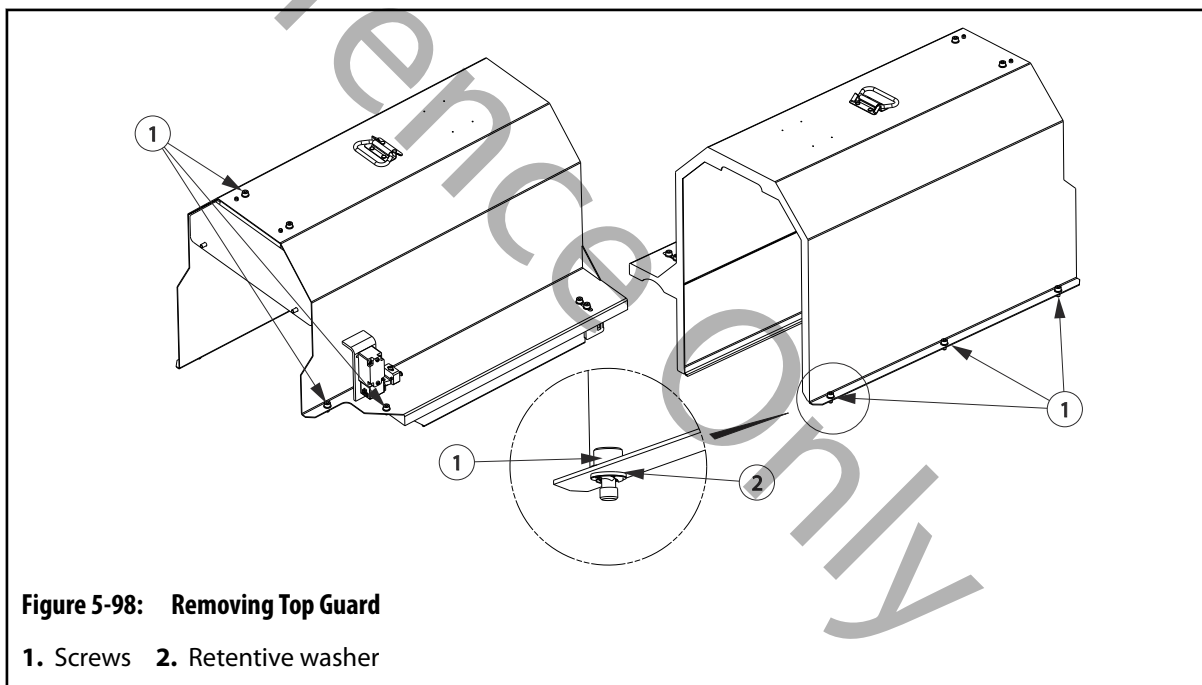
WARNING!

Burn hazard – risk of serious injury. Hot gases may be trapped behind the nozzle tip. Machine surfaces could be hot. Wear personal protective equipment.

4. Open and lift the purge guard door to remove it from the guard.



5. Disconnect the wires from the switch.
6. Lift and push back top guard. Make sure cover screws remain with guard when shifted.



7. Remove top guard.
8. Disconnect heater electrical wires and thermocouple at quick disconnect plugs

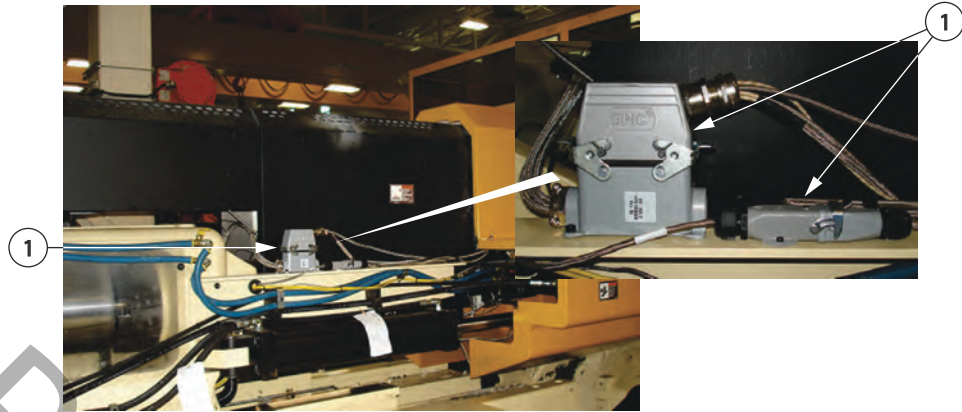


Figure 5-99: Disconnecting Heater Electrical Wires

1. Quick disconnect plugs

9. Remove power cable clamps. The clamps should stay with the cable).

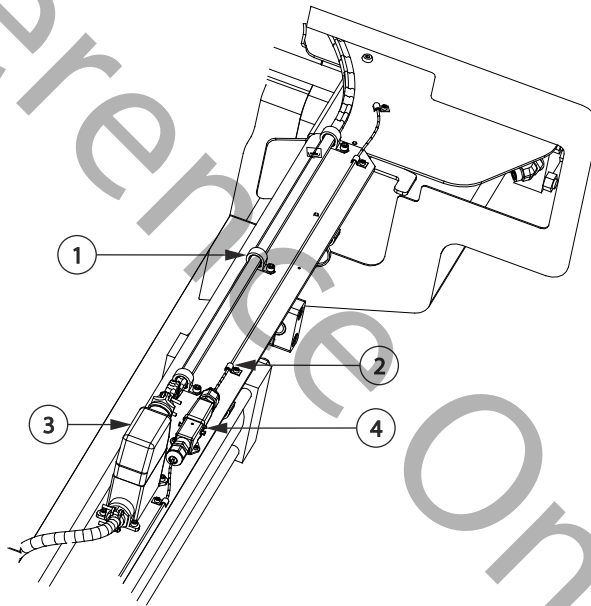


Figure 5-100: Electric Assembly

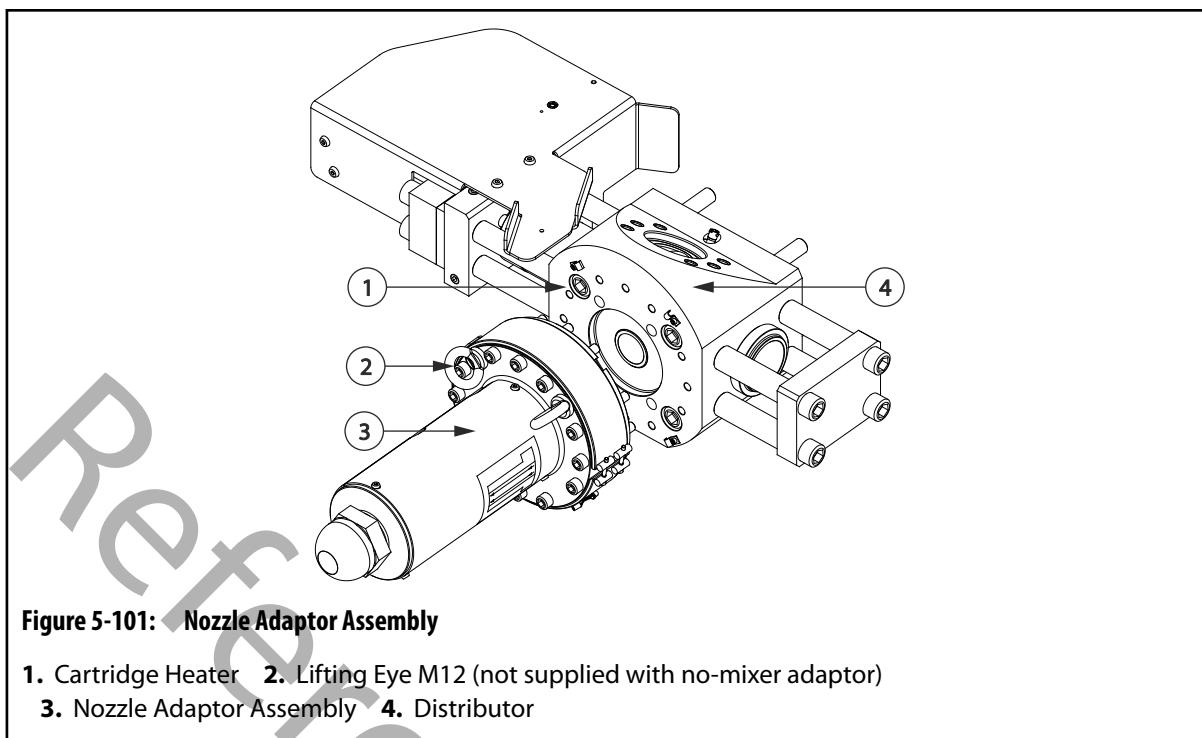
1. Power Cable Clamp 2. Thermocouple Clip 3. Quick Disconnect 4. Bracket

10. Loosen thermocouple clips and free wire from bracket and shut-off cover.

11. Remove the nozzle adaptor bolts.

12. Use wooden pry bar to separate nozzle adaptor assembly from distributor.

13. Using a suitable lifting device, lift and remove the adaptor assembly.



14. Clean melt channel interface in the distributor.
15. If direct shutoff cartridge heaters require replacement. Refer to [Section 5.4.22](#) for more information.

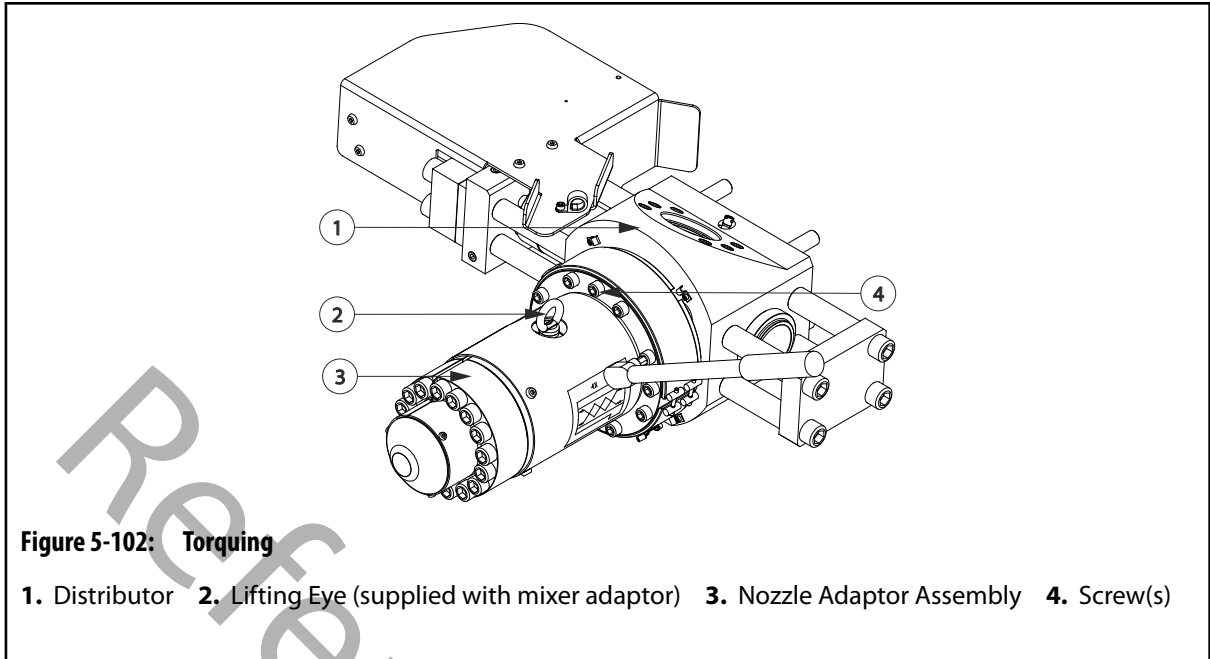
NOTE:

If one cartridge heater is burnt out, all four must be replaced.

5.4.15.2 Installing the Nozzle Adaptor

To install the nozzle adaptor, do the following:

1. Install the nozzle adaptor to the distributor.
2. Coat the screws with Castrol Optimol anti-seize paste (U/N 3077).
3. Make sure heaters are aligned and area is free of electrical wires.
4. Hand-tighten the screws.
5. Torque the screws to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.



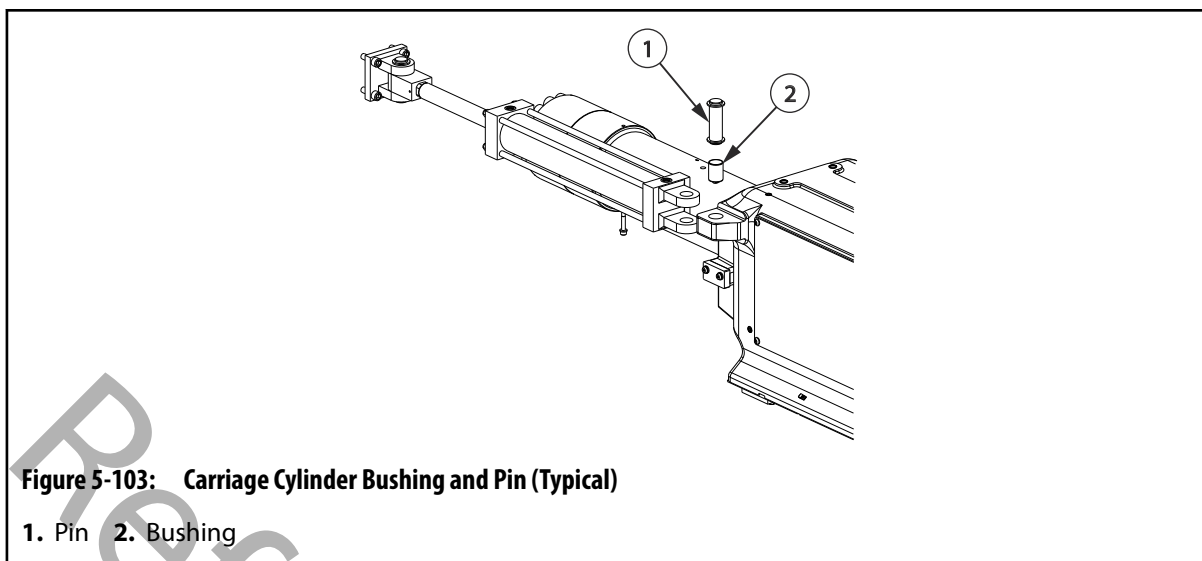
6. Reattach thermocouple cable to clips on bracket and shutoff cover.
7. Fasten power cable clamps.
8. Attach power and thermocouple connectors.
9. Replace top guard.
10. Reconnect the wires to the switch.
11. Check the alignment of the purge guard switch and the switch actuator. For more information, refer to [Section 5.2.6.10](#).
12. Install and close the purge guard door.
13. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
14. On the HMI, press and hold the **Carriage Forward** key to move the injection carriage toward the clamp.

5.4.16 Inspecting the Carriage Cylinder Bushings and Pins

The carriage cylinder bushings and pins must be inspected for excess wear at intervals specified in the maintenance schedule.

To inspect the bushings and pins, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove the pin and bushing.



3. Visually inspect the bushing. If the bushing is brittle, cracked or worn, replace the bushing and pin.
4. Install the bushing and pin.
5. Remove all locks and tags.

5.4.17 Replacing a Heater Band

To replace a faulty heater band, do the following:

1. On the HMI, touch the **Heats** button and touch the **Machine Heats** tab to display the **Machine Heats** screen.
2. Review the actual temperatures of each heater band to locate the faulty heater band.
3. Touch the **Heats Setup** tab to display the **Setup** screen.



Figure 5-104: Setup Screen

1. Setup Screen - Altanium Inside 2. Setup Screen - Integrated Heats
3. Machine Heats Enable Check Box 4. Machine Heats Stop Button 5. Machine Heats Start Button

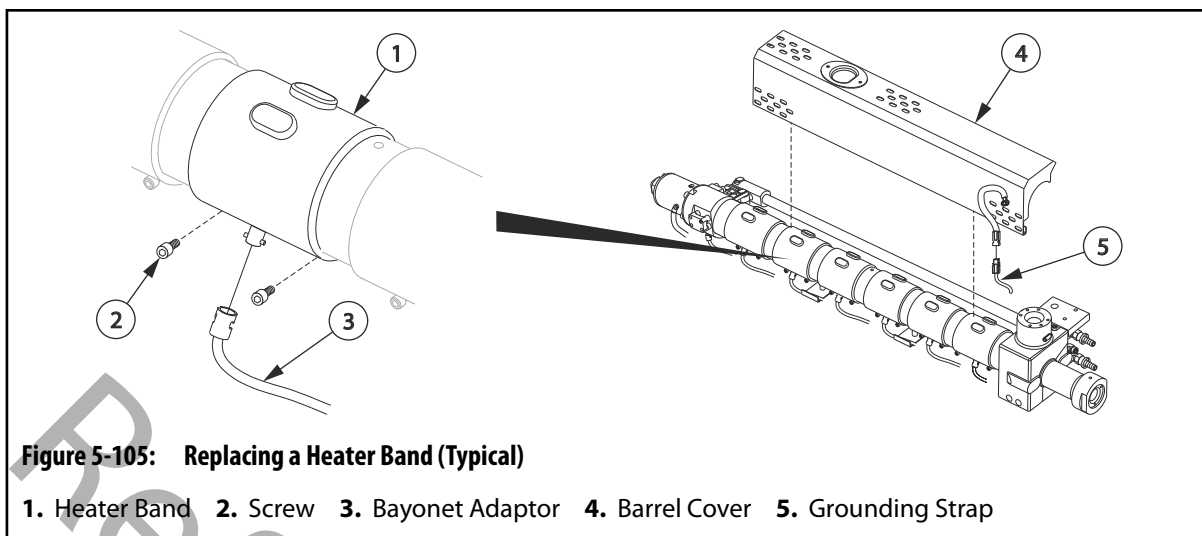
4. In the **Machine Heats** area, touch the **Stop** button or clear the **Machine Heats Enable** check box to disable the barrel heaters.
5. Make sure the cycle mode is set to manual by pressing the **Manual Cycle** key.
6. Touch the **Machine Mode Selector** button on the toolbar and select **Normal** mode
7. Press and hold the **Carriage Back** key until the nozzle tip clears the purge guard.
8. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



WARNING!

Burn hazard – risk of severe injury. The barrel and barrel heaters are hot. Wear appropriate personal protective equipment.

9. Disconnect the grounding strap, where applicable, and remove the barrel cover.



10. Disconnect the bayonet adaptor and thermocouple from the faulty heater band.
11. Disconnect the high temperature wire for the heater band from the junction terminal box. Refer to the electrical schematics to locate the appropriate wire.

NOTE:

The high temperature wire is part of the heater band.

12. Mark the location of the fault heater band on the barrel.
13. Remove the screws and gently remove the heater band.
14. Clean the surface of the barrel with soap and water where the heater band was attached. Dry the barrel thoroughly.

CAUTION!

Mechanical hazard – risk of equipment damage. Widening a heater band repeatedly and too widely could damage the heater band. If installing or removing a heater band, widen the heater band just enough to fit over the outside diameter of the barrel.

15. Carefully open the two halves of the replacement heater band and slide it over the barrel.
16. Position the new heater band at the location marked in [step 12](#).
17. Apply a lubricant to the threads of the screws. Refer to [Section 7.9](#) for a list of recommended lubricants.
18. Install the screws and torque them alternately in 3- 4 steps starting at 2 N·m (20 lbf·in) and ending at 9 N·m (80 lbf·in) .

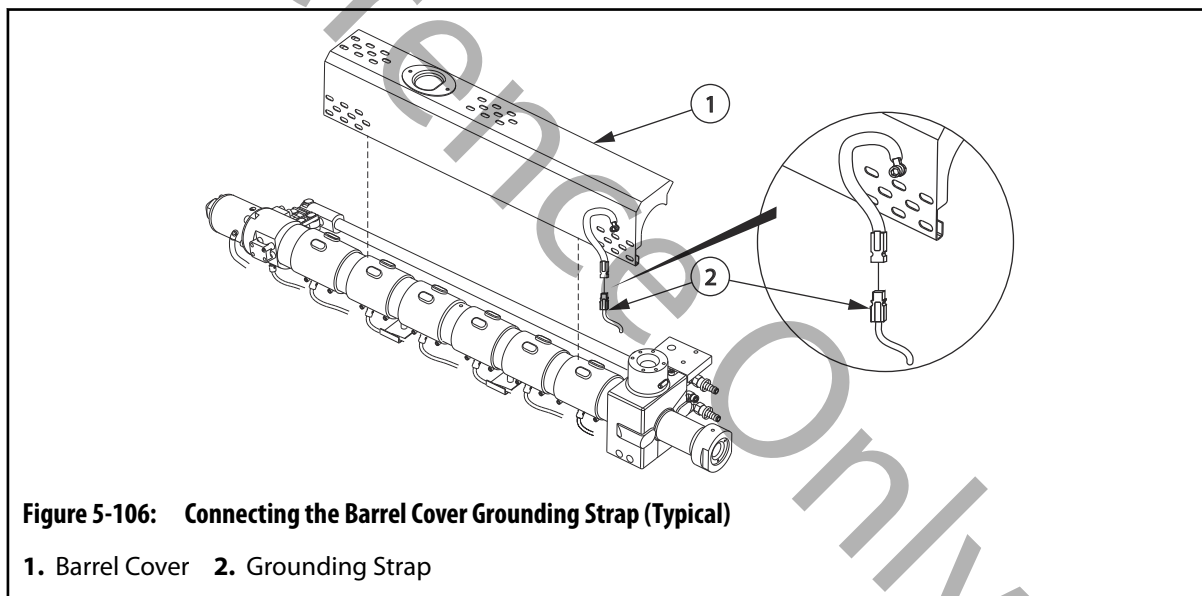
Step	Torque
1	2 N·m (20 lbf·in)
2	5 N·m (40 lbf·in)
3	7 N·m (60 lbf·in)

Step	Torque
4	9 N·m (80 lbf·in)

19. Connect the high temperature wire from the heater band to the junction terminal box. Refer to the electrical schematics for connection details.
20. Reconnect the bayonet adaptor and thermocouple.
21. Install the barrel cover.
22. Connect the barrel cover grounding strap, where applicable.

**DANGER!**

Electrocution hazard – risk of death or serious injury. If a heater band contacts an ungrounded barrel cover, this could cause electrocution and death to a person who touches the ungrounded barrel cover. Always connect the barrel cover grounding strap after installing the barrel cover.



23. Remove the locks and tags.
24. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
25. On the HMI, touch the **Heats** button and touch the **Setup** tab to display the **Setup** screen.

NOTE:

Do not enable mold heats.

26. In the **Machine Heats** area, touch the **Start** button or select the **Machine Heats Enable** check box to enable the barrel heaters.
27. Touch the **Machine** tab to display the **Machine** screen.

Observe the temperature of the heat zone in the **Machine** screen and verify that the new heater band is working properly.

5.4.18 Purging the Injection Unit

Purging the injection unit removes any dirt, obstructions or processed material that can affect production. The process is also used to transition from one color and/or type of resin to another. For information about changing the resin color, refer to [Section 5.4.19](#).

To plasticize and purge material from the injection unit, do the following:

1. Make sure the supply of process material is adequate for purging the injection unit.
2. Make sure the machine heats are at operating temperature. Refer to [Section 4.26.1.14](#) for more information.
3. On the HMI, touch the **Injection** button and touch the **Recovery** tab to display the **Recovery** screen.

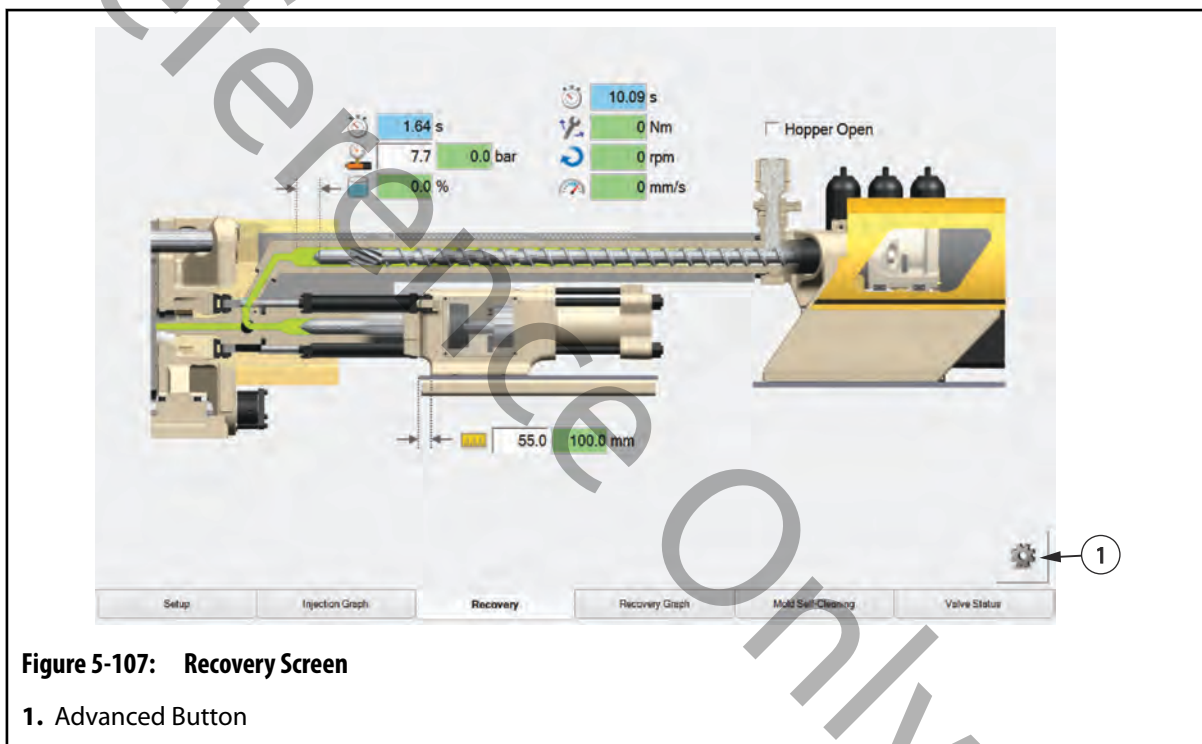


Figure 5-107: Recovery Screen

1. Advanced Button

4. Touch the **Advanced** button. The **Advanced Settings** dialog box appears.

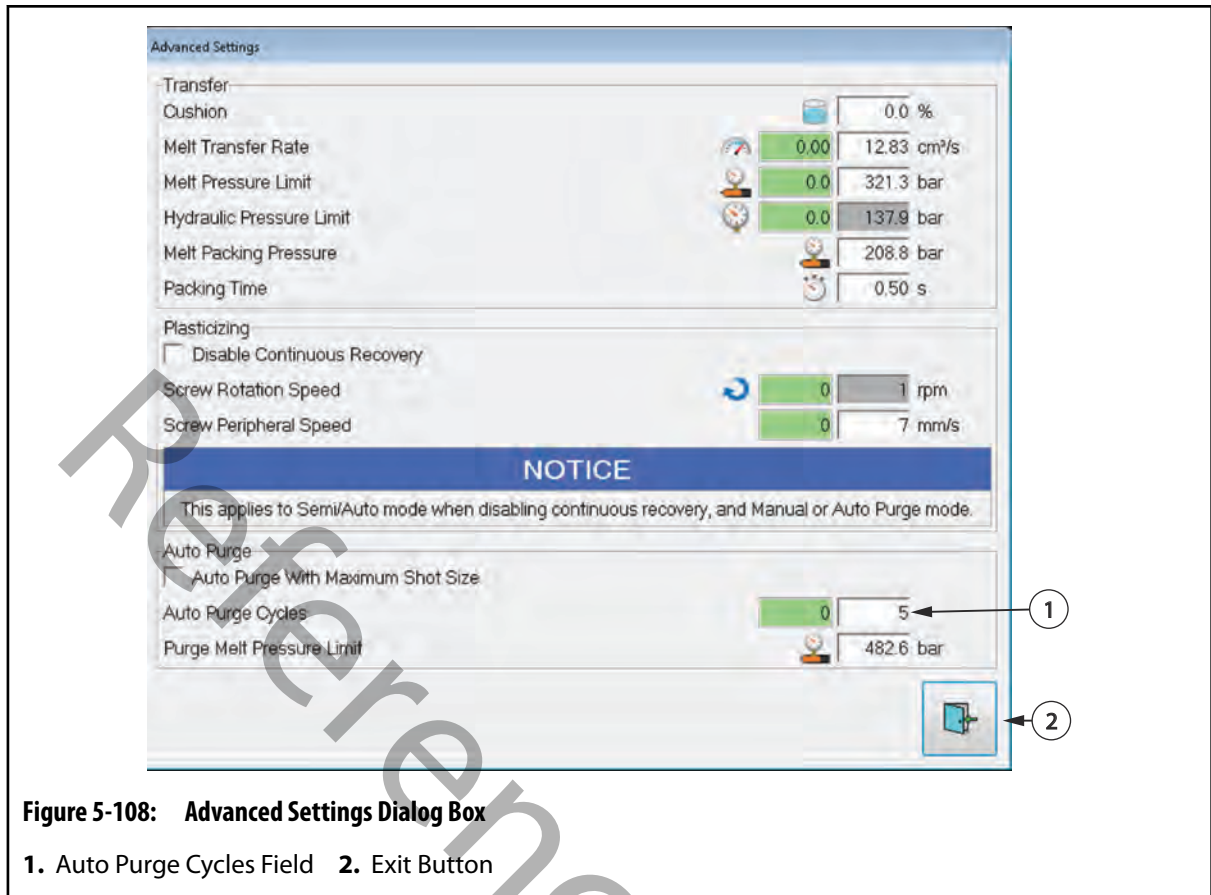


Figure 5-108: Advanced Settings Dialog Box

1. Auto Purge Cycles Field 2. Exit Button

5. Touch the **Auto Purge Cycles** field and type the number of purging cycles.
6. Touch the **Exit** button.
7. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Auto Purge** mode.
8. Press the **Auto Cycle** key followed by the **Cycle Start** key to start purging the injection unit automatically. The carriage will automatically move into the purge zone.
Purging will stop automatically after the required number of purging cycles has been completed.
9. Repeat [step 8](#) until the quality of the purged material is visually acceptable (that is, free of bubbles and degradation).



WARNING!

Burn hazard – risk of severe injury. Contact with molten material and exposed hot surfaces could cause severe burn injuries. Wear personal protective equipment and use a metal rod to remove resin purged from the machine.

10. After purging is completed and purged material has cooled, empty the purged material into a suitable metal container for disposal.

5.4.19 Changing the Resin Color

To change the color of the resin, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove all traces of the original resin from the material feed equipment.
3. Depending on application restrictions, add one of the following to the material feed equipment to reduce the cleaning time required:
 - Purge compound
 - Natural (uncolored) resin
 - New colored resin
4. Remove all locks and tags.
5. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.



WARNING!

Hot resin spray hazard – risk of death or serious injury. Molten resin under high pressure could suddenly release and spray out from the machine nozzle. Before purging the injection unit, clear the area of all non-essential personnel and wear personal protective equipment consisting of a heat-resistant coat, heat-resistant gloves and a full face shield over safety glasses.

6. Purge the injection unit until all traces of the old color are eliminated. Refer to [Section 4.26.1.16](#) for more information.
7. On the HMI, touch the **Injection** button and touch the **Setup** tab to display the **Setup** screen.
8. Touch the **Cooling Time** field and type the minimum value.
9. Increase the temperature of the hot runner nozzle tips, manifolds and sprue by 20 to 30 °C (68 to 86 °F) . Refer to [Section 4.26.1.14.1](#) for more information.
10. Repeat [step 3](#) to replenish the material feed equipment.
11. Produce a series of test parts until all traces of the old color are eliminated.
12. When the color change is complete, decrease the temperature of the nozzle tips, manifolds and sprue by 20 to 30 °C (68 to 86 °F) .
13. Fill the material feed equipment with the new resin.

5.4.20 Inspecting the Direct Shutoff System

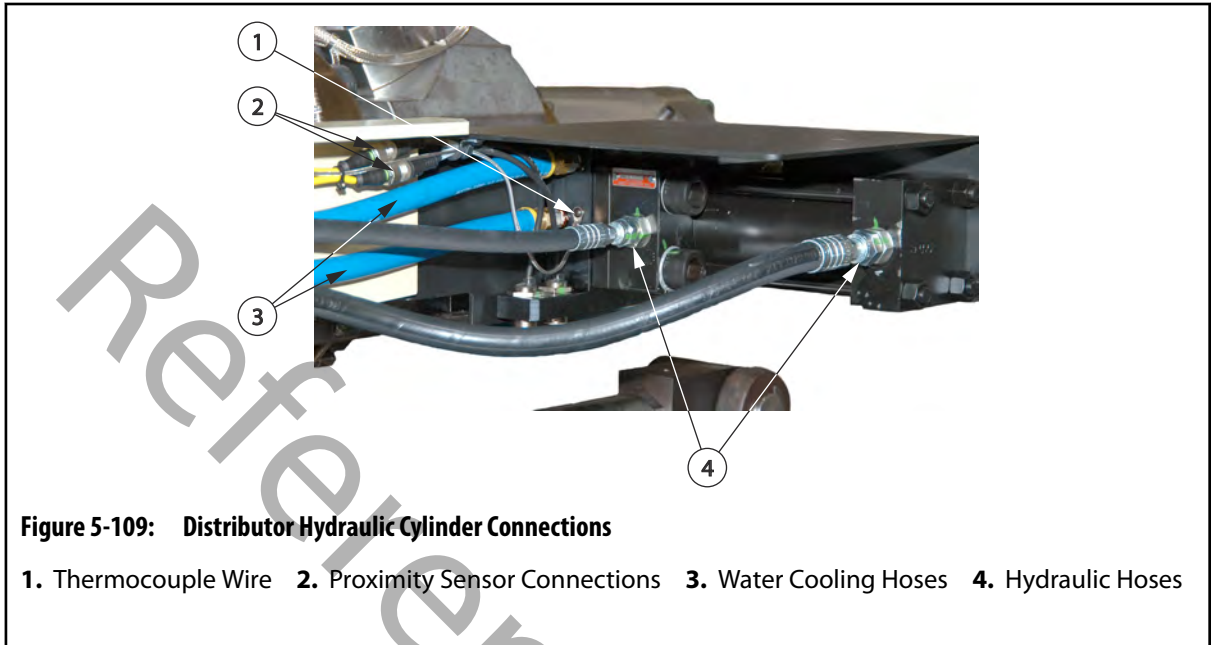
When inspecting the direct shutoff system, check for black dust in the area. If necessary, replace the bushing in the distributor.

Refer to [Section 5.4.21](#) for more information about replacing the bushings.

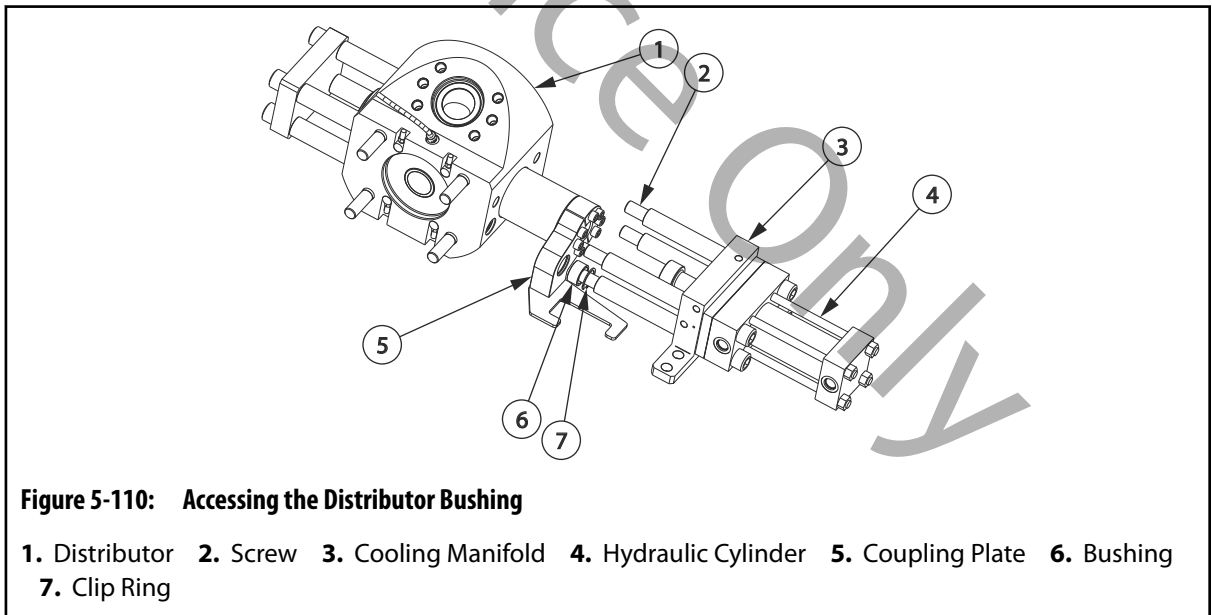
5.4.21 Replacing the Direct Shutoff Bushing

To replace the bushing in the direct shutoff system, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove the cover from the distributor assembly.
3. Disconnect the water cooling hoses, hydraulic hoses, proximity sensor wires and thermocouple from the hydraulic cylinder in the distributor assembly.



4. Loosen the screws that secure the hydraulic cylinder and cooling manifold to the distributor until the cylinder and manifold can be removed.



5. Remove the clip ring in the coupling plate and replace the bushing.
6. Install the clip ring.
7. Apply a lubricant to the threads of the screws used to install the hydraulic cylinder and cooling manifold. Refer to [Section 7.9](#) for a list of recommended lubricants.

8. Align the hydraulic cylinder and cooling manifold with the distributor and tighten the screws. Torque the screws to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.
9. Connect the proximity sensor wires, thermocouple, water cooling hoses and hydraulic hoses to the hydraulic cylinder in the distributor.
10. Install the cover for the distributor assembly.
11. Remove all locks and tags.

5.4.22 Replacing the Direct Shutoff Cartridge Heaters

To replace the cartridge heaters in the direct shutoff system, do the following:

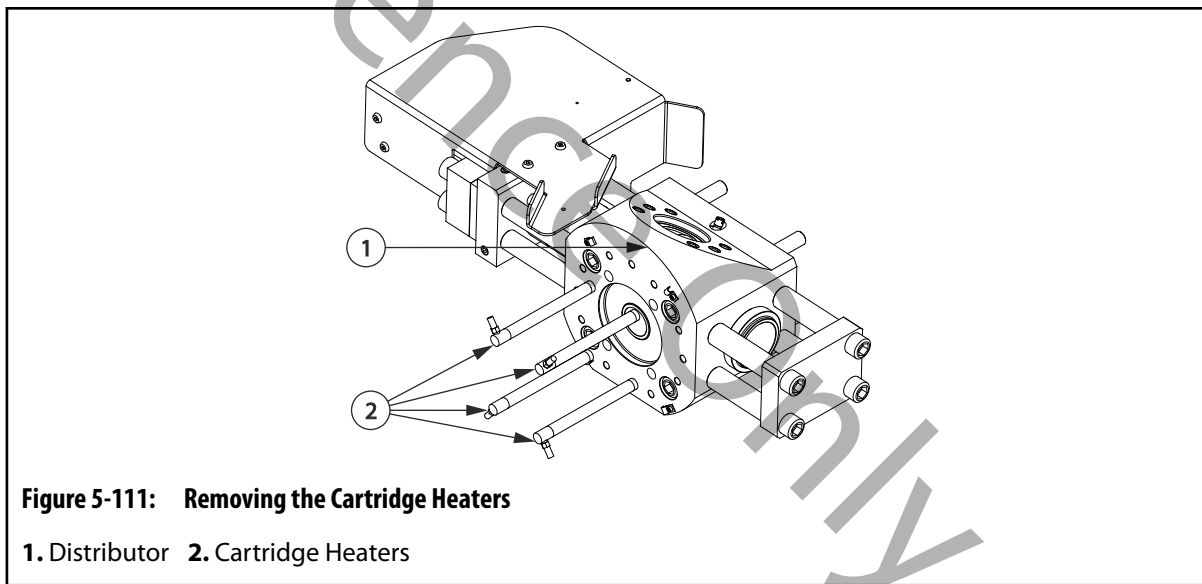
1. Remove the nozzle adaptor. Refer to [Section 5.4.15.1](#) for more information.



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment can fail and could cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

2. Disconnect the heater wires for the cartridge heaters from the electrical heater box.



3. Remove the existing cartridge heaters from the distributor.
4. Cut the heater wires for the new cartridge heaters to the same length as the wires for the existing cartridge heaters.
5. Crimp a male connector onto the end of the heater wire for the new cartridge heaters.
6. Connect the heater wires to the electrical heater box.
7. Coat the new cartridge heaters with Watlube heater release agent (P/N 118-0026).
8. Install the new cartridge heaters into the distributor.
9. Install the nozzle adaptor. Refer to [Section 5.4.15.2](#) for more information.

5.4.23 Replacing the Barrel Head Cartridge Heaters

To replace the cartridge heaters in the barrel head, do the following:

1. On the HMI, press and hold the **Carriage Back** key to move the injection carriage away from the clamp.
2. Make sure the barrel head is at operating temperature.

If the barrel head is not at operating temperature, turn on the machine heats until each heat zone is at operating temperature. Refer to [Section 4.26.1.14](#) for more information.

NOTE:

Do not enable the mold heats.

-
3. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
-

**WARNING!**

Burn hazard – risk of serious injury. Machine surfaces can be hot. Contact with hot surfaces could cause serious burn injuries. Wear personal protective equipment when working near these areas.

4. Open the purge guard.
5. Remove the retaining plate on the barrel head.

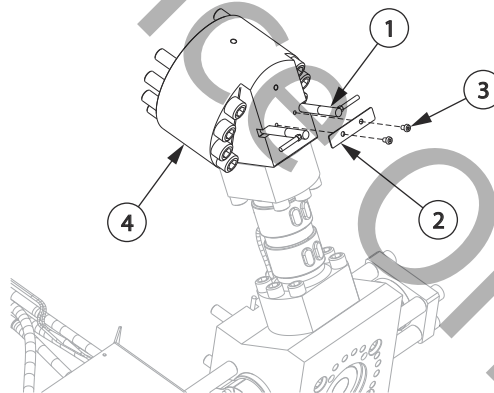


Figure 5-112: Barrel Head Cartridge Heater Assembly

1. Cartridge Heater 2. Retaining Plate 3. Screw 4. Barrel Head

6. Remove the existing cartridge heaters from the barrel head.

If the cartridge heaters have seized inside the barrel head, do the following:

- a. Remove the screws from the barrel head that connect it to the barrel.
- b. Remove all locks and tags.
- c. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.

**WARNING!**

Burn hazard – risk of serious injury. Machine surfaces can be hot. Contact with hot surfaces could cause serious burn injuries. Wear personal protective equipment when working near these areas.

- d. Make sure the barrel head is at operating temperature.

If the barrel head is not at operating temperature, turn on the machine heats until each heat zone is at operating temperature. Refer to [Section 4.26.1.14](#) for more information.

NOTE:

Do not enable the mold heats.

- e. On the HMI, press and hold the **Carriage Forward** key to separate the barrel head from the barrel.
 - f. Lock out and tag the machine.
 - g. Push the cartridge heaters out of the barrel head from the opposite side of the retaining plate.
 - h. Remove all locks and tags.
 - i. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
 - j. On the HMI, press and hold the **Carriage Forward** key until the barrel head makes contact with the barrel.
 - k. Lock out and tag the machine.
 - l. Install the screws for the barrel head and hand-tighten.
 - m. Allow the temperature of the barrel head to equalize with the barrel, and then torque the screws to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.
 - n. Remove all locks and tags.
 - o. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
 - p. Turn off the barrel heats. Refer to [Section 4.27.3.6](#) for more information.
 - q. Lock out and tag the machine.
7. Cut the heater wires for the new cartridge heaters to the same length as the wires for the existing cartridge heaters.
 8. Crimp a male connector onto the end of the heater wire for the new cartridge heaters.
 9. Connect the heater wires to the electrical heater box.
 10. Coat the new cartridge heaters with Watlube heater release agent (P/N 118-0026).
 11. Install the new cartridge heaters into the barrel head.
 12. Apply a lubricant to the threads of the screws used to install the retaining plate. Refer to [Section 7.9.2](#) for a list of recommended lubricants.
 13. Install the retaining plate and hand-tighten the screws.
 14. Torque the screws to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.
 15. Close the purge guard.
 16. Remove all locks and tags.

5.4.24 Removing and Installing the Plasticizing Screw

The following procedures describe how to remove and install the plasticizing screw for two-stage injection units.

NOTE:

This procedure requires two service technicians.

5.4.24.1 Removing the Plasticizing Screw

Complete the following procedures in sequence to remove the plasticizing screw:

Step	Task		Reference
1	Prepare the machine		Section 5.4.24.1.1
2	Disengage the plasticizing screw and barrel head		Section 5.4.24.1.2
3	Swing the barrel		Section 5.4.24.1.3
4	Remove the screw	Without the screw removal tool	Section 5.4.24.1.4
		With the screw removal tool	Section 5.4.24.1.5

**IMPORTANT!**

The operating temperature for the barrel must be maintained throughout this procedure. If the barrel needs to be reheated at any time, do the following:

- i. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
- ii. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
- iii. Enable the machine heats as described in . Do not enable the mold or hot runner heats. Make sure the machine heats are at operating temperature.

5.4.24.1.1 Preparing the Machine

To prepare the machine for screw removal, do the following:

**WARNING!**

Burn hazard – risk of serious injury or death. Removing the screw is hazardous due to the potential for explosion, fire and toxic fumes. Only properly trained and qualified personnel should carry out the following procedure. Read and understand all instructions, make sure that all required tools and equipment are available, and make sure all safety precautions are in place before starting.

1. Shut off the process material supply to the feed throat and empty the hopper or direct feed hose. Refer to [Section 4.27.3.5](#) for more information.

NOTE:

If the process material feed system uses a manual shutoff, make sure the manual shutoff slider remains in the closed position to allow the barrel to vent.

2. Touch the **Heats** button and touch the **Machine Heats** tab to display the **Machine Heats** screen.

3. Make sure the machine heats are at operating temperature.

If the barrel is not at operating temperature, turn on the machine heats until each barrel heat zone is at operating temperature. Refer to [Section 4.27.3.6](#) for more information.

NOTE:

Do not enable the mold heats.



WARNING!

Burn or explosion hazard – risk of death or serious injury. Molten process material under high pressure could be present. Purge the injection unit just prior to removing the plasticizing screw to minimize the potential for any pressure build-up in the injection unit. Wear personal protective equipment while purging the injection unit.

4. On the HMI, press the **Pump Motor On** key and purge the injection unit. Refer to [Section 4.26.1.16](#) for more information.
5. Press and hold the **Inject** key until the screw is fully forward, but do not inject.

NOTE:

When the **Carriage Back** key is pressed, the carriage will stop at the purge position first. Press the key again to move the carriage back all the way.

6. Press and hold the **Carriage Back** key until the carriage cylinders are fully extended.
7. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.

CAUTION!

Mechanical hazard – risk of damage to the machine. The direct feed hose (if equipped) could be too short to swing with the barrel. Disconnect the feed hose before swinging the barrel.

8. If equipped, disconnect the direct feed hose from the injection unit.
9. Remove the top and operator side guard panels from the extruder casting.

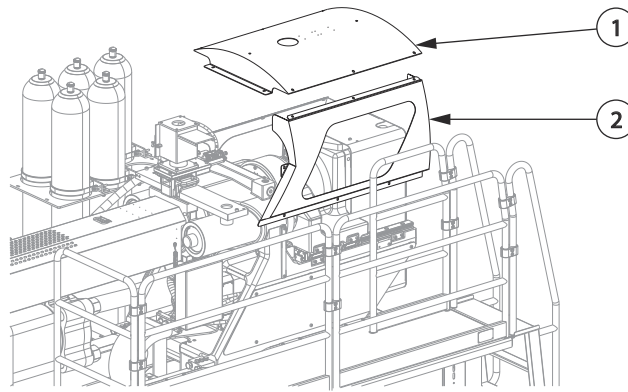


Figure 5-113: Removing the Guard Panels

1. Top Guard Panel 2. Operator Side Guard Panel



WARNING!

Crushing hazard – risk of serious injury or damage to equipment. The purge guard is heavy and can weigh up to 70 kg (154 lb) . It is recommended for two people to perform this procedure. Make sure the purge guard is supported and use proper lifting techniques. Failure to use a support and/or proper lifting techniques could result in serious injury or damage to the purge guard.

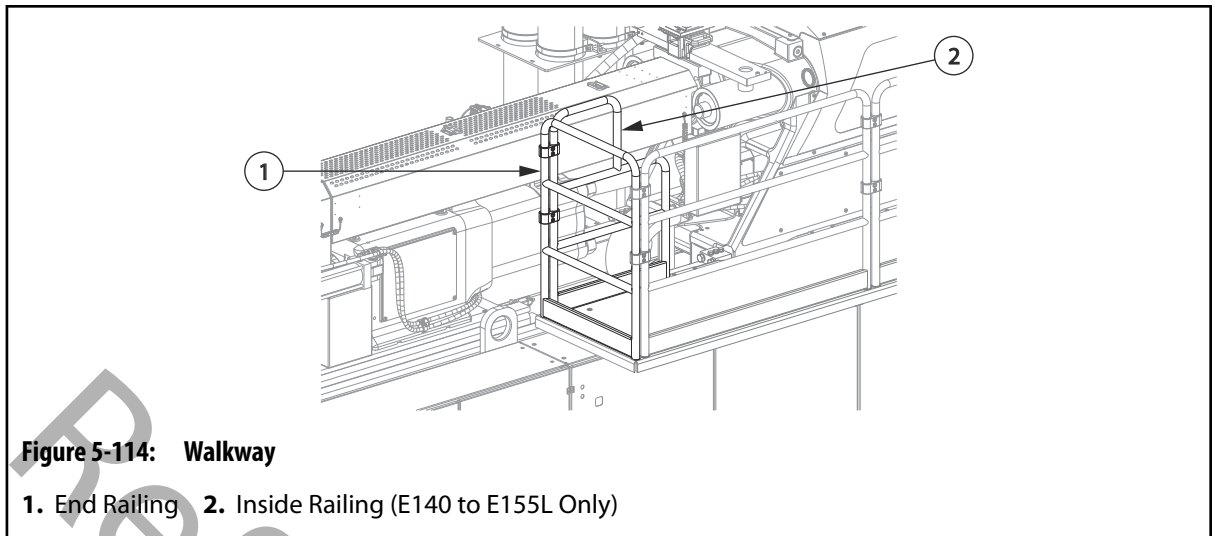
10. Remove the purge guard and barrel cover.

CAUTION!

Mechanical hazard – risk of damage to the machine. Molten material dripping from the barrel head could damage the heater bands below. Install a pan to catch any spillage.

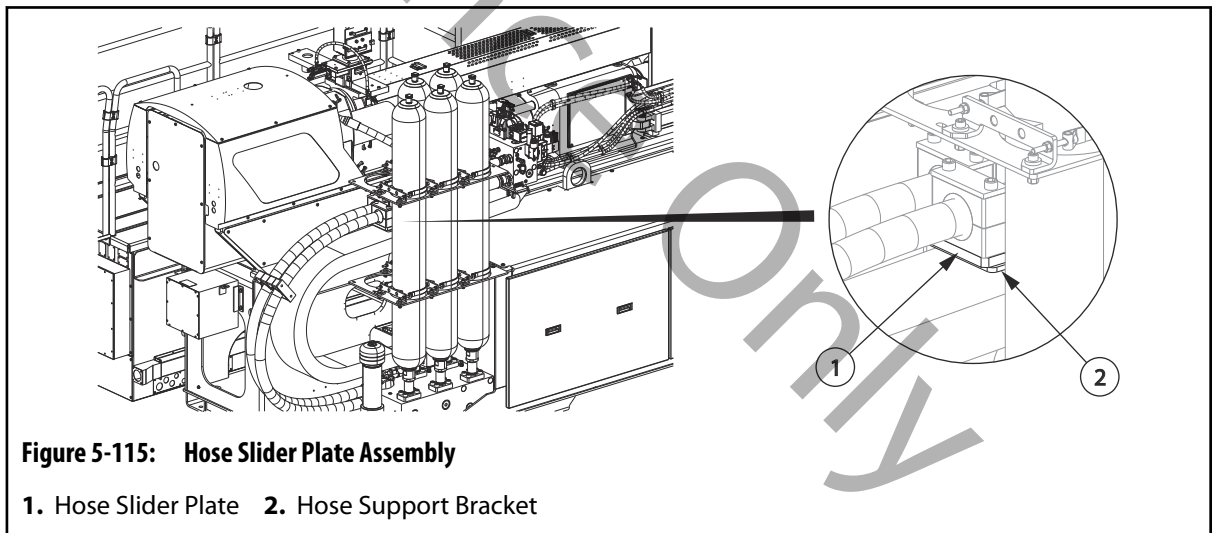
11. Install a pan under the barrel at the barrel head end to catch any molten material.

12. Remove or swing any railings that may prevent the barrel from swinging toward the operator side.

**CAUTION!**

Mechanical and hydraulic hazard – risk of damage to the equipment or oil spill. Make sure all hoses and cables are free to move when the barrel is swung. Damage to the hoses, cables or connections could occur, resulting in damage or the loss of hydraulic oil.

13. On the non-operator side of the machine, disconnect the hose slider plate from the hose support bracket.



14. Disconnect the cable track mounting bracket from the injection manifold.

5.4.24.1.2 Disengaging the Barrel Head

To disengage the barrel head from the barrel, do the following:

**WARNING!**

Complete the Lockout/Tag out of all energy sources in accordance with applicable local codes before performing maintenance activities. Failure to do so could result in serious injury or death.

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.

CAUTION!

Mechanical hazard – risk of equipment damage. Molten material dripping from the barrel head could damage heater bands below. Install a pan to catch any spillage.

2. Install a pan under the barrel at the barrel head to catch any molten material from the barrel head.

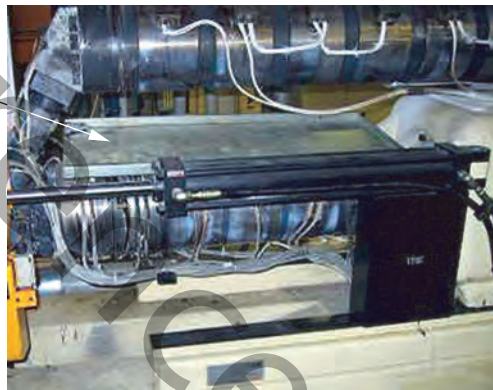


Figure 5-116: Pan Installation

1. Pan

**WARNING!**

Burn hazard – risk of serious injury or death. Contact with molten resin or high pressure gas could cause death or severe burns. Wear personal protective equipment while servicing the feed throat, nozzle, mold areas, and when purging the injection unit.

3. Remove the barrel head bolts in a star pattern.
4. If the barrel head heater band interferes with the barrel head/barrel interface, adjust the last barrel head heater band. It may also be necessary to remove the thermocouple and the thermocouple post.
5. Remove all locks and tags.

5.4.24.1.3 Swinging the Barrel

To swing the barrel into the screw change zone, do the following:

1. Wrap a lifting sling around the barrel and attach it to an overhead lifting device. Make sure there is no slack in the lifting sling.
2. Swing the barrel out toward the operator side of the machine using the overhead lifting device.

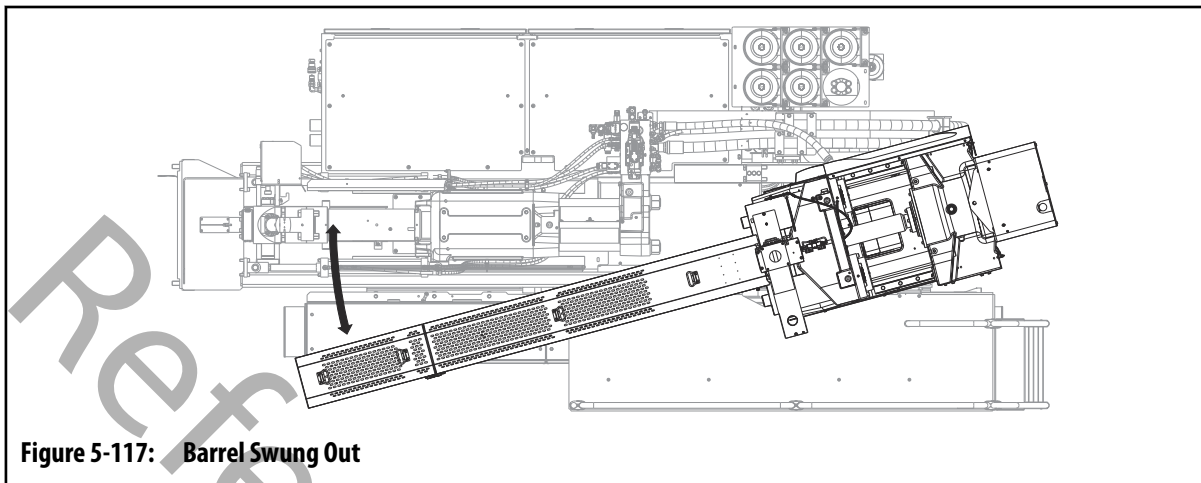


Figure 5-117: Barrel Swung Out

CAUTION!

Mechanical hazard – risk of damage to the machine. The barrel must be secured in place once swung into the maintenance position. Damage to the plasticizing screw could occur if the barrel is allowed to move freely.

3. Loosen the screw on the underside of the injection housing on the non-operator side of the machine. The screw prevents the barrel from moving unexpectedly while the plasticizing screw is being removed.

