



BARNES™
MOLDING SOLUTIONS

HOT RUNNER CONTROL TECHNOLOGY

G25 Hot Runner Temperature Controller

Operator Manual



Gammaflux

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1 General

1.1 Regarding the Guide

Have the electronic version of the Operator Manual easily accessible for the G25 Temperature Controller during the entire service life of the product.

Follow all instructions and safety notes in the manual. Otherwise, personal injury and damage to property are possible.

1.2 General Description of the Hot Runners

Hot Runner Systems are used in injection molding machines for the production of molded plastic parts. Manifolds transport the melt from the inlet bushing to the nozzles. Nozzles are the link to the cavity. They either gate directly into the part or into a sub runner which will lead into the cavity. These are the nozzles of the Hot Runner series connected to the manifold.

1.3 Target Group

The target group of this manual are the operators of the G25 Temperature Controller. They will find the needed information in the relevant chapters.

1.4 Intended Use

The goal of the G25 Controller is to provide optimum temperature control for the Hot Runner system. The G25 Controllers are not stand-alone systems and must be incorporated in the injection mold for use. All G25 Controllers are used exclusively for the processing of thermoplastic materials based on the individual requirements of the specified material. Use in conformity with the specified purpose also includes the study and understanding of and the compliance with all instructions and tasks of the submitted instructions for use. To guarantee a reliable operation of the G25 Controller, it is necessary to comply with the specified periodic inspections and regular maintenance.

1.5 Improper Use

The G25 Controller for Hot Runners may be only used in the manner described in Section 1.4 Intended Use. Any other use is excluded. If the G25 Controller is used in any manner that contradicts the intended purpose, the right to any warranty claims shall cease to exist.

1.6 User qualification

Technical knowledge means that personnel must:

- Be capable of reading and fully understand electrical, and in some applications, hydraulic circuits.
- Fully understand the interrelationship of the built-in safety systems.
- Have knowledge regarding the function and build-up of technical components.



A qualified person is one who, due to his technical training and experience, has sufficient knowledge that he can evaluate the work transferred:

- Can recognize possible hazards.
- Can instigate measures to eliminate hazards.
- Has the required repair and assembly knowledge.

1.7 Used Standard and Norms

Injection Molding Machine (IMM)	
Number	Description
2006/42/EC	Machinery Directive
2004/108/EC	Electromagnetic Compatibility Directive
2006/95/EC	Low Voltage Directive

G25 Temperature Controller	
Number	Description
2006/42/EC	Machinery Directive
2004/108/EC	Electromagnetic Compatibility Directive
2006/95/EC	Low Voltage Directive
EN ISO 12100-1:2003/A1:2009	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology - Amendment 1
EN ISO 12100-2:2003/A1:2009	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles - Amendment 1
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 61010-1:2010	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

Tab. 1 Used Standard and Norms

1.8 Unauthorized modification

No conversions or modifications to the product are intended. If these are nevertheless carried out, personal injury and damage to property may result. In addition, the warranty expires and the manual loses its validity.

If necessary, contact the manufacturer before carrying out a modification to obtain further information about the possibilities of a modification.



1.9 Carry Out First Aid

Before first aid is given, the Emergency Stop button on the Injection Molding machine must be pressed. The product must be switched off and disconnected from the power supply if necessary. During first aid, it must be ensured that the rescuer does not expose himself to any danger. If an accident occurs, first aid must be carried out immediately. This can be done by persons trained in first aid or by the company first aider or by the company rescue service. Minor injuries can be treated on site. First aid equipment must be provided by the employer. In addition, the employer must train his personnel in first aid on a regular basis. If the person has been injured by electric shock, has suffered a serious burn, crush injury or similar, a licensed medical professional must be consulted immediately. Electric shock and other injuries may result in death or permanent injury if professional medical attention and treatment are not obtained.

1.10 General Information

The G25 Hot Runner Temperature Controller is a compact, industry hardened and attractively styled controller. The controller is based upon single module integrity using microprocessor-based temperature control modules.



Fig. 1 24-zone G25 Enclosure



1.11 General Description

All G25 temperature controllers feature Triangulated Control Technology®. Use of this unique technology provides the following advantages:

Sense

Controllers precisely measure the temperature 20 times per second.

Control

The proprietary self-optimizing G25 PID2 control algorithm adjusts if the actual temperature deviates 0.014 °C (0.03 °F) from set point. The second derivative (PID2) monitors the actual temperature rate of change. As a result, the output to the heater is regulated in advance of the typical proportional band to limit or eliminate over or undershoot.

Actuate

Using phase angle fired output (0.1 % resolution, 1,000 steps), the G25 Controller delivers smooth and exact power to each heater for the ultimate in temperature control.

Triangulated Control Technology

Triangulating your process with a G25 Controller means achieving better temperature control that could result in reduced scrap, improved part weight consistency, material savings, higher profit margins and enhanced part quality.

Reliability

G25 Controllers lead the market in reliability. The expected life is 10 to 15 years based on the quality of heater electrical maintenance. Some controllers have been in continuous operation for more than 25 years. Each Temperature Control module has the G25 proprietary PID2 control algorithm. This algorithm is time tested and proven on hot runner systems around the world.

Phase Angle Firing

The G25 Controller uses phase angle fired outputs. Phase angle firing provides major benefits compared to time proportioning outputs. With phase angle fired outputs, output voltage to the heater can be adjusted to any level from 0 VAC to full voltage with great precision. Time proportioning controllers are limited to providing only 0 VAC and full voltage to heaters.

The G25 Controller comes with a touch Display Panel that enables the operator access to all data pertinent to the operation of the controller. A 15.6" Full HD, and a 18.5" Full HD touch Display Panel are available. The screen design enables the operator to become quickly familiarized with the controller while giving the operator access to a wide array of tools to maximize hot runner performance. The G25 Controller touch Display Panel uses easy-to-understand icons to identify the control functions, process values and alarm status. All hot runner set up, mold performance, and monitoring information is accessed by using the touch Display Panel located on the enclosure. With the proper security password, a user can customize many of the features of the G25 Controller. A USB communication port is included for easy uploading and downloading of information.

The G25 Controller is designed to provide the user with the most powerful hot runner diagnostic tools available. Features such as heater resistance, wattage monitoring, settable alarm limits, field calibration capability and interactive graphic representation of the mold are standard. The G25 Controller supports two Ethernet ports for connection to the IMM using OPC UA (EUROMAP 82.2) or intranet or internet connectivity.

To meet the needs of the international markets, the G25 Controller accommodates field selection of "J" Type or "K" Type thermocouples, degrees F or degrees C temperature configuration, and either DELTA or WYE mains input power.



The G25 Controller has been designed to include a vast array of features that provide the user with the industry's best temperature control along with the industry's most complete package of process information and diagnostic tools.

Features Include:

Ease of Use / Flexibility

- Expanded use of universally accepted icons.
- 5 security levels increase or decrease operator options and availability of screens.
- Alarm History.
- Monitor function enables user to alarm temperature inputs that are not being controlled by the G25 Controller such as cooling water temperatures.
- Group creation enables user to view all zones or only the zones in each group.
- Various screens with graphics that provide real time data of the hot runner zones.
- Network communication – Ethernet and OPC-UA ready for connections to local area networks. OPC-UA under development.
- Boost enables the user to temporarily raise a zone or group of zones temperature to eliminate cold slugs on startup.
- Standby enables a user to lower a group of zones to the standby temperature while the process is idle.
- Trim enables the user to make a permanent set point shift (for example 100 ° F) on the zone or zones selected.
- User can quickly shift setpoint for a group of zones even if the setpoints are different.
- Operator Identification enables the user to create an authorized users list with individual user codes that must be entered by an operator before changes can be made.
- Programmable array of automatic heat up and cool down features including Sequence Startup, Even Heat, Even Cool and Sequence Shutdown.
- An "Auto load % calculation" feature for quick loading of Manual percentages based on actual zone data is part of the Qualification procedure.
- Global input power flexibility.
- Small footprint.

Control

- Enhanced control algorithms employing proprietary G25 PID2 control.
- High resolution thermocouple input.
- High resolution voltage output.
- Automatic switching to learned manual setting when thermocouple fails.

Remote Inputs

Up to twelve remote inputs are available as an option. One or two remote inputs are most common. More can be used in custom configurations. The remote input signals need to be 24 VDC. Remote inputs can be used to trigger the following functions or to indicate the status of an external device:

- E-Stop:
- Control Inhibit: This input from the IMM turns OFF the zone outputs of the controller.
- Control Allow: This input from the IMM allows zones outputs of the controller to be ON.
- Remote Standby: This input from the IMM activates the G25 Controller Standby feature.
- Sequence Start Trigger
- Sequence Cool Trigger
- IMM Ready: This input from the IMM can be used to notify the G25 Controller that it is okay to turn ON the heaters.



- Mold ID – Under development.
- Water Flow Sensor: Can be used to notify the controller that cooling water is ON or OFF in injection molding machine. Under development.

Remote Outputs

Most commonly, 1 or 2 remote outputs are available. More can be used in custom configurations.

- Audible Alarm / Alarm Buzzer
- Resettable Alarm: When any zone continuously has an alarm active for five seconds, the alarm contact will turn ON. Pressing the Clear Alarm button will turn the alarm contact OFF.
- Non-resettable Alarm: When any zone continuously has an alarm active for five seconds, the alarm contact will turn ON. Pressing the Clear Alarm button will not change the condition of the alarm contact. The alarm contact will turn OFF when all alarms in the controller are cleared.
- OK to Run Output: The controller can provide a contact closure to the IMM to denote that the mold is heated and is ready for injection.
- A 24VDC supply signal is available.

