Mold Masters

SeVG PLUS

User Manual

version 2

Original Instructions

Contents

Section 1 - Introduction

The purpose of this manual is to assist users in the integration, operation and maintenance of the SeVG Plus controller. This manual is designed to cover most system configurations. If you need additional information specific to your system please contact your representative or a *Mold-Masters* office whose location can be found in the “Global Support” section.

1.1 Intended Use

The SeVG Plus controller is a servo electrical gate controller, which is designed to be safe during normal operation. Any other uses would fall outside the engineered intent of this machine and may result in safety hazards. Use of this unit outside of its intended scope will void any and all warranties.

This manual is written to be used by skilled persons who are familiar with hot runner controllers 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 Release Details

Table 1-1 Release Details

Document Number	Release Date	Version
SeVGP-UM-EN-00-01-1	July 2019	01-1
SeVGP-UM-EN-00-01-2	June 2020	01-2
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SeVGP--UM--EN--00--02-2	May 2021	02-2

1.3 Warranty

For current warranty information please refer to the documents available from our website: https://www.moldmasters.com/index.php/support/warranty or contact your *Mold-Masters* representative.

1.4 Return Policy

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

Our policy is one of continuous improvement, and *Mold-Masters* reserves the right to alter product specifications at any time without giving notice.

1.5 Movement or Resale of Mold-Masters Products or Systems

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 Copyright

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

Abbreviation	Unit	Conversion Value
bar	Bar	14.5 psi
in.	Inch	25.4 mm
kg	Kilogram	2.205 lb
kPa	Kilopascal	0.145 psi
gal	Gallon	3.785 l
lb	Pound	0.4536 kg
lbf	Pound force	4.448 N
lbf.in.	Pound force inch	0.113 Nm
l	Litre	0.264 gallon
min	Minute	
mm	Millimeter	0.03937 in.
mΩ	Milli Ohm	
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

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Section 3 - Safety

3.1 Introduction

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 such items as 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.

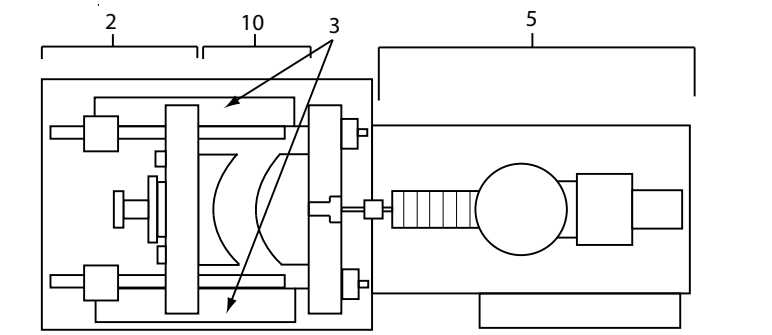
3.2 Safety Hazards

WARNING

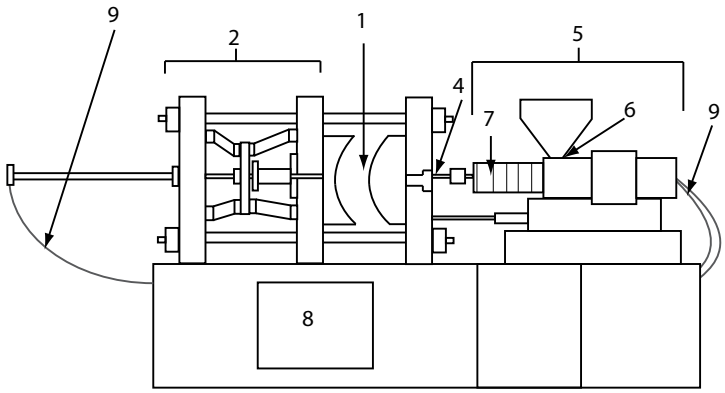
Also refer to all machine manuals and local regulations and codes for safety information.

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

Refer to the illustration of hazard areas below when reading the Safety Hazards.



Top view with guards removed



Front view with guards removed

1. *Mold area*
2. *Clamping mechanism area*
3. *Area of movement of core and ejector drive mechanisms outside areas 1 and 2*
4. *Machine nozzle area*
5. *Plasticating and / or injection unit area*
6. *Feed opening area*
7. *Area of the heater bands of the plasticizing and / or injection cylinders*
8. *Parts discharge area*
9. *Hoses*
10. *Area inside the guards and outside the mold area*

Figure 3-1 Injection molding machine hazard areas

Table 3-1 Safety Hazards	
Hazard Area	**Potential Hazards**
Mold Area Area between the platens. See area 1	**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 See area 2	**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 See area 3	**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. See area 4	M**echanical 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
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. See area 5	**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
Feed Opening See area 6	Pinching and crushing between injection screw movement and housing

Table 3-1 Safety Hazards	
Hazard Area	**Potential Hazards**
Area of the Heater Bands of the Plasticizing and / or Injection Cylinders See area 7	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 See area 9	• 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 See area 10	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	• 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

3.3 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

- Make sure that the cables are connected to the correct motors. Cables and motors are clearly labeled. Reversing the cables can result in unexpected and uncontrolled motion causing a safety risk or damage to the machine.
- 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 electric servo motors could overheat presenting a hot surface which could cause burns to someone touching it.
- 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.

3.4 General Safety Symbols

Table 3-2 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 –Molten Material Splashing Hazard** Molten 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 3-2 Typical Safety Symbols	
Symbol	**General Description**
	**Caution** Failure to follow instructions may damage equipment
	**Important** Indicates additional information or used as a reminder

3.5 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.

The use of *Mold-Masters* standard connections can help to eliminate the potential for wiring errors.

Mold-Masters Ltd. cannot be responsible for damage caused by customer wiring and / or connection errors.

3.6 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. There is also a high voltage cable connection between the servo motor and the controller. 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

3.6.1 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.
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.

3.6.2 Energy Forms and Lockout Guidelines

Table 3-3 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.

3.7 Disposal

WARNING

Milacron *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, including electricity, hydraulics, pneumatics and cooling.
2. Ensure that the system to be disposed of is free from fluids. In the case of hydraulic needle valve systems, drain the oil from the lines and cylinders and dispose it in an environmentally responsible manner.
3. The electrical components are to be dismantled, separating them accordingly as environmentally-friendly waste or 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 all possible materials should be at the forefront of the disposal process.

3.8 SeVG Plus Electrical Safety

The actuator operates with life threatening voltages and imposes a risk of personnel exposure to dangerous situations such as electrical shock. It is crucial to comply with these warnings to minimize any personal danger.

WARNING - ELECTRIC SHOCK HAZARD

- DO NOT enter the cabinet without first ISOLATING the supplies. As a three-phase supply is used, this potential may be 600 volts or higher.
- High voltage and amperage cables are connected to the controller and the mold. There is also a high voltage cable connection between the servo motor and the controller. Electrical power must be shut off and lockout / tagout procedures followed prior to installing or removing any cables.
- The main power disconnect is a rotary switch, which is located at the back of the cabinets. This main power switch is used to safely handle the total load current at the time of switch on and switch off.
- The main power switch can be locked using a padlock applied under the lockout / tagout procedure found in “3.6.2 Energy Forms and Lockout Guidelines” on page 3-11.
- 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. Personnel performing operation, maintenance, mounting or any other activities with the actuator should be correspondingly trained in safe operation of the actuator and prevention of dangerous situations.
- Follow the general installation and safety regulations when working on power installations.
- In North America - in accordance with NFPA 79 (external wiring), UL508A (internal wiring), NEC, NFPA 70: 1 cable with 3 conductors, 1 neutral conductor and 1 equipment grounding conductor
- Before switching on, the equipment grounding conductor must have been permanently connected to all electric components in accordance with the connection diagram.
- Even for brief measurements or tests, operation is only allowed if the equipment grounding conductor has been permanently connected to the points of the components provided for this purpose.
- Before accessing electrical parts with voltage potentials higher than 50V you must disconnect electric components from the mains or from the power supply unit.

WARNING - ELECTRIC SHOCK HAZARD

- Secure the electric component from reconnection.
- With electric components, observe the following aspects:
  - Always wait 30 minutes after switching off power to allow live capacitors to discharge before accessing an electric component.
  - Measure the electrical voltage of live parts before beginning to work to make sure that the equipment is safe to touch.
- Install the covers and guards provided for this purpose before switching on.
- Never touch any electrical connection points of the components while power is turned on.
- Do not remove or plug in connectors when the component has been powered.
- Under specific conditions, electric drive systems can be operated at mains protected by residual-current-operated circuit-breakers sensitive to universal current (RCDs / RCMs).

3.8.1 Connection of Equipment Grounding Conductor

WARNING - HIGH VOLTAGE AND HIGH LEAKAGE CURRENT

- Before switching on and before commissioning, ground or connect the components of the electric drive and control system to the equipment grounding conductor at the grounding points.
- The machine and all exposed, non current carrying conductive parts, material, and equipment likely to be energized shall be effectively grounded.
- Where electrical devices are mounted on metal mounting panels that are located within nonmetallic enclosures, the metal mounting panels shall be effectively grounded. Where specified by the manufacturer, components and subassemblies shall be bonded to the equipment grounding circuit in accordance with the manufacturer's instructions.
- Connect the equipment grounding conductor of the components of the electric drive and control system permanently to the main power supply at all times. The leakage current is greater than 3.5mA.
- Establish an equipment grounding connection with a copper wire of a cross section of at least 10 mm^2 (8 AWG) or additionally run a second equipment grounding conductor of the same cross section as the original equipment grounding conductor.
- Exclusively operate the device:
  - with plugged on connectors, even if there have not been any lines connected to the connectors
  - with connected equipment grounding conductor

WARNING

The motor rod is not considered a reliable ground connection.

3.9 Operational Environment

WARNING

- The display console and controller cabinet together are designed for use in the plastic injection molding industry as with Milacron and third party servo gate control, commonly used in mold tools. They must not be used in residential, commercial or light industrial environments. They must not be used in an explosive atmosphere or where there is a possibility of such an atmosphere.
- The controller cabinet and its touchscreen console should be installed in a clean and dry environment where the ambient conditions do not exceed the limits that follow:
  - Temperature +5 to +45°C
  - Relative Humidity 90% (non-condensing)
- Do not make changes to the factory settings without the help of *Mold-Masters* service personnel. Changes to these settings can result in hazardous out-of-control or unexpected movement. It can also damage the machine, and it will void the warranty.

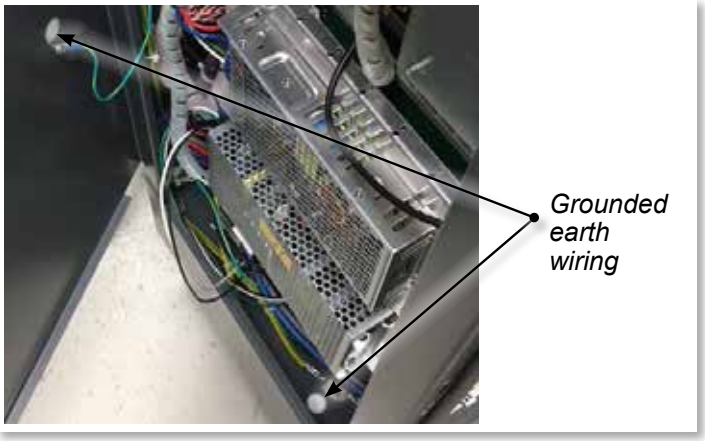
3.10 Lifting Instructions

Please see “5.1 Lift the Large SeVG Plus Controller” on page 5-2 for specialized instructions.

3.11 Grounded Earth Connections

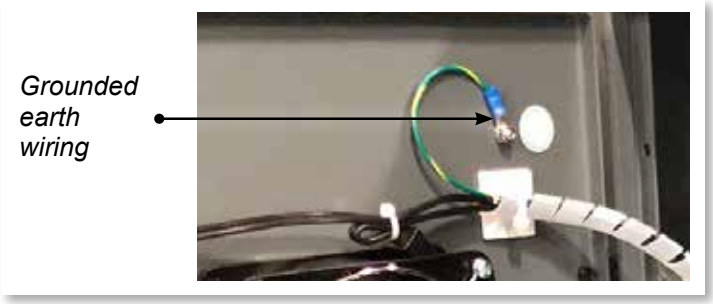
3.11.1 For the Small Cabinet

Grounded earth connections are located on the M5 self clinching studs attached to the metallic panels of the small SeVG Plus cabinet:



3.11.2 For the Large Cabinet

Grounded earth connections are found in the following locations on the large cabinet for the SeVG Plus controller:



3.12 Cabinet Push / Tip Forces

Table 3-4 Cabinet Push / Tip Forces		
	Small Cabinet	**Large Cabinet**
Force required to move cabinet on castors	11 lbs (5KG F)	22 lbs (10KG F)
Force required to tip cabinet if one castor is missing	40lbs (18KG F)	33 lbs (15KG F)

Section 4 - Overview

4.1 System Overview

This controller is a servo electrical valve gate controller for up to 64 linear gates.

The SeVG Plus can be used as a stand-alone system or in combination with Mold-Masters TempMaster temperature controllers.

4.2 Touchscreen Buttons Overview

Inactive icons are white. Once the function is activated, the icon will turn green. See Figure 4-1.

Inactive icon *Active icon*

Figure 4-1 Active icons show green in color

4.3 Configuration and Startup

CAUTION

Incorrect configuration of the SeVG Plus system may cause performance issues and can also result in damaged valve pins and / or gate inserts.

4.4 SeVG Plus Actuator Models

The SeVG Plus actuator is available in four models:

Table 4-1 SEVG Plus Actuator Models

Model	Stroke (mm)	Cooled
SE20-15	15	No
SE108C	18	Yes

The size and options for the SeVG Plus actuator depend on the system requirements. Please check your General Assembly drawings to confirm the type of SeVG Plus actuator in your system.

For further information about assembly or disassembly of an SeVG Plus system within a Hot Runner system, please refer to your Hot Runner User Manual.

IMPORTANT

The SeVG Plus controller is not configured to control cooling systems. *Mold-Masters* assumes no responsibility for connection, monitoring and / or maintenance of any cooling system associated with an SeVG Plus system.

4.5 Controller Front

4.5.1 Small Cabinet

Figure 4-2 SeVG Plus small cabinet

4.5.2 Large Cabinet

Figure 4-3 SeVG Plus large cabinet

4.6 Controller Connections

Controller connections are found at the rear of the cabinets.

4.6.1 Small Cabinet

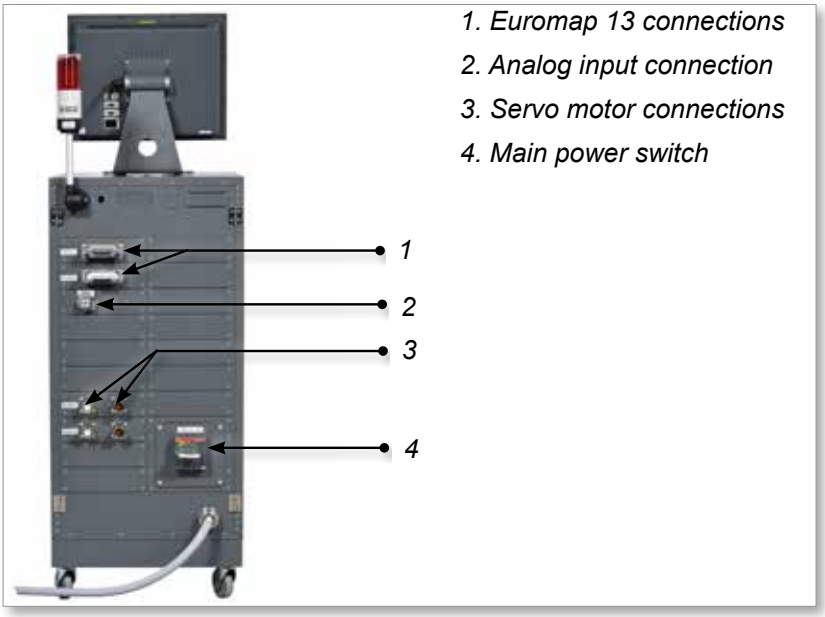
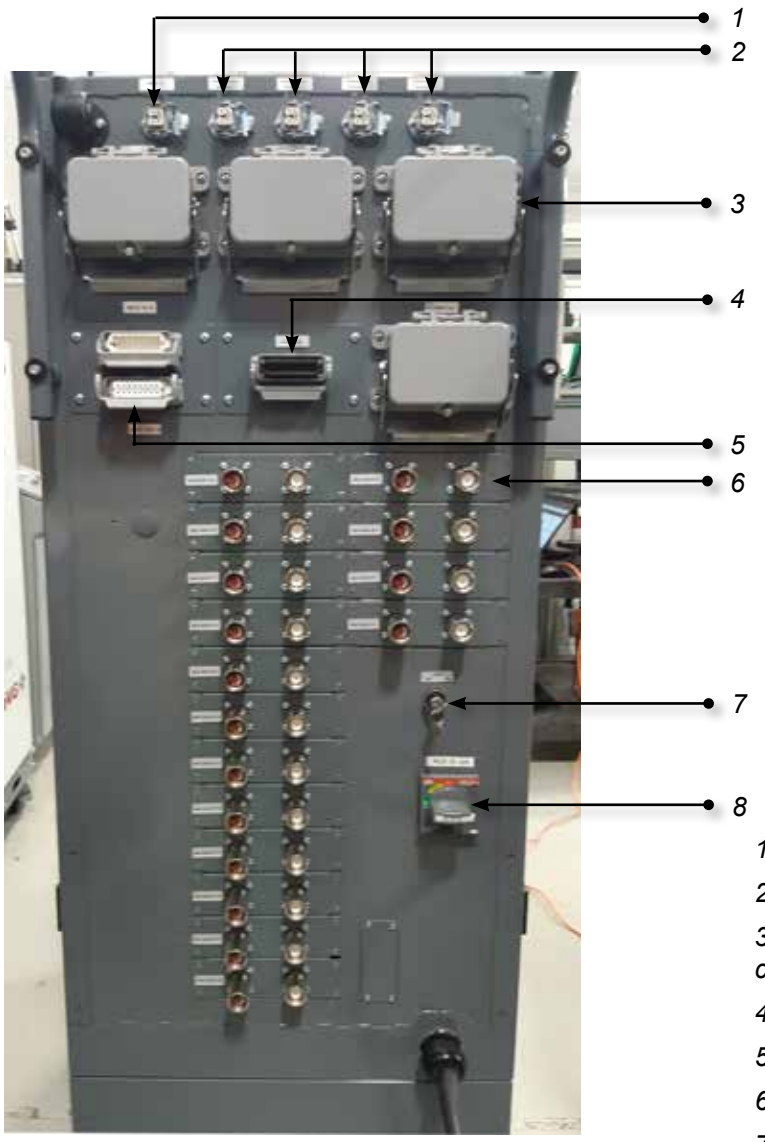


Figure 4-4 Small SeVG Plus cabinet connections

4.6.2 Large Cabinet



1. Digital IO connection
2. Analog input connections
3. Hot runner controller connections
4. IO connection
5. E13 connections
6. Motor connections
7. Bypass switch
8. Main power switch

Figure 4-5 Large SeVG Plus cabinet connections

4.7 User Interface—The Main Screen

The stand alone controller boots up to the SeVG+ interface.

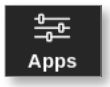
4.7.1 Main Screen—Integrated Hot Runner Controller

The SeVG+ is available with the option of an integrated hot runner controller (HRC) system. If the controller has an integrated HRC, the default screen after bootup is the HRC interface. See Figure 4-6.