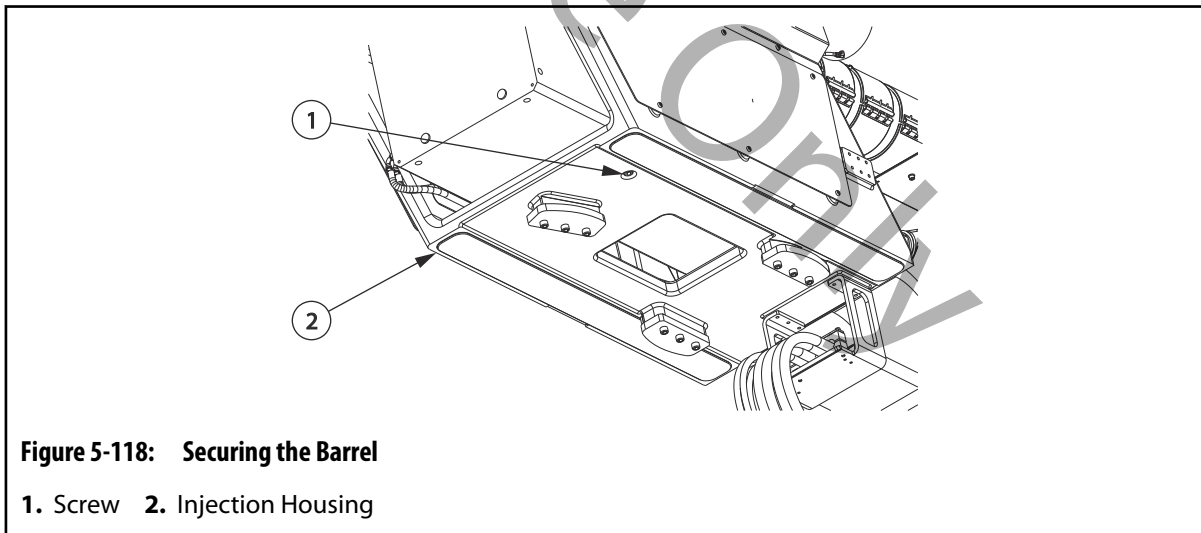


Figure 5-118: Securing the Barrel

1. Screw 2. Injection Housing

5.4.24.1.4 Removing the Plasticizing Screw without the Screw Removal Clamp Tool

To remove the plasticizing screw without the screw removal clamp tool, do the following:

NOTE:

The following procedure should be performed only when the screw removal clamp tool is unavailable. If the screw removal clamp tool is available, refer to [Section 5.4.24.1.5](#) for more information.

1. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
2. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
3. Press the **Manual Cycle** key.
4. Press the **Injection Jog Back** key to retract the injection piston and plasticizing screw. The piston must be retracted until the flat surfaces of the screw are located between the two bosses in the casting.
5. Use a wooden pry bar to disengage the plasticizing screw from the drive housing.

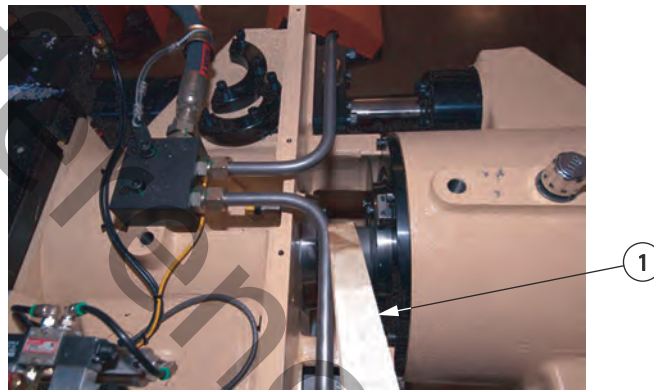


Figure 5-119: Disengaging the Screw from the Drive Housing (Typical)

1. Wooden Pry Bar

6. Attach a heat resistant lifting sling around the nozzle end of the plasticizing screw.



WARNING!

Mechanical hazard – risk of damage to the equipment. Do not apply any upward or downward force on the plasticizing screw. Excessive force could damage the screw, barrel and injection housing.



WARNING!

Burn and gas hazard – risk of serious injury or death. Removing the screw could release trapped gasses and exploding molten material. Keep all personnel away from the area while the screw is being pulled out.

7. Attach the lifting sling to an overhead lifting device and pull the plasticizing screw out of the barrel. As the screw is being removed, attach a heat resistant lifting sling to the extruder end of the screw and attach the sling to the overhead lifting device.

8. Once the screw has been removed from the barrel, use the overhead lifting device to move the screw to a safe area.

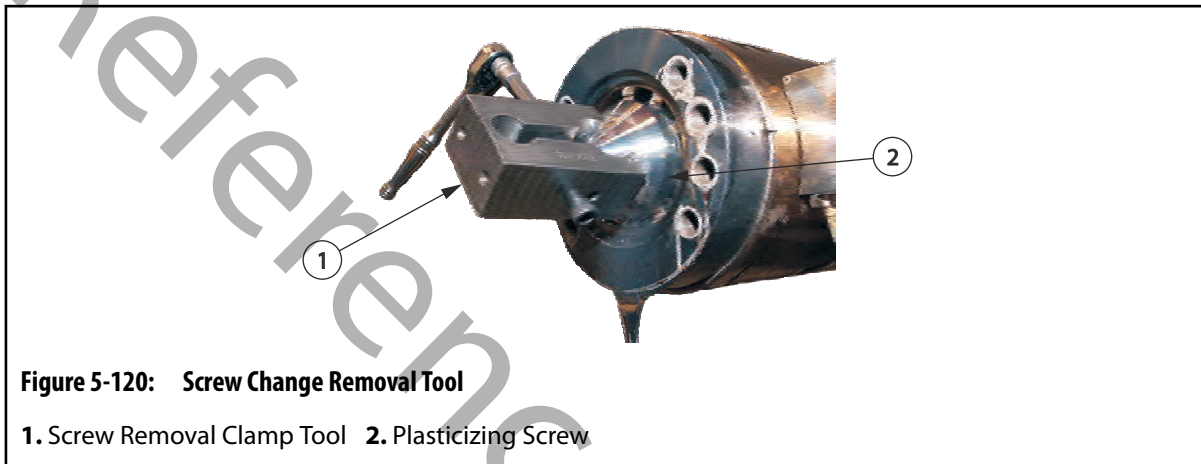
5.4.24.1.5 Removing the Plasticizing Screw with the Screw Removal Clamp Tool

To remove the plasticizing screw using the screw removal clamp tool, do the following:

NOTE:

The following procedure should be performed only when the screw removal clamp tool is available. If the screw removal clamp tool is unavailable, refer to [Section 5.4.24.1.4](#) for more information.

1. Attach the screw removal clamp tool (P/N 607695) to the flats on the screw tip.

**WARNING!**

Burn and gas hazard – risk of serious injury or death. Removing the screw could release trapped gasses and exploding molten material. Keep all personnel away from the area while the screw is being pulled out.

2. Insert a rod through the screw removal clamp tool and connect the bar to a lift motor with lifting slings.

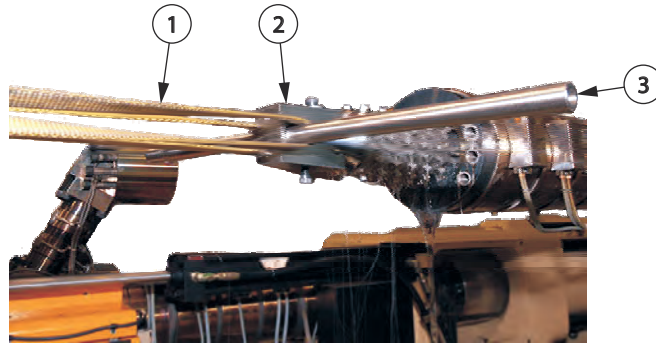


Figure 5-121: Removing the Plasticizing Screw

1. Lifting Straps to Lift Motor **2.** Screw Removal Clamp Tool **3.** Rod



WARNING!

Mechanical hazard – risk of damage to the equipment. Do not apply any upward or downward force on the plasticizing screw. Excessive force could damage the screw, barrel and injection housing.

- 3.** Use the lift motor to pull the screw out of the barrel. As the screw is being removed, attach heat resistant lifting slings at both ends of the screw and attach them to an overhead lifting device.
- 4.** Once the screw has been removed from the barrel, use the overhead lifting device to move the screw to a safe area.
- 5.** Inspect the teflon packing at the end of the plasticizing screw. Replace as necessary.

5.4.24.2 Installing the Plasticizing Screw

Complete the following procedures in sequence to install the plasticizing screw:

Step	Task Description	Reference
1	Prepare the machine	Section 5.4.24.2.1
2	Insert the plasticizing screw	Section 5.4.24.2.2
3	Swing the barrel	Section 5.4.24.2.3
4	Connect the plasticizing screw and barrel head	Section 5.4.24.2.4

**IMPORTANT!**

The operating temperature for the barrel must be maintained throughout this procedure. If the barrel needs to be reheated at any time, do the following:

- i. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
- ii. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
- iii. Enable the machine heats as described in .
- iv. Lock out and tag the machine.

5.4.24.2.1 Preparing the Machine

To prepare the machine for screw installation, do the following:

1. Make sure the teflon packing at the gearbox end of the plasticizing screw is in good condition. Replace as necessary.

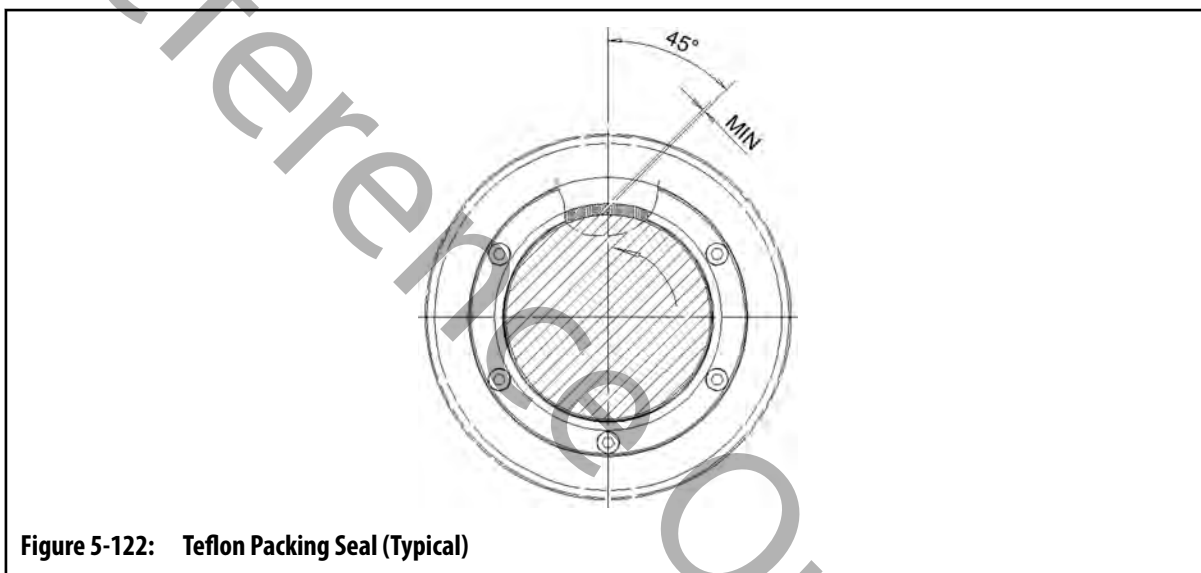


Figure 5-122: Teflon Packing Seal (Typical)

2. Remove all locks and tags. Refer to [Section 2.6](#) for more information.

NOTE:

Upon starting the machine, the HMI will generate a *Temposonics Fault - invalid number of magnets* alarm message and a *Barrel swung out* alarm message. Ignore these messages.

**DANGER!**

Electrocution hazard – risk of death or serious injury. The barrel may be connected to a live energy source. Do not touch the barrel once the power is turned on.

3. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
4. On the HMI, touch the **Heats** button and touch the **Machine Heats** tab to display the **Machine Heats** screen.

5. Make sure the machine heats are at operating temperature.

If the barrel is not at operating temperature, turn on the machine heats until each barrel heat zone is at operating temperature. Refer to [Section 4.27.3.6](#) for more information.

NOTE:

Do not enable the mold heats.

6. Lock out and tag the machine.

5.4.24.2.2 Inserting the Plasticizing Screw

To insert the plasticizing screw in the barrel, do the following:

NOTE:

Make sure all contact surfaces of mating parts are free of process material and other debris before reinstalling them.

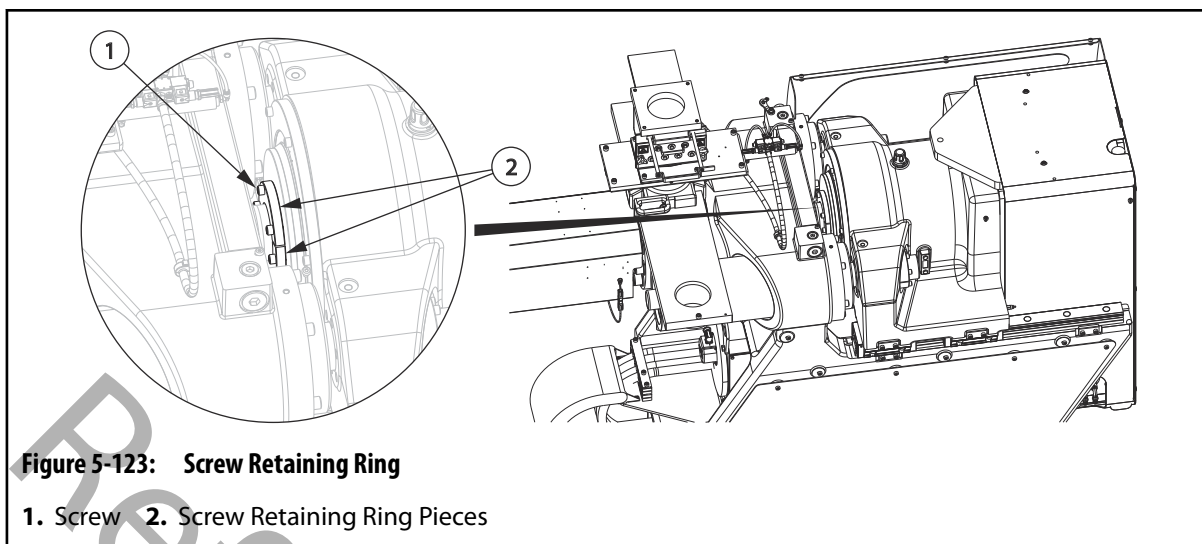
1. Apply a lubricant to the splines of the plasticizing screw. Refer to [Section 7.9.2](#) for a list of recommended lubricants.
 2. Attach lifting slings to both ends of the plasticizing screw and connect the slings to an overhead lifting device.
 3. Using the overhead lifting device, lift the plasticizing screw until it is level with the barrel.
-



WARNING!

Mechanical hazard – risk of damage to the equipment. Do not apply any upward or downward force on the plasticizing screw. Excessive force could damage the screw, barrel and injection housing.

4. Slowly insert the plasticizing screw into the barrel.
5. Carefully engage the splines of the plasticizing screw into the quill by doing the following:
 - a. Slowly rotate the screw until the splines line up with the grooves in the quill.
 - b. Push the screw all the way in until it bottoms out.
6. Install the two-piece screw retaining ring.



7. Clean the barrel mating surfaces thoroughly.



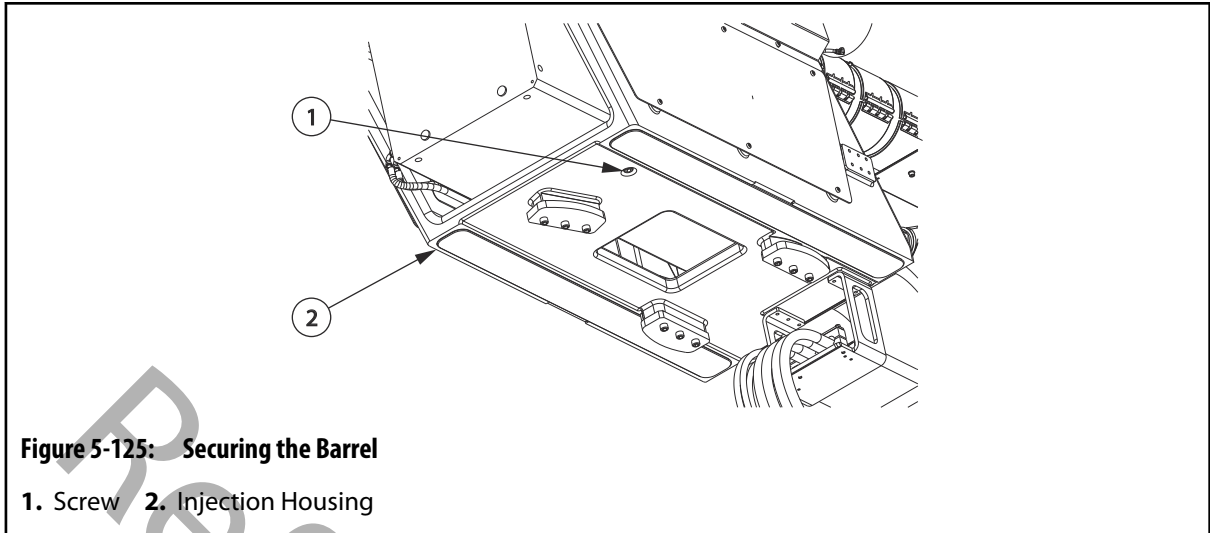
5.4.24.2.3 Swinging the Barrel

To swing the barrel back into position, do the following:

CAUTION!

Mechanical hazard – risk of damage to the machine. The barrel must be secured in place once swung into the maintenance position. Damage to the plasticizing screw could occur if the barrel is allowed to move freely.

1. Tighten the screw on the underside of the injection housing. The screw must be flush with the bottom face of the injection housing to allow the barrel to swing.



2. Wrap a lifting sling around the barrel and attach it to an overhead lifting device. Make sure there is no slack in the lifting sling.
3. Swing the barrel back into position using the overhead lifting device.

5.4.24.2.4 Connecting the Plasticizing Screw and Barrel Head

To connect the plasticizing screw and barrel head, do the following:

1. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
2. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
3. On the HMI, press and hold the **Carriage Forward** key until the barrel is mated with the barrel head.
4. Lock out and tag the machine.
5. Inspect the barrel head screws that secure the barrel head to the barrel. If one screw needs to be replaced, replace all of the screws.
6. Apply a lubricant to the barrel head screws. Refer to [Section 7.9](#) for a list of recommended lubricants.



WARNING!

Burn hazard – risk of serious injury. Incorrectly tightened barrel head screws can fail under high injection pressures, resulting in the release of high pressure spray of molten material which could cause injury. Tighten the barrel head screws to the recommended torque.

7. Install the barrel head screws and connect the barrel head to the barrel. Tighten the screws in a star pattern and torque to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.

**WARNING!**

Burn hazard – risk of serious injury. The machine is designed to keep the injection nozzle tip safely within the purge guard during operation and purging. Operating or purging the machine outside of this guarding is prohibited and can result in uncontained molten resin spray, causing serious injury or death.

The purge guard must overlap the barrel cover by a minimum of 10 mm (0.4 in) .

**WARNING!**

Crushing hazard – risk of serious injury or damage to equipment. The purge guard is heavy and can weigh up to 70 kg (154 lb) . It is recommended for two people to perform this procedure. Make sure the purge guard is supported and use proper lifting techniques. Failure to use a support and/or proper lifting techniques could result in serious injury or damage to the purge guard.

8. Install the purge guard and barrel cover.
9. Check the alignment of the purge guard switch and the switch actuator. For more information, refer to [Section 5.2.6.10](#).

**DANGER!**

Electrocution hazard – risk of death or serious injury. If a heater band contacts an ungrounded barrel cover, this could cause electrocution and death to a person who touches the ungrounded barrel cover. Always connect the barrel cover grounding strap after installing the barrel cover.

10. Connect the barrel cover grounding strap, where applicable.

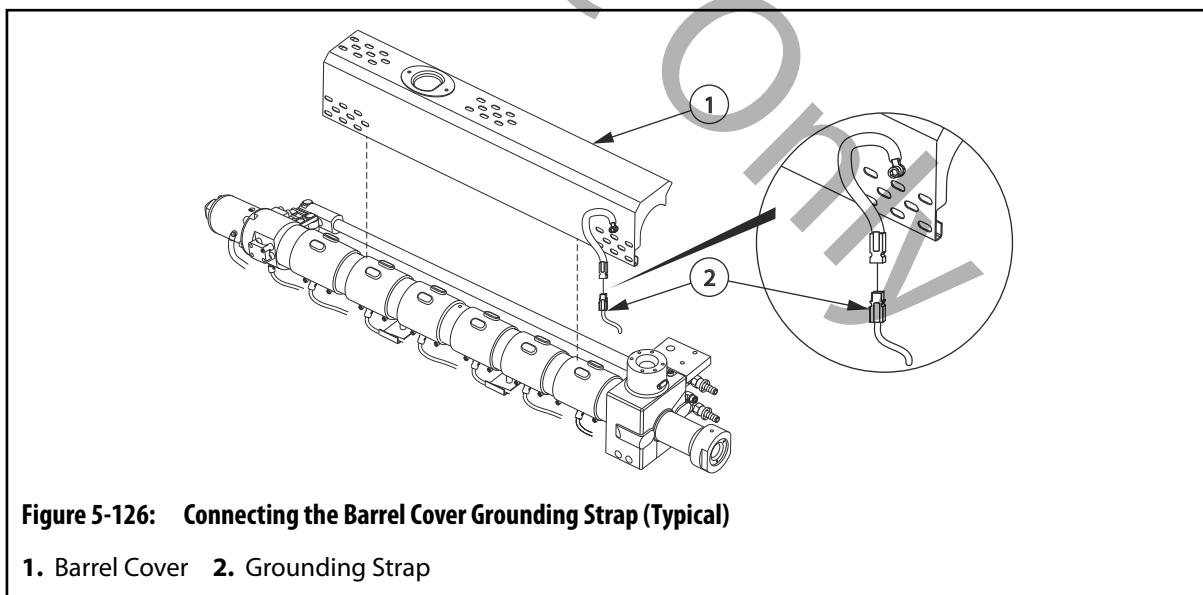


Figure 5-126: Connecting the Barrel Cover Grounding Strap (Typical)

1. Barrel Cover 2. Grounding Strap

11. Install the top and operator side guard panels from the extruder casting.

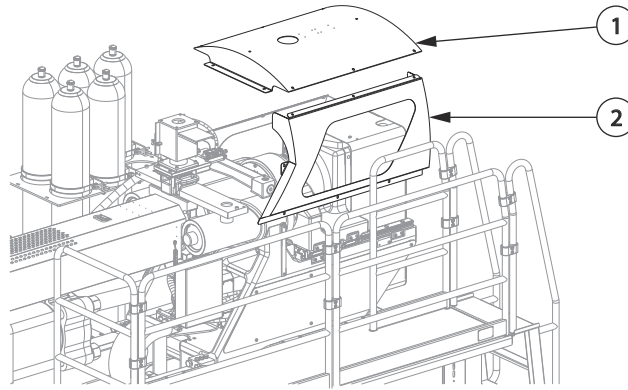


Figure 5-127: Installing the Guard Panels

1. Top Guard Panel 2. Operator Side Guard Panel

12. Reassemble the walkway railings.

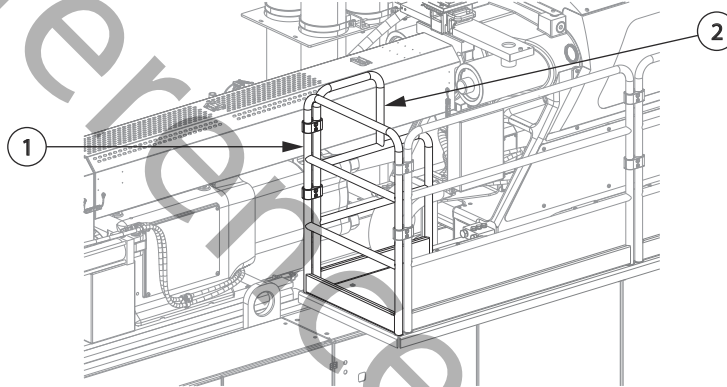


Figure 5-128: Walkway

1. End Railing 2. Inside Railing (E140 to E155L Only)

13. Calibrate the injection unit. Refer to [Section 5.10](#) for more information.

5.5 Electrical System Maintenance

The following procedures are specifically for electrical components on the machine.

5.5.1 Inspecting Electrical Components

To inspect electrical components on the machine, do the following:

1. Lock out and tag the machine.
2. Wipe the heat sink on the back of the electrical cabinet with a clean cloth.
3. Open the electrical cabinet doors and check for cracked, burnt or corroded components.
4. Repair or clean components as necessary.

5. Remove all locks and tags.

5.5.2 Removing and Installing the Fingersafe Covers

The following procedure describes how to remove and install the fingersafe covers on the Q1M, Q2M and Q3M main electrical power connections.

5.5.2.1 Removing the Fingersafe Cover



DANGER!

Electrocution hazard— contact with hazardous voltages will cause death or serious injury. Turn off power and review electrical schematics before servicing equipment. Electrical cabinets can contain more than one live circuit. Test all circuits before handling to make sure circuits have been de-energized.

To remove the fingersafe cover, do the following:



WARNING!

Complete the lockout/tagout of all energy sources in accordance with applicable local codes before performing maintenance activities. Failure to do so can result in serious injury or death.

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Make sure the black tab on the fingersafe cover is in the unlocked position. To unlock the black tab, push it in.

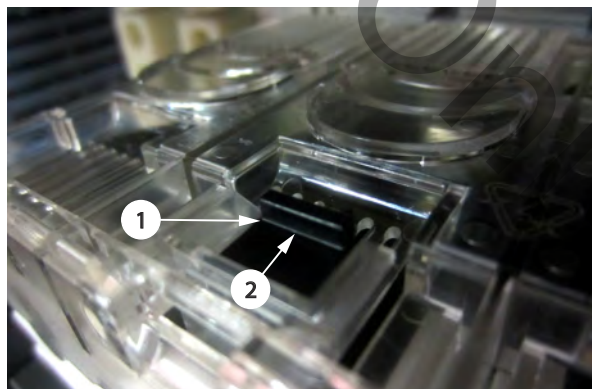


Figure 5-129: Black Tab on the Fingersafe Cover

1. Black Tab in the Unlocked Position 2. Unlocking Direction

3. Insert a small flat screwdriver under the face of the clear tab. The clear tab is located directly beneath the black tab.

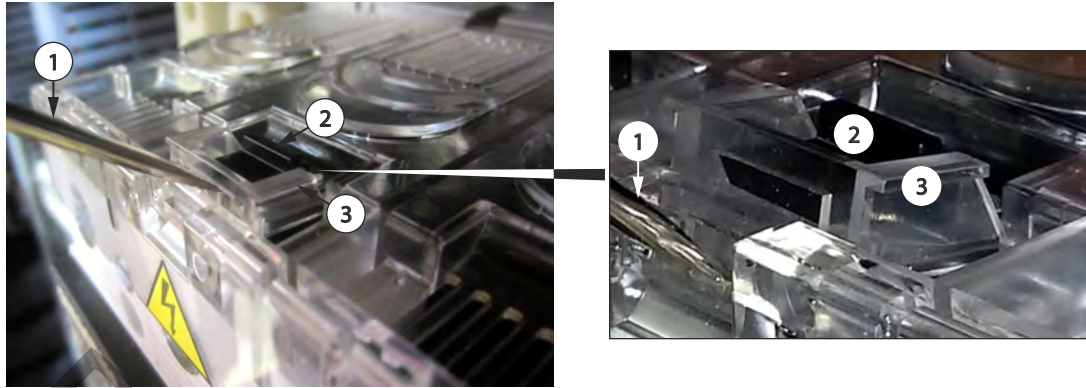


Figure 5-130: Lift Clear Tab

1. Screwdriver 2. Black Tab 3. Clear Tab

4. Use the screwdriver to gently lift the clear tab and simultaneously slide the fingersafe cover forward.

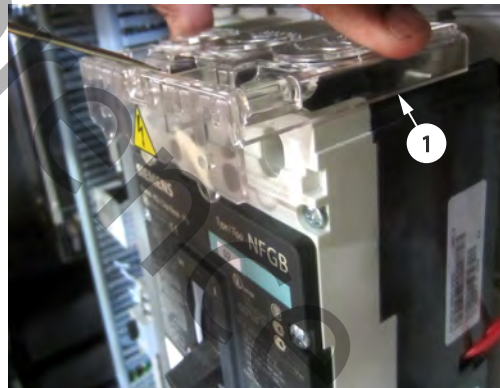


Figure 5-131: Slide Fingersafe Cover

1. Fingersafe Cover

5. Remove all locks and tags.

5.5.2.2 Installing the Fingersafe Cover



DANGER!

Electrocution hazard— contact with hazardous voltages will cause death or serious injury. Turn off power and review electrical schematics before servicing equipment. Electrical cabinets can contain more than one live circuit. Test all circuits before handling to make sure circuits have been de-energized.

To install the fingersafe cover, do the following:

**WARNING!**

Complete the lockout/tagout of all energy sources in accordance with applicable local codes before performing maintenance activities. Failure to do so can result in serious injury or death.

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Make sure the black tab on the fingersafe cover is in the unlocked position. To unlock the black tab, push it in.

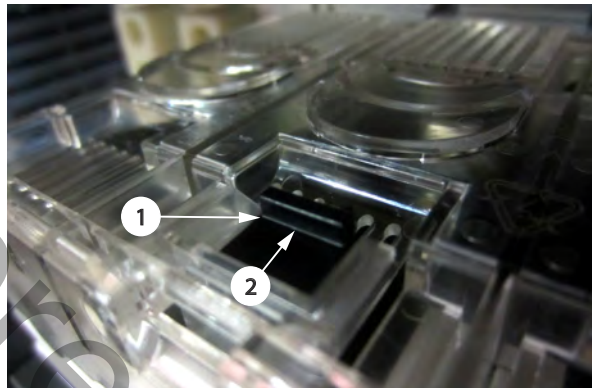


Figure 5-132: Black Tab on the Fingersafe Cover

1. Black Tab in the Unlocked Position 2. Unlocking Direction

3. Align the fingersafe cover with the tracks.

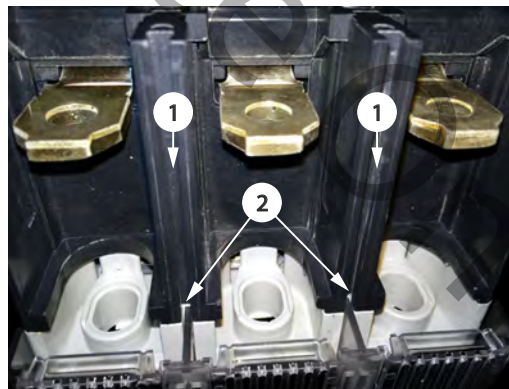


Figure 5-133: Align the Fingersafe Cover with the Tracks

1. Tracks 2. Fingersafe Cover Aligned on the Tracks

4. Slide the fingersafe cover along the tracks until it clicks in the fully seated position.

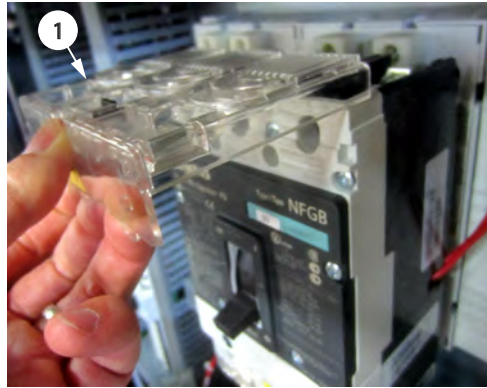


Figure 5-134: Slide the Fingersafe Cover

1. Fingersafe Cover

5. Remove all locks and tags.

5.5.3 Torquing the DC Bus Bar Screws

The DC bus bar screws must maintain a consistent level of torque for proper operation. Follow the maintenance schedule by performing timely servicing.

5.5.3.1 Robot Cabinet

The DC bus bar screws in the Sinamics drive must be torqued at the interval specified in the maintenance schedule.

To torque the DC bus bar screws, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



DANGER!

Electrocution hazard – risk of death or serious injury. After performing the lockout/tagout procedure, allow 30 minutes for the residual voltage to discharge to less than 50 V before performing any electrical procedures. Only qualified personnel should perform the lockout/tagout procedure.

2. Wait 10 minutes for the DC drive bus voltage to discharge before opening the product handling electrical cabinet.
3. Open the product handling electrical cabinet.

NOTE:

Two keys are provided with the Sinamics drive for opening the cover.

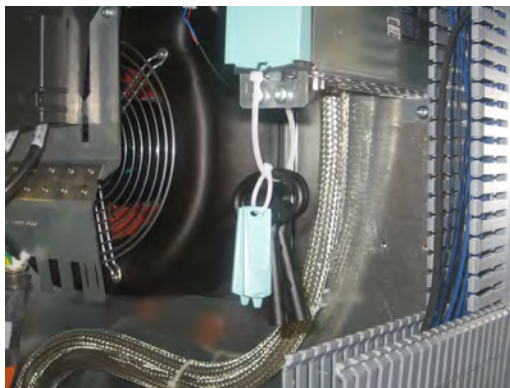


Figure 5-135: Sinamics Drive Keys

4. Using the key for the Sinamics drive cover, do the following:
 - a. Insert the key into each slot along the cover and press the cover out.

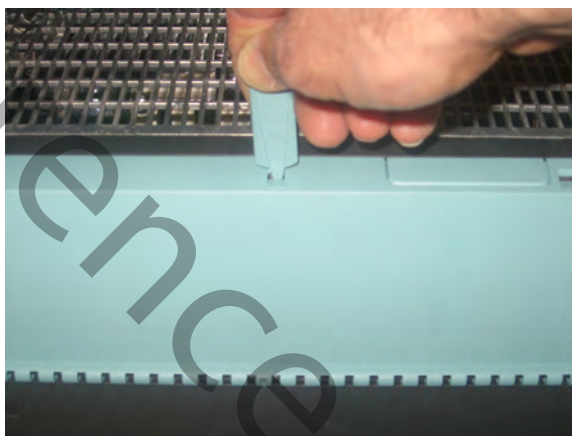


Figure 5-136: Opening the Sinamics Drive Cover

- b. Pull the cover open using the key.



Figure 5-137: Releasing the Tabs

5. Using a voltmeter, verify the DC bus bar voltage is less than 50 V .

6. Make sure all the 24V DC bus bar connectors are fully inserted and secure.

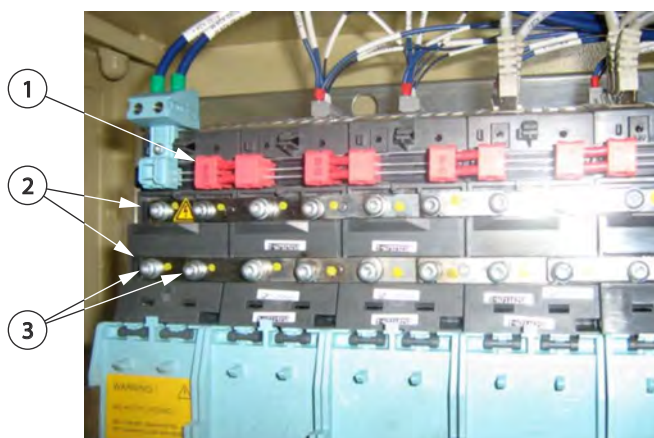


Figure 5-138: Sinamics Drive

1. 24V DC Bus Bar Connectors 2. Bus Bars 3. Screws

7. Make sure all the bus bars are in line.



IMPORTANT!

Do not tighten the DC link connections without a torque wrench. Use only a calibrated torque wrench. If any of the DC link screws become loose during torquing, replace the drive.

8. Using a T20 TORX bit, torque all screws along the bus bar to 1.8 N·m (16 lbf·in) $\pm$ 30%. Make sure to torque the screws from right to left.



Figure 5-139: DC Bus Bar Screws

9. Apply a witness mark.



DANGER!

Electrocution hazard — risk of serious injury or death. All covers must be installed before the line voltage is switched on. Operation of the equipment is not permitted if the cover is damaged.

10. Close the Sinamics drive cover.
11. Close the product handling electrical cabinet.
12. Remove all locks and tags.

5.5.4 Replacing the Uninterruptible Power Supply (UPS) Battery

The machine is equipped with an Uninterruptible Power Supply (UPS) that prevents the HMI software from crashing in the event of a power outage. It also allows the user to save machine settings and protects the HMI from momentary power fluctuations.

To replace the battery, do the following:

1. Save the current mold setup file. Refer to [Section 4.20.1](#) for more information.
2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
3. Open the electrical cabinet and confirm that the lights on the UPS have turned off.

NOTE:

The UPS requires approximately 30 seconds to shut down.



Figure 5-140: UPS and Battery (Typical)

1. UPS 2. UPS Battery



Figure 5-141: Optional UPS Battery

4. Disconnect the wires from the UPS battery.
5. Remove the screws securing the battery to the cabinet.
6. Remove the battery.
7. Position the new battery on the rail and secure it with screws.
8. Connect the wires to the new UPS battery. Refer to the electrical schematics for more information.
9. Close the electrical cabinet.
10. Remove all locks and tags.
11. Power up the machine and log on to the HMI. Refer to [Section 4.26](#) for more information.
12. Load the most current mold setup file for the mold that is installed. Refer to [Section 4.20.3](#) for more information.

5.5.5 Inspecting the Electric Pump Motor Assemblies

To inspect the electric pump motors, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Open the access panels on the power pack.
3. Check the couplings from the bell housing windows for play between the motor and the pump assemblies on the injection, clamp, and circulation circuits.
4. Check for any sign of oil leaks from the front bearing seal in the injection, clamp, and circulation circuit pumps.
5. Close the access panels on the power pack.
6. Remove all locks and tags.

5.5.6 Replacing Sinamics Drive Module Fan(s) After a Drive Warning Error

The Sinamics booksize drive module unit is programmed to control the fan's maximum operating service life (40,000 hours). When this limit has been reached, a warning will appear. To clear the

drive warning error, replace the drive module fan(s) and then reset the fan operating hours back to zero. Refer to [Section 5.5.6.2](#), [Section 5.5.6.3](#) and [Section 5.5.6.4](#) for more information.

5.5.6.1 Preparing to Replace a Sinamics Control Module Cooling Fan

This section describes the preparation required to access the control module cooling fan(s) for replacement.



WARNING!

Complete the Lockout/Tagout procedure in accordance with applicable local codes and the product manual before performing maintenance activities. Failure to do so could result in serious injury or death.



DANGER!

Electrocution hazard Contact with hazardous voltages will cause death or serious injury. Turn off power and review electrical schematics before servicing equipment. Electrical cabinets can contain more than one live circuit. Test all circuits before handling to make sure circuits have been de-energized.

To prepare the Sinamics module for fan(s) replacement, do the following:

1. Determine the fan part number for ordering:
 - a. Refer to the **Location** column on **Alarms** screen to identify the Sinamics drive with the fan alarm.
 - b. Refer to the electrical schematic to determine the drive model ID and mounting location.
 - c. Using the mounting location, determine the module part number. Refer to the bill of materials in the electrical schematics.
 - d. Verify the supplier IP number by locating the module in the electrical cabinet and comparing the component sticker ID on the module. Select the fan part number that corresponds with the supplier IP number.
2. Lockout and tagout the machine. Refer to [Section 2.6](#) for more information.



WARNING!

Wait 20 minutes for the power stored in the drive to drop from 600 volts to close to 0 volts.

3. Open electrical cabinet to access the module drive lineup.



IMPORTANT!

Locate the supplier IP on the module drive lineup. Verify that the supplier IP on the module matches the supplier IP on the new replacement fan box to make sure that the fan is the correct part.



Figure 5-142: Module Drive Lineup

1. Supplier IP Location on Module

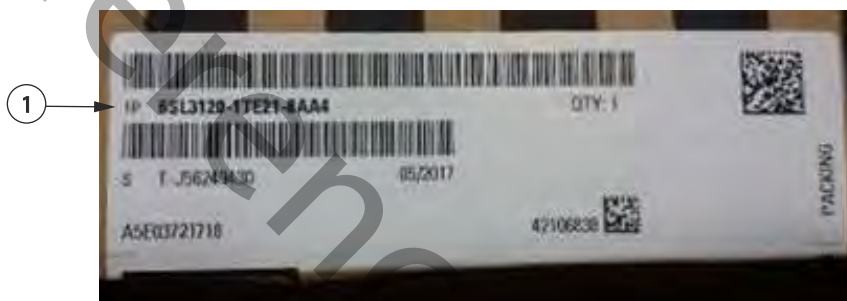


Figure 5-143: Supplier IP Label on Fan Box

1. Supplier IP

4. Turn the cover fastening screw $\frac{1}{2}$ a rotation counter clockwise and open the cover.



Figure 5-144: Sinamics Module Cover

1. Cover Screw



DANGER!

Electrocution hazard – risk of death or serious injury. Allow 20 minutes for the residual voltage to discharge to less than 10 Volts before performing any electrical procedures.

5. Use a voltage meter to measure the DC voltage. The reading must be less than 10 volts.



Figure 5-145: Measuring the DC Voltage

When the reading is less than 10 volts, it is safe to either remove the fan from the control module, while installed within the electrical cabinet, or to remove the control module, if required, to access the fan.

6. Select the fan replacement procedure based on the module and fan type.

5.5.6.2 Replacing the Fan in Sinamics Control Modules Where Module Removal is Required

This section describes how to replace the fan(s) where the control module must be removed from the electrical to access the fan(s).



WARNING!

Complete the Lockout/Tagout procedure in accordance with applicable local codes and the product manual before performing maintenance activities. Failure to do so could result in serious injury or death.



DANGER!

Electrocution hazard Contact with hazardous voltages will cause death or serious injury. Turn off power and review electrical schematics before servicing equipment. Electrical cabinets can contain more than one live circuit. Test all circuits before handling to make sure circuits have been de-energized.

To replace the fan(s) where the control module must be removed to access the fan(s), do the following:



IMPORTANT!

Complete the procedure *Preparing to Replace a Sinamics Control Module Cooling Fan* before starting this procedure. Refer to [Section 5.5.6.1](#) for more information.

1. Remove the screws and linkages to and from the adjacent modules and the 24-volt DC linkage and set aside.



Figure 5-146: Adjacent Modules

1. 24 volt DC Linkage 2. Screws and Linkage

2. Mark all of the ports and cable ends for reinstallation.
3. Unplug the cables connected to the top and bottom of the module.



Figure 5-147: Cables at Top of Module



Figure 5-148: Cables at Bottom of Module

4. Remove the module from the drive lineup and place it on a flat surface.
5. Remove and replace the fan which will be one of the following configurations:

Control Module Type	Fan Replacement Procedure
9A Single Motor Module 18A Single Motor Module 30A Single Motor Module 45A Single Motor Module 60A Single Motor Module 36kW Active Line Module 80kW Active Line Module 36kW Active Interface Module	- Release the cover latch and remove the fan cover. - Release and disconnect the electrical connector. - Gently lift the tab up and remove the fan from the module using needle nose pliers. - Push the replacement fan into the module and press until it latches into place. - Insert the electrical connector until it latches into place. - Line up the tabs of the fan cover to the module and push the fan cover into place.
Control Supply Module	- Place the unit flat on its side. - Open the module housing cover on the side by removing the six screws. - Pull the release the latch to remove the module housing cover. - Pull back the white cover to access the fan. - Release and disconnect the electrical connector. - Remove the bottom two screws that retain the fan to the module and remove the existing fan. - Insert the new fan electrical connector until it latches into place. - Push the fan into the module until it latches into place and fasten it with the two retaining screws. - Reinstall the module housing cover and secure it with the six screws.
120kW Active Line Module	- Remove the four fan cover T-25 Torx screws on the back of the unit and remove the fan cover. - Release and disconnect the electrical connectors. - Remove the eight fan expansion rivets by turning the fan cover upside down and pushing at the center of the rivets to pop them out. - Remove the existing fan from the cover. - Line up the new fan to the cover and insert the eight expansion rivets to secure it to the fan cover. - Insert the electrical connector until it latches into place. - Reinstall the fan and cover assembly to the module and secure the four T-25 Torx screws.

Control Module Type	Fan Replacement Procedure
55kW Active Interface Module	1. Remove the five fan cover T-25 Torx screws on the back of the unit and remove the fan cover. 2. Release and disconnect the electrical connectors. 3. Remove the four screws that secure the fan to the fan cover. 4. Remove the existing fan from the cover. 5. Line up the new fan to the cover and insert the four screws that secure it to the fan cover. 6. Insert the electrical connector until it latches into place. 7. Reinstall the fan and cover assembly to the module and secure the five T-25 Torx screws.

6. Install the module into the drive lineup in the electrical cabinet.
7. Reconnect the cables to the top and bottom of the module.

NOTE:

Refer to the ports and cable ends that were marked in [step 2](#).

8. Reinstall the screws and linkages to and from the adjacent modules and the 24-volt DC linkage.
9. Close and lock the cover.
10. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
11. Power up the machine.
12. Reset the fan operating hours back to zero to clear the drive warning error. Refer to [Section 5.5.6.4](#) for more information.

5.5.6.3 Replacing the Sinamics Control Module Fan Where Module Removal is Not Required

This section describes how to replace the fan(s) for control modules that are not required to be removed from the electrical cabinet to access the fan(s).

5.5.6.3.1 Replacing the Fan(s) Sinamics 80kW and 120kW Active Interface Modules

This section describes how to replace the fan(s) in 80kW Active Interface Modules and 120kW Active Interface Modules.

**WARNING!**

Complete the Lockout/Tagout procedure in accordance with applicable local codes and the product manual before performing maintenance activities. Failure to do so could result in serious injury or death.

**DANGER!**

Electrocution hazard Contact with hazardous voltages will cause death or serious injury. Turn off power and review electrical schematics before servicing equipment. Electrical cabinets can contain more than one live circuit. Test all circuits before handling to make sure circuits have been de-energized.

**IMPORTANT!**

Complete the procedure *Preparing to Replace a Sinamics Control Module Cooling Fan* before starting this procedure. Refer to [Section 5.5.6.1](#) for more information.

To replace the fan(s) in 80kW Active Interface Modules and 120kW Active Interface Modules, do the following:

**IMPORTANT!**

Do not remove the module from the robot cabinet. The fan removal is performed with the module remaining installed in the electrical cabinet.

1. Release the latches and lift the cable covers to access the cables.



Figure 5-149: Cable Covers

2. Remove the terminal nuts and the six cables (L1, L2, L3, U2, V2 and W3).

NOTE:

The cables are not shown in the following figures, but are present in a production environment.



Figure 5-150: Cable Connections

3. Lift the cable securing linkages to release the wires.



Figure 5-151: Cable Linkages

4. Replace the fans.
 - a. Remove the three fan cover screws and open the fan cover.
 - b. Release and disconnect the fan electrical harness connector from the module to free up the fan and cover assembly from the module.
 - c. Release and disconnect both electrical connectors to free up the existing fans from the electrical harness.
 - d. Remove the six fan to cover screws to separate the existing fans from the cover.
 - e. Line up the new fans with the cover and secure the fans to the cover with six screws.
 - f. Insert the two fan harness electrical connectors to latch into place.
 - g. Connect the fan electrical harness connector to the module.
 - h. Secure the fan cover to the module with three screws.
5. Match L1, L2, L3, U2, V2 and W3 cables and connect them to the terminals. Refer to the labels on the wires and markings inscribed on terminal housings.



Figure 5-152: Terminal Housing Inscribed (Example L2)

6. Torque the wire terminal nuts.
7. Push the linkages down to secure the cables.
8. Close and latch the cable covers.
9. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
10. Power up the machine.
11. Reset the fan operating hours back to zero to clear the drive warning error. Refer to [Section 5.5.6.4](#) for more information.

5.5.6.3.2 Replacing the Fan in Sinamics 132A and 200A Single Motor Modules (External Fan)

This section describes how to replace the fan in 200A Single Motor Modules and 132A Single Motor Modules.



WARNING!

Complete the Lockout/Tagout procedure in accordance with applicable local codes and the product manual before performing maintenance activities. Failure to do so could result in serious injury or death.



DANGER!

Electrocution hazard Contact with hazardous voltages will cause death or serious injury. Turn off power and review electrical schematics before servicing equipment. Electrical cabinets can contain more than one live circuit. Test all circuits before handling to make sure circuits have been de-energized.



IMPORTANT!

Complete the procedure *Preparing to Replace a Sinamics Control Module Cooling Fan* before starting this procedure. Refer to [Section 5.5.6.1](#) for more information.

To replace the fan in 200A Single Motor Modules and 132A Single Motor Modules, do the following:

**IMPORTANT!**

Do not remove the module from the robot cabinet. The fan removal is performed with the module remaining installed in the electrical cabinet.

1. Locate the fan on the back of the module.



Figure 5-153: Fan on Back of Module

2. Disconnect the power cable from the module.
3. Replace the fan:
 - a. Using a flat screwdriver, apply pressure to the upper and lower retaining tabs and then pull on the fan to remove it from the module.
 - b. Using a flat screwdriver, apply pressure to the tabs and push the new fan into the module.
4. Connect the power cable to the module.
5. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
6. Power up the machine.
7. Reset the fan operating hours back to zero to clear the drive warning error. Refer to [Section 5.5.6.4](#) for more information.

5.5.6.3.3 Replacing the Fan Sinamics 132A Single Motor Module (Internal Fan)

This section describes how to replace the fan in 132A Single Motor Modules with internal fans.

**WARNING!**

Complete the Lockout/Tagout procedure in accordance with applicable local codes and the product manual before performing maintenance activities. Failure to do so could result in serious injury or death.

**DANGER!**

Electrocution hazard Contact with hazardous voltages will cause death or serious injury. Turn off power and review electrical schematics before servicing equipment. Electrical cabinets can contain more than one live circuit. Test all circuits before handling to make sure circuits have been de-energized.

**IMPORTANT!**

Complete the procedure *Preparing to Replace a Sinamics Control Module Cooling Fan* before starting this procedure. Refer to [Section 5.5.6.1](#) for more information.

To replace the fan in 132A Single Motor Modules with internal fans, do the following:

**IMPORTANT!**

Do not remove the module from the robot cabinet. The fan removal is performed with the module remaining installed in the electrical cabinet.

1. Release and disconnect the connector from the latch.



Figure 5-154: Connector Disconnect from Latch

2. Remove the two screws from the shield plate.



Figure 5-155: Shield Plate Screw Remove

3. Disconnect the ground wires.



Figure 5-156: Ground Wires Disconnect

4. Lift the power cable cover to access the cable connections.



Figure 5-157: Power Cable Connections Cover

5. Remove the power cables (i.e. A, V, W, etc).



Figure 5-158: Power Cables Removal

6. Unscrew the ground shield clamps.



Figure 5-159: Unscrew Ground Shield Clamps

7. Replace the fan:
 - a. Remove the nuts from behind the fan cover.
 - b. Lift and remove the fan cover.
 - c. Remove the existing fan.
 - d. Install the new fan.
 - e. Reinstall the fan cover.
 - f. Reinstall the nuts behind the fan cover.
8. Screw in the shield clamps.
9. Reinstall the power cables.

NOTE:

Make sure that the power cables make flat to flat connection and that they line up (i.e. A with A, V with V, W with W, etc).

10. Close and lock the power cable cover.
11. Reconnect the ground wires.
12. Reinstall the two screws from the shield plate.
13. Insert the connector of the new fan until it latches into place.
14. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
15. Power up the machine.
16. Reset the fan operating hours back to zero to clear the drive warning error. Refer to [Section 5.5.6.4](#) for more information.

5.5.6.4 Resetting the Sinamics Control Module Fan Operating Hours

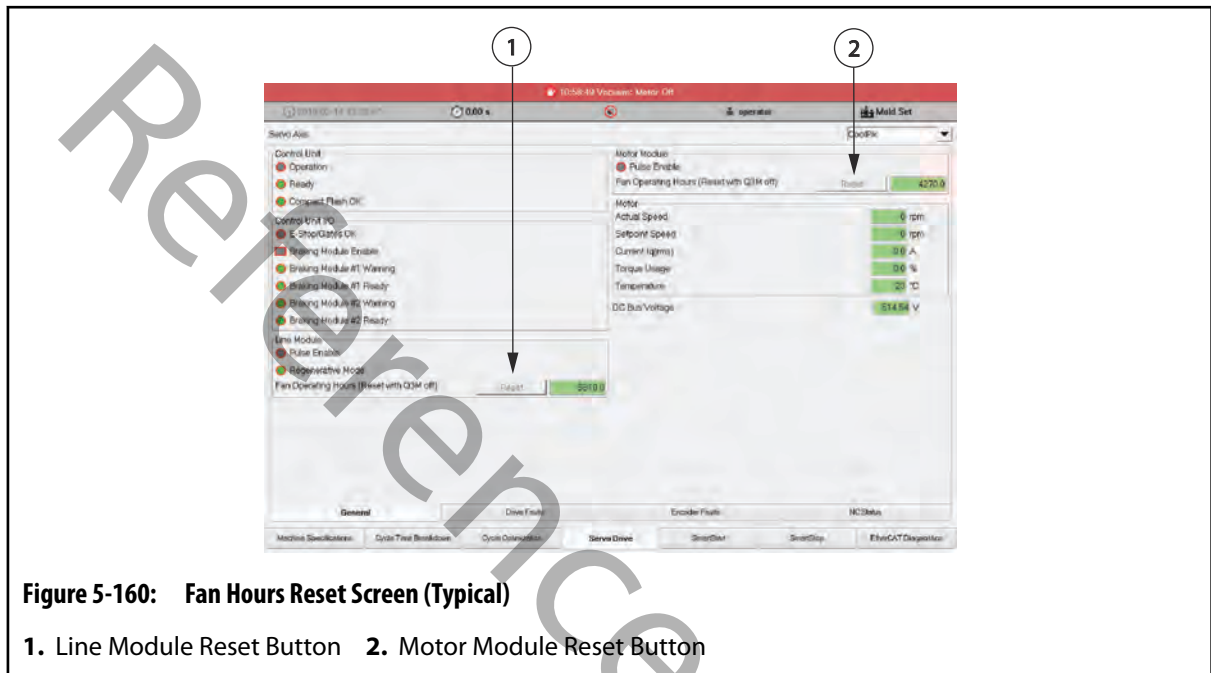
To reset the control module fan operating hours, do the following:



IMPORTANT!

This procedure must be performed with the Q3M breaker off to reboot power to the machine motion control.

1. Move the Q3M breaker handle to the OFF position. This turns off power to motion control.
2. On the HMI, touch the **Machine** button and touch the **Servo Drive** tab. Then touch the **General** tab to display the **Servo Axis** screen.



3. Reset the fan operating hours back to zero. This is performed on either the line module or the motor module, based on which type of module fan was replaced.
 - a. In the **Line Module** screen area of the **Servo Axis** screen, touch the **Reset** button.
 - b. In the **Motor Module** screen area of the **Servo Axis** screen, touch the **Reset** button.
4. Move the Q3M breaker handle back to the ON position. This restores power to motion control.

5.6 Hydraulic System Maintenance

The following procedures are specifically for hydraulic components on the machine.

5.6.1 Removing Air from the Hydraulic System

The machine must be run for a period of time before starting production if:

- the machine is being started for the first time since being in storage for an extended period of time

- the hydraulic oil supply has been replaced
- a new hydraulic pump has been installed
- a new hydraulic hose(s) has been installed
- a new hydraulic manifold has been installed

The process will make sure no air is present in the hydraulic system.

To remove air from the hydraulic system, do the following:

NOTE:

The location of port PP1G may vary depending on the machine size. Refer to the hydraulic schematics for more information.

1. At the power manifold, remove the cap on the gauge port marked *PP1G* and attach a hydraulic pressure gauge. The pressure gauge must be capable of reading pressures up to 240 bar (3481 psi) .
2. Unplug the CEN valve to isolate the clamp hydraulics from the hydraulic pump. The CEN valve is located on the power manifold.
3. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Unload All Pumps** mode.
4. Quickly press the **Pump Motor On** key followed by the **Pump Motor Off** key to jog the pump motor. Wait 10 seconds and then repeat.

Repeat this step a total of four times.

CAUTION!

Mechanical hazard – risk of damage to the pump motor. Do not allow the pump motor to run for more than 10 minutes if the system pressure is less than 20 bar (290 psi) .

5. Check the pressure gauge on the power manifold. If the system pressure is less than 20 bar (290 psi) , allow the pump to run at one minute increments until the system pressure reaches 20 bar (290 psi) .
6. Gradually increase the amount of time the hydraulic pump runs for up to approximately one hour.
7. At the end of the one hour period, press the **Pump Motor Off** key to stop the pump motor.
8. Install the CEN valve.
9. Press the **Pump Motor On** key to start the pump motor.
10. Check the pressure gauge on the power manifold. When the system pressure reaches the maximum operating pressure, allow the pump motor to run for 20 minutes.

Refer to [Section 7.12](#) for the maximum hydraulic system operating pressure.

11. Press the **Pump Motor Off** key to stop the pump motor.
12. Replace the pressure filter element. Refer to [Section 5.6.19](#) for more information.

5.6.2 Checking, Adjusting, Charging, and Discharging Bladder Accumulators

The following maintenance procedures may be performed on bladder accumulators, as needed:

NOTE:

These procedures require the use of bladder accumulator charging kits available from Husky. Refer to [Section 5.6.2.1](#) for more information.

Table 5-4: Bladder Accumulator Maintenance Procedures

Procedure	Reference
Check and adjust a bladder accumulator precharge pressure.	Section 5.6.2.2
Precharge a new or empty bladder accumulator.	Section 5.6.2.3
Discharge a bladder accumulator.	Section 5.6.2.4

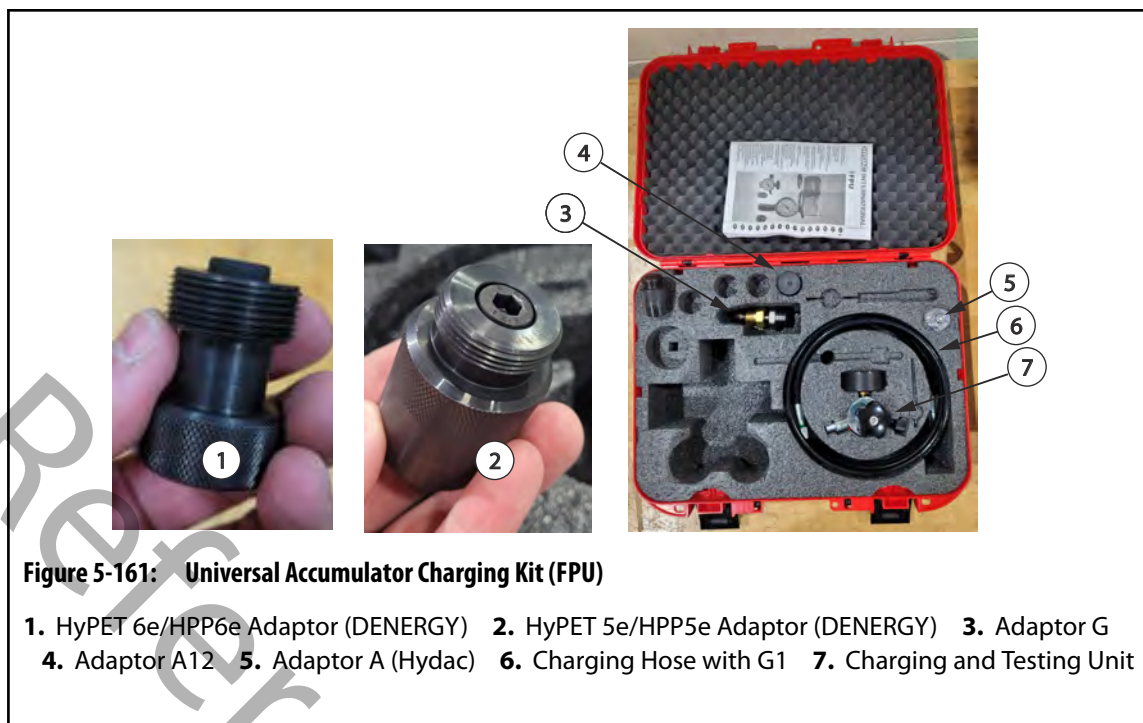
5.6.2.1 Bladder Accumulator Charging Kits

An accumulator charging kit, which includes a charging and testing unit, does not ship with the machine. The kit is available through your nearest Husky Parts Distribution Center. Check with Husky for the part number.

The accumulator adaptor for the bladder accumulators ships with the machine.

Two kits are available:

- Universal Accumulator Charging Kit (FPU)



- Standard Accumulator Charging Kit (FPS)



5.6.2.2 Checking and Adjusting the Bladder Accumulator Precharge Pressure

To check and adjust the bladder accumulator precharge pressure, do the following:



WARNING!

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before servicing accumulators. Use under well ventilated conditions.

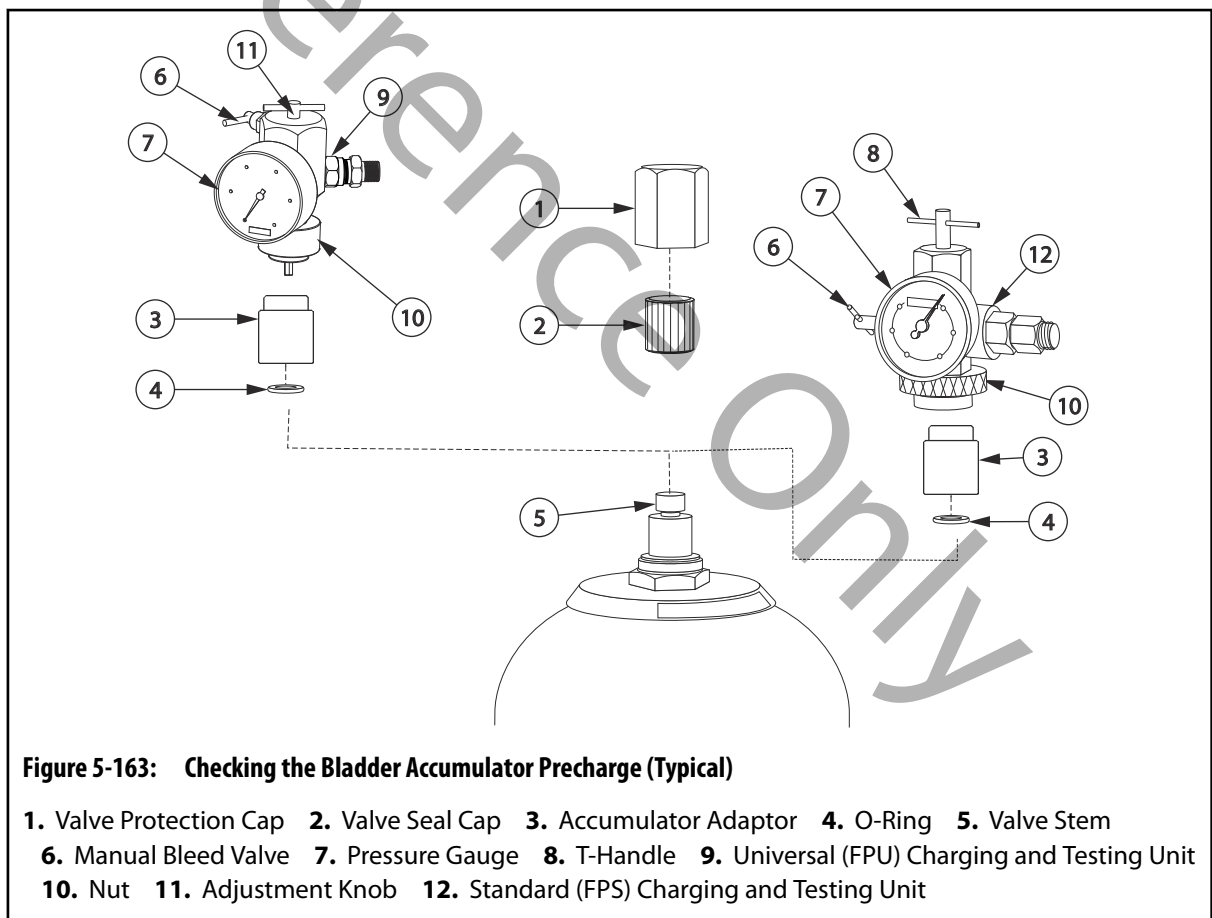
1. Make sure the hydraulic oil is at operating temperature.
2. Make sure the machine at operating temperature and has been running at least 30 minutes.
3. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



WARNING!

High pressure hazard – risk of death or serious injury. Do not remove the entire gas valve assembly or the drain fitting. A loosened gas valve assembly or drain fitting under pressure could become a high velocity projectile.

4. Remove the valve protection cap and the valve seal cap.



NOTE:

An accumulator charge kit, including a charging and testing unit, is available through your nearest Husky Parts Distribution Center. Refer to [Section 5.6.2.1](#) for more information. If an adaptor is required to connect to the nitrogen supply tank, contact Husky.

5. Make sure the manual bleed valve is closed (turn clockwise).
-

CAUTION!

Mechanical hazard - Risk of damage to the machine. The accumulator adaptor is supplied with the machine. Verify the accumulator adaptor with the machine drawing package. Make sure to install the correct accumulator adaptor. Installing the wrong adaptor can cause serious damage the accumulator.

6. Attach the accumulator adaptor to the FPS/FPU charging and testing unit. The adaptor should be hand-tightened onto the FPS/FPU charging and testing unit.
-

NOTE:

Make sure the O-ring is installed.

NOTE:

Mechanical hazard - risk of damage to the gas valve. Make sure the plunger is retracted on the charging and testing unit. Failure to retract the plunger can cause damage to the gas valve.

7. On the FPS/FPU charging and testing unit, turn the T-handle/adjustment knob fully counter-clockwise to retract the plunger.
 8. Thread the FPS/FPU charging and testing unit onto the accumulator gas valve stem and hand-tighten.
-

CAUTION!

Mechanical hazard – risk of damage to the machine. To prevent damage to the accumulator valve, turn the T-handle/adjustment knob until the pressure gauge starts to register pressure or a maximum of three full turns.

9. Turn the T-handle/adjustment knob clockwise a maximum of three (3) full turns from the fully (open) counter-clockwise position. The gauge needle should indicate the existing gas pre-charge pressure.
10. Note the bladder accumulator precharge pressure.

If the precharge pressure is higher than the pressure indicated in [Section 7.12](#), decrease the precharge pressure to the required value. Refer to [step 11](#)

If the precharge pressure is less than the pressure indicated in [Section 7.12](#), increase the precharge pressure. Refer to [step 12](#).
11. **To decrease the pressure, do the following:**

**WARNING!**

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before using nitrogen. Use under well ventilated conditions.

**WARNING!**

Noise hazard – risk of hearing loss. High pressure nitrogen gas could create high pitched noises as it escapes the accumulator. Wear hearing protection before discharging the accumulator.

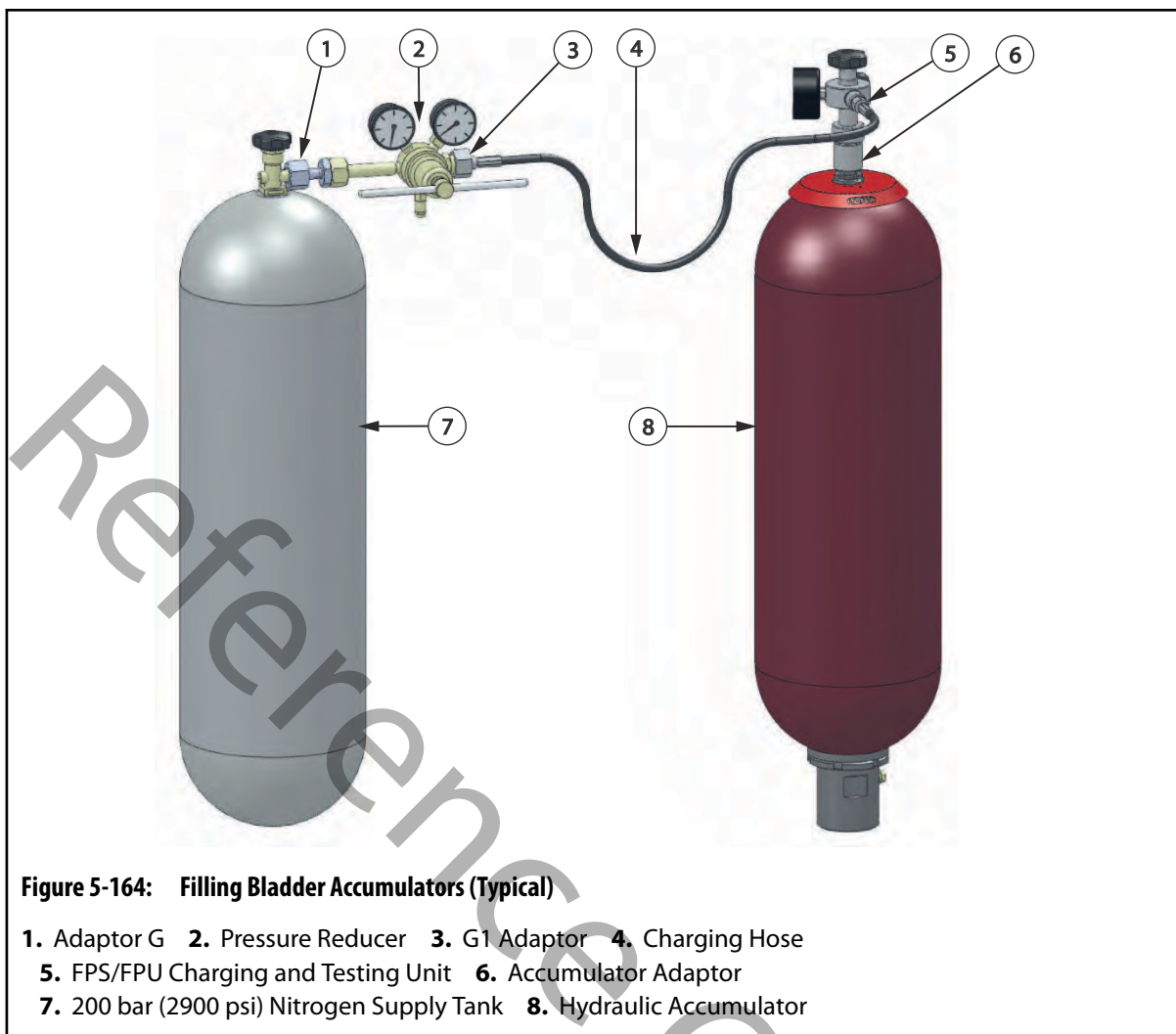
- a. Slowly turn the manual bleed valve counter-clockwise (open) to release the required amount of nitrogen gas in the accumulator.
- b. Once the precharge pressure reaches the required value, turn the manual bleed valve clockwise (close) fully.
- c. Proceed to [step 13](#).

12. To increase the pressure, do the following:

- a. Connect the charging hose assembly to the FPS/FPU charging and testing unit.

**IMPORTANT!**

In order to complete the hose connections, it may be necessary to install adaptor fittings onto components that have either incompatible valve arrangements or end couplings. Be sure these adaptors are available from the nitrogen gas supplier and install them as required.



- b. Install adaptor G1 to the hose assembly.
- c. Connect the other end of adaptor G1 to the pressure reducer. The adaptor in the kit may be required.

**WARNING!**

Explosion hazard – risk of death or serious injury. To prevent an explosion, use pure nitrogen gas to precharge the accumulator. Nitrogen gas must be at least 99.995% pure.

CAUTION!

Mechanical hazard – risk of damage to the accumulator. Sudden increases in pressure could damage an accumulator. Make sure to open the nitrogen supply tank slowly to prevent damage.

- d. Connect the pressure reducer to the nitrogen tank using the applicable adaptor.

CAUTION!

Mechanical hazard – risk of damage to the machine. To prevent damage to the accumulator valve, turn the T-handle/adjustment knob until the pressure gauge starts to register pressure or a maximum of three full turns.

- e. Turn the T-handle/adjustment knob clockwise a maximum of three (3) full turns from the fully counter-clockwise (open) position. The gauge needle should indicate the existing gas pre-charge pressure.



WARNING!

Explosion hazard – risk of death or serious injury. To prevent an explosion, use pure nitrogen gas to precharge the accumulator. Nitrogen gas must be at least 99.995% pure.



WARNING!

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before servicing accumulators. Use under well ventilated conditions.



WARNING!

Trapped gas pressure – risk of death or serious injury. Trapped gas could escape suddenly if equipment fails or is used improperly. Only use equipment rated to handle the pressure from the nitrogen supply tank to the accumulator. Turn the supply valve off after each use and when the supply tank is empty.

CAUTION!

Mechanical hazard – risk of damage to the accumulator. Charge the accumulator by slowly opening the shutoff valve on the nitrogen supply tank. The accumulator could be damaged if the valve is opened quickly.

- f. Listen carefully while slowly rotating (opening) the shutoff valve on the nitrogen supply tank counter-clockwise. Stop rotating the valve once the nitrogen gas begins to audibly enter the bladder accumulator.
- g. Increase the flow rate incrementally by slowly rotating (closing) the shutoff valve at the nitrogen supply tank counter-clockwise. Continue to check the pressure at the pressure charging and testing unit until the desired precharge pressure is reached.

NOTE:

Stop work if the pressure gauge reading does not increase when adding nitrogen. In this case, the accumulator bladder bag has most likely failed and requires replacement.

**IMPORTANT!**

When the shutoff valve on the nitrogen supply tank is open, the pressure FPS/FPU charging and testing unit indicates the pressure in the charge hose. To determine the correct accumulator precharge pressure, close the shutoff valve at the nitrogen supply tank and release the hose pressure. To release the hose pressure, turn the T-handle counter-clockwise and then turn the manual bleed valve counter-clockwise (open).

- h.** Once the accumulator precharge pressure is reached, fully rotate (close) the shutoff valve on the nitrogen supply tank clockwise .

NOTE:

Allow 5 to 10 minutes for the gas pressure to stabilize before checking the precharge pressure

- i.** Check the precharge pressure indicated on the charging and testing unit.
 - If the precharge pressure is less than required, repeat [step 12f](#) to [step 12h](#).
 - If the precharge pressure is higher than the pressure required decrease the precharge pressure, refer to [step 11](#).
- j.** Proceed to [step 13](#).
- 13.** On the charging and testing unit, turn the T-handle/adjustment knob fully counter-clockwise (open).
- 14.** Before disconnecting the FPS/FPU charging and testing unit, turn the manual bleed valve counter-clockwise (open) to slowly discharge the nitrogen gas in the charging and testing unit. Once the pressure is relieved, turn the manual bleed valve clockwise (close) fully.
- 15.** Check the pressure gauge to make sure all pressure has been discharged.
- 16.** Disconnect the FPS/FPU charging and testing unit and the adaptor from the bladder accumulator.
- 17.** Install the valve seal cap and valve protection cap.
- 18.** Remove all locks and tags.

5.6.2.3 Precharging a New or Empty Bladder Accumulator

To fill empty or new bladder accumulators with nitrogen gas, do the following:

NOTE:

Refer to [Section 7.10](#) to determine the nitrogen gas capacity of the bladder accumulator(s).

CAUTION!

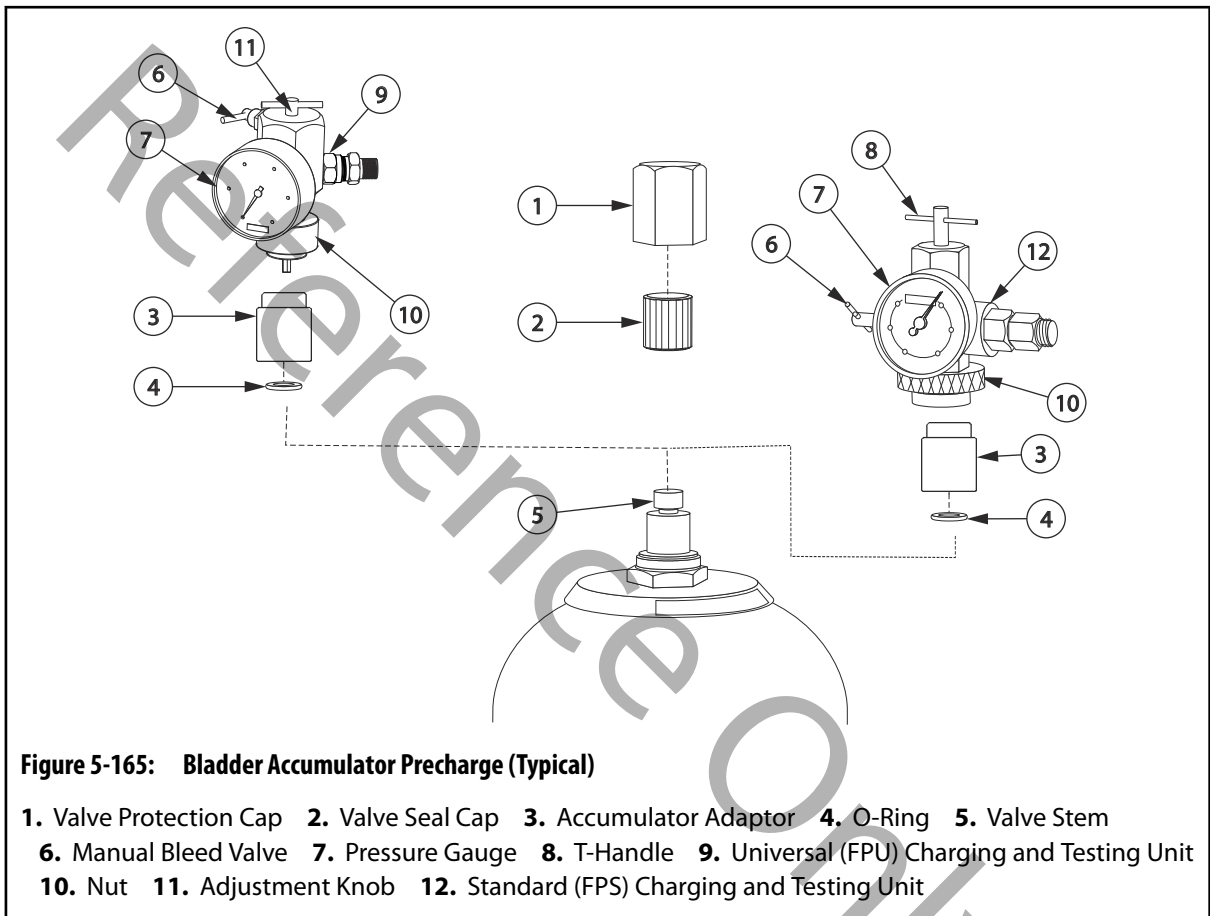
Mechanical hazard - risk of damage to the accumulator. Do not start a machine with empty bladder accumulators. Starting a machine with empty accumulators can cause damage to the machine and/or the accumulator.

- 1.** Make sure the accumulator is a room temperature.
- 2.** Verify the accumulator is empty. Refer to [Section 5.6.2.2](#) for more information.

3. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
4. Remove the valve protection cap and the valve seal cap.
5. Attach the accumulator adaptor to the FPS/FPU charging and testing unit. The adaptor should be hand-tightened onto the FPS/FPU charging and testing unit.

NOTE:

Make sure the O-ring is installed.



6. Make sure the manual bleed valve is turned fully clockwise (closed).

CAUTION!

Mechanical hazard - Risk of damage to the machine. The accumulator adaptor is supplied with the machine. Verify the accumulator adaptor with the machine drawing package. Make sure to install the correct accumulator adaptor. Installing the wrong adaptor can cause serious damage the accumulator.

7. On the FPS/FPU charging and testing unit, turn the T-handle/adjustment knob fully counter-clockwise to retract the plunger.

NOTE:

An accumulator charge kit, which includes a charging and testing unit, does not ship with the machine. The kit is available through your nearest Husky Parts Distribution Center. Check with Husky for the part number. Refer to [Section 5.6.2.1](#) for more information.

8. Thread the FPS/FPU charging and testing unit onto the accumulator gas valve stem and hand-tighten.
9. Connect the charging hose assembly to the FPS/FPU charging and testing unit.

**IMPORTANT!**

In order to complete the hose connections, it may be necessary to install adaptor fittings onto components that have either incompatible valve arrangements or end couplings. Be sure these adaptors are available from the nitrogen gas supplier and install them as required.

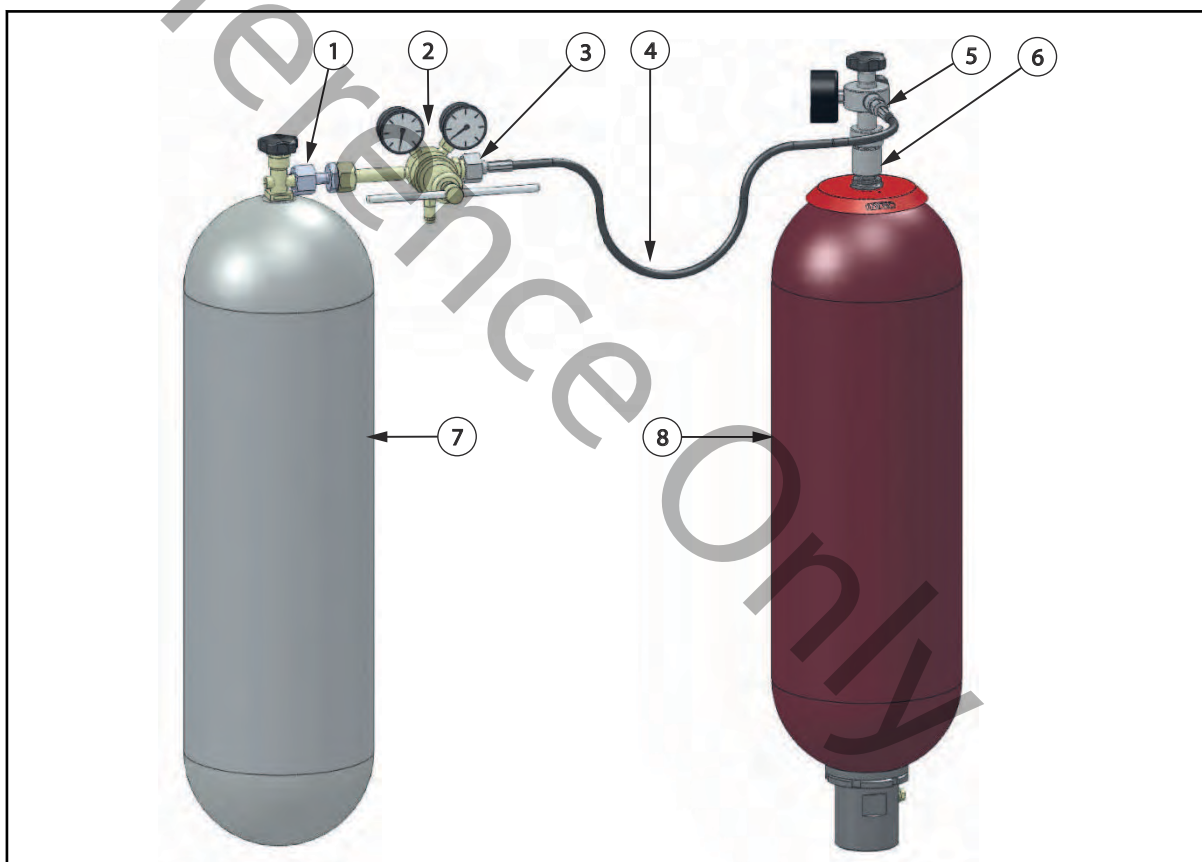


Figure 5-166: Filling or Precharging the Bladder Accumulators (Typical)

1. Adaptor G 2. Pressure Reducer 3. G1 Adaptor 4. Charging Hose
5. FPS/FPU Charging and Testing Unit 6. Accumulator Adaptor
7. 200 bar (2900 psi) Nitrogen Supply Tank 8. Hydraulic Accumulator

10. Install adaptor G1 to the hose assembly.

11. Connect the other end of adaptor G1 to the pressure reducer. The adaptor in the kit may be required.



WARNING!

Explosion hazard – risk of death or serious injury. To prevent an explosion, use pure nitrogen gas to precharge the accumulator. Nitrogen gas must be at least 99.995% pure.

CAUTION!

Mechanical hazard – risk of damage to the accumulator. Sudden increases in pressure could damage an accumulator. Make sure to open the nitrogen supply tank slowly to prevent damage.

12. Connect the pressure reducer to the nitrogen tank using the applicable adaptor.

CAUTION!

Mechanical hazard – risk of damage to the machine. To prevent damage to the accumulator valve, turn the T-handle/adjustment knob until the pressure gauge starts to register pressure or a maximum of three full turns.

13. Turn the T-handle/adjustment knob clockwise a maximum of three (3) full turns from the fully (open) counter-clockwise position. The gauge needle should indicate the existing gas pre-charge pressure.



WARNING!

Explosion hazard – risk of death or serious injury. To prevent an explosion, use pure nitrogen gas to precharge the accumulator. Nitrogen gas must be at least 99.995% pure.



WARNING!

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before servicing accumulators. Use under well ventilated conditions.



WARNING!

Trapped gas pressure – risk of death or serious injury. Trapped gas could escape suddenly if equipment fails or is used improperly. Only use equipment rated to handle the pressure from the nitrogen supply tank to the accumulator. Turn the supply valve off after each use and when the supply tank is empty.

CAUTION!

Mechanical hazard – risk of damage to the accumulator. Charge the accumulator by slowly opening the shutoff valve on the nitrogen supply tank. The accumulator could be damaged if the valve is opened quickly.

- 14.** Charge the bladder accumulator to the required precharge pressure by doing the following:
- Listen carefully while slowly rotating (opening) the shutoff valve on the nitrogen supply tank counter-clockwise. Stop rotating the valve once the nitrogen gas begins to audibly enter the bladder accumulator. Allow the pressure to reach 7 bar (100 psi) .
 - Allow the bladder in the bladder accumulator to settle for 30 seconds.
 - Increase the flow rate incrementally by slowly rotating (opening) the shutoff valve at the nitrogen supply tank counter-clockwise. Continue to check the pressure at the pressure charging and testing unit until the desired precharge pressure is reached.
-

NOTE:

Stop work if the pressure gauge reading does not increase when adding nitrogen. In this case, the accumulator bladder bag has most likely failed and requires replacement.

**IMPORTANT!**

When the shutoff valve on the nitrogen supply tank is open, the pressure FPS/FPU charging and testing unit indicates the pressure in the charge hose. To determine the correct accumulator precharge pressure, close the shutoff valve at the nitrogen supply tank and release the hose pressure. To release the hose pressure, turn the T-handle counter-clockwise (open) and then turn the manual bleed valve counter-clockwise (open).

- Once the accumulator precharge pressure is reached, fully rotate (close) the shutoff valve on the nitrogen supply tank clockwise.
- 15.** Check the precharge pressure indicated on the charging and testing unit. If the precharge pressure is less than required, repeat [step 14](#).
- 16.** Wait 20 to 30 minutes for the gas pressure in the bladder accumulator to stabilize.
- 17.** Check the precharge pressure indicated on the charging and testing unit.
-

**IMPORTANT!**

The precharge pressure is based on temperature. Make sure to compare the pressure values for the correct temperature.

- If the precharge pressure is less than the pressure indicated in [Section 7.12](#), repeat [step 14](#).
- If the precharge pressure is higher than the pressure indicated in [Section 7.12](#), decrease the precharge pressure to the required value. To decrease the pressure, do the following:



WARNING!

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before using nitrogen. Use under well ventilated conditions.



WARNING!

Noise hazard – risk of hearing loss. High pressure nitrogen gas could create high pitched noises as it escapes the accumulator. Wear hearing protection before discharging the accumulator.

- a. Slowly turn the manual bleed valve counter-clockwise (open) to release the required amount of nitrogen gas in the accumulator.
 - b. Once the precharge pressure reaches the required value, turn the manual bleed valve clockwise fully (close).
18. On the FPS/FPU charging and testing unit, turn the T-handle/adjustment knob fully counter-clockwise (open).
19. Before disconnecting the FPS/FPU charging and testing unit, turn the manual bleed valve counter-clockwise (open) to slowly discharge the nitrogen gas in the charging and testing unit. Once the pressure is relieved, turn the manual bleed valve clockwise fully (close).
20. Check the pressure gauge to make sure all pressure has been discharged.
21. Disconnect the FPS/FPU charging and testing unit and the accumulator adaptor from the bladder accumulator.
22. Install the valve seal cap and valve protection cap.
23. Remove all locks and tags.

5.6.2.4 Discharging a Bladder Accumulator

This procedure is used for removing all precharge pressure from the accumulator to perform service or to ship the accumulator.

To decrease the precharge pressure in an accumulator, do the following:

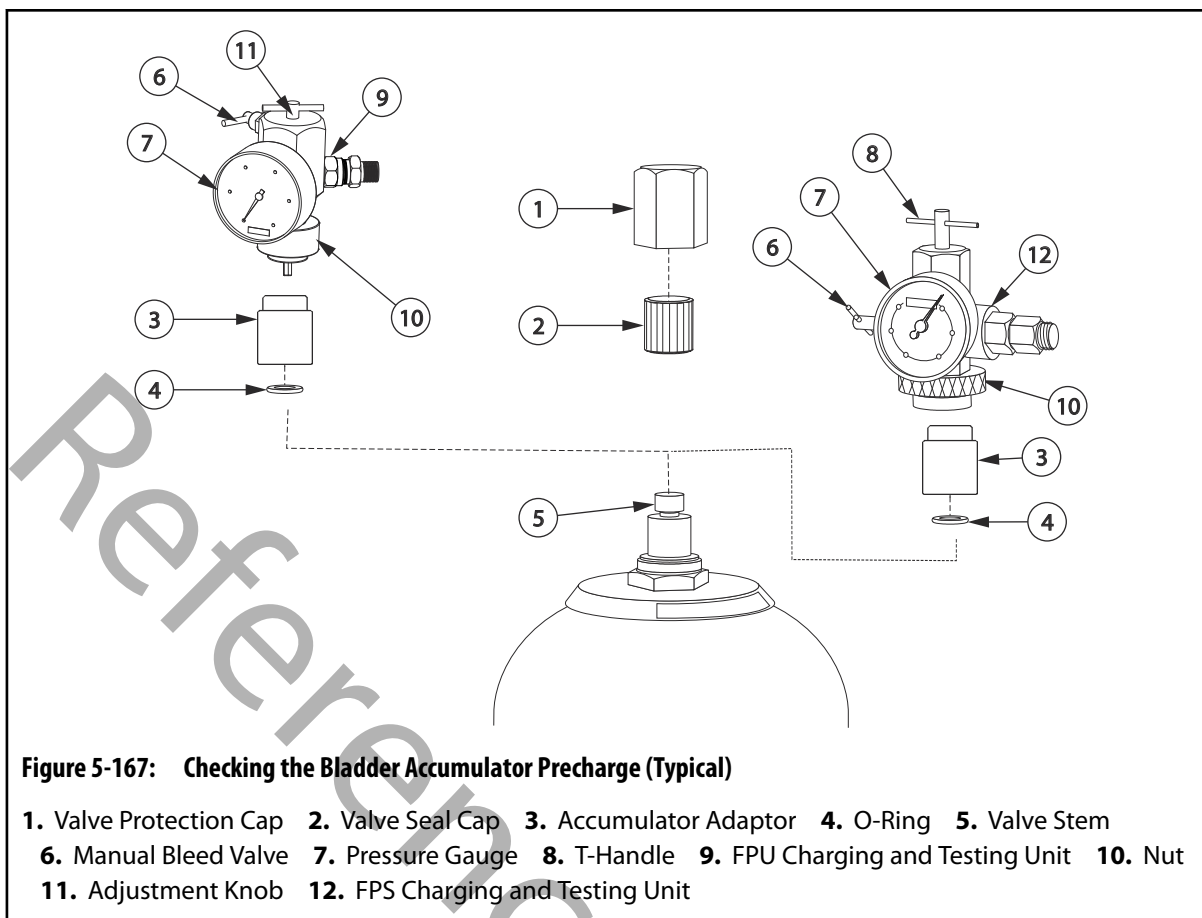
1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



WARNING!

High pressure hazard – risk of death or serious injury. Do not remove the entire gas valve assembly or the drain fitting. A loosened gas valve assembly or drain fitting under pressure could become a high velocity projectile.

2. Remove the valve protection cap and the valve seal cap.

**NOTE:**

An accumulator charge kit, including a charging and testing unit, is available through your nearest Husky Parts Distribution Center. Refer to [Section 5.6.2.1](#) for more information.

3. Make sure the manual bleed valve is turned fully clockwise (closed).

CAUTION!

Mechanical hazard - Risk of damage to the machine. The accumulator adaptor is supplied with the machine. Verify the accumulator adaptor with the machine drawing package. Make sure to install the correct accumulator adaptor. Installing the wrong adaptor can cause serious damage the accumulator.

4. Attach the accumulator adaptor to the FPS/FPU charging and testing unit. The adaptor should be hand-tightened onto the FPS/FPU charging and testing unit.

NOTE:

Make sure the O-ring is installed.

5. On the FPS/FPU charging and testing unit, turn the T-handle/adjustment knob fully counter-clockwise to retract the plunger in the FPS/FPU charging and testing unit.

6. Thread the FPS/FPU charging and testing unit onto the accumulator gas valve stem and hand-tighten.

CAUTION!

Mechanical hazard – risk of damage to the machine. To prevent damage to the accumulator valve, turn the T-handle/adjustment knob until the pressure gauge starts to register pressure or a maximum of three full turns.

7. Turn the T-handle/adjustment knob clockwise a maximum of three (3) full turns from the fully (open) counter-clockwise position. The gauge needle should indicate the existing gas pre-charge pressure.



WARNING!

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before using nitrogen. Use under well ventilated conditions.



WARNING!

Noise hazard – risk of hearing loss. High pressure nitrogen gas could create high pitched noises as it escapes the accumulator. Wear hearing protection before discharging the accumulator.

8. Slowly turn the manual bleed valve counter-clockwise (open) to release the nitrogen gas in the accumulator. Once the nitrogen gas is depleted, fully turn the manual bleed valve clockwise (close).
9. Check the pressure gauge to confirm all pressure has been discharged.
10. On the FPS/FPU charging and testing unit, turn the T-handle/adjustment knob fully counter-clockwise (open).
11. Disconnect the charging and testing unit and the accumulator adaptor from the bladder accumulator.
12. Install the valve seal cap and valve protection cap.
13. Remove all locks and tags.



IMPORTANT!

If accumulator is put back in service, make sure to precharge the accumulator using the applicable precharging procedure, refer to [Section 5.6.2.3](#)

5.6.3 Checking, Adjusting, Charging, and Discharging Piston Accumulators

The following maintenance procedures may be performed on piston accumulators, as needed:

NOTE:

These procedures require the use of piston accumulator charging kits available from Husky. Refer to [Section 5.6.3.1](#) for more information.

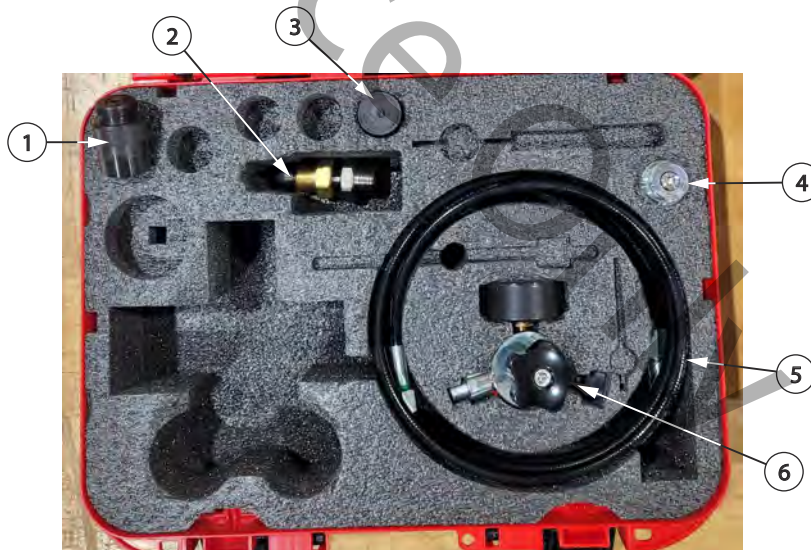
Table 5-5: Piston Accumulator Maintenance Procedures

Procedure	Reference
Check and adjust a piston accumulator precharge pressure.	Section 5.6.3.2
Precharge a new or empty piston accumulator.	Section 5.6.3.3
Discharge a piston accumulator.	Section 5.6.3.4
Drain the hydraulic oil from a piston accumulator.	Section 5.6.3.5

5.6.3.1 Piston Accumulator Charging Kits

Piston accumulator charging kits, which includes a charging and testing unit and low pressure regulator, do not ship with the machine. These kits are available through your nearest Husky Parts Distribution Center. Check with Husky for the part number.

Two kits are required:

**Figure 5-168: Universal Accumulator Charging Kit (FPU)**

1. Adaptor (Denergy) 2. Adaptor G 3. Adaptor A12 4. Adaptor A (Hydac) 5. Charging Hose with G1
6. Charging and Testing Unit



Figure 5-169: Low Pressure Accumulator Kit

1. Hose Assembly Kit 2. Pressure Regulator 3. Union Adaptor (Hose Connector)

5.6.3.2 Checking and Adjusting the Piston Accumulator Precharge Pressure

To check the piston accumulator precharge pressure, do the following:

1. Make sure the hydraulic oil is at operating temperature.
2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
3. Remove the cap from the gauge port on the piston accumulator.

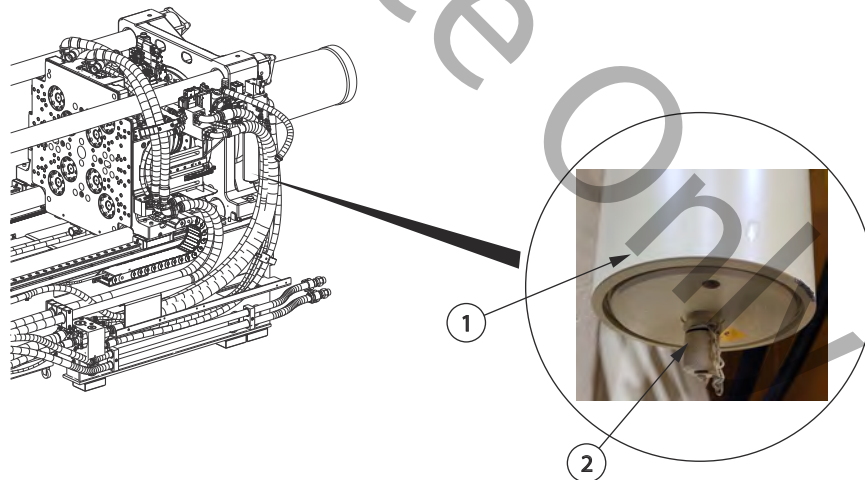


Figure 5-170: Piston Accumulator

1. Piston Accumulator 2. Gauge Port and Cap

NOTE:

A piston accumulator charge kit, including a charging and testing unit and pressure regulator, is available through your nearest Husky Parts Distribution Center.

If using a piston accumulator charge kit with an adaptor between the piston accumulator and the charging and testing unit, check with Husky for the part number.

If using a piston accumulator charge kit with a hose between the piston accumulator and the pressure regulator, check with Husky for the part numbers.



WARNING!

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before servicing accumulators. Use under well ventilated conditions.



WARNING!

Trapped gas pressure – risk of death or serious injury. Trapped gas can escape suddenly if equipment fails or is used improperly. Only use equipment rated to handle the pressure from the nitrogen supply tank to the accumulator. Turn the supply valve off after each use and when the supply tank is empty.

4. On the FPU charging and testing unit, turn the adjustment knob fully counter-clockwise to retract the plunger.
 5. Make sure the manual bleed valve is turned fully clockwise (closed).
 6. Attach the accumulator adaptor A12 to the FPU charging and testing unit. The adaptor A12 should be hand-tightened onto the FPU charging and testing unit.
 7. Connect one end of the low pressure accumulator kit hose to the low pressure accumulator union. Connect the low pressure union to the universal accumulator adaptor A12.
-



WARNING!

Trapped gas pressure and suffocation hazard – risk of serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. To avoid the sudden release of nitrogen, make sure the hose is connected to a device that contains a check valve before connecting it to the gauge port on the piston accumulator.

8. Connect the other end of the low pressure accumulator kit hose to the gauge port on the piston accumulator.
 9. Turn the adjustment knob on the pressure regulator fully clockwise to the maximum pressure setting.
-

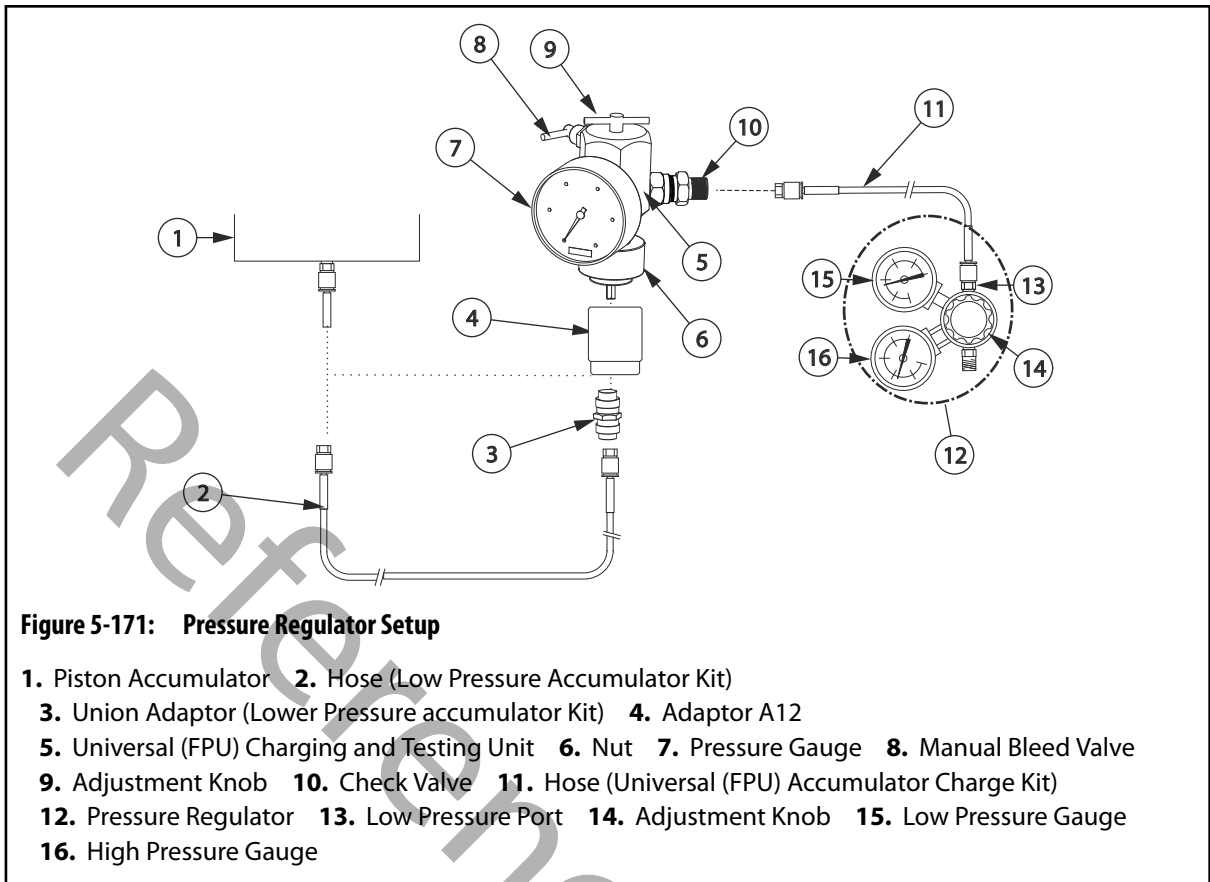


Figure 5-171: Pressure Regulator Setup

1. Piston Accumulator 2. Hose (Low Pressure Accumulator Kit)
3. Union Adaptor (Lower Pressure accumulator Kit) 4. Adaptor A12
5. Universal (FPU) Charging and Testing Unit 6. Nut 7. Pressure Gauge 8. Manual Bleed Valve
9. Adjustment Knob 10. Check Valve 11. Hose (Universal (FPU) Accumulator Charge Kit)
12. Pressure Regulator 13. Low Pressure Port 14. Adjustment Knob 15. Low Pressure Gauge
16. High Pressure Gauge

10. Connect one end of the universal charging kit hose to the check valve on the FPU charging and testing unit.
11. Connect the other end of the universal charging kit hose to the low pressure port on the pressure regulator.
12. Turn the adjustment knob on the FPU charging and testing unit clockwise a maximum of three (3) full turns from the fully (open) counter-clockwise position.
13. Note the precharge pressure measured by the low pressure gauge on the pressure regulator.
 - If the precharge pressure is more than the pressure indicated in [Section 7.12](#), hydraulic oil has leaked into the gas area of the accumulator and needs to be drained. Refer to [Section 5.6.3.5](#) for more information.
 - If the precharge pressure is less than the pressure indicated in [Section 7.12](#), the precharge pressure must be increased.

To increase the pressure, do the following:

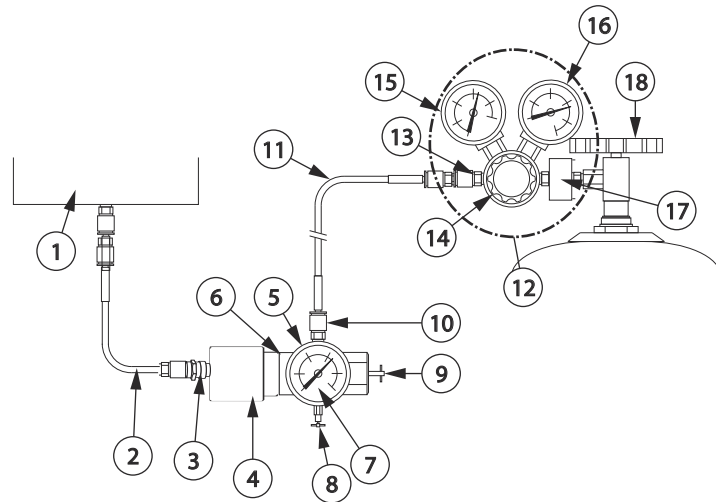


Figure 5-172: Pressure Regulator and Charge and Gauge Unit Setup

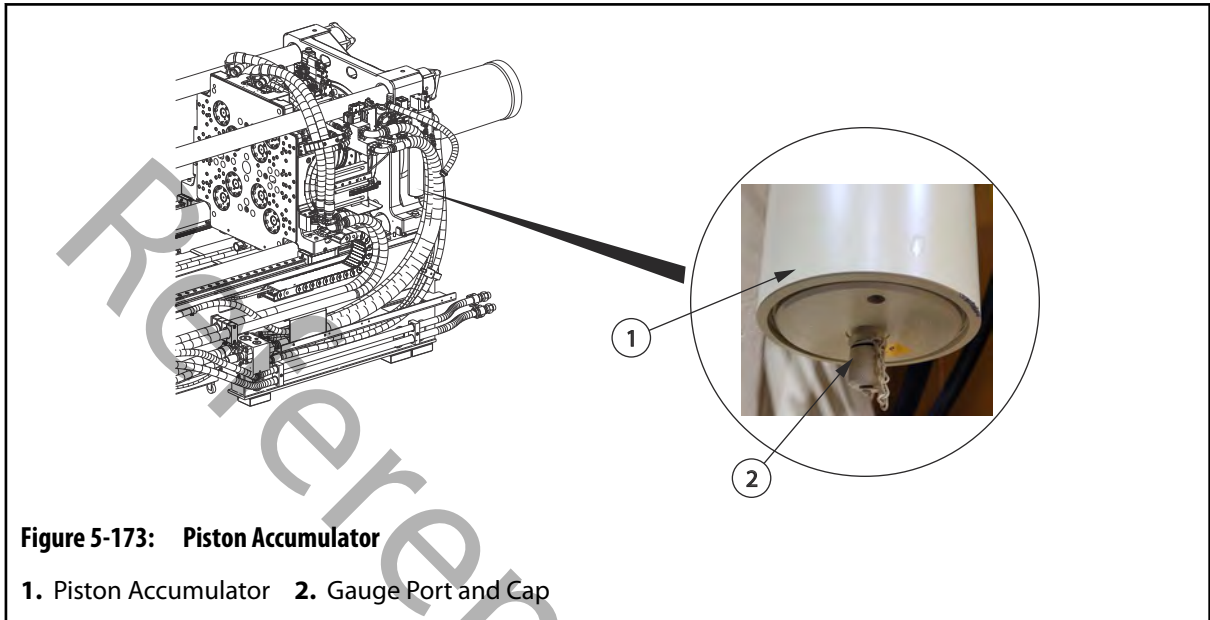
1. Piston Accumulator 2. Hose (Low Pressure Accumulator Kit)
 3. Union Adaptor (Lower Pressure accumulator Kit) 4. Adaptor A12
 5. Universal (FPU) Charging and Testing Unit 6. Nut 7. Pressure Gauge 8. Manual Bleed Valve
 9. Adjustment Knob 10. Check Valve 11. Hose (Universal (FPU) Accumulator Charge Kit)
 12. Pressure Regulator 13. Low Pressure Port 14. Adjustment Knob 15. Low Pressure Gauge
 16. High Pressure Gauge 17. Adaptor G

- a. Connect the pressure regulator to the nitrogen supply tank using the appropriate adaptor G.
 - b. Slowly open the shutoff valve on the nitrogen supply tank until the pressure gauge on the FPU charging and testing unit measures the 3.4 bar (50 psi) .
 - c. Slowly turn the adjustment knob on the pressure regulator counter-clockwise (open). Once the precharge pressure reaches the value specified in [Section 7.12](#), turn the knob fully clockwise (close) to stop the flow of nitrogen gas.
 - d. Close the shutoff valve on the nitrogen supply tank.
 - e. Turn the adjustment knob on the FPU charging and testing unit fully counter-clockwise position.
 - f. Before disconnecting the FPU charging and testing unit, turn the manual bleed valve counter-clockwise (open) to slowly discharge the nitrogen gas in the FPU charging and testing unit and pressure regulator. Once the pressure is relieved, turn the manual bleed valve clockwise fully (close).
 - g. Check the low pressure gauge on the pressure regulator to make sure all pressure has been discharged.
 - h. Disconnect the pressure regulator from the nitrogen supply tank.
14. Disconnect the pressure regulator and hose from the FPU charging and testing unit.
 15. Disconnect the FPU charging and testing unit and hose from the piston accumulator.
 16. Install the cap for the gauge port on the piston accumulator.
 17. Remove all locks and tags.

5.6.3.3 Precharging a New or Empty Piston Accumulator

To fill the piston accumulator with nitrogen gas to the precharge pressure, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove the cap from the gauge port on the piston accumulator.



NOTE:

A piston accumulator charge kit, including a charging and testing unit and pressure regulator, is available through your nearest Husky Parts Distribution Center.

If using a piston accumulator charge kit with an adaptor between the piston accumulator and the charging and testing unit, check with Husky for the part number.

If using a piston accumulator charge kit with a hose between the piston accumulator and the pressure regulator, check with Husky for the part numbers.



WARNING!

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before servicing accumulators. Use under well ventilated conditions.



WARNING!

Trapped gas pressure – risk of death or serious injury. Trapped gas can escape suddenly if equipment fails or is used improperly. Only use equipment rated to handle the pressure from the nitrogen supply tank to the accumulator. Turn the supply valve off after each use and when the supply tank is empty.

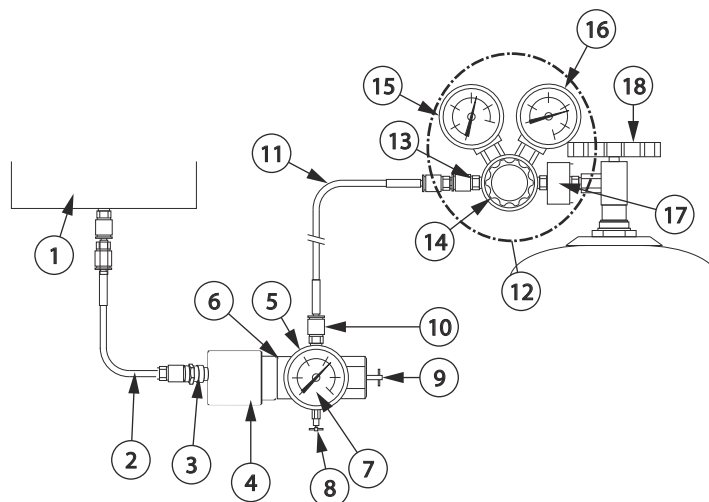


Figure 5-174: Pressure Regulator and Charge and Gauge Unit Setup

1. Piston Accumulator 2. Hose (Low Pressure Accumulator Kit)
 3. Union Adaptor (Lower Pressure accumulator Kit) 4. Adaptor A12
 5. Universal (FPU) Charging and Testing Unit 6. Nut 7. Pressure Gauge 8. Manual Bleed Valve
 9. Adjustment Knob 10. Check Valve 11. Hose (Universal (FPU) Accumulator Charge Kit)
 12. Pressure Regulator 13. Low Pressure Port 14. Adjustment Knob 15. Low Pressure Gauge
 16. High Pressure Gauge 17. Adaptor G 18. Nitrogen Supply Tank Shutoff Valve 200 bar (2900 psi)

3. On the FPU charging and testing unit, turn the adjustment knob fully counter-clockwise to retract the plunger.
4. Make sure the manual bleed valve is fully closed (turn clockwise).
5. Attach the accumulator adaptor A12 to the FPU charging and testing unit. The adaptor A12 should be hand-tightened onto the FPU charging and testing unit
6. Connect one end of the low pressure kit hose to the low pressure accumulator union. Connect the low pressure union to the universal accumulator adaptor A12.
7. Connect the other end of the low pressure accumulator kit hose to the gauge port on the piston accumulator.
8. Turn the adjustment knob on the pressure regulator fully clockwise to the maximum pressure setting.
9. Connect one end of the universal accumulator charging kit hose to the low pressure port on the pressure regulator.
10. Connect the other end of the universal accumulator charging kit hose to the check valve on the FPU charging and testing unit.
11. Turn the adjustment knob on the FPU charging and testing unit clockwise a maximum of three (3) full turns from the fully (open) counter-clockwise position.
12. Connect the pressure regulator to the nitrogen supply tank using appropriate adaptor G.
13. Slowly open the shutoff valve on the nitrogen supply tank until the pressure gauge on the FPU charging and testing unit measures 3.4 bar (50 psi) .
14. Slowly turn the adjustment knob on the pressure regulator counter-clockwise. Once the precharge pressure reaches the value specified in [Section 7.12](#), turn the knob fully clockwise (close) to stop the flow of nitrogen gas.

15. Close the shutoff valve on the nitrogen supply tank.
16. Turn the adjustment knob on the FPU charging and testing unit fully counter-clockwise position (open).
17. Before disconnecting the FPU charging and testing unit, turn the manual bleed valve counter-clockwise (open) to slowly discharge the nitrogen gas in the FPU charging and testing unit and pressure regulator. Once the pressure is relieved, turn the manual bleed valve clockwise fully (close).
18. Check the low pressure gauge on the pressure regulator to make sure all pressure has been discharged.
19. Disconnect the pressure regulator from the nitrogen supply tank.
20. Disconnect the pressure regulator and hose from the FPU charging and testing unit.
21. Disconnect the FPU charging and testing unit and hose from the piston accumulator.
22. Install the cap for the gauge port on the piston accumulator.
23. Remove all locks and tags.

5.6.3.4 Discharging a Piston Accumulator

To discharge the nitrogen gas from the piston accumulator, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove the cap from the gauge port on the piston accumulator.

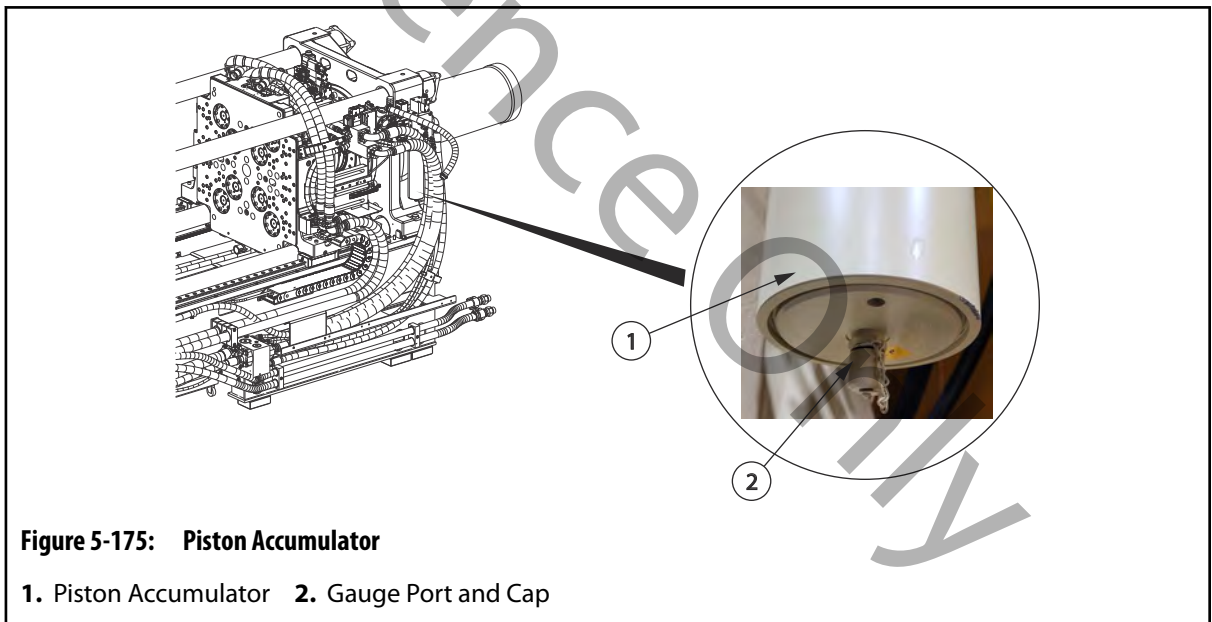


Figure 5-175: Piston Accumulator

1. Piston Accumulator 2. Gauge Port and Cap

NOTE:

A piston accumulator charge kit, including a charging and testing unit and pressure regulator, is available through your nearest Husky Parts Distribution Center.

If using a piston accumulator charge kit with an adaptor between the piston accumulator and the charging and testing unit, check with Husky for the part number.

If using a piston accumulator charge kit with a hose between the piston accumulator and the pressure regulator, check with Husky for the part number.



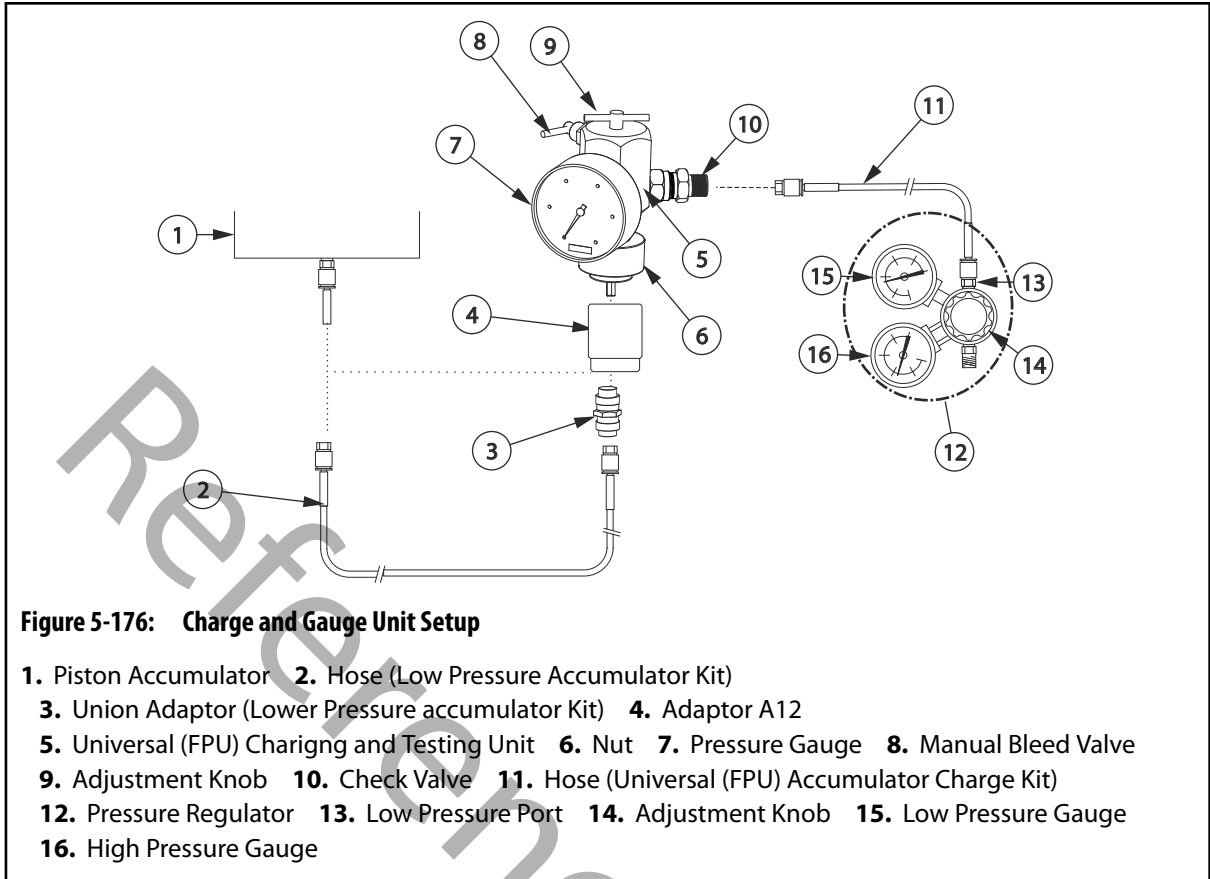
WARNING!

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before servicing accumulators. Use under well ventilated conditions.



WARNING!

Trapped gas pressure – risk of death or serious injury. Trapped gas could escape suddenly if equipment fails or is used improperly. Only use equipment rated to handle the pressure from the nitrogen supply tank to the accumulator. Turn the supply valve off after each use and when the supply tank is empty.



3. On the FPU charging and testing unit, turn the adjustment knob fully counter-clockwise to retract the plunger.
4. Make sure the manual bleed valve is fully closed (turn clockwise).
5. Attach the accumulator adaptor A12 to the FPU charging and testing unit. The adaptor A12 should be hand-tightened onto the FPU charging and testing unit.
6. Connect one end of the low pressure kit hose to the low pressure accumulator union. Connect the low pressure union to the universal accumulator adaptor A12.
7. Connect the other end of the low pressure kit hose to the gauge port on the piston accumulator.
8. Turn the adjustment knob on the pressure regulator fully clockwise to the maximum pressure setting.
9. Connect one end of the universal charging kit hose to the low pressure port on the pressure regulator.



WARNING!

Trapped gas pressure and suffocation hazard – risk of serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. To avoid the sudden release of nitrogen, make sure the hose is connected to a device that contains a check valve before connecting it to the gauge port on the piston accumulator.

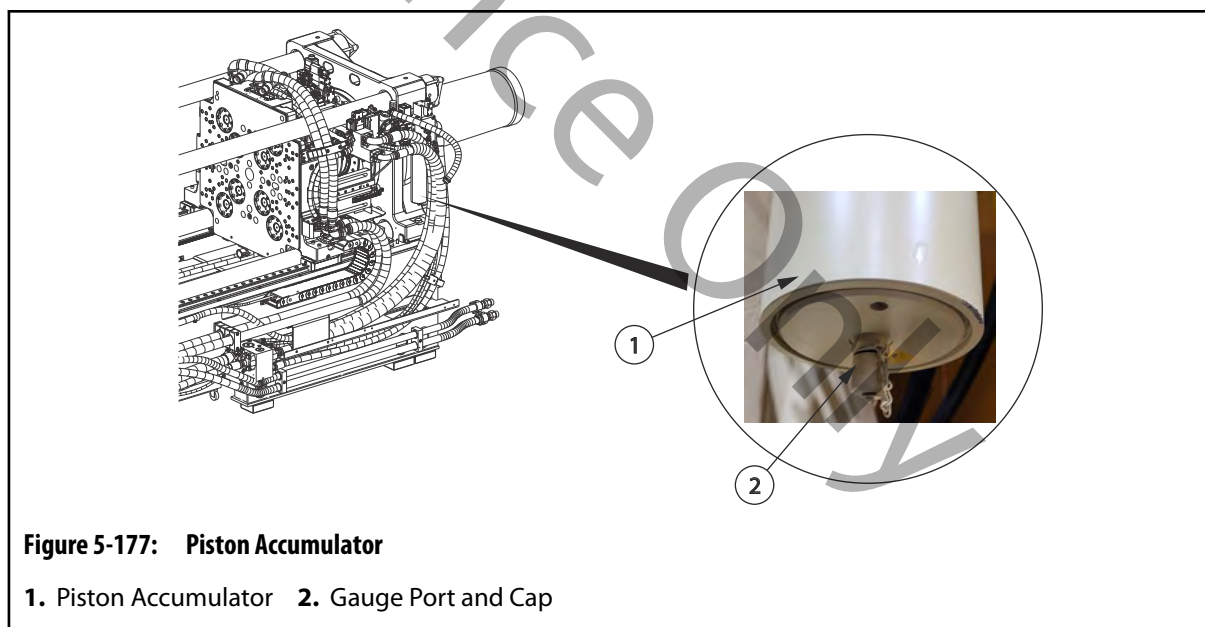
10. Connect the other end of the universal charging kit hose to the check valve on the FPU charging and testing unit.
11. Turn the adjustment knob on the FPU charging and testing unit clockwise a maximum of three (3) full turns from the fully (open) counter-clockwise position.
12. Slowly turn the manual bleed valve counter-clockwise (open) to release the nitrogen gas in the piston accumulator. Once the nitrogen gas is depleted, fully turn the manual bleed valve clockwise (close).
13. Check the low pressure gauge on the pressure regulator to make sure all pressure has been discharged.
14. Disconnect the pressure regulator and hose from the FPU charging and testing unit.
15. Disconnect the FPU charging and testing unit and hose from the piston accumulator.
16. Install the cap for the gauge port on the piston accumulator.
17. Remove all locks and tags.

5.6.3.5 Draining the Hydraulic Oil from the Piston Accumulator

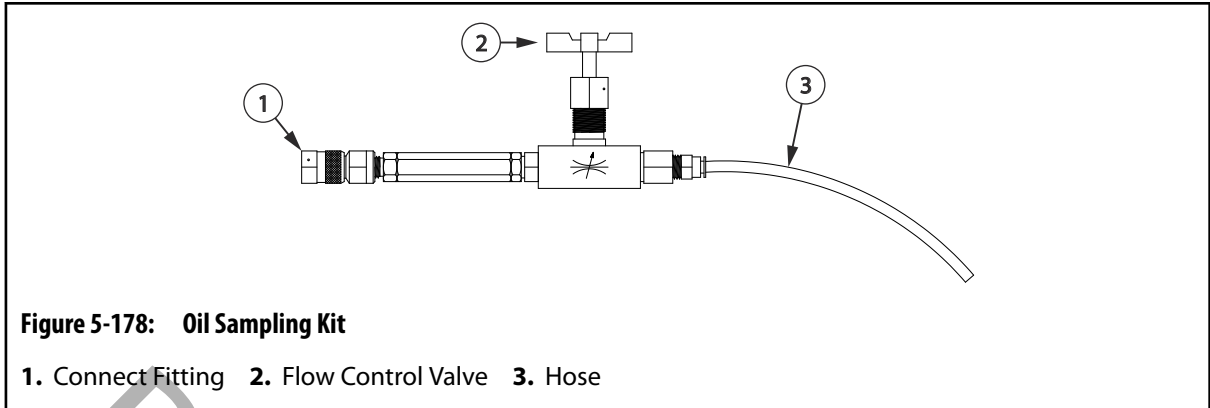
When the precharge pressure in the piston accumulator is higher than the required pressure at operating temperature, hydraulic oil has leaked into the gas side of the accumulator and must be removed.

To drain hydraulic oil from the gas side of the piston accumulator, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove the cap from the gauge port on the piston accumulator.



3. On the oil sampling kit, turn the valve fully clockwise.



4. Connect one end of the 2 m (6.6 ft) long Stauff hose assembly to the piston accumulator gauge port.
5. Connect the other end of the Stauff hose assembly to the oil sampling kit.
6. Insert the drain tube on the oil sampling kit into a suitable container to collect the oil.



WARNING!

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before servicing accumulators. Use under well ventilated conditions.



WARNING!

Noise hazard – risk of hearing loss. High pressure nitrogen gas could create high pitched noises as it escapes the accumulator. Wear hearing protection before discharging the accumulator.

7. Slowly turn the valve on the oil sampling kit counter clockwise to start discharging the nitrogen gas and hydraulic oil from the piston accumulator.
8. Once all the nitrogen gas and hydraulic oil has been depleted from the gas side of the accumulator, disconnect the 2 m (6.6 ft) hose from the gauge port.
9. Install the cap for the gauge port on the piston accumulator.
10. Precharge the piston accumulator. Refer to [Section 5.6.3.3](#) for more information.
11. Remove all locks and tags.

5.6.4 Replacing the Burst Disc on an Accumulator Relief Valve (If Equipped)

For machines shipped to Italy, the accumulators are equipped with accumulator relief valves with burst discs, if the burst disc is broken or shatters due to pressure it must be replaced.

**WARNING!**

Suffocation hazard – risk of death or serious injury. High pressure nitrogen gas could deplete the oxygen in the air and cause rapid suffocation. Read the Material Safety Data Sheet (MSDS) before servicing the accumulators. Use under well ventilated conditions.

To replace a burst disc on an accumulator, do the following:

**WARNING!**

Complete the Lockout/Tag out of all energy sources in accordance with applicable local codes before performing maintenance activities. Failure to do so could result in serious injury or death.

1. Lockout and tag the machine. Refer to [Section 2.6](#) for more information.

**WARNING!**

High pressure hazard – risk of death or serious injury. Do not remove the burst disc unless all the gas is depleted from the accumulator. Removing the burst disc under pressure could become a high velocity projectile.

2. Make sure all pressure is depleted from the accumulator.
 - Refer to [Section 5.6.2.4](#) for more information on discharging a bladder accumulator.
 - Refer to [Section 5.6.3.4](#) for more information on discharging a piston accumulator.
3. Remove the broken burst disc.
4. Install the new burst disc.



Figure 5-179: Burst Disc

1. Burst Disc Adapter 2. Burst Disc

5. Tighten the burst disc (1/4 inch NPT).



WARNING!

High pressure hazard – risk of death or serious injury. Make sure the burst disc is installed correctly before precharging the accumulator. An incorrectly installed burst disc under pressure could become a high velocity projectile.

6. Precharge the accumulator.

- Refer to [Section 5.6.2.3](#) for more information on precharging a bladder accumulator.
- Refer to [Section 5.6.3.3](#) for more information on precharging a piston accumulator.

7. Remove all locks and tags.

5.6.5 Checking the Hydraulic Oil Quality

Maintaining high quality hydraulic oil is essential for optimum machine performance and dependability. Therefore, it is strongly recommended that hydraulic oil cleanliness and chemical properties be monitored at the interval specified in the maintenance schedule as part of a simple preventive oil maintenance program.



IMPORTANT!

If component failures can be directly linked to degraded oil, even after a detailed failure analysis has been performed, Husky may at its discretion choose to revoke warranty of any affected component.



IMPORTANT!

Always take a sample of new hydraulic oil to establish a baseline for future samples.

CAUTION!

Mechanical hazard – risk of damage to the machine. Re-additizing or fortifying the hydraulic oil does not provide enough protection for equipment. Customers found to be doing this can expect warranty limitations or cancellation in the event of hydraulic component failure.



WARNING!

High pressure spray hazard – risk of death or serious injury. High pressure hydraulic oil spray can penetrate human tissue and could cause death or serious injury.

To check the cleanliness and quality of the hydraulic oil, do the following:

1. Run the machine for a minimum of 30 minutes at normal operating temperature.
2. Stop production.

3. On the HMI, press the **Pump Motor Off** key to stop the pump motor.
4. Clean the outside of the port on the power manifold labeled *PP3G*.

NOTE:

The location of port PP3G may vary depending on the machine size. Refer to the hydraulic schematics for more information.

-
5. Make sure sampling valve is closed and then connect it to the power manifold port labeled *PP3G*.
 6. Use a 20 L pail placed under the sampling valve to collect the waste oil during procedure.
 7. On the HMI, press the **Pump Motor On** key to start the pump motor.
 8. Turn the handle on the sampling valve to fully open the valve. Allow oil to continue to flow into the waste container.

CAUTION!

Contamination hazard – risk of damage to the machine. Do not touch the sampling valve while taking a hydraulic oil sample. This could cause particles to loosen and contaminate the sample.

-
9. Remove the cap from a 1 L (0.25 U.S. gal) capacity sampling bottle and place the bottle under the uninterrupted stream of oil. Be sure not to touch the bottle with the sample valve hose.
 10. Fill the sampling bottle until it is half full.
 11. Cap the sampling bottle, shake it for 30 seconds and then empty the bottle into the waste oil container.
 12. Repeat [step 9](#) to [step 11](#) to rinse the sampling bottle a second time.
 13. For the final sample, fill the sampling bottle to within 1 cm (0.5 in) of the top.
Immediately cap the bottle to prevent the entry of external contaminants.
 14. Close the sampling valve.
 15. On the HMI, press the **Pump Motor Off** key to stop the pump motor.
 16. Remove the sampling valve from the power manifold.
 17. Complete the following on the information card provided on the oil sample kit.
 - Machine serial number
 - Customer Name and Facility
 - Manufacturer and brand name of the oil.
 - Estimated run time on the oil
 - If there has been a incident placed with the Call Center reference the VA# for tracking purposes
 18. Place the completed sampling bottle into the pre-addressed shipping container and forward immediately to a Husky recommended fluid analysis service.

NOTE:

When selecting a fluid analysis service, Husky recommends sending samples to an independent laboratory that does not hold interests in hydraulic oil sales. For a list of characteristics to be tested, required test standards and warning limits, refer to [Section 7.9.7](#).

NOTE:

For samples sent to any Husky parts center, follow the Customer Owned Material procedure. This will require the customer to call the parts center for a Customer Owned Material Return Authorization.



IMPORTANT!

As part of the fluid analysis, the following tests should be performed on your hydraulic oil:

- i. ISO cleanliness count
- ii. TAN
- iii. Spectro-chemical
- iv. Physical test (e.g. viscosity, water content, etc.)
- v. MPC Varnish potential as per ASTM D7843

19. If required, restart production on the machine.

5.6.6 Checking the Hydraulic Oil Level

To check the hydraulic oil level, do the following:

During normal machine operation, check the hydraulic tank sight glass to determine the hydraulic oil level. The oil level should be between the one-half and three-quarter level.

If the oil level is low, replenish the oil. Refer to [Section 5.6.7](#) for more information.

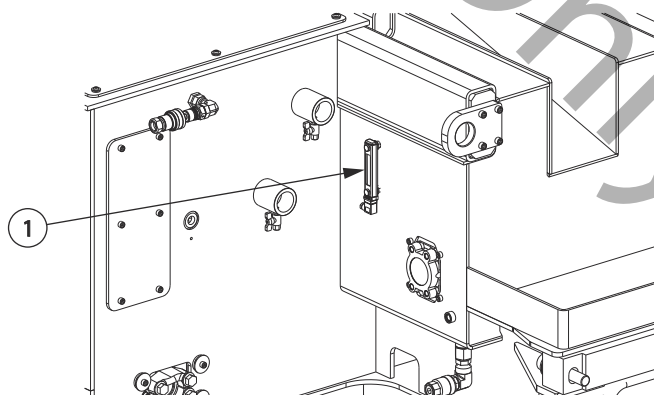


Figure 5-180: Hydraulic Tank Sight Glass (Typical)

1. Sight Glass

5.6.7 Replacing the Hydraulic Oil

If a preventive oil maintenance program is established, this procedure is only required when the characteristics of the oil exceed the acceptable oil condition quality. Refer to [Section 7.9.7](#) for more information.

In the absence of a preventive oil maintenance program, the hydraulic oil must be replaced on an annual basis to prevent excess contamination and wear in the machine.

5.6.7.1 Draining the Hydraulic Tank

To drain the hydraulic tank, do the following:



WARNING!

Burn hazard – contact with hot oil can cause severe burns. To avoid injury while draining or handling oil, wear personal protective equipment and make sure the oil temperature is less than 60 °C (140 °F) .

1. Make sure that all machine hydraulic cylinders are in the fully retracted position
 2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
 3. Connect a transfer hose to the quick disconnect fitting on the drain valve.
-

NOTE:

A female quick-disconnect fitting (P/N 745475) must be installed on the end of the transfer hose.

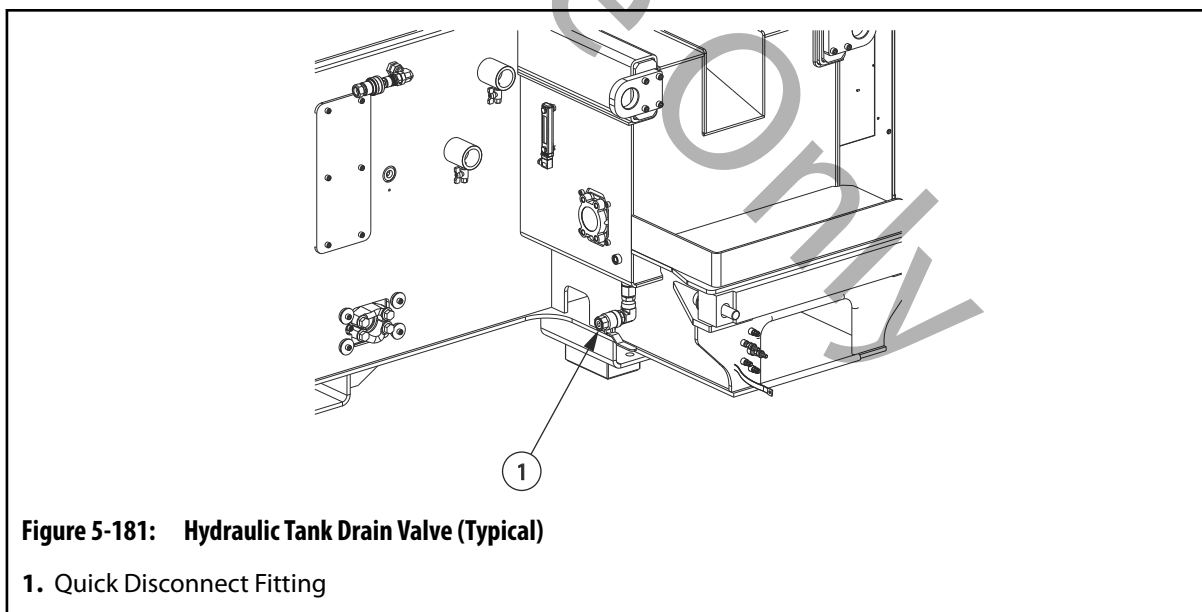


Figure 5-181: Hydraulic Tank Drain Valve (Typical)

1. Quick Disconnect Fitting

4. Position the other end of the transfer hose over a suitable waste container.

NOTE:

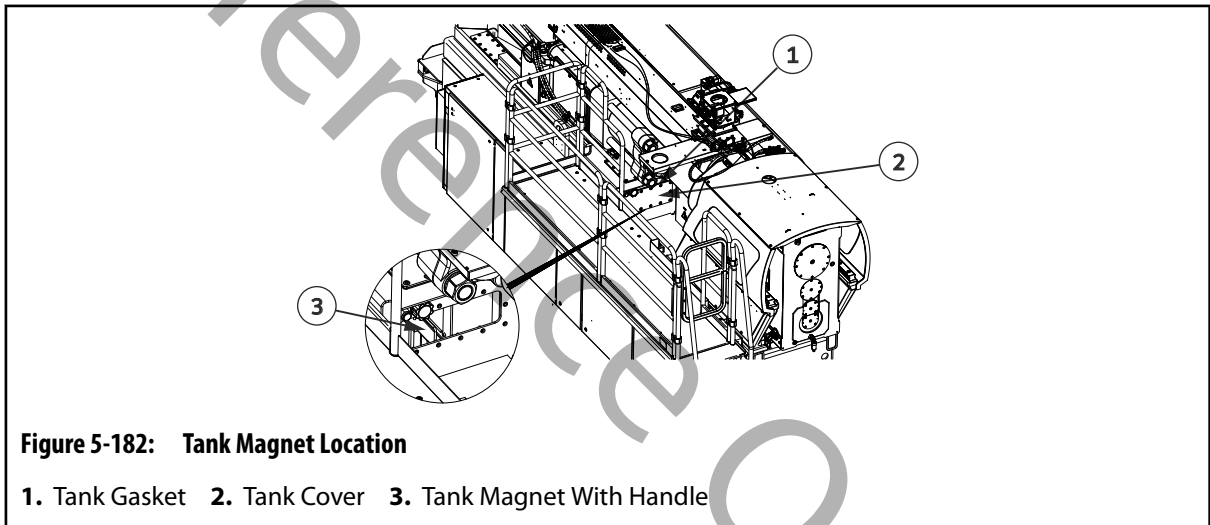
Refer to [Section 7.9.4](#) for the hydraulic oil capacity.

5. Open the drain to start draining the hydraulic system.
6. When the hydraulic system is empty, close the drain and disconnect the transfer hose.
7. Remove the reservoir covers and vacuum all residual oil from the bottom. Reinstall the covers.
8. Remove all locks and tags.

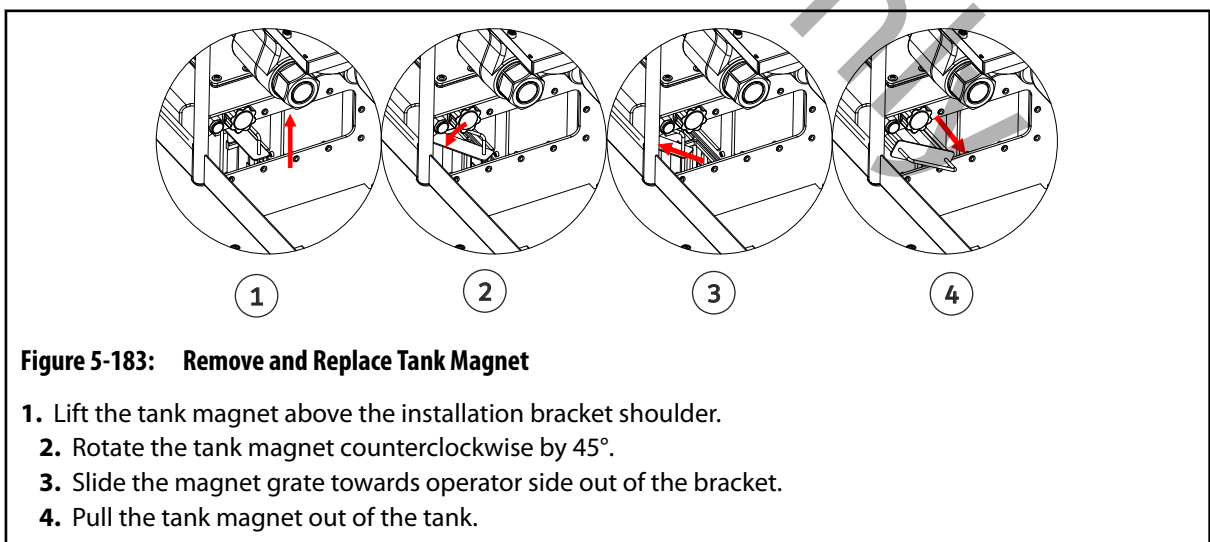
5.6.7.2 Inspecting and Cleaning the Tank Magnet

To inspect and clean the tank magnet, do the following:

1. Drain the hydraulic tank. Refer to [Section 5.6.7.1](#) for more information.
2. Remove the desiccant breather from the tank, if equipped.
3. Remove the rear tank cover and gasket.



4. Remove the tank magnet from the bracket inside the tank. Refer to the following figure:



5. Wipe the magnets with a clean cloth to remove all particles.
6. After cleaning, install the magnet onto the bracket inside the tank. Installation is reverse order of removal.
7. Install the rear tank cover and gasket.
8. Install the desiccant breather, if equipped, on the tank.
9. Refill the hydraulic tank. Refer to [Section 5.6.7.3](#) for more information.

5.6.7.3 Filling the Hydraulic Tank

To fill the hydraulic system with new hydraulic oil, do the following:

NOTE:

Refer to [Section 7.9.1](#) for a list of recommended hydraulic oils.

NOTE:

A portable fluid transfer cart is required to fill the hydraulic tank from a barrel, holding tank or truck. This unit must be fitted with filters that have an efficiency of $\beta_{10} \geq 1000$ or better.

NOTE:

The quick disconnect fitting is designed for a 19 mm (0.75 in) NPT hose-end fitting.

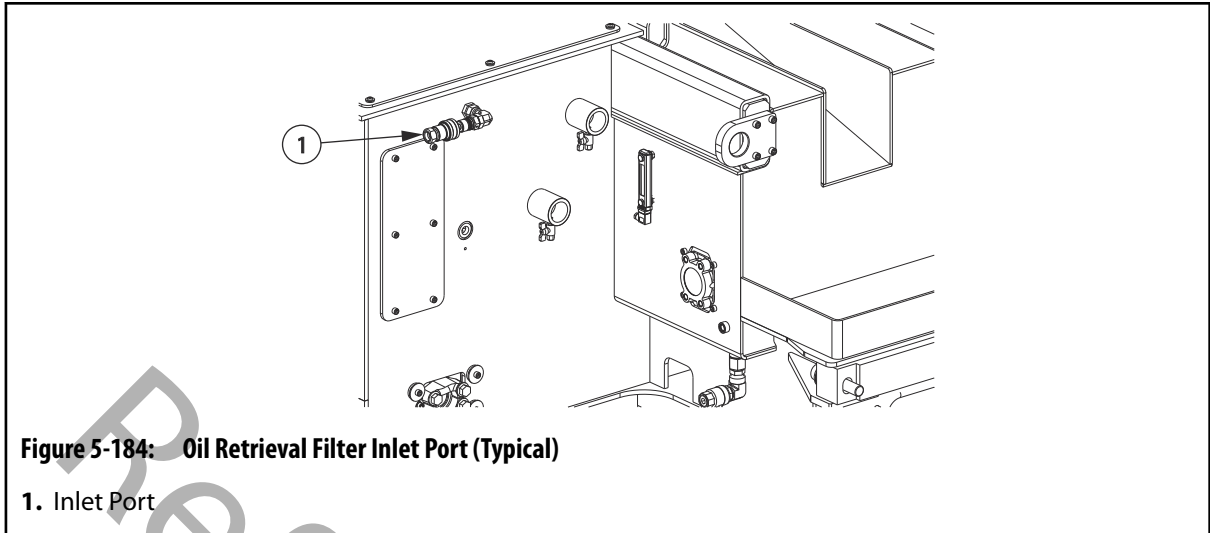
1. Connect the supply hose from the transfer pump to the supplied quick disconnect fitting.
 2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
-



IMPORTANT!

Only fill the hydraulic tank through the designated fill port, upstream of the pressure filter assembly.

3. Remove the plug from the inlet port for the oil retrieval filter.
-



CAUTION!

Contamination hazard – risk of damage to the machine. Unfiltered oil in the hydraulic tank will damage hydraulic components in the machine. Always fill the tank through the filter, not through the drain port.

4. Connect the supply hose to the inlet port.



WARNING!

Slip, trip or fall hazard – risk of serious injury. Do not leave the machine unattended while filling the hydraulic tank. The hydraulic tank could overflow creating a hazardous workplace. Only fill the hydraulic tank until the oil level reaches the top of the sight glass.



WARNING!

Environmental hazard – risk of damage to the environment. Spilled hydraulic oil or oil that has not been properly disposed of could pollute the environment and create a health hazard. Clean up all spilled hydraulic oil immediately and dispose of it properly according to local regulations.



IMPORTANT!

The oil capacities listed in are estimated based on the total volume of the hydraulic system. The actual volume required for filling may vary based on the amount of oil left in the hydraulic tank, hoses, cylinders, etc.

5. Fill the hydraulic tank to between 1/2 to 3/4 full in the sight glass. This is the high level mark.

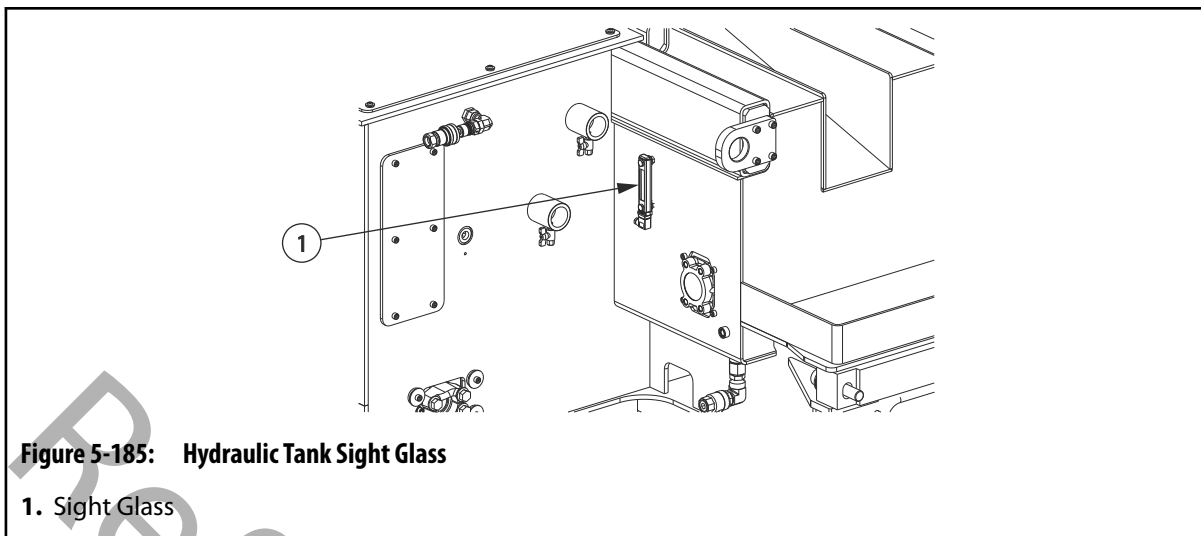


Figure 5-185: Hydraulic Tank Sight Glass

1. Sight Glass

6. Disconnect the supply hose from the inlet port.
7. Install the plug for the inlet port.

CAUTION!

Mechanical hazard – risk of damage to equipment. To prevent damage to the hydraulic pumps, do not start the machine until the hydraulic pumps are primed.

8. Prime the hydraulic pumps. Refer to [Section 3.1.6.2](#) for more information.
9. Remove all locks and tags.
10. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
11. On the HMI, press the **Pump Motor On** key followed by the **Auto Cycle** key.
12. Press the **Cycle Start** key to cycle the system.
13. Check the hydraulic oil level at the sight glass while the machine is cycling. Repeat [step 2](#) to [step 7](#) if more oil is required.

5.6.8 Checking the Oil Recovery Unit

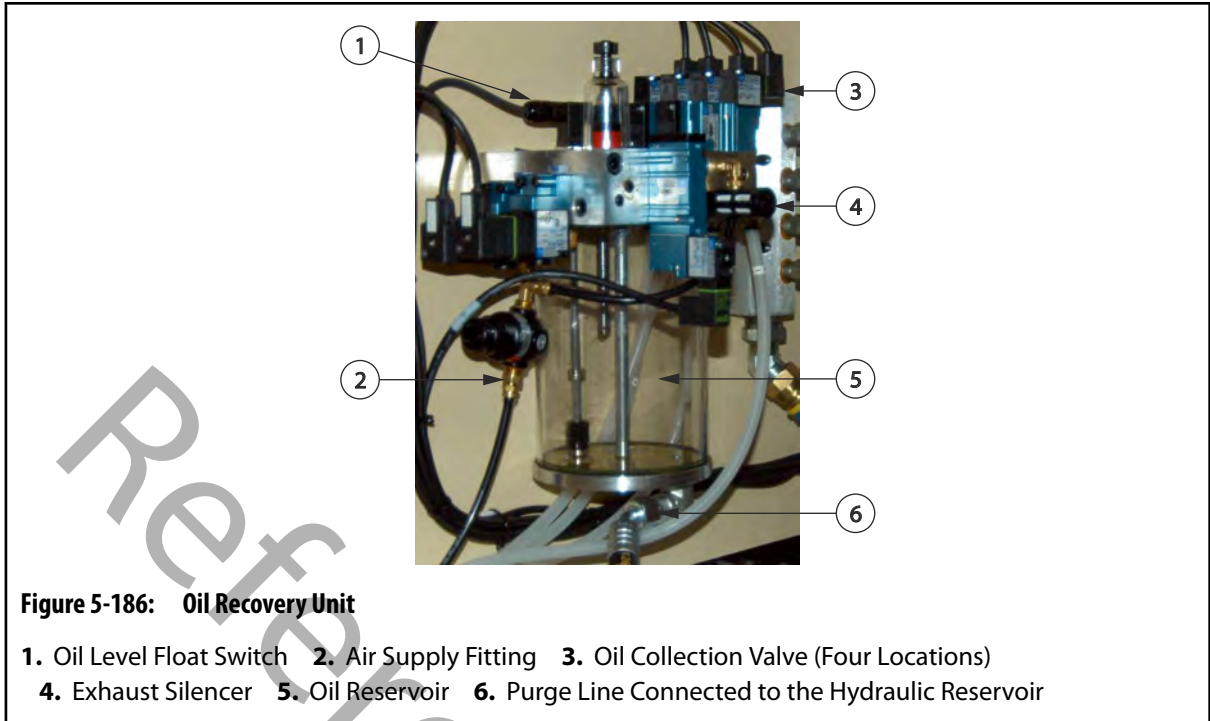
To check the functionality of the oil recovery unit, do the following:

1. On the HMI, press the **Pump Motor Off** key to stop the pump motor.
2. Remove the access panels on the power pack.

CAUTION!

Contamination hazard – risk of contaminating the hydraulic oil supply. Do not mix different brands or grades of oil. Mixing oils can cause premature breakdown of the oil which could result in machine damage.

3. Disconnect one end of an oil recovery hose from any inlet port at either the clamp or injection end of the machine. Insert the hose end into a container of hydraulic oil. Refer to [Section 7.9.1](#) for a list of recommended hydraulic oils.



4. On the HMI, press the **Pump Motor On** key to start the pump motor. Hydraulic oil should start travelling through the oil collection hose after a short delay.



IMPORTANT!

If the oil recovery unit is unable to draw hydraulic oil out of the container, do the following:

- i. On the HMI, press the **Pump Motor Off** key to stop the pump motor.
- ii. Disconnect the oil recovery hose from the oil collection valve on the recovery unit and blow it out with compressed air until the air flows freely to the other end. This will remove any blockages.
- iii. Connect the hose back to the oil collection valve on the oil recovery unit.
- iv. On the HMI, press the **Pump Motor On** key to start the pump motor. Hydraulic oil should start travelling through the oil collection hose after a short delay.

If the oil recovery unit is still unable to draw hydraulic oil from the container, the venturi inside the oil recovery manifold may be out of position or damaged. Replace the venturi, if damaged, and repeat the above procedure to confirm.

5. Verify that air is blowing out of the exhaust silencer.
6. Allow the hydraulic oil to be drawn into the reservoir until the float on the oil level switch reaches the top position.

At this time, the purge sequence is activated and the oil recovery unit should purge the oil back to the hydraulic reservoir. If the purge sequence does not occur, the oil level switch may be faulty and should be replaced.

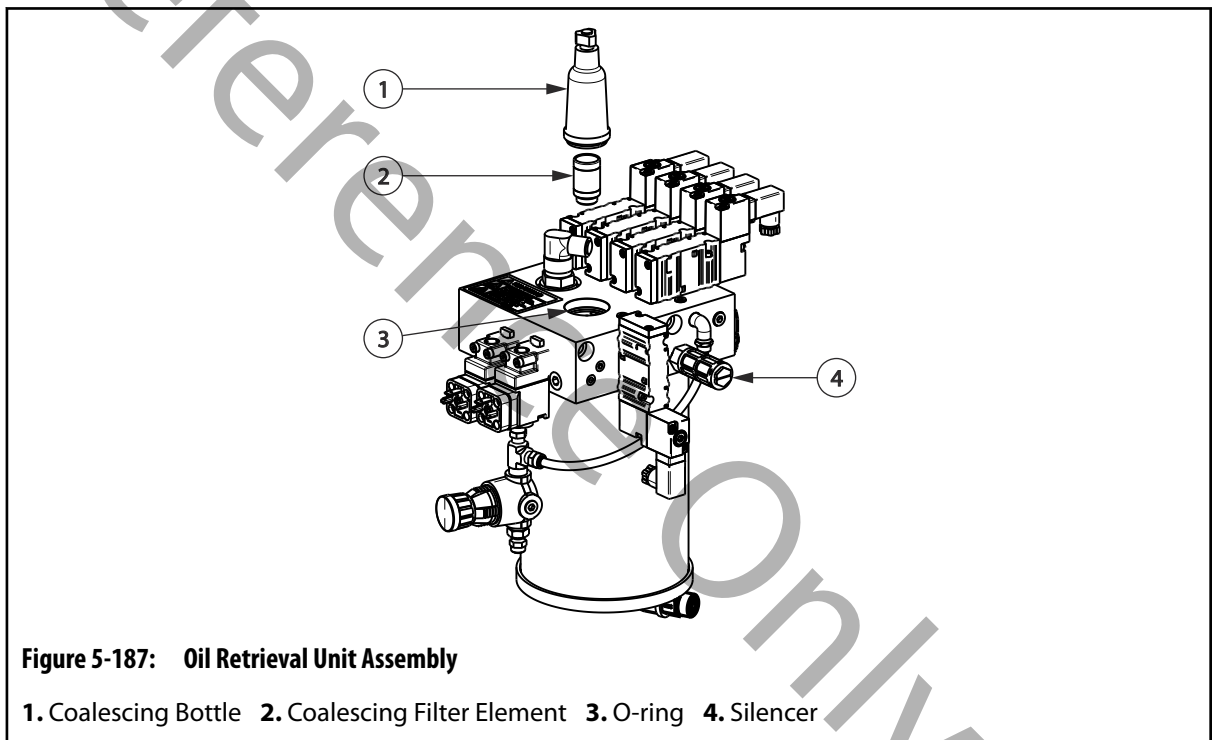
Once the float on the oil level switch reaches the bottom position, the purge sequence will stop. Some oil should remain in the oil recovery unit and will prevent air from entering the hydraulic reservoir.

7. Remove the oil inlet hose from the hydraulic oil container and connect it back to the machine in its original location.
8. On the HMI, press the **Pump Motor Off** key to stop the pump motor.
9. Install the access panels for the power pack.

5.6.9 Replacing the Coalescing Filter and Silencer on the Oil Recovery Unit

To replace the coalescing filter and silencer, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove the access panels on the power pack.
3. Remove the coalescing bottle and wipe clean using a clean cloth.



4. Remove and discard the coalescing filter and silencer elements.
5. Thoroughly clean the area where the filter and silencers were installed.
6. Using compressed air and a clean cloth, clean the filter port.
7. Install the new coalescing filter and tighten by hand. Do not use tools.
8. Make sure the filter element gasket is compressed.
9. Install the new silencer element and tighten by hand. Do not use tools.
10. Install the coalescing bottle into the manifold. Make sure the o-ring is in the manifold bore and does not pinch.
11. Tighten the coalescing bottle by hand. Do not use tools.
12. Install the access panels for the power pack.

13. Remove all locks and tags.

5.6.10 Inspecting the Hydraulic Cylinders, Valves and Manifolds

Check for the following when inspecting hydraulic cylinders, valves and manifolds:

- Worn, warped or damaged seals
- Signs of hydraulic oil leaks
- Other wear or damage to the hydraulic components

Replace or repair components as necessary.

5.6.11 Inspecting and Replacing Hydraulic Hose Assemblies

Damaged or worn hoses, or loose connections can allow high pressure hydraulic oil to spray out and potentially penetrate human tissue. This can cause death or serious injury. High pressure hydraulic oil spray or mist can also ignite when it contacts hot surfaces at temperatures equal to or above the oil's flash point.

Regular inspection of hydraulic hoses and connections can minimize or prevent such hazards.

If the hoses are damaged or signs of an oil leak are found, the hoses must be replaced.



IMPORTANT!

Hoses should be replaced every three years, or when a problem with the hose is discovered as the result of regular inspections.

5.6.11.1 Inspecting Hydraulic Hoses

To check the hydraulic hose assemblies, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



WARNING!

High pressure spray hazard – risk of death or serious injury. Loose connections can cause high pressure hydraulic oil spray that can penetrate tissue and could cause death or serious injury. To locate the origin of a leak, use a piece of sheet metal.



WARNING!

Fire hazard – risk of death or serious injury, and property damage. Loose connections can cause hydraulic oil to spray onto hot machine surfaces and could start a fire. Regular inspection and maintenance of hoses and connections will minimize such fire hazards.

**WARNING!**

Burn hazard – risk of serious injury. Hydraulic oil can be very hot. Wear personal protective equipment and avoid contact with hot oil.

2. Check all hydraulic hoses for signs of blisters, wear, or radial cracks.

Replace all damaged hoses. Refer to [Section 5.6.11.2](#) for more information.

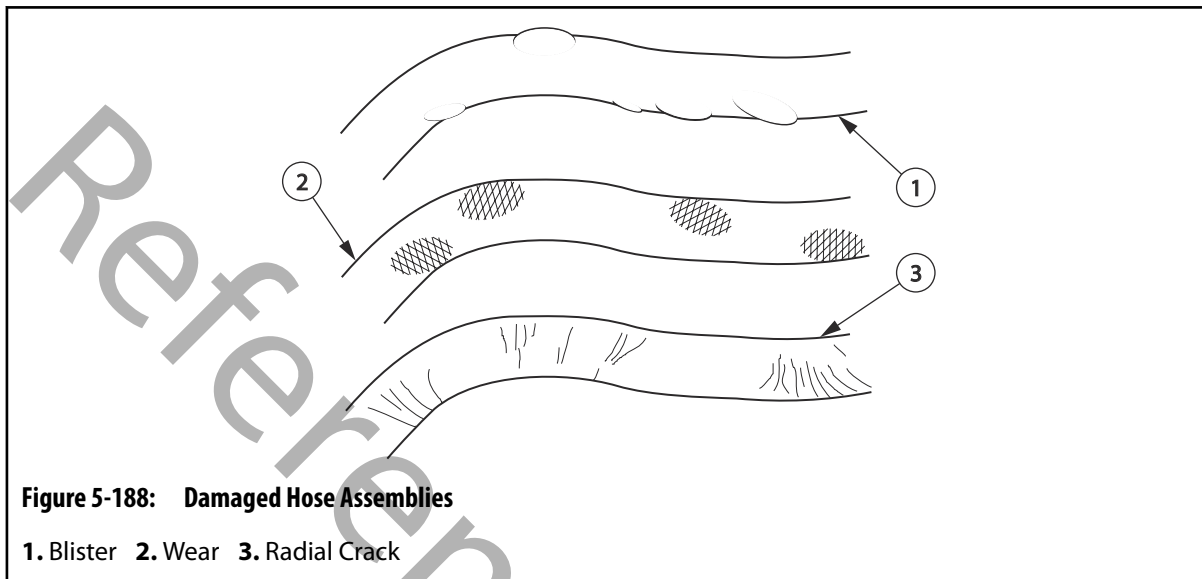


Figure 5-188: Damaged Hose Assemblies

1. Blister 2. Wear 3. Radial Crack

3. Check all hydraulic hose fittings for oil leaks. Replace all damaged fittings.
4. Check for any loose hose fittings. Tighten all hose fittings to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.

5.6.11.2 Replacing Hydraulic Hoses

To replace a hydraulic hose, do the following:

**WARNING!**

High pressure spray hazard – risk of death or serious injury. High pressure hydraulic oil spray can penetrate human tissue and could cause death or serious injury. Lock out and tag the machine before removing any hose.

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.

**IMPORTANT!**

Drain the hydraulic reservoir when:

- Removing a clamp hydraulic component which is below the fluid level of the injection unit tank.
- Disconnecting a reservoir hydraulic line.

CAUTION!

Contamination hazard – risk of an oil spill. Failure to drain the hydraulic reservoir before removing hydraulic hoses or components located below the level of the reservoir could cause a massive oil leak.

2. Drain the hydraulic tank. Refer to [Section 5.6.7.1](#) for more information.
-

**WARNING!**

Burn hazard – risk of serious injury. Hydraulic oil can be very hot. Wear personal protective equipment and avoid contact with hot oil.

**IMPORTANT!**

When replacing hoses, compare the layline information marked on the new and old hoses to determine if the new hose is suitable for the application. For more information about reading layline information, refer to [Section 5.6.11.3](#).

3. Note the layline and existing clearances of the hoses being replaced.
 4. Remove the damaged hose from the fitting.
-

CAUTION!

Mechanical hazard – risk of equipment damage. Hoses and hose assemblies are generally not designed to operate under torsional stress. Install hoses and hose assemblies so the relative motion of the machine bends the hose and eliminates any twists.

CAUTION!

Mechanical hazard – risk of equipment damage. Hydraulic hoses oscillate and vibrate during normal operation. When installing new hydraulic hoses, maintain the clearances between existing hoses and electrical cables.

5. Install the new hoses. Make sure to install the new hoses with the same clearances as the old hoses.
 6. Make sure the hydraulic hoses do not extend beyond the machine contour.
 7. Torque all connections. Refer to [Section 7.13](#) for standard torque specifications.
-

CAUTION!

Mechanical hazard – risk of damage to the machine. When installing hose clamps, remember the following:

- **Do not install hose clamps where hoses bend. Bends must be free to absorb any changes in hose length that occur when the hose is under pressure.**
- **Do not clamp high and low pressure hoses together.**
- **Use hose clamps with soft rubber inserts rather than hard plastic clamps. Hard plastic clamps could damage the hose reinforcement.**

8. If necessary, secure the hose to the machine with hose clamps.
9. Remove all locks and tags.
10. Power up the machine and log onto the HMI. Refer to [Section 4.2](#) for more information.
11. Inspect the new hose for oil leaks. If an oil leak is found, lock out and tag the machine and check the hose fittings.

5.6.11.3 Reading Layline Information

Hoses are marked with layline information to indicate hose specifications. The following is an example of a typical layline with an explanation of each section.

Example Layline Information	Description
MANULI ROCKMASTER /2SN-6EN853 2SN DN10 WP350BAR/5000PSI MSHA 1C126/8-FRAS--400T 280807 MADE IN ITALY 2Q07	MANULI: Company name ROCKMASTER /2SN-6EN853 2SN: Type DN10: Hose size in millimeters WP350bar/5000psi: Maximum work pressure MSHA: Mine Safety and Health Administrators 1C126/8: MSHA release number. MADE IN ITALY: Country of manufacturing 2Q07: Quarter (2Q) and year (07) of manufacture

5.6.12 Checking the Hydraulic System Pressure

To check the hydraulic system pressure, do the following:

1. On the HMI, press the **Pump Motor Off** key to turn off the pump motor.

NOTE:

The location of port PP1G may vary depending on the machine size. Refer to the hydraulic schematics for more information.

2. On the power manifold, remove the cap on the appropriate port:
 - For clamp system pressure, connect to port labelled *PP21G*.
 - For injection system pressure, connect to port labelled *PP23G*.

Attach a hydraulic pressure gauge with a quick disconnect fitting. The gauge must have a range from 0 to 400 bar (0 to 5800 psi) .

3. On the HMI, press the **Pump Motor On** key to turn on the pump motor. Allow the system pressure to build.
4. Once the system pressure is stable, compare the reading from the hydraulic gauge to the maximum hydraulic system operating pressure listed in [Section 7.12](#).
5. Press the **Pump Motor Off** key to turn off the pump motor.
6. Remove the hydraulic pressure gauge and install the port cap on the power manifold.

5.6.13 Checking the Automatic Dump Valve

The automatic dump valve discharges all hydraulic system pressure from the bladder accumulators when the **Pump Motor Off** key is pressed.

To check the automatic dump valve, do the following:

1. Remove the cap from the gauge port on the power manifold.

NOTE:

Refer to the hydraulic schematic to determine the specific location of the gauge port.

2. Attach a hydraulic pressure gauge with a quick disconnect fitting to the gauge port. The gauge must have a range from 0 to 400 bar (0 to 5800 psi) .
3. On the HMI, press the **Pump Motor On** key to start the pump motor. Allow the pump motor to run for a minute to build up the temperature and pressure in the hydraulic system.
4. Press the **Pump Motor Off** key to stop the pump motor.
5. Check the pressure gauge to confirm the bladder accumulators are fully discharged of any hydraulic pressure.
6. Disconnect the pressure gauge and re-install the cap over the gauge port.

5.6.14 Checking the CEN Valve

The CEN valve prevents clamp motion when the front gate is open.



IMPORTANT!

In addition to the following procedure, the CEN valve functionality should be checked by the operator using the HMI each time the machine is started. Refer to [Section 4.26.1.5.5](#) for more information.

The following check should be performed by maintenance staff in accordance with the maintenance schedule.

To check the functionality of the CEN valve, do the following:

**WARNING!**

High pressure spray hazard – risk of death or serious injury. High pressure hydraulic oil spray can penetrate human tissue and cause extensive injuries. Make sure the pump motor is turned off.

1. Press the **Pump Motor Off** key to stop the pump motor.
2. Attach a pressure gauge to a port immediately downstream of the CEN valve.
3. On the HMI, press the **Pump Motor On** key to start the pump motor. The gauge will indicate pressure.
4. Open the front gate. The pressure should drop to zero.
5. Close the front gate. The pressure should rise.
6. Press the **Pump Motor Off** key to stop the pump motor.
7. Disconnect the pressure gauge.

5.6.15 Replacing the Hydraulic Tank Breather Cap

To replace the breather cap for the hydraulic tank, do the following:

1. On the HMI, press the **Pump Motor Off** key to stop the pump motor.

CAUTION!

Contamination hazard – risk of damage to the machine. The hydraulic system is exposed to contaminants whenever a hydraulic component is removed. To avoid consequential damage during maintenance, absolute cleanliness must prevail.

2. Clean the area around the breather cap.
3. Turn the breather cap counter-clockwise and remove it.
4. Install a new breather cap and hand tighten the cap.

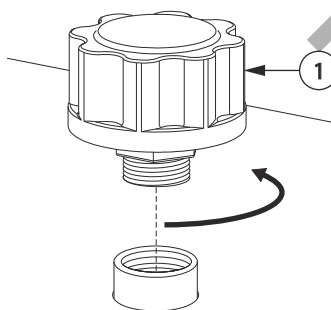


Figure 5-189: Replacing the Breather Cap (Typical)

1. Breather Cap

5.6.16 Inspecting and Replacing the Hydraulic Tank Desiccant Breather Cartridge (If Equipped)

The following procedures describe how to inspect and replace the hydraulic tank desiccant breather cartridge on the hydraulic tank.

5.6.16.1 Inspecting the Hydraulic Tank Desiccant Breather Cartridge

Examine the color of the material in the cartridge and compare it with the indicator strip on the cap. If the color indicates replacement is necessary, refer to [Section 5.6.16.2](#).

NOTE:

The hydraulic tank desiccant breather cartridge is typically located at the rear of the machine.

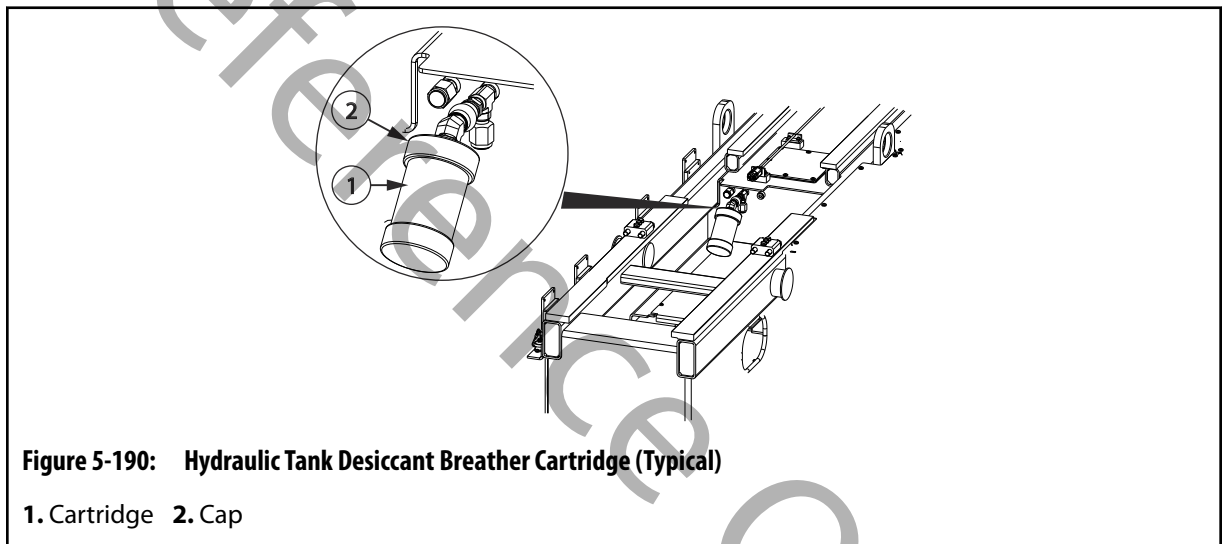


Figure 5-190: Hydraulic Tank Desiccant Breather Cartridge (Typical)

1. Cartridge 2. Cap

5.6.16.2 Replacing the Hydraulic Tank Desiccant Breather Cartridge

To replace the hydraulic tank breather cartridge, do the following:

1. Unscrew the old cartridge from the cap.

NOTE:

No tools are required. The cartridge is hand-tightened only.

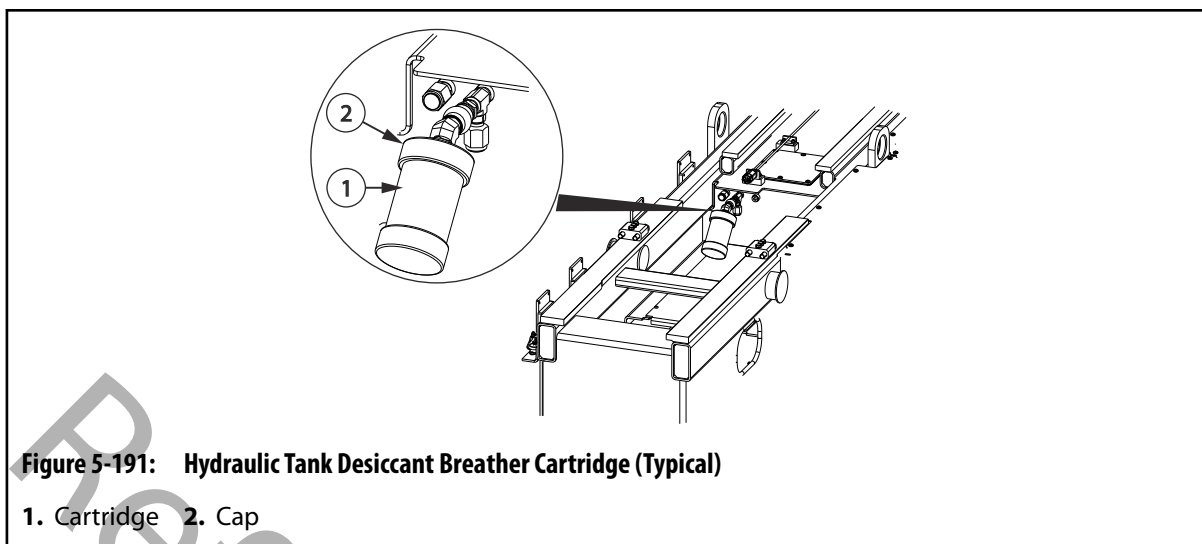


Figure 5-191: Hydraulic Tank Desiccant Breather Cartridge (Typical)

1. Cartridge 2. Cap

2. Screw on the new cartridge and hand-tighten.
3. Remove the air seal from the cartridge by pulling on the tab.

5.6.17 Priming, Flushing, and Commissioning the System

The system must be primed with oil, after installation, to prevent air from entering the hydraulic system.

To prime, flush, and commission the system, do the following:

CAUTION!

Mechanical hazard – risk of damage to the machine. To avoid damage to the system, do not restart the pump until it is primed.

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Make sure the hydraulic tank is filled with hydraulic oil.
3. Remove the plug from the adaptor block.

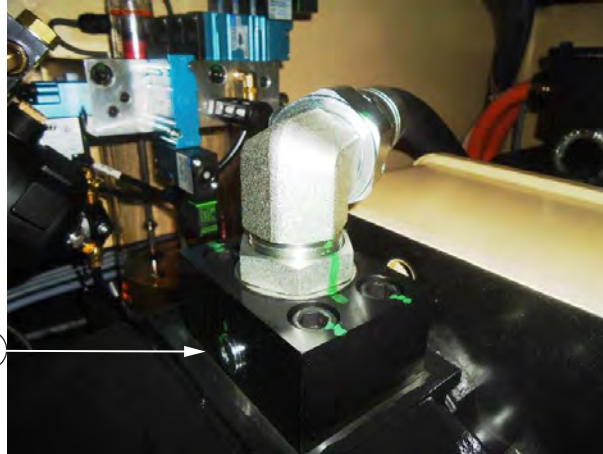


Figure 5-192: Remove the Plug

1. Priming Plug



IMPORTANT!

Wait until the oil flows from the measuring port and all of the air vents from the pump. It can take several minutes for the oil to flow and all the air to vent from the port.

4. Wrap a clean general-purpose shop towel around the pump outlet port to capture any oil spills.
5. Manually turn the pump by rotating the pump motor coupling in the direction indicated by the arrow on the top of the pump.

Watch out for oil coming out of the pump outlet port.

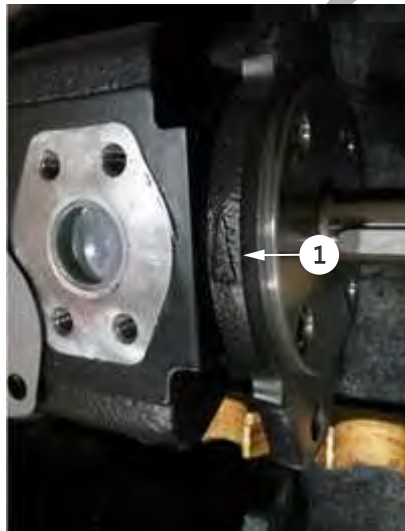
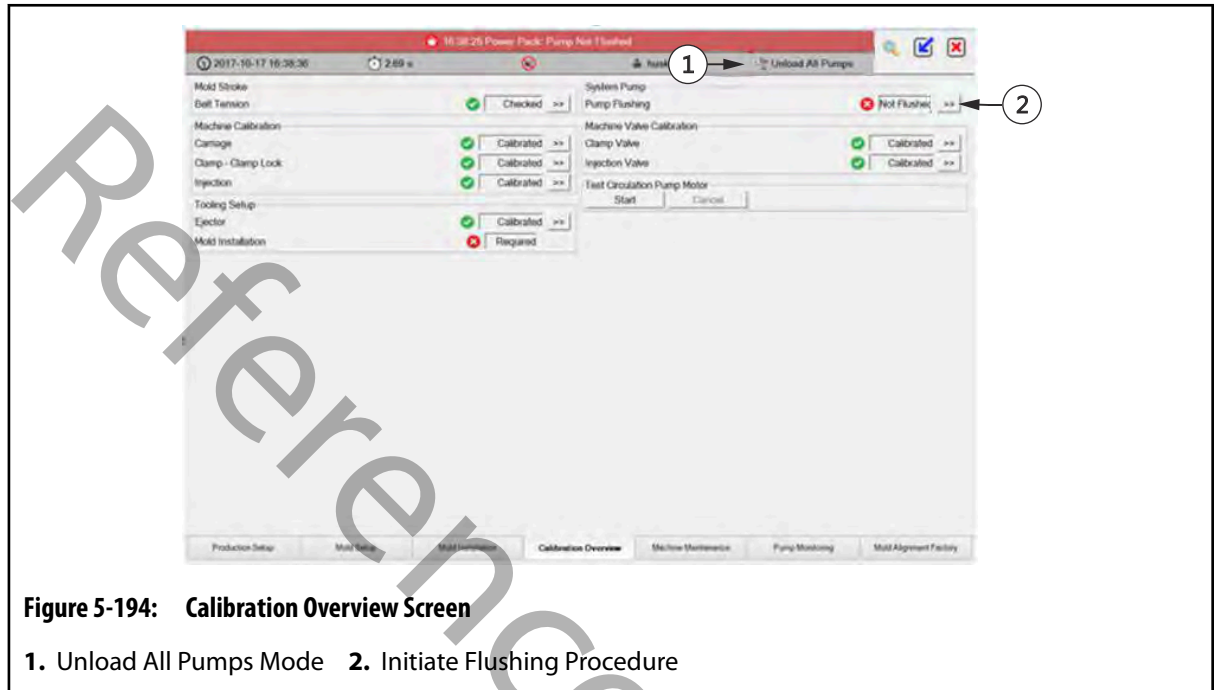


Figure 5-193: Pump Rotation Direction

1. Pump Direction Arrow

6. Once the oil at the pump outlet is free of bubbles, stop rotating the pump motor coupler.
The pump is now ready for flushing.
7. Reinstall the plug into the adaptor block.
8. Perform the following steps to access the pump flushing and commissioning wizard:
 - a. Clear all active alarms on the machine HMI alarm screen.
 - b. Click on the **Calibration Overview** tab.



- c. Select the **Unload All Pumps** machine mode.
- d. Click the >> button in order to initiate the flushing process.
The **Pump Flushing** wizard appears.



9. Click **Start** on the wizard and follow the instructions to complete the pump flushing and commissioning.

When pump flushing is finished, the field beside the **Start** button will display **Flushed**.

10. Continue to follow the wizard instructions to complete the pump flushing and commissioning.

The following, are the high level stages of the wizard:

- a. Preparation (after some confirmation, open manual dump valves).
- b. Pump flushing (step 1 in the wizard).
- c. A 30 minute wait to allow the oil tank to de-aerate.
- d. Pump commissioning (steps 2 to 7 in the wizard) with increasing pump speed and pressure.

NOTE:

The pump flushing and commissioning steps require the manual dump valve to be opened and closed. For the location of the manual dump valves, refer to the following figure.

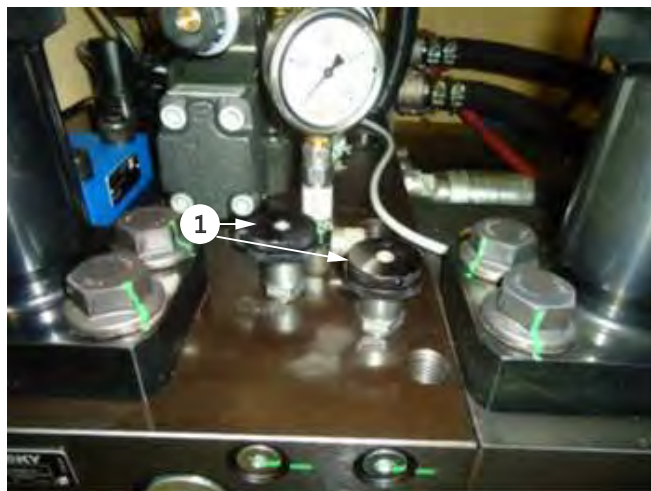


Figure 5-196: Manual Accumulator Dump Valves in Power Manifold

1. Manual Dump Valve Knobs

11. Return the machine to production.

5.6.18 Replacing the Oil Retrieval Filter Element

The oil retrieval filter element must be replaced at intervals specified in the maintenance schedule.

To replace the oil retrieval filter element, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove the access panels on the power pack.
3. Place a container under the oil retrieval filter to collect any spilled hydraulic oil and/or debris.

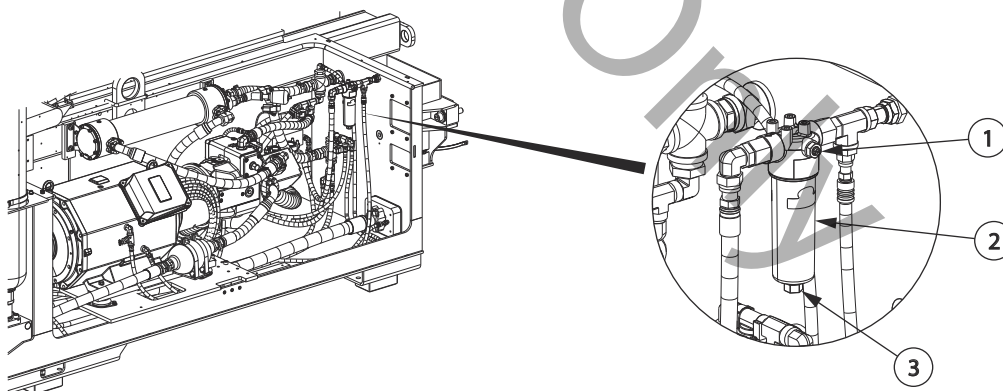


Figure 5-197: Oil Retrieval Filter

1. Relief Port Plug 2. Filter Bowl 3. Drain Port Plug

**WARNING!**

Burn hazard –risk of serious injury. Contact with hot oil could cause severe burns. To avoid injury while draining or handling oil, make sure the oil temperature is less than 60 °C (140 °F) and wear personal protective equipment including nitrile gloves.

4. Loosen the relief port plug and drain port plug. Allow the oil within the oil retrieval filter to drain completely.
5. When the filter bowl is empty, tighten the relief port plug and drain port plug.

CAUTION!

Contamination hazard - risk of damage to the machine. To avoid consequential damage, absolute cleanliness must prevail when opening the hydraulic circuit. Before removing the filter element, clean the whole area around the filter.

6. Clean the area around the filter bowl.
7. Unscrew the filter bowl from the filter body.
8. Replace the filter element.
9. Install the filter bowl.
10. Clean the area around the filter bowl.
11. Install the access panels for the power pack.
12. Remove all locks and tags.

5.6.19 Replacing the Pressure Filter Element

The pressure filter element must be replaced at intervals specified in the maintenance schedule or when a *Dirty Pressure Filter* alarm is generated.

To replace the pressure filter element, do the following:

1. Lock out and tag the machine. Refer to the *Machine Manual* [Section 2.6](#) for more information.
2. Place a container under the pressure filter to collect any spilled hydraulic oil and/or debris.

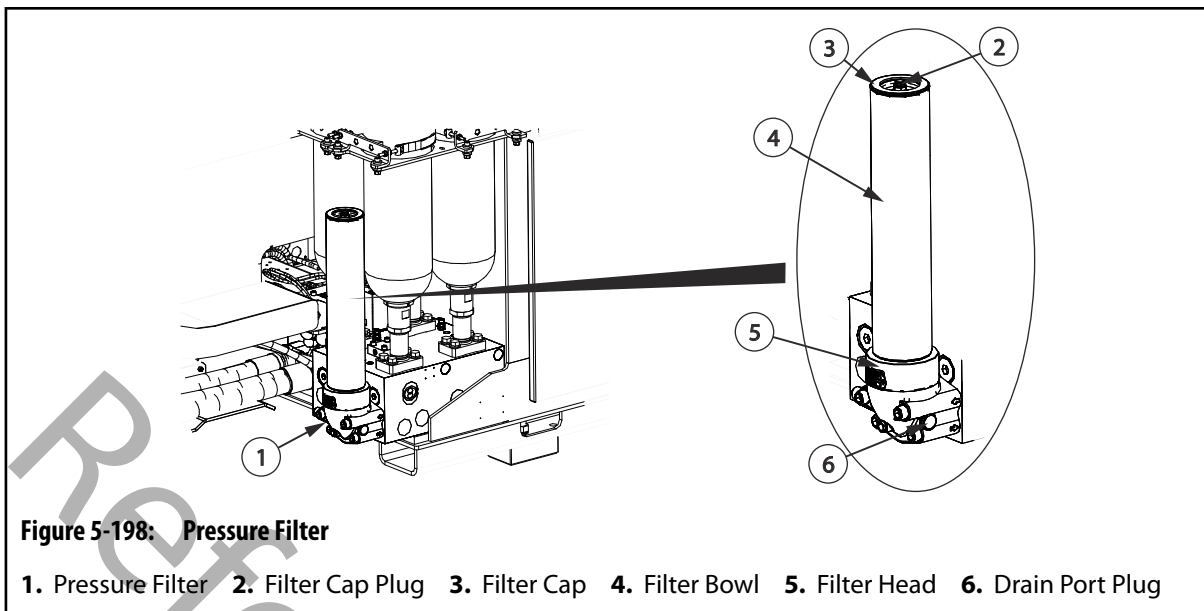


Figure 5-198: Pressure Filter

1. Pressure Filter 2. Filter Cap Plug 3. Filter Cap 4. Filter Bowl 5. Filter Head 6. Drain Port Plug



WARNING!

Burn hazard – risk of serious injury. Contact with hot oil could cause severe burns. To avoid injury while draining or handling oil, make sure the oil temperature is less than 60 °C (140 °F) and wear personal protective equipment including nitrile gloves.

3. Turn the filter cap plug one and a half turns to open.
4. Open the drain port plug slightly and allow the fluid to drain completely.
5. When all fluid has drained, tighten the drain port plug to 16 N·m (12 lbf·ft) .

CAUTION!

Contamination hazard - risk of damage to the machine. To avoid consequential damage, absolute cleanliness must prevail when opening the hydraulic circuit. Before removing the filter element, clean the whole area around the filter.

6. Clean the area around the filter bowl.
7. Unscrew and remove the filter cap from the filter bowl.

NOTE:

The filter assembly is equipped with an auto-pull element extraction mechanism to facilitate element removal. When removing the filter cap, tabs on the element end cap lock into the hooks in the cap and the element is automatically pulled from the fitting.

8. Remove and discard the pressure filter element.
9. Lubricate the pressure filter element O-ring with clean system fluid. Refer to [Section 7.9](#) for a list of recommended lubricants.

CAUTION!

Contamination hazard – risk of equipment damage. Install the pressure filter element in the correct orientation in the filter bowl. Installing the pressure filter element incorrectly could result in unfiltered hydraulic oil, which will result in machine damage.

10. Make sure the pressure filter element is oriented correctly. Make sure the lubricated O-ring open end is face down toward the filter head.



11. Install the pressure filter element into the filter bowl.

**IMPORTANT!**

Visually inspect the cap-to-bowl O-ring for signs of wear or damage and replace if necessary.

12. Lightly lubricate the cap-to-bowl O-ring with clean system fluid.
13. Install the filter cap. Make sure the filter cap threads are fully and correctly seated.
14. Torque the filter cap to 100 N·m (74 lbf·ft) .
15. Remove the filter cap plug.
16. Fill the filter cap opening with clean hydraulic oil until all air bleeds through the filter cap opening. Refer to [Section 7.9](#) for a list of recommended lubricants.
17. Install the filter cap plug and torque to 16 N·m (12 lbf·ft) .
18. Remove all locks and tags.
19. On the HMI, press the **Pump Motor On** Key to start the pump.

5.6.20 Measuring Servo Valve Data

The condition of a servo valve can be determined by measuring data collected using the following tools:

- A breakout box (must be specifically designed for the servo valve)
- A multimeter (for static measurements)
- An oscilloscope (for dynamic measurements)



IMPORTANT!

The breakout box must be specifically designed for use with the servo valve. A standard breakout box (P/N 2821184) for all Moog servo valves (Moog GmbH and Moog-Hydrolux) is available through Husky Parts and Service.

For Moog-Hydrolux servo valves, a separate face plate (P/N 2821186) must be installed.

To measure the servo valve data, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Disconnect the servo valve cable from the servo valve.

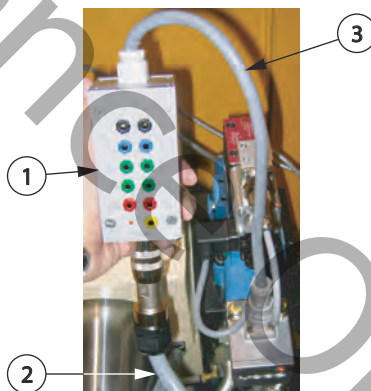


Figure 5-200: Installing the Breakout Box

1. Breakout Box 2. Servo Valve Cable 3. Breakout Box Cable

3. Attach the breakout box connector from the breakout box to the servo valve.
4. Attach the servo valve cable to the breakout box.
5. For Moog-Hydrolux servo valves, replace the faceplate with the appropriate plate.

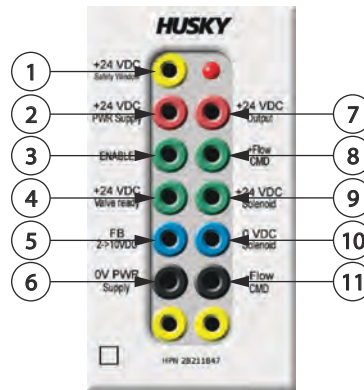


Figure 5-201: Moog GmbH Breakout Box Faceplate (Typical)

1. +24 Vdc Safety Window 2. +24 Vdc PWR Supply 3. ENABLE 4. +24 Vdc Valve Ready
5. FB 2->10 Vdc 6. 0 V PWR Supply 7. +24 Vdc Output 8. +Flow CMD 9. +24 Vdc Solenoid
10. 0 Vdc Solenoid 11. -Flow CMD

6. Make sure the breakout box is routed to the outside of the machine. It must not be inside the purge area or any area protected by safety gates.



WARNING!

Crushing hazard – risk of death or serious injury. Electrical impulses from the multimeter to the breakout box can initiate uncontrolled machine motion. Make sure the multimeter is set to measure DC voltages only.

7. If a multimeter is used, make sure it is set to measure DC voltage.



WARNING!

Burn and crushing hazard – risk of death or serious injury. The multimeter or oscilloscope must not be operated inside the purge area or any area protected by safety gates. Make sure the wires to the breakout box are long enough to operate the multimeter or oscilloscope outside of the machine.

8. Attach the multimeter or oscilloscope to the breakout box.
9. Remove all locks and tags.
10. Power up the machine and log on to the HMI. Refer to [Section 4.26.1.2](#) for more information.
11. On the HMI, press the **Pump Motor ON** key to start the pump motor.
12. Measure the servo valve data using the breakout box while the pump motor is on. Refer to [Table 5-6](#) for expected values.
13. Press the **Pump Motor Off** key to stop the pump motor.
14. Measure the servo valve data using the breakout box while the pump motor is off. Refer to [Table 5-6](#) for expected values.

**IMPORTANT!**

Values other than those listed in [Table 5-6](#) indicate a problem with the servo valve. Refer to [Chapter 6–Troubleshooting](#) for potential solutions.

Table 5-6: Breakout Box Expected Values

Breakout Box Label	Signal Description	Typical Electrical Nomenclature	Voltage ^[11]	
			Pump Off	Pump On
+24 Vdc Safety Window	Main spool is centered	DQ from valve	24 Vdc	
+24 Vdc PWR Supply	Valve Power	L24.U supply to valve	24 Vdc	
ENABLE	Permission to operate	DQ to valve	0 Vdc	24 Vdc
+24 Vdc Valve Ready	Valve self test is OK	DQ from valve	0 Vdc	24 Vdc
FB 2->10 Vdc	Main spool position	Analog test point (displays mechanical null position if valve is not enabled)	6 Vdc (stroke) 5.6 Vdc (other)	6 Vdc
0 V PWR Supply	Power common	Reference point for DQ measurements	0 Vdc	
+24 Vdc Output	Valve option	Not used	24 Vdc	
+Flow CMD	Speed/pressure command	PQ to valve ^[12]	0 Vdc	
+24 Vdc Solenoid	Pilot unlock valve	DQ to valve	0 Vdc	24 Vdc
0 Vdc Solenoid	Digital signal common	Reference point for Pilot Unlock valve DQ measurement	0 Vdc	
-Flow CMD	Analog signal common	Reference point for Flow CMD PQ measurement	0 Vdc	

^[11] Safety gates closed, no machine motion.

^[12] Refer to the Valve Status screen for actual value.

15. Lock out and tag the machine.

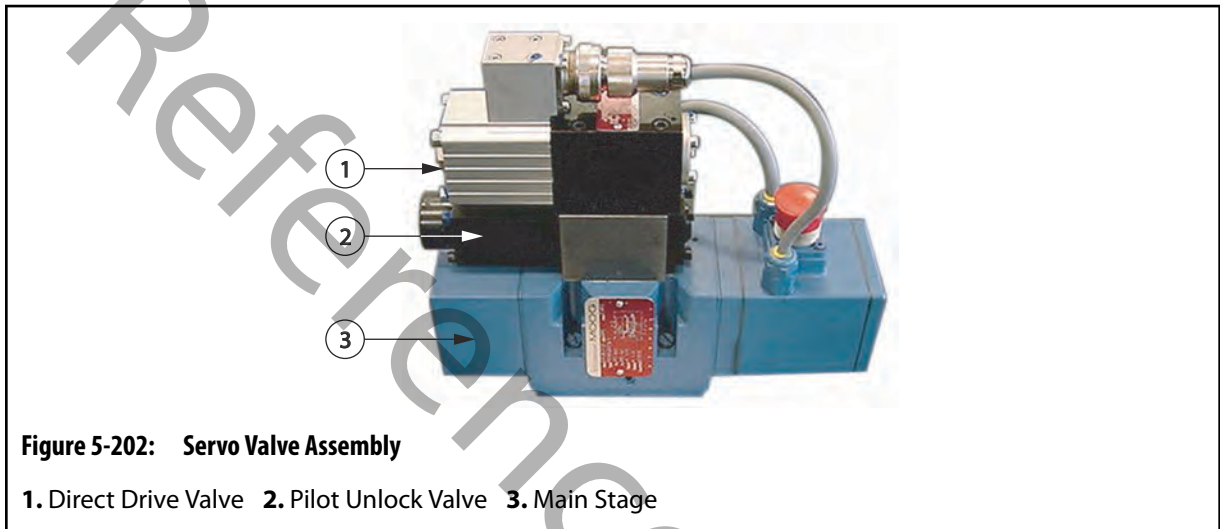
16. Disconnect the multimeter or oscilloscope from the breakout box.

17. Disconnect the breakout box from the servo valve and servo valve cable.
18. Reconnect the servo valve cable to the servo valve.

5.6.21 Replacing the Servo Valve Seals

Only select seals can be replaced in the servo valve assembly. Replacing any seal other than the following will void the warranty:

- Seal between the direct drive valve and pilot unlock valve
- Seal between the pilot unlock valve and main stage
- Seal between the main stage and manifold



To replace one of the approved seals in the servo valve, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove any dirt or debris from the servo valve.

CAUTION!

Contamination hazard - risk of contaminating the hydraulic oil supply. The hydraulic system is exposed to contaminants whenever a hydraulic component is removed. To avoid consequential damage during maintenance, absolute cleanliness must prevail. Make sure all ports, hose ends or other openings are capped/plugged to prevent debris from entering the system.

3. Separate the necessary sections of the servo valve to access the seal.
4. Replace the seal.
5. Assemble the servo valve and hand tighten the screws.
6. Torque the screws incrementally in a cross-pattern to 50% of the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.
7. Torque the screws incrementally in a cross-pattern to 100% of the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.

8. Make sure the servo valve is clean of any dirt or debris.

5.7 Cooling System Maintenance

The following procedures are specifically for the cooling system components on the machine.

5.7.1 Inspecting the Cooling Water System

To inspect the cooling water system, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Turn off the water supply to the machine.



WARNING!

Burn and high pressure hazard – risk of death or serious injury. High pressure steam or boiling water may be trapped in the motor cooling circuit. Wear appropriate personal protective equipment and slowly release the pressure from the cooling circuit using the drain valves before working on any part of the motor cooling water circuit.

3. Slowly open the water inlet and outlet drain valves to allow any residual pressure in the system to escape.
4. Inspect the cooling water system for loose fittings and leaks in the following locations:
 - Stationary platen cooling water manifold (if equipped)
 - Moving platen cooling water manifold (if equipped)
 - Mold cooling water connections
 - Feed throat
 - Machine cooling water connections
5. Check for cooling water leaks on the machine and inside the power pack.
6. Check for any wear or damage to hoses and components. Replace as necessary.
7. Close the inlet and outlet drain valves.
8. Turn on the water supply to the machine.
9. Remove all locks and tags.

5.7.2 Removing and Installing the Water Saver Valve

The following procedures describe how to remove and install the water saver valve.

5.7.2.1 Removing the Water Saver Valve

To remove the water saver valve, do the following:

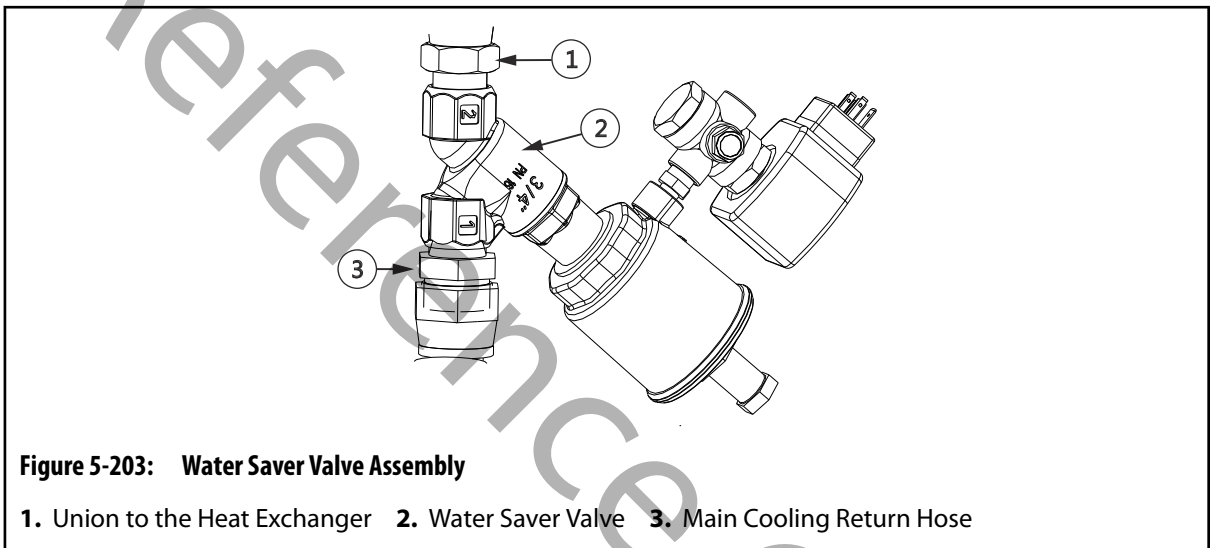
1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Turn off the water supply to the machine.



WARNING!

Burn hazard – risk of death or serious injury. High pressure steam or boiling water could be trapped in the motor cooling circuit. Wear appropriate personal protective equipment and slowly release the pressure from the cooling circuit using the drain valves before working on any part of the motor cooling water circuit.

3. Slowly open the water inlet and outlet drain valves to allow any residual pressure in the system to escape.
4. Disconnect the solenoid cap from the water saver valve.
5. Disconnect the air supply hose from the water saver valve.
6. Place a large container under the water saver valve to collect water.
7. Disconnect the main cooling return hose from the water saver valve.



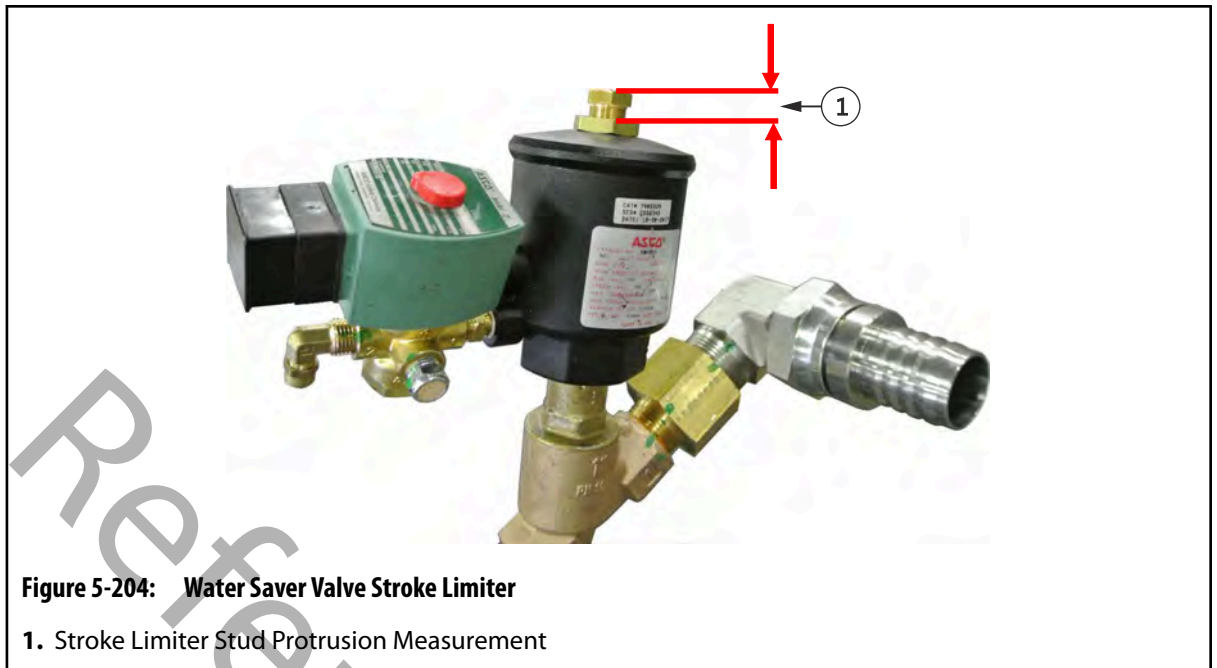
8. Unscrew the union and remove the water saver valve from the heat exchanger mounting.
9. Remove all adaptors from the water saver valve.

5.7.2.2 Installing the Water Saver Valve

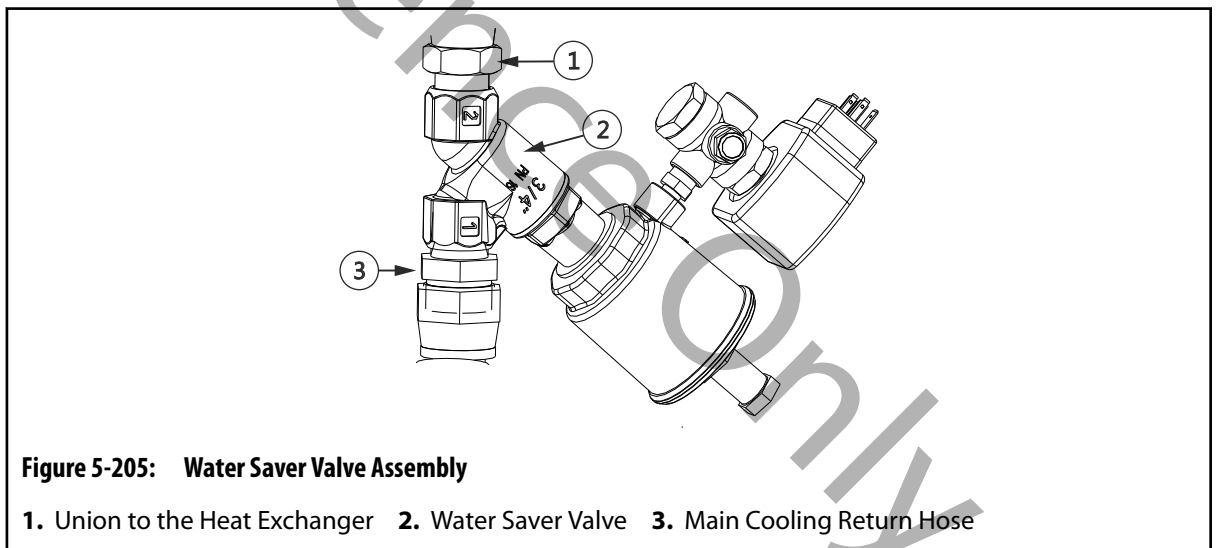
To install the water saver valve, do the following:

1. Apply teflon tape or a paste to the adaptors on the water saver valve. Refer to [Section 7.9](#) for more information about recommended lubricants.
2. Set the water saver valve stroke limiter to make sure that when the water saver valve is open, there will be sufficient pressure available to feed the other parallel cooling lines for the pump motor, feed throat, electric screw motor, gearbox, etc.

Make sure the stroke limiter stud protrudes from the lock nut by the required machine and valve specific measurement. Refer to the following note and figure for more details.



3. Install the water saver valve to the heat exchanger mounting and tighten the union. Make sure the arrow on the water saver valve points in the direction the cooling water must flow through the circuit.



4. Connect main return hose to the water saver valve.
5. Connect the air supply hose to the water saver valve.
6. Connect the solenoid cap to the water saver valve.
7. Close the water inlet and outlet drain valves.
8. Turn on the water supply to the machine.

5.7.3 Cleaning the Heat Exchanger

The heat exchanger requires minimal maintenance when high water quality is maintained. However, if the heat exchanger must be cleaned, it can be cleaned using chemical or mechanical methods. The method selected must be the choice of the plant operator and will depend on the type of deposits and facilities available in the plant.

The typical conditions that require the cleaning of the heat exchanger are:

- Excess fouling
- Air or gas binding, improper piping installation or lack of suitable vents
- Interrupted flow in unit
- Operating conditions differing from design conditions
- Excess clearance between baffles, shell and/or tubes due to corrosion

To clean the heat exchanger, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove all oil from the oil tank.
3. Remove all water hoses.

CAUTION!

Mechanical hazard – risk of damage to the machine. Care should be taken to prevent cutting or scoring the tube wall.

4. Remove the Heat exchanger from the power pack enclosure.
5. Remove the front and rear bonnets from the heat exchanger.
6. Clean the tubes with suitable brushes or pipe cleaners.
7. Flush any debris from the tubes with water.
8. Replace the bonnet gaskets.
9. Install the front and rear bonnets. Torque all screws to the specified torque value. Refer to [Section 7.13](#) for standard torque values.
10. Install the heat exchanger to the powerpack enclosure wall.
11. Connect all oil and water hoses.
12. Fill the oil tank to the maximum level.
13. Remove all locks and tags.

5.7.4 Disconnecting the Machine Cooling Water Supply

When storing the machine or leaving it idle for an extended period of time, Husky recommends disconnecting the machine cooling water supply and draining all water cooled components.

CAUTION!

Mechanical hazard – risk of damage to the machine. Any water trapped in the machine can freeze and could cause damage. Flush out any trapped water using compressed air.

To disconnect the machine cooling water system, do the following:

1. Turn off the cooling water supply to the machine.
2. Remove the supply hose at the inlet port and the return line at the outlet port.

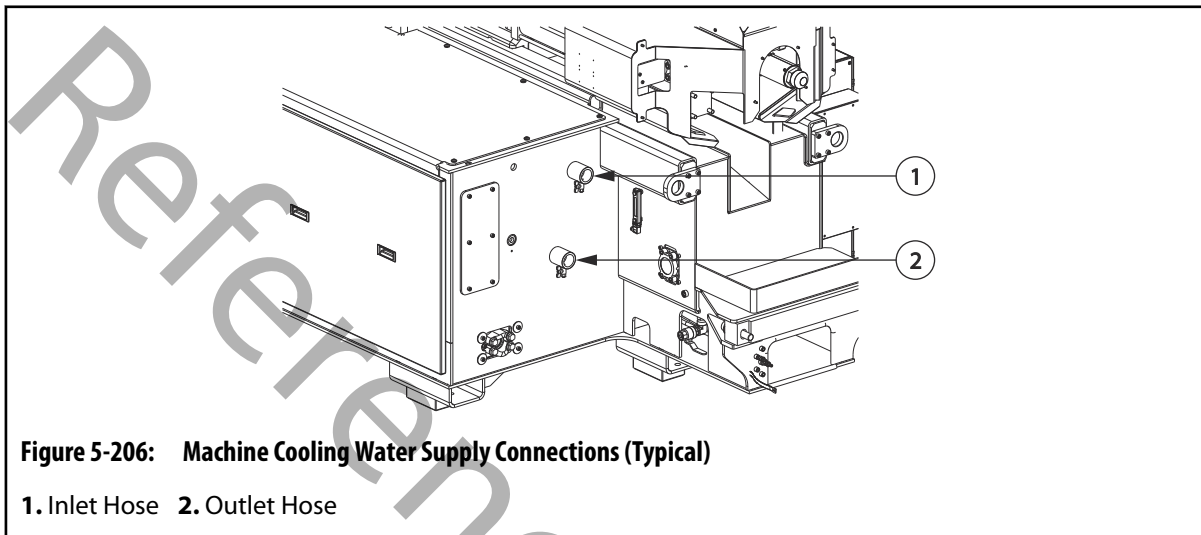


Figure 5-206: Machine Cooling Water Supply Connections (Typical)

1. Inlet Hose 2. Outlet Hose

5.7.5 Priming the Mold Cooling Circuit

To make sure the mold cooling circuit is filled with water, do the following:

1. Make sure the parameters in the HMI for the clamp, injection, recovery, mold and heats match the parameters detailed in the *Mold Setup Guide*.
2. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Dry Cycle** mode.
3. Touch the **Injection** button and touch the **Setup** tab to display the **Setup** screen.
4. Set the **Cooling Time** value to 3.0 seconds. This will allow the cooling circuit in the mold to fill completely with water.
5. For machines equipped with an auto-shutoff valve, do the following:
 - a. Press the **Tooling Plate Cooling On** key to open the valve.
 - b. At the water pump outlet pipe, open the air bleed valve until water starts coming out. Close the air bleed valve. The water pump is primed.
 - c. Press the **Tooling Plate Cooling Off** key to close the valve.
6. Press the **Pump Motor On** key to start the pump motor.
7. Press the **Semi Cycle** key followed by the **Cycle Start** key to cycle the machine once. Watch the mold to make sure it moves freely without interfering with cables or hoses.
8. Press the **Pump Motor Off** key to stop the pump motor.
9. Reset the **Cooling Time** value to its original setting.

5.8 Pneumatic System Maintenance

The following procedures are for specifically for the pneumatic components on the machine.

5.8.1 Draining the Air Regulator

To drain water from the air regulator, do the following:

CAUTION!

Mechanical hazard – risk of damage to the machine. Water condensation in the air regulator could cause rust damage to pneumatic components. Drain water from the regulator on a regular basis.

1. Place a container under the bleed valves on the filter assemblies.

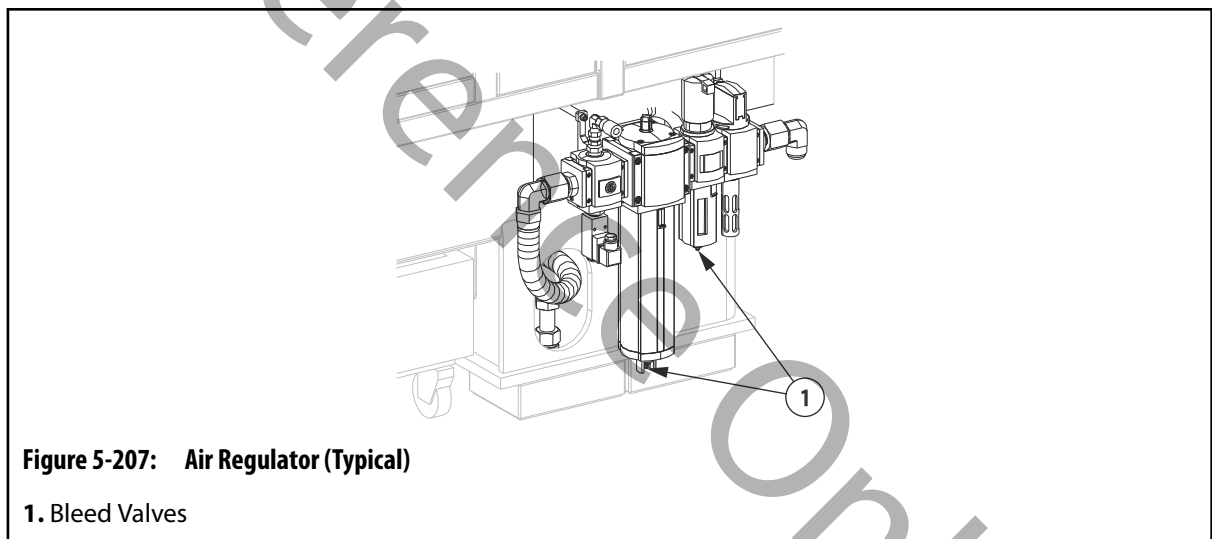


Figure 5-207: Air Regulator (Typical)

1. Bleed Valves

2. Open the bleed valves to drain the water into the container.
3. Close the bleed valves once all water has drained from the filters.

5.8.2 Replacing the Air Regulator Filter Element

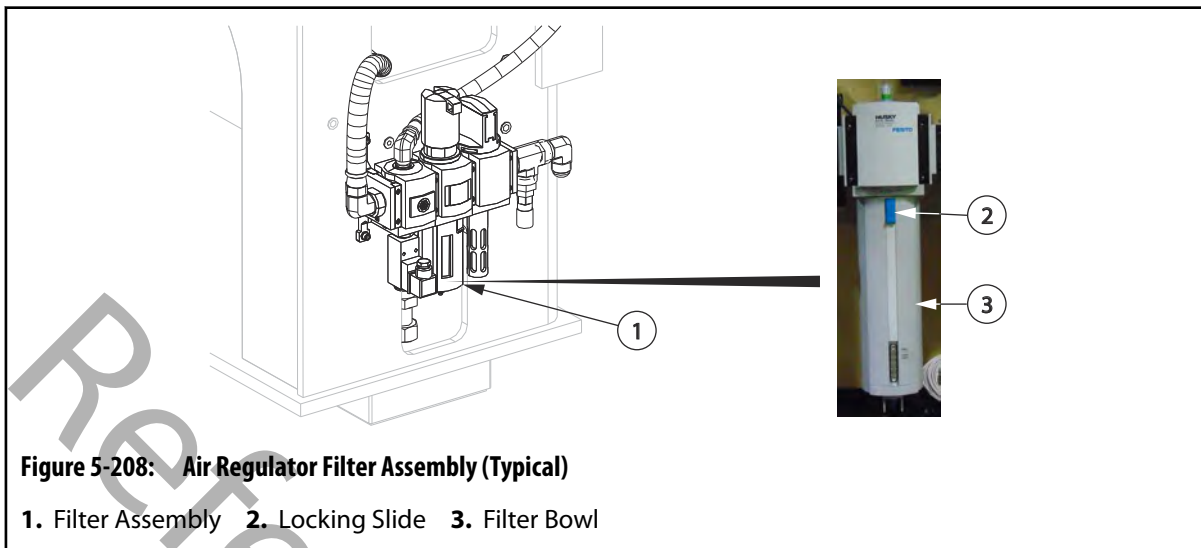
To replace the filter element in the air regulator, do the following:



WARNING!

High pressure spray hazard – risk of death or serious injury. High pressure hydraulic oil spray can penetrate human tissue and cause death or serious injuries. Lock out and tag the machine before replacing the oil filter element.

1. Rotate the shutoff lever/switch on the air regulator to the OFF position to turn off the air supply.



2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
3. Move the locking slide down to release the filter bowl.
4. Turn the filter bowl to release the filter bowl and remove it. The seal may come off during removal.
5. Remove and discard the used filter element.

CAUTION!

Mechanical hazard – risk of damage to the pneumatic components. Replace the filter element. Do not clean and reuse the filter element.

6. Insert a new filter element into the filter bowl.
7. Install the seal.
8. Install the filter bowl onto the housing and rotate.
9. Make sure the filter bowl clicks into place and the locking slide is in the correct position
10. Remove all locks and tags.
11. Rotate the shutoff lever/switch on the air regulator to the ON position to turn on the air supply. Check for any air leaks.

5.8.3 Draining Water from the Air Storage Tank(s)

CAUTION!

Mechanical hazard – risk of damage to the machine. Water condensation in the air storage tank could cause corrosion damage to the tank interior and pneumatic components. Drain water from the tank(s) according to the interval recommended in the maintenance schedule.

To drain water from the air storage tank(s), do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



WARNING!

High pressure spray hazard – risk of death or serious injury. Depressurize the system air pressure before removing the air tank drain plug.

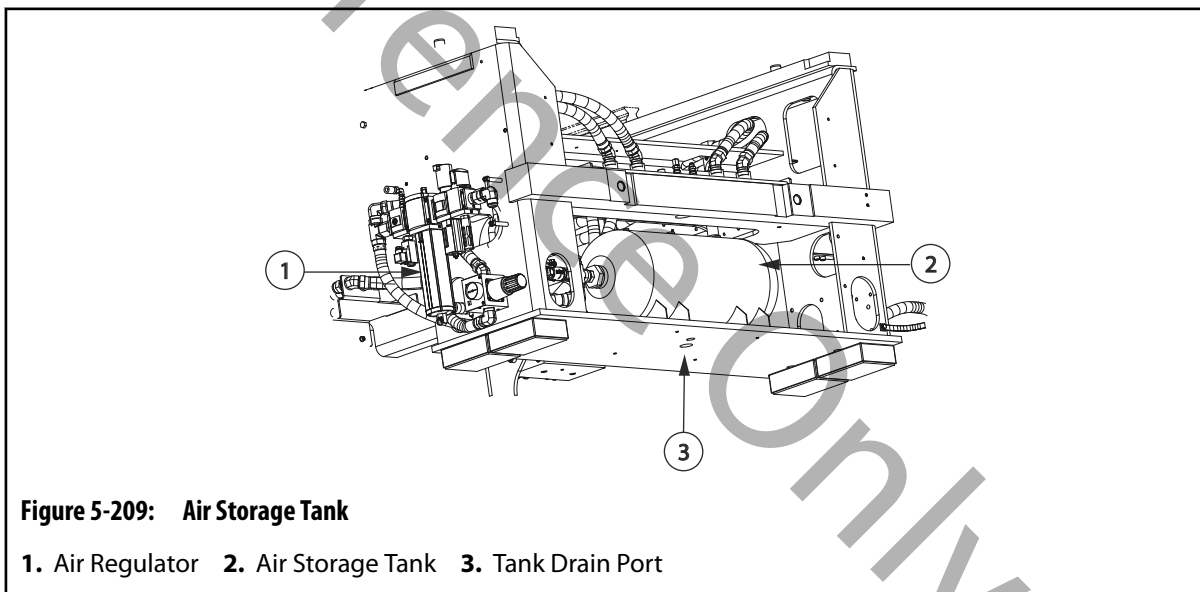
NOTE:

The system air is depressurized during the lock out and tag procedure.

2. Place a suitable container under the drain port at the bottom of the tank and remove the drain plug to drain the water into the container.

NOTE:

Some machine guards may require removal to access the air tank(s) drain port.



3. Replace the drain port plug once all water has drained from the tank.

NOTE:

The system air pressure is restored during the removal of locks and tags procedure.

4. Remove all locks and tags.

5.8.4 Inspecting and Replacing Pneumatic Hose Assemblies

The condition of the pneumatic hoses must be inspected at intervals specified in the maintenance schedule. If the hoses are damaged or signs of an air leak are found, the hoses must be replaced.



IMPORTANT!

Hoses should be replaced every three years, or when a problem with the hose is discovered as the result of regular inspections.

5.8.4.1 Inspecting Pneumatic Hoses

To inspect the pneumatic hoses, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Check all pneumatic hoses for signs of blisters, cuts, cracks, hardness or brittleness.
Replace all damaged hoses. Refer to [Section 5.8.4.2](#) for more information.
3. Check for any loose hose fittings. Tighten all hose fittings to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.
4. Remove all locks and tags.

5.8.4.2 Replacing Pneumatic Hoses

To replace a pneumatic hose, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



IMPORTANT!

Hoses and hose assemblies are generally not designed to operate under torsional stress. Install hoses and hose assemblies so the relative motion of the machine bends the hose and eliminates any twists.

2. Remove the damaged hose from the fitting and replace with a new hose.
3. Torque all connections. Refer to [Section 7.13](#) for standard torque specifications.

CAUTION!

When installing hose clamps, remember the following:

- **Do not install hose clamps where hoses bend. Bends must be free to absorb any changes in hose length that occur when the hose is under pressure.**
- **Do not clamp high and low pressure hoses together.**
- **Use hose clamps with soft rubber inserts rather than hard plastic clamps. Hard plastic clamps could damage the hose reinforcement.**

4. If necessary, secure the hose to the machine with hose clamps.
5. Remove all locks and tags.
6. Power up the machine and log on to the HMI. Refer to [Section 4.26.1.2](#) for more information.
7. Listen for air leaks. If an air leak is found, lock out and tag the machine and check the hose fittings. Refer to [Section 2.6](#) for more information.

5.8.5 Changing the Operating Mode of the Air Tank (If Equipped)

A 45 litre air tank can be installed on the machine as an option. The air tank has two operating modes:

- Isolated Valve Gate Mode: The air tank is used for pressure adjustment and accumulation for the valve gate manifold without affecting the remaining pneumatic circuit.
- System Air Tank Mode: The air tank is used as an accumulator for the entire pneumatic circuit to reduce pressure fluctuations throughout the molding cycle.

Machines are shipped with the air tank in isolated valve gate mode.

To change the operating mode of the air tank, do the following:



WARNING!

Complete the Lockout/Tag out of all energy sources in accordance with applicable local codes before performing maintenance activities. Failure to do so could result in serious injury or death.

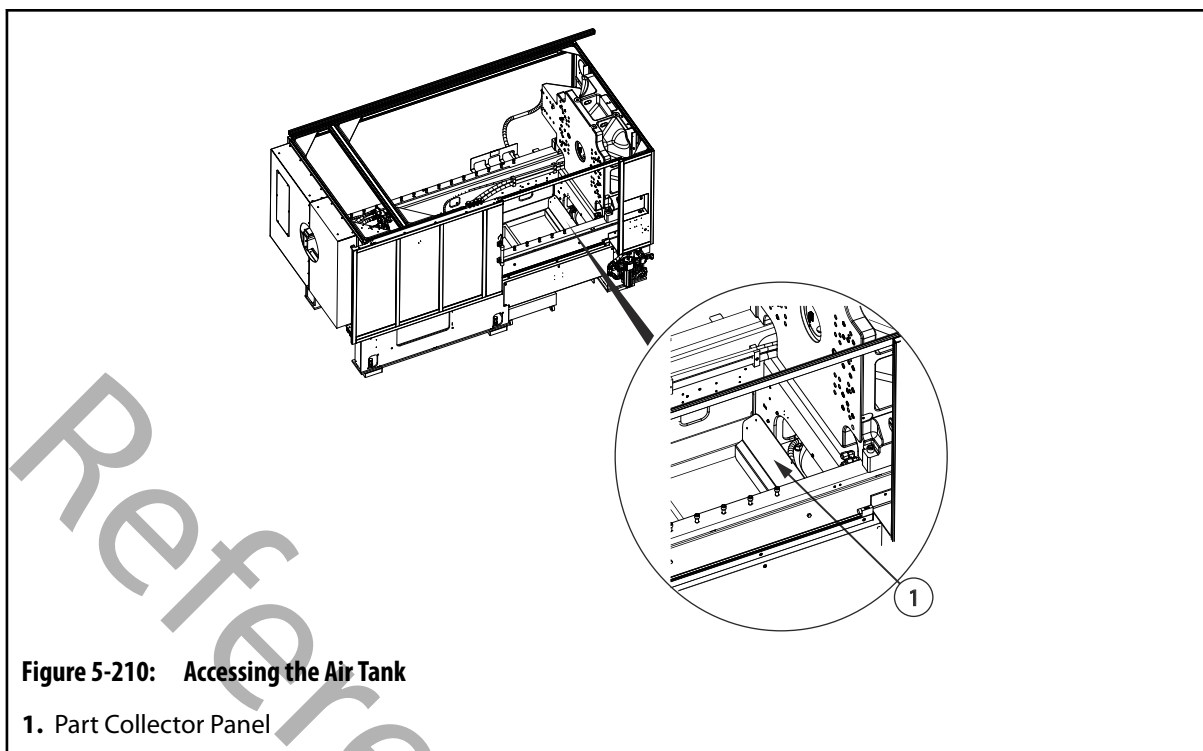
1. Lockout and tag the machine. Refer to [Section 2.6](#) for more information.



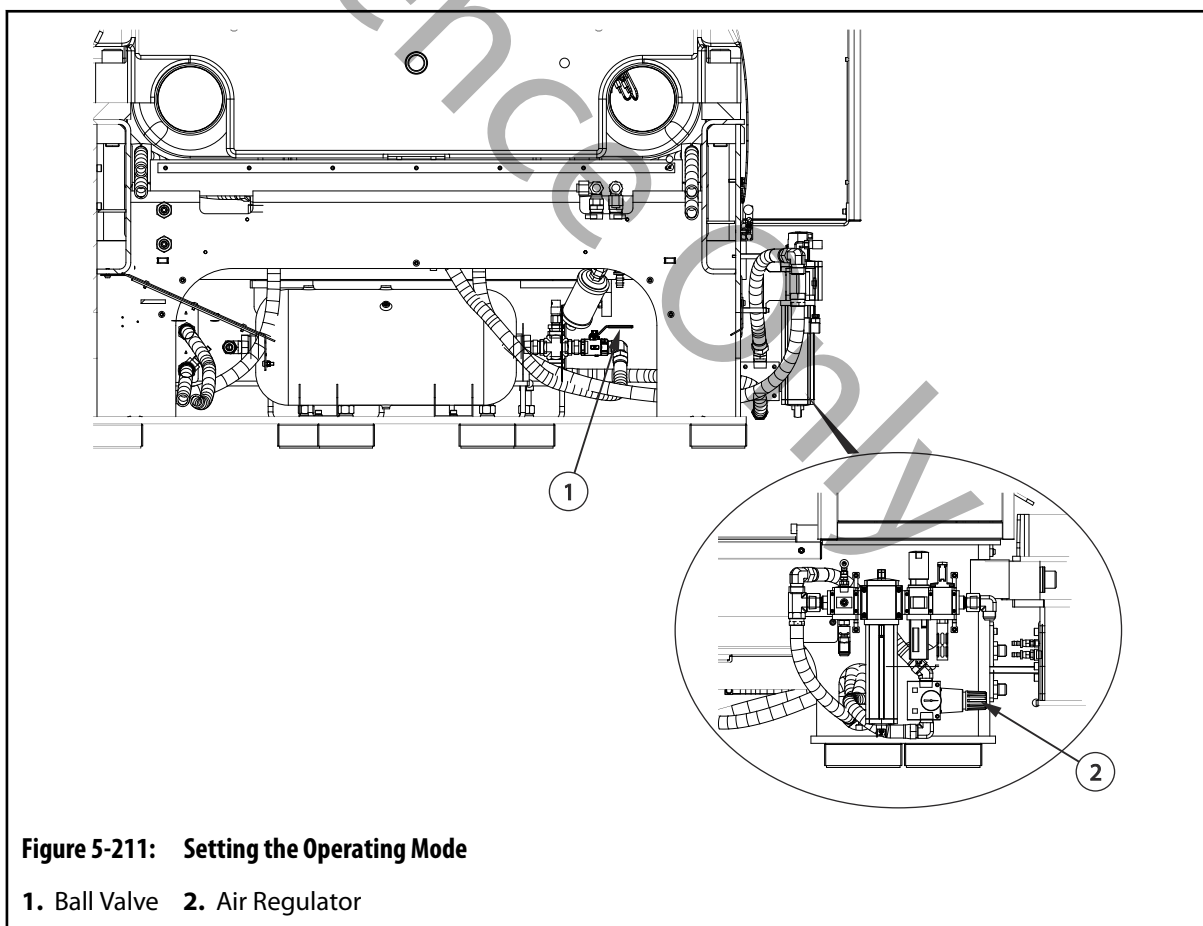
WARNING!

Crushing hazard - risk of death or serious injury. Access to the air tank must be through the part collector panel. Accessing the air tank around the guarding or while the machine is running could result in serious injury or death.

2. Remove the part collector panel.



3. Set the air tank mode:



For isolated valve gate mode:

- a. Close the ball valve fully.
- b. Adjust the pressure regulator, mounted on clamp leg, to desired valve gate pressure setting.

For system air tank mode:

- a. Open the ball valve fully.
- b. Adjust pressure regulator back to the system pressure setting.
4. Install the part collector panel.
5. Remove all locks and tags.

5.9 Product Handling Unit Maintenance

The following procedures are specifically for the product handling unit and related components.

5.9.1 Checking the Conveyor Belt Operation

The condition of the conveyor belt must be checked regularly at intervals specified in the maintenance schedule.

To check the condition of the conveyor belt, do the following:

1. During normal conveyor belt operation, look through the transparent panel and visually check the conveyor belt for signs of dirt, wear or damage.

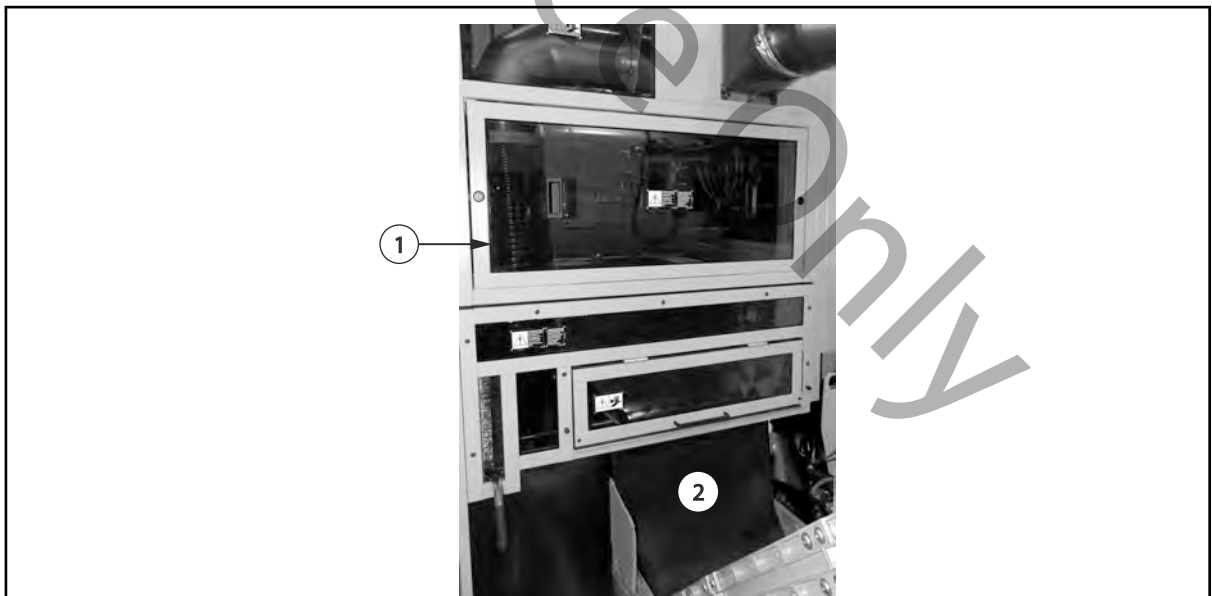


Figure 5-212: Dehumidification Skirt

1. Transparent Panel **2.** Dehumidification Skirt

2. Make sure the conveyor belt operation is smooth and straight.

3. Lift the dehumidification skirt and listen to make sure the conveyor belt gearbox motor is operating correctly.

**IMPORTANT!**

Immediately repair or replace the conveyor belt if it shows signs of wear and/or damage.

4. If any visible or audible issues require repair or inspection, refer to [Section 5.9.1](#) for more information about inspecting the conveyor belt and drive chain.

5.9.2 Inspecting the Conveyor Belt and Drive Chain

The condition of the conveyor belt and drive chain must be checked regularly at intervals specified in the maintenance schedule.

To check the condition of the conveyor belt and drive chain, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove the bottom panel of the robot front guard to access the conveyor. Refer to the following figure:



Figure 5-213: Robot Front Guard Bottom Panel

3. Disconnect the conveyor belt drive motor power cable.

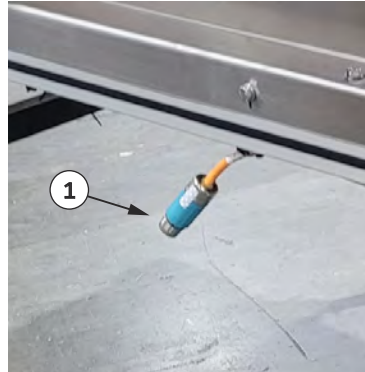


Figure 5-214: Conveyor Belt Drive Motor Power Cable

1. Conveyor Power Cable Connection

4. Roll the conveyor out from inside the machine cabinet.
5. Remove the conveyor belt drive chain cover.
6. Inspect the chain and sprockets for wear. Replace as necessary.

NOTE:

Drive chains and sprockets must be replaced together.



Figure 5-215: Conveyor Belt Drive Chain and Sprockets

7. Check the drive chain tension and adjust, as necessary. Refer to [Section 5.9.3](#) for details.
8. Re-install the conveyor belt drive chain cover.
9. Roll the conveyor back into the machine.
10. Re-connect the power cable to the conveyor.
11. Re-install the bottom panel of the robot front guard.
12. Remove all locks and tags.
13. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
14. On the HMI, press the **Semi Cycle** key. The conveyor will start automatically.
15. Visually inspect the conveyor belt for signs of dirt, wear or damage as the conveyor belt rotates.

**IMPORTANT!**

Immediately repair or replace the conveyor belt if it shows signs of wear and/or damage.

16. Clean the conveyor belt as necessary.
17. Inspect the conveyor belt tension and adjust as necessary. Refer to [Section 5.9.4](#) for details.
18. Press the **Normal Cycle** key when finished inspecting the conveyor belt.

5.9.3 Adjusting the Conveyor Drive Chain Tension

To adjust the conveyor drive chain tension, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Roll the conveyor out from the machine. Refer to [Section 5.9.2](#) for more information.
3. Remove the drive chain cover.

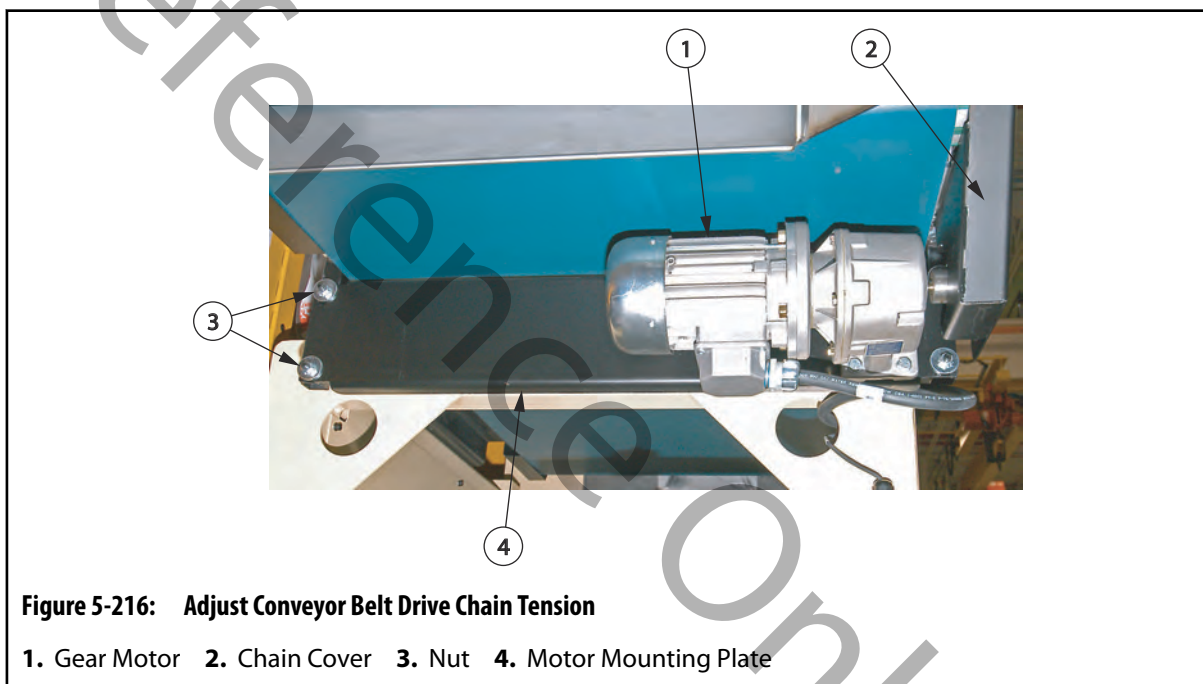
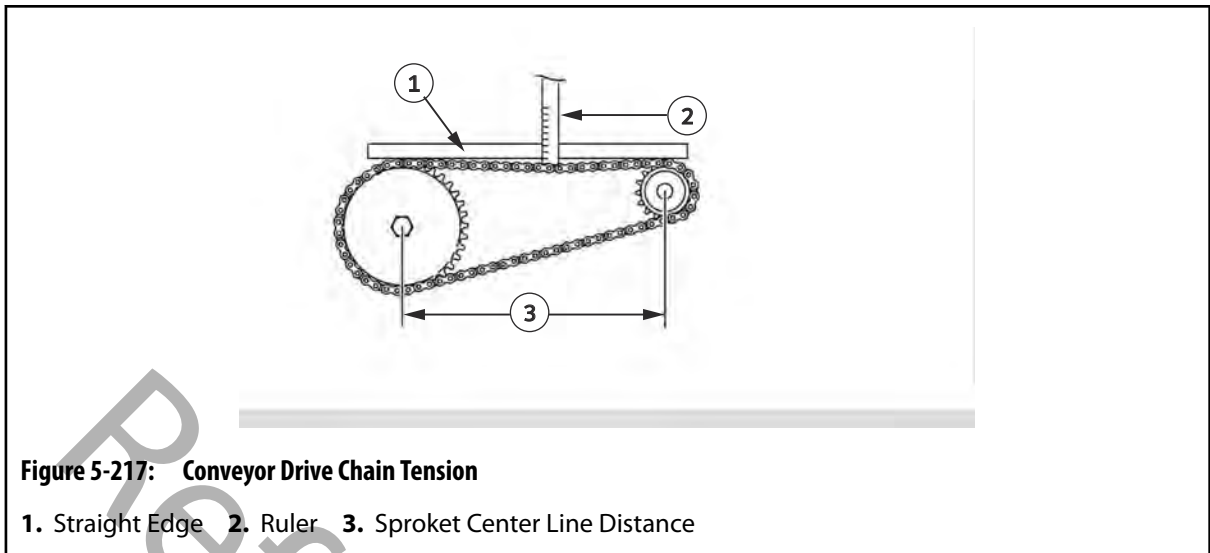


Figure 5-216: Adjust Conveyor Belt Drive Chain Tension

1. Gear Motor 2. Chain Cover 3. Nut 4. Motor Mounting Plate

4. Loosen the nuts on the motor mounting plate that hold the gear motor. Make sure the nuts remain friction tight.
5. Use a ruler and straight edge to measure the amount of deflection (tension) in the drive chain. Increase or decrease the sprocket center line distance to adjust the chain tension. Refer to the following figure for details:

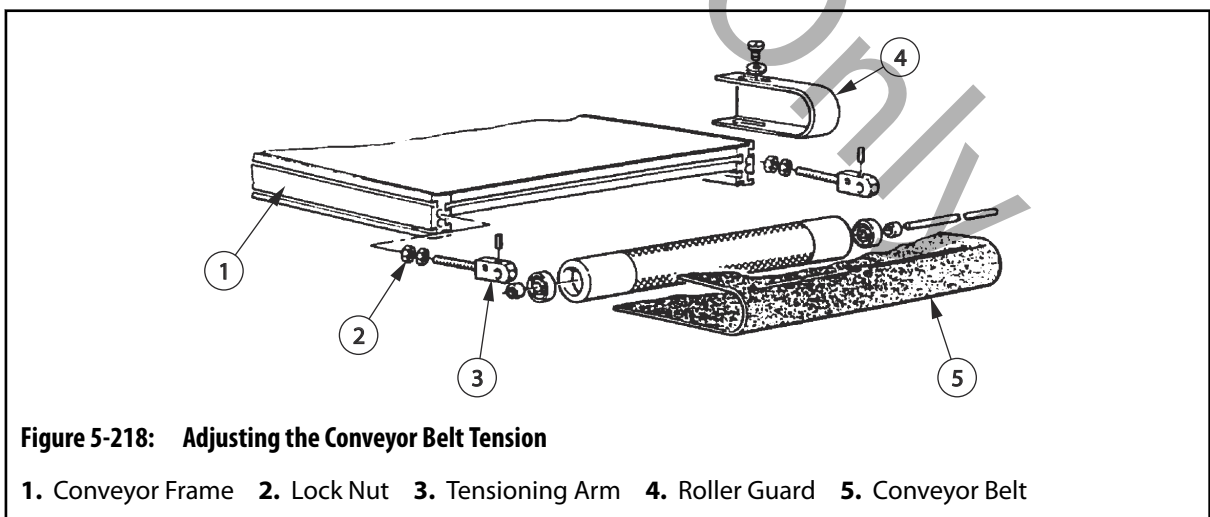


6. Adjust the position of the motor mounting plate to increase or decrease the drive chain tension. The chain must not deflect more than 5 mm (0.2 in) .
7. Tighten the nuts to secure the motor mounting plate.
8. Install the cover over the drive chain.
9. Roll the conveyor back into the machine. Refer to [Section 5.9.2](#) for more information.
10. Remove all locks and tags.

5.9.4 Adjusting the Conveyor Belt Tension

To adjust the conveyor belt tension, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Roll the conveyor out from the machine. Refer to [Section 5.9.2](#) for more information.
3. Remove the roller guards from both sides of the belt.



4. Loosen the lock nuts that lock the tensioning arms against the conveyor frame.
5. Adjust the position of the tensioning arms equally to increase or decrease the belt tension.

Make sure the sag (on the bottom side of the belt) is at the correct value based on the conveyor size as listed in the following table.



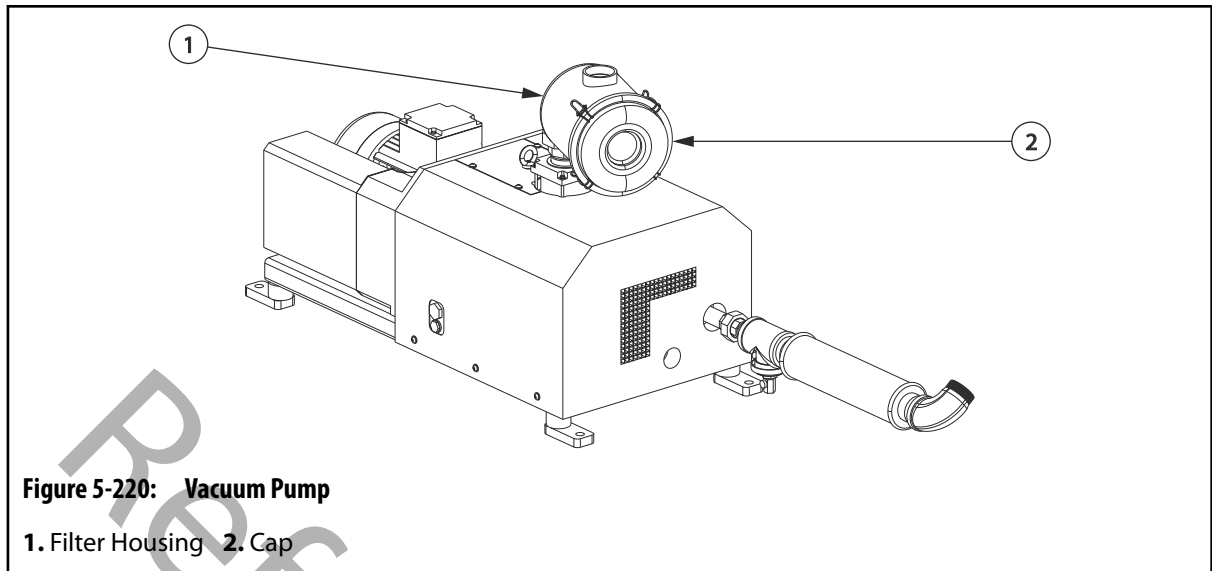
Figure 5-219: Conveyor Belt Sag Measurement

6. Tighten the lock nuts.
7. Install the roller guards.
8. Roll the conveyor back into the machine. Refer to [Section 5.9.2](#) for more information.
9. Remove all locks and tags.

5.9.5 Inspecting the Vacuum Pump Inlet Air Filter

To inspect the inlet air filter in the vacuum pump, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Wait for the vacuum pump to cool to room temperature ($< 25^{\circ}\text{C}$ or $< 77^{\circ}\text{F}$).
3. Remove the cap from the filter housing.



4. Remove the inlet air filter.
5. Using compressed air, remove any dust from the inlet air filter and the filter housing.
6. Inspect the inlet air filter for the following:
 - Excess dust packed into the filter element
 - Dust passes through the filter element
 - The filter paper is significantly discolored

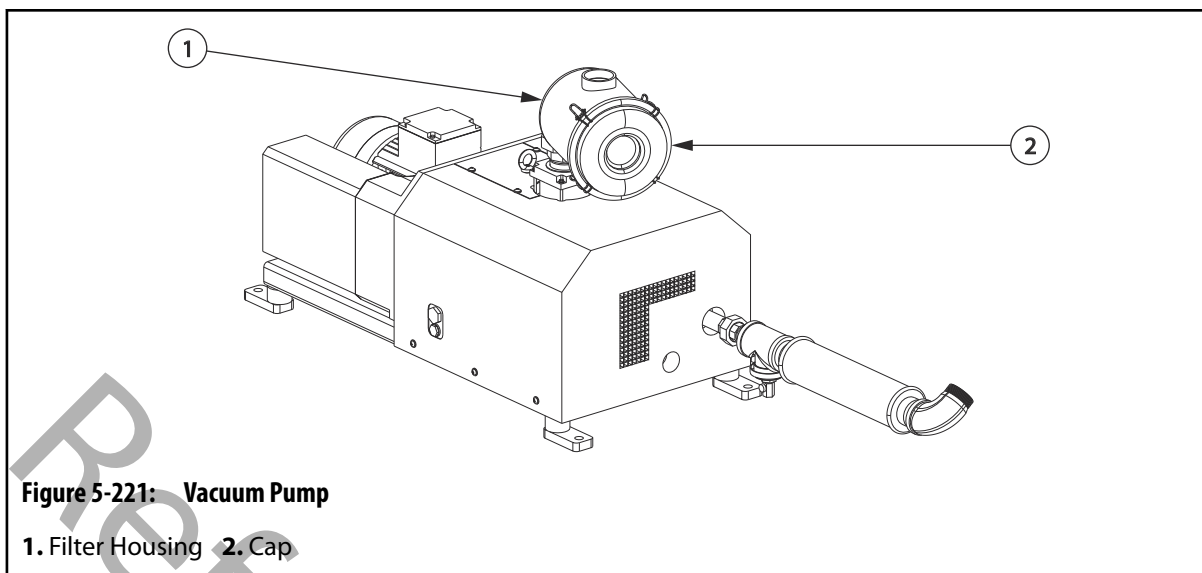
Replace the inlet air filter if any of the above conditions exist. Refer to [Section 5.9.6](#) for more information. Otherwise, insert the filter into the filter housing.

7. Install the cap for the filter housing.
8. Remove all locks and tags.

5.9.6 Replacing the Vacuum Pump Inlet Air Filter

To replace the inlet air filter in the vacuum pump, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Wait for the vacuum pump to cool to room temperature ($< 25^{\circ}\text{C}$ or $< 77^{\circ}\text{F}$).
3. Remove the cap from the filter housing.

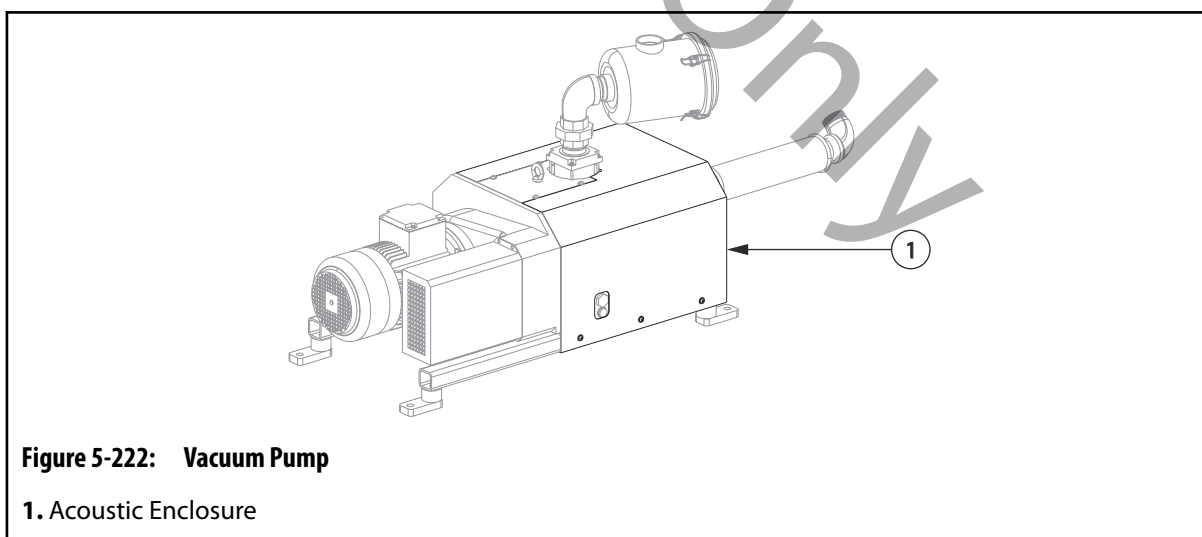


4. Remove and discard the old inlet air filter.
5. Insert a new inlet air filter into the filter housing.
6. Install the cap for the filter housing.
7. Remove all locks and tags.

5.9.7 Cleaning the Vacuum Pump

To clean the vacuum pump, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Wait for the vacuum pump to cool to room temperature ($< 25^{\circ}\text{C}$ or $< 77^{\circ}\text{F}$).
3. Make sure the exterior of the vacuum pump is free of any dirt or debris. Clean the exterior if necessary.
4. Remove the acoustic enclosure.



CAUTION!

Mechanical hazard – risk of damage to the equipment. Make sure the foam padding remains dry during cleaning.

5. Using water and clean cloth, clean the fan wheels, fan cowlings, ventilation grill and cooling fins.
6. Install the acoustic enclosure.
7. Remove all locks and tags.

5.9.8 Checking the Vacuum Pump Oil Level

To check the oil level in the vacuum pump, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.

**IMPORTANT!**

The oil level in the vacuum pump should remain the same at all times. If the oil level is not at the required level, the vacuum pump may be leaking and requires repair. Contact your nearest Husky Regional Service and Sales office for assistance.

2. Inspect the sight glass on the vacuum pump. The oil level should be above the middle mark on the sight glass.

If the oil level is lower, replenish the oil supply with new oil. Refer to [Section 5.9.9.2](#) for more information.

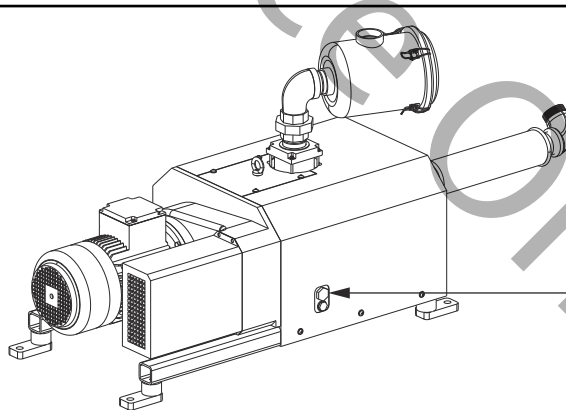


Figure 5-223: Vacuum Pump

1. Sight Glass

3. Remove all locks and tags.

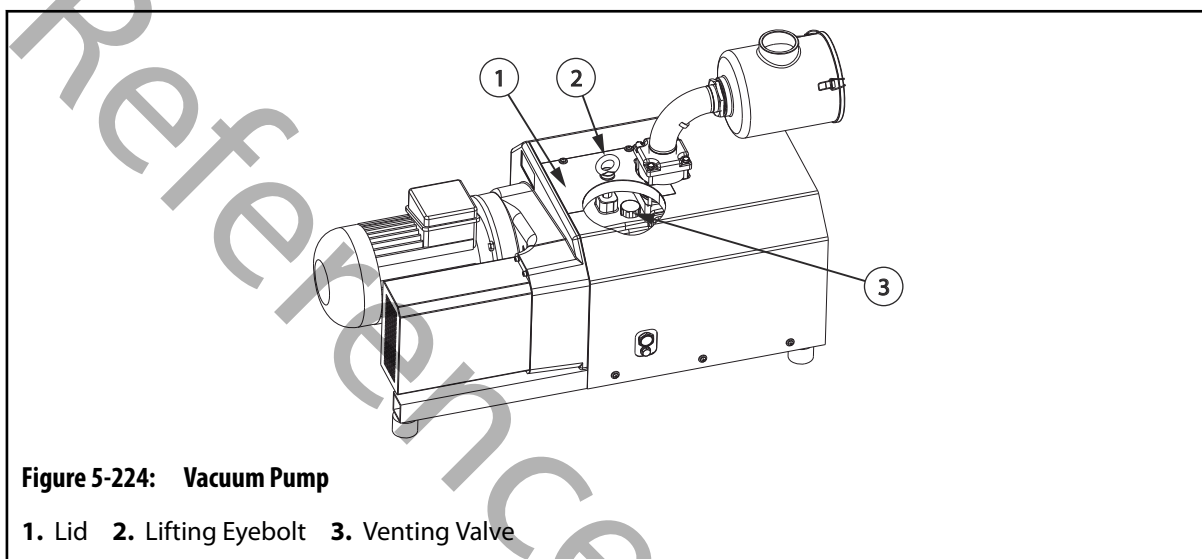
5.9.9 Replacing the Vacuum Pump Oil

The following procedures describe how to drain and fill the oil in the vacuum pump. To prevent excess contamination and wear on components, the oil must be replaced at intervals specified in the maintenance schedule.

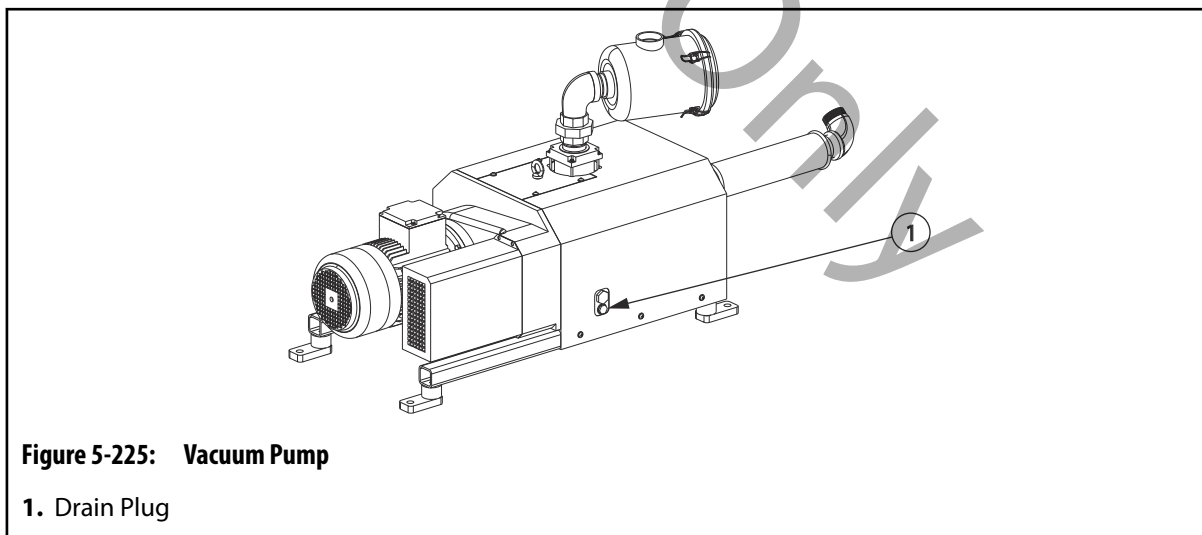
5.9.9.1 Draining Oil From the Vacuum Pump

To drain the oil from the vacuum pump, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Remove the lifting eyebolt and lid.



3. Loosen the venting valve inside the vacuum pump.
4. Place a suitable container under the drain plug.



**WARNING!**

Burn hazard – contact with hot oil can cause severe burns. To avoid injury while draining or handling oil, wear personal protective equipment and make sure the oil temperature is less than 60 °C (140 °F) .

5. Remove the drain plug and allow the vacuum pump to drain completely.
6. Inspect the seal on the drain plug for damage and wear. Replace the seal if necessary.
7. Install the drain plug.
8. Fill the vacuum pump with new oil. Refer to [Section 5.9.9.2](#) for more information.

5.9.9.2 Filling the Vacuum Pump with Oil

To fill the vacuum pump with clean gear oil, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Make sure the drain plug is installed.

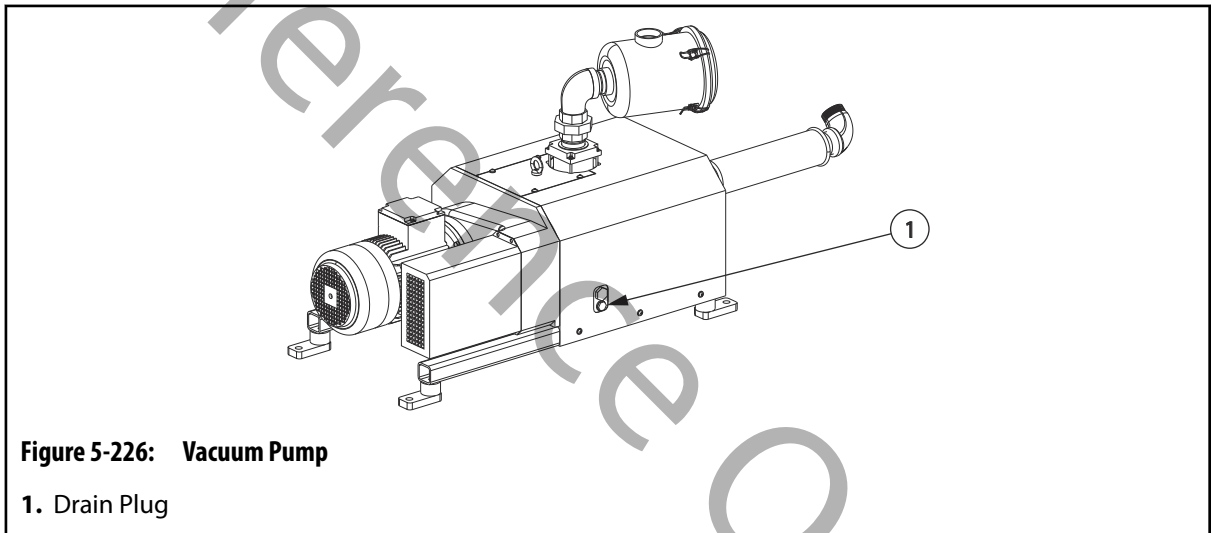


Figure 5-226: Vacuum Pump

1. Drain Plug

CAUTION!

Contamination hazard – risk of oil contamination. The oil supply is exposed to dirt, debris and other foreign materials when ports are opened. Make sure the area around the port is cleaned before removing the plug or disconnecting the hose.

3. Clean the area around the venting valve inside the vacuum pump.
4. Remove the venting valve.
5. Add approximately 1 L (0.3 U.S. gal) of oil through the venting valve port until the level is above the middle mark on the sight glass. Refer to [Section 7.9](#) for a list of recommended lubricants.
6. Install the venting valve.
7. Clean up all spilled oil.
8. Install the lifting eyebolt and lid.

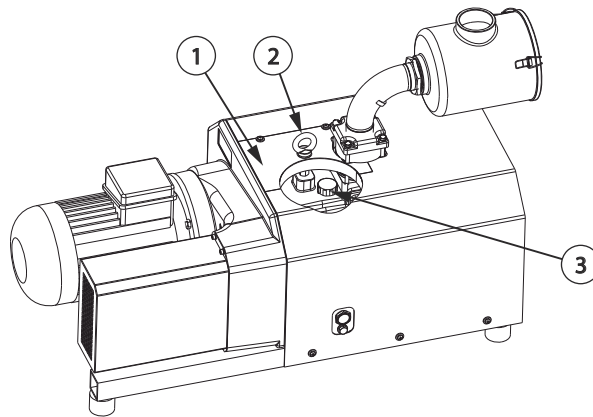


Figure 5-227: Vacuum Pump

1. Lid 2. Lifting Eyebolt

9. Remove all locks and tags.

5.9.10 Inspecting the Vacuum Silencer(s)

Visually inspect vacuum silencers on vacuum valves for any dirt or dust, and replace if necessary. Refer to [Section 5.9.11](#) for more information.



Figure 5-228: Vacuum Silencer (Typical)

1. Vacuum Valve 2. Vacuum Silencer

5.9.11 Replacing the Vacuum Silencer(s)

In addition to regular inspections, vacuum silencers on vacuum valves must be replaced when specified in the maintenance schedule.

To replace a vacuum silencer, do the following:

1. Unscrew the vacuum silencer from the vacuum valve.

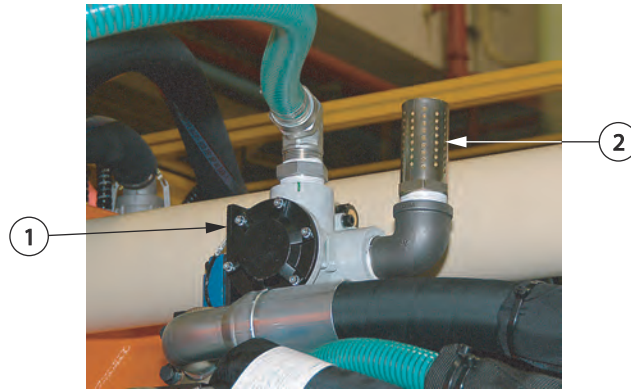


Figure 5-229: Vacuum Silencer (Typical)

1. Vacuum Valve 2. Vacuum Silencer

2. Install the new vacuum silencer onto the vacuum valve.

5.9.12 Inspecting the Z-Axis Linear Bearings

To inspect the Z-axis linear bearings, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Inspect the Z-axis linear bearing rails for pitting, scratches or other surface abrasions.

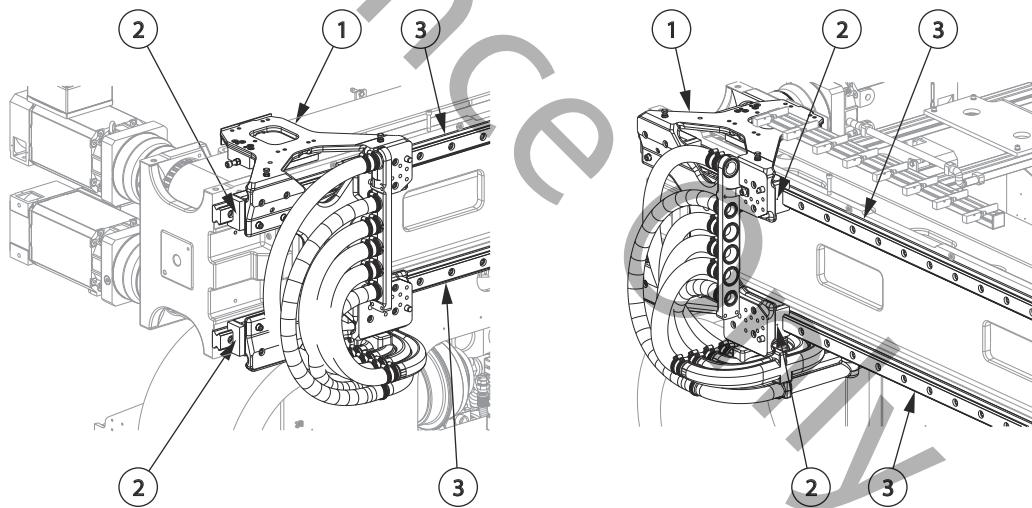
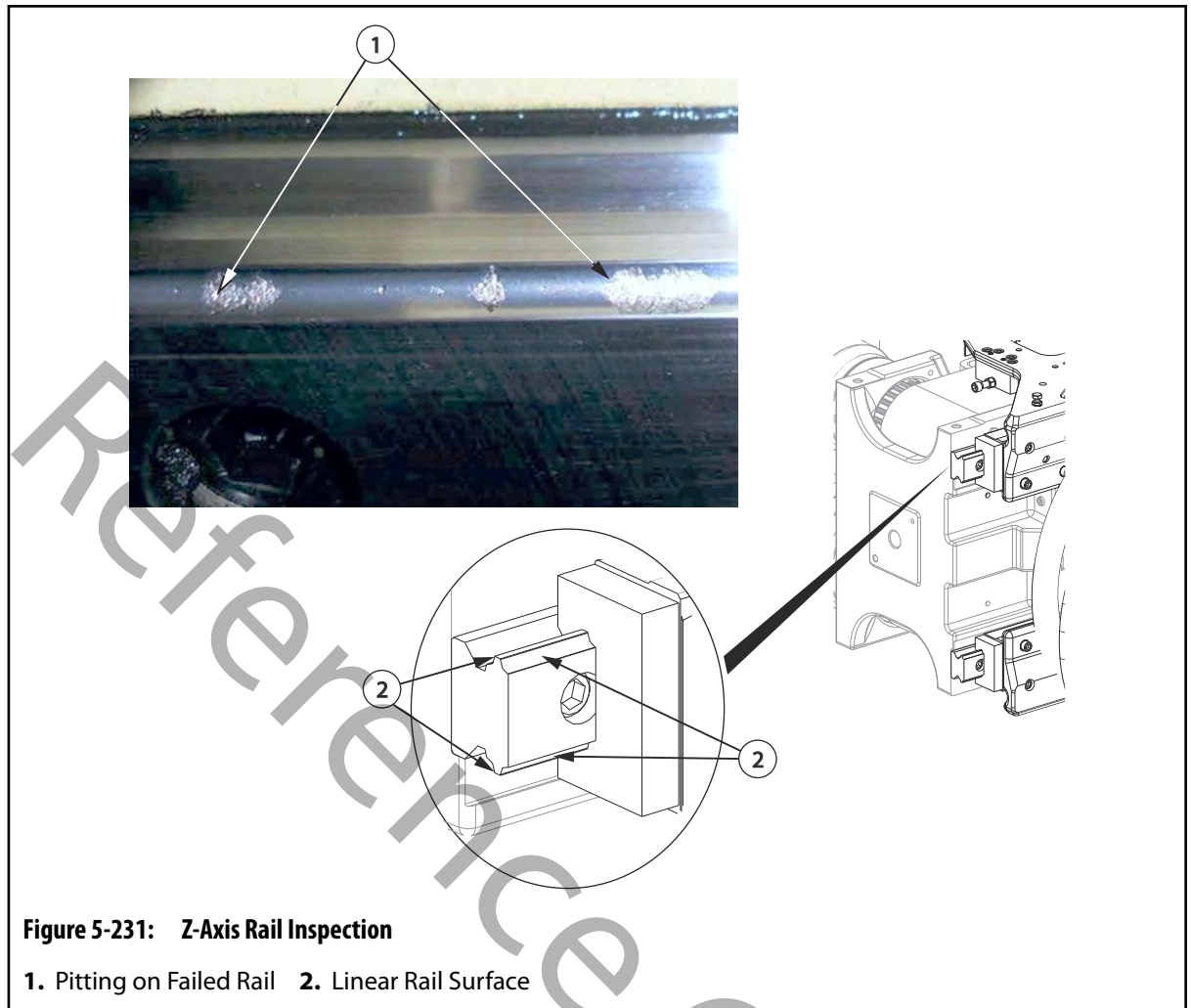


Figure 5-230: Z-Axis Linear Bearings

1. Z-Axis Carriage 2. Linear Bearing 3. Rail



3. Inspect the grease for small particles which are likely silver in colour. Rub a sample of grease between fingers to detect foreign particles. The presence of particles in the grease likely indicates that both the bearing blocks and linear rails should be replaced.
4. Check between the linear bearings and rails for any misalignment.
5. Check for loose or missing fasteners on the linear bearings and rails.
6. Remove all locks and tags.
7. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
8. On the HMI, display the **Product Handling** function group in the sidebar. Refer to [Section 4.4.8](#) for more information.
9. Press the **Tooling Plate In** and then press **Tooling Plate Out** keys to move the tooling plate in and out horizontally.
10. Repeating the tooling plate horizontal in and out motion in [step 9](#), listen for any vibration or noise while the tooling plate moves along the rails.

If vibrations or noise are detected, inspect the linear bearings and repair/replace as necessary.

NOTE:

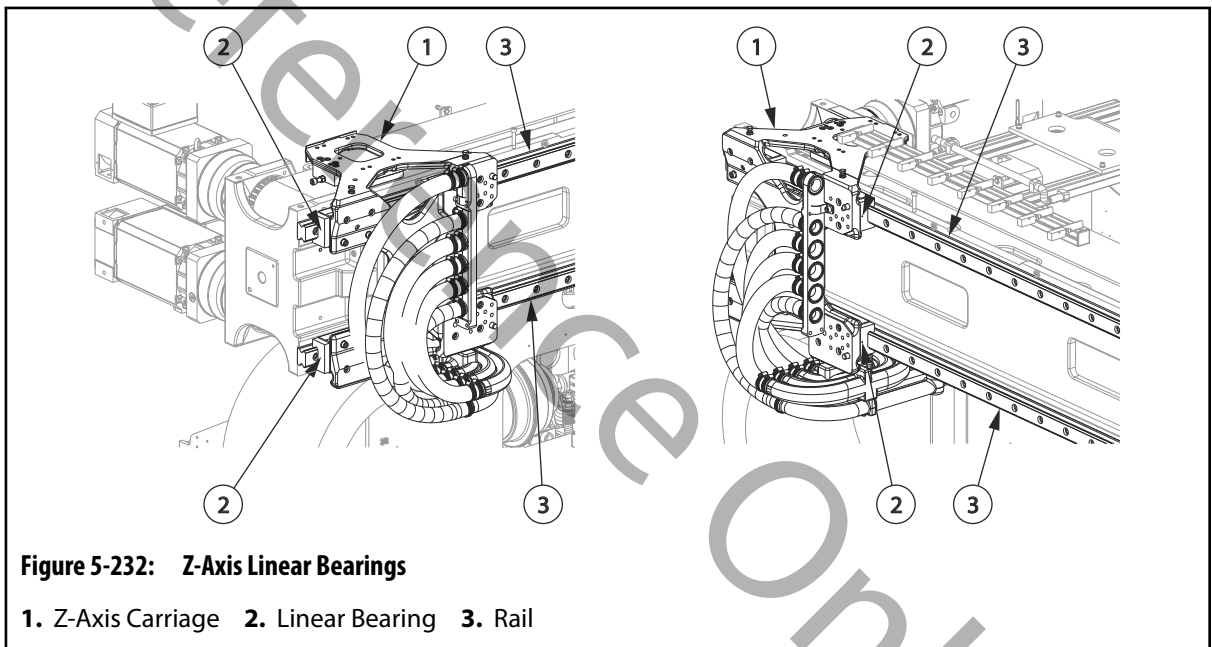
Linear bearings and rails must be replaced as a single assembly.

5.9.13 Lubricating the Z-Axis Linear Bearings

The Z-axis linear bearings must be lubricated at intervals specified in the maintenance schedule. The linear bearings are lubricated using a three-step application. The total quantity of grease is divided by three and applied to the linear bearings in three applications. The quantity of grease applied to the linear bearings should never exceed the Total Grease Quantity Per Linear Bearing Block column in [Table 5-7](#)

To lubricate the Z-axis linear bearings, do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Wipe the grease fittings on the Z-axis linear bearings with a clean cloth.

**CAUTION!**

Mechanical hazard – risk of damage to the machine. Do not use a powered grease gun when lubricating the Z-axis linear bearings. Always use a manual grease gun.

CAUTION!

Mechanical hazard – risk of equipment damage. Do not mix different brands or grades of lubricants or greases. Mixing lubricants or greases can cause premature breakdown of the lubricant or grease and could result in equipment damage.

3. Prepare or load the hand-powered grease gun with grease and calculate the required number of strokes based on the application amount delivered per stroke for your grease gun.
4. Apply the first application of grease to each grease fitting, according to the Three-Step Grease Application Quantity Per Linear Bearing Block column in [Table 5-7](#)

Refer to [Section 7.9](#) for a list of recommended lubricants.

CAUTION!

Mechanical hazard – risk of damage to the machine. Injecting the full amount of lubricant in one step could result in inadequate lubrication of the bearings and lead to premature failure of the linear bearing. Make sure to inject the lubricant in three steps.

Table 5-7: Z-Axis Linear Bearing Lubricant Quantity

Product Handling Unit	Total Grease Amount Per Linear Bearing Block	Three-Step Grease Application Amount ^[13]
HyPET120	5.2 ml (0.17 oz)	1.7 ml (0.06 oz)
HyPET225	8.4 ml (0.28 oz)	2.8 ml (0.1 oz)
HyPET300		
HyPET400	16 ml (0.54 oz)	5.3 ml (0.18 oz)
HyPET500		

^[13] [10] The MG70 grease gun delivers approximately 0.6 ml (0.02 oz) of grease with each stroke of the hand pump. For example, 7mL of grease is delivered by 7 mL/0.6 mL = approximately 12 pumps with the MG70 grease gun.

5. Move the linear bearing block(s) one full block length along the rail.
 - a. Remove all locks and tags.
 - b. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
 - c. Alternately press the **Tooling Plate In** and **Tooling Plate Out** keys to move the tooling plate horizontally. This will distribute the grease evenly.
 - d. Lock out and tag the machine.
6. Repeat [step 4](#) and [step 5](#) for the second and third grease application. Do not over-lubricate the bearings.
7. Remove any excess grease on the grease fittings with a clean cloth. It is not necessary to wipe the linear rails clean but they should be free from debris
8. Remove all locks and tags.

5.9.14 Inspecting the Z-Axis Drive Belt

To inspect the condition of the Z-axis drive belt(s) and measure belt tension, do the following:



IMPORTANT!

For the first month after the installation of a new Z-axis drive belt, the drive belt must be inspected every week. If after this period the belt tension is unchanged, the drive belt can be inspected every three months. Otherwise, the drive belt must be inspected every week until the belt tension is consistent.

For the required tension frequencies, refer to [Table 5-8](#).

CAUTION!

Mechanical hazard – risk of damage to the machine. Belt failure during product handling unit operation could cause serious equipment damage. Replace a worn belt immediately.

NOTE:

The Z-axis drive belts must be thoroughly inspected if machine motion has been brought to a sudden stop.

1. Position the tooling plate approximately 10 mm (0.4 in) from its home position.
2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



IMPORTANT!

For units with two Z-axis drive belts, signs of wear on only one drive belt may indicate either an alignment problem or the tension for one belt is higher/lower than the other. Make sure to correct the alignment or belt tension after replacing the worn drive belt.

3. Inspect the Z-axis drive belts for signs of wear, such as worn belt teeth, or exposed or broken wire strands in the belt.
Replace the belt if there are any signs of wear. Refer to [Section 5.9.14.1](#) for more information about belt wear. Refer to [Section 5.9.17](#) for more information about replacing the belt.
4. Check the belt alignment. The edges of the belt should not rub on the drive or idler pulleys.
5. Make sure the belt clamp plate mounting screws are secure.
6. Check that the belt clamp plates fully engage the belt teeth.
7. Measure the Z-axis drive belt tension. Refer to [Section 5.9.15](#) for more information.
8. Remove all locks and tags.
9. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
10. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Mold Set** mode.
11. Press and hold the **Mold Open** key until the mold is open.
12. Alternately press the **Tooling Plate In** and **Tooling Plate Out** keys to move the tooling plate horizontally. Listen for squealing or slipping noises from the belt while the tooling plate moves along the rails. Squealing and slipping noises indicate the belt is loose.

Correct the belt tension, if necessary. Refer to [Section 5.9.16](#) for more information.

5.9.14.1 Belt Wear

Z-axis timing belts often show signs of normal or cosmetic wear as they are worn-in during operation. Only replace the belts when excessive wear is present.

5.9.14.1.1 Normal Wear

The belt does not need to be replaced with signs of normal wear.

Signs of normal or cosmetic wear include:

- Green nylon layer has worn off
- White polyurethane is visible
- Steel cords are visible but green nylon layer and polyurethane is still present at the bottom lands of the belt teeth.

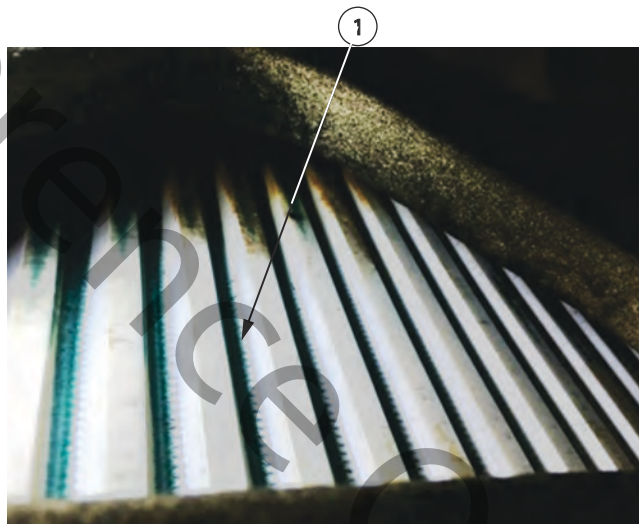


Figure 5-233: Normal Wear

1. Steel Cords Visible, Green Nylon Layer Present

5.9.15 Measuring the Z-Axis Drive Belt Tension

The tension in the Z-axis drive belt(s) must be measured using a sonic tension meter that measures tension through frequency. A sonic tension meter (P/N 740966) is available through Husky.



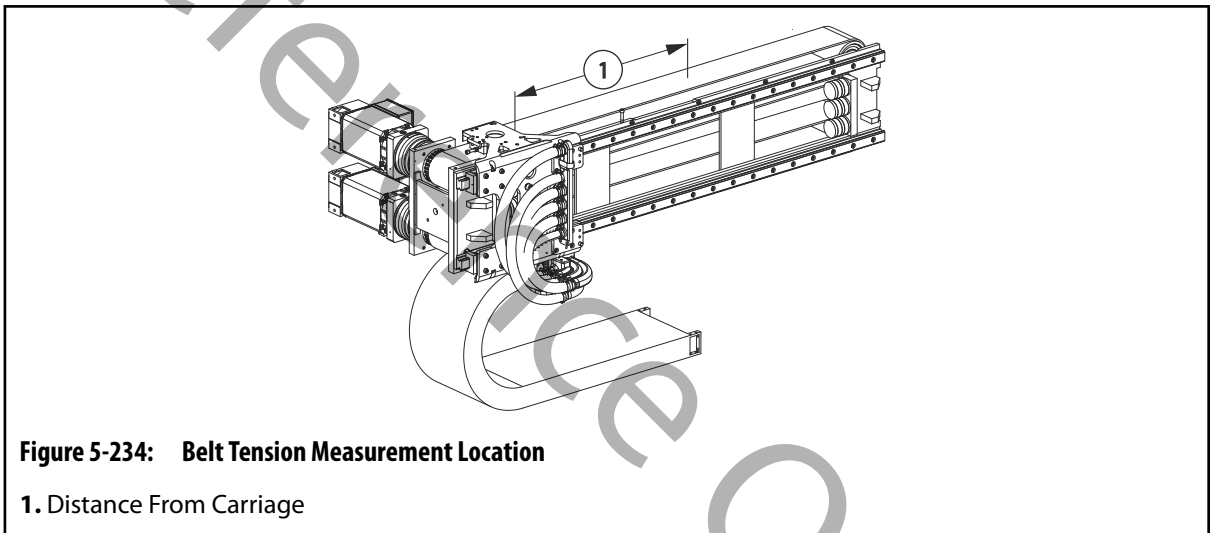
IMPORTANT!

For the first month after the installation of a new Z-axis drive belt, the drive belt must be inspected every week. If after this period the belt tension is unchanged, the drive belt can be inspected every three months. Otherwise, the drive belt must be inspected every week until the belt tension is consistent.

For the required tension frequencies, refer to [Table 5-8](#).

To measure tension along the Z-axis drive belt, do the following:

1. Position the tooling plate in its home position. The carriage must be against the rubber bumpers.
2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
3. Place a mark on the belt where the frequency measurement will be taken from. Refer to [Table 5-8](#) to determine the distance the mark should be from the carriage.



4. Hold the sonic tension meter approximately 25 mm (0.98 in) away from the surface of the Z-axis drive belt.



5. Press and hold the test button on the meter while simultaneously striking the Z-axis drive belt with a rubber mallet. The tension frequency should match the frequency listed in [Table 5-8](#).

If the frequency is greater or less than the value listed, the belt tension must be adjusted. Refer to [Section 5.9.16](#) for more information.

Table 5-8: Required Z-Axis Drive Belt Tension

Product Handling Unit	Measurement Location	Frequency
225	810 mm (32.85 in)	23 Hz
300		
400	973 mm (38.31 in)	19 Hz
500	1046 mm (41.18 in)	18 Hz

6. Remove all locks and tags.
7. Operate the machine in Dry Cycle mode for 30 minutes. On the HMI, touch the **Machine Mode Selector** button on the toolbar and select **Dry Cycle** mode.
8. Lock out and tag the machine.
9. Repeat [step 4](#) and [step 5](#).

5.9.16 Adjusting the Z-Axis Drive Belt Tension

To increase or decrease the Z-axis drive belt tension, do the following:

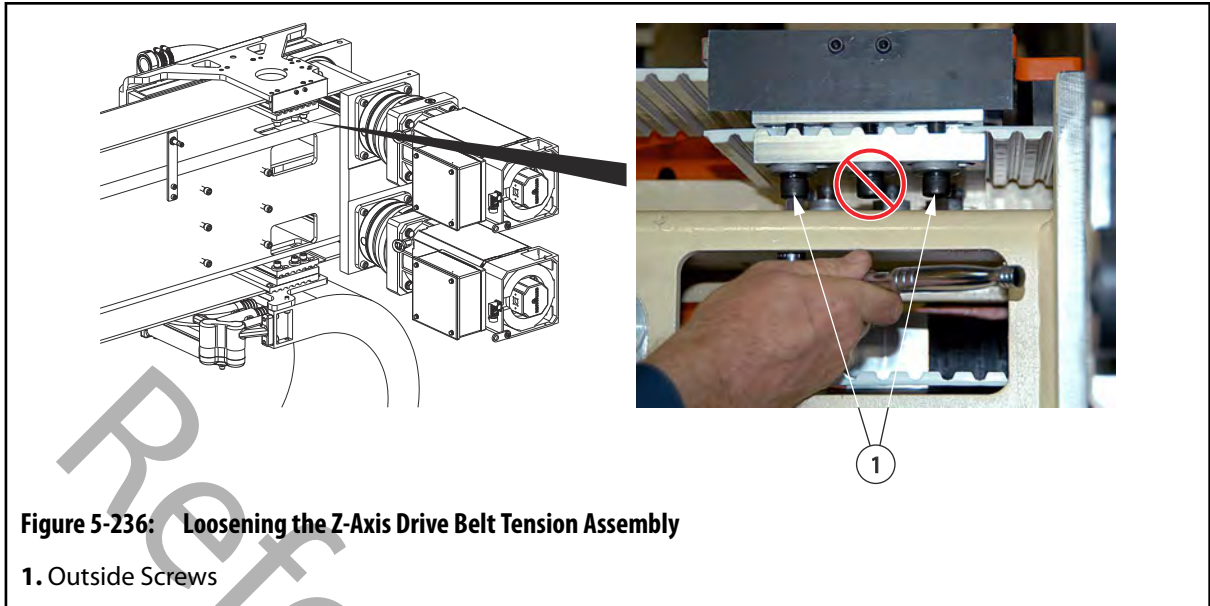
1. Position the tooling plate approximately 10 mm (0.4 in) from its home position.
2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.



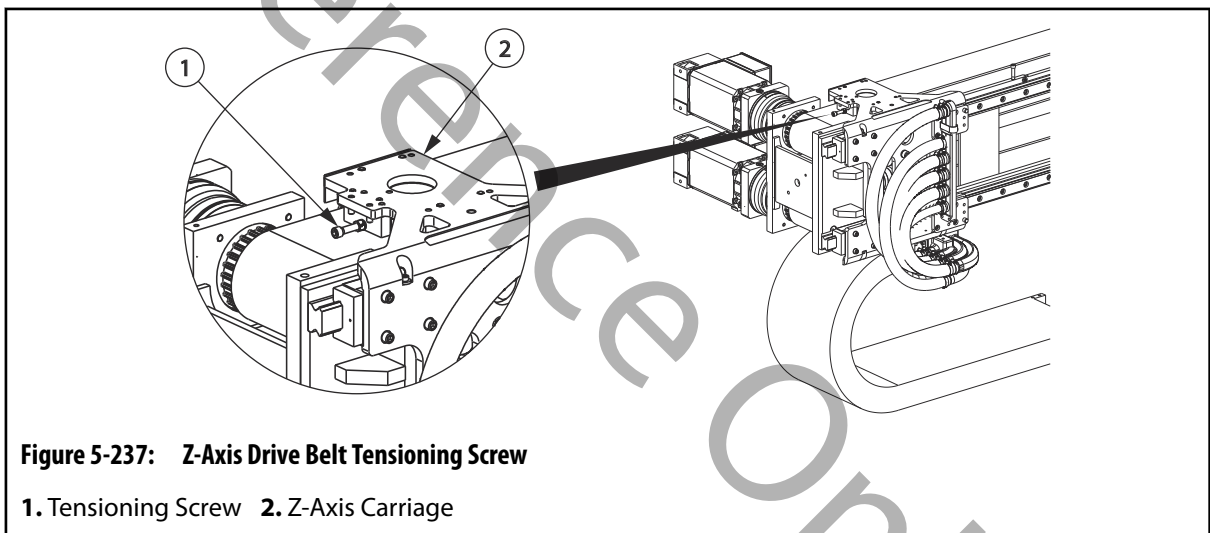
IMPORTANT!

Do not loosen the center two screws on the belt tension assembly.

3. Loosen the outside screws on the belt tension assembly.



4. Using the tensioning screw, increase or decrease the belt tension.

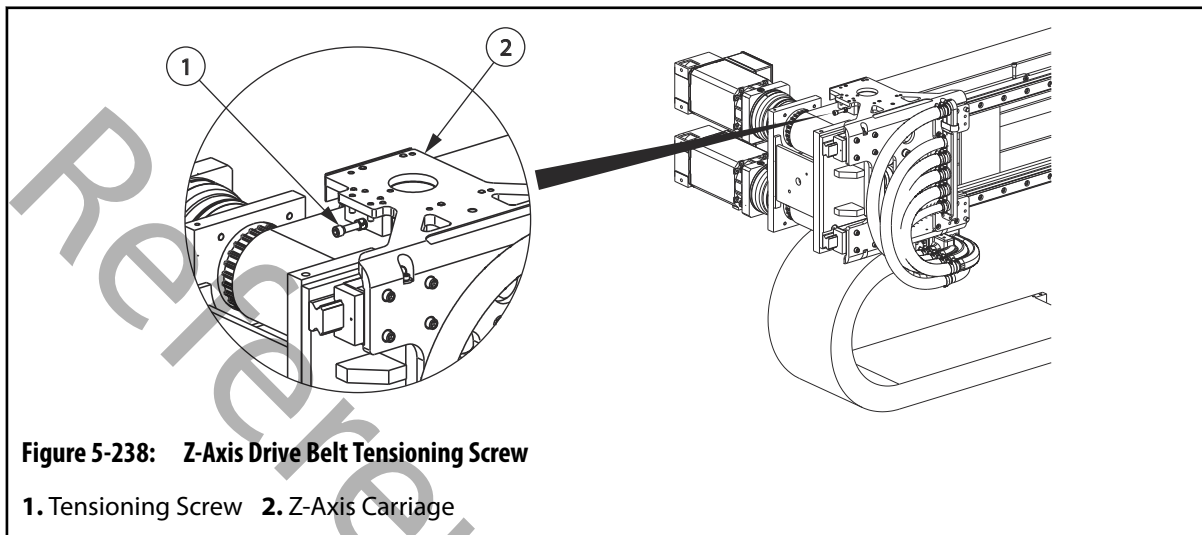


5. Measure the belt frequency and, if necessary, adjust the tensioning screw until the required frequency is achieved. Refer to [Section 5.9.15](#) for information about measuring the belt tension.
6. Tighten the screws in the belt tensioning assembly to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.
7. Once the correct tension is set, manually push the tooling plate along the Z-axis and note any tracking problems. If a tracking problem occurs, shift the belt within the tensioning assembly.
8. Once the belt tracking has been inspected, make sure the belt tension is correct and adjust as needed.
9. Remove all locks and tags.

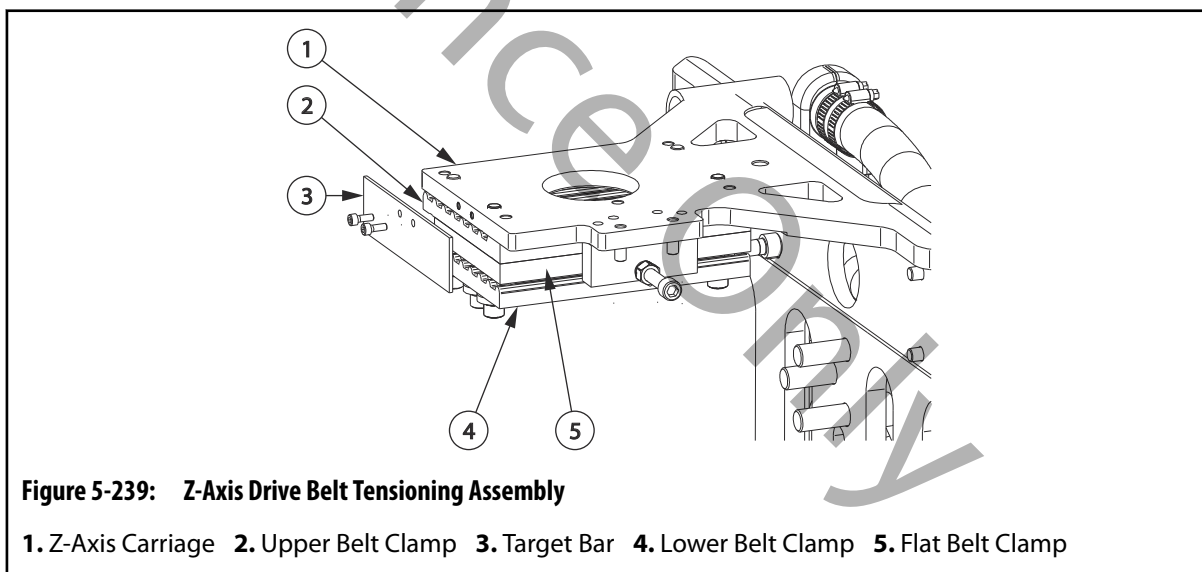
5.9.17 Replacing the Z-Axis Drive Belt

To replace a broken or worn Z-axis drive belt, do the following:

1. Position the tooling plate approximately 10 mm (0.4 in) from its home position.
2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
3. Using the tensioning screw, decrease the belt tension.



4. Remove the target bar.



5. Disassemble the lower grooved belt clamp.
6. Disassemble the flat belt clamp and upper belt clamp.
7. Remove the broken or worn Z-axis drive belt.
8. Route one end of a new Z-axis drive belt under the idler pulley and pull it through the inside of the Z-axis beam. Make sure the teeth face up.

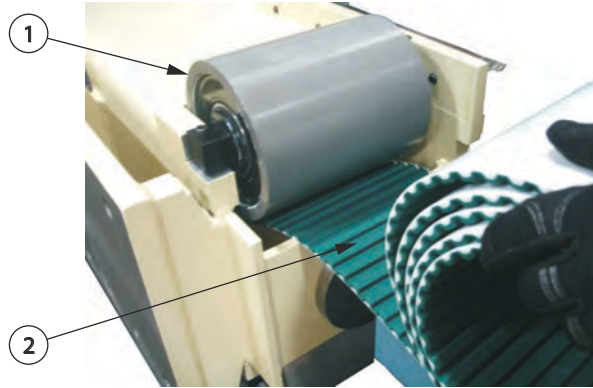


Figure 5-240: Routing the Z-Axis Drive Belt

1. Idler Pulley 2. Drive Belt

9. Pull the Z-axis drive belt under and over the drive belt sprocket for the Z-axis motor and gear reducer.
10. Bring the two ends of the Z-axis drive belt together under the Z-axis carriage.

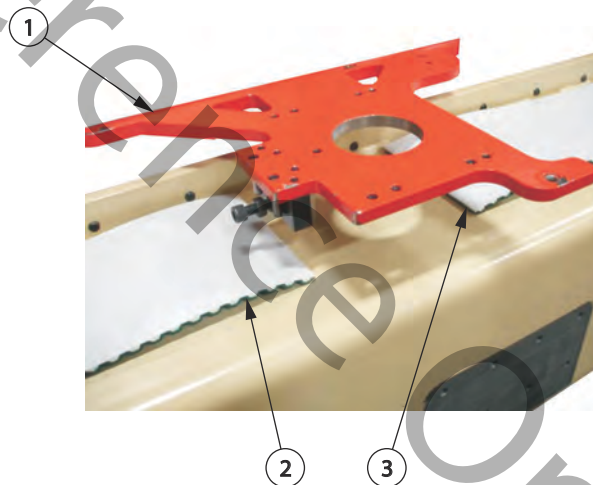


Figure 5-241: Bringing the Z-Axis Drive Belt Ends Together

1. Z-Axis Carriage 2. Z-Axis Drive Belt (Idler End) 3. Z-Axis Drive Belt (Motor End)

CAUTION!

Mechanical hazard – risk of damage to the machine. Before securing the Z-axis drive belt to the Z-axis carriage, make sure the teeth are fully engaged in the grooves of the belt clamp.

11. Secure the motor end of the new Z-axis drive belt to the carriage using the upper belt clamp. Tighten all screws to the specified torque value. Refer to [Section 7.13](#) for standard torque values.
12. Assemble the flat belt clamp and lower belt clamp together at the idler end of the new Z-axis drive belt. Install two screws with washers through the center of the clamps to secure them together.

13. Secure the flat belt clamp and lower belt clamp assembly to the upper belt clamp with four screws and washers. Hand tighten the screws and then turn them counter-clockwise 1/4 turn.

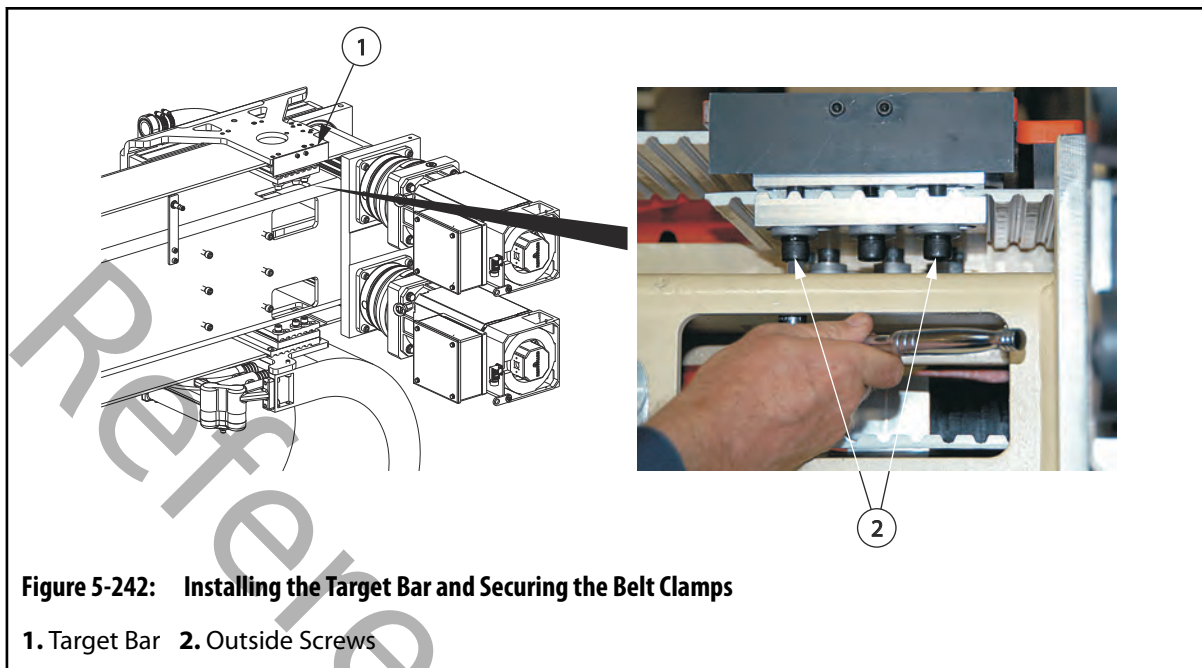


Figure 5-242: Installing the Target Bar and Securing the Belt Clamps

1. Target Bar 2. Outside Screws

14. Install the target bar.
15. Adjust the Z-axis drive belt tension. Refer to [Section 5.9.16](#) for more information.
16. Remove all locks and tags.

5.9.18 Replacing the Z-Axis Motor and Gear Reducer Assembly

The following procedures describe how to remove and replace the motor and gear reducer on the Z-axis beam.

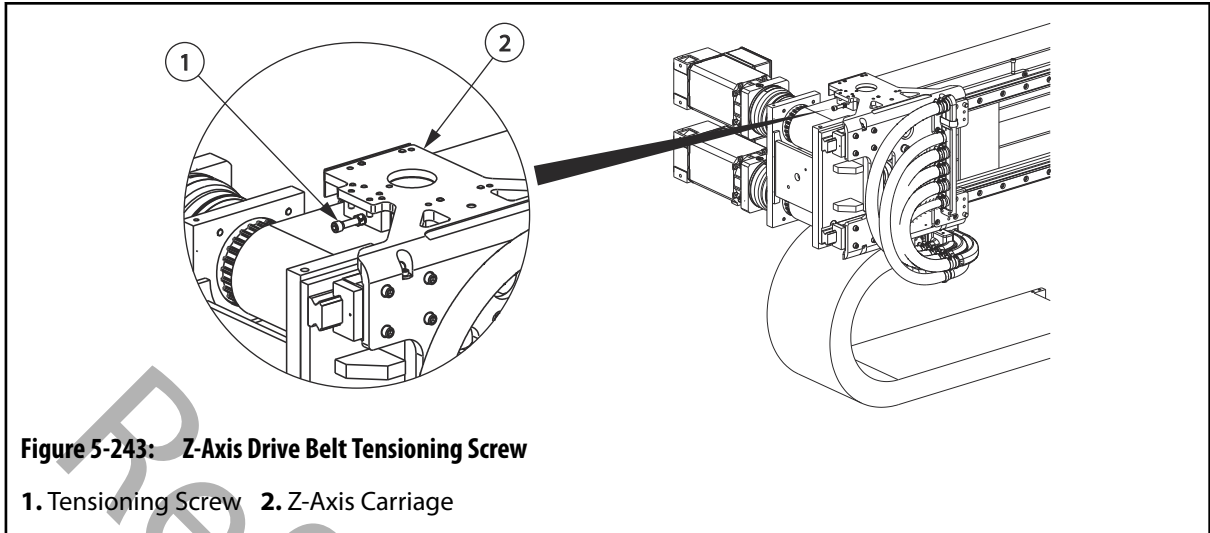
NOTE:

Depending on machine options, the Z-axis beam may be equipped with one or two motor and gear reducer assemblies.

5.9.18.1 Removing the Z-Axis Motor and Gear Reducer Assembly

To remove the motor and gear reducer assembly from the Z-axis beam, do the following:

1. Press one of the emergency stop buttons.
2. With the power on, disconnect the encoder cable from the motor. This will erase the robot reference.
3. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
4. Disconnect the power cable from the motor.
5. Loosen the drive belt by rotating the tensioning screw on the drive belt tensioning assembly.

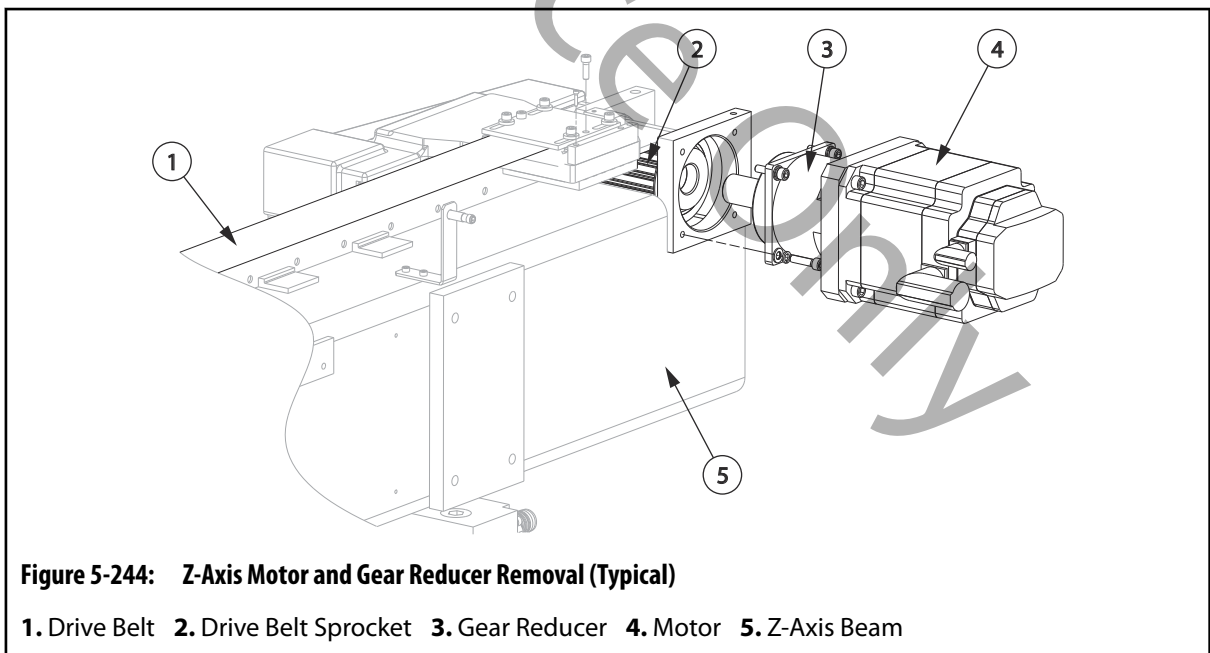


WARNING!

Crushing hazard – risk of death or serious injury.

- **Improperly balanced loads can make lifting unmanageable. Always use designated lifting points to lift the equipment.**
- **Exercise care when working beside the suspended equipment. To prevent injury, keep hands and fingers out of the way.**

6. Support the motor/gear reducer assembly with lifting straps and a suitable lifting device.



7. On the ring clamp, loosen all screws a few turns. Do not remove the screws. The ring clamp should automatically spring loose.

**IMPORTANT!**

If the locking assembly does not spring loose, insert threaded rods or screws into the threaded holes of the thrust ring and gently tap or pull the hardware.

8. Remove the screws holding the drive assembly to the Z-axis beam.
9. Remove the motor/gear reducer assembly.
10. Sit the motor/gear reducer assembly vertically on a workbench.

5.9.18.2 Assembling the Motor and Gear Reducer

To assemble the motor and gear reducer together, do the following:

CAUTION!

Mechanical hazard – risk of damage to the machine. Assembling the motor to the gear reducer in the horizontal position could damage the gear reducer. Assemble the motor and gear reducer vertically.

1. Remove the plastic plugs from the access holes.

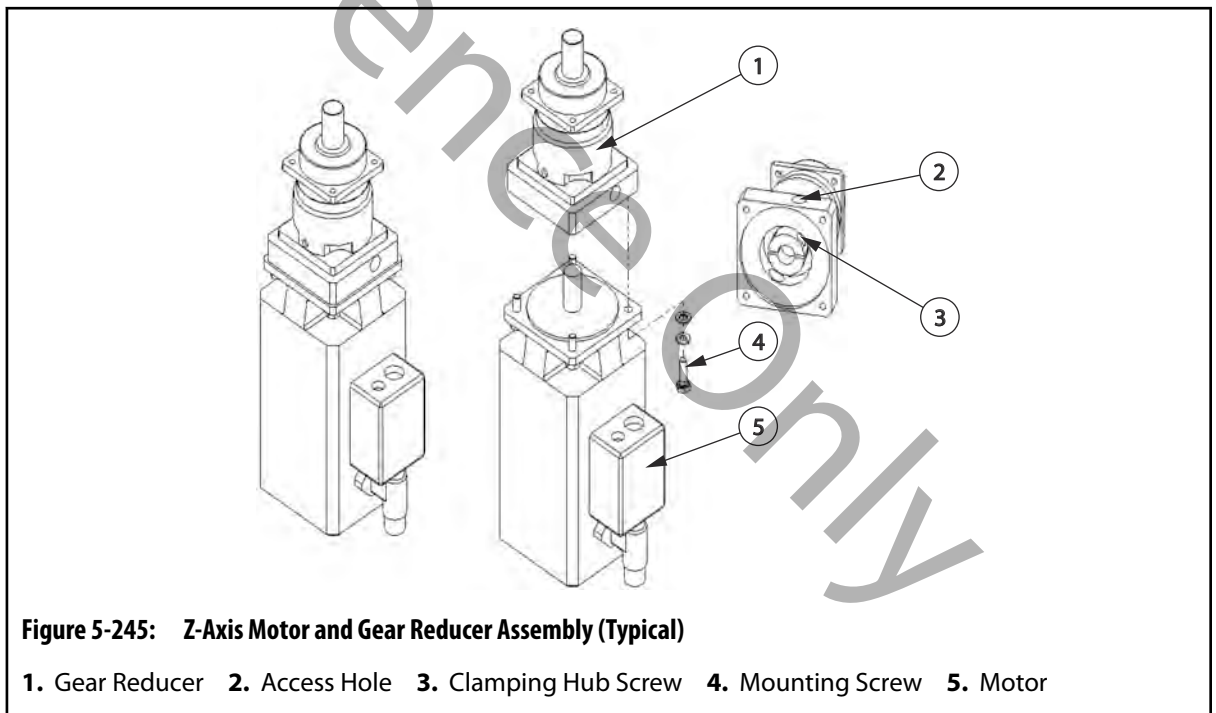


Figure 5-245: Z-Axis Motor and Gear Reducer Assembly (Typical)

1. Gear Reducer 2. Access Hole 3. Clamping Hub Screw 4. Mounting Screw 5. Motor

2. Rotate the gear reducer output shaft until the two clamping hub screws align with the access holes.
3. Loosen the clamping screws through the access holes.
4. Remove the four motor mounting screws from the gear reducer.
5. Gently separate the gear reducer from the motor.

CAUTION!

Mechanical hazard – risk of damage to the machine. Any axial loads on the motor shaft end, such as tapping with a hammer, could damage the motor and shift the holding brake. Loosen the gear reducer clamping hub to assemble the motor shaft with no force.

6. Inspect and clean the shaft and mating surfaces.

NOTE:

Do not apply grease or oil to the motor or gear reducer shafts. The drive shafts must be clean and dry.

7. Install the gear reducer onto the new motor. Make sure there is no measurable gap between the gear reducer and the motor mounting surfaces.

CAUTION!

Mechanical hazard – risk of damage to the machine. The use of a hammer could cause demagnetization of the rotor.

8. Orient the gear reducer to properly align the oil fill/drain ports with the new motor. In the final installed position the large fill/drain ports should be oriented in such a manner as to allow easy access for filling and draining of the gear reducer housing lubricant/oil.
9. Apply a lubricant to the mounting screws. Refer to [Section 7.9.2](#) for a list of recommended lubricants.
10. Install the mounting screws and tighten by hand.
11. Rotate the gear reducer output shaft until the clamping hub screws align with the access holes.

CAUTION!

Mechanical hazard – risk of damage to the machine. Exceeding the recommended torque specifications could damage the gear reducer clamping hub assembly. Follow either the specified torque values listed below or the manufacturer's specifications.

12. Alternately tighten the clamping hub screws, gradually increasing the torque value in three stages from approximately 15% to 50%, and finally 100% of the specified torque value listed in [Table 5-9](#).

Table 5-9: Clamping Screw Recommended Torques

Gear Reducer Size	Motor Shaft Diameter	Clamping Cap Screws DIN 912 12.9	Width Across Flats	Tightening Torque
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Table 5-9: Clamping Screw Recommended Torques (Continued)

Gear Reducer Size	Motor Shaft Diameter	Clamping Cap Screws DIN 912 12.9	Width Across Flats	Tightening Torque
SP 100	≤ 14 mm (0.6 in)	M5	4 mm (0.15 in)	9.5 N·m (7 lbf·ft)
	14 < x < 19 mm	M6	5 mm (0.20 in)	14 N·m (10 lbf·ft)
	(0.6 < x < 0.75 in)	M8	6 mm (0.24 in)	35 N·m (26 lbf·ft)
	19 < x < 24 mm			
SP 140	(0.75 < x < 0.9 in)			
	≤ 19 mm (0.75 in)	M6	5 mm (0.20 in)	14 N·m (10 lbf·ft)
	19 < x < 24 mm	M8	6 mm (0.24 in)	35 N·m (26 lbf·ft)
	(0.75 < x < 0.9 in)	M10	8 mm (0.31 in)	79 N·m (58 lbf·ft)
SP 180	24 < x < 38 mm			
	(0.9 < x < 1.5 in)			
	≤ 24 mm (0.9 in)	M8	6 mm (0.24 in)	35 N·m (26 lbf·ft)
	24 < x < 38 mm	M10	8 mm (0.31 in)	79 N·m (58 lbf·ft)
	(0.9 < x < 1.5 in)			

13. Torque the mounting screws to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.
14. Insert plastic plugs, supplied with the gear reducer, into the access holes and make sure they are flush with the adaptor plate surface.

5.9.18.3 Installing the Z-Axis Motor and Gear Reducer Assembly

To install the Z-axis motor and gear reducer assembly on the Z-axis beam, do the following:



WARNING!

Crushing hazard – risk of death or serious injury.

- **Improperly balanced loads can make lifting unmanageable. Always use designated lifting points to lift the equipment.**
- **Exercise care when working beside the suspended equipment. To prevent injury, keep hands and fingers out of the way.**

1. Lift and position the drive assembly on the Z-axis beam.
2. Attach the drive assembly to the Z-axis beam using the original screws. Torque the screws to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.
3. Attach the ring clamp to the gear reducer shaft and belt sprocket. Torque the screws to the specified torque value. Refer to [Section 7.13](#) for standard torque specifications.
4. Adjust the Z-axis drive belt tension. Refer to [Section 5.9.16](#) for more information.
5. Connect the power and encoder cables to the motor.

6. Release the emergency stop button.
7. Remove all locks and tags. Refer to [Section 2.6](#) for more information.
8. Power up the machine and log on to the HMI. Refer to [Section 4.2](#) for more information.
9. On the HMI, press the **Robot Enable** key to turn on the product handling equipment.
10. Test the Z-axis motor and gear reducer by alternately pressing the **Tooling Plate In** and **Tooling Plate Out** keys to move the tooling plate horizontally.

5.9.19 Robot Y-Axis (If Equipped)

A two-position vertical (Y-axis) robot option is available to support the staggered End of Arm Tool (EOAT). Perform the following procedures if the system is equipped with the Y-axis option.

5.9.19.1 Lowering the Y-Axis Manually by Releasing Trapped Pressure

The Y-axis is operated by a hydraulic cylinder system. In cases of failure, the system must be checked for trapped pressure and must be in the down position before performing any maintenance or service work in the robot area.

Attempting to remove any hydraulic components without first releasing trapped pressure will cause oil spray and uncontrolled lowering of the Y- axis.



IMPORTANT!

This procedure is to be performed only in cases where the machine has stopped unexpectedly and the Y-axis has stopped in the mid-position.

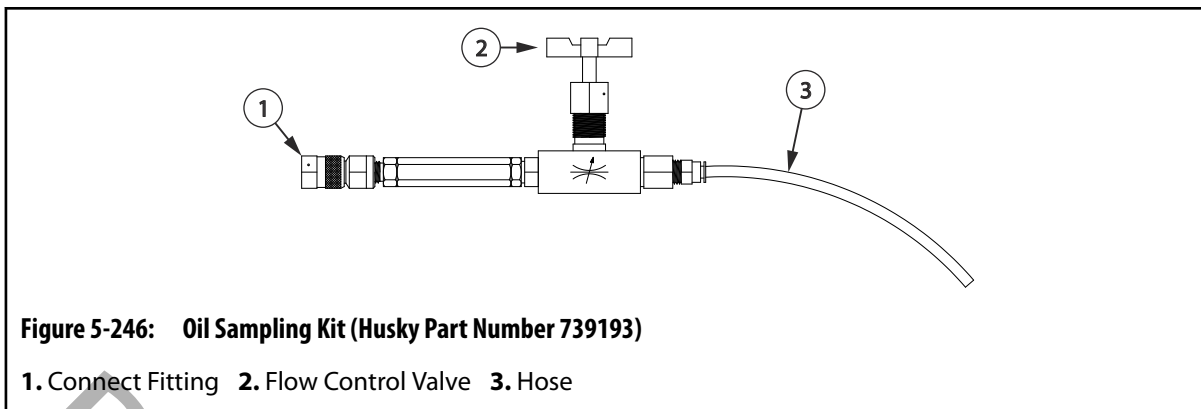
To release pressure and manually lower the Y-Axis, do the following:

1. If the Y-axis beam has not fully lowered, manually retract the locking pin. Refer to [Section 5.9.19.2](#) for more information.
2. Press the **Pump Motor Off** key to stop the pump motor.
3. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
4. Access the robot area through the vacuum pump door.

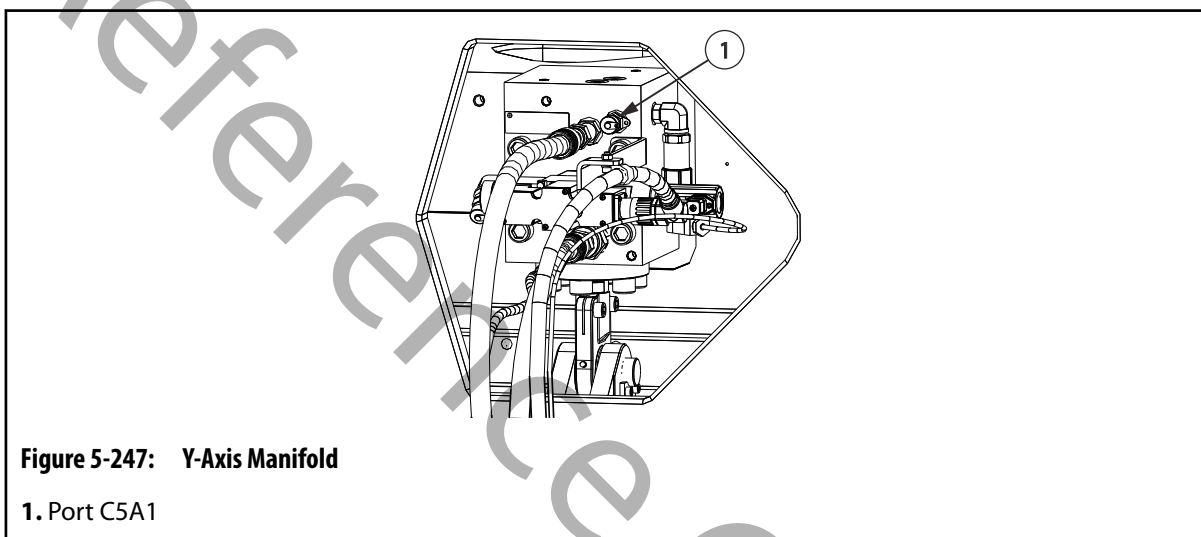


IMPORTANT!

Even after the hydraulic system has been depressurized and any energy source locked/tagged out, always use a pressure gauge to verify all pressure has been removed prior to servicing a hydraulic circuit. Connect oil sampling kit (Husky part number 739193) to the gauge port of the affected hydraulic manifold and a small amount of oil be drained from the circuit. The draining happens in a controlled way due to an installed orifice in the kit.



5. Verify that the flow control valve is fully closed on the oil sampling kit.
6. Attach the oil sampling kit to the manual lowering port C5A1 on the Y-axis manifold.



7. Place the hose end of the sampling valve into a 1 L (0.25 U.S. gal) capacity container. The released volume will be less than 0.5 L (0.13 U.S. gal).

**WARNING!**

Crushing hazard – risk of serious injury. Trapped pressure could cause uncontrolled lowering of the Y-Axis. Make sure no parts of the body are exposed to pinch points.

8. Slowly open the flow control valve until a trickle of oil is visible through the hose. The Y-axis beam will begin to lower.
9. Allow the oil to leak until the flow stops and the Y-axis beam is resting on the lower mechanical stops. If the beam does not fully lower, check for and remove any mechanical interference.
10. Verify that the Y-Axis beam has fully lowered and is sitting securely on the lower mechanical stops.
11. Close the flow control valve. Remove the sampling valve from port C5A1.
12. Remove all locks and tags.

5.9.19.2 Retracting the Robot Locking Pin Manually

The Y-axis/staggered end of arm tool robot option is equipped with two parallel, redundant devices to prevent the Y-axis from falling unexpectedly from the upper position. A hydraulic counterbalance valve suspends the load under all operating modes. A locking pin acts as a second layer of protection by supporting the load when engaged while the Y-axis is in the fully up position.

If the locking pin is not retracting properly via the HMI due to a mechanical fault, the following steps should be taken to manually lower the Z-axis beam/end of arm tool assembly.

To manually retract the locking pin, do the following:

1. Press the **Pump Motor Off** key to stop the pump motor.
2. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
3. Confirm that the air pressure supply to the robot regulator is minimum 5 bar (70 psi).



WARNING!

Crushing hazard – risk of death or serious injury.

- **Improperly balanced loads can make lifting unmanageable. Always use designated lifting points to lift the equipment.**
- **Exercise care when working beside the suspended equipment. To prevent injury, keep hands and fingers out of the way.**

4. Support the Z-axis beam using lifting straps and an appropriately rated lifting device.
5. Make sure that the 2 upper hard stop assemblies are securely in place and have not been removed.

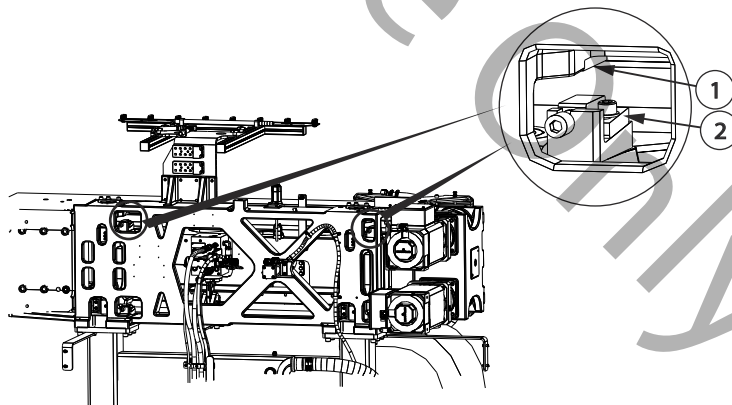
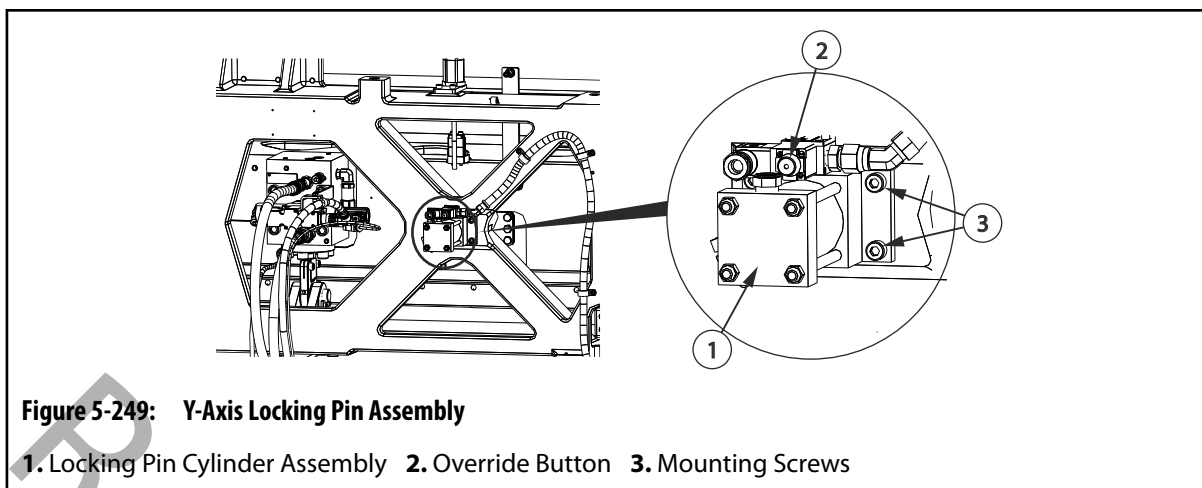


Figure 5-248: Y-Axis Hard Stop Locations

1. Upper Stop Plate 2. Hard Stop Wedge

6. Check for any gap between the two upper hard stop wedges and the upper stop plates. No gap should be present. Raise the assembly until the upper hard stop wedges contact the upper stop plates.
7. With the safety gates closed, press the **Pump Motor On** key to start the pump motor.
8. Check if the lock pin has retracted via the HMI.



9. Press the **Pump Motor Off** key to stop the pump motor.
10. Open the robot vacuum pump door and attempt to force the locking pin to retract by pressing the override button.
11. If the lock pin still does not retract, jog the Z-axis carriage/end of arm tool into the mold area (if possible) to create access/visibility of the locking pin through the rectangular pockets in the front of the cast Z-beam.
12. With the Z-axis beam/end of arm tool assembly still supported by the lifting device, enter the vacuum pump door and remove the 4 mounting screws securing the lock pin cylinder assembly to the Z-support.
13. Remove the entire locking pin cylinder assembly and continue the investigation outside of the robot gates.
14. Remove all locks and tags.

5.9.19.3 Inspecting the Y-Axis Bushings and Rod Eye

To inspect the Y-axis bushings and rod eye do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Inspect the Y-axis bushings and rod eye for pitting, scratches or other surface abrasions.
3. Inspect the Y-axis bushings and rod eye for contamination.
4. Wipe clean and lubricate if necessary. Refer to [Section 5.9.19.4](#) for more information.
5. Remove all locks and tags.

5.9.19.4 Lubricating the Y-Axis Bushings and Rod Eye

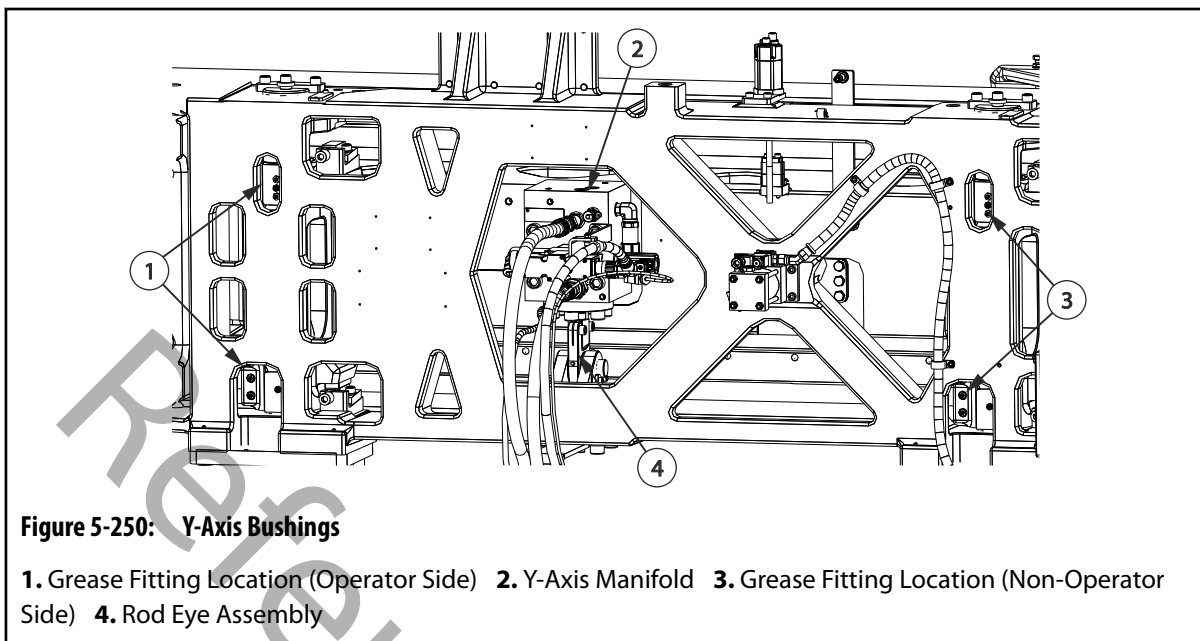
The Y-axis bushings and rod eye must be lubricated at intervals specified in the maintenance schedule.

5.9.19.4.1 Lubricating the Y-Axis Bushings

To lubricate the Y-axis bushings do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Make sure the Y-Axis is in down position.

3. Wipe the grease fittings on the Y-axis bushings with a clean cloth.



CAUTION!

Mechanical hazard – risk of damage to the machine. Do not use a powered grease gun when lubricating the Y-axis bushings. Always use a manual grease gun.

CAUTION!

Mechanical hazard – risk of equipment damage. Do not mix different brands or grades of lubricants or greases. Mixing lubricants or greases can cause premature breakdown of the lubricant or grease and could result in equipment damage.

4. Using a manual grease gun, inject lubricant into the grease fittings on each bushing housing. Refer to [Table 5-10](#) for the required quantity.
Refer to [Section 7.9](#) for a list of recommended lubricants.

Table 5-10: Y-Axis Bushing Lubricant Quantity

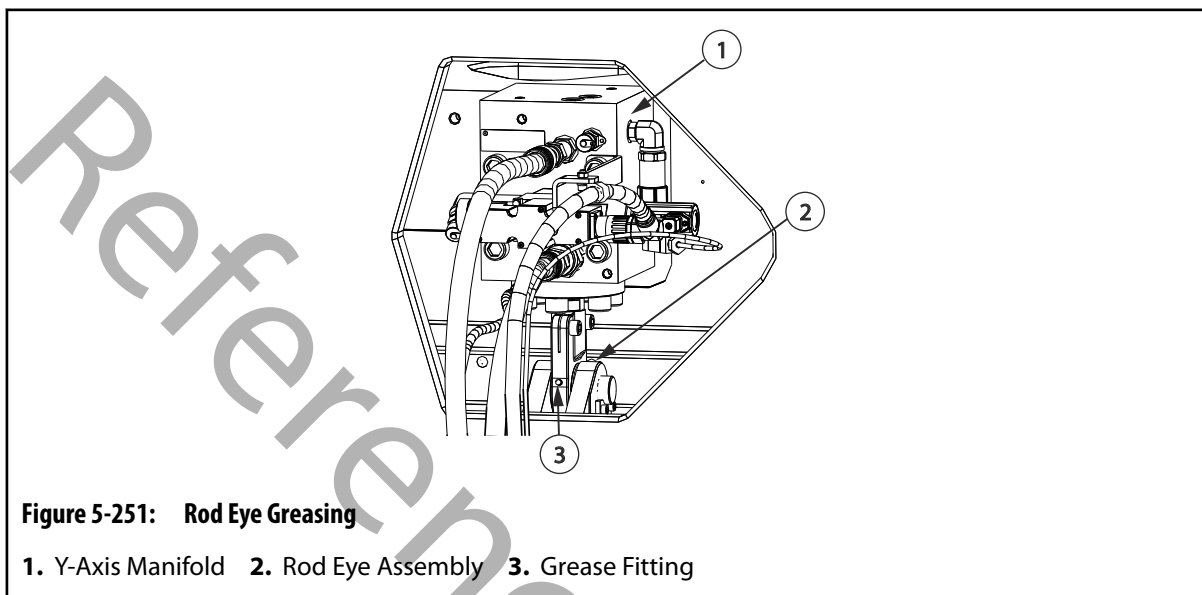
Product Handling Unit	Quantity of Lubricant
HPP 225	7 ml (0.24 oz)
HPP 300	
HPP 400	
HPP 500	

5. Remove all locks and tags.

5.9.19.4.2 Lubricating the Y-Axis Rod Eye

To lubricate the Y-axis rod eye do the following:

1. Lock out and tag the machine. Refer to [Section 2.6](#) for more information.
2. Make sure the Y-Axis is in down position.
3. Wipe the grease fittings on the Y-axis rod eye with a clean cloth.



CAUTION!

Mechanical hazard – risk of damage to the machine. Do not use a powered grease gun when lubricating the Y-axis rod eye. Always use a manual grease gun.

CAUTION!

Mechanical hazard – risk of equipment damage. Do not mix different brands or grades of lubricants or greases. Mixing lubricants or greases can cause premature breakdown of the lubricant or grease and could result in equipment damage.

4. Using a manual grease gun, inject lubricant into the grease fitting until the grease is seen exiting the rod eye around the bearing boundaries.
Refer to [Table 5-11](#) for the required quantity.
Refer to [Section 7.9](#) for a list of recommended lubricants.

Table 5-11: Y-Axis Rod Eye Lubricant Quantity

Product Handling Unit	Quantity of Lubricant
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Table 5-11: Y-Axis Rod Eye Lubricant Quantity (Continued)

Product Handling Unit	Quantity of Lubricant
HPP 225	1.5 ml (0.05 oz)
HPP 300	
HPP 400	
HPP 500	

- Remove all locks and tags.

5.10 Calibrating Machine Components

The calibration of various machine components is controlled by the Human Machine Interface (HMI), which uses interactive on-screen guides to collect information and instruct the user when to perform required steps while it calibrates the selected component.

The various calibration functions available are displayed on the **Calibration Overview** screen.

NOTE:

The mold is calibrated through the **Mold Installation** screen. Refer to [Section 5.11](#) for more information.

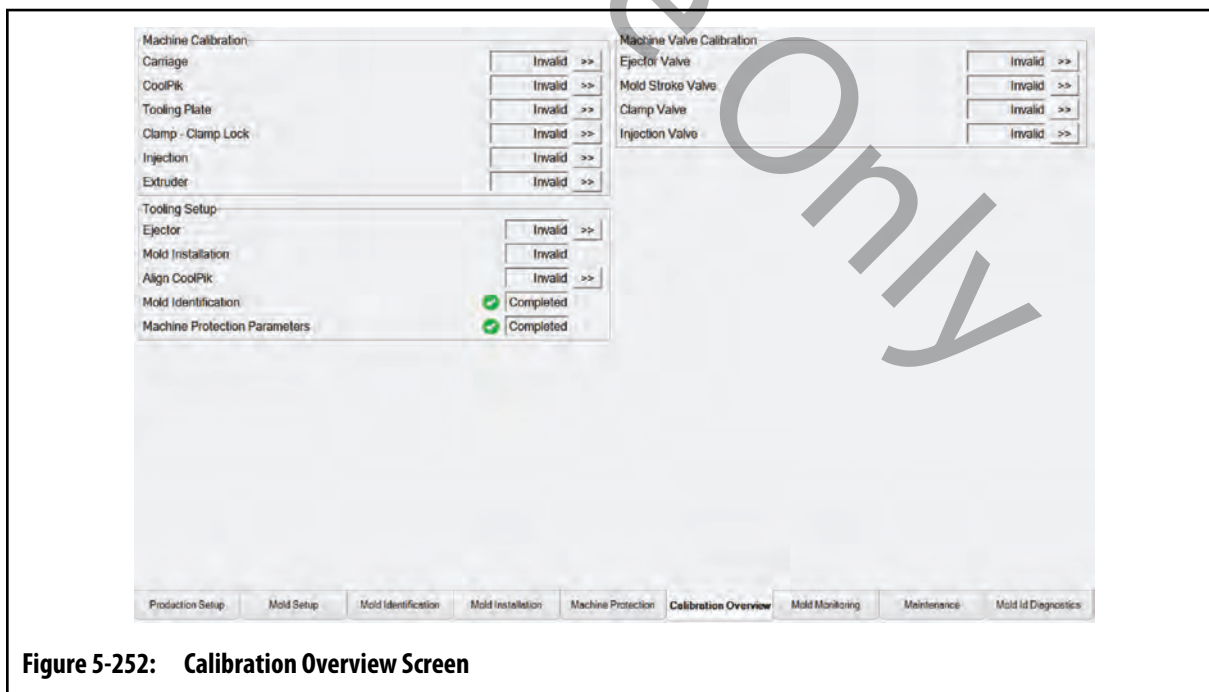


Figure 5-252: Calibration Overview Screen

5.10.1 Available Calibration Functions

The following describes the components that can be calibrated and the conditions that would require calibration.

Component	When to Calibrate
Tooling Plate	- After replacing a drive, motor or encoder - After installing the tooling plate - After the tooling plate has hit the bumpers
CoolPik, if equipped	- After replacing a drive, motor or encoder - After installing a mold, tooling plate or CoolPik unit - After the tooling plate has hit the bumpers
Align CoolPik, if equipped	After installing the CoolPik plate
Carriage	After replacing the stroke position sensor rod
Injection	- After replacing the stroke position sensor rod - After installing the plasticizing screw
Extruder	After replacing the stroke position sensor rod
Clamp	After replacing the clamp, stroke position sensor rods, magnet or mounting brackets
Ejector	After installing a mold
Mold Installation	When installing a mold
Mold Stroke Valve	- After replacing the mold stroke valve - When troubleshooting the mold stroke valve
Ejector Valve	- After replacing the ejector valve - When troubleshooting the ejector valve
Clamp Valve	- After replacing the clamp valve - When troubleshooting the clamp valve
Error Message	When the HMI detects an error that requires calibration to correct

5.10.2 Calibrating Machine Components

Individual calibration procedures for each component are detailed in the Human Machine Interface (HMI).

**IMPORTANT!**

After successfully calibrating a component, other components may need to be calibrated as well to make sure the components are properly aligned. For example, calibrating the clamp will often require further calibration of all product handling equipment.

Components that require calibration are identified on the **Calibration Overview** screen.

To start the calibration procedure for any component, do the following:

1. If calibrating a clamp, mold or product handling component, touch the **Machine Mode Selector** button on the tool bar and select **Mold Set** mode.
For all other components, refer to the next step.
2. Press the **Manual Cycle** key followed by the **Pump Motor On** key.
3. Touch the **Production** button and touch the **Calibration Overview** tab to display the **Calibration Overview** screen.

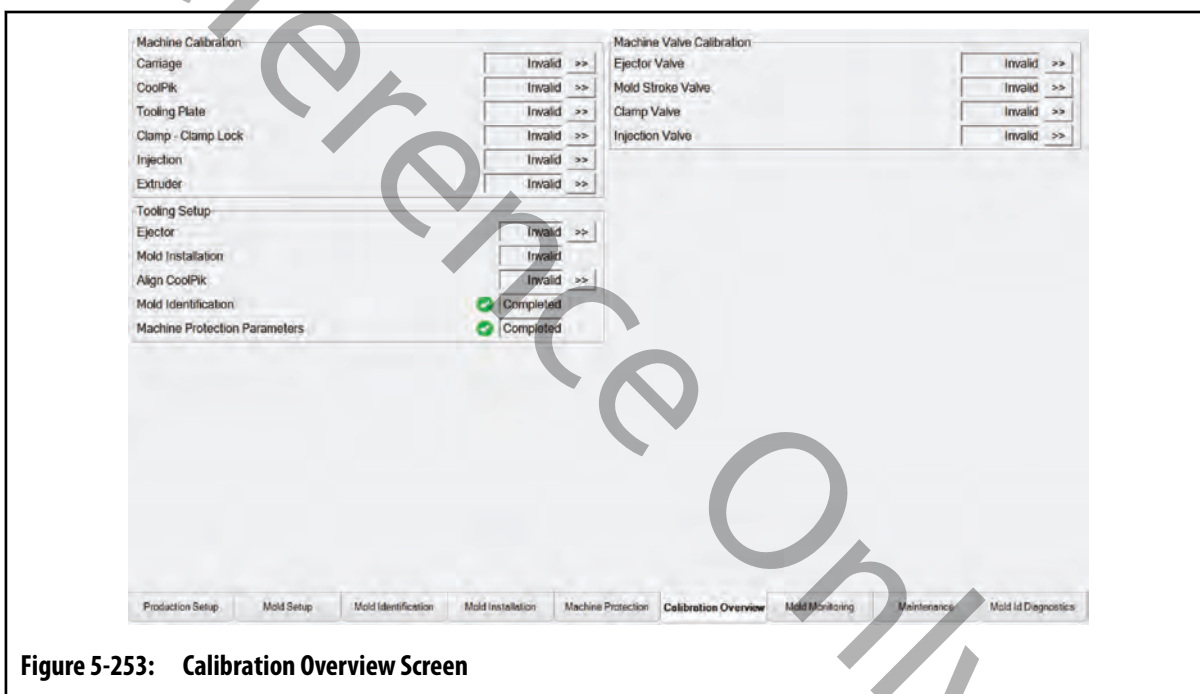
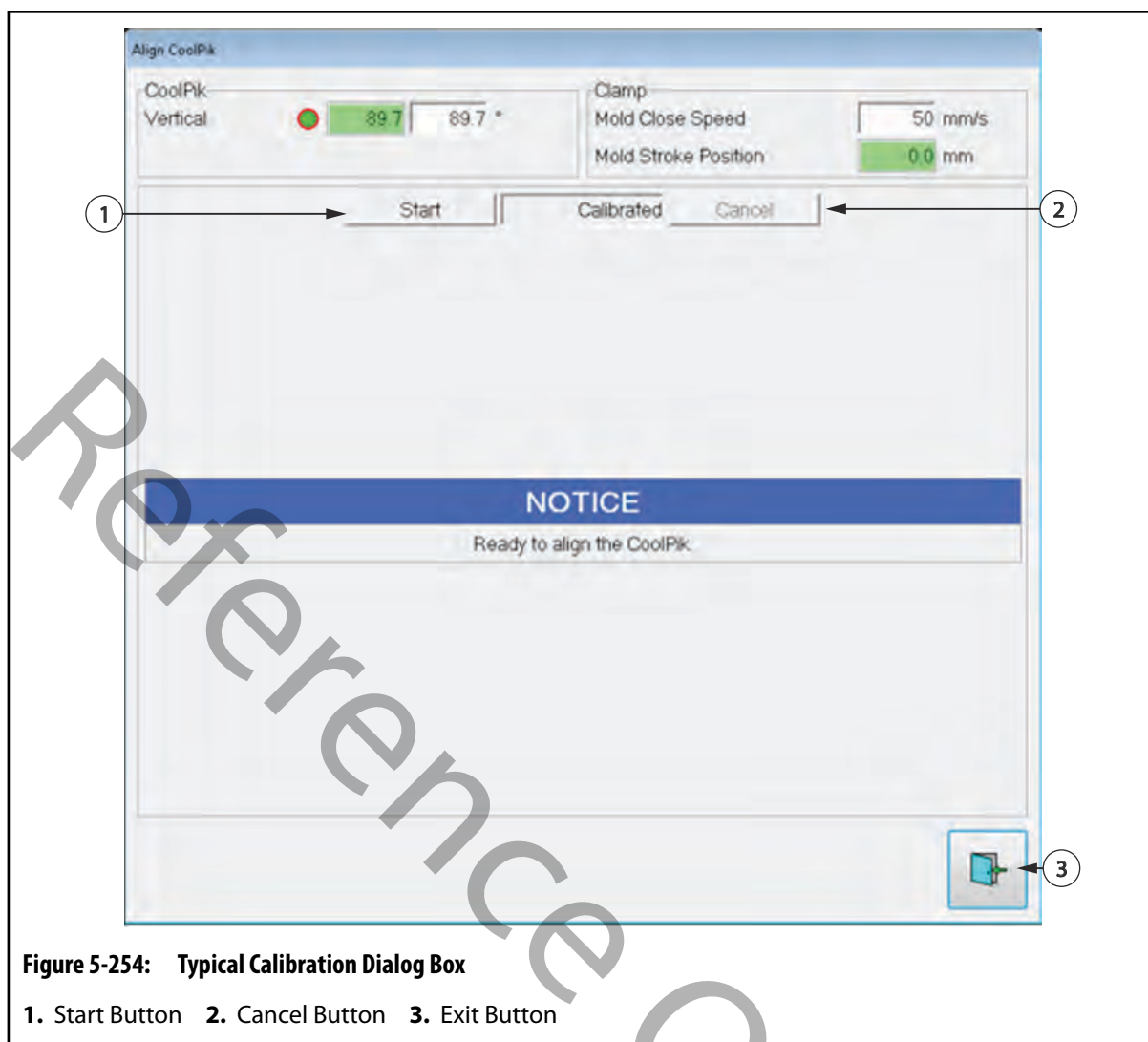


Figure 5-253: Calibration Overview Screen

4. Touch the button for the desired calibration function. A dialog box for the selected calibration function appears.

**IMPORTANT!**

Calibration will pause automatically when the following conditions occur. All conditions must be restored before calibration can continue.

- i. Pump motor turns off
- ii. A safety gate is opened
- iii. Cycle mode changed to Auto Cycle or Semi Auto Cycle
- iv. Manual function mode changed to something other than Mold Set mode
- v. An alarm is generated

NOTE:

Calibration can be aborted at any time by pressing the **Cancel** button.

5. Touch the **Start** button to start the calibration procedure. Follow any on-screen instructions that are displayed.

When calibration is finished, the field beside the **Start** button will display **Calibrated**.

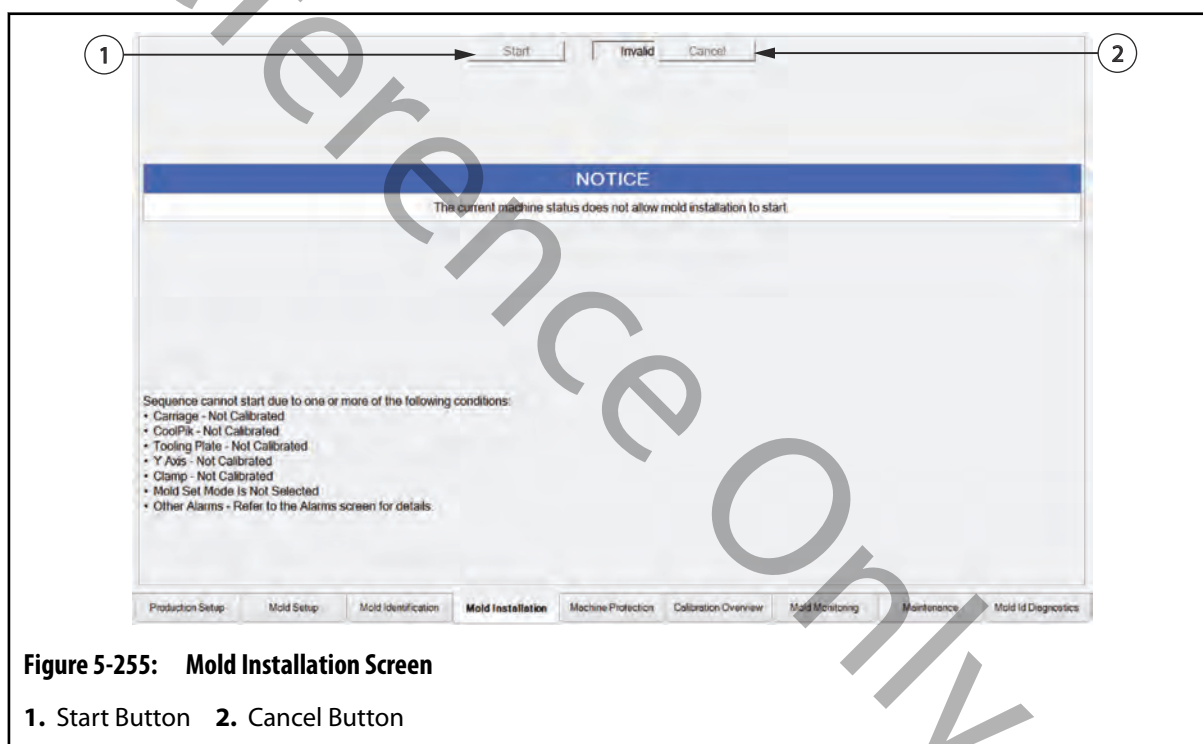
6. Touch the **Exit** button to return to the **Calibration Overview** screen.

5.11 Calibrating, Aligning and Realigning the Mold

Calibration and alignment of the mold is controlled by the Human Machine Interface (HMI), which uses an interactive on-screen guide to collect information and instruct the user when to perform required steps.

To calibrate, align or realign the mold, do the following:

1. On the HMI, touch the **Production** button and touch the **Mold Installation** tab to display the **Mold Installation** screen.



2. Touch the **Start** button to start the calibration wizard. Follow all instructions on the screen.

Chapter 6 Troubleshooting

This chapter describes general problems that may be encountered when working with the machine or any ancillary equipment, and offers potential solutions for each.

The problems discussed are not a definitive list. If the problem you are experiencing is not listed in this chapter, contact Husky Technical Support or your nearest Husky Regional Service and Sales Office for assistance.

Problems	Reference
Excessive mold wear	Section 6.1
Hydraulic oil temperature	Section 6.2
Loss of clamp tonnage	Section 6.3
No machine heats	Section 6.4
Temposonics rod faults	Section 6.5
Servo valves	Section 6.6
Industrial PC (IPC) issues	Section 6.7
Human Machine Interface (HMI) display screen issues	Section 6.8
EtherCAT issues	Section 6.9

6.1 Mold Wear

Mold wear occurs naturally over time, but can be accelerated when clamp forces are misaligned or offset.

Excessive mold wear is indicated by burnt resin, flashing, inconsistent part thickness, poor part quality and the premature contact of mold components before the parting line has fully closed.

It may also be indicated by the following machine alarms: Part Interference, Clamp Piston Synchronization Fault and Loss of Mold Protection Sensitivity.

The following is a list of potential causes and solutions:

Potential Cause	Solution
Machine is not level	Make sure the machine is level. Refer to Section 5.2.6 for more information.

Potential Cause	Solution
Mold halves are not aligned	- Check the integrity of the mold parting line and mold have alignment. Refer to the mold <i>Service Manual</i>. - Apply clamp tonnage when connecting the mold halves to the platens. - If the problem persists, contact Husky for assistance.
Mold is under or over size	Make sure the mold meets the minimum and maximum dimensions for the machine.
Improper locating ring	Use the correct size of locating ring for the mold. Make sure the locating ring is not damaged.
Mold or machine components are contaminated or not lubricated	Clean and inspect the mold and moving components for wear.
Mold functions are set improperly	- Make sure the moving cores are in the proper position when opening, closing and applying tonnage to the mold - Make sure mold functions do not drift from their Set or Pulled positions. This can be caused by a bad cylinder or a lack of air/hydraulic pressure in the Set or Pulled positions.

6.2 Hydraulic Oil Temperature

High oil temperatures (approximately 53 to 55°C (127 to 130°F) can degrade hydraulic oil quality, reduce viscosity/lubricity, and significantly impact hydraulic components.

The following is a list of potential causes and solutions:

Potential Cause	Solution
Cooling water turned off	Make sure the cooling water shutoff valves are open. Refer to Section 5.7.1.
Manual dump valve is open	Make sure the manual dump valve is closed.
Incorrectly mounted pressure relief valves	Make sure the pressure relief valves on the manifold are mounted and tightened correctly.
Hydraulic cooler pump	- Check the actual pump flow through the hydraulic cooler pump. - Replace the hydraulic cooler pump if necessary.

Potential Cause	Solution
Water saver valve is not opening	- Make sure the water saver valve is setup properly - Make sure the output terminal for the valve is on making sure that 24 Vdc from the terminal is reaching the valve. - Check the air pressure.
Oil temperature thermocouple failure	- Measure the actual oil temperature; make sure it matches the oil temperature displayed on the HMI - Review the Alarms screen for thermocouple or EtherCAT alarms. - If the oil temperature displayed on the HMI is 900 and there is an Open Thermocouple alarm. - Replace the thermocouple.
Heat exchanger blocked	- Measure the water flow through the heat exchanger. If the flow is low, turn off the water, remove the end cap from the heat exchanger and inspect the cooling tubes for blockage. If the cooling tubes are blocked, clean them with a pipe brush or RYDLYME cleaning solution (P/N 2599075). - Measure the flow through the heat exchanger after cleaning to confirm the cooling tubes are clear.
Hydraulic component failure	- Stop the machine, close the gates, and leave the pumps on. The temperature will drop if the problem is related to the cycle. - Stop the machine, open the operator gate, and leave the pumps on. The temperature will drop if the problem is related to clamp hydraulic component failure. - Run the machine in dry cycle. If the temperature does not rise, the problem is related to injection component failure. - Run the machine in full cycle. Check for performance issues (erratic stroke of cylinders, inconsistency, slamming, etc.) that may indicate a faulty valve.
Oil quality	- Check the hydraulic tank oil quality. Refer to Section 5.6.5. - Clean the inside of the heat exchanger cooling tubes. Refer to Section 5.7.3. - Replace as recommended by the fluid analysis service or when MPC > 40

6.3 Loss of Clamp Tonnage

When the tonnage set point has been reached, injection begins. If the tonnage drops by 10% or more during injection until the end of cooling, the alarm Tonnage lost or Loss of clamp tonnage during injection appears.

The following is a list of potential causes and solutions:

Potential Cause	Solution
Accumulator manual dump valve is open	Make sure all accumulator manual dump valves are closed.
Clamp lock gear speed is too fast	- Check the Cycle Time Breakdown screen to make sure clamp up occurs later than clamp lock in. - Make sure the oil temperature is not hotter than normal, causing high piston speed.
Loss of system pressure during high speed injection	- Make sure the accumulator precharge pressure is properly set. - Make sure the system pressure is properly set.
Clamp pressure transducer failure	- Verify the transducer reading using a pressure gauge. - Check for a faulty or damaged pressure transducer. - Check the wiring, connections, power supply and input module. - Make sure the power and feedback cables do not run parallel or close to each other. - Check the hydraulic oil supply.
Transducer analog input failure	Check the transducer input on the Valve Status screen.
Accumulator failure	- Check the accumulator precharge pressure. - Refer to Section 5.6.2.2 for bladder accumulators. - Refer to Section 5.6.3.2 for piston accumulators.
Low system pressure	- Make sure the system pressure matches the schematic specifications. Refer to the hydraulic schematic. - Monitor the system pressure for large pressure drops during the cycle.
Clamp piston seal failure	- Inspect the clamp portion of the machine for hydraulic leaks. - In Manual mode, clamp up the machine and then open the operator gate. Monitor clamp cylinder pressure on the Valve Status screen. If after 10 minutes the pressure has dropped more than 10%, either the clamp piston seal is leaking excessively or the clamp tonnage lock valve is leaking. - Monitor for clamp lock interference (contact) with center column teeth during clamp piston rotation. This may indicate that the clamp piston seal is leaking. - Monitor the clamp piston for a tendency to drift while the mold is open. This may indicate the clamp seal is bad. - The seal cannot be ordered as an individual item, the whole assembly must be replaced. Contact Husky for more information.

6.4 No Machine Heat

Electrical heat is used to soften the material in the barrel for initial screw rotation, and for fine control of temperature of heat zones along the barrel.

The following is a list of potential causes and solutions:

Potential Cause	Solution
Main heat power supply failure	- Make sure the main breaker is on and not tripped by an overload. - Make sure the main heat supply voltage is on. The heaters are supplied by 3 phase power. If one phase is off then half of the heaters will not turn on.
Heats are not enabled through the HMI	Enable the heats. Refer to Section 4.26.1.14 for more information.
Main heat contactor is off	- Check the Alarms screen for any heat-related messages. - If at least 1 heat zone is overtemperature, the main heat contactor will turn off.
Output terminal to the heat zone has failed	- Check that 24 Vdc is at the output terminal and at the SSR for the heat zone when the Machine Heats screen shows greater than 0% for the heat zone. - Replace the output terminal if the HMI shows greater than 0% but the 24 Vdc output does not turn on.
Open heat power circuit (heater band, fuse, solid state relay)	Make sure the current is flowing to the heater band when the Machine Heats screen shows greater than 0%.
Faulty thermocouple	- Measure the temperature at the barrel. Make sure the reading on the Machine Heats screen close to the measured temperature. - Replace the thermocouple. - Replace the fieldbus module.
Check ambient temperature	Make sure cold air is not flowing across the barrel.

6.5 Temposonics Rod Faults

Machine position measurements are accomplished by Temposonics rods which provide feedback to the IPC. Motion will not be possible if a position measurement alarm exists.

The following is a list of potential causes and solutions:

Potential Cause	Solution
Components are not fastened tightly	• Make sure the magnet and bracket are fastened tightly. • Make sure the Temposonics rod is fastened tightly. • Make sure other magnets using the same rod are fastened tightly. • Monitor for excessive machine vibration during the cycle.
Temposonics rod is bent	• Make sure the rod is straight. It can be straightened to correct the problem but use pressure not impact to straighten. • Make sure there are no loose hoses which may push on the rod during machine operation.
Magnet is not being detected by the rod	• Make sure the magnet is mounted within the allowable range. • Make sure the machine motion is not moving the magnet into the dead zone at either end of the rod.
Temposonics rod has failed	• Replace the Temposonics rod.
Static field on the rod is causing interference	• Plastic dust on the rod can set up a static field. Clean the rod of plastic dust with a clean cloth.
24Vdc power has excessive noise	• A nearby machine that is not properly grounded can cause noise which will create a Temposonics rod fault. Monitor whether the fault appears whenever a particular machine begins operation. • Check to determine if a welder has begun work in the area. • Using an oscilloscope, verify the 24 Vdc power does not have excessive noise.

6.6 Servo Valves

When measuring servo valve data using a breakout box, certain values are expected. Any value other than what is expected indicates a problem with the servo valve.

The following is a list of potential causes and solutions:

Problem	Potential Cause	Solution
Unexpected value from +24 Vdc Safety Window port	Servo valve was installed with excessive torque	1. Loosen the screws that secure the servo valve to the manifold. 2. Hand tighten the screws and then torque them in two stages (50% torque, then 100% torque) in a cross-pattern. Refer to Section 7.13 for standard torque specifications.
	Servo valve is contaminated	1. Check the quality of the pilot oil. 2. If necessary, replace the servo valve.
	Servo valve has failed	• Replace the servo valve.
Unexpected value from +24 Vdc PWR Supply port	Open fuse/breaker in the electrical cabinet	• Replace the fuse or reset the breaker.
Unexpected value from ENABLE port	Controller is not permitting servo valve operation	• Check the Alarms screen for conditions that would prohibit motion.
	Digital output terminal has failed	• Replace the digital output terminal.
	Open fuse/breaker in the electrical cabinet	• Replace the fuse or reset the breaker.
Unexpected value from +24 Vdc Valve ready port	Servo valve has failed	• Replace the servo valve.
Unexpected value from FB 2->10 Vdc port	Servo valve was installed with excessive torque	1. Loosen the screws that secure the servo valve to the manifold. 2. Hand tighten the screws and then torque them in two stages (50% torque, then 100% torque) in a cross-pattern. Refer to Section 7.13 for standard torque specifications.
	Servo valve is contaminated	1. Check the quality of the pilot oil. 2. If necessary, replace the servo valve.
	Servo valve has failed	• Replace the servo valve.
Unexpected value from +Flow CMD port	Analog output terminal has failed	• Replace the digital output terminal.

Problem	Potential Cause	Solution
Unexpected value from +24 Vdc Solenoid port	Controller is not permitting servo valve operation	Check the Alarms screen for conditions that would prohibit motion.
	Digital output terminal has failed	Replace the digital output terminal.
	Open fuse/breaker in the electrical cabinet	Replace the fuse or reset the breaker.

6.7 Industrial PC (IPC) Issues

The following is a list of potential causes and solutions:

Problem	Potential Cause	Solution
The IPC does not turn on when the machine is started	No power is being supplied to the IPC	- Check the breaker in the electrical cabinet for the IPC. Replace or repair as necessary. - Measure the voltage at the power connection to the IPC and check the plug wiring. Replace or repair as necessary.
The IPC does not boot up completely	Damaged boot drive	Contact Husky Technical Support.
IPC boots up and software starts, but controls do not function	Cables from the HMI to the IPC may be loose	Check the cables.
	Error in software or equipment other than the IPC	Contact Husky Technical Support.

6.8 Human Machine Interface (HMI) Display Screen Issues

The following is a list of potential causes and solutions:

Problem	Potential Cause	Solution
HMI functions do not operate as expected	Error in software or equipment other than the display screen	• Contact Husky Technical Support.
No picture or dark picture	Faulty fluorescent bulb	• Replace the HMI.
	The cable from the HMI to the to the IPC is loose.	• Check the cable.
	No power being supplied to the DVI/USB range extender.	• Check the breaker in the electrical cabinet for the IPC. Replace or repair as necessary. • Measure the voltage at the power connection to the IPC and check the plug wiring. Replace or repair as necessary.
Control panel functions incorrectly or intermittently	Defective components in the display screen	• Replace the HMI display screen.

6.9 EtherCAT Troubleshooting

The following procedure describes how to access the EtherCAT Diagnostics screen in situations where Husky Customer Support can help you troubleshoot EtherCAT issues.

6.9.1 Accessing the EtherCAT Diagnostics Screen

To access the EtherCAT Diagnostics screen, do the following:

1. Touch the **Machine** button, and then touch the **EtherCAT Diagnostics** tab. The **EtherCAT Diagnostics** screen appears.
2. Contact Husky Customer Support.
3. Follow Husky Customer Support instructions to navigate the **EtherCAT Diagnostics** screen to assist them with troubleshooting EtherCAT issues.

Reference Only

Chapter 7 Specifications

This chapter details the technical specifications of the machine, including machine weights, environmental requirements, services, supplies, and torque specifications.

NOTE:

Husky reserves the right to change specifications without prior notice.

7.1 Machine Weights, Loads and Requirements

The following sections provide information about machine weights, maximum allowable mold weights, and calculating static and dynamic floor loads.

Specification	Reference
Machine and product handling unit weights	Section 7.1.1
Maximum allowable mold weights	Section 7.1.2
Calculating the total load	Section 7.1.3

7.1.1 Machine and Product Handling Unit Weights

The following weights are approximate and are provided to assist in determining the lifting requirements for the machine and product handling unit. Actual weights vary according to individual configurations.

To calculate the total weight of the machine, determine the machine configuration and complete the following calculation:

$$\text{Total Weight} = \text{Clamp Unit} + \text{Injection Unit} + \text{Product Handling Unit} + \text{CoolPik Plenum}$$

NOTE:

The weights listed do not include fluids.

Table 7-1: Calculated Weights – Clamp Unit

Clamp Size	Weight ^[1]
120	5500 kg (12125 lb)

Table 7-1: Calculated Weights – Clamp Unit (Continued)

Clamp Size	Weight ^[1]
225	9000 kg (19841 lb)
300	12500 kg (27558 lb)
400	18000 kg (39683 lb)
500	22000 kg (48501 lb)

^[1] Weight does not include the mold.

Table 7-2: Calculated Weights – Injection Unit

Injection Unit	Weight ^[2]
P85/95 EE85	11300 kg (24912 lb)
P85/95 EE100	14315 kg (31559.14 lb)
P100/110 EE120 P100/120 EE120	14530 kg (32033 lb)
P120/130 EE140	14530 kg (32033 lb)
P120/140 E140L	20800 kg (45856 lb)
P155/160 EE155L	24135 kg (53209 lb)

^[2] Weight includes the injection unit, injection base and electrical cabinet.

Table 7-3: Calculated Weights – Product Handling Unit

Product Handling Unit	Weight ^[3]
120	1900 kg (4189 lb)
225	3350 kg (7385 lb)
300	3400 kg (7496 lb)
400	4270 kg (9414 lb)
500	4600 kg (10141 lb)

^[3] Weight includes the product handling unit electrical cabinet. Refer to the mold Service Manual for the weight of the CoolPik plate and tooling plate.

Table 7-4: Calculated Weights – CoolPik Plenum

CoolPik Plenum	Weight
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Table 7-4: Calculated Weights – CoolPik Plenum (Continued)

CoolPik Plenum	Weight
120	190 kg (419 lb)
225	200 kg (441 lb)
300	230 kg (507 lb)
400	360 kg (794 lb)
500	445 kg (981 lb)

7.1.2 Maximum Allowable Mold Weight

The weight of the mold must not exceed the maximum allowable weight as determined by the clamp unit. Using a heavier mold may cause damage to the mold and/or clamp unit.

Clamp Size	Maximum Mold Weight
120	2607 kg (5747 lb)
225	4890 kg (10780 lb)
300	6100 kg (13448 lb)
400	8300 kg (18298 lb)
500	9800 kg (21605 lb)

7.1.3 Calculating Static and Dynamic Loads

The production floor must be designed to support the static and dynamic loads generated by the machine. To calculate the static and dynamic loads, determine the following:

Specification	Reference
Weight of the clamp unit	Section 7.1.1
Weight of the injection unit(s)	Section 7.1.1
Weight of the hydraulic oil in the hydraulic reservoir	—
Maximum allowable mold weight	Section 7.1.2
Total footprint area of the leveling mounts under the clamp unit	Installation Drawing
Total footprint area of the leveling mounts under the injection unit	

7.1.3.1 Calculating the Static Load

Static load is the pressure in kg/cm² (lb/in²) generated by the machine when it is idle.

To determine the static load of the clamp unit and mold, complete the following calculation:

$$\frac{\text{Clamp Weight + Maximum Allowable Mold Weight}}{\text{Total Footprint Area for All Leveling Mounts Under the Clamp Unit}} = \text{Static Load}$$

To determine the static load of the injection units, complete the following calculation:

$$\frac{\text{Injection Units Weight + Weight of Hydraulic Oil}}{\text{Total Footprint Area for All Leveling Mounts Under the Injection Units}} = \text{Static Load}$$

7.1.3.2 Calculating the Total Load

Dynamic load is the pressure in kg/cm² (lb/in²) generated by the machine motion. The total load is the static load plus the dynamic load.

To determine the combined dynamic and static load of the clamp unit and mold, complete the following calculation:

$$\frac{(\text{Clamp Weight + Maximum Allowable Mold Weight}) \times 2}{\text{Total Footprint Area for All Leveling Mounts Under the Clamp Unit}} = \text{Total Load}$$



IMPORTANT!

Consider the total load of the clamp unit and mold when designing the production floor. However, if the total load of the clamp unit and mold is less than the static load of the injection units, consider the static load of the injection units when designing the production floor.

7.2 Clamp Specifications

The clamp shutheight, maximum daylight and maximum stroke are dependent on the machine size.

Clamp Size	Minimum Shutheight	Maximum Shutheight	Maximum Daylight	Maximum Stroke ^[4]
120	485 mm (19 in)	650 mm (25 in)	1320 mm (52 in)	835 mm (32 in)
225	565 mm (22.2 in)	880 mm (34.6 in)	1505 mm (59.2 in)	625 mm (24.6 in)
300	565 mm (22.2 in)	880 mm (34.6 in)	1850 mm (72.8 in)	970 mm (38.1 in)
400	565 mm (22.2 in)	880 mm (34.6 in)	1850 mm (72.8 in)	1285 mm (50.5 in)
500	550 mm (21.6 in)	900 mm (35.4 in)	1925 mm (75.7 in)	1375 mm (54.1 in)

^[4] Maximum stroke at maximum shutheight

7.3 Product Handling Specifications

The following specifications for the product handling unit are dependent on the machine size.

Specification	120	225	300	400	500
Z-Axis Total Stroke	1120 mm (44 in)	1450 mm (57 in)	1530 mm (60 in)	1760 mm (68 in)	1955 mm (77 in)
Tooling Plate Maximum Payload ^[5]	100 kg (220 lb)	120 kg (265 lb)	160 kg (353 lb)	220 kg (485 lb)	290 kg (639 lb)
CoolPik Maximum Payload ^[5]	25 kg (55 lb)	50 kg (110 lb)	60 kg (132 lb)	80 kg (176 lb)	80 kg (176 lb)
Maximum Mold/ Tooling Plate Cavities	48	48	72	96	144

^[5] For optimized performance.

7.4 Environmental Requirements

The production area must meet the following requirements:

Condition	Requirement
Ambient Air Quality	Suitable filtration system to minimize harmful dust and airborne particles
Ambient Room Temperature without the Tropical Cooling Option	0 to 40 °C (32 to 104 °F)

Condition	Requirement
Ambient Room Temperature with the Tropical Cooling Option	0 to 48 °C (32 to 118 °F)
Relative Humidity	< 95% (non-condensing)
Ventilation	Suitable ventilation system to remove all harmful gases, vapors or dust released when processing certain plastic resins

7.5 Electrical Power Supply

An electrical power supply for the machine and hot runner is required. Refer to the installation drawing for the location of the electrical power connections on the machine. For hot runners, refer to the mold *Service Manual* or hot runner *Service Manual* for other power connection points.

Electrical power supply specifications for the machine are listed on the electrical schematic and the nameplate on the electrical cabinet.

Before establishing the electrical power supply, be aware of the following:

- All power cables must be rated according to the specifications in the electrical schematic for the machine and hot runner (optional). Specifications are also provided on the machine and hot runner nameplates.

NOTE:

The supply voltage may vary up to $\pm 10\%$ of the value specified on the electrical schematic and nameplate. This fluctuation must be momentary. The machine will provide full performance within $\pm 5\%$ of this value. Machine performance may be reduced outside of this range.

NOTE:

The supply frequency may vary up to $\pm 1\%$ continuously of the value specified on the electrical schematic and nameplate.

-
- If the machine supply voltage is 575V or higher, then the supply voltage for drives must come from a grounded wye source. If necessary, an isolation transformer must be installed to create the solidly grounded wye source. The use of an autotransformer is not permitted.

CAUTION!

Mechanical hazard – risk of damage to the machine. If the machine contains one or more Electromagnetic Compatibility (EMC) filters, then they must be connected to a solidly grounded wye supply or damage to the filters may result. Refer to the electrical schematic for more information.

If a solidly grounded wye supply is not available, then the EMC filters must be removed from the machine. Contact Husky to obtain a retrofit package that includes instructions for the specific machine to enable qualified personnel to remove the filters.



DANGER!

Electrocution hazard – risk of death or serious injury. EMC filters are connected to the machine electrical system. EMC filters must only be removed by qualified personnel. Review the electrical schematics before servicing equipment.

- If a machine is configured to meet CE compliance or EN standards, then it is shipped configured for a solidly grounded wye supply. If a machine is going to be configured for a different supply, then order a kit (HPN 7425488) for the machine serial number. The kit provides instructions and hardware to reconfigure the machine for a different supply. Contact Husky for more information.
- A solidly grounded wye supply is required for machines installed at altitudes of 2000 m (6562 ft) or higher.
- The prospective short circuit fault level at the main equipment terminals must be no more than 10,000 A RMS symmetrical.
- For auxiliary equipment, the available fault current at the connection point to the equipment must not be greater than the short circuit current rating marked on the panel nameplate.

7.5.1 Main Breaker Wire Size

Follow local electrical codes when connecting the customer supply wires to the main breakers.



IMPORTANT!

Make sure to use the correct wire size for the lugs. Refer to the preliminary electrical document for electrical load requirements, breaker lug wire size capacity and torque values.

7.6 Machine Cooling Water Specifications

The cooling water for the machine must comply with certain specifications.

7.6.1 Machine Cooling Water Guidelines

CAUTION!

Mechanical hazard – risk of damage to the machine. Failure to abide by these guidelines for tower and chilled water quality could result in damages to the injection molding system and may void the warranty.

Cooling water treatment is required to protect all water cooled equipment from corrosion and deposit fouling inside the cooling channels, regardless of virgin water quality.

Corrosion can lead to water leaks and failure of mold/machine components.

Deposits in the cooling channels can reduce heat transfer, resulting in:

- reduced efficiencies
- longer molding cycles
- reduced part quality
- increased maintenance
- increased costs

Since local water supplies vary widely in quality, Husky recommends all customers work with reputable water treatment companies in their area to establish a water treatment program best suited for their needs. A good water treatment program must be developed specifically for each facility, taking the following into account:

- municipal water conditions
- cooling system design
- water usage patterns

7.6.2 Machine Cooling Water Treatment Procedure

The first step of a water treatment program is to have a qualified laboratory perform an analysis of the following:

- municipal water supply
- chilled water system
- tower water system

Once a water analysis is completed, a water treatment specialist can recommend an appropriate water treatment program. The analysis and treatment of the cooling water should be performed on a regular basis.

7.6.3 Machine Cooling Water Chemistry

The following details the recommended chemistry of the cooling water:

NOTE:

Recommended values represent conditions under which most problems associated with poor water quality can be controlled using normal water treatment additives. They do not represent water that can be used untreated. Meeting the recommended values does not guarantee that cooling water is not corrosive. It is important that all metals in the cooling system be protected using suitable corrosion inhibitors.

**IMPORTANT!**

The values specified are typical recommended values that may be achievable in most cooling systems. Deviations from these values may be necessary, but should be reviewed with your water treatment company first.

Table 7-5: General

Constituents	Units	Cooling Water System	
		Chiller	Tower Water
pH ^[6]	pH units	7.2 to 8.5	7.2 to 9.0
Conductivity	µmhos/cm	< 3000	< 3000
Total Hardness (CaCO ₃)	ppm	< 10	60 to 1000
Calcium Hardness (CaCO ₃)	ppm	< 10	20 to 800
"M" Alkalinity (CaCO ₃)	ppm	—	< 500

^[6] If there is aluminum in the system (i.e. take-off system), then a maximum pH value of 8.5 is recommended

Table 7-6: Cations

Constituents	Units	Cooling Water System	
		Closed Loop Chiller	Tower Water
Total Iron (Fe)	ppm	< 3.00	< 3.00
Manganese (Mn)	ppm	< 0.05	< 0.05
Copper (Cu)	ppm	< 0.05	< 0.10
Aluminum (Al)	ppm	< 0.10	< 0.50

Table 7-7: Anions (Corrosive Impurities)

Constituents	Units	Cooling Water System	
		Closed Loop Chiller	Tower Water
Free Chlorine (Cl ₂)	ppm	< 0.1	< 1.0
Chloride (Cl)	ppm	< 200	< 400
Sulfate (SO ₄)	ppm	< 300	< 500
Silica (SiO ₂)	ppm	< 150	< 150

Table 7-8: Solids

Constituents	Units	Cooling Water System	
		Closed Loop Chiller	Tower Water
Suspended Solids	ppm	< 10	—
Filter Size	µm	< 25	< 25

Table 7-9: Microbiological Activity

Constituents	Units	Cooling Water System	
		Closed Loop Chiller	Tower Water
Sulfate Reducing Bacteria ^[7]	Cfu/ml	< 1	< 2
Total Aerobic Bacteria	Cfu/ml	< 10000	< 10000

^[7] Detection of bacteria living under deposits in the bulk water may not reveal the actual severity and degree of contamination in the system.

Table 7-10: Maximum Corrosion Rate

Constituents	Units	Cooling Water System	
		Closed Loop Chiller	Tower Water
Mild Steel	mils Per Year	< 1.0	< 2.0
Galvanized Steel	mils Per Year	< 1.0	< 3.0
Copper and Copper Alloys	mils Per Year	< 0.1	< 0.2
Aluminium	mils Per Year	< 0.25	< 0.5
Stainless Steel	mils Per Year	< 0.1	< 0.1

Table 7-10: Maximum Corrosion Rate (Continued)

Constituents	Units	Cooling Water System	
		Closed Loop Chiller	Tower Water
Zinc	mils Per Year	< 2.0	< 2.0

7.6.4 Machine Cooling Water Temperature and Pressure

Description	Value
Inlet Temperature Range	10 to 34 °C (50 to 93 °F) , Non-Condensing ^[8]
Maximum Inlet Pressure	6 bar (90 psi)
Minimum Pressure Drop	2 bar (29 psi)

^[8] The temperature of the water supply must be above the temperature at which condensation will occur.

7.6.5 Machine Cooling Water Flow Rate Requirements

The total machine cooling water flow rate requirement is the addition of the machine type in [Section 7.6.5.1](#) and CoolPik DH2.2 [Section 7.6.5.2](#) flow rates.

Total machine cooling water flow rate = Machine type flow rate + CoolPik DH2.2 (if equipped) flow rate.

7.6.5.1 Machine Cooling Water Flow Rates

Depending on the machine type, select the cooling water flow rate from the appropriate tables in this section.

Table 7-11: HyPET6e Model Machines

Clamp Size	Injection Unit	Screw Speed	Water Flow Rate
225	P85/95 EE85	SSS/ISS	240L/min (63 U.S. gal/min)
	P85/95 EE100	SSS/ISS	
	P100/110 EE120	SSS/ISS	
300	P85/95 EE100	ISS	270L/min (71 U.S. gal/min)
	P100/110 EE120	SSS/ISS	
	P100/120 EE120	SSS/ISS	
	P120/130 EE140	SSS/ISS	

Table 7-11: HyPET6e Model Machines (Continued)

Clamp Size	Injection Unit	Screw Speed	Water Flow Rate
400	P85/95 EE100	SSS/ISS	300L/min (79 U.S. gal/min)
	P100/110 EE120	SSS/ISS	
	P100/120 EE120	SSS/ISS	
	P120/130 EE140	SSS/ISS	
	P120/140 EE140(30:1)	ISS	
500	P110/110 EE120	SSS/ISS	330L/min (87 U.S. gal/min)
	P120/130 EE140	SSS/ISS	
	P120/140 EE140(30:1)	ISS	
	HP155/160 E155 (30:1)	ISS	

Table 7-12: HyPET HPP6e Model Machines

Clamp Size	Injection Unit	Screw Speed	Water Flow Rate
225	P85/95 EE85	SSS/ISS	240L/min (63 U.S. gal/min)
	P85/95 EE100	SSS/ISS	
	P100/110 EE120	SSS/ISS	
300	P85/95 EE100	ISS	270L/min (71 U.S. gal/min)
	P100/110 EE120	SSS/ISS	
	P100/120 EE120	SSS/ISS	
	P120/130 EE140	SSS/ISS	
400	P85/95 EE100	SSS/ISS	300L/min (79 U.S. gal/min)
	P100/110 EE120	SSS/ISS	
	P100/120 EE120	SSS/ISS	
	P120/130 EE140	SSS/ISS	
	P120/140 EE140(30:1)	SSS/ISS	

Table 7-12: HyPET HPP6e Model Machines (Continued)

Clamp Size	Injection Unit	Screw Speed	Water Flow Rate
500	P110/110 EE120	SSS/ISS	330L/min (87 U.S. gal/min)
	P120/130 EE140	SSS/ISS	
	P120/140 EE140(30:1)	ISS	
	P155/160 E155 (30:1)	ISS	

7.6.5.2 Cooling Water Flow Rates for the CoolPik DH2.2

Depending on the machine size select the flow rate for the CoolPik DH2.2.

Table 7-13: For CoolPik DH2.2

Clamp Size	CoolPik DH2.2	Continental	Tropical
		Water Requirement	Water Requirement
225	DSH2403	110 L/min. (29 U.S. gal/min)	130 L/min. (34 U.S. gal/min)
300	DSH3003	140 L/min. (37 U.S. gal/min)	170 L/min. (45 U.S. gal/min)
400	DSH5003	250 L/min. (66 U.S. gal/min)	300 L/min. (79 U.S. gal/min)
500	DSH7003	310 L/min. (82 U.S. gal/min)	380 L/min. (100 U.S. gal/min)

7.7 Mold Cooling Water Specifications

Mold cooling water supply specifications are dependent upon the mold. Refer to the mold *Service Manual* for details.

In addition to the chilled water flow rates are required for the CoolPik DH2.2.

Table 7-14: For CoolPik DH2.2

Clamp Size	CoolPik DH2.2	Continental	Tropical
		Water requirement	Water requirement

Table 7-14: For CoolPik DH2.2 (Continued)

Clamp Size	CoolPik DH2.2	Continental	Tropical
		Water requirement	Water requirement
225	DSH2403.2	105 L/min. (28 U.S gal/min)	132 L/min. (35 U.S gal/min)
300	DSH3003.2	114 L/min. (30 U.S gal/min)	150 L/min. (40 U.S gal/min)
400	DSH5003.2	187 L/min. (49 U.S gal/min)	253 L/min. (40 U.S gal/min)
500	DSH7003.2	252 L/min. (67 U.S gal/min)	346 L/min. (91 U.S gal/min)

Table 7-15: For CoolPik Blower

Clamp Size	CoolPik Blower	Continental/Tropical
		Water Requirement
225	DSH2403	87 L/min. (23 U.S gal/min)
300	DSH3003	111 L/min. (29 U.S gal/min)
400	DSH5003	180 L/min. (48 U.S gal/min)
500	DSH7003	247 L/min. (65 U.S gal/min)

7.8 Compressed Air Specifications

The compressed air supply must comply with certain specifications.

7.8.1 Compressed Air Quality

Compressed air supplied to the machine must meet the following quality standards in accordance with ISO 8573-1 Class 2.4.1.

Table 7-16: Solid Particles

Compressed Air Volume	Filtration Ratio	Maximum Number of Particles ^[9]
1 m ³ (35.3 ft ³)	0.1 to 0.5 µm (3.93700 to 19.6850 µin)	100000
	0.5 to 1.0 µm (19.6850 to 39.3700 µin)	1000
	1.0 to 5.0 µm (39.3700 to 196.850 µin)	10

^[9] Measured in accordance with ISO 8573-4 Class 2.

Table 7-17: Humidity

Item	Specification
Amount of Water Allowed	0%
Pressure Dew Point ^[10]	3 °C (37.4 °F)

^[10] Measured in accordance with ISO 8573-3 Class 4.

Table 7-18: Oil

Compressed Air Volume	Maximum Amount of Oil ^[11]
1 m ³ (35.3 ft ³)	0.01 mg (0.015432 gr)

^[11] Applies to both oil aerosol and oil vapor. Measured in accordance with ISO 8573-2 and 8573-5.

7.8.2 Compressed Air Requirements

Description	Value
Compressed Air Supply	Refer to Section 7.8.3
Inlet Pressure (Minimum to Maximum)	7.9 to 10.3 bar (115 to 150 psi)

7.8.3 Compressed Air Consumption

Clamp Size	Maximum Cavities	Estimated Flow Rate with Vacuum Part Transfer ^[12]		
		7 Second Cycle	14 Second Cycle	20 Second Cycle
225	96	2064 L/min (72 SCFM)	1032 L/min (36 SCFM)	722 L/min (25 SCFM)

Clamp Size	Maximum Cavities	Estimated Flow Rate with Vacuum Part Transfer ^[12]		
		7 Second Cycle	14 Second Cycle	20 Second Cycle
300	128	2752 L/min (96 SCFM)	1376 L/min (48 SCFM)	963 L/min (34 SCFM)
400	144	3096 L/min (108 SCFM)	1548 L/min (54 SCFM)	1084 L/min (38 SCFM)
500	160	3440 L/min (120 SCFM)	1720 L/min (60 SCFM)	1204 L/min (42 SCFM)

^[12] Measured at 7.9 bar (115 psi)

7.9 Lubricant, Sealant and Hydraulic Oil Specifications

Lubricants, sealants and hydraulic oils used in the machine must comply with certain specifications.



WARNING!

Chemical hazard - Some of the chemicals used with Husky equipment are potentially hazardous and could cause injury and illness. Before storing, handling, or working with any chemical or hazardous material, thoroughly read and understand each applicable Material Safety Data Sheet (MSDS), use recommended personal protective equipment and follow the manufacturer's instructions.

For Husky part numbers, refer to the consumables list in [Section 1.11](#).

7.9.1 Recommended Oils

The following oils have been tested for compatibility with Husky equipment. Use only the oils listed to assure compliance with Husky's warranty terms.

Application	Recommended Oils	Category
Hydraulic System ^[13]	Total Azolla ZS46 Chevron AW46 Chevron Rando HD46 Chevron Clarity SynHOAW 32 Petro-Canada Hydrex AW46 Shell Tellus S2M 46 Shell Tellus S2MX 46 Shell Tellus S3M 46 Shell Tellus S4 ME 46 Mobil DTE 25 Ultra Mobil DTE 10 Excel 46 Schaeffer 254-ISO 46 ^[14] Lubra Hidraulico ISO 46 SC Premium Lukoil Geyser ST 46 Phillips 66 Powerflow NZ 46 Phillips 66 Megaflow AW 46 Lubriplate ZF-46	Mineral oil based
	Hydrotex Syn-Nth ^[14] Petro-Canada Purity FG	Synthetic
Extruder Motor/Gearbox Drive Housing	Castrol Alpha EP 220 (Non-Food Grade) Castrol Alpha SP 220 (Non-Food Grade) Mobilgear 600 XP 220 (Non-Food Grade) Shell Omala S2 GX 220 (Non-Food Grade)	—
Vacuum Pump	Busch VS 150 (For Busch pumps) Becker G 150 (For Becker pumps)	—
Electric Clamp Lock Piston	Mobilgear 600 XP 220	—

^[13] All hydraulic oils are ISO grade 46.

^[14] Only available in North America.

CAUTION!

Mechanical hazard – risk of equipment damage. Never mix different brands or grades of oil. Mixing different oils can cause premature breakdown of the oil and could result in equipment damage.

**IMPORTANT!**

It is the customer's responsibility to comply with Husky's oil specifications. To use an oil other than those approved, contact your nearest Husky Regional Service and Sales office for details on how to obtain approval.

7.9.2 Recommended Lubricants for General Applications

The following is a list of recommended lubricants for general applications.

NOTE:

Husky recommends only the following lubricants and sealants, and does not assume any responsibility for brands not specified. It is the customers responsibility when consulting with an alternate supplier to make sure a suitable equivalent is used.

NOTE:

Lubricants and sealants of inferior quality can cause premature wear of components.

**WARNING!**

Chemical hazard - Some of the chemicals used with Husky equipment are potentially hazardous and could cause injury and illness. Before storing, handling, or working with any chemical or hazardous material, thoroughly read and understand each applicable Material Safety Data Sheet (MSDS), use recommended personal protective equipment and follow the manufacturer's instructions.

CAUTION!

Mechanical hazard – risk of equipment damage. Do not mix different brands or grades of lubricants or greases. Mixing lubricants or greases can cause premature breakdown of the lubricant or grease and result in equipment damage.

Application	Food Grade Lubricant	Non Food Grade Lubricant
Dynamic joints (i.e. rod ends, plain bearing, linkages, tie bar shoe, etc.)	Lubriplate FGL-1 Lubriplate FGL-2 Lubriplate Synxtreme FG-1	Lubriplate 3000
Electric clamp lock piston assembly	—	Mobilgear 600 XP 220

Application	Food Grade Lubricant	Non Food Grade Lubricant
Clamp lock Rod Ends and Plain Bearings, Perma Nova Automatic Lubricator for Rod Ends	Klübersynth UH1 14 151	—
Fasteners (Mechanical) ^[15]	Lubriplate FGL-1 Lubriplate Synxtreme FG-1	Hydraulic Oil ^[16] Lubriplate 3000 Molykote G
Fasteners (Mechanical) ^[17]	—	Optimoly Paste TA
Fasteners (Electrical) ^[17]	—	Optimoly Paste TA
Linear bearings	Lubriplate FGL-1 Lubriplate Synxtreme FG-1	THK AFB-LF Lubriplate 730-1
Metal surfaces that are bare or exposed	LPS1 Premium Lubricant is acceptable for use in Canadian food processing establishments	LPS1 Premium Lubricant
Roller and ball bearings Wear pads or injection housing wear pads	Lubriplate FGL-1 Lubriplate FGL-2 Lubriplate Synxtreme FG-1	Lubriplate 3000
Robot linear bearings	Lubriplate Synxtreme FG-1	THK AFJ
Seals	Lubriplate SFGO Ultra 46	Hydraulic Oil ^[17] Fiske AW-46

^[15] For low temperature (< 150 °C (302 °F) applications.

^[16] Refer to the list of recommended hydraulic oils

^[17] For high temperature (> 150 °C (302 °F) applications.

7.9.3 Recommended Lubricants and Sealants for Fittings

The following is a list of recommended lubricants and sealants that should be used when installing fittings.

Application	Connection		Food Grade	Non Food Grade
Hydraulic	Steel	SAE, ORFS, BSPP	Lubriplate FGL-2 ^[18]	Hydraulic Oil ^[19]
Lubrication	Steel	SAE, ORFS, BSPP	Lubriplate FGL-2 ^[18]	Hydraulic Oil ^[19]
		NPT	Loctite 567	Loctite 577

Application	Connection		Food Grade	Non Food Grade
Air	Steel, Aluminum and Brass	NPT	Loctite 567	Loctite 577
		JIC	—	Hydraulic Oil ^[19]
	Steel	SAE, BSPP	Loctite 567	Loctite 577
	Brass	SAE, BSPP	—	—
Water	Steel and Brass	NPT	Loctite 567	Loctite 577
		SAE, BSPP, JIC	—	Hydraulic Oil ^[19]
	Aluminum	NPT	Loctite 567	Loctite 577
	Stainless Steel	NPT	Loctite 567	Loctite 577
		JIC, SAE ^[20]	—	Hydraulic Oil ^[19]

^[18] Apply the lubricant to the surface that makes contact with the O-ring.

^[19] Refer to the list of recommended hydraulic oils.

^[20] SAE plugs included.

7.9.4 Hydraulic Oil Capacity

The oil capacity for the hydraulic system is based on the machine size and configuration.



IMPORTANT!

The oil capacities listed are estimated based on the total volume of the hydraulic system. The actual volume required for filling may vary based on the amount of oil left in the hydraulic tank, hoses, cylinders, etc. Make sure to follow the procedure for filling the hydraulic tank.

Injection Unit Size	Oil Required at Startup	Oil Required For Oil Change
P85 EE85	724 L (192 U.S. gal)	550 L (146 U.S. gal)
P85 EE100	910 L (241 U.S. gal)	706 L (187 U.S. gal)
P100 EE100	910 L (241 U.S. gal)	706 L (187 U.S. gal)
P100 EE120	950 L (251 U.S. gal)	716 L (189 U.S. gal)
P100 EE140	1110 L (294 U.S. gal)	857 L (227 U.S. gal)
P120 EE120	950 L (251 U.S. gal)	716 L (189 U.S. gal)
P120 EE140	1110 L (294 U.S. gal)	857 L (227 U.S. gal)
P120 EE140L	1210 L (320 U.S. gal)	923 L (244 U.S. gal)

Injection Unit Size	Oil Required at Startup	Oil Required For Oil Change
P155 EE155L	1305 L (345 U.S. gal)	965 L (255 U.S. gal)

7.9.5 Drive Housing and Gearbox Oil Capacities

The oil capacity for the drive housing and gearbox is based on the machine model and size.

Table 7-19: For HyPET6e Machines

Injection Unit	Extruder	Drive Housing	Gearbox
P85	EE85	2.5 L (0.7 U.S. gal)	39 L (11 U.S. gal)
P85	EE100	3.2 L (0.8 U.S. gal)	53 L (14 U.S. gal)
P100	EE100	3.2 L (0.8 U.S. gal)	53 L (14 U.S. gal)
P100	EE120	3.2 L (0.8 U.S. gal)	53 L (14 U.S. gal)
P100	EE140	5.9 L (1.6 U.S. gal)	116 L (31 U.S. gal)
P120	EE120	3.2 L (0.8 U.S. gal)	53 L (14 U.S. gal)
P120	EE140	5.9 L (1.6 U.S. gal)	116 L (31 U.S. gal)
P120	EE140L	5.9 L (1.6 U.S. gal)	115 L (30 U.S. gal)
P155	EE155L	6.5 L (1.7 U.S. gal)	145 L (38 U.S. gal)

Table 7-20: HyPET HPP6e, and HyPET HPP6e HD Machines

Injection Unit	Extruder	Drive Housing	Gearbox
P85	EE85	2.5 L (0.7 U.S. gal)	43 L (11 U.S. gal)
P85	EE100	3.2 L (0.8 U.S. gal)	58 L (15 U.S. gal)
P100	EE100	3.2 L (0.8 U.S. gal)	58 L (15 U.S. gal)
P100	EE120	3.2 L (0.8 U.S. gal)	58 L (15 U.S. gal)
P100	EE140	5.9 L (1.6 U.S. gal)	115 L (30 U.S. gal)
P120	EE120	3.2 L (0.8 U.S. gal)	58 L (15 U.S. gal)
P120	EE140	5.9 L (1.6 U.S. gal)	115 L (30 U.S. gal)
P120	EE140L	5.9 L (1.6 U.S. gal)	115 L (30 U.S. gal)
P155	EE155L	6.5 L (1.7 U.S. gal)	115 L (30 U.S. gal)

7.9.6 Notes About Hydraulic Oil

- Hydraulic oils with a high zinc content as part of the anti-wear additive package (>400 ppm Zn), will most likely experience a corresponding increase in copper content over time, as noted in the oil sample. While this copper (in solution with the oil) poses no threat as particulate contamination, it is known that it can increase the rate of oxidation of the fluid. Therefore, extremely high copper content (>100 ppm Cu) is undesirable.
- Zinc-free (ashless) oils are preferred by Husky for use in Husky equipment, as the alternative anti-wear additive packages contain no heavy metals. This makes them more environmentally-friendly at the time of disposal.

NOTE:

Care must be taken to assure compatibility when mixing zinc-based fluids with zinc-free alternatives.

- Husky does not endorse the usage of fire resistant or higher flash point hydraulic oils due to a possible incompatibility with seals and excess wear on hydraulic components.

7.9.7 Acceptable Hydraulic Oil Quality

The following table lists the characteristics of hydraulic oil that should be tested during fluid analysis, as well as the caution limits and action required limits.

NOTE:

Oil samples testing should be performed according to the maintenance schedule to allow for proper trending to be carried out and to monitor and confirm the health of the oil in the reservoir.

CAUTION!

Hydraulic oil is considered to be at the end of its useful life when any of the warning limits have been reached.

If regular oil analysis is not done, it is recommended to replace the oil at 8,000 hours of operation to prevent degradation and equipment failures.

CAUTION!

Contamination hazard – risk of damage to the machine. Hydraulic oil is considered to be at the end of its useful life when any of the warning limits have been reached.

NOTE:

It is extremely important to baseline a sample of the oil when it is new. All comparisons of the quality of the oil from that point onward will be compared to the new sample.

Table 7-21: Oil Analysis Chart

Tests	Normal	Caution Note	Action Required
ICP Spectroscopy			
Sodium (Na)	0 > 5	5 > 10	> 10
Potassium (K)	0 > 5	5 > 10	> 10
Silicon (Si)	0 > 5	5 > 10	> 10
Aluminum (Al)	0 > 5	5 > 10	> 10
Iron (Fe)	< 5	5 - 10	> 10
Copper (Cu)	< 5	5 - 10	> 10
Lead (Pb)	< 5	5 - 10	> 10
Tin (Sn)	< 5	5 - 10	> 10
Chromium (Cr)	< 5	5 - 10	> 10
Nickel (Ni)	< 5	5 - 10	> 10
Titanium (Ti)	< 5	5 - 10	> 10
Silver (Ag)	< 5	5 - 10	> 10
Vanadium (V)	< 5	5 - 10	> 10
Antimony (Sb)	< 5	5 - 10	> 10
Beryllium (Be)	< 5	5 - 10	> 10
Additives			
Calcium (Ca)	- 10%	- 25%	- 50%
Zinc (Zn)	- 10%	- 25%	- 50%
Phosphorus (P)	- 10%	- 25%	- 50%
Magnesium (Mg)	- 10%	- 25%	- 50%
Molybdenum (Mo)	- 10%	- 25%	- 50%
Boron (B)	- 10%	- 25%	- 50%
Barium (Ba)	- 10%	- 25%	- 50%

Table 7-21: Oil Analysis Chart (Continued)

Tests	Normal	Caution Note	Action Required
Lithium (Li)	- 10%	- 25%	- 50%
Visc @ 40°C cSt	46	+/- 5%	+/- 10%
Water (PPM)	< 150 PPM	150 PPM – 250 PPM	>250 PPM
NIT (A/cm)	N/A	N/A	N/A
OX (A/cm)	—	<7	<10
SUL (A/cm)	N/A	N/A	N/A
ISO Code	14/12/10	17/14/11	19/16/13
>4μ	80 – 160	640 – 1300	2500 – 5000
>6μ	20 – 40	80 – 160	320 - 640
>14μ	5 – 10	10 – 20	40 - 80
TAN-E mg/g	— ^[21]	+50%	+100%
MPC Varnish potential	MPC <20 No action. Monitor at 2,000 hour intervals	20 < MPC < 40 Warning. Monitor monthly, use varnish removal equipment	MPC > 40 Alarm. Replace oil immediately

^[21] Normal is determined by the baseline sample.

7.10 Nitrogen Volume for Hydraulic Accumulators

Depending on the machine model the number of accumulators can differ. Make sure to select the correct model, clamp, injection unit size and motor type to identify the volume of nitrogen required.

NOTE:

Explosion hazard – risk of death or serious injury. To prevent an explosion, use pure nitrogen gas to precharge the accumulator. Nitrogen gas must be at least 99.995% pure.

Machine Model	Reference
HyPET6e Injection Accumulator	Table 7-22
HyPET6e and HyPET HPP6e Clamp Accumulator	Table 7-23

Table 7-22: HyPET6e and HyPET HPP6e Machine Models Injection Accumulator (Including Injection Completion Option)

Clamp Size	Injection Unit Size ^[22]		Maximum Volume ^[23]
225	P85	E85 ISS	2X 50 L (13.2 U.S. gal)
		E100 ISS	2X 50 L (13.2 U.S. gal)
	P100	E120 ISS	3X 50 L (13.2 U.S. gal)
300	P85	E100 ISS	3X 50 L (13.2 U.S. gal)
	P100	E120 ISS	4X 50 L (13.2 U.S. gal)
	P120	E140 ISS	4X 50 L (13.2 U.S. gal)
400	P85	E100 ISS	3X 50 L (13.2 U.S. gal)
	P100	E120 ISS	4X 50 L (13.2 U.S. gal)
	P120	E140 ISS	4X 50 L (13.2 U.S. gal)
		E140L ISS	4X 50 L (13.2 U.S. gal)
500	P100	E120 ISS	4X 50 L (13.2 U.S. gal)
	P120	E140 ISS	5X 50 L (13.2 U.S. gal)
		E140L ISS	6X 50 L (13.2 U.S. gal)
	P155	E155 ISS	8X 50 L (13.2 U.S. gal)

^[22] ISS = Increased Screw Speed

^[23] For machines that meet American Society of Mechanical Engineers (ASME) standards, 54 L (14.3 U.S. gal) bottles are used in place of 50 L (13.2 U.S. gal) bottles.

Table 7-23: HyPET6e and HyPET HPP6e Machine Models Clamp Accumulator

Clamp Size	Maximum Volume ^[24]
225	2X 50 L (13.2 U.S. gal)
300	2X 50 L (13.2 U.S. gal)
400	2X 50 L (13.2 U.S. gal)
500	2X 50 L (13.2 U.S. gal)

^[24] For machines that meet American Society of Mechanical Engineers (ASME) standards, 54 L (14.3 U.S. gal) bottles are used in place of 50 L (13.2 U.S. gal) bottles.

7.11 Rust Inhibitor Specifications

The rust inhibitor used on the machine must meet the following specifications:

Type	Water-borne corrosion resistant non-hardening film
Trade Name	Cortec Corp. VpCI-389

7.12 Machine Data

The following lists the various machine settings or limits.

Table 7-24: Hydraulic System Settings

Description	Value
Hydraulic Oil Filtration	$\beta_5 \geq 1000$
Hydraulic Oil Operating Temperature	50 °C (122 °F)
Hydraulic System Operating Pressure (Maximum)	235 bar (3408 psi)
Bladder Accumulator Precharge Pressure at Operating Temperature	140 bar (2030 psi)
Bladder Accumulator Precharge Pressure at Room Temperature 20 °C (68 °F)	127 bar (1842 psi)
Piston Accumulator Precharge Pressure at Operating Temperature	3.4 bar (50 psi)

Table 7-25: Injection Temperature Limit

Injection Temperature	Value
Minimum Permissible Temperature for Plasticizing	182 °C (360 °F)
Maximum Permissible Temperature for Plasticizing	340 °C (644 °F)

7.13 Standard Torque Specifications

Unless stated otherwise on the assembly drawings, all hardware, including bolts, screws, fittings and flanges, must be lubricated and torqued according to the following standard specifications. Visit www.husky.co and refer to HS-252 - Standard Assembly Torques for a list of standard torque specifications.

Reference Only

Reference Only