Diagnostics

Ground Fault and Wet Heater Bakeout

Provide superior heater protection during startup and during heater shorts. On startup, the G25 Controller will initially provide a very low voltage (1-5 VAC) to the heater and the heater current will be monitored. If the current draw is excessive, the G25 Controller will “bakeout” the heater by providing a low voltage pulse to the heater. Once the heater is dry, the G25 Controller will ramp the zone output to full voltage, while continuing to monitor the current draw. Ground Fault detection can be used to prohibit affected zones from turning ON until the condition has cleared. Ground Fault is selectable as ON or OFF (Settings – System Options). Wet Heater Bakeout is always ON.

Mold Monitor

Provides extensive on-line monitoring of the heater’s resistance and wattage values to ensure efficiency and to provide preventative maintenance information. A machine cycling input signal can be monitored to ensure the injection molding machine is operating. If the machine stops for a designated period of time, the controller outputs will go to Standby mode to reduce material degradation in the tool. Early material leak detection is featured using a wattage alarm to detect elevated wattage demand.

Tools & Diagnostics

Provides off-line tools to troubleshoot the mold. Tests include:

- Wiring Analysis: This test checks the tools wiring. The software clearly notifies the user of mis-wired zones along with any thermocouple or heater problems.
- Fault Analysis: This test quickly identifies thermocouple open, thermocouple reversed, thermocouple short (pinched), open fuse, heater open, heater wet and heater short, uncontrolled output, and ground fault issues.
- Thermodynamic Analysis: This test automatically ramps all selected zones to selected temperature, and then cools the zones. During the heating and cooling process this feature provides and records critical information. By providing zone-by-zone data for resistance, power consumption, heating and cooling rates, tool maintenance becomes a much easier task. This data is saved so that it can be compared to future tool data.
- Historical Mold Performance: This test allows the user to easily compare a known “good” thermodynamic analysis baseline to the current thermodynamic analysis. Intuitively troubleshoot your mold with hard data.
- Field Calibrator: Enables in-house calibration at the user’s convenience.
- Databases: Can be sent to experts to assist in troubleshooting.
- Languages: A variety of languages are available with more being added. Contact Gammaflux for more information.



1.12 Specifications

Specifications	
Item	Data
Calibration Accuracy	0.1 °C (0.2 °F)
Control Accuracy (Steady state)	+/- 0.05 °C (0.1 °F)
Power Control Time	8.3 msec (120 times per second) at 60 Hertz
Process Sampling	50 msec (20 times per second)
Control Algorithm	Automatic, self-optimizing, manual override
Degrees F or C	User Selectable
Operating Range	0 °-500 °C (0 °-932 °F)
Output Voltage	0-240 VAC, Phase angle fired, 0.1% resolution
Standby Temperatures	User selectable 0 °-500 °C (0 °-932 °F)
Remote Input	24 VDC

Tab. 2 G25 Controller Specifications

Thermocouple Input Specifications	
Item	Data
Thermocouple	Type J (standard), Type K (selectable).
Cold Junction Compensation	Internal to enclosure
External Resistance	10 MΩ
Temperature Variation	None

Tab. 3 Thermocouple input specifications

Electrical Specifications	
Item	Data
Input Power	180-265 VAC 3-Phase Delta (Phase to Phase) / Wye (Phase to Neutral)
Frequency	47-53 Hz, 57-63 Hz
Operating (Ambient) Temperature	0-40 °C (32-104 °F) (Convection cooled ZPM) 0-50 °C (32-122 °F) (Fan cooled ZPM)
Humidity Range	10-95 % non-condensing
Output Module Range	2-zone 15 A card: 4080 W@240 VAC 1-zone 30 A card: 8000 W@240 VAC
Communications	HMI to Controller: USB. Internal: RS485.

Tab. 4 Electrical Specifications



1.13 Equipment Standards

- Throughout this manual, references are made to various standards: ANSI (American National Standards Institute), OSHA (Occupational Safety and Health Act) and CE (Conformity in Europe) for safety or operating protocol. We recommend that these standards be the minimum used. If there are more stringent local standards, they must be followed.
- Important: For machine or mold rebuild, repair or maintenance, lockout/tag out procedures must be followed as recommended in ANSI Z24a4a.1-1982 (The American National Standards Institute) and as specified in OSHA 29CFR PART 1910.14a7.
- Only approved standards (as noted above) equipment rated for application should be used with G25 Controller Systems for hot runners.

1.14 Safety Instructions within the Instruction Manual

- The G25 Controller for Hot Runners is an incomplete machine. When the G25 Controller is fitted into a machine, the interaction between the entire machine and the G25 Controller causes changes to the potential hazards. In particular, the influence of electrical controls which cause high temperatures in the mold. This necessitates a hazard analysis and operating instructions for the entire machine.
- These operating instructions are intended to provide information and to prevent hazards when installing the G25 Controller, as well as information and guidelines for the transport, storage, and maintenance (inspection, servicing, repair) of the controller.
- Only by strictly observing these operating instructions, is it possible to prevent accidents and material damage and ensure fault-free operation of the G25 Controller.
- To protect the operator at the workplace, ensure that all safety devices installed on the machine and mold are functioning correctly. Never disable or by-pass a safety device. Follow the machine and mold manuals for safe procedures and safety checks.

1.15 Safety Instructions and Symbols Used

The following safety instructions, symbols and operating advice are used in this manual or in the product itself. They are highlighted by the respective word. The described measures are used to prevent injuries and avoid damage to the G25 Controller and must be followed.

They follow the standard IEC 61010-1 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use.

1.15.1 Danger Symbols Definitions

**Danger**

Indicates an imminent hazardous situation which may result in death or serious injury.

**Warning**

Indicates a dangerous situation that may lead to irreversible injury.

**Caution**

Indicates a dangerous situation that may lead to reversible injury.



NOTICE

Notice

Indicates a situation that may lead to material damage and provides additional information on proper procedures and trouble free labor without the possibility of personal injury.

1.15.2 Personal Protective Equipment



Read the User Instruction



Wear Safety Shoes



Wear Close-fitting Working Cloth



Wear Headgear



Wear Protective Goggles



Wear Face Protection



Wear Work Gloves



Wear Apron against High Temperature



Wear Hearing Protection

1.15.3 Warning Symbols



General Warning



Warning of Electrical danger



Warning of Hot Surface



Warning of Overhead Load



Warning of Forklift Trucks Operating



Warning of Falling Objects



Lockout / Tag out the main power source.

1.15.4 Product Safety Label

Safety label



Description

Electrical Danger



1.15.5 Electrical Symbols

Symbol	Description	Usage
	Potential earth ground Protective Earth Conductor Terminal	For safety purposes
	Earth (ground) Terminal	For non-safety related functions, for example, functional earth terminal
	Frame or Chassis Terminal	
	Alternating Current	
	Power ON	
	Power OFF	

Tab. 5 Electrical Symbols



1.16 General Safety Instructions

All safety instructions shall be carefully studied before the operation of the G25 Controller for Hot Runners is initiated. When working with the Hot Runner System, all safety instructions contained herein must be followed. Noncompliance with safety notes and instructions could result in serious injuries.



DANGER

Danger to Life by Electric Shock

The electrical cables connected to the Controller System, Injection Molding Machine and Hot-Runner are under high voltage.

Serious personal injury or death can result from electrical contact.

- Electrical work must be carried out by qualified persons.
- Verify that all power source connections are properly grounded.
- In emergency case switch all systems off
- When working on the Temperature Controller, always observe the five safety rules of electrical engineering to prevent personal injury and damage to property.



WARNING

Heavy Weight Hazard

Transport and lifting equipment should be operated only by trained personnel.

- Use personal protective equipment, such as head gear, safety shoes and work gloves.
- Operate lifting and transport equipment slowly and carefully to avoid uncontrolled swinging of the manifold.
- Lifting and transport equipment for lifting Hot Runner Systems shall be approved and properly rated taking into account the weight and size of the manifold.





! WARNING

Hot Surfaces Hazard

Contact between the skin and the hot injection mold could result in burns. Contact with externally replaceable fuses, if not allowed to cool before removal, could also result in burns.

- Use personal protective equipment, such as work gloves, apron, sleeves, and face protection, to guard against burns.
- When servicing or handling the hot runner system outside the manifold plates or the injection molding machine, care must be taken to heed the hot surface exposure warnings.



! WARNING

Personal Protection

Danger when working around the feed throat, purging the machine or clearing the gates of the mold.

Operators must be aware of the possibility and danger of hot resin and/or gases spurting from gates, machine nozzle and feed throat of the hopper.

- The operator must wear safety glasses, face shield, heat-resistant gloves and protective clothing.



! WARNING

Lockout / Tag-Out

Throughout this manual, instructions are given to Lockout / Tag-Out power sources. Usually, no instructions are given to turn the power source back ON. This is assumed to have been covered by the instruction to perform any operation requiring the power source provided that all steps in the instructions prior to the power being applied have been completed. If the power source must again be turned OFF the instruction to Lockout / Tag-Out is repeated.

- See Section 1.19 Lockout / Tag-Out Instructions and Procedures for details.



WARNING

Housekeeping

Clearly define areas for the controller to be positioned.

- Provide clear access to the front and rear of the cabinet in case of an emergency.
- Do not position the equipment so that it is difficult to operate the disconnecting device.
- Check frequently for frayed or worn electrical cables located on the rear of the cabinet.
- Replace any frayed or worn cable immediately once it is found.
- Never place any materials on or near the controller cabinet that would block air flow near the cabinet ventilation ports.
- Never clean the mold, machine, or hot runner controller while it is operating.
- Never place any materials on top of the hot runner controller cabinet.
- Make certain that all cable connectors on the rear of the cabinet are securely clamped down and held in place. If any are loose, secure them before operating the controller.



WARNING

Lockout / Tag-Out

Always lockout / tag-out the main power breaker before opening the controller enclosure.

- Do not close the main breaker if the controller cabinet is open.
- Be sure main power is locked out / tagged out during pre-startup procedures.
- Be sure main power is locked out / tagged out when replacing fuses.
- See Section 1.19 Lockout / Tag-Out Instructions and Procedures for details.



WARNING

General Warning – Covers and Cabinet

There is high voltage electrical circuits inside of the cabinet. Don't work inside the cabinet unless you are properly trained in electrical safety and authorized to work in the cabinet.

- Never remove the cover, try to open the cabinet.
- Never disconnect cables without turning OFF the mains circuit breaker.

**! WARNING****General Warning – Verify Equipment Repairs**

Measure resistance between each mains supply conductor and the protective earth conductor and ensure there is no short circuit. Measure the resistance of the path from an accessible enclosure point to the protective earth conductor terminal of the mains supply plug / wiring and verify it is low enough to comply with applicable standards.

- Disconnect system from main power breaker.
- Verify equipment is safe after repair.

**! WARNING****General Warning – Protective Conductor**

All controllers have a protective conductor terminal (earth lug) on the rear of the cabinet. Using a 6-AWG (16 mm²) green wire, connect the terminal to earth. This is a safety wire and must be included in the controller setup.

- Unauthorized personnel should not be allowed access to the interior of the cabinet.

**! WARNING****General Warning – Ensure AC Line Power Matches**

Incorrect wiring or application of voltages that exceed the controller rating will result in severe damage to the controller.

- Before applying AC line power to the controller, check to ensure that the AC line power matches the power rating indicated on the label attached to the rear of the G25 Controller enclosure.
- Confirm that the AC line power matches the controller configuration of Delta or Wye (Star).
- Confirm that the actual voltages do not exceed the controller rating, the input power is connected properly, and that the controller is properly grounded.

**! WARNING****General Warning – External Switch or Circuit Breaker**

For permanently connected equipment requiring an external switch or circuit breaker (CB), use a switch or CB of appropriate amperage and voltage ratings to safely handle the system's labeled amperage and voltage rating.

- Place the switch or CB near the equipment.

**! WARNING****General Warning – Trained Personnel**

All power-up procedures must be done by a trained, qualified setup person or electrician.

- Proper training provided by Barnes Molding Solutions personnel is a must for qualification to set-up the equipment safely.



1.17 General Notices

NOTICE

Observe the following instructions. Any deviation from these instructions may result in damage to the Hot Runner System and to the injection molding machine.

High Voltage Tests

Do not use a high voltage test on any terminals within the cabinet when all electronic cards are installed. The high voltage associated with these tests could damage electronic circuits within the cabinet.

Shorted Triacs

It is common for output triacs to short when a fuse blows. A shorted triac cannot be regulated and will apply full power to the heater. Always check a controlled zone that has a blown fuse by adjusting power from zero to 100 % in the Manual Mode. The voltage should go from zero to 240 Volts (or full voltage) respectively, although not necessarily in a proportional relationship.

Replacing Fuses

When replacing fuses, make certain that only SIBA Very-Fast Acting fuses are used on the output modules. Regular fuses will not provide adequate protection and will void the product warranty. Contact Barnes Molding Solutions with any questions.

Instruction Manual

The G25 Hot Runner Temperature Controller Operator's Instruction Manual must be consulted in all cases where the general warning symbol is used to find out the nature of the potential hazards and any actions which must be taken to avoid them.

System Safety

The safety of any system incorporating the G25 Controller is the responsibility of the assembler of the system.

Improper Use

If the equipment is used in a manner not specified by Barnes Molding Solutions, the protection by the equipment may be impaired.

Circuit Breaker Sizes

The circuit breaker sizes are determined at the time of order entry based upon information supplied by the customer. Circuit breakers are located on the control enclosure.

Fault Currents

Fault currents exceeding the G25 Controller circuit breaker rating must be protected by the building supply in accordance with local and national wiring regulations.

"J" Type Thermocouples

Any controller using "J" type thermocouples should not be set for a temperature higher than 760 °F (400 °C). At this temperature "J" type thermocouples can begin to oxidize and become non-linear (lost their calibration or repeatability). In Addition, most thermoplastic resins are molded at lower temperatures. Higher temperatures could cause the materials to degrade (burn).

**Thermocouple Wires**

Make certain that each connection in any thermocouple circuit is between either two red or two white wires ("J" Type), and between either two red or two yellow wires ("K" Type). Do not connect any red and white / red and yellow thermocouple wires together even if this may appear to correct an operating problem.

Some hot runner systems also use white / black wires for "J" Type thermocouples.

The thermocouple wires are not rated to carry mold or line voltage power. Always lockout / tag-out the main power breaker when working on the thermocouple or mold power wires.

Lifting Instructions

Lift the G25 Controller only with a mechanical lifting device in such a manner that the lifting device's weight bearing surfaces contact the bottom of the G25 Controller's pedestal. The entire weight of the G25 Controller needs to be supported by the pedestal during any movement. There are no handles or lifting points on the G25 Controller Cabinet.

1.18 Danger of Material Defects

- Only approved and CE certified temperature controllers rated for application with over current / voltage protection must be used with Hot Runner Systems.
- Verify that all cables are damage free and in good condition.
- Verify that all electrical connectors are clean and making good contact and are securely fastened and latched. Dirty or otherwise contaminated connector pins can cause loss of signal and subsequent errors.
- Clean all connectors with a spray-type commercial electrical contact cleaner / degreaser and allow them to dry fully before reconnecting.
- All G25 Controllers shall provide separate temperature adjustment for each heating zone; the controller shall have the Soft-Start (Wet Heater Bake-Out) function for gradual heat-up. In this way you can prevent premature wearing and damage to the hot runner system.
- To extend the lifetime of temperature sensors, avoid long-term operation of temperature control in manual mode. Immediately replace defective temperature sensors.
- If you replace heaters or their parts, always use original spare parts from the manufacturer and carry out the replacement as described in this manual.
- Do not interchange power supply cables with temperature sensor cables. Temperature sensor cables are not suitable for high voltage applications and will melt if exposed to high currents. Power supply cables are not suitable for use as temperature sensor cables for data transfer to the temperature controller.
- To maximize the life of temperature sensors, maintain the operating temperature as specified in the respective material safety data sheets during processing.
- Take notice of the production and color identification of temperature sensor cables.
- Always use the specified temperature sensor.
- Check that the aluminum surfaces of heaters do not come in contact to the nozzle cutouts. If they do, enlarge the nozzle cutouts as needed. Any contact between the heaters and the nozzle cutouts will lead to the risk of improper temperature control, which could result in damage to the aluminum casting.
- If applicable, set the necessary operating temperature to the lowest level possible to avoid plastic degradation and to prevent damage to the temperature sensors.
- The cooling compound for nozzles with a cooling insert should always have the correct mixing ratio to prevent corrosion and obstructed circulation.



1.19 Lockout / Tag-Out Instructions and Procedures



! WARNING

Lockout / Tag-Out

It is necessary to take actions prior to doing any service on the G25 Controller.

- Turn off the Controller Main Power Switch.
- Unplug the Controller from the main power source.
- Lock the plug end of the power cord with a Shackle.



! WARNING

General Warning

Some circuits remain active via charged capacitors, so 5 minutes are required to ensure the capacitors have been discharged.

- Allow a minimum of 5 minutes after power has been disconnected prior to servicing equipment.



Fig. 2 Shackle

When working on, repairing, or adjusting electrical plug-type equipment, the following procedures must be utilized to prevent accidental or sudden start-up.

NOTICE

Place locks and tags on all stored energy isolating devices that can accept a lockout device.

Tags cannot replace locks. Tags will be attached securely at the same location that the lockout devices would have been attached. Where a Tag cannot be attached directly to the energy isolating device, the Tag will be attached as close as possible and so that it would be immediately obvious to anyone attempting to operate the equipment.

1. Turn off Controller Main Power Switch.
2. Un-plug Controller from wall socket or in-line socket.
3. Place Shackle over Power Cord and lock the Shackle.
4. Test equipment to ensure power source has been removed by switching system to ON.
5. While keeping load side of plug within direct and immediate view, perform required operations.
6. Inspect power cord and socket before removing the Tag. Any defects must be repaired before placing the equipment back in service.
7. Remove Tag and place equipment back in service.



1.20 Lockout / Tag-Out – 5 Basic Safety Rules

1. Disconnect completely

Meaning that the electrical installation must be disconnected from live parts on all poles.

2. Secure against re-connection

Reliably prevent the accidental re-connection of an installation where work is in progress.

This can be achieved by replacing turned off fuses in the low-voltage system with lock-out devices, or by use of an approved lockable cord-plug cover.

3. Verify that the installation is electrically deactivated

Confirm that the installation is electrically deactivated! Use suitable measuring / test equipment, such as a voltage detector, to verify the absence of operating voltage on all poles of the electrical installation.

Check the correct function of the voltage detector prior to use.

4. Carry out earthing and short-circuiting

If the installation is dead, connect the cables and earthing system with short-circuit-proof earthing and short-circuiting devices.

NOTICE

The relevant parts must be earthed before they are short-circuited.

5. Provide protection against adjacent live parts

According to the five safety rules, adjacent parts are parts located in the vicinity zone.

If parts of an electrical installation in the vicinity zone of the work cannot be disconnected, additional precautions must be taken before work starts. In this case, use insulating protective shutters or covering material as protection against accidental contact.



2 Cabinet & Wiring

The G25 Controller uses 15-Amp Output Modules, each of which contains 2-zones of control. 30-Amp Output Modules are also available, each of which contain 1-zone of control. Mains circuit breakers are sized up to 150 A DELTA or 80 A WYE for enclosures with up to 3 blocks (72 zones) of control. Up to 300 ΔA DELTA or 200 A WYE Mains circuit breakers are available for larger systems.

The 24-zone G25 Enclosure as shown in Fig. 3 24-zone G25 Enclosure below includes up to 24-zones of 15-Amp Output Modules with up to a 100 A DELTA or 60 A WYE Mains circuit breaker.

The 15.6" or 18.5" touchscreen is mounted on the G25 enclosure.



Fig. 3 24-zone G25 Enclosure

Primary AC power is distributed from the Mains circuit breaker to each Output Module. The AC power is distributed so that the load is as equally distributed as possible. The Output Modules are sequentially wired to different phases.

Regulated output power is routed from the Output Power Modules to the appropriate mold power connector on the rear of the cabinet. High current plug-in connectors are used to transfer AC power to and from the mold. In a similar fashion, the thermocouple signals are routed into the controller using plug-in connectors clearly marked for thermocouple inputs.



2.1 Cabinet Dimensions

The Table Cabinet Maximum Number of Zones and Dimensions (without display attached) indicates the maximum number of zones and dimensions of the various types of controller cabinets and the mobile stands.

Models with numbers of Zones

G25 Enclosure Model	Maximum Number of Zones
M	12
T1	24
T2	48
MS	12
S1	24
S2	48
S3	72
D2	96
D3	144
D4	192

Tab. 6 Cabinet Maximum Number of Zones

Physical Data

	*Height (inches/millimeters)	Width (inches/millimeters)	Depth (inches/millimeters)	*Weight (pounds/kilograms)
M enclosure	20.00/508	10.00/254	12.50/318	50.0/22.7
MS enclosure	36.50/927	23.00/584	20.00/508	75.1/34.1
T1 enclosure - short top	21.25/540	10.00/254	23.00/584	75.1/34.1
T1 enclosure - tall top	25.75/654	10.00/254	23.00/584	80.1/36.3
T2 enclosure - short top	32.00/813	10.00/254	23.00/584	130.4/59.1
T2 enclosure - tall top	36.50/927	10.00/254	23.00/584	135.4/61.4
S1/S2 enclosure - short top	35.00/889	20.00/508	23.00/584	139.4/63.2
S1/S2 enclosure - tall top	39.50/1003	20.00/508	23.00/584	144.4/65.5
S3 enclosure - tall top	50.25/1276	20.00/508	23.00/584	199.7/90.6
D2 enclosure - tall top	39.50/1003	20.00/508	23.00/584	243.6/110.5
D3 enclosure - tall top	50.25/1276	20.00/508	23.00/584	343.2/155.7
D4 enclosure - tall top	61.00/1549	20.00/508	23.00/584	442.8/200.9

Tab. 7 Cabinet Maximum Number of Zones and Dimensions (without display)



2.2 System Set-Up and Input Power Connections

2.2.1 Safety Instructions



! WARNING

General Warning – Trained Personnel

All wiring should be done by trained electrical personnel and in accordance with all applicable wiring codes.



! WARNING

General Warning – Ensure AC Line Power Matches

Incorrect wiring or application of voltages that exceed the controller rating will result in severe damage to the controller.

- Before applying AC line power to the controller, check to ensure that the AC line power matches the power rating indicated on the label attached to the rear of the G25 enclosure.
- Confirm that the AC line power matches the controller configuration of delta or wye (star).
- Confirm that the actual voltages do not exceed the controller rating, the input power wiring is connected properly, and that the controller is properly grounded.



! WARNING

General Warning – External Switch or Circuit Breaker

For permanently connected equipment requiring an external switch or circuit breaker (CB), use a switch or CB of appropriate amperage and voltage ratings to safely handle the system's labeled amperage and voltage rating.

- Place the switch or CB near the equipment.



! CAUTION

Fault Currents

Fault currents in excess of the circuit breaker's rating must be protected by the building supply in accordance with local and national wiring regulations.



2.2.2 Input Power Wiring

Standard connector drawings are supplied with the system. See the G25 Troubleshooting and Maintenance Manual for details. Place the control cabinet in position. The cables that correspond to the appropriate thermocouple and power output are labeled with letters so that they may be matched without confusion. When installing the cable sets, match the labels up exactly on the cable set hood and cabinet.

For permanently connected equipment without factory supplied wiring, use wire of appropriate amperage and voltage ratings to safely handle the systems' labeled amperage and voltage rating.

The standard AC input power cable provided is Type SO and it is approximately 12 feet (3.2 m) long with color-coded "flying leads" (no power plug). Its diameter is determined by the size of the specified circuit breaker in that it is sized to carry the same amount of current as the circuit breaker. See Tab. 8 Input Power Wiring for common color codes. Standard power input is 220/230/240 VAC DELTA three phase or 380/400/415 VAC WYE (230 VAC to the controller) three phase. A step-down transformer is available as an option. The circuit breaker sizes are determined at time of order entry based upon information supplied by the user. Circuit breakers are located on the rear of the enclosure.

Phase	4-wire (Standard)	5-wire (optional)	European (optional)
L1	Red	Red	Brown
L2	White	Orange	Black
L3	Black	Black	Black
Neutral	----	White	Blue
Safety Ground	Green	Green	Green / Yellow

Tab. 8 Input Power Wiring



2.3 Cable Amperage and Voltage Ratings

Connector	Amps (A _{AC-RMS})	Insulation (VAC _{RMS})	Notes
Mains Input	*	600	Refer to unit label for amperage rating. Refer to circuit breaker data sheet.
Power Output	*	300	Refer to unit label for amperage rating. Refer to connector data sheet.
T/C Input	1 A	300	Refer to connector data sheet.
Remote I/O	1 A	300	
Operator Interface Power Input	5 A	300	

Tab. 9 Amperage and Insulation Ratings

2.4 LED Power Indicators

These are provided on the rear of the enclosure to indicate the status of the incoming power.



Fig. 4 LED Indicators

2.4.1 AC Mains Status LEDs

Orange LEDs indicate that Phase 1, Phase 2 and Phase 3 voltages are present.



2.5 Remote I/O Signals

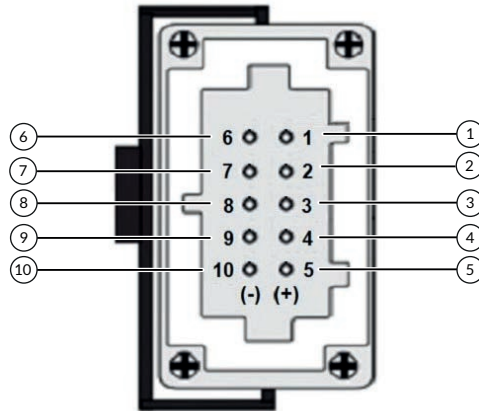


Fig. 5 Remote I/O Connector

Number	Part
1	ICM #1 Input
2	ICM #2 Input
3	24 VDC Supply Voltage
4	ICM #2 Output
5	ICM #1 Output
6	ICM # Input Common
7	ICM #2 Input Common
8	24 VDC Common
9	ICM #2 Output Common
10	ICM #1 Output Common

Tab. 10 Remote I/O Connector- overview



2.5.1 Remote Input / Output Signals (Standard)

The G25 Controller can be ordered with 1 input / 1 output, 2 input / 2 output, or none. There is one input and one output on each ICM module. The digital inputs are 24 VDC optically isolated, and the digital outputs are Form 1C relays (240 VAC/24 VDC/1 A) to provide for external interlocking with the IMM. The relays are protected by a replaceable 1 A fuse located on the ICM module. See Fig. 6 Remote Output Fuse for details. The functions assigned to these input and output signals are configurable via the G25 System Controller. See Fig. 5 Remote I/O Connector for details.

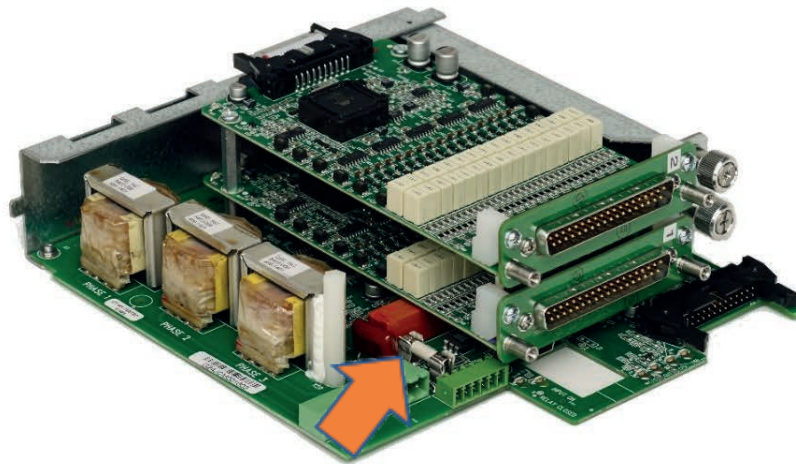


Fig. 6 Remote Output Fuse

2.5.2 Remote Input / Output Options (Standard)

The G25 Controller and can be ordered with the following versions:

Version	Description
A	One input (#1 – Standby) and one output (#1 – Alarm Buzzer - not available on HA-10 connector as it is wired directly to the alarm buzzer).
C	Two inputs (#1 – Standby, #2 – Control Inhibit), two outputs (#1 – OK to Run, #2 – Alarm Buzzer) - not available on HA-10 connector as it is wired directly to the alarm buzzer).
E	One input (#1 – Standby) and one output (OK to Run). No audible alarm.
G	Two inputs (#1 – Standby, #2 – Control Inhibit), two outputs (#1 – OK to Run, #2 – user assignable). No audible alarm.

Tab. 11 Description inputs and outputs



2.6 Remote I/O Connections

Version A - Internal Wiring to Connector

G25 Remote I-O Connector Wiring -- HA-10

Standby Input from IMM -- 24 vdc supplied by G25

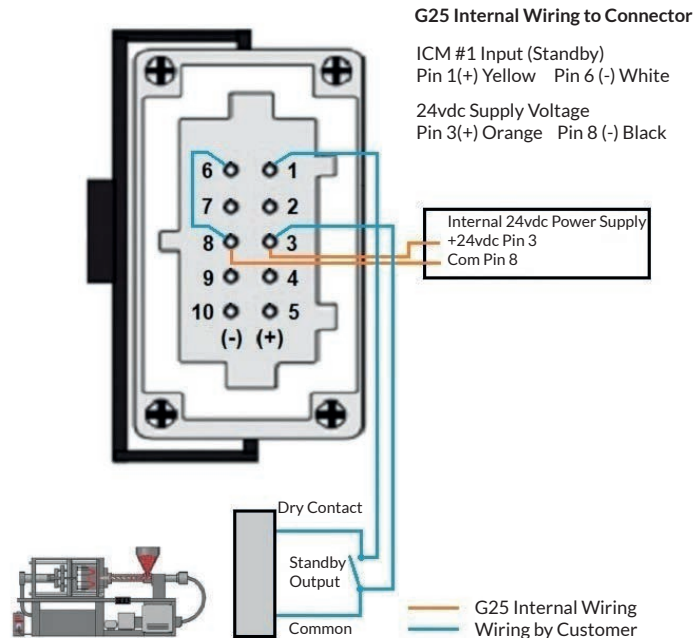


Fig. 7 Version A - Remote I/O Input Connector - Remote Standby

Version C - Internal Wiring to Connector

G25 Remote I-O Connector Wiring HA--10

Standby + Inhibit Inputs & OK to Run Output
from / to IMM -- 24vdc supplied by G25

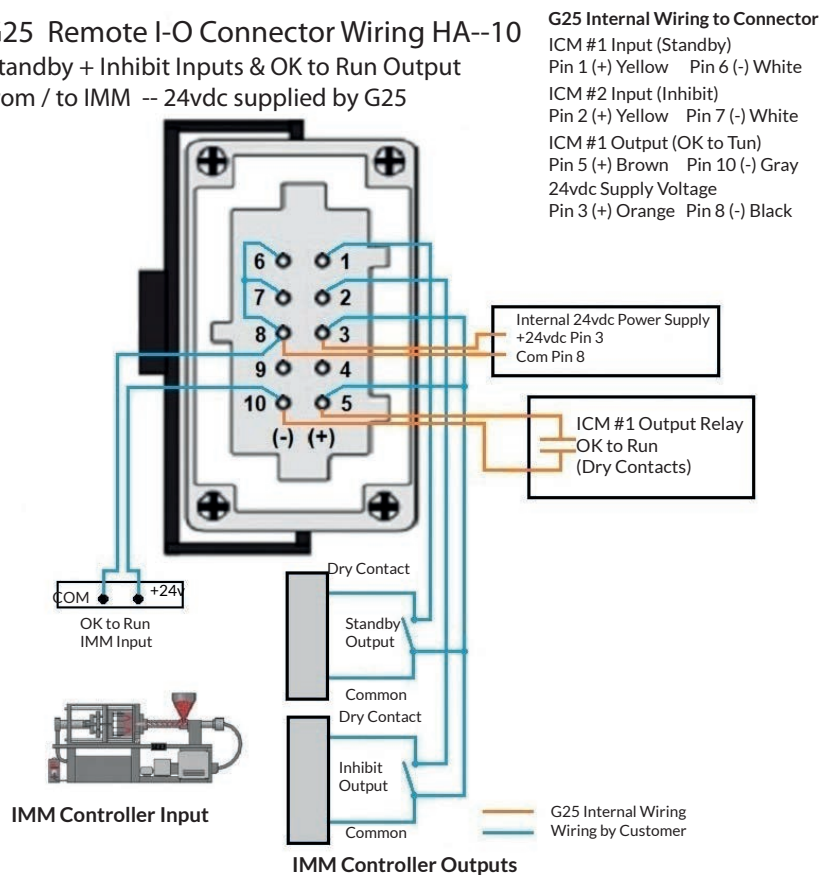


Fig. 8 Version C - Remote I/O Input Connector - Remote Standby



**Version E -
Internal Wiring to
Connector**

G25 Remote I-O Connector Wiring HA--10

Standby Input & OK to Run Output
from / to IMM -- 24vdc supplied by G25

G25 Internal Wiring to Connector

ICM #1 Input (Standby)

Pin 1 (+) Yellow Pin 6 (-) White

ICM #1 Output (OK to Run)

Pin 5 (+) Brown Pin 10 (-) Gray

24vdc Supply Voltage

Pin 3 (+) Orange Pin 8 (-) Black

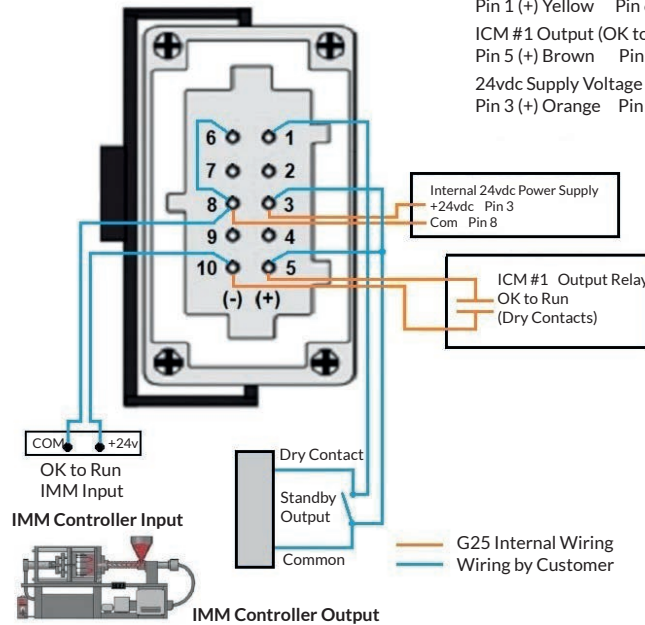


Fig. 9 Version E - Remote I/O Input Connector - Remote Standby

**Version G -
Internal Wiring
to Connector**

G25 Remote I-O Connector Wiring HA--10

Standby + Inhibit inputs & OK to Run +
Outputs from / to IMM -- 24vdc supplied by G25

G25 Internal Wiring to Connector

ICM #1 Input (Standby)

Pin 1 (+) Yellow Pin 6 (-) White

ICM #2 Input (Inhibit)

Pin 2 (+) Yellow Pin 7 (-) White

ICM #1 Output (OK to Run)

Pin 5 (+) Brown Pin 10 (-) Gray

ICM #2 Output (Open)

Pin 4 (+) Brown Pin 9 (Gray)

2vdc Supply Voltage

Pin 3 (+) Orange Pin 8 (-) Black

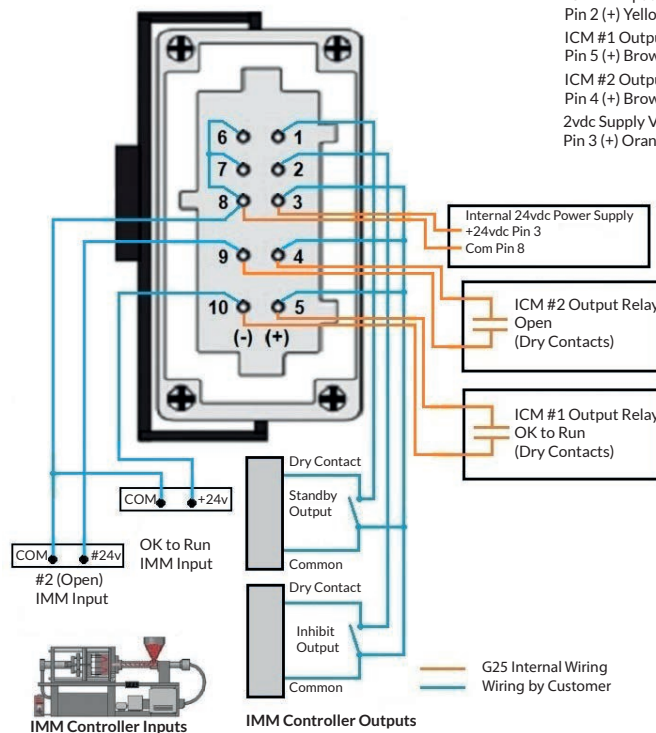


Fig. 10 Version G - Remote I/O Input Connector - Remote Standby



2.7 Fuse Information

Fuse	Amp / Volt Rating	Size	Notes
Output Module (Mold Power Output) F1, F2	20 A 500 VAC	0.25 x 1.25 in 6.35 x 32 mm	SIBA 70.125.40.20 Very-fast acting (FF) GF #8323-018
Output Module (Mold Power Output) F1, F2	30 A 500 VAC		Very-fast Acting (FF) GF #8322-031
ICM Module (Remote Output Relay) F1	3 A 240 VAC/24 VDC		Littlefuse 373110 1 Fast Blow GF #8330-007

Tab. 12 Fuse Ratings

2.8 Shipment

The G25 Controller and the mold cables are usually packaged in the same shipment container. Upon receipt, carefully check the shipping container for damage that may have occurred in transit. Note any damage on the shipping documents when receipt is verified. During unpacking of the shipment, if any hidden damage is discovered, the carrier should be notified immediately so that a claim can be filed. All technical drawings provided with the system should be retained for documentation and systems support.



3 Controller Functions

3.1 Log-in

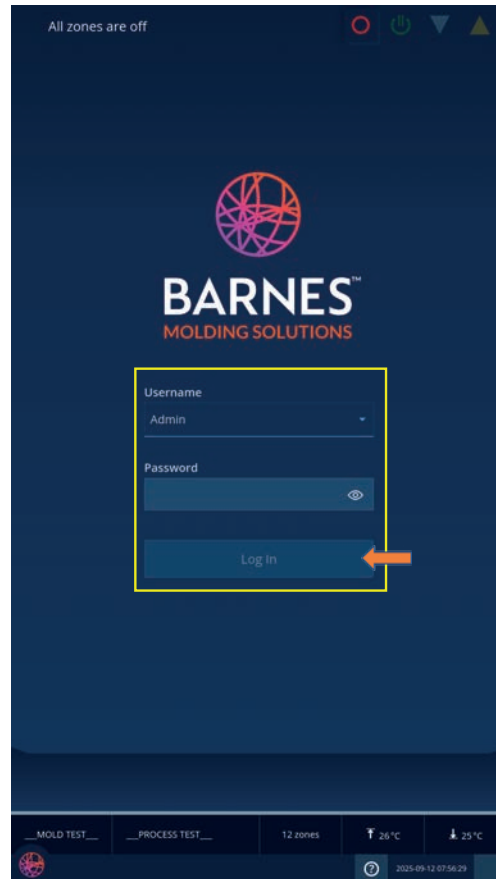


Fig. 11 Enter the user name and password

1. Touch Username and a keyboard will be displayed.

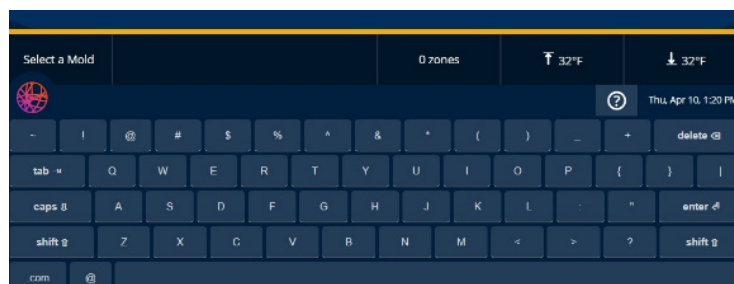


Fig. 12 Keyboard

2. Enter Username and Password, then touch “Log In”.



3.2 Security Levels

NOTICE

Features that are not available to the user (determined by the users' security level) do not appear on the screen. They will appear when a user with a higher security level enters the appropriate code. This approach eliminates confusion by only showing data and selections that the user can access.

- Administrator
 - Process Engineer
 - Operator
 - Setup
 - Plant Manager
-
- After Log In is completed, the message "Set up a mold to continue" will be displayed.
 - For the Quick Start setup, touch + Add Mold -> Quick Mold.
 - See Section 4 Quick Start Method of Initial Mold Setup for details.
 - For the Mold Wizard setup, touch +Add Mold -> Mold Wizard.
 - See Section 5 Mold Wizard for details.



4 Quick Start Method of Initial Mold Setup

This section provides a step-by-step procedure of initially setting up a new mold. This is the basic setup which does not include creation of zone groups.

NOTICE

The more comprehensive setup which is accomplished by the Mold Wizard is highly recommended. See Section 5 Mold Wizard for details.

4.1 Quick Start Procedure

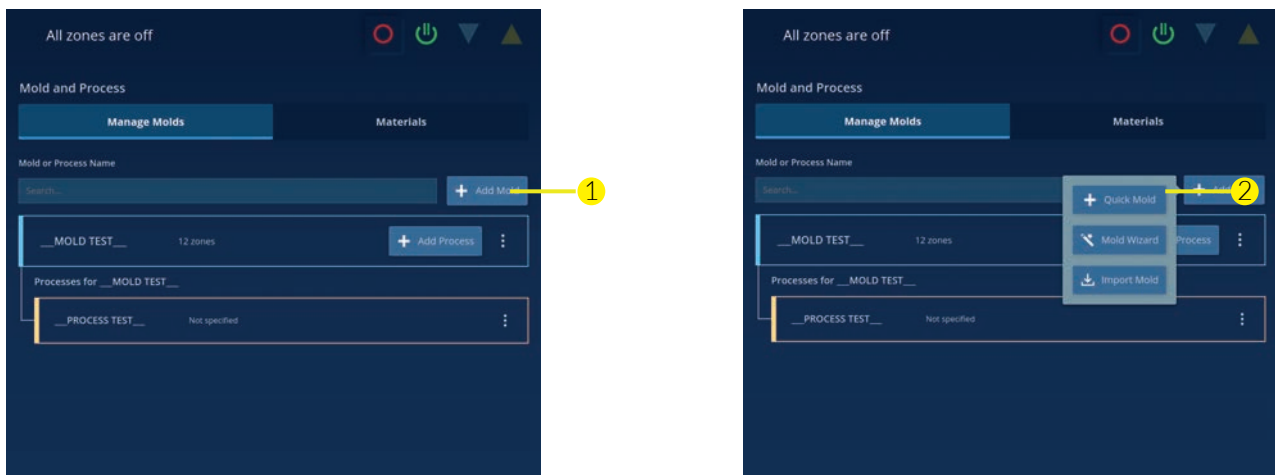


Fig. 13 Quick Mold Setup start

1. After Log In is completed, the message "Set up a mold to continue" will be displayed.
2. For the Quick Start setup, touch + Add Mold ①, then Quick Mold ②.
Use this for the simplified setup method.
See Section 4 Quick Start Method of Initial Mold Setup for details.

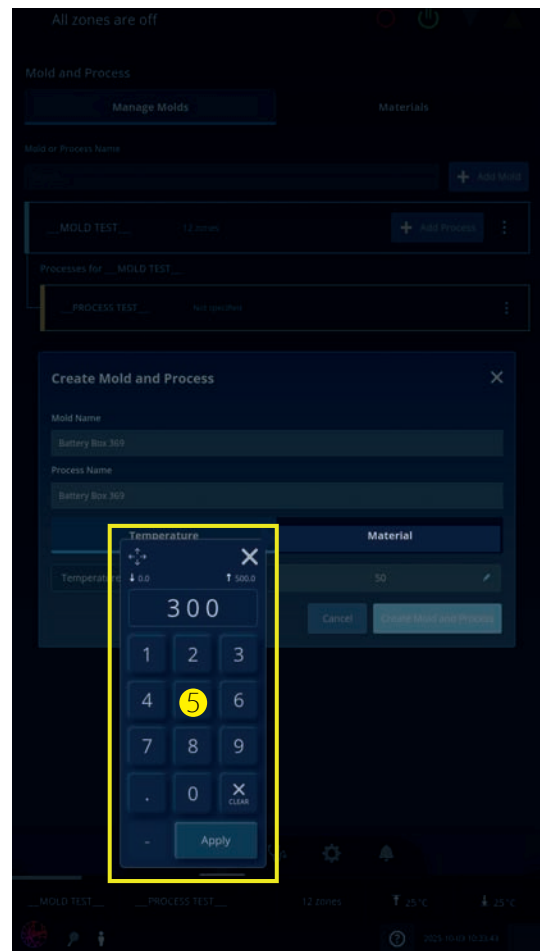
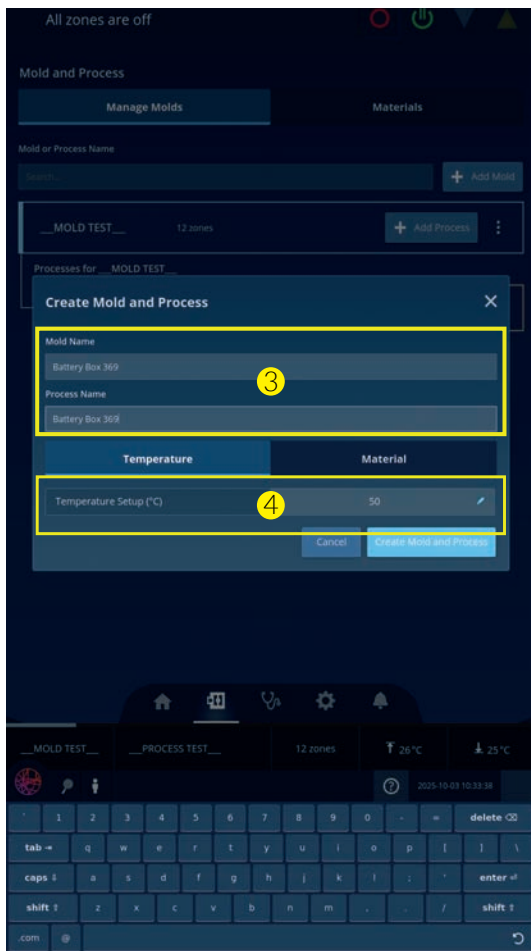


Fig. 14 Quick Mold Setup selection

3. Enter the Mold Name and Process Name ③.
4. Touch the Setpoint Change Icon ④ and enter the process temperature ⑤.
5. This setpoint will be applied to all zones.

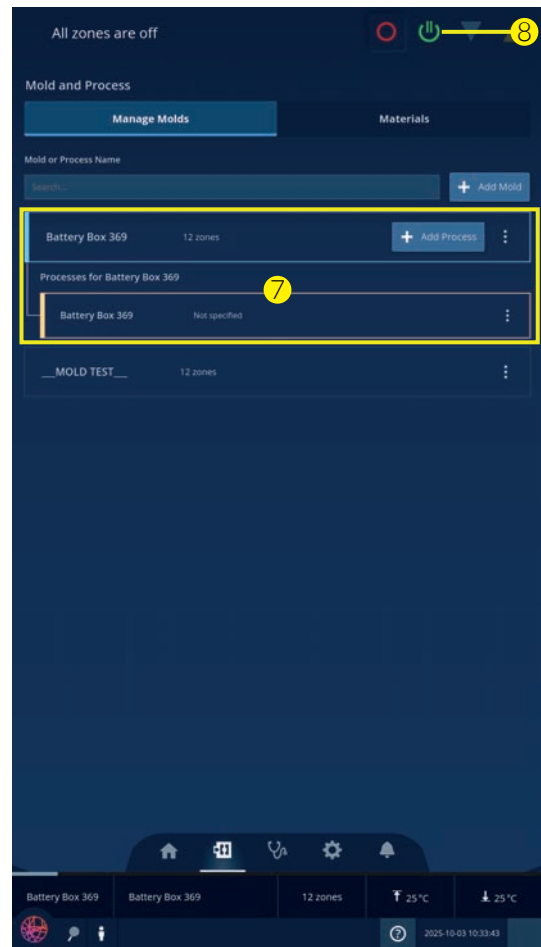
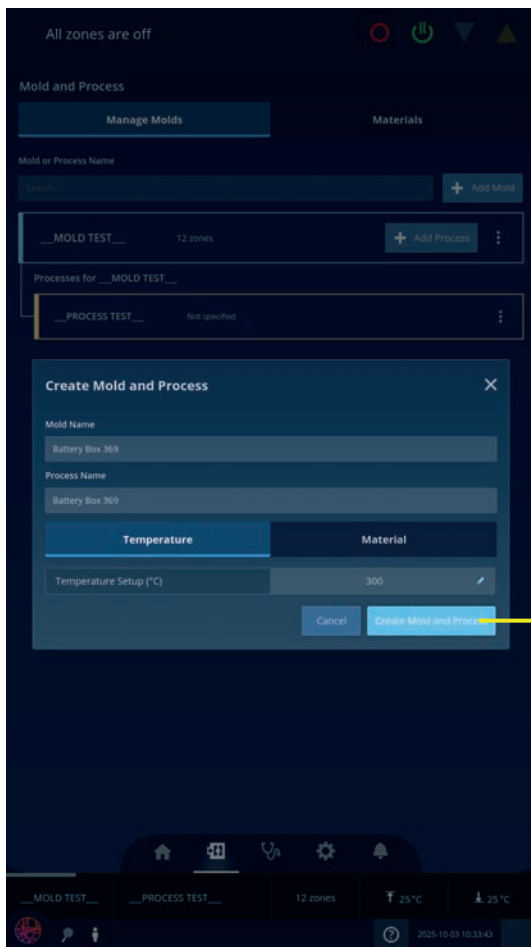


Fig. 15 Quick Mold Setup created

6. Touch “Create Mold and Process” when done.
7. When setup is completed, the Mold and Process screen will be displayed 7.
8. Touch the Heaters ON Button 8 to proceed to the next step of heating the mold.



Fig. 16 Turn on all heaters

9. Touch Turn ON ALL heaters and heating will begin.

NOTICE

To be able to turn on heaters, both a Mold and a corresponding Process must be selected.

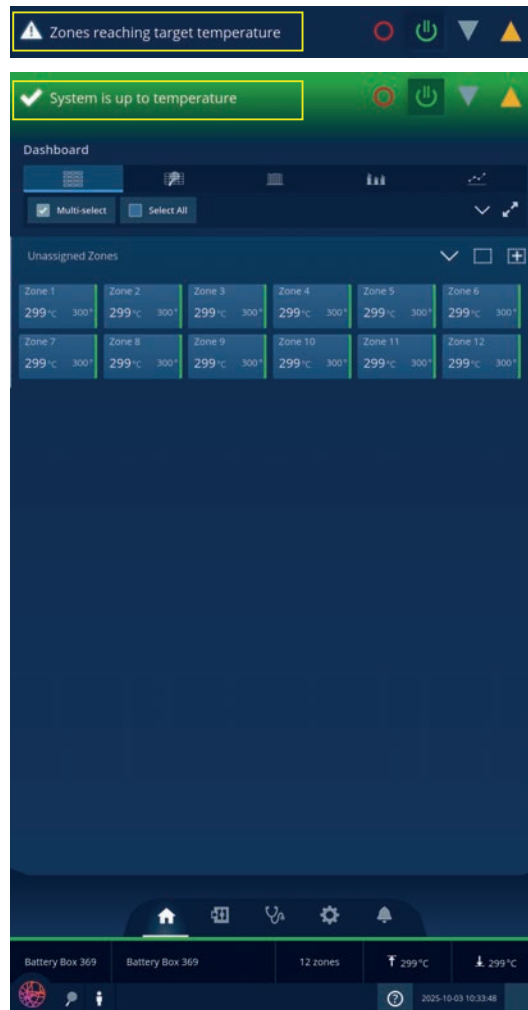


Fig. 17 All zones on temperature

NOTICE

The more comprehensive setup which is accomplished by the Mold Wizard will automatically create Groups such as Tip, Sprue and Manifold, and is recommended. See Section 5 Mold Wizard for details.



4.2 Glossary of Screen Icons

4.2.1 Mold Heater Functions

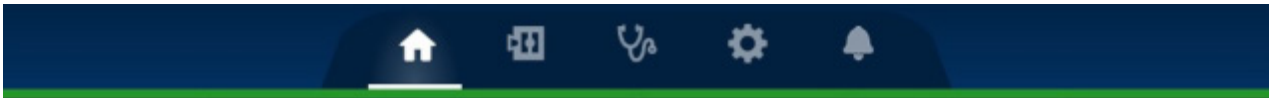
✓ System is up to temperature



Icon	Meaning	Description
	Turn OFF Heaters	Selects Heaters OFF
	Turn ON Heaters	Selects Heaters ON
	Standby	Selects Standby ON and OFF
	Boost	Selects Boost ON and OFF

Tab. 13 Mold Heater Functions

4.2.2 Home, Mold and Process, Mold Doctor, Settings



Icon	Meaning	Description
	Home	Selects the Dashboard / Minicontroller screen.
	Mold and Process	Selects the Mold and Process screen for managing molds and materials.
	Mold Doctor	Selects the Mold Doctor screen for mold wiring and heating checks, and tuning
	Settings	Selects the Settings screen for a various system and hardware functions.
	Alarm	Selects the alarm screen.

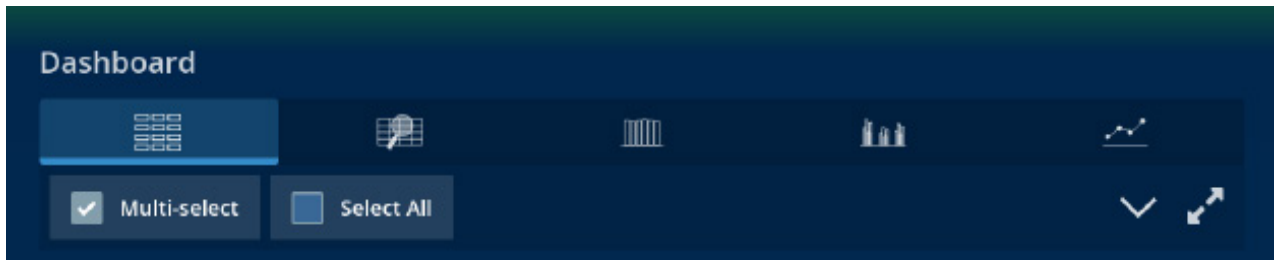
Tab. 14 Tab bar features



4.2.3 Dashboard / Minicontroller



- Select the Home screen.



Icon	Meaning	Description
	Dashboard / Minicontroller	
	Data	
	Bar Graph	
	Multiple Bar Graph	
	Line Graph	
	Multi-Select	Selects multiple zones.
	Select All	Selects all zones.
	Condense All Groups	Condenses all Dashboard / Minicontroller screen Groups.
	Expand All Groups	Expands all Dashboard / Minicontroller screen Groups.
	Condense All Zones	Condenses the Dashboard / Minicontroller screen display of zones to include only Actual Temperature and Temperature Setpoint.
	Expand All Zones	Expands the Dashboard / Minicontroller screen display of zones to include Actual Temperature, Temperature Setpoint, Mode (Auto, Manual), % Output, Actual Voltage, and Actual Amperage of each zone.

Tab. 15 Dashboard Minicontroller features



4.2.4 Groups

Unassigned Zones



Icon	Meaning	Description
	Condense Selected Group	Condenses only the selected Group.
	Expand Selected Group	Expands only the selected Group.
	De-Select A Group	Un-Selects all Zones in an individual Group.
	Select A Group	Selects all Zones in an individual Group. Provides for entering a new setpoint for all of the selected zones.

Tab. 16 Dashboard Minicontroller group features

4.2.5 Mold and Process

Mold and Process

Manage Molds

Materials

Option	Description
Manage Molds	Quick Mold Setup, Mold Wizard, and Process Wizard functions.
Materials	Materials Database, Custome materials, etc.

Tab. 17 Mold and Process



4.2.6 Mold Doctor



- Select the Mold Doctor screen.

Mold Doctor®

Fault

Wiring

Thermodynamic

Historical

Tuning

Option	Description
Fault	Mold fault analysis.
Wiring	Mold wiring fault analysis.
Thermodynamic	Mold heating and cooling analysis.
Historical	Compares Thermodynamic analysis reports.
Tuning	Mold heater tuning procedure.

Tab. 18 Mold Doctor features

4.2.7 Settings



- Select the Settings screen.

Settings

General

Process and Hardware

Tools



System Options



My Profile



User Management



Set System Time



Network Settings



System Updates

Option	Description
General	Basic system settings for Setpoint Units, Language, Time, Individual Profiles, Network, etc.
Process and Hardware	Settings / Checks for Controller Configuration, Remote I-O Functions, Field Calibration, OPC-UA, System Power and Voltages, etc.
Tools	Service Data, Reports, I/O Mapping (TC Input Swap & Output Copy), Find Zones, Historical Data, etc.

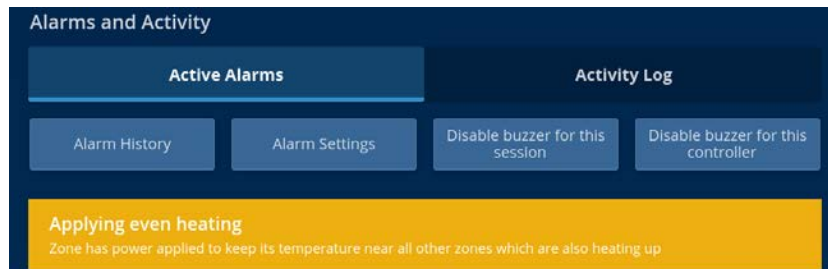
Tab. 19 Setting sections



4.2.8 Alarms and Activity



- Select the Alarms and Activity screen.



Option	Description
Active Alarms	Alarm History, Alarm Settings, Buzzer Settings, etc.
Activity Log	History of alarms and setpoint changes.

Tab. 20 Alarms sections



4.3 Setpoints Screen

1. Go to the dashboard and select one or multiple zones.
2. The zone setpoint screen will appear.



3. Press  to open the setpoints screen.

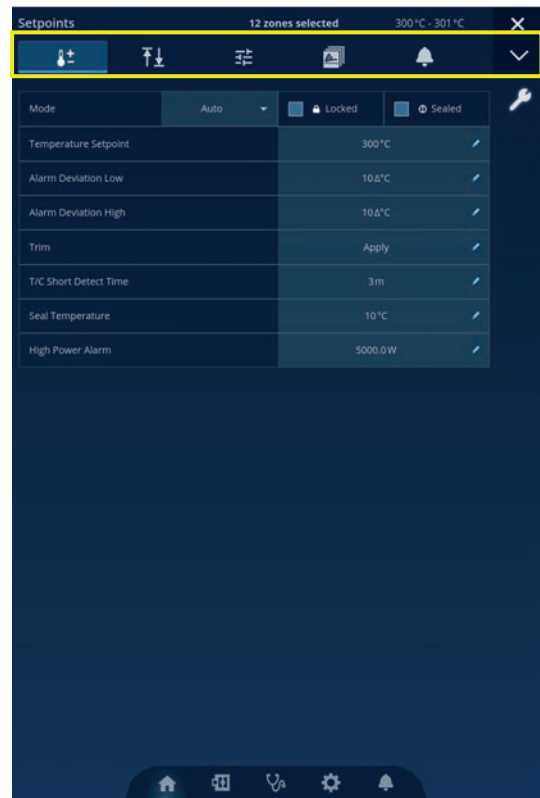
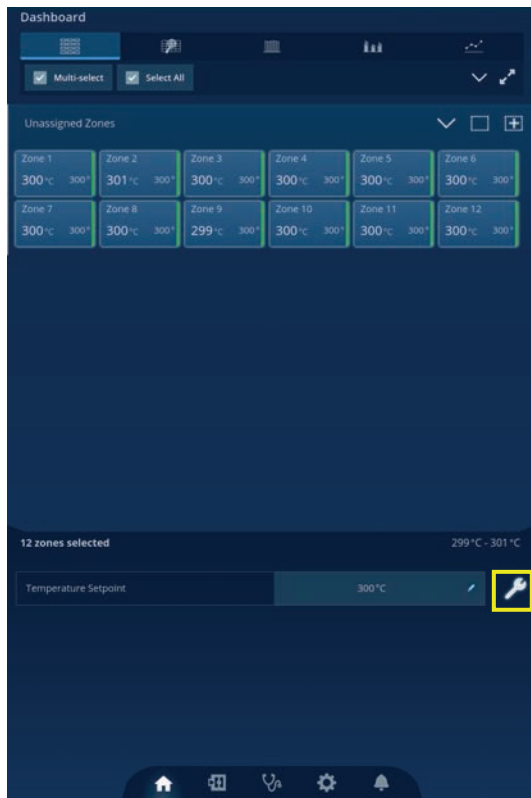


Fig. 18 Setpoints Screen



Icon	Meaning	Description
	Setpoints	Provides for Temperature, Alarm Deviation Low, Alarm Deviation High setpoints, and selections of Mode (Auto, Manual, Monitor), Trim, TC Short Detection Time, Seal Temperature, High Power Alarm, Locked (ON/OFF), and Sealed (ON/OFF).
	Limits	Provides for Global Limits (Trim, Boost, Manual Boost) and Zone Limits (Critical Over Temperature, Maximum Current, Setpoint Minimum, Setpoint Maximum, Manual Setpoint Maximum) setpoints.
	Tuning	Provides display of Actual Tuning Used, Auto Select Performed, and for selections of Tuning Override, Tuning Type, Power Priority, Firing Mode, Attenuated by (%), Calibration Offset.
	Groups and Naming	Provides for creation and naming of Groups.
	Alarm Settings	Provides for selection of which alarms are active.

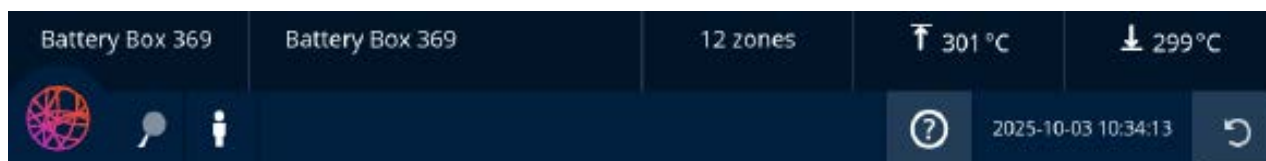
Tab. 21 Setpoints screen features

4.3.1 Additional Banners and Icons



Icon	Meaning	Description
	Adjustments	Selects the Setpoints screen for temperature related setpoints, limits tuning, groups and names, and alarm setpoints.
	Setpoint	When selected, a Setpoint Entry Box will be displayed.

Tab. 22 Setpoints screen features



Icon	Meaning	Description
	Mold Name	
	Process Name	
	Number of Zones in the selected mold	
	Average High Temperature	
	Average Low Temperature	
	Start	Provides for selection of Log-In and Log-Out.
	Shortcut Search	Provides for search of shortcuts, and for pinning / un-pinning them to the Start screen.
	User	Selects an individual User Profile screen or Log-Out selection.
	System Help	Provides for access to User's Manual, Screenshot, Report a Problem, Export Files.
	System Time / Date	Provides access to the System Time screen for setting of the System time and date.
	Refresh	Reloads the screen state.
	Delete Icon	Provides for deletion of the selected item.
	Home	Displays the Home Screen.
	Adjustment Icon	Provides access to the additional setpoint selections. For example, High Deviation setpoint.



	Down Icon	Provides for expanding the selected area.
	UP Icon	Provides for compressing the selected area.
	Exit Icon	Goes back to the Dashboard screen.

Tab. 23 Additional banners and icons

4.3.2 Graphic Screen Icons

NOTICE

Graph screens must be enabled to view these Icons.



Icon	Meaning	Description
	Pause	Pauses Line Graph screen.
	Start	Starts/Restarts Line Graph screen.
	Refresh	Refreshes Line Graph screen.
	View Data	When selected, data for a selected zone on the Pilot Graph screen will display Setpoint and Actual Temperature values. On the Bar Graph screen, it will display up to four of the data selections, such as Temperature, % Output, etc.
	Graph Settings	Provides various settings for each of the graphs.
	Mark	When selected, a vertical dashed-line is applied to the Line Graph. Can be