Figure 4-6 SeVG+ screen—hot runner controller interface

4.7.2 Navigate to the SeVG Plus Screen

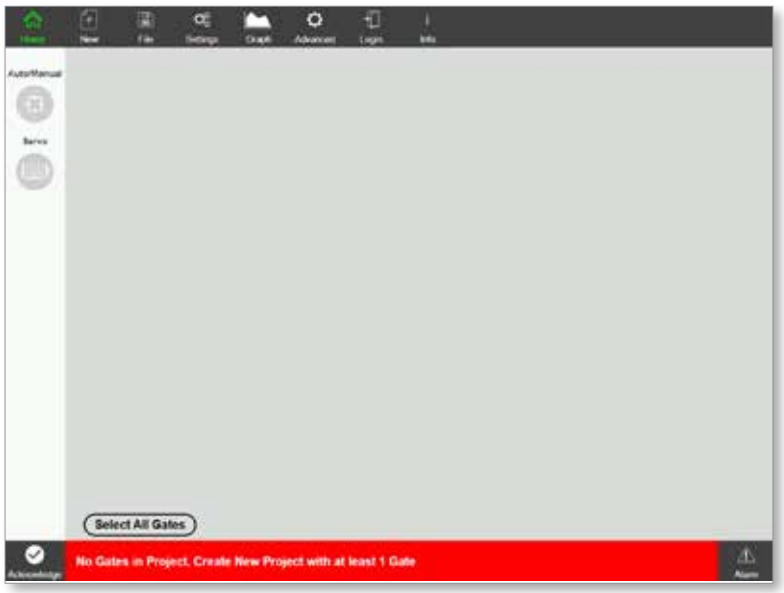
1. Choose [**Apps**]:



The Apps Screen opens:

2. Choose [**SEVG**]:

The Main screen of the SeVG Plus system opens:



4.7.3 Main Screen of Stand-alone System

The SeVG Plus is also available as a stand-alone motion control system. See Figure 4-7 for the main screen:

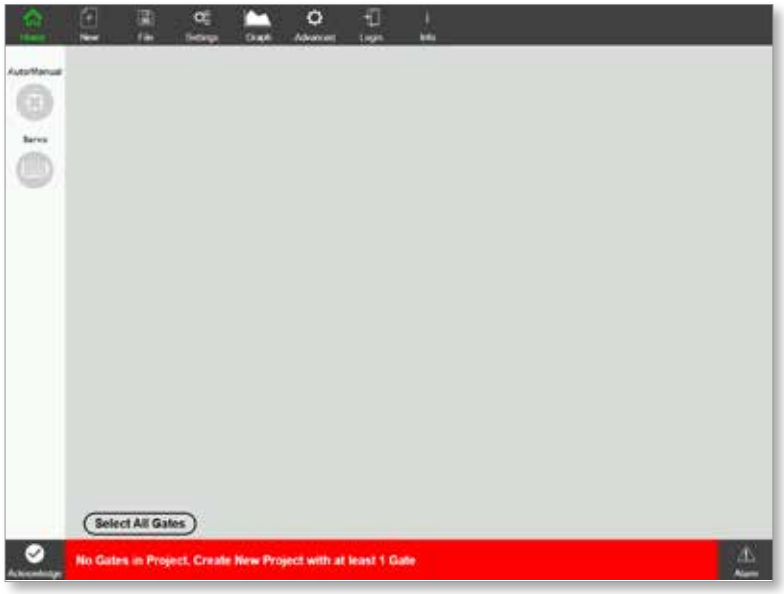
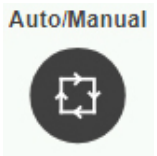


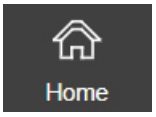
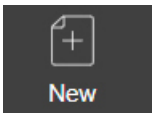
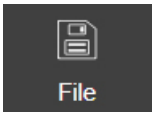
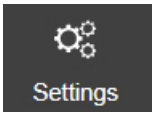
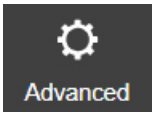
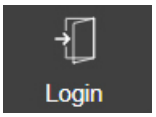
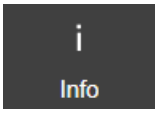
Figure 4-7 Main screen of stand-alone system

The touchscreen can display up to 16 gates. If the number of gates configured is higher than 16, the user can touch and drag the screen to view the remaining gate or gates.

4.7.4 Main Screen Side Menu Buttons

Table 4-2 Left Side Menu Buttons	
Button	**Description**
	To change between Auto and Manual mode.
	To enable the servo motors. See “6.5 Enable the Servo Motors” on page 6-10.
	To move the valve pins forward and backward in Manual mode. See “6.5 Enable the Servo Motors” on page 6-10.
	To home the system. See “6.6 Home the System” on page 6-11.
	To move the valve pins for distances as specified by a motion profile. See “6.7 Check the Step Function” on page 6-12.

4.7.5 The Main Screen - Top Menu Buttons

Table 4-3 Top Menu Buttons	
Button	**Description**
	To return to the Home screen.
	To create new project with new mechanical settings such as number of gates, pin type, etc. See “6.3 Create a New Project” on page 6-4.
	To access file actions including: load, save, save as, delete and rename.
	To access the Settings screen.
	To access the Graph screen. See “9.1 Overview” on page 9-1.
	To access digital and analog IO setup and monitoring or to enable an integrated hot runner controller.
	To login or to access user information or access levels. See “6.2 Login” on page 6-1.
	To see the software version and system information.

4.7.6 The Bottom Information Bar

The default information displayed in the bottom information bar, from left to right, includes:

- type of user and user access level
- the date and time
- the Alarm icon

See Figure 4-8.

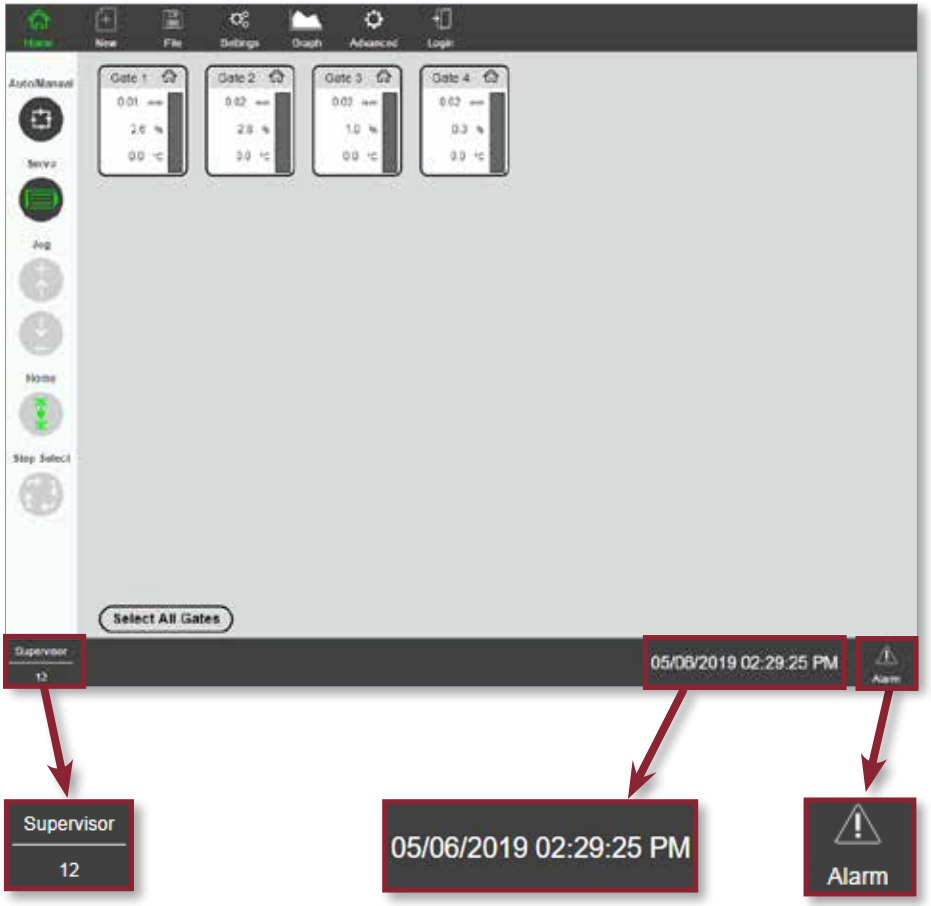


Figure 4-8 Bottom information bar

For more information about users and access levels, see “Section 7 - User Access and Passwords” on page 7-1.

If a status message or an alarm is triggered, the bottom information bar changes and displays:

- the Acknowledge icon
- a description of the status (gray background) or the alarm (red background)
- the Alarm icon

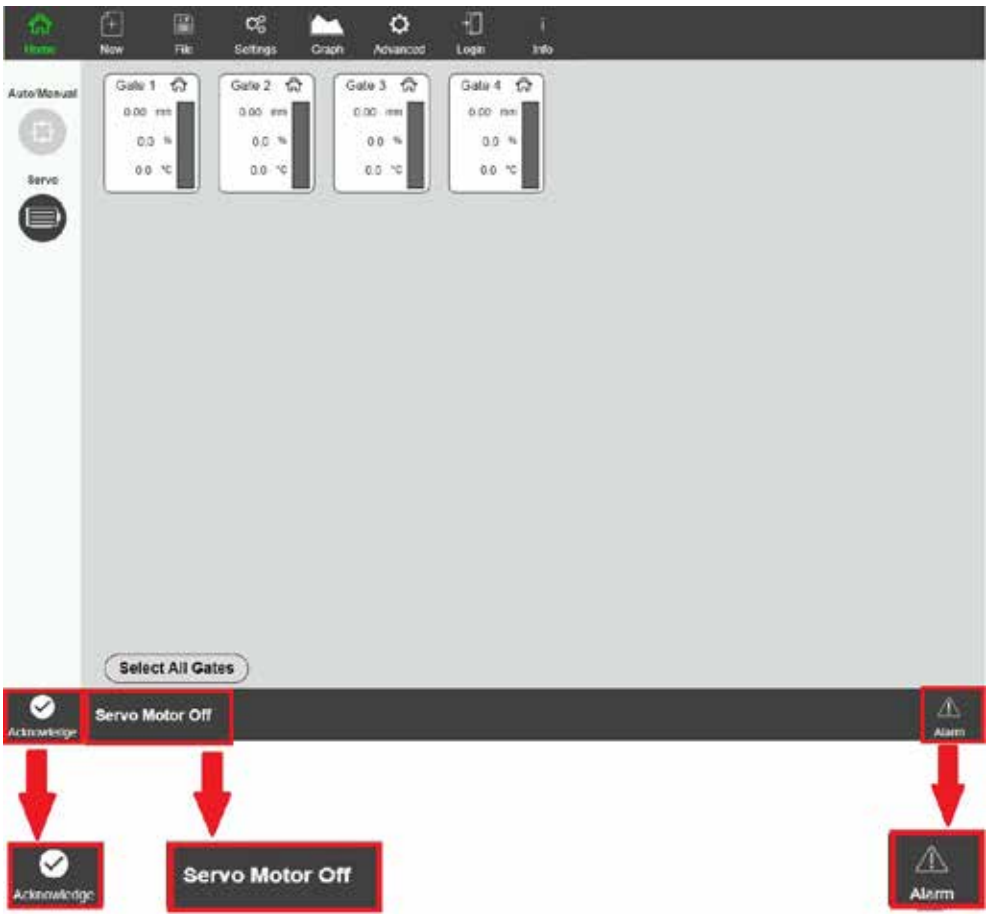


Figure 4-9 Bottom information bar with sample alarm message

For more information about error messages and the Alarm screens, see “Section 8 - Troubleshooting” on page 8-1.

Section 5 - System Setup

WARNING

Ensure that you have fully read “Section 3 - Safety” before setting up the SeVG Plus controller.

It is the responsibility of the integrator to understand and follow international and local standards for safety of machinery when integrating the SeVG Plus into the molding system. This responsibility includes providing necessary e-stop connections, safety interlocks and guarding to protect operators.

The SeVG Plus controller should be located in such a way that the main disconnect is easily accessible in case of emergency.

The SeVG Plus controller is shipped with a power cable which is a correct size to run the system. When you install a connector on the cable, ensure that the connector can safely withstand the full system load.

The SeVG Plus controller supply should have a fused disconnect or main circuit breaker according to local safety codes. Refer to the serial plate on the controller cabinet for confirmation of the supply requirements. If the local supply is outside the specified range, please contact *Mold-Masters* for advice.

WARNING - ELECTRICAL SHOCK HAZARD

It is crucial to comply with these warnings to minimize any personal danger.

- Ensure that all energies are properly locked out in the controller and molding machine before installation of the controller into the system.
- DO NOT enter the cabinet without first ISOLATING the supplies OR, for the large SeVG Plus controller, having a qualified electrician move the BYPASS SWITCH to ON, to gain live access to the controller. There are unguarded terminals inside the cabinets which may have a dangerous potential across them. Where a three-phase supply is used, this potential may be up to 600 VAC.
- With the BYPASS SWITCH set to OFF opening the high power section of the controller will cause the circuit breaker to TRIP, disconnecting all power to the cabinet.
- Voltage and amperage cables are connected to the controller and the mold. There is also a voltage cable connection between the servo motor and the controller. Electric power must be shut off and lockout / tagout procedures followed prior to installing or removing any cables.
- Integration should be done by properly trained personnel based on local codes and regulations. Electrical products may not be grounded when removed from the assembled or normal operating condition.
- 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.
- Integration should be done by properly trained personnel based on local law or regulation requirements. Electrical products may not be grounded when removed from the assembled or normal operating condition.
- 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.
- Ensure the wires between the controller and the motors do not touch any heated components.

5.1 Lift the Large SeVG Plus Controller

5.1.1 Preparation

WARNING

When doing any work on the machine that requires lifting the machine, 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.

Always ensure that all lifting devices are in good repair and of adequate capacity before commencing work. Failure to lift or support the controller properly can result in severe injury or death and / or damage to the controller.

1. Choose lift equipment that is rated for the prescribed load.
2. Define the **load path:** the path and orientation the item will move in while it is being lifted, and the location and orientation where it will be set down.
3. Identify and avoid potential **pinch points:** where an individual or a component of the lifting equipment or load may be caught between two surfaces.
4. Secure and remove all boxes and accessories from the crate and store in a safe location away from the lift path.
5. Remove all cables not attached to the controller from the crate and store in a safe location away from the lift path.

The large SeVG Plus controller is shipped with four eyebolts with threaded studs and four washers. These components are attached to the keys at the back of the controller. See Figure 5-1.

Figure 5-1 Eyebolts and washers

6. Assemble eyebolts and washers and install into the holes on the top of the SeVG Plus controller. See Figure 5-2.

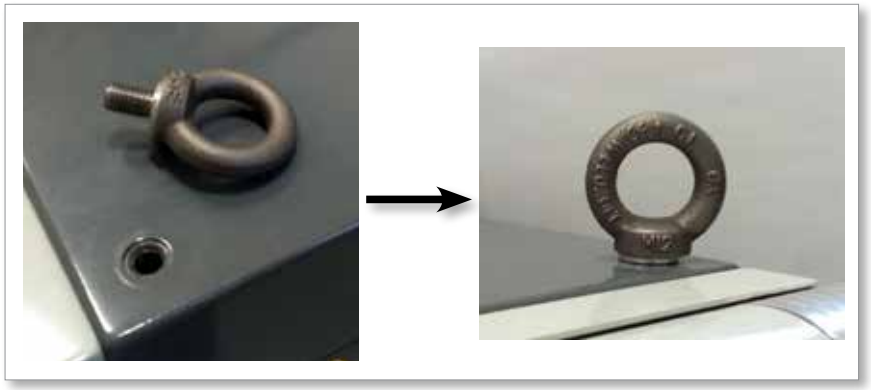


Figure 5-2 Install eyebolts and washers

7. Attach slings to all of the eyebolts. See Figure 5-3.

IMPORTANT

Slings **must** be attached securely to all four eyebolts.

Balance the load in the chain or lifting device before it is lifted more than a few inches.

Minimize swinging by bringing the hook over the load appropriately.

Move powered hoists slowly into engagements with loads.

Figure 5-3 Attach slings to all four eyebolts

8. Lift the SeVG Plus controller from the crate.

Section 6 - Operation

WARNING

Ensure that you have fully read “Section 3 - Safety” before operating the SeVG Plus controller.

6.1 Mode of Operation

For operating instructions for Hot Runner Controller functions, please see the M2 Controller User Manual.

6.1.1 Controller Power Up

CAUTION

Although the main power switch has the capacity to switch the whole system off, it is recommended that this is only done in an emergency. The controller uses computer technology and should be switched off in stages. A sequenced method for switching on and off protects the console and keeps the switched load to a minimum to extend the life of the main isolator.

Before you turn on the controller ensure that all motor power and encoder cables are properly connected based on how the cables are labeled.

Any damage to the motor cables will result in performance issues and / or motor failure.

IMPORTANT

Ensure that the mechanical assembly is completed, that the valve pins are connected to the valve pin holder and that the motor is correctly mounted to the plate or manifold.

For all SeVG Plus controllers, the main power disconnect is a rotary switch located at the back of the controller. This switch is rated to safely handle the total load current when switched off.

After the bootup process is complete, the user sees either the hot runner controller screen or the default motion control screen.

See “4.7 User Interface—The Main Screen” on page 4-5 for more information.

6.2 Login

The user must be logged in to operate the SeVG Plus system. The controller is sent with the default password of “1” for both Supervisor and Operator.

IMPORTANT

Mold-Masters recommends that this password be changed immediately for security purposes.

See “Section 7 - User Access and Passwords” on page 7-1 for more information on

NOTE

Any loss of power to the controller requires the user to login again.

The user is also prompted to login if either the [**New**] or [**File**] buttons are chosen and the user is not currently logged in. See Figure 6-1.

Figure 6-1 Login prompt box

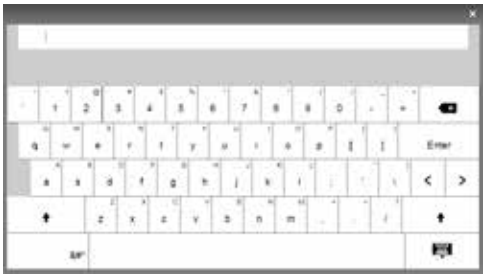
1. Choose [**Login**]:

The Login box opens:

Figure 6-2 Login box

2. Use the drop-down menu to choose the correct user:

3. Enter the password:



4. Choose [**Enter**] to accept the entry or choose [✕] to return to the Login box.

   If you enter an invalid password, you will see the following dialog:

5. Choose [**Login**] to complete the process.

Once the user is logged in, the level of access is displayed in the lower left corner of the screen. See Figure 6-3.

Figure 6-3 User access level on the Main screen

6.3 Create a New Project

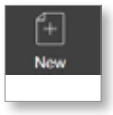
CAUTION

To ensure proper operation and to prevent damage to the system, the user must choose the correct valve pin style when creating a new project.

Refer to the General Assembly drawing to determine the correct valve pin style for your system.

Only users with Supervisor access (level 12) and higher can create a new project.

1. Choose [**New**]:



The Project Settings box opens:

2. Choose the required number of gates:

The keypad entry is shown in red if the number of gates entered exceeds the number of gates detected at boot up. See Figure 6-4.

Figure 6-4 Too many gates entered

3. Choose [↲] to accept the value entered or [✕] to return to the Project Settings box.

4. Choose the correct pin type from the drop-down menu:

IMPORTANT

Ensure the correct valve pin type is chosen. See the caution at the start of section “6.3 Create a New Project” on page 6-4.

5. Enter the maximum pin stroke:

IMPORTANT

The maximum pin stroke is related to the type of gate used. Please refer to your General Assembly drawings to find the correct valve pin stroke for your gate style.

6. Choose [↲] to accept the value entered or [✕] to return to the New Project box.

7. Choose the motor type.

8. Choose [**Create**].

6.4 Set System Limits

Only users with Supervisor access (level 12) and higher can configure system limits.

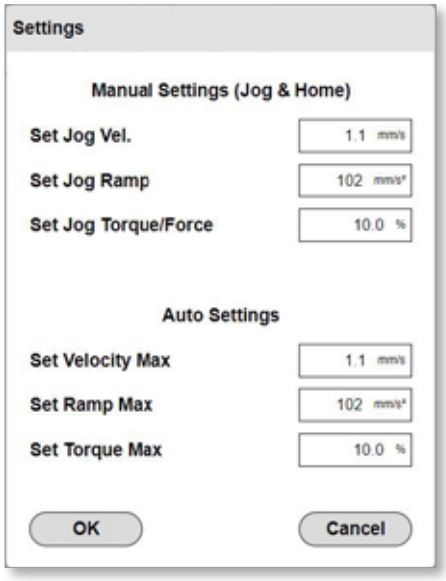
The user can configure the manual settings:

- jog velocity
- jog ramp
- jog torque / force

The auto settings are maximums based on the limitations of the motor and are configured at the factory:

- velocity MAX
- ramp MAX
- torque MAX

Choose [**Settings**] from the top menu buttons to open the Settings box:



6.4.1 Set Jog Velocity

1. Choose [**Set Jog Vel.**]:

2. Enter the required value.

NOTE

The maximum setting for this limit is 5.

3. Choose [↵] to accept the value entered or [✕] to return to the Settings box.

6.4.2 Set Jog Ramp

1. Choose [**Set Jog Ramp**]:

2. Enter the required value.

NOTE

The maximum setting for this limit is 1000.

3. Choose [↵] to accept the value entered or [✕] to return to the Settings box.

6.4.3 Set Jog Torque/Force

1. Choose [**Set Jog Torque/Force**]:

2. Enter the required value.

NOTE

The maximum setting for this limit is 30%.

3. Choose [↵] to accept the value entered or [✕] to return to the Settings box.
4. Choose [**OK**] to confirm all new settings and return to the Main screen.

An information message is displayed because the servo motors have not been enabled. See Figure 6-56 for an example of the Main screen after gates have been created.

Figure 6-5 Gates created but not homed

6.5 Enable the Servo Motors

Choose [**Servo**] and note the following changes to the Main screen:

- [**Auto/Manual**] button is not available to use
- [**Servo**] button is now enabled and it is green in color
- [**Jog**] and [**Home**] buttons appear and are available

See Figure 6-6.

Figure 6-6 Main screen with Servo button enabled

The motion of the valve pin can be tested after homing with the [**Jog**] button.

NOTE

The position value indicator in the gate box will change when you push the [**Jog**] button, if the motor is not in an end position.

6.6 Home the System

For the system to identify open and closed positions for the valve pins, the user must home the system.

1. Choose one or more gates.
2. Choose the [**Home**] button:

The following message is displayed:

After the homing process is complete, the Main screen updates.
See Figure 6-7.

Figure 6-7 Main screen - homing successful

Note the following:

- [**Auto/Manual**] button is available to use
- [**Servo**] button is green and enabled
- [**Jog**] and [**Home**] buttons appear and can be enabled once a gate is selected
- [**Step Select**] button appears
- the home icon [ ] appears in the top right hand corner of the gate

See Figure 6-8.

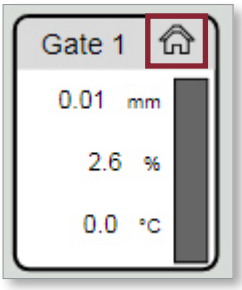


Figure 6-8 Home icon on gate

6.7 Check the Step Function

Mold-Masters recommends that the user check the Step function before running the system.

IMPORTANT

The [**Auto/Manual**] button and the [**Home**] button are unavailable to use during this process.

1. Choose [**Step Select**]:

A second step button appears and a message displays in the warning bar. See Figure 6-9.

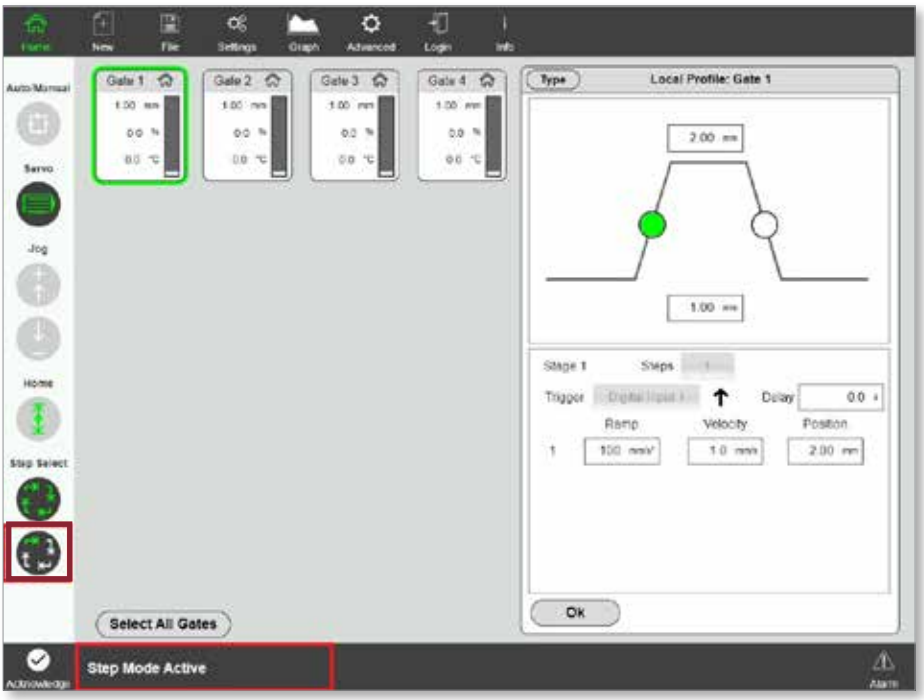


Figure 6-9 Main screen with second Step button

2. Choose the bottom [**Step Select**] button to check closed position:

The position value indicator changes.

3. Choose [**Step Select**] to exit this mode.

6.8 Profiles: Local and Global

The user can choose to configure profiles that apply to an individual gate (local) or profiles that apply to all gates (global). The user must perform the same steps to configure local or global profiles.

6.8.1 Set Local Profile

The user must choose each gate individually to setup profiles locally.

1. Choose a gate.

A green border appears around the selected gate. See Figure 6-10.

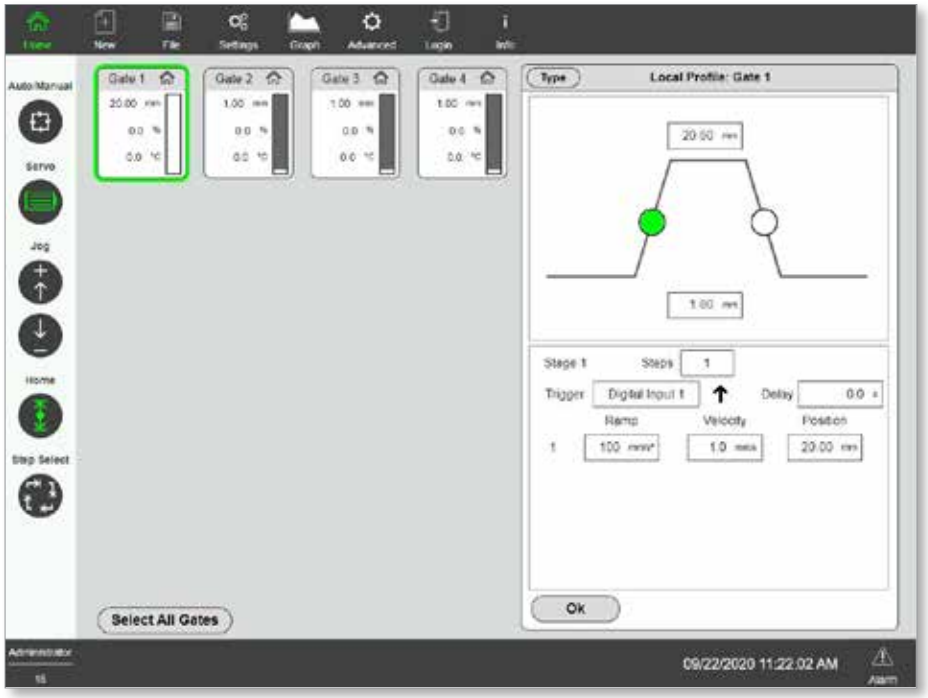
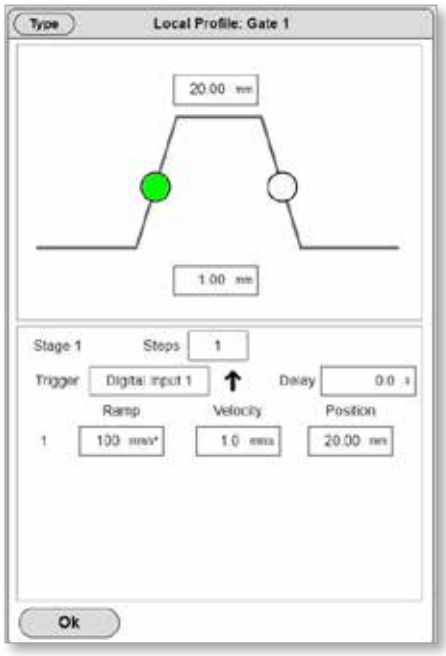
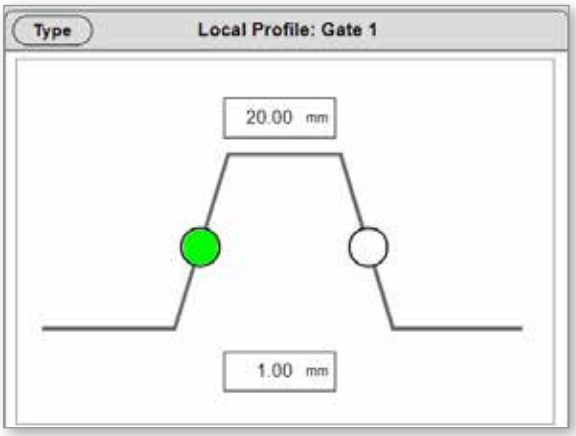


Figure 6-10 Selecting a gate

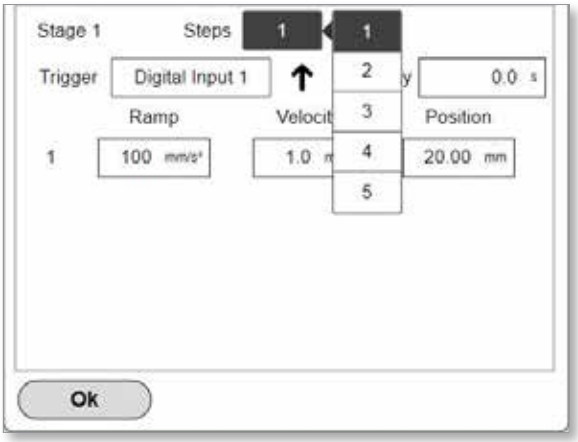
The Local Profile box opens:



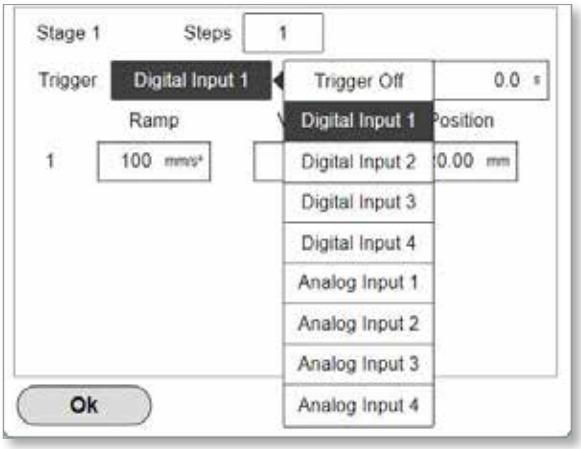
2. Choose the green indicator to select the stage.



3. Choose the number of steps:



4. Choose a digital or an analog (screw position) trigger:



See “6.9 Trigger Functions” on page 6-21 for more about trigger types.

5. Choose the timing of the trigger:

Rising edge - triggers when the rising edge of the digital input is seen

Falling edge - triggers when the falling edge of the digital input is seen

NOTE

The option of [**No Trigger**] is also available.

6. Set a time delay in seconds, if required:

7. Choose [↲] to accept the value entered or [✕] to return to the Local Profile box.
8. Choose [**Ramp**] and enter the required value:

9. Choose [↲] to accept the value entered or [✕] to return to the Local Profile box.
10. Choose [**Velocity**] and enter the required value:

11. Choose [↲] to accept the value entered or [✕] to return to the Local Profile box.

12. Choose [**Position**] and enter the required value:

13. Choose [↲] to accept the value entered or [✕] to return to the Local Profile box.
14. Choose [**OK**] to confirm all new settings and return to the Main screen or select the gate to close the Local Profile box without changing the settings.

6.8.2 Set Global Profiles

1. Choose [**Select All Gates**].

All gates are highlighted in a green border. See Figure 6-11.

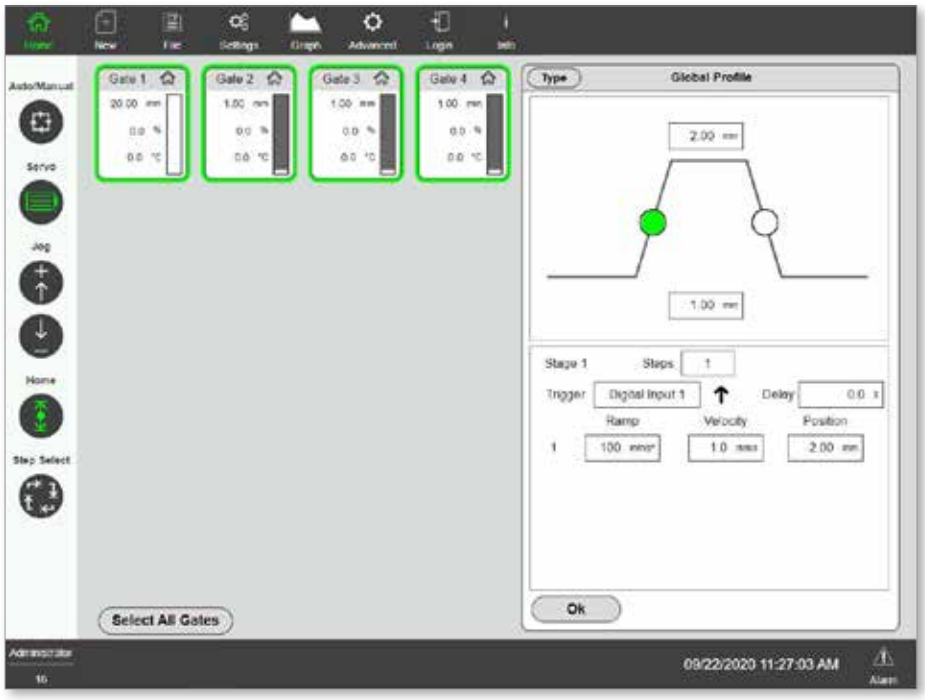
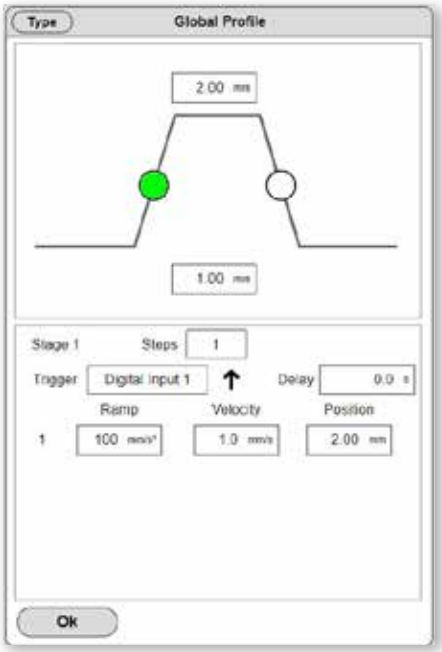


Figure 6-11 Setting a global profile

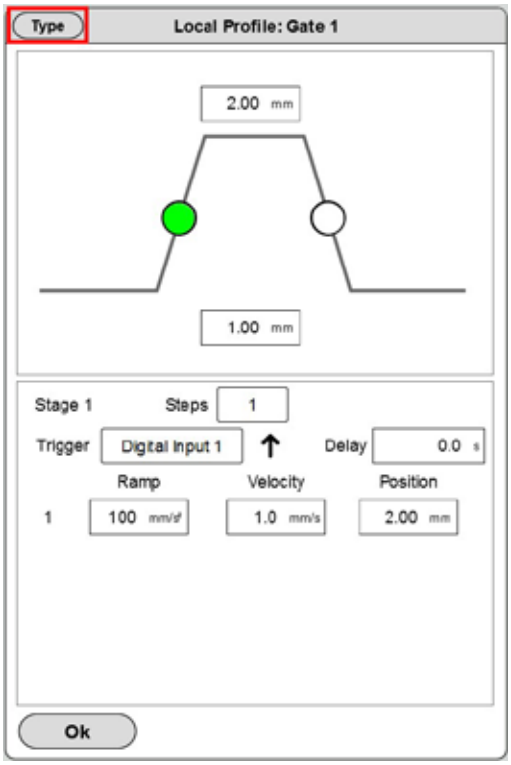
The Global profile box opens:



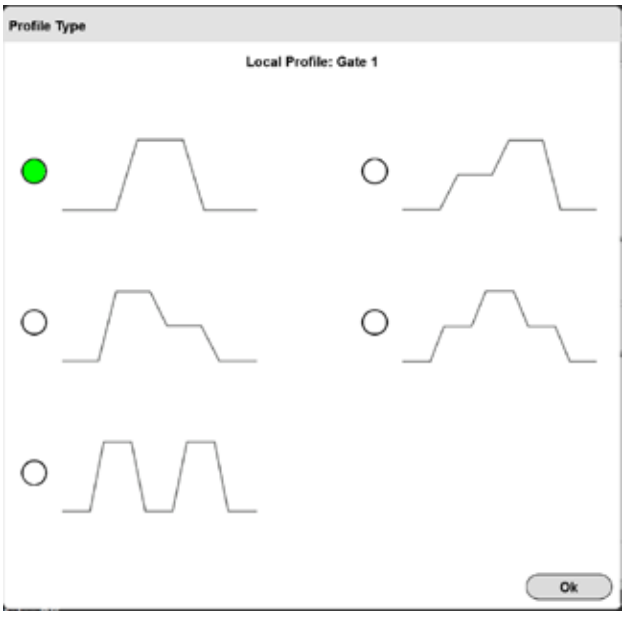
2. Set parameters as described in “6.8.1 Set Local Profile” on page 6-14.
3. Choose [↵] to accept the value entered or [✕] to return to the Local Profile box.
4. Choose [**OK**] to confirm all new settings and return to the Main screen or select the gate to close the Local Profile box without changing the settings.

6.8.3 Change Profile Type

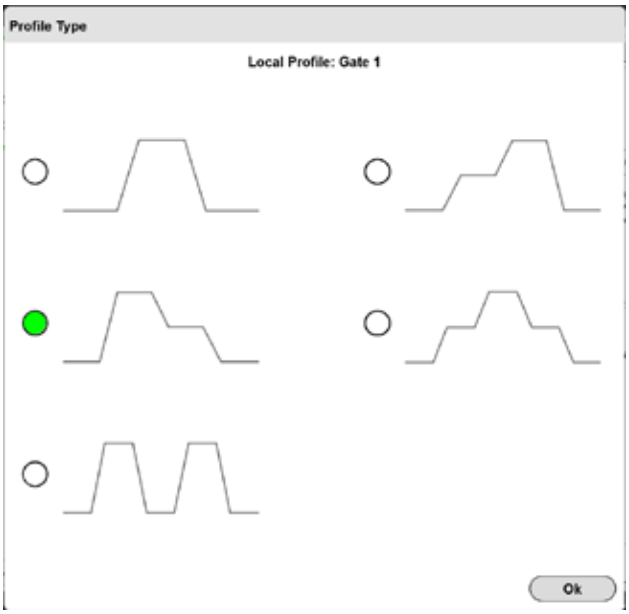
1. Tap the “Type” button.



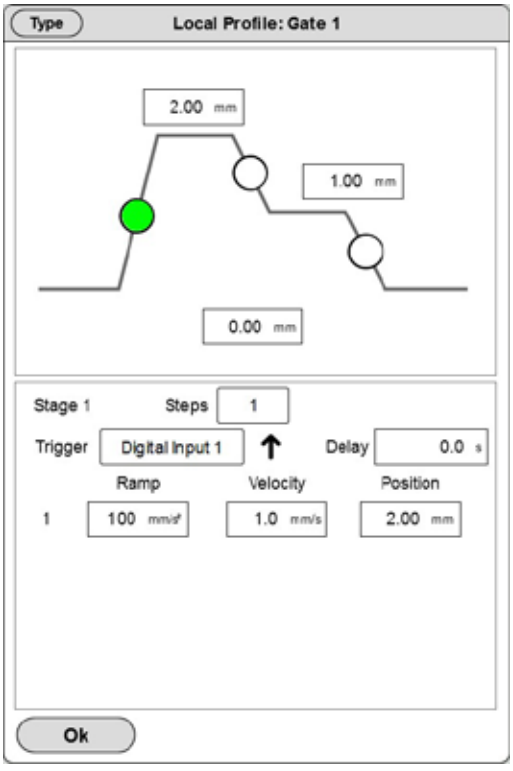
A dialog box opens for selection of Profile Type:



2. Select the option button beside the desired profile type.’
Select “Ok”.



The Profile type on the settings page updates:



Instead of two profile movements, three movements can now be initiated by a trigger or time delay.

The method of selecting different stages is the same as previously described.

6.9 Trigger Functions

The user can choose from up to four digital triggers or four analog triggers.

- **Digital**: the gates are controlled by inputs from the injection molding machine, using rising and falling edge or pulse triggers
- **Analog**: an external transducer mounted on the injection molding machine detects screw position and gate motion is linked to screw position

6.9.1 Set Digital Triggers

Triggers are chosen from the drop-down menu. See Figure 6-12.

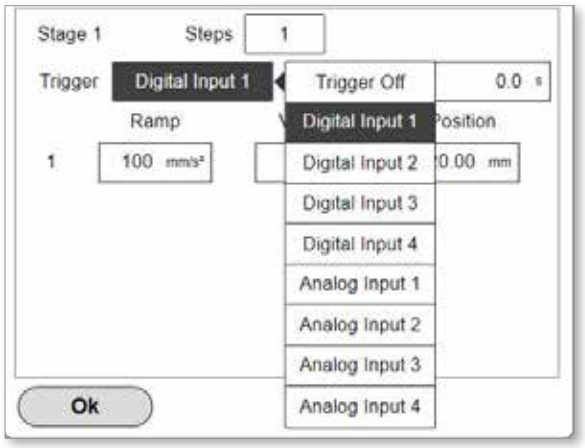


Figure 6-12 Digital triggers in drop-down menu

The timing of an open or close trigger can be set to [**Rising Edge**] or [**Falling Edge**]:

Rising edge - triggers when the rising edge of the digital input is seen

Falling edge - triggers when the falling edge of the digital input is seen

NOTE

The option of [**No Trigger**] is also available.

Figure 6-13 shows a global profile that uses a rising edge for its open trigger and a falling edge for its close trigger.

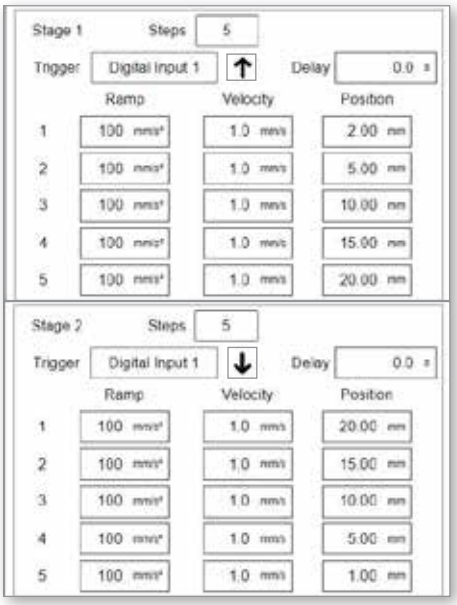


Figure 6-13 Rising and falling edges

To use a pulse trigger, the user chooses a matching set of rising or falling triggers. See Figure 6-14.

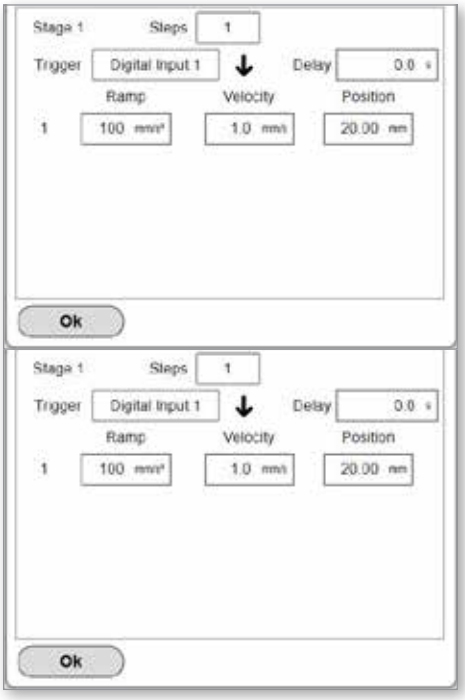


Figure 6-14 Pulse trigger

NOTE

Pulse triggers cannot be used with analog inputs.

6.9.2 Monitor Digital Triggers

Digital triggers can be monitored from the Advanced screen.

To access the Advanced screen, choose:

The Advanced Options box opens. See Figure 6-15.

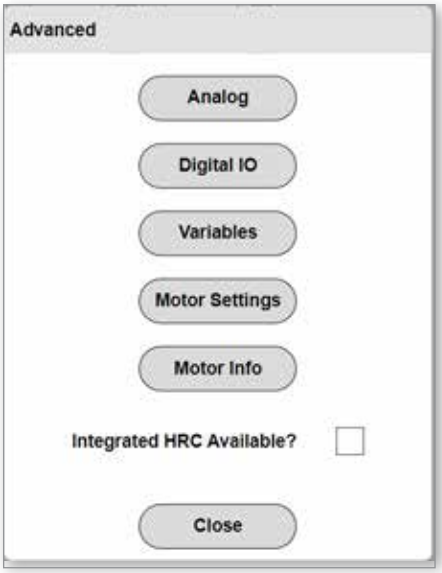


Figure 6-15 The Advanced Options box

Table 6-1 Advanced Options Buttons	
Button	**Description**
Analog	Allows you to set up and calibrate analog input. See “6.9.3 Calibrate Analog Inputs” on page 6-26.
Digital IO	Allows you to monitor digital inputs and outputs.
Variables	Allows MM tester and higher to adjust some monitoring limits.
Motor Settings	Allows you to adjust the motor settings.
Motor Info	Allows you to view the motor information.
HRC Enabled? ☐	For SeVG Plus units that have the integrated hot runner controller option.
Close	Returns the controller software to the Main screen.

Digital inputs and outputs:

- can be on or off
- can be forced or unforced

NOTE

Inputs and outputs should be set to [**Unforced**] during regular operation.

The lights next to the inputs and outputs indicate their condition:

- green - the input or output is active
- white - the input or output is **not** active

See Figure 6-16.

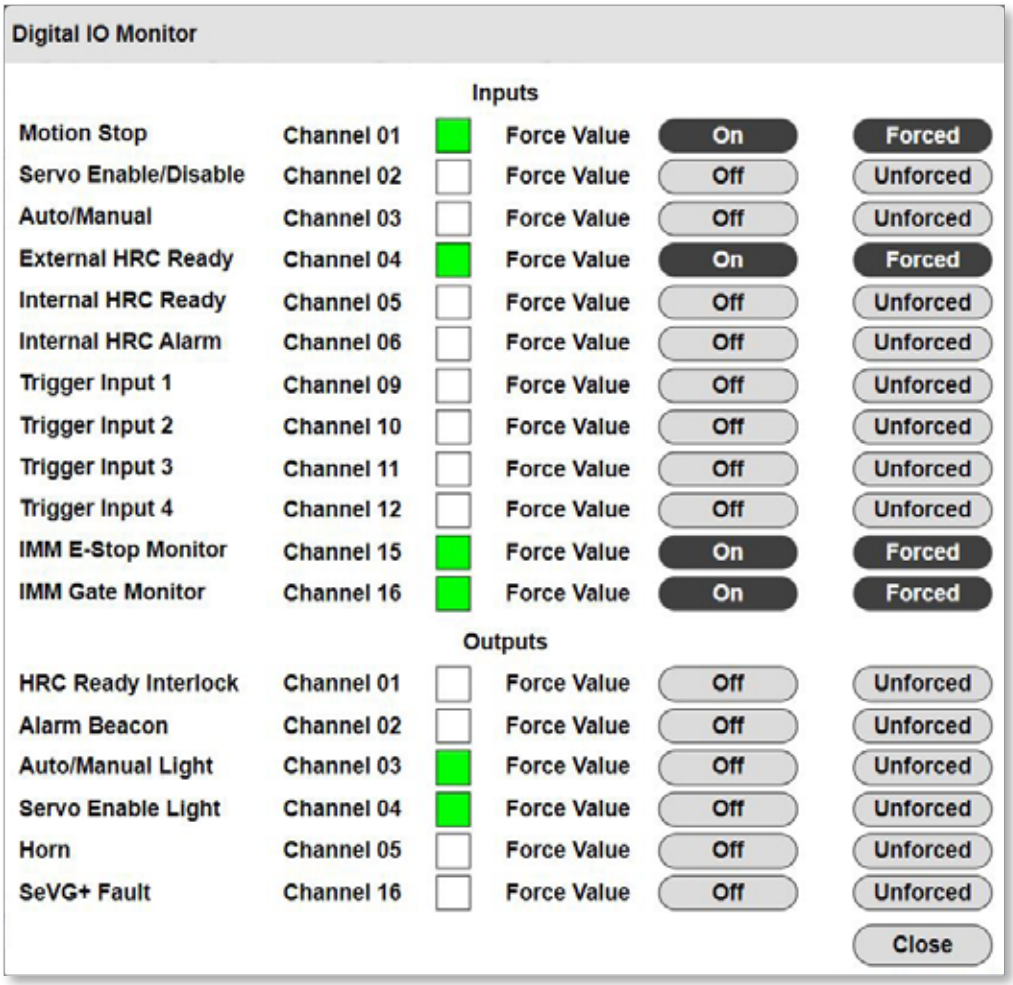


Figure 6-16 Digital IO monitor

For a list of digital inputs and outputs and their descriptions, see “Table 6-2 Digital Inputs and Outputs” on page 6-25.

Table 6-2 Digital Inputs and Outputs	
Digital Input	**Description**
Motion Stop	An alternative to using the black motion stop button on the controller cabinet
Servo Enable/Disable	An alternative to using the [**Servo**] button on the Main screen
Auto/Manual	The user can change between modes of operation
External HRC Ready	External hot runner controller statu
Internal HRC Ready	Integrated hot runner controller status
Internal HRC Alarm	Integrated hot runner controller alarm status
Trigger Input 1-4	The user can force or unforce up to 4 digital inputs
IMM E-Stop Monitor	Input from the E-Stop button of the injection molding machine
IMM Gate Monitor	Input from the safety gate of the injection molding machine
Digital Output	**Description**
HRC Ready Interlock	Status from all hot runner controllers linked to SeVG Plus
Alarm Beacon	Triggers the alarm light attached to the controller
Auto/Manual Light	Puts the controller into Auto or Manual mode
Servo Enable Indicator	Allows the user to start the servo motors. Its light will match the display of the buttons on the Main screen and the buttons on the controller cabinet
SeVG+ Fault	Indicates any error with the SeVG Plus controller

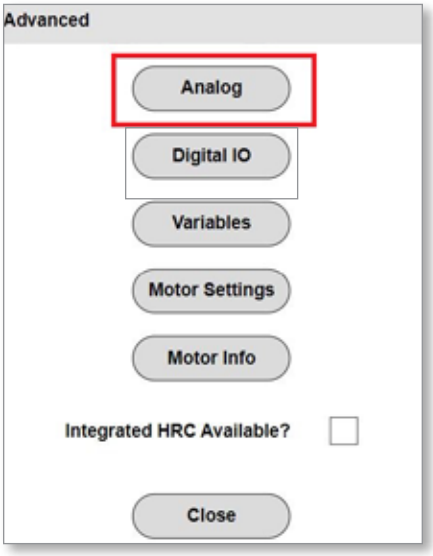
Choose [**Close**] to return to the Main screen from the Advanced screen.

6.9.3 Calibrate Analog Inputs

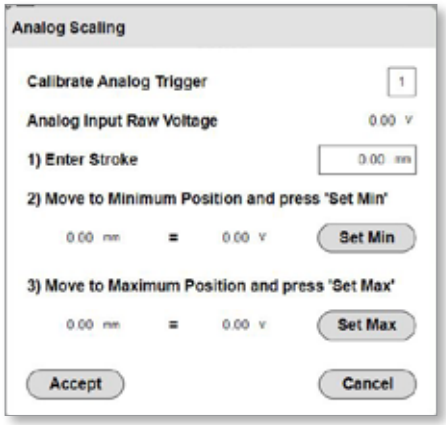
The SeVG Plus can use up to four analog inputs. To use analog triggers, the user must first calibrate the analog inputs.

1. Choose [**Advanced**] to open the Advanced screen:

2. Choose [**Analog**] from the Advanced box:



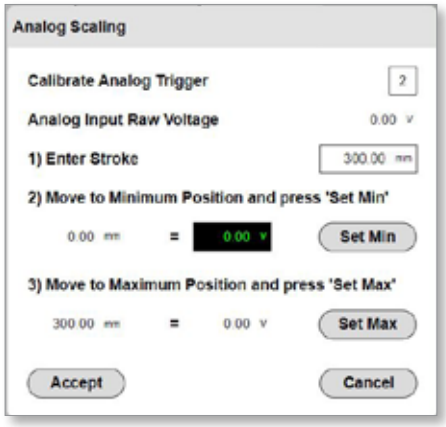
The Main screen with the Analog Scaling box opens:



3. Choose the analogue trigger from the drop-down menu.

4. Enter the maximum stroke of the injection screw:

5. Move the screw fully back.
6. Choose [**Set Min**] to set the minimum position:



NOTE

The value for the voltage changes to green in color after the value is set.

7. Move the screw fully forward.

8. Choose [**Set Max**] to set the maximum position.

The voltage value changes to green after the value is set.

9. Choose [**Done**] to save these values and return to the Main screen or choose [**Cancel**] to return to the Main screen without saving.

The gates will automatically populate with these values.

This process can be repeated for up to four analog inputs.

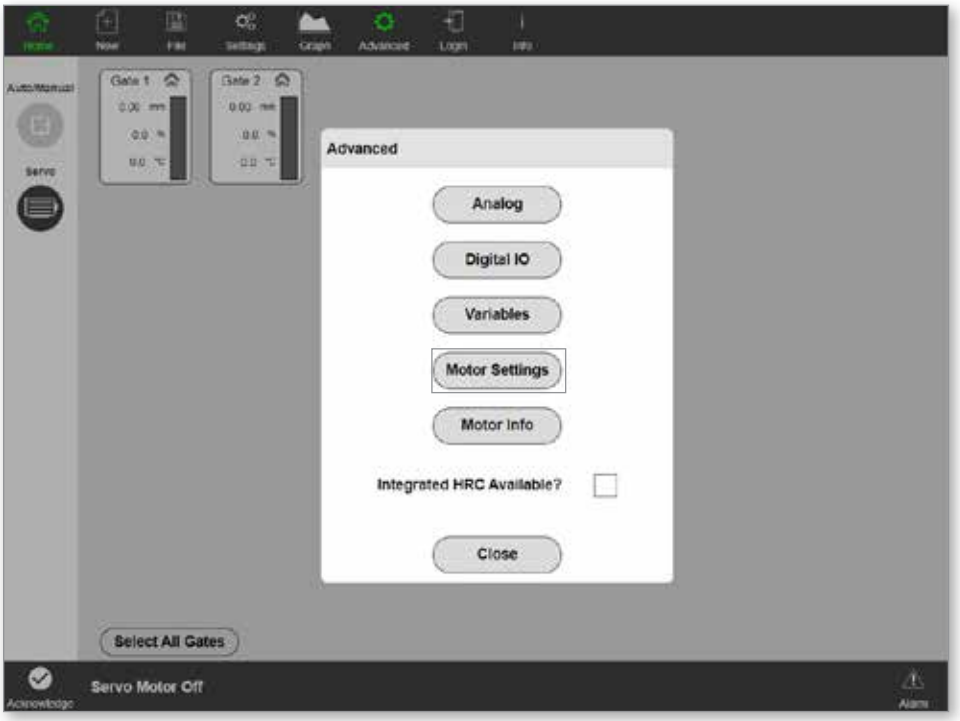
6.9.4 Auto-Tune the Motor

Motor auto-tune can be performed:

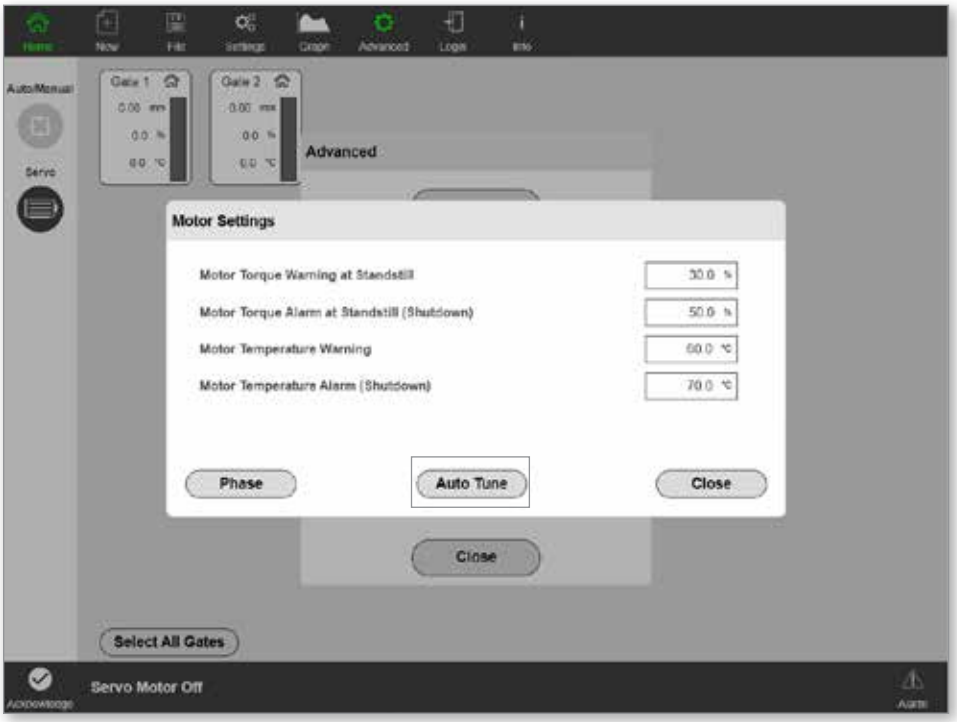
- when the motor vibration is high during standstill and the servo is on
- when the motor torque is erratic during motion

To auto-tune a motor:

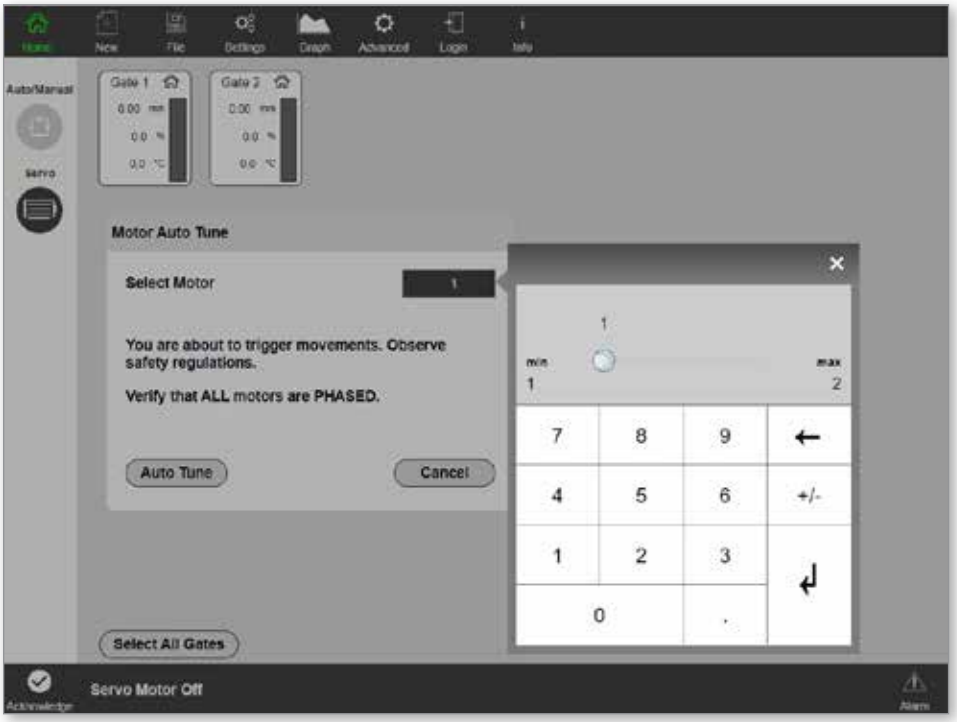
1. Choose **[Advanced]**.
2. Choose **[Motor Settings]**.



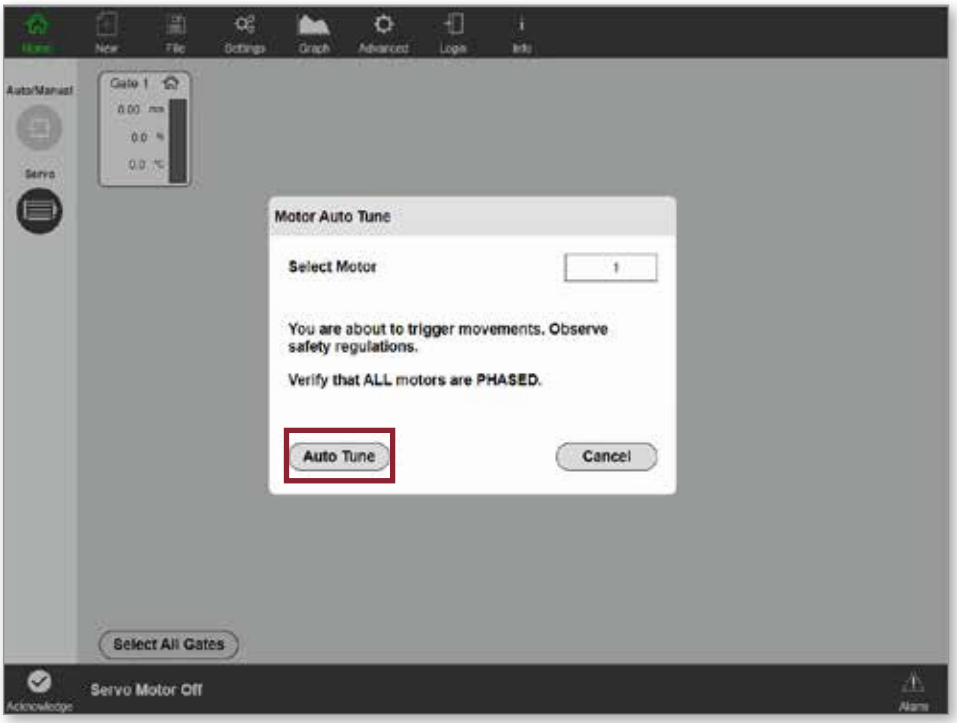
3. Choose **[Auto Tune]**.



4. Choose the motor that requires tuning.



5. Choose **[Auto Tune]**.



The following dialog boxes open:

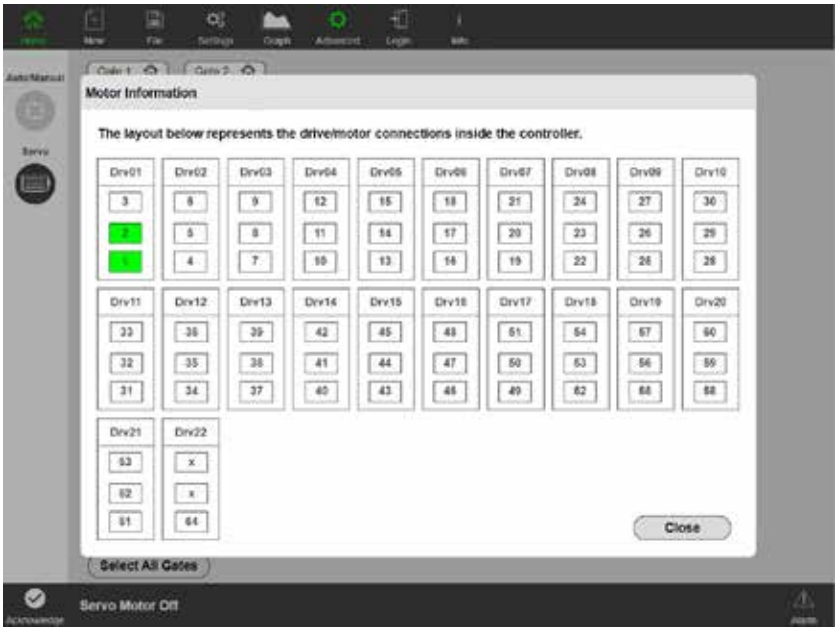
6.9.5 View Motor Information

The Motor Information screen shows the motors that were detected during the boot-up initialization process. This screen only shows information and has no functionality. To make changes to the motor hardware connections, power off the controller, make the changes, and reboot the controller to see the changes.

To show the Motor Information screen:

1. Choose **[Advanced]**:

2. Choose **[Motor Info].**



The green highlighted numbers indicate the motors that are connected. The layout indicates the servo drive arrangement and motor locations on the drive hardware.

6.9.6 Set Analog Triggers

Triggers are chosen from the drop-down menu. See Figure 6-17.

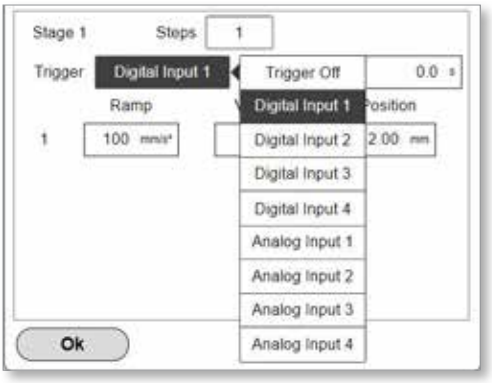


Figure 6-17 Analog triggers in drop-down menu

The user must set a threshold value to use analog triggers. See Figure 6-18.

Figure 6-18 Set threshold

NOTE

The threshold is the position at which the motion step is activated. The maximum value for a threshold is the stroke entered during analog calibration. See”6.9.3 Calibrate Analog Inputs” on page 6-26.

The timing of the open or close trigger can be set to [**Rising Edge**] or [**Falling Edge**]:

Rising edge - triggers as the valve pin is moving toward its maximum stroke

Falling edge - triggers as the valve pin is moving toward its minimum stroke

NOTE

The option of [**No Trigger**] is also available, if required.

The user now sets the other parameters for each step as required.

Start

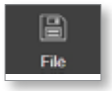
6.10 Load an Existing Profile

The user can choose a saved project and load its parameters to the gates.

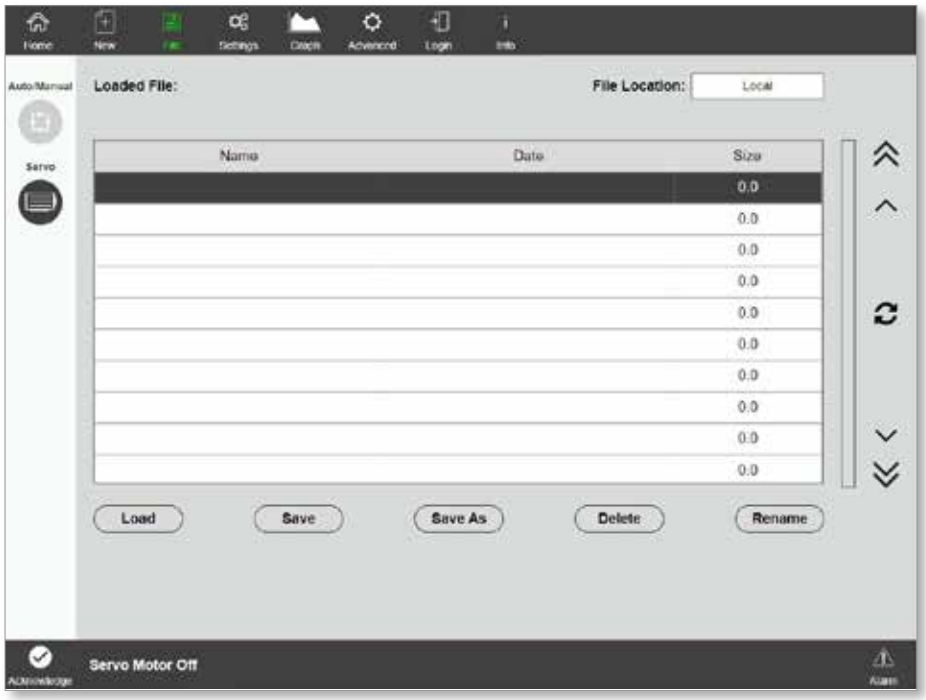
NOTE

The load function not available when the servo is enabled.

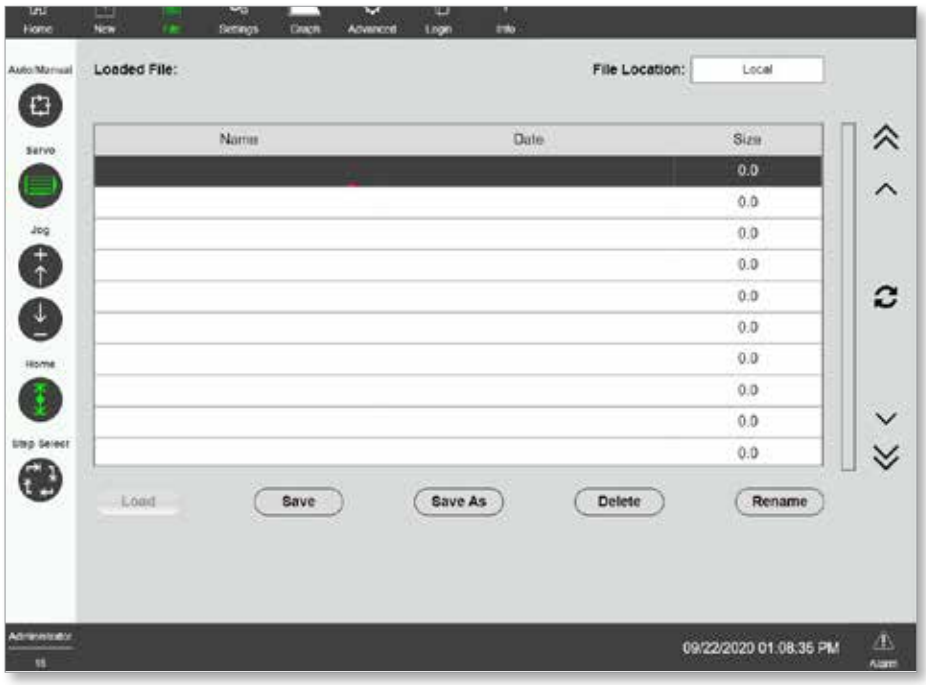
1. Choose [**File**] from the top menu buttons:



The File screen opens:



2. Choose the file to be loaded from the list:



3. Choose the [**Load**] tab at the bottom of the screen:

This message appears after the profile has been successfully loaded:

4. Choose [**OK**] to return to the main File screen.

6.11 Save a Profile

The user has two options when saving a profile:

- save
- save as

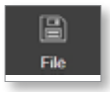
NOTE

To save the first profile created, the user must choose [**Save As**].

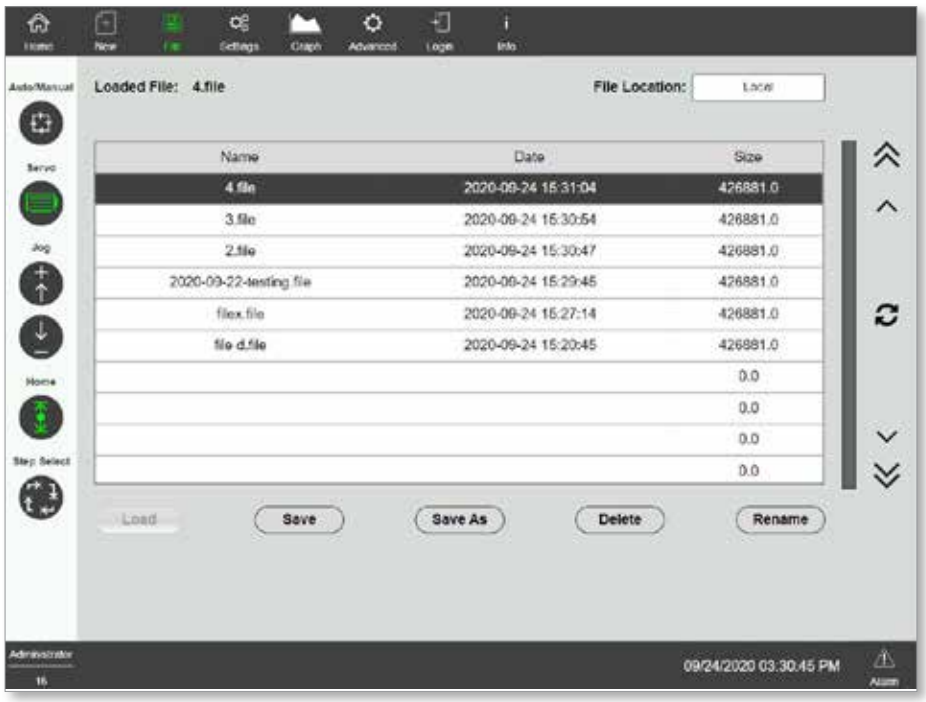
6.11.1 Save

To save updates to an existing profile

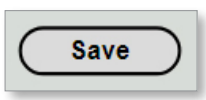
1. Choose [**File**] from the top menu bar:



The File screen opens:



2. Choose the [**Save**] button at the bottom of the screen:



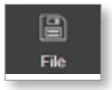
A confirmation dialog box opens:

3. Choose [**OK**].

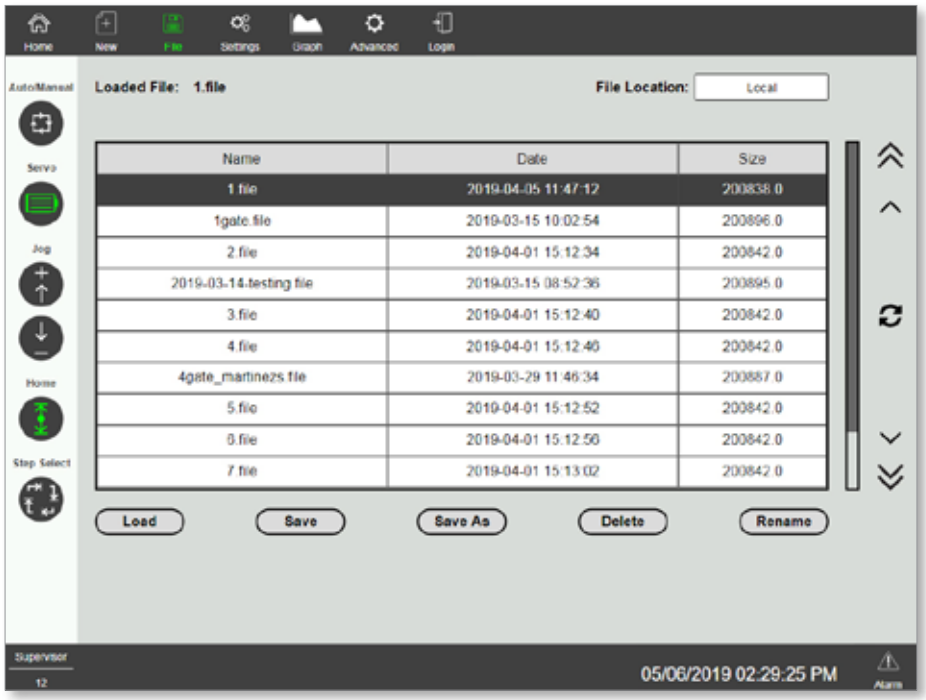
6.11.2 Save As

To save an updated profile under a new name or to save the very first profile created.

1. Choose [**File**] from the top menu bar:



The File screen opens:

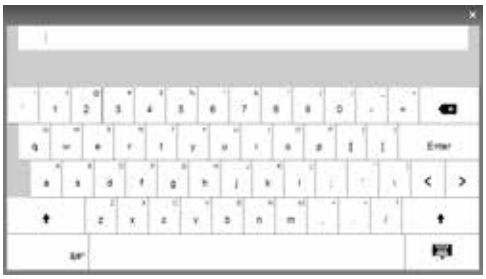


2. Choose [**Save As**] from the bottom of the screen:

A dialog box opens:

3. Click in the text box.

A keyboard opens:



4. Enter the new file name.
5. Choose [**Enter**]:

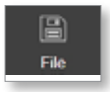
6. Choose [**OK**] to accept the file name and to return to the File screen, or choose [**Cancel**] to return to File screen.

   A dialog box opens:

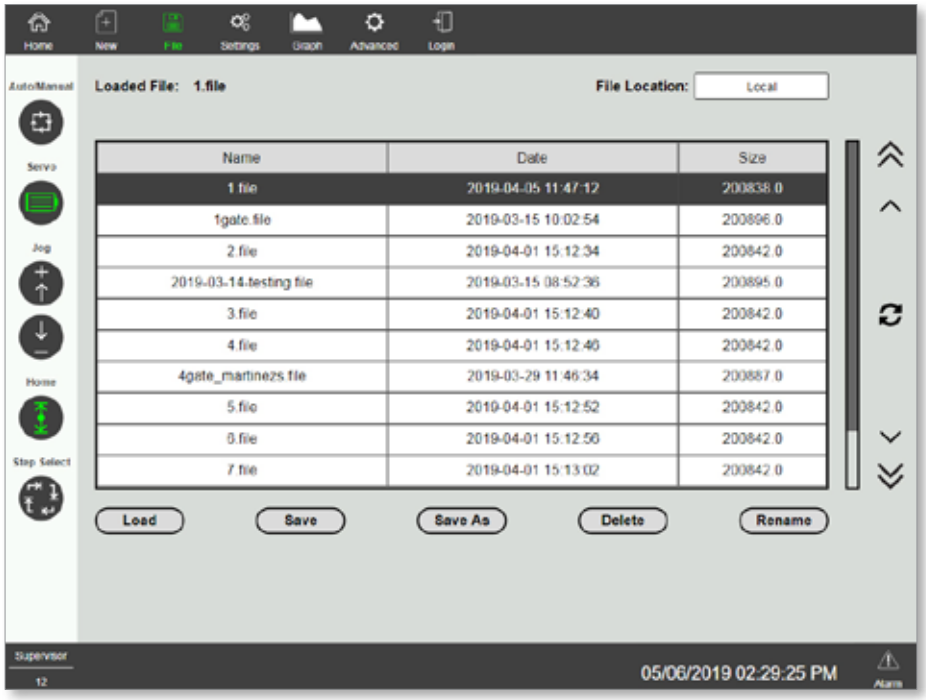
7. Choose [**OK**].

6.12 Delete a Profile

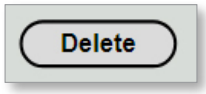
1. Choose [**File**] from the top menu buttons:



The File screen opens:



2. Choose the file or files to be deleted from the list.
3. Choose [**Delete**] from the bottom of the screen:



A dialog box opens:

4. Choose [**Ok**] to delete the selected file or files.

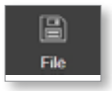
   A dialog box opens:

5. Choose [**OK**].

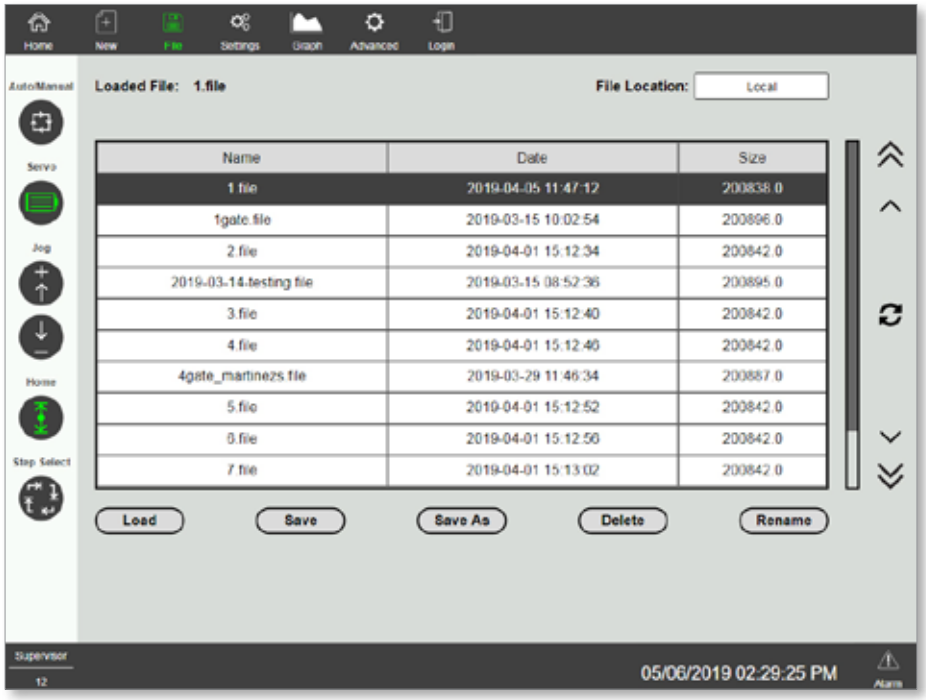
6.13 Rename a Profile

The user can rename a profile even if it is not loaded.

1. Choose [**File**] from the top menu buttons:



The File screen opens:

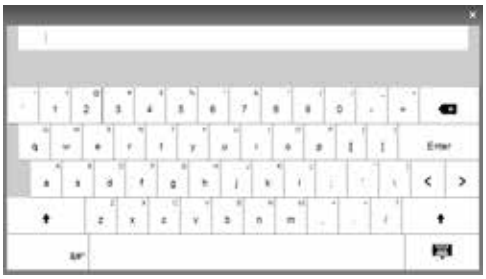


2. Choose the file to be renamed.
3. Choose [**Rename**] from the bottom of the screen:

A dialog box opens:

4. Tap in the text box.

A keyboard opens:



5. Enter the new file name, and choose [**Enter**].

6. Choose [**Ok**] to accept the file name and to return to the File screen, or choose [**Cancel**] to not accept the file name and return to the File screen.

   A dialog box opens:

7. Choose [**OK**].

Section 7 - User Access and Passwords

There are seven levels of password access for the SeVG Plus controller. See Table 7-1.

Table 7-1 Levels of Password Control

User	Level	Default Password	Description
Operator	5	1	Access includes: • start or stop the controller • create and change a profile • start or stop graph
Supervisor	12	1	In addition to all equivalent access as for operators, supervisors can also: • change manual settings • add, delete or update users with access levels less than 12 • change graph settings
MMTester	14	*Mold Masters* only	This level is available for *Mold-Masters* service technicians.
Administrator	16	*Mold Masters* only	This is also a level for the programmers only.

7.1 Add a User

Only users with a password of level 12 or above can add users.

1. Follow the login procedure as shown in “6.2 Login” on page 6-1 and login as an Administrator.

NOTE

If the user has access level 12 or above, the Login box opens with two tabs, Login and Administration. See Figure 7-1.

Figure 7-1 Login tab with supervisor access

2. Choose the Administration tab:

3. Choose [**New User**].
   The User Details box opens:

4. Click in the **User** text box.

The keyboard opens:

5. Enter the user name, and choose [**Enter**].
6. Click in the **Password** text box.
   The keyboard opens.
7. Enter the password, and choose [**Enter**].
8. Click in the **Confirmation** text box.
   The keyboard opens.
9. Enter the password again, and choose [**Enter**].
10. Click the **Role** dropdown box.

11. Choose the level of access for the new user:

12. Choose [**Ok**] to create the new user.

7.2 Delete a User

Only users with a password of level 12 or above can delete users.

1. Follow the login procedure as shown in “6.2 Login” on page 6-1 and login as an Administrator.

NOTE

If the user has access level 12 or above, the Login box opens with two tabs, Login and Administration. See “Figure 7-1 Login tab with supervisor access” on page 7-2.

2. Choose the Administration tab:

3. Choose the user to delete:

4. Choose [**Delete User**].

The User Details box opens. The user name and role boxes are filled in automatically.

5. Enter the password, and choose [**Enter**]:

6. Enter the password again, and choose [**Enter**]:

A dialog box opens:

7. Choose [**OK**] to delete the user.

7.3 Edit User Details

Only users with a password of level 12 or above can edit user details.

1. Follow the login procedure as shown in “6.2 Login” on page 6-1 and login as an Administrator.

NOTE

If the user has Supervisor access level 12 or above, the Login box opens with two tabs, Login and Administration. See “Figure 7-1 Login tab with supervisor access” on page 7-2.

2. Choose the Administration tab:

3. Choose the user to edit:

4. Choose [**Edit User**].
5. Edit the user details.

6. Choose [**Ok**] to save the changes.

Section 8 - Troubleshooting

WARNING

Ensure that you have fully read “Section 3 - Safety” before troubleshooting any issues with the SeVG Plus controller.

Alarm messages warn the user about adverse conditions with the controller or the injection molding machine. See “8.2 Alarm Messages” on page 8-6 for a list of error messages.

These messages are displayed in the lower information bar. Note the following changes to the default display:

- the message displays in white text
- the background of the information bar turns red
- the operator level on the left side is replaced by the [**Acknowledge**] icon

See Figure 8-1.

Figure 8-1 Alarm message in information bar

An alarm message displays in the bottom information bar until the user acknowledges it on the Alarm screen. See “8.1.2 Acknowledge an Alarm Message” on page 8-3.

IMPORTANT

Some alarm messages remain visible in the information bar even after acknowledgement. In these cases, the user must resolve the condition that has triggered the error message for it to disappear.

8.1 The Alarm Screen

After an alarm message is triggered by the system, the user chooses the alarm icon located on the right hand side of the Information bar to open the Alarms screen:

Two tabs are shown on the Alarms screen:

- the Alarm tab - shows alarms presently active
- the History tab - shows a historical record of alarms

8.1.1 The Alarms Tab

The Alarm tab shows the following information:

- **Timestamp** - date and time of alarm
- **Scope** - whether the alarm is local and affects one gate or if it is global and affects all gates
- **Name** - the name of the alarm
- **Message** - description of the alarm
- **State** - acknowledged or not acknowledged

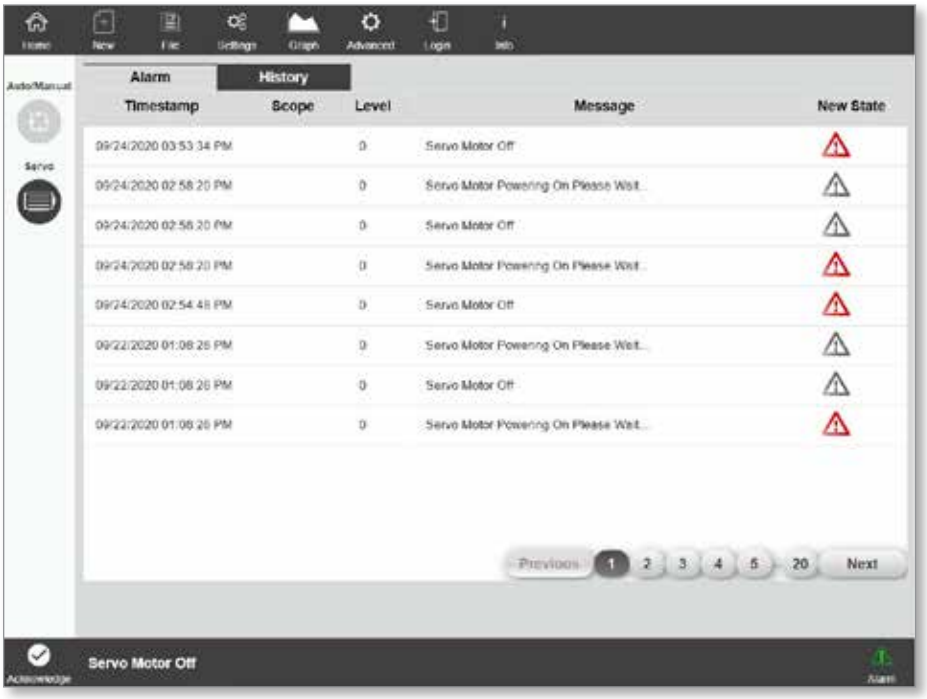


Figure 8-2 Alarm tab with acknowledged alarm

8.1.2 Acknowledge an Alarm Message

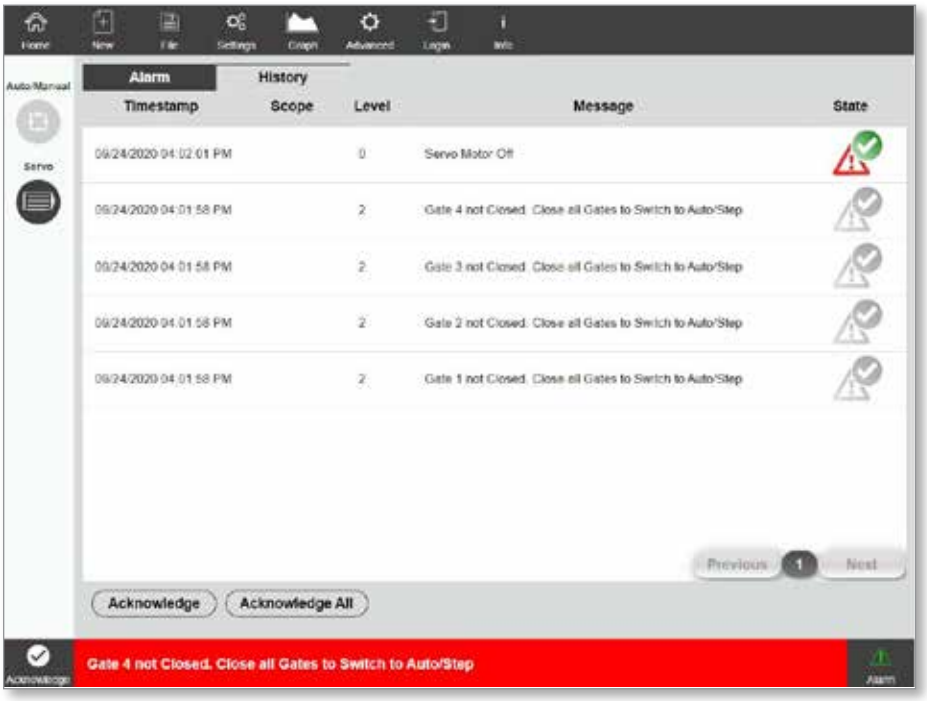
The difference between an acknowledged alarm and an unacknowledged alarm is shown by the color of the checkmark:

Unacknowledged
Grey triangle

Acknowledged
Green triangle

An alarm may be acknowledged automatically by the system, depending on its type. If the alarm is not automatically acknowledged by the system, then the user must acknowledge it.

1. Choose the required alarm or alarms from the Alarms tab:



2. Choose the [**Acknowledge**] button.

The user can choose the [**Acknowledge All**] button to acknowledge all alarm messages shown on the Alarm tab. In this case, the user does not have to choose any specific alarm.

NOTE

The user can also choose the acknowledge button from the Main screen. This action acknowledges all pending alarms.

The message disappears from the Alarm tab and appears on the History tab.

See “8.1.3 The History Tab” on page 8-5.

IMPORTANT

Some alarm messages remain visible in the Alarm tab even after acknowledgement. In these cases, the user must resolve the condition that has triggered the error message for it to disappear.

NOTE

The [**Acknowledge**] icon located in the lower left hand corner of the screen acknowledges the alarm currently shown in the information bar. See “Figure 8-2 Alarm tab with acknowledged alarm” on page 8-2.

The user can also choose to resolve the cause of the alarm before acknowledgement. In this case, both the triangle and the checkmark turn grey in color. See Figure 8-3

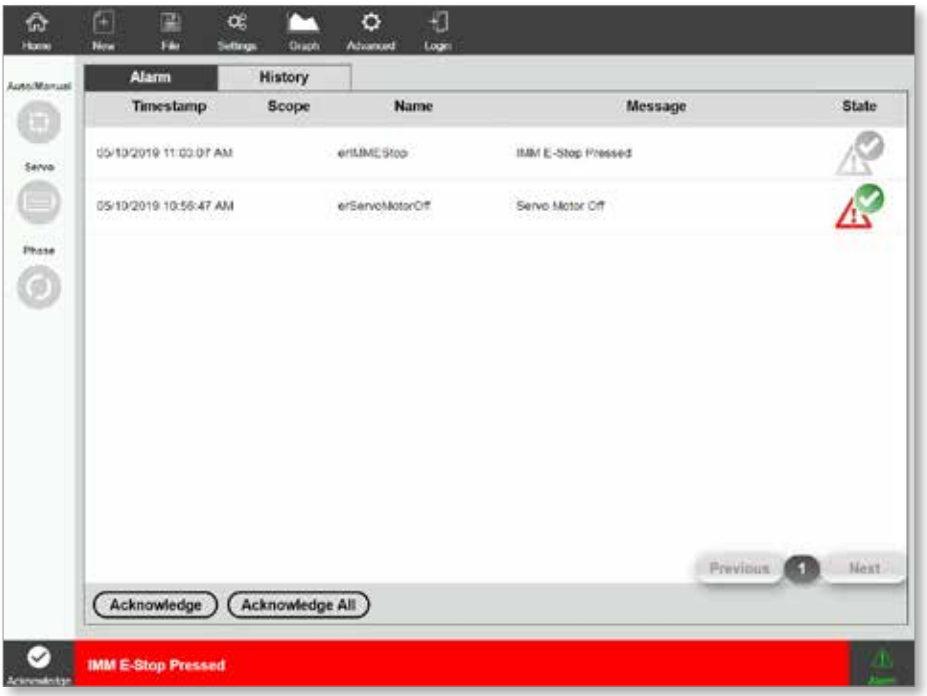


Figure 8-3 Alarm notification greyed out

The alarm notification then automatically moves to History tab.

8.1.3 The History Tab

The History tab displays a historical record of the alarms of the system:

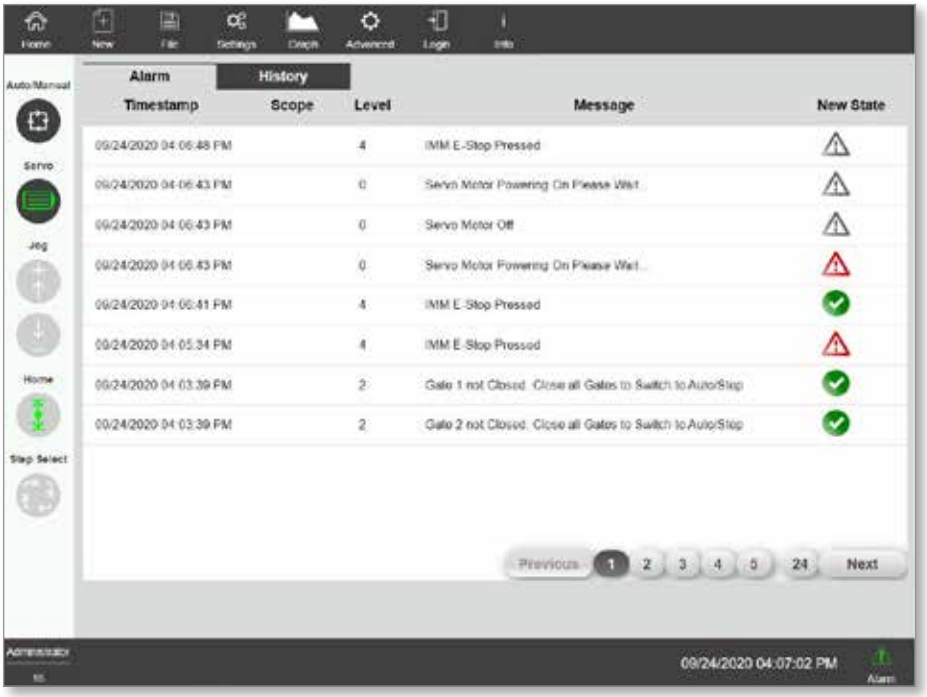


Figure 8-4 History tab

8.2 Alarm Messages

NOTE

If in doubt about an error message, please contact a representative at *Mold-Masters*.

Table 8-1 Alarm Messages

Error Name	Fault Text	Cause	Notes
DriveEnableLow		Drive xx enable signal was lost during operation OR Drive xx was requested to power on without enable signal.	Ensure enable signal is available to drive. Check safety system.
DriveOverload		Drive xx has been working beyond nominal operational point.	Check for blockage.
EncoderError		Drive xx has noticed a problem with the system encoder. Check corresponding error ID for more information.	Follow help for error id. Check encoder cabling.
erAllGatesHomingInProgress	All Gates Homing In Progress. Please wait...	All axes are selected and are being homed.	
erEncoderChangeDir	Project change detected. Changing motor direction	Toggle Motion Direction is selected on HMI.	
erExternalTempInterlock	External Temperature Controller Not Ready.	di_RemoteHRCEnabled = FALSE	
erGateHomingInProgress	Gate xx Homing In Progress. Please wait...	Only one axis is selected and is being homed.	
erGateNotClosedAuto	Gate xx not Closed. Close All Gates to Switch to Auto.	An axis is not at its closed position as per profile setting AND user attempts to go to Auto.	
erHomingTimeout	Homing did not successfully complete in the allowable time limit.	Homing did not complete and timeout has expired.	
erIMMEStop	IMM E-Stop Pressed	di_EStopIMM = FALSE	
erIMMEStopInMotion		di_EStopIMM = FALSE during motion	
erIntegratedTempAlarm	Integrated Temperature Controller Alarm. Cannot Enable Servo.	Integrated temperature controller has an alarm.	di_InternalHRCAlarm = True
erIntegratedTempInterlock	Integrated Temperature Controller Not Ready.		di_ InternalHRCEnabled = FALSE
erMotorPhaseRequired	Gate xx requires phasing. Cannot enable servo.	Motor phase value is not found.	Recalibrate the motor showing this error.
erMotorTempAlarm	Gate xx Motor Over-Temperature Shutdown	Motor temperature exceeds alarm level.	
erMotorTempWarn	Gate xx Motor Over-Temperature Warning	Motor temperature exceeds warn level AND motor temperature exceeds alarm level.	

Table 8-1 Alarm Messages			
Error Name	**Fault Text**	**Cause**	**Notes**
erMoveToClose	No Gates in Project. Create New Project with at least 1 Gate	No gates are added to the current project.	Add gates to the project.
erNoServosDetected		No motors detected.	Investigate Powerlink connection, motors connection, etc.
erOutOfPositionLimit	Gate xx moved outside of Operation Limits.	Gate xx moved outside of operation limits.	
erSafetyGateOpened	IMM Safety Gate Open	di_bSafetyGateClosed = FALSE	
erSafetyGateOpenedInMotion	IMM Safety Gate opened while in motion	di_bSafetyGateClosed = FALSE during motion.	Close safety gate and acknowledge the alarm.
erSafetyReactionMove	Safety Reaction in progress. Moving pins to close position.	One of the following alarms occurs: “erIMMEStopInMotion” “erStopButtonPressedInMotion” “erSafetyGateOpenedInMotion” AND at least one gate is not at its closed position.	
erServoDriveInit	Gate xx not initialized	Drive initialization failed due to hardware fault, missing connection, etc.	
erServoMotorOff	Servo Motor Off	Servo drives not enabled	
erServoPowerOn	Servo Motor Powering On. Please Wait…	Servo motors enabled for the first time after power up.	
erStandstillTorqueAlarm	Gate xx Torque Alarm at Standstill	Axis at standstill AND torque exceeds alarm limit.	
erStandstillTorqueWarn	Gate xx Torque Warning at Standstill	Axis at standstill AND torque exceeds warn limit but is less than Alarm limit.	
erStepModeActive	Step Mode Active	Operation mode = step	
erStopButtonPressed	Stop Button Pressed	di_StopButton = FALSE	
erStopButtonPressedInMotion		di_StopButton = FALSE during motion.	
erWaitingForTrigger	Waiting for Start Trigger	Operation mode = Auto AND first trigger has not been seen by the controller.	
GeneralDriveError	General axis error	An error has occurred on servo drive xx.	Acknowledge error and restart sequence.
GeneralWarning	Drive xx has issued a warning.		Investigate warning message code.
LagError	Drive xx has noted that the difference between actual and set positions is outside of allowed bounds.		Inspect system for blockages. Lower maximum allowable accelerations.Increase maximum torque.

Table 8-1 Alarm Messages			
Error Name	**Fault Text**	**Cause**	**Notes**
MainVoltageError	Drive xx is not receiving proper mains voltage.		Inspect main voltage supply to drive.
Module xx Not OK	The module OK status on the respective IO card is not true.		Check that card is inserted. Check that card is functioning properly.
MotorOverload	Motor xx has been working beyond nominal operational point.		Check for blockage.
NoCommunication	Drive xx is not communicating with controller.		Check Powerlink network.
ParameterInvalid	An invalid parameter has been provided to drive xx.		Adjust parameters. If error persists, contact *Mold-Masters* for assistance.
erGateProfileExceedsStroke	Gate xx profile exceeds project stroke. Cannot enter Auto/Step.		Update gate profile.

8.3 Recalibration of Motor Offsets

Your SeVG Plus controller and motors are calibrated before they leave the factory, and they do not need to be recalibrated during normal operation.

Recalibration of motor offsets may be useful or required under the following circumstances:

- troubleshooting individual motor issues
- if a motor is replaced with a new or existing SeVG Plus motor from a different location within the system

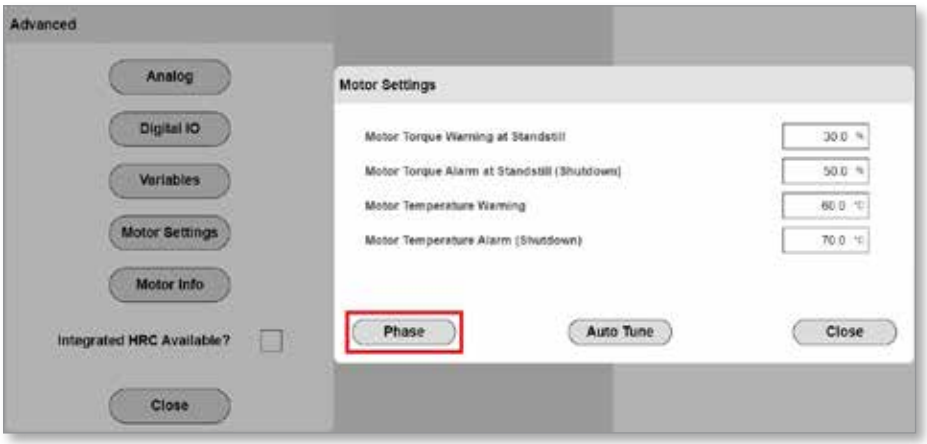
NOTE

Recalibration can only be done when the servo motors are not enabled.

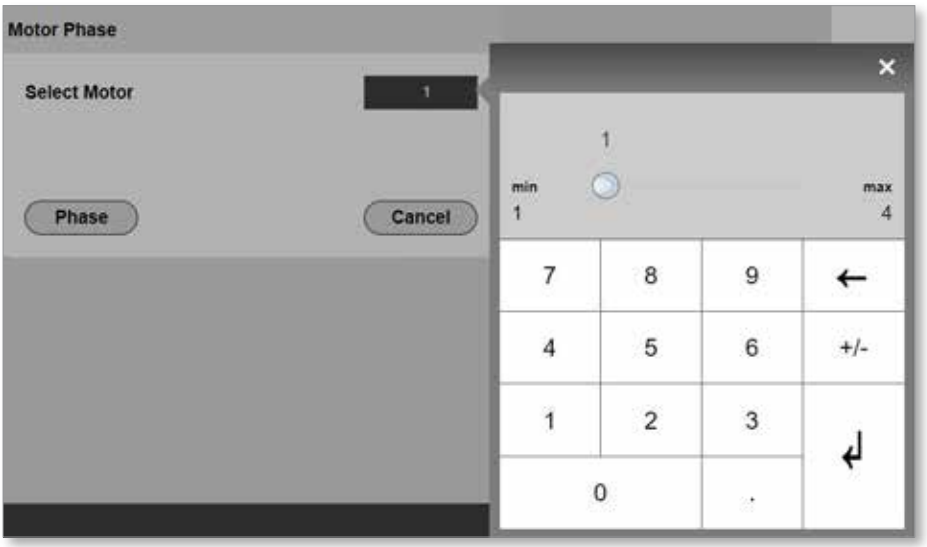
The [**Phase**] button is unavailable until you select a motor.

To recalibrate the offset for a particular motor:

1. Go to Advanced Menu > Motor Settings.
2. Choose **[Phase]**.



3. Choose a motor.



4. Choose **[Phase].**

   A dialog window appears:

   The dialog window disappears after the recalibration is completed.

Section 9 - Graph Screen

9.1 Overview

The Graph screen of the SeVG Plus controller produces real time feedback, and it is used for recording and displaying process variables for diagnostic purposes.

Configured settings can be saved to the SeVG Plus system or exported to a USB memory stick.

NOTE

The USB memory stick must be inserted into the PLC unit to save files.

9.2 Bottom Menu Overview

The user can configure the graph parameters and output with the buttons along the bottom of the screen.

From left to right these tabs are:

- Start
- Inactive
- Setup
- Export
- Save Setup
- Load Setup

See Figure 9-1.

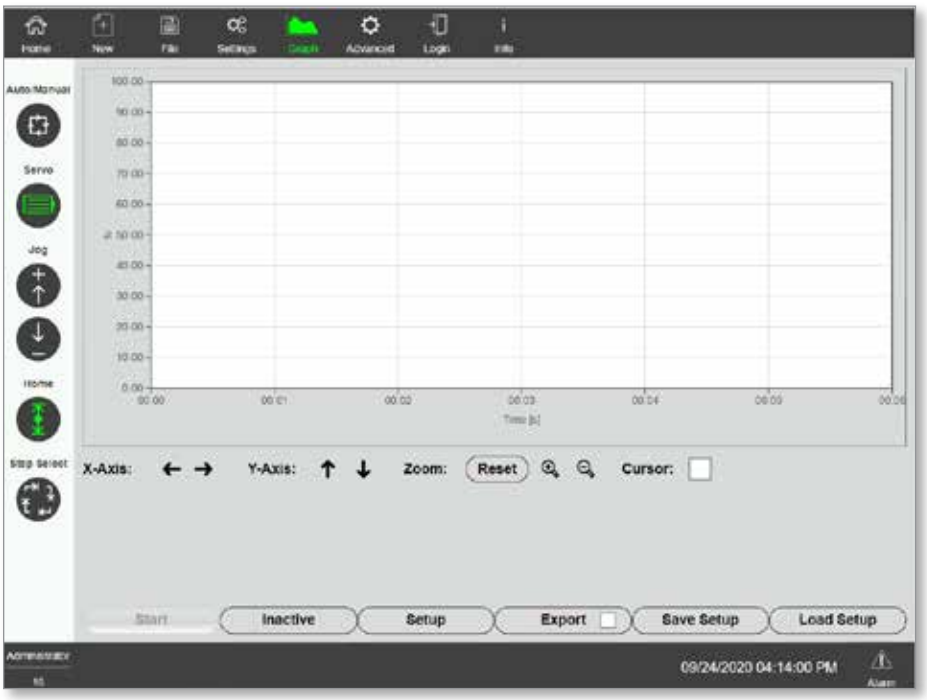
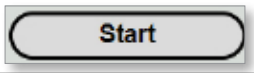
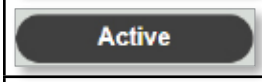
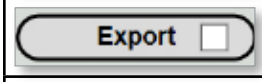
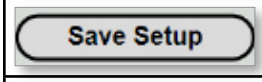
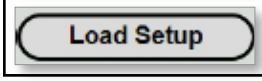
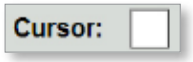


Figure 9-1 Graph screen

Table 9-1 Bottom Menu Buttons	
Button	**Description**
	Starts the graph. This button is greyed out if the graph is inactive.
	Graph function is available. Toggles to [**Inactive**].
	Graph function is unavailable. Toggles to [**Active**].
	Sets up the required graph parameters.
	Sets up the export parameters for the graph. User must enter checkmark into box for export action to activate.
	Saves the current setup of graph parameters.
	Loads the required graph setup from a list of saved options.

9.3 Other Buttons on the Graph Screen

Table 9-2 Other Buttons on the Graph Screen	
Button	**Function**
	User can scroll graph from start point through to end point along the x-axis.
	User can scroll graph from start point through to end point along the y-axis.
	User can zoom graph in or out. [**Reset**] returns graph to default size and resets both axes to start point.
	A moveable cursor appears at the start point of the graph when the graph is active and the checkbox is selected. See “9.5.1 Activate the Cursor” on page 9-15.

9.4 Setup Graph Parameters

The user can configure the graph to display different data about the system's performance. The user can choose to display:

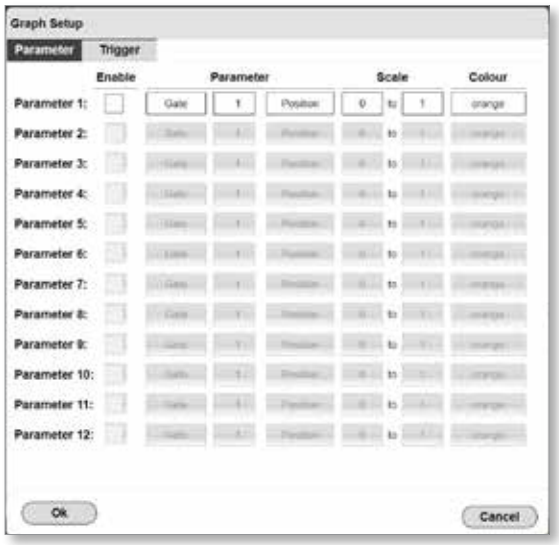
- gate data
- trigger data
- both gate and trigger data

The user is able to graph one or more parameters for the selected gate or gates on a single graph. The chosen parameters are shown on the main Graph screen.

See "Figure 9-2 Graph screen with parameter boxes highlighted" on page 9-12.

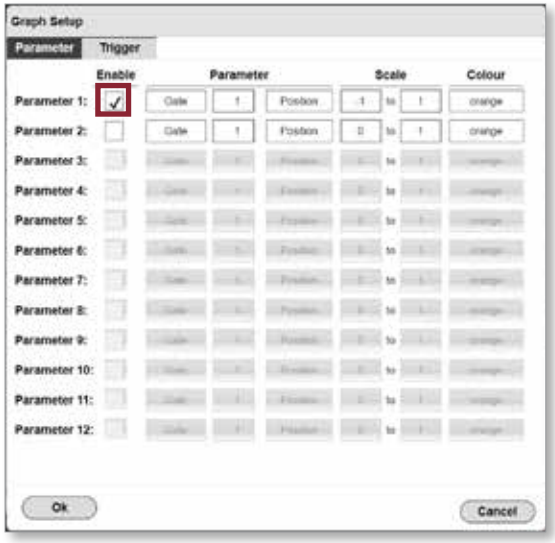
1. Choose [**Setup**].

   The Setup box opens:



The Setup box has two tabs: parameter and trigger.

2. Check the [**Enable**] box beside the first parameter:



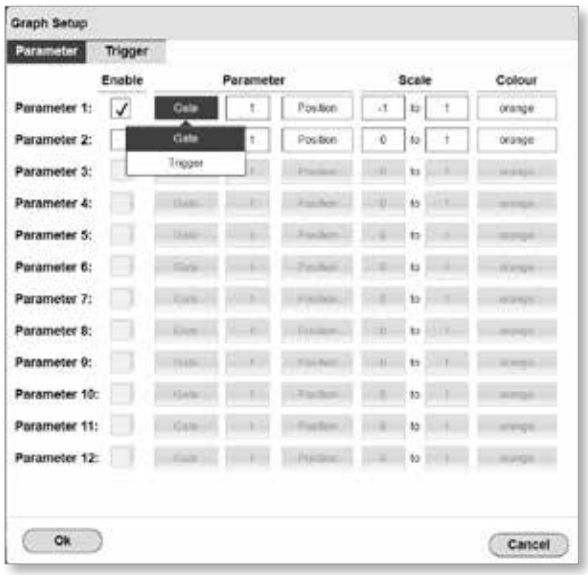
To clear a parameter's configured settings, the user removes the checkmark from the [**Enable**] column.

NOTE

All enabled parameters which follow will also be disabled by this action.

The user can enable multiple parameters by checking multiple boxes but each parameter must be configured individually.

3. Choose [**Gate**] or [**Trigger**]:



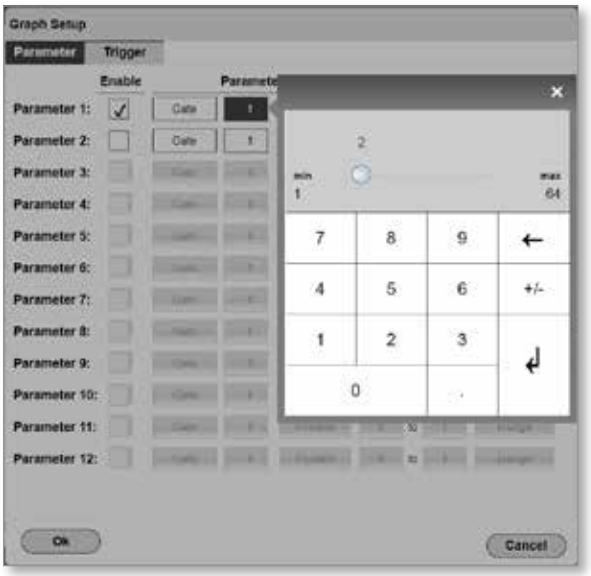
The user has different options for the configuration of gate and trigger parameters.

For gate parameters, see “9.4.1 Configure a Gate Parameter” on page 9-5.

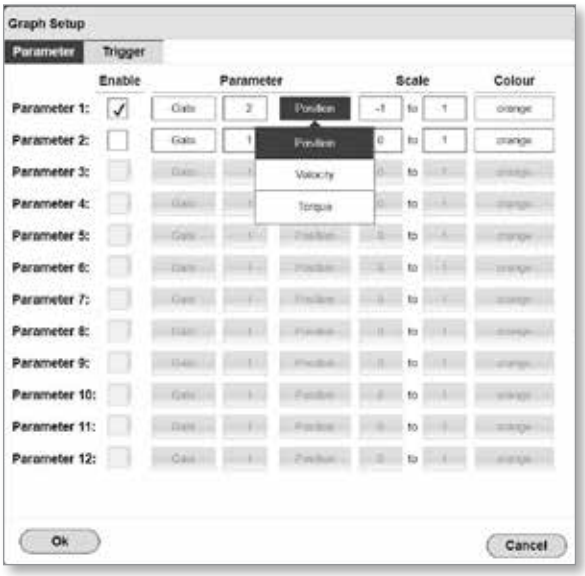
For trigger parameters, see “9.4.2 Configure a Trigger Parameter” on page 9-8.

9.4.1 Configure a Gate Parameter

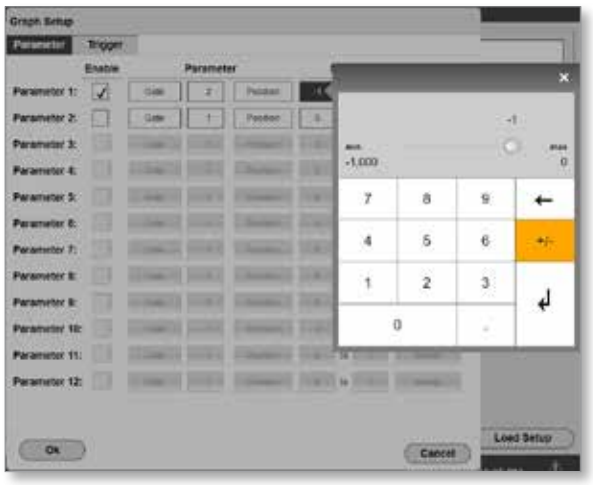
1. Choose the gate number:



2. Choose the value to display on the y-axis:[**Position**], [**Velocity**] or [**Torque**]:



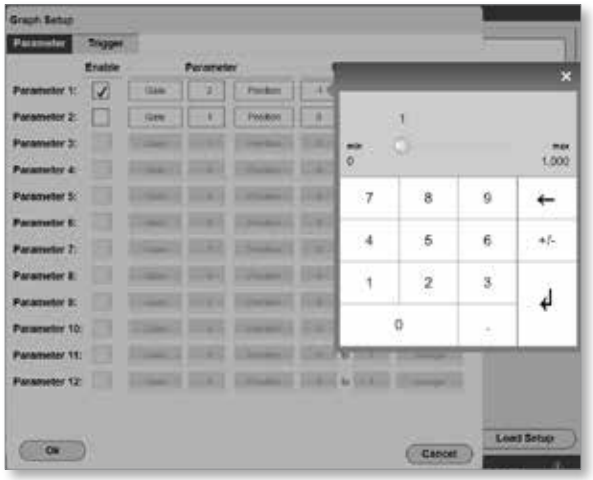
3. Enter a minimum value for the scale of the y-axis:



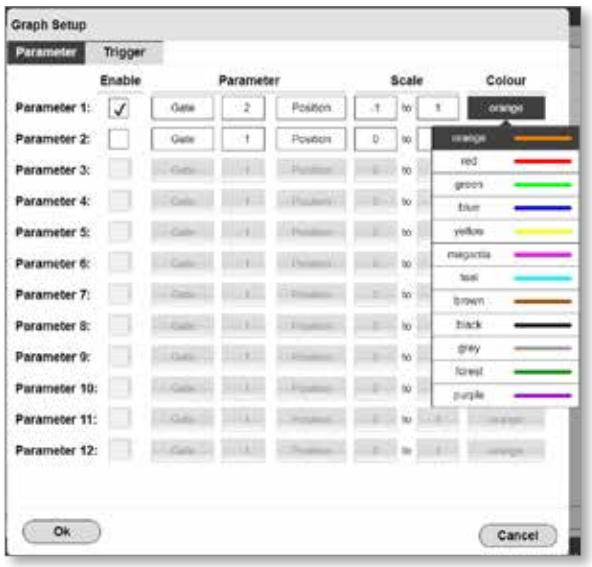
IMPORTANT

The graph scale will correspond to the largest scale entered for all parameters in the configuration.

4. Enter a maximum value for the scale of the y-axis:



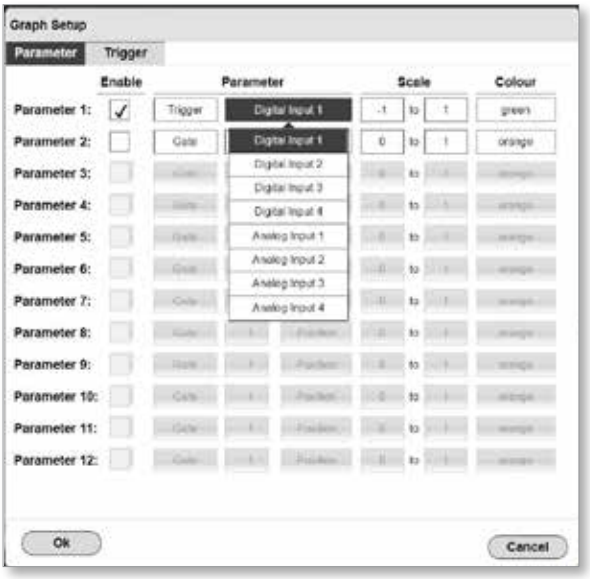
5. Choose the line color.



6. Repeat steps 1 through 4 to configure other parameters, as required.

9.4.2 Configure a Trigger Parameter

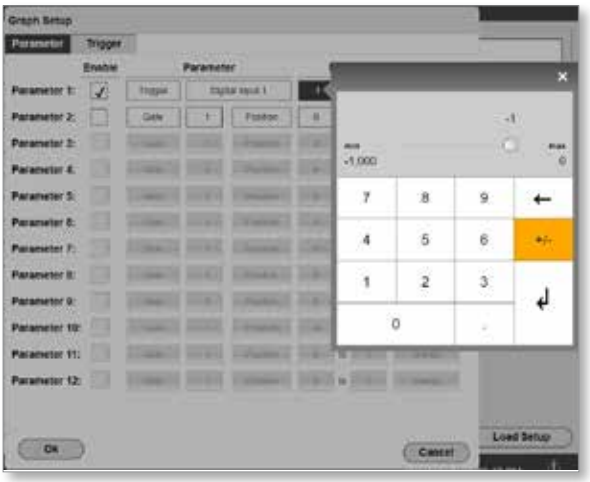
1. Choose a trigger from the Parameter drop-down menu:



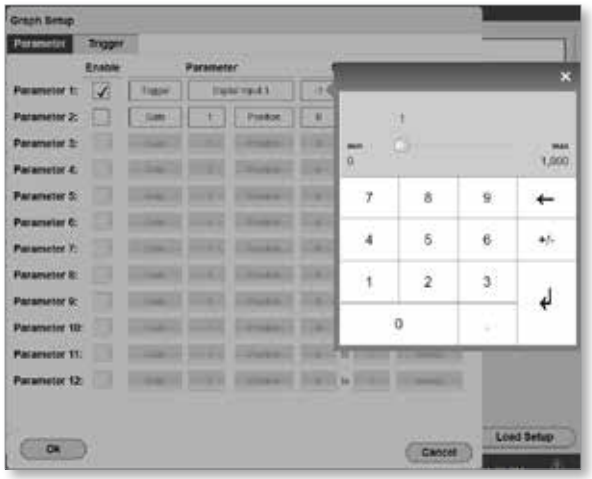
IMPORTANT

The y-axis automatically displays the largest scale entered during this process.

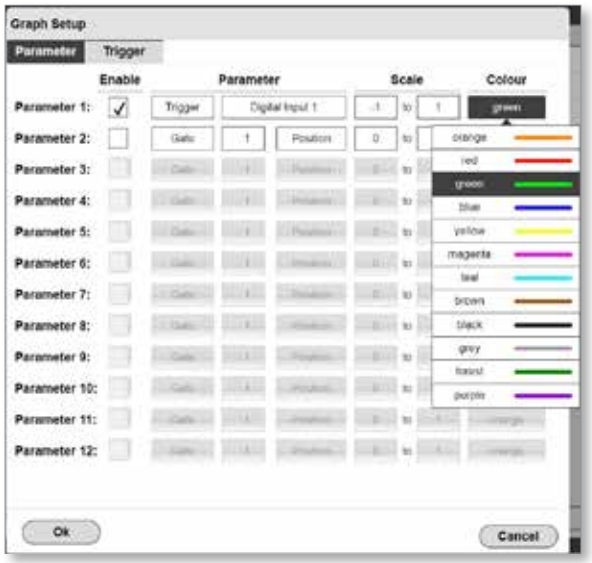
2. Enter a minimum value for the scale of the y-axis:



3. Enter a maximum value for the scale of the y-axis:



4. Choose the line color:



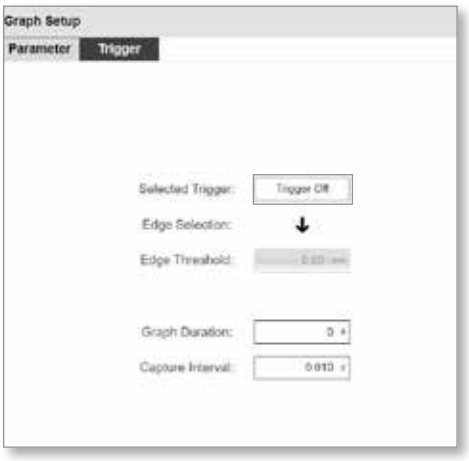
5. Repeat steps 1 through 4 to configure other parameters, as required.

After the parameters have been configured, the user must configure the graph output with the [**Trigger**] tab.

9.4.3 Trigger Tab

The Trigger tab is used to configure the timing of the graph data.

1. Choose the drop-down menu to the right of **Selected Trigger**:

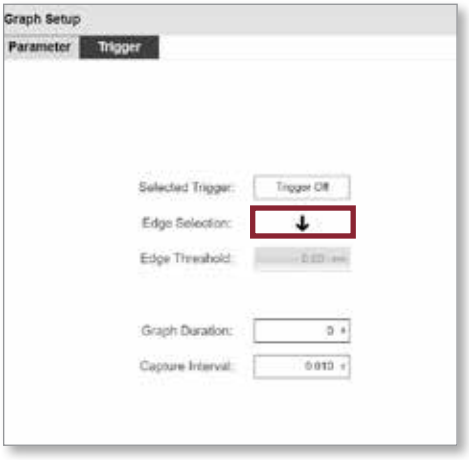


2. Choose a trigger:

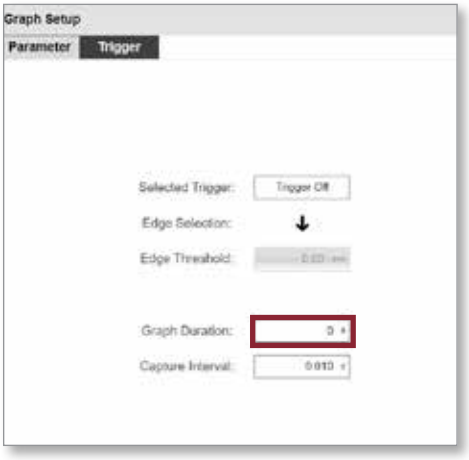
NOTE

A [**Trigger Off**] option is also available.

3. Choose the drop-down menu to the right of [**Edge Selection**]:

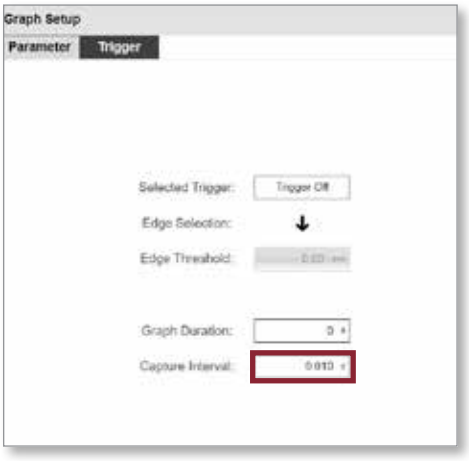


4. Choose Rising Edge [↑] or Falling Edge [↓].
5. Choose the box to the right of [**Graph Duration**]:



6. Enter the length of time in seconds that the graph is to be active:

7. Choose the box to the right of [**Capture Interval**]:



8. Enter the length of time in seconds that the graph is to be displayed:

9. Choose [**OK**] to save the settings.

After the user has finished the configuration process, the parameters and their configurations are shown in boxes at the bottom of the main Graph screen. See Figure 9-2.

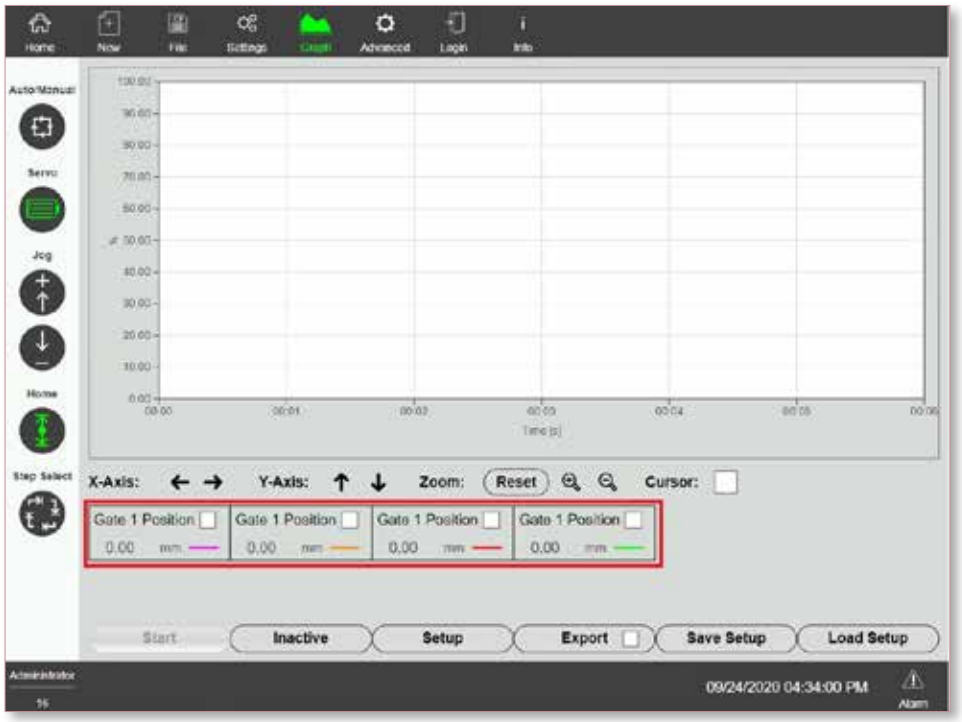
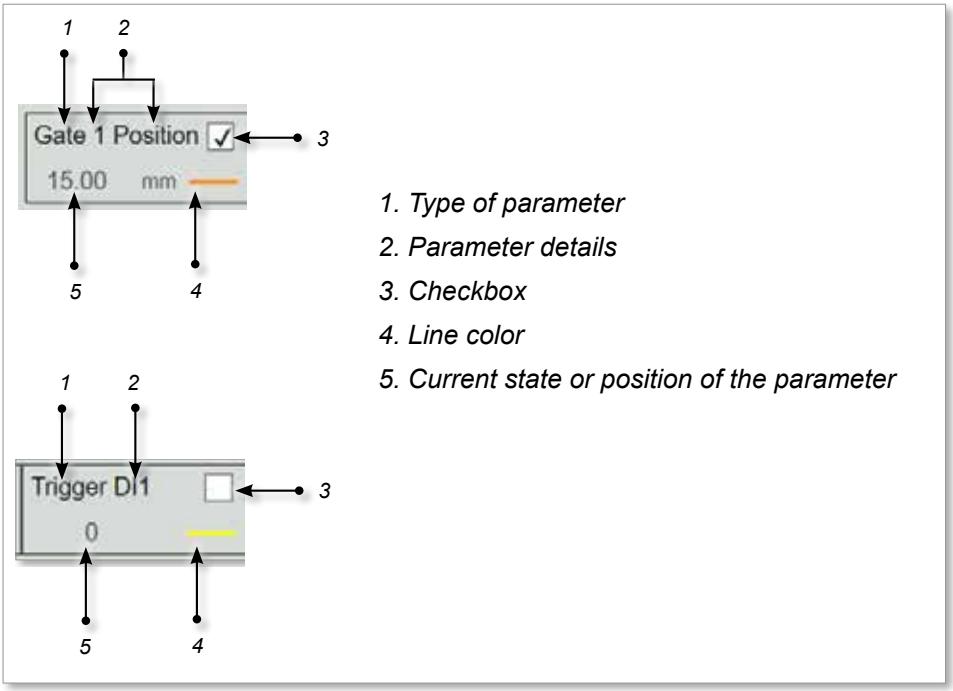


Figure 9-2 Graph screen with parameter boxes highlighted

Each box shows information about a specific, user-selected parameter:



1. *Type of parameter*
2. *Parameter details*
3. *Checkbox*
4. *Line color*
5. *Current state or position of the parameter*

The user must choose the empty checkbox for each parameter to display its information on the graph.

9.5 Start and Stop the Graph

To start the graph, choose [**Inactive**].

The [**Inactive**] button changes to [**Active**] and the other buttons along the bottom of the graph become greyed out and inaccessible.

NOTE

The [**Start**] button is available only if the [**No trigger**] option is chosen and the user wants to start and to stop the graph manually. See Figure 9-3.

Figure 9-3 Inactive button pressed and no trigger chosen

The graph plots data until the graph duration time has elapsed.

To stop the graph at any point, choose [**Active**] again.

9.5.1 Activate the Cursor

When the graph is active and the Cursor checkbox is selected, a moveable cursor appears on screen. See Figure 9-4.

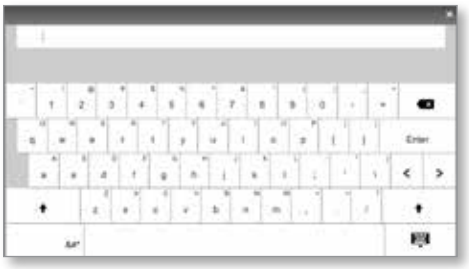
Figure 9-4 Graph with cursor

The user can place the cursor at the required point on the graph. The data for that point in time is displayed in the boxes below the graph for all active parameters.

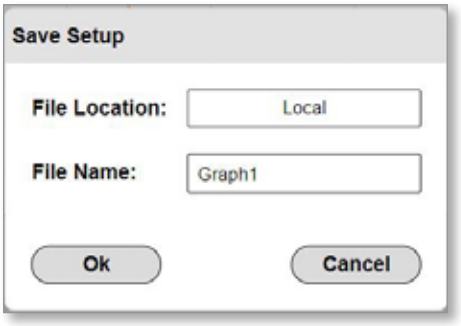
9.6 Save Graph Setup

1. Choose [**Save Setup**]. The file name dialog box opens:

2. Click the text box to the right of **File Name.** The keyboard opens:



3. Enter a name for the file.



4. Choose [**OK**] to save the file name. A confirmation dialog box opens:

5. Choose [**OK**].

9.7 Load Existing Graph Setup

1. Choose [**Load Setup**]

   The Load Setup box opens:

2. Choose the File Location drop-down box, and select a file location:

3. Choose a file from the list:

4. Choose [**OK**].

9.8 Export Graph Data

The user can export graph data into a file or file(s) as required. The data can be saved locally to the compact flash card or externally to a USB memory stick. Each file is exported in sequence, with a prefix specified by the user.

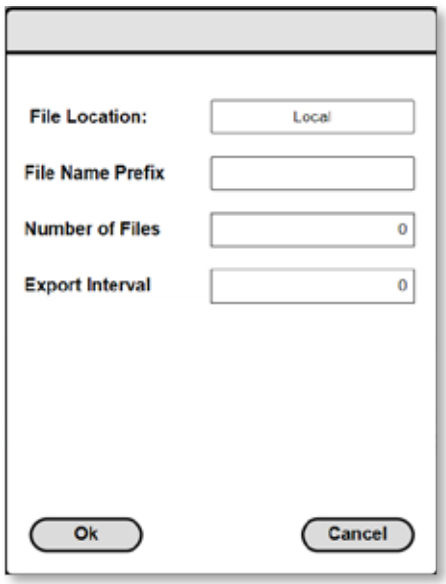
Export starts when both the graph is started and the [Export] box is selected. All files exported include data points for all parameters selected for the particular graph setup.

The pattern of export is determined by to the set [**Export Interval**].

The export process finishes after the number of files exported equals the set value for [**Number of Files**].

1. Choose [**Export**].

   The file export box opens:



2. Choose file location:

3. Choose the File Name Prefix box to open the following box:

4. Choose the File Name box to open the keyboard:

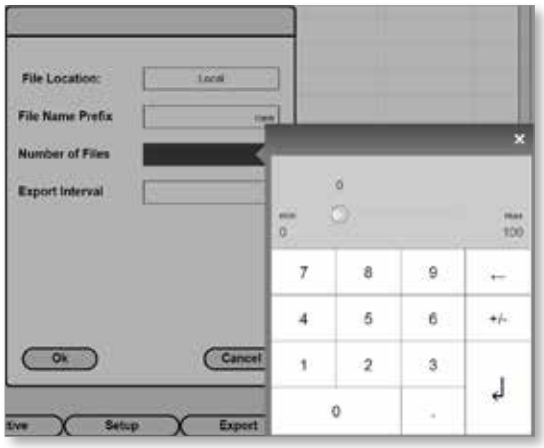
5. Enter a name prefix for the file or files:

NOTE

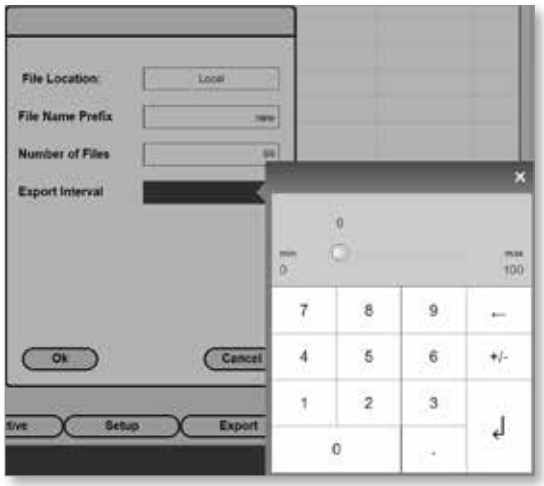
The system will export all these files with chosen prefix, for example, trialrun01, trialrun02, trialrun03.

6. Choose [**OK**] to save file name and return to the file export box, or choose [**Cancel**] to return without saving.

7. Choose the Number of Files box:



8. Enter the required number of files and choose [↵].
9. Choose the Export Interval box:



NOTE

The export interval sets how many cycles to skip between each export:

- Interval = 1: export every cycle
- Interval = 2: export every second cycle
- Interval = 3: export every third cycle

10. Enter the required export interval and choose [↵].
11. Choose [**OK**].

12. Check the box beside the [**Export**] button:

NOTE

The [**Export**] button is grayed out when the graph is inactive.

Section 10 - SE108C Servo-Electromechanical Linear Actuator

10.1 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 such items as a face shield and heat resistant gloves.
- Ensure the original and continuing competence of personnel caring for, setting up, inspecting and maintaining the injection molding equipment.
- Establish and follow a program of periodic and regular inspections of the injection molding equipment to ensure it is in a safe operating condition.
- Ensure that no modifications, repairs, or rebuilds of portions are made to the equipment that reduces the level of safety existing at time of manufacture or re-manufacture.

In the event of any deviation in the actuator operation, such as extraneous noise from the actuator or jerky motion or jamming, immediately stop the actuator, and determine the cause of the deviation. Only after eliminating the cause should you start the actuator again.

WARNING

Make sure to ground the actuator before supplying voltage to it.

A voltage of 230 V is supplied to the actuator.

The actuator housing is connected to a PE pin in the connector. The PE pin of the actuator must be connected to ground via a connection cable and a servo drive.

The actuator rod is not a reliable ground connection.

WARNING

Make sure that the power is off before you disconnect the motor from the controller.

WARNING

Do not disconnect the cable from the actuator and/or the servo drive when the controller is powered.

CAUTION

Do not touch any surface of the actuator until it has cooled.

The surface temperature of the actuator during operation and after shutdown may exceed 70°C (158°F).

CAUTION

Do not home against the actuator hard stop on the rod's extended position.

Home with Toggle Motion Direction checked and at a maximum torque of 10% (0.5 N·m).

The actuator hard stop is not intended for homing.

10.2 Overview

10.2.1 Purpose

The actuator is designed for actuating a valve pin of a hot-runner valve-gate system.

The actuator converts a rotary motion into controllable linear movement of a valve pin attached to the actuator rod via a valve pin holder.

10.2.2 Description

The actuator has two feedback sensors:

- an absolute encoder for position feedback
- a thermal sensor for temperature feedback

The actuator has built-in water cooling, a hollow actuator shaft, and anti-rotation features.

A rotatable single connector is used for both power input and sensor signals output.

The actuator housing is made of uncoated aluminum to minimize radiant heat transfer.

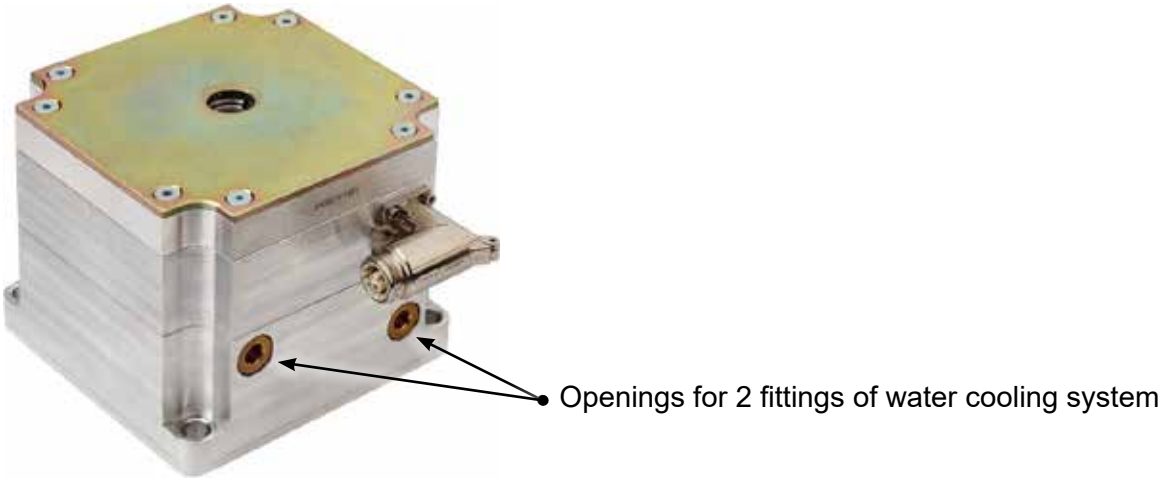


Figure 10-1 Top view of SE-108C actuator

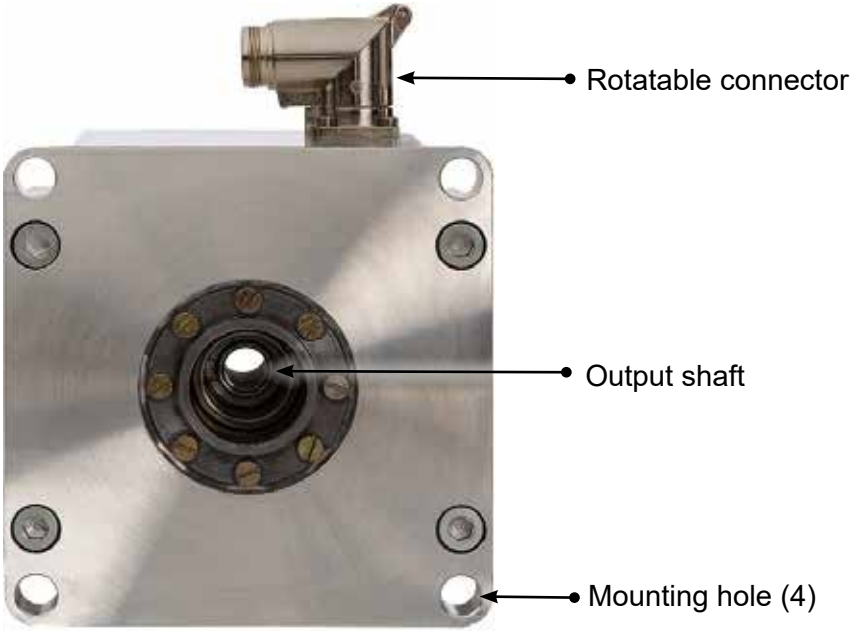


Figure 10-2 Bottom view of SE-108C

10.3 Specifications

RMS values are stated for current and voltage values.

10.3.1 Actuator Specifications

Parameter	Unit	Value
Performance specifications		
Frame Size (length x width x height)	mm	108 x 108 x 90.5
Screw lead	mm/rev	2.5
Stroke	mm	18
Position repeatability	mm	0.01
Peak force	N	5000
Max. speed	mm/sec	83
Electrical specifications		
Rated torque	N·m	1.5
Peak torque	N·m	4.5
Stall torque	N·m	1.7
Rated current	A	2.2
Stall current	A	2.3
Peak current	A (max 0.2 sec)2)	7.2
Power supply	phases x V	3 x 230
Rated rotational velocity	rpm	2000
Insulation thermal endurance class	F	155
Feedback sensor specifications		
Type	–	Absolute encoder

10.3.2 Water Cooling Specifications

Parameter	Unit	Max. Value	Min. Value
Water cooling equipment			
Water flow	l/min	7	3
Max. water inlet temperature	°C [°F]	55 [131]	20 [68]
Operating pressure	bar	1.5	0.7
Max. allowed pressure for built-in cooling channels	bar	8	–
Opening for water fittings	–	1/2-20 UNF-2B	–
Water quality			
pH	–	8.5	7.5
Filtration degree	µm	200	–
Hardness	meq/l	2	–
Chlorides	mg/l	20	–
Sulfates	mg/l	10	–

10.4 Operating Conditions and Limits

Parameter	Value
Operating environment specifications	
Operating environment	Air
Operating temperature range of environment air	20 to 150°C [68 to 302°F]
Temperature range of the valve gate pin and manifold	20 to 360°C [from 68 to 680°F]
Relative air humidity at 25°C [77 °F]	Max. 80 %
Air pressure	84.0 to 106.7 kPa
Mounting conditions	
Mounting method	The actuator is installed on 4 support spacers and fixed by screws to the manifold of the hot runner system. For HH mounting, spacers are not required if the plate is not above 40°C.
Supports and spacers specifications	Min. height 3 mm, max. diameter 14 mm,max. thermal conductivity 16 W/(m·K)
Motor mounting screws	M8, 8.8-A2U, length of thread engagement 10 mm min.
Tightening torque of screws	(22.0 ± 2.2) N·m

10.5 Installation and Removal

CAUTION

Do not disassemble the actuator. Failure to obey may damage the actuator.

For any service needs please contact Mold-Masters.

10.5.1 Installing the Valve Pin in the Actuator

The valve pin is connected to the actuator through a valve pin holder which is attached to the actuator by a 9/16-24 UNEF 2B thread.

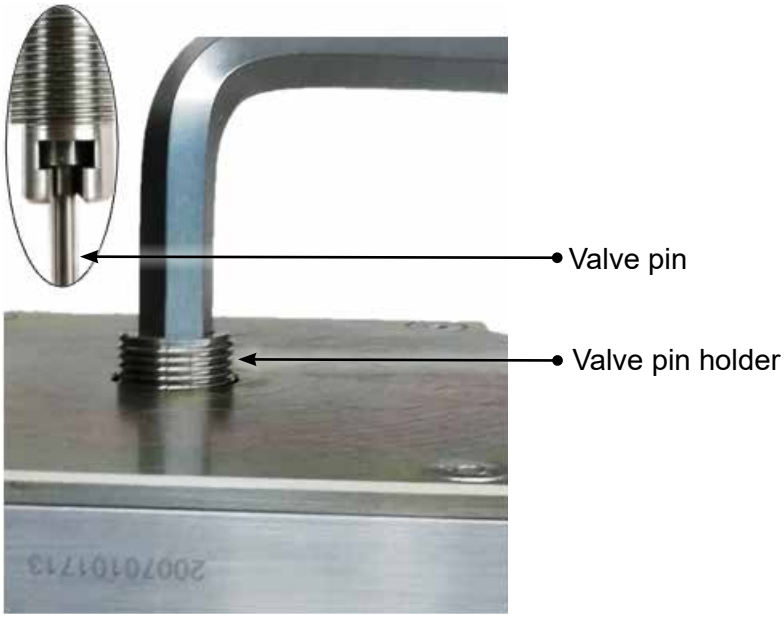


Figure 10-3 Valve pin holder

Equipment needed to perform the following procedure: An 8 mm hex key

1. Select a pin holder that is correct for the size of the valve pin.
2. Slide the valve pin head into the retaining slot of the pin holder.
3. Insert the valve pin holder (with the valve pin) into the hollow shaft of the actuator.

CAUTION

Do not exceed 11 N·m when tightening the valve pin holder. Failure to obey may damage the actuator.

4. Use an 8 mm hex key to tighten to a torque of 10 N·m.

10.5.2 Removing the valve pin from an actuator mounted on a hot runner system

Equipment needed to perform the following procedure: An 8 mm hex key, pliers, a screwdriver, and an M6-1.0 socket-head cap screw

CAUTION

Before removing the valve pin, make sure that the actuator can drive the valve pin freely.

CAUTION

Make sure that the hot runner system is at process temperature and the flow of cooling water to the actuator is correct.

CAUTION

Do not exceed a torque of 11 N·m when loosening the valve pin holder. Failure to obey may damage the actuator.

1. Use the 8 mm hex key to unscrew the valve pin holder from the hollow shaft of the actuator.
2. Insert the M6-1.0 socket-head cap screw into the valve pin holder, and tighten the screw to disengage the valve pin.
3. Use the pliers to completely remove the valve pin.

10.5.3 Removing the actuator assembly with the valve pin connected

CAUTION

Do not remove the valve pin holder if the valve pin is locked by the hot runner system. Failure to obey may damage the actuator.

CAUTION

Before removing the valve pin, make sure that the actuator can drive the valve pin freely.

CAUTION

Make sure that the hot runner system is at process temperature and the flow of cooling water to the actuator is correct.

CAUTION

Steps 3 and 4 of the following procedure must be done immediately after step 2 to avoid overheating and damaging the actuator.

1. Disconnect the power cable.
2. Disconnect the cooling water hoses.
3. Unscrew the four M8 bolts.
4. Lift the actuator to extract the valve pin from the pin guiding mechanism.

10.5.4 Connecting the water supply equipment to the actuator

Equipment needed to perform the following procedure: A 6 mm hex key and water fittings with a thread size of 1/2-20 UNF-2B

CAUTION

Do not exceed a torque of 35 N·m when tightening the water fittings. Failure to obey may damage the actuator.

1. Use the 6 mm hex key to remove the plugs from the holes on the actuator housing.
2. Tighten the water fittings into the ports on the actuator housing.

10.6 Troubleshooting

10.6.1 Troubleshooting Table

Failure Description	Root Cause	Recommendation
No actuator rod motion in response to command current signal. Actuator cannot hold the load.	Damage or break to conductors or shielding in the cable	Check the condition of the cable
	The cable is incorrectly connected to the motor phases and/or the signal circuits of the actuator	Check that the cable conductor functions match the actuator power and/or signal circuits.
	Improper setup of servo drive	Check all data entered during setup
	Overload	Check the load applied to the actuator rod
	No connection of cable shield and cable ground wire to the corresponding contacts in the servo drive	Check the connection of the cable shield and cable ground wire to the corresponding contacts in the servo drive
The actuator cannot move the applied load	Excessive load for the given actuator type or excessive friction	Contact the service center
	The rod and the load moving line are misaligned	Perform installation according to section 4 «Installation, Connection and Dismantling»
	Current limit setting is below the value needed to develop the required force	Check current limit setting
Excessive heating of the actuator	Excessively high current	Change the actuator working parameters
	Excessively high ambient temperature	Consider the operating conditions
	Exceeded temperature or insufficient water flow in the water supply equipment	Check the water supply equipment (specifications for water cooling see in section 2.3 «Specifications»)
Inconsistency between information on rotor rotation direction coming from feedback sensor and the actual rotation direction	Incorrect connection of the motor phases to the servo drive	Check cable connection to the servo drive
	Incorrect configuration of feedback sensor parameters in the servo drive software	Check configuration of feedback sensor parameters in the servo drive software
Vibration of the actuator housing	Improper actuator mounting, loose fasteners	Check the actuator mounting
	Incorrect setting	Check all data entered during setup

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