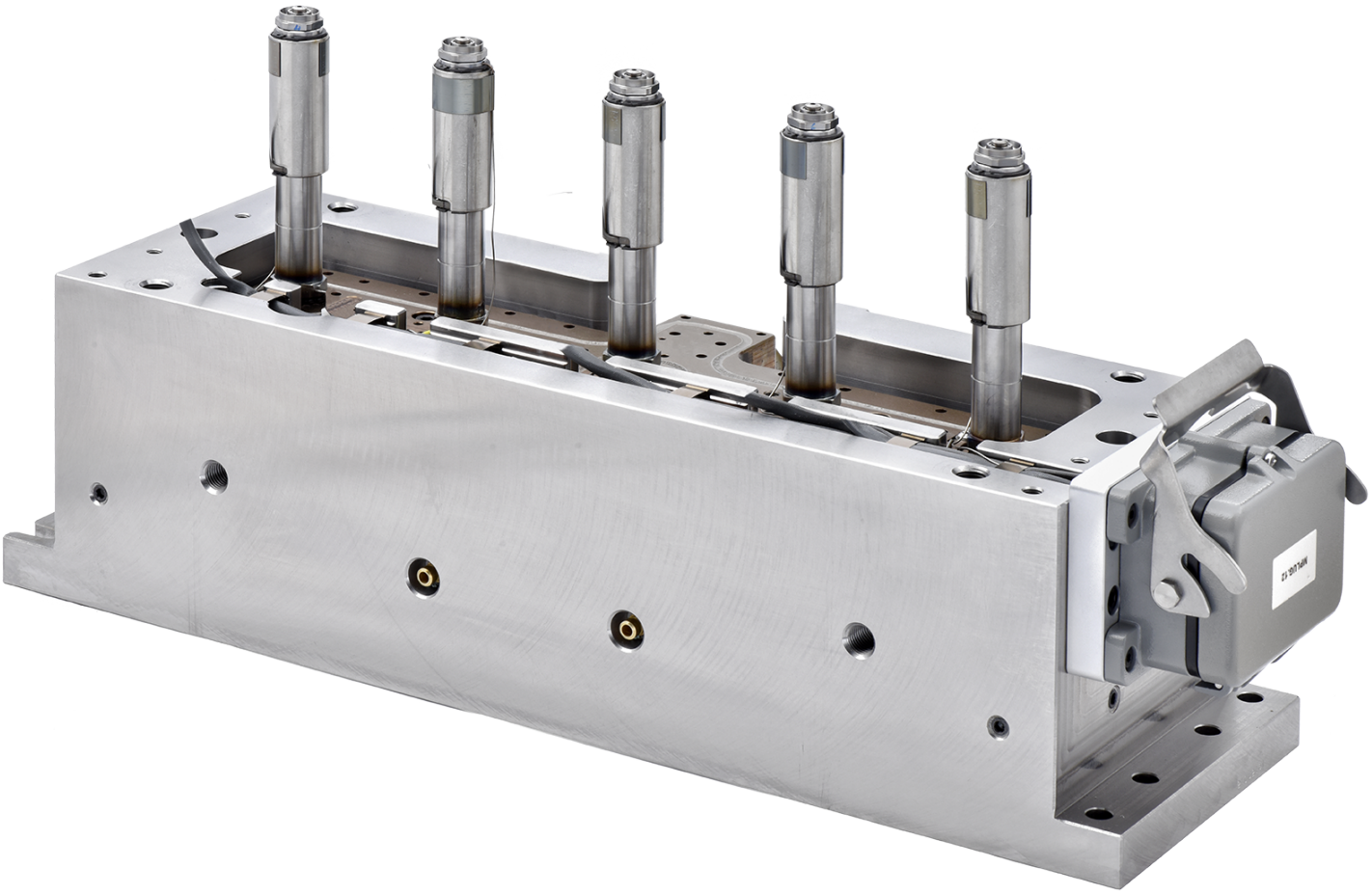
Mold Masters

Axiom TG

Single Stage PET Hot Runner
User Manual

version 2



Contents

Section 1 - Introduction

The purpose of this manual is to assist users in the safe operation and/or maintenance of a Hot Runner and it was designed to cover all relevant topics. If you need any additional information specific to your system please contact your representative or the Mold-Masters office.

1.1 Intended Use

Mold-Masters' Hot Runner systems have been built to process thermoplastic material at the required temperature for injection molding and must not be used for any other purpose.

This manual is written for use by skilled persons who are familiar with injection molding machinery and their terminology. Operators should be familiar with plastic injection molding machines and the controls of such equipment. Maintenance persons should have sufficient understanding of electrical safety to appreciate the dangers of 3-phase supplies. They should know how to take appropriate measures to avoid any danger from electrical supplies.

1.2 Documentation

This manual is part of the documentation package for your order and should be referenced along with the following documents included in the package:

- The Bill of Materials (BOM). Together with the General Assembly drawing, the Bill of Materials should be referenced when ordering spare parts.
- General Assembly drawing used to integrate your Hot Runner system into the mold.
- Hot Half drawing used to integrate Hot Half to cavity plate.

1.3 Release Details

When ordering this manual, please reference a document number from the following table.

Table 1-1 Release Details

Document Number	Release Date	Version
UM--AXTG--ENG--01	May 2023	01
UM--AXTG--ENG--02	June 2026	02

1.4 Returned Goods Policy

Please do not return any parts to Mold-Masters without pre-authorization and a return authorization number supplied by Mold-Masters.

Our policy is one of continuous improvement and we reserve the right to alter product specifications at any time without giving notice.

1.5 Movement or Resale of Mold-Masters Products

This documentation is intended for use in the country of destination for which the product or system was purchased.

Mold-Masters takes no responsibility for documentation of products or systems if they are relocated or resold outside the intended country of destination, as stated on the accompanying invoice and/or waybill.

1.6 Terminology

*V*arious terms can be used to refer to components listed in user manual. As these terms may differ from company to company, please find below a list of terminology to assist in the identification of components used in this document.

Bridge:

- Distributes melt from the inlet component to one or more sub-manifolds. Not always required on smaller hot runner systems.
- **Alternate terms:** main manifold, distributor bar

Nozzle:

- Delivers melt from the manifold to the gate. Refer to any nozzle section for examples.
- **Alternate terms:** drop, hot drop, probe, heater, sprue, cast, heated bushing

Nozzle Well:

- Cutout in mold plate to fit nozzle. See any nozzle section for examples.

Gate Seal:

- Connected to the nozzle, usually threaded into the front of the nozzle. Provides a seal between the nozzle and the mold steel. Refer to any nozzle section for examples.
- **Alternate terms:** transfer seal, T-seal, tit-seal

Inlet Component:

- The part of the hot runner system that makes contact with the machine nozzle. The inlet nozzle radius (spherical radius) must be specified to suit the machine nozzle to be used. The machine nozzle should also have an opening to match the inlet component selected.

Liner/Sprue:

- Component held in place in the front of the nozzle by the gate seal. Used in certain valve and sprue gating techniques. Refer to any nozzle section for examples.

Locating Ring:

- Ring used to position the system in the mold plate and the mold in the machine. Refer to Inlet Component section for examples.

Manifold:

- Distributes melt from the main manifold or inlet component to the individual nozzles.
- Alternate terms: sub-manifold, distributor

1.7 Units of Measure and Conversion Factors

NOTE

The dimensions given in this manual are from original manufacturing drawings.

All values in this manual are in S.I. units or subdivisions of these units. Imperial units are given in parenthesis immediately after the S.I. units.

Table 1-2 Units of Measure and Conversion Factors

Unit	Abbreviation	Conversion value
bar	Bar	14.5 psi
in.	Inch	25.4 mm
kg	Kilogram	2.205 lb
kPa	Kilopascal	0.145 psi
lb	Pound	0.4536 kg
lbf	Pound force	4.448 N
lbf.in.	Pound force inch	0.113 Nm
min	Minute	
mm	Millimeter	0.03937 in.
mΩ	Milliohm	
N	Newton	0.2248 lbf
Nm	Newton meter	8.851 lbf.in.
psi	Pound per square inch	0.069 bar
psi	Pound per square inch	6.895 kPa
rpm	Revolutions per minute	
s	Second	
°	Degree	
°C	Degree Celsius	0.556 (°F -32)
°F	Degree Fahrenheit	1.8 °C +32

Section 2 - Safety

Please be aware that the safety information provided by Mold-Masters does not absolve the integrator and employer from understanding and following international and local standards for safety of machinery. It is the responsibility of the end integrator to integrate the final system, provide necessary e-stop connections, safety interlocks and guarding, to select the appropriate electrical cable for the region of use and to ensure compliance with all relevant standards.

It is the responsibility of the employer to:

- Properly train and instruct its personnel in the safe operation of equipment, including the use of all the safety devices.
- Provide its personnel with all necessary protective clothing, including a face shield and heat resistant gloves.
- Ensure the original and continuing competence of personnel caring for, setting up, inspecting and maintaining injection molding equipment.
- Establish and follow a program of periodic and regular inspections of injection molding equipment to ensure it is in safe operating condition and proper adjustment.
- Ensure that no modifications, repairs, or rebuild of portions are made to the equipment that reduces the level of safety existing at time of manufacture or remanufacture.

2.1 Safety Hazards

WARNING

Refer to all machine manuals and local regulations and codes for safety information.

The following safety hazards are most commonly associated with plastic injection molding equipment (see European Standard EN201 or American Standard ANSI/SPI B151.1).

Table 2-1 Safety Hazards

Hazard Area	Potential Hazards
Mold Area Area between the platens.	**Mechanical Hazards** Crushing and / or shearing and / or impact hazards caused by: • Movement of the platen. • Movements of the injection barrel(s) into the mold area. • Movements of cores and ejectors and their drive mechanisms. • Tie bar motion. **Thermal Hazards** Burns and / or scalds due to operating temperature of: • The mold heating elements. • Plasticized material released from / through the mold.
Clamping Mechanism Area	**Mechanical Hazards** Crushing and / or shearing and/or impact hazards caused by: • Movement of the platen. • Movement of the drive mechanism of the platen. • Movement of the core and ejector drive mechanism.
Movement of Drive Mechanisms Outside the Mold Area and Outside the Clamping Mechanism Area	**Mechanical Hazards** Mechanical hazards of crushing, shearing and / or impact caused by the movements of: • Core and ejector drive mechanisms.
Nozzle Area The nozzle area is the area between the barrel and the sprue bushing.	**Mechanical Hazards** Crushing, shearing hazards, and / or impact hazards caused by: • Forward movement of the plasticizing and / or injection unit including nozzle. • Movements of parts of the power operated nozzle shutoff and their drives. • Over pressurization in the nozzle. **Thermal Hazards** Burns and or scalds due to operating temperature of: • The nozzle. • Plasticized material discharging from the nozzle.

Table 2-1 Safety Hazards	
Hazard Area	**Potential Hazards**
Plasticizing and / or Injection Unit Area Area from the adapter / barrel head / end cap to the extruder motor above the sled including the carriage cylinders.	**Mechanical Hazards** Crushing, shearing and / or drawn-into hazards caused by: • Unintentional gravity movements e.g. for machines with plasticizing and / or injection unit positioned above the mold area. • The movements of the screw and / or the injection plunger in the cylinder accessible through the feed opening. • Movement of the carriage unit. **Thermal Hazards** Burns and or scalds due to operating temperature of: • The plasticizing and / or injection unit. • The heating elements e.g. heater bands. • The plasticized material and / or vapors discharging from the vent opening, feed throat or hopper. **Mechanical and / or Thermal Hazard** Hazards due to reduction in mechanical strength of the plasticizing and / or injection cylinder due to overheating.

Table 2-2 Safety Hazards	
Hazard Area	**Potential Hazards**
Feed Opening	Pinching and crushing between injection screw movement and housing.
Area of the Heater Bands of the Plasticizing and / or Injection Cylinders	Burns and / or scalds due to operating temperature of: • The plasticizing and / or injection unit. • The heating elements e.g. heater bands. • The plasticized material and / or vapors discharging from the vent opening, feed throat or hopper.
Parts Discharge Area	**Mechanical Hazards** Accessible Through the Discharge Area Crushing, shearing and / or impact hazards caused by: • Closing movement of the platen. • Movements of cores and ejectors and their drive mechanisms. **Thermal Hazards** Accessible Through the Discharge Area Burns and or scalds due to operating temperature of: • The mold. • Heating elements of the mold. • Plasticized material released from/through the mold.
Hoses	• Whipping action caused by hose assembly failure • Possible release of fluid under pressure that can cause injury. • Thermal hazards associated with hot fluid.
Area Inside the Guards and Outside the Mold Area	Crushing and / or shearing and/or impact hazards caused by: • Movement of the platen. • Movement of the drive mechanism of the platen. • Movement of the core and ejector drive mechanism. • Clamp opening movement.
Electrical Hazards	• Electric shock or burns due to contact with live conductive parts. • Electrical or electromagnetic disturbance generated by the motor control unit. • Electrical or electromagnetic disturbance that can cause failures in the machine control systems and adjacent machine controls. • Electrical or electromagnetic disturbance generated by the motor control unit.
Hydraulic Accumulators	High pressure discharge.
Power Operated Gate	Crush or impact hazards caused by the movement of the power operated gates.
Vapors and Gases	Certain processing conditions and / or resins can cause hazardous fumes or vapors.

2.2 Operational Hazards

WARNINGS

- Refer to all machine manuals and local regulations and codes for safety information.
- The equipment supplied is subjected to high injection pressures and high temperatures. Ensure that extreme caution is observed in the operation and maintenance of the injection molding machines.
- Only fully trained personnel should operate or maintain equipment.
- Do not operate the equipment with unconfined long hair, loose clothing or jewelry, including name badges, neckties, etc. These may get caught in the equipment and can cause death or serious injury.
- Never disable or bypass a safety device.
- Ensure that the protective guards are placed around the nozzle to prevent the material from splashing or drooling.
- A burn hazard exists from material during routine purging. Wear heat-resistant personal protective equipment (PPE) to prevent burns from contact with hot surfaces or splatter of hot material and gases.
- Material purged from machine may be extremely hot. Ensure protective guards are in place around the nozzle to prevent material from splashing. Use proper personal protective equipment.
- All operators should wear personal protective equipment, such as face shields and use heat resistant gloves when working around the feed inlet, purging the machine or cleaning the gates of the mold.
- Remove purged material from the machine immediately.
- Decomposing or burning material could result in noxious gases being emitted from the purged material, feed inlet or mold.
- Ensure proper ventilation and exhaust systems are in place to help prevent inhalation of harmful gases and vapors.
- Consult manufacturer’s Material Safety Data Sheets (MSDS).
- Hoses fitted to the mold will contain high or low temperature fluids or air under high pressure. The operator must shut down and lockout these systems as well as relieving any pressure before performing any work with these hoses. Regularly inspect and replace all flexible hoses and restraints.
- Water and / or hydraulics on the mold may be in close proximity to electrical connections and equipment. Water leakage may cause an electrical short circuit. Hydraulic fluid leakage may cause a fire hazard. Always keep water and / or hydraulic hoses and fittings in good condition to avoid leaks.
- Never perform any work on the mold machine unless the hydraulic pump has been stopped.
- Check frequently for possible oil leaks / water leaks. Stop the machine and make repairs.

WARNING

- A crushing hazard exists between the nozzle and mold melt inlet during carriage forward motion.
- A possible shearing hazard exists between the edge of the injection guard and the injection housing during injection.
- The open feed port could present a hazard to a finger or a hand inserted during operation of the machine.
- The barrel, barrel head, nozzle, heater bands and mold components are hot surfaces which could result in burns.
- Keep flammable liquids or dust away from the hot surfaces as they could ignite.
- Follow good housekeeping procedures and keep floors clean to prevent slips, trips and falls due to spilled material on the work floor.
- Apply engineering controls or hearing conservation programs as necessary to control noise.
- When doing any work on the machine that requires moving and lifting the machine, ensure that lifting equipment (eyebolts, fork lift truck, cranes, etc.) will have sufficient capacity to handle mold, auxiliary injection unit or Hot Runner weight.
- Connect all lifting devices and support the machine using a crane of adequate capacity before commencing work. Failure to support the machine can result in severe injury or death.
- Mold cable from the controller to the mold must be removed before servicing the mold.

2.3 General Safety Symbols

Table 2-3 Typical Safety Symbols	
Symbol	**General Description**
	**General – Warning** Indicates an immediate or potentially hazardous situation, which if not avoided, could result in a serious injury or death, and / or damage to equipment.
	**Warning – Barrel Cover Grounding Strap** Lockout / tagout procedures must be followed before removing the barrel cover. Barrel cover can become energized upon removal of grounding straps and contact can result in death or serious injury. Grounding straps must be reconnected before reconnecting power to machine.
	**Warning – Crushing and / or Impact Points** Contact with moving parts can cause serious crushing injury. Always keep guards in place.
	**Warning – Crush Hazard Closing Mold**
	**Warning – Hazardous Voltage** Contact with hazardous voltages will cause death or serious injury. Turn off power and review electrical schematics before servicing equipment. May contain more than one live circuit. Test all circuits before handling to make sure circuits have been de-energized.
	**Warning – High Pressure** Overheated fluids may cause severe burns. Discharge pressure before disconnecting water lines.
	**Warning – High Pressure Accumulator** Sudden release of high pressure gas or oil can cause death or serious injury. Discharge all gas and hydraulic pressure before disconnecting or disassembling accumulator.
	**Warning – Hot Surfaces** Contact with exposed hot surfaces will cause serious burn injury. Wear protective gloves when working near these areas.
	**Mandatory – Lockout / Tagout** Ensure that all energies are properly locked out, and remain locked out until the service work is completed. Servicing equipment without disabling all internal and external power sources can cause death or serious injury. De-energize all internal and external power sources (electrical, hydraulic, pneumatic, kinetic, potential, and thermal).
	**Warning – Material Splashing Hazard** Material or high pressure gas can cause death or severe burns. Wear personal protective equipment while servicing the feed throat, nozzle, mold areas, and when purging the injection unit.
	**Warning – Read Manual Before Operation** Personnel should read and understand all instructions in the manuals before working on equipment. Only properly trained personnel should operate the equipment.
	**Warning – Slip, Trip or Fall Hazard** Do not climb on equipment surfaces. Serious slip, trip or fall injuries can result from personnel climbing on equipment surfaces.

Table 2-4 Typical Safety Symbols	
Symbol	**General Description**
	**Caution** Failure to follow instructions may damage equipment.
	**Important** Indicates additional information or used as a reminder.

2.4 Wiring Check

CAUTION

System Mains Supply Wiring:

- Before connecting the system to a power supply, it is important to check that the wiring between the system and the power supply has been done correctly.
- Particular attention must be given to the current rating of the power supply. For example, if a controller is rated at 63A, then the power supply must also be rated at 63A.
- Check that the phases of power supply are wired correctly.

Controller to Mold Wiring:

- For separate power and thermocouple connections, ensure that the power cables are never connected to the thermocouple connectors and vice-versa.
- For mixed power and thermocouple connections, ensure that the power and thermocouple connections have not been wired incorrectly.

Communications Interface and Control Sequence:

- It is the customer's responsibility to verify functionality of any custom machine interface at safe speeds, prior to operating equipment in the production environment at full speed in automatic mode.
- It is the customer's responsibility to verify all required motion sequences are correct, prior to operating equipment in the production environment at full speed in automatic mode.
- Switching the machinery into Auto mode without having verified the control interlocks and motion sequence are correct, may cause damage to machinery and / or equipment.

Failure to do wiring or connections properly will result in equipment failure.

2.5 Lockout Safety

WARNING

DO NOT enter the cabinet without first ISOLATING the supplies.

High voltage and amperage cables are connected to the controller and the mold. Electrical power must be shut off and lockout / tagout procedures followed prior to installing or removing any cables.

Use lockout / tagout to prevent operation during maintenance.

All maintenance should be performed by properly trained personnel based on local laws and regulation. Electrical products may not be grounded when removed from the assembled or normal operating condition.

Ensure proper grounding of all electrical components before performing any maintenance to avoid potential risk of electrical shock.

Often power sources are inadvertently turned on or valves are opened mistakenly before maintenance work is completed, resulting in serious injuries and fatalities. Therefore, it is important to ensure that all energies are properly locked out and that they remain locked out until the work is completed.

If a lockout is not performed, uncontrolled energies could cause:

- Electrocution from contact with live circuits
- Cuts, bruises, crushing, amputations or death, resulting from entanglement with belts, chains, conveyors, rollers, shafts, impellers
- Burns from contact with hot parts, materials or equipment such as furnaces
- Fires and explosions
- Chemical exposures from gases or liquids released from pipelines

2.5.1 Electrical Lockout

WARNING - READ MANUAL

Refer to all machine manuals and local regulations and codes.

NOTE

In some instances, there may be more than one power source feeding equipment and steps must be taken to ensure that all sources are effectively locked out.

Employers must provide an effective lockout/tagout program.

1. Shut down machine using normal operational shutdown procedure and controls. This should be done by, or in consultation with the machine operator.
2. After ensuring that the machinery has been completely shut down, and all controls in the “off” position, open the main disconnect switch located in the field.
3. Using your own personal padlock, or one assigned by your supervisor, lock the disconnect switch in the off position. Do not lock only the box. Remove the key and retain. Complete a lockout tag and affix to the disconnect switch. Each person working on the equipment must follow this step. The lock of the person doing the work or in charge must be installed first, remain throughout and be removed last. Test the main disconnect switch and make sure it cannot be moved to the “on” position.
4. Try to start the machine using the normal operation controls and point of operation switches to make sure that the power has been disconnected.
5. Other sources of energy that could create a hazard while working on the equipment must also be de-energized and appropriately “locked-out”. This can include gravity, compressed air, hydraulics, steam and other pressurized or hazardous liquids and gases. See Table 2-5.
6. When the work is completed, prior to removing the last lock, make sure the operational controls are in the “off” position so that the main disconnect switching is done under “no load”. Ensure all blocks, tools and other foreign materials are removed from machine. Also ensure that all personnel that may be affected are informed that the lock(s) will be removed.
7. Remove lock and tag, and close the main disconnect switch if permission has been given.
8. When the work has not been completed on the first shift, the next operator should install a personal lock and tag before the first operator removes the original lock and tag. If the next operator is delayed, a lock and tag could be installed by the next supervisor. Lockout procedures should indicate how the transfer is to be conducted.
9. It is important that, for their personal protection, each worker and/or fore person working in or on a machine places his/her own safety lock on the disconnect switch. Use tags to spotlight work in progress and give details of work being done. Only when the work is completed and the work permit signed off, may each worker remove his/her lock. The last lock to be removed should be that of the person supervising the lockout and this responsibility should not be delegated.

2.5.2 Energy Forms and Lockout Guidelines

Table 2-5 Energy Forms, Energy Sources and General Lockout Guidelines		
Energy Form	**Energy Source**	**Lockout Guidelines**
Electrical Energy	• Power transmission lines • Machine power cords • Motors • Solenoids • Capacitors (stored electrical energy)	• Turn off power at machine first (i.e., at point of operation switch), and then at the main disconnect switch for the machine. • Lock and tag the main disconnect switch. • Fully discharge all capacitative systems (e.g., cycle machine to drain power from capacitors) according to the manufacturer's instructions.
Hydraulic Energy	• Hydraulic systems (e.g., hydraulic presses, rams, cylinders, hammers)	• Shut off, lock (with chains, built-in lockout devices, or lockout attachments) and tag valves. • Bleed off and blank lines as necessary.
Pneumatic Energy	• Pneumatic systems (e.g.,lines, pressure reservoirs, accumulators, air surge tanks, rams, cylinders)	• Shut off, lock (with chains, built-in lockout devices, or lockout attachments) and tag valves. • Bleed off excess air. • If pressure cannot be relieved, block any possible movement of machinery.
Kinetic Energy (Energy of a moving object or materials. Moving object may be powered or coasting)	• Blades • Flywheels • Materials in supply lines	• Stop and block machine parts (e.g. stop flywheels and ensure that they do not recycle). Review entire cycle of mechanical motion and ensure that all motions are stopped. • Block material from moving into area of work. • Blank as required.
Potential Energy (Stored energy that an object has the potential to release due to its position)	• Springs (e.g., in air brake cylinders) • Actuators • Counterweights • Raised loads • Top or movable part of a press or lifting device	• If possible, lower all suspended parts and loads to the lowest (rest) position. • Block parts that might be moved by gravity. • Release or block spring energy.
Thermal Energy	• Supply lines • Storage tanks and vessels	• Shut off, lock (with chains, built-in lockout devices, or lockout attachments) and tag valves. • Bleed off excess liquids or gases. • Blank lines as necessary.

2.6 Disposal

WARNING

Mold-Masters declines any responsibility for personal injury or personal damage arising from reuse of the individual components, if these parts are used other than for the original and proper intended purpose.

1. Hot Runner and system components must be disconnected from the power supply fully and properly before disposal (electricity, hydraulics, pneumatics and cooling).

2. Ensure that the system to be disposed of is free from fluids.

3. The electrical components are to be dismantled, separating them accordingly environmental friendly and disposed as hazardous waste if necessary.

4. Remove the wiring. The electronic components are to be disposed in accordance with the national electric scrap ordinance.

5. The metal parts are to be returned for metal recycling (waste metal and scrap trade). The instructions of the corresponding waste disposal company are to be observed in this case.

Recycling of the materials occupies a forefront position during the disposal process.

2.7 Hot Runner Safety Hazards

WARNING

- The equipment supplied is subjected to high injection pressures and high temperatures.
- Ensure that extreme caution is observed in the operation and maintenance of the Hot Runner system and the injection molding machines.
- Do not operate the equipment with unconfined long hair, loose clothing or jewelry, including name badges, neckties, etc. These may get caught by the moving belt mechanism and can cause death or serious injury.
- Never disable or bypass a safety device.
- All operators should wear personal protective equipment, such as face shields, and use heat resistant gloves when working around the feed throat, purging the machine or cleaning the gates of the mold.
- Check frequently for possible oil or water leaks. Stop the machine and make repairs.
- Do not look directly into the feed throat of a hopper. Unexpected release of resin may cause serious burns. Use a mirror. Failure to do so may cause serious injury.
- Remove purgings from the machine immediately. Never directly handle plastic purgings or drool until they have completely cooled. Purgings may appear solid but may still be hot and cause serious injury.
- Some plastics develop gases that may be dangerous to personal health. Follow the plastics supplier's recommendations. Review their material safety data sheet. Ensure the molding area is well ventilated.
- Never touch or inspect the timing belt when power is on and motor and controller are connected. Unplug the controller before any maintenance.
- High voltage and amperage cables are connected to the controller (220 VAC). There is also a high voltage cable connection between the servo motor and controller.
- Always unplug the controller before performing any maintenance work.
- Hoses fitted to the mold will contain high or low temperature fluids or air under high pressure. The operator must shut down and lockout these systems as well as relieving any pressure before performing any work with these hoses.
- Never perform any work on the mold unless the hydraulic pump has been stopped.
- High voltage and amperage cables are connected to the mold. Electric power must be shut off prior to installing or removing any cables.

WARNING

- Water and / or hydraulics on the mold may be in close proximity to electrical connections and equipment. Water leakage may cause an electrical short circuit. Hydraulic fluid leakage may cause a fire hazard. Always keep water and / or hydraulic hoses and fittings in good condition to avoid leaks.
- Make sure the lifting eyebolt, lifting chain and crane are rated to adequately support the weight of the plate(s). Failure to do so can cause a serious injury.
- All maintenance on Mold-Masters products should be performed by properly trained personnel based on local law or regulation requirements.
- Ensure proper grounding of all electrical products before performing any maintenance to avoid potential risk of electrical shock.
- Make sure the machine has been locked out and tagged out in accordance to the machine's documented procedures. Failure to do so may lead to serious injury or death.
- Check that all coolant, hydraulic and air lines as well as electrical cables will not interfere with the moving parts of the mold, machine or robot. The lines must be of sufficient length so that they will not strain or pinch when the mold halves separate.
- Care must be taken to ensure the nozzle terminal ends do not come in contact with the hydraulic fluid. The nozzles may short out or become damaged.
- Do not mix electrical power cables with thermocouple extension cables. They are not designed to carry the power load or list accurate temperature readings in each other's application.

Section 3 - Preparation

WARNING

Ensure that you have fully read “Section 2 - Safety” on page 2-1 before unpacking, cleaning or assembling parts of the Hot Runner system.

WARNING

Be aware of warnings placed on the assembly drawings. When the manifold is heated the metal expands stretching the mounting screws, if screw lengths are shortened there is a possibility of shearing.

The expansion factor is calculated into the length of each screw size.

Make sure the lifting eyebolt, lifting chain and crane are rated to adequately support the weight. Failure to do so can cause a serious injury.

Make sure the machine has been locked out and tagged out in accordance to the machines documented procedures. Failure to do so may lead to serious injury or death.

CAUTION

The use of an incorrect size, length and grade screw could cause the screw to shear, fatigue or stretch beyond its yield point, resulting in expensive downtime of the Hot Runner.

3.1 Unpacking

The following section is a step-by-step guide to prepare your Mold-Masters Hot runner system for use.

1. Carefully remove all components from the shipping box and check that all components listed on the packing slip were supplied.
2. Check that all mold base dimensions are correct and correspond to Mold-Masters General Assembly drawings.

3.2 Cleaning

1. All nozzles, manifolds and Hot Runner components must be free of the rust inhibitor applied at the factory.
2. Disassemble the system.
3. Wipe down the nozzle body.
4. Remove the part and wipe clean.
5. If necessary, use a cotton swab to clean narrow interior surfaces or screw threads. For large surfaces such as mold plates, use thinner in spray form to clean channels and recesses.

3.3 Tools Required

Depending on the size and complexity of your Hot Runner system, you will require most of the tools and materials listed below.

- Allen keys: Depending on system, set of metric or imperial size keys to use 4, 5, 6, 8 and 10 mm (0.16, 0.20, 0.24, 0.31 and 0.39 in.) on cap screws
- Nickel based anti-seize compound: to prevent oxidation of screw threads that could cause screws to seize with high temperatures
- Solvents (denatured alcohol): for removal of rust inhibitors
- Calibrated torque wrench: for consistent screw pressure throughout the system
- Open-end crowfoot wrench
- Pliers: for general assembly work
- Circlip pliers: to remove and install circlip in valve systems
- Micrometer: 0-150 mm (0-5.9 in.) to check system part and plate thickness
- Depth micrometer: to check bore depths
- Slot head screw driver: used in installing thermocouples and ground wires
- Slot head screw driver (small): used in fastening electrical wires to connectors
- Crimping tool: for fastening connector pins when necessary
- Wire strippers: for preparing wires
- Utility knife: for cutting tape, wires etc.
- Glass tape: for grouping wires into zones
- Dye spotting blue compound: for checking face contact
- Sockets
- Lapping compound for valve gate systems
- Plastic face hammer
- Proper actuator installation/extraction tools

Figure 3-1 Toolkit required

Section 4 - Assembly

4.1 Nozzle Assembly

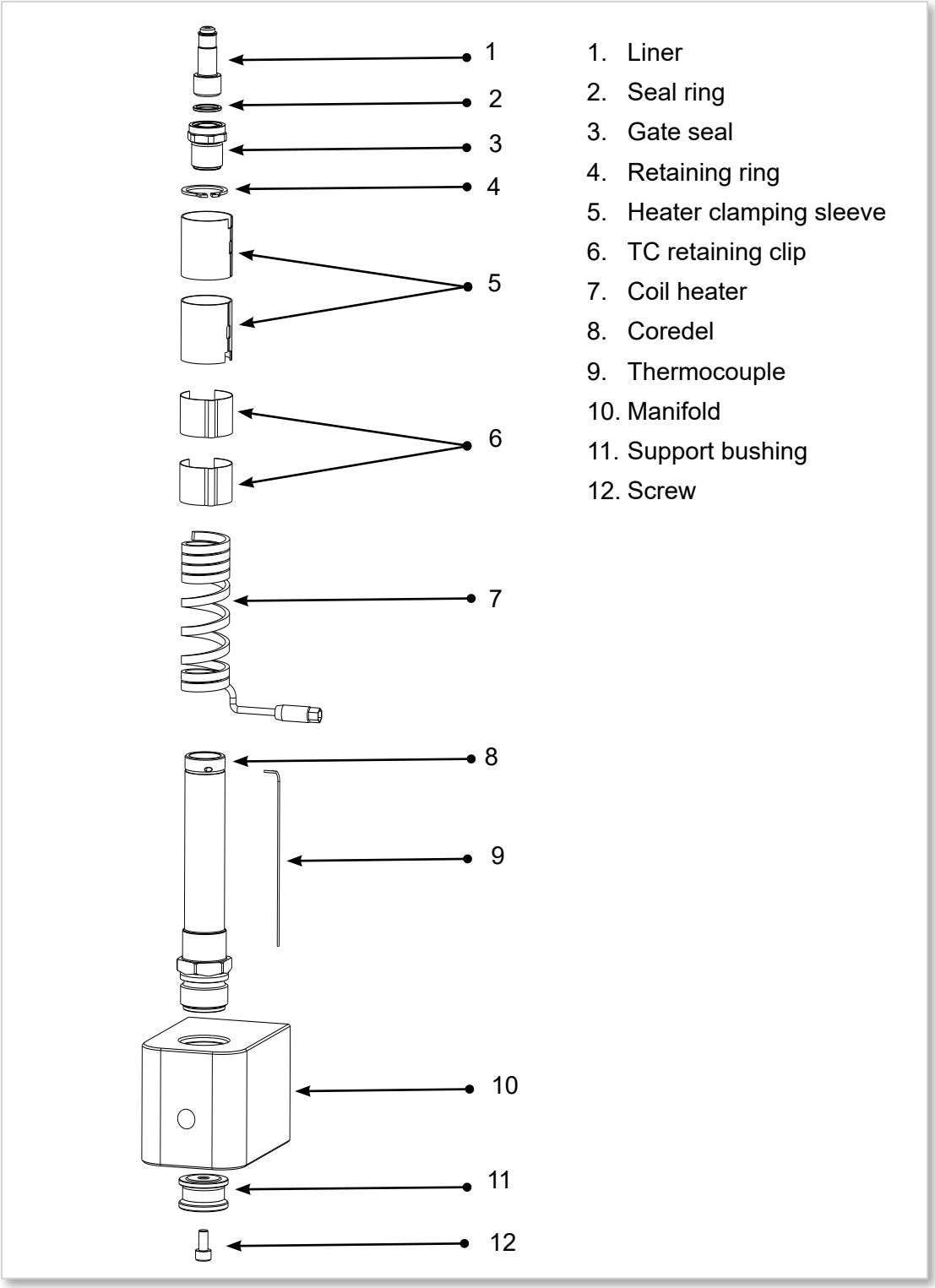


Figure 4-1 Nozzle assembly (exploded view)

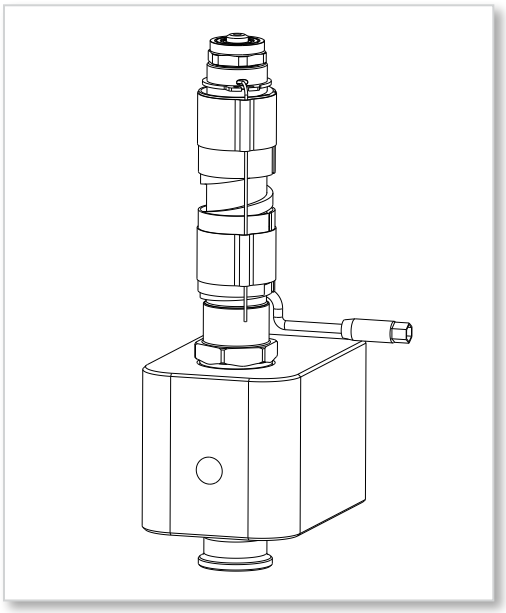
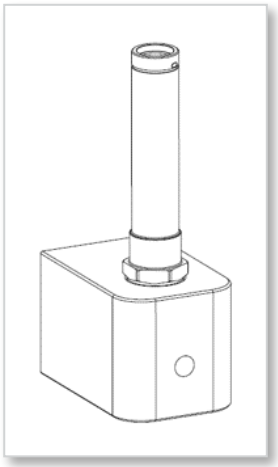


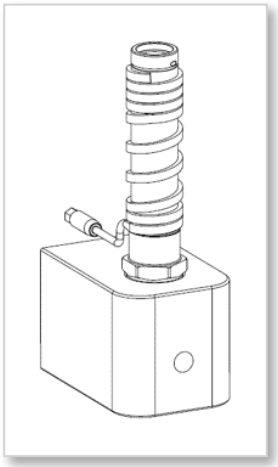
Figure 4-2 Nozzle assembly

4.2 Installing a nozzle

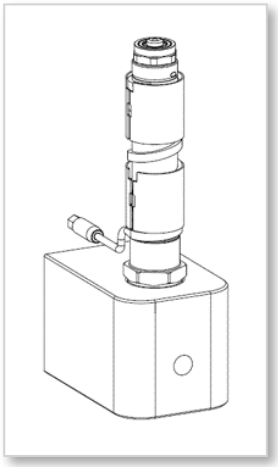
1. Install the nozzle in the manifold, and use a 27 mm wrench to tighten the nozzle to a torque of 53 Nm (39 ft-lb).



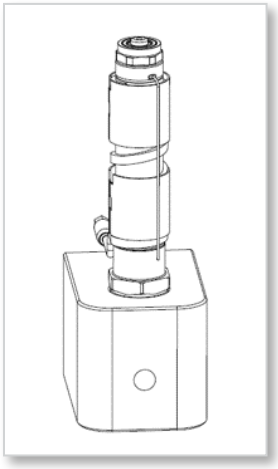
2. Install the nozzle coil heater by bending it counterclockwise and sliding it down over the coredel until it reaches the shoulder of the coredel.



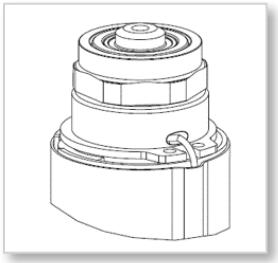
3. Install the liner, gate seal, seal ring, and heater clamping sleeve. Using a 20 mm wrench, tighten the gate seal to a torque of 38 Nm (28 ft-lb).



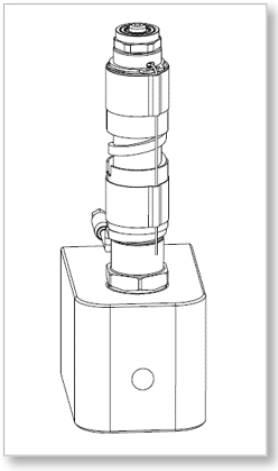
4. Insert the thermocouple in the hole in the coredel. Bend the thermocouple approximately 50° at the exit position and make the thermocouple follow the profile of the nozzle body toward the manifold.



5. Install the retaining ring on the coredel so that the opening between its ears aligns with the thermocouple.



6. Install thermocouple retaining clips near the tip end and near the flange end, making sure that the thermocouple is in the thermocouple groove.



Section 5 - System Startup and Shutdown

WARNING

Ensure that you have fully read “Section 2 - Safety” on page 2-1 before starting up or shutting down the Hot Runner.

NOTE

For maintenance or repair enquiries, please contact a representative at Mold-Masters.

5.1 Pre-Startup

WARNING

Take appropriate safety precautions by assuming the system is pressurized and hot at all times.

CAUTION

When running thermally sensitive materials, use a thermally stable material as recommended by the material supplier for the initial startup.

The maximum operating temperature for Hot Runner systems is 400°C (750°F).

1. Install the mold into the molding machine.

NOTE

Ensure that the machine nozzle opening is the same size or is **not more** than 1.0 mm (0.040 in.) smaller than the back plate bore.

2. Connect all water lines and test to ensure there are no leaks and that the required flow is achieved in all water circuits.
3. Connect all electrical components and monitor to ensure that all zones are receiving heat and all thermocouples are reacting appropriately.
4. If applicable, test the valve pin actuation, but only if the Hot Runner is at processing temperature. See the previous **CAUTION**.

5.2 Startup

WARNING

When the mold is open never inject material through Hot Runner system under high pressure. Failure to do so can result in serious injury or death.

CAUTION

Failure to follow this procedure may result in leakage / damage occurring in the Hot Runner.

IMPORTANT

When running thermally sensitive materials, use a thermally stable material as recommended by the material supplier for the initial startup.

1. Turn on the machine barrel and mold cooling system.
2. Prior to start up, ensure the:
   a) Machine barrel is up to processing temperature.
   b) Mold cooling is on and at cooling temperature.
3. Heat up all Hot Runner manifolds and / or bridges and inlets (excluding the nozzles) to processing temperature.
4. Begin nozzle heating when the manifolds and / or bridges have come within 50°C of processing temperature.

IMPORTANT

Wait until ALL heating zones have reached processing temperature for 5 minutes before continuing.

For Hot Runner systems using heater plates, allow 10 minutes of soak time after the system reaches processing temperature.

5. Startup the system.
   a) For empty systems or where there is no material in the gate detail, extrude material through the Hot Runner system using 34.4 bar (500 PSI) of back pressure. The purpose is to fill the seal at low pressure.
   b) For systems filled with material, purge intended shot size twice from the barrel prior to bringing the machine barrel forward to the Hot Runner interface.
6. Set injection time and pressure according to part size, gate size and material.

5.3 Shutdown

CAUTION

Failure to follow this procedure may result in leakage / damage occurring in the Hot Runner.

IMPORTANT

Thermally sensitive materials should be purged from the Hot Runner system prior to shutdown using a thermally stable material with a similar processing temperature.

1. Turn off all heat to the system.
2. Leave the mold cooling system turned on until the Hot Runner system temperature is within 55°C (130°F) of the mold temperature.

Section 6 - Troubleshooting

Molding is a complicated process with many variables to consider. If you are having problems, take a step-by-step systematic approach to find a solution that optimizes the process.

Some basic rules for troubleshooting:

- Define the problem; what is observed is only a symptom of the underlying problem.
- Develop a method to isolate the problem.
- Test one item at a time to verify results.
- Monitor the final solution to verify that the problem has been solved. Repeat occurrences of the same symptom may indicate other problems.
- Document the solution so that a repeat occurrence can be solved quickly.
- Consult other resources to augment the troubleshooting information in the attached guide. One of the best resources may be your resin supplier.

To help in this process, we welcome you to reference Mold-Masters Troubleshooting Guide which offers general information related to common issues. This document can be found in the troubleshooting section of Mold-Masters' website https://www.moldmasters.com. If you cannot find your issue within the documentation and continue to have problems, please contact your local Mold-Masters hot runner expert for assistance.

Scan the QR code for our global contacts:

www.moldmasters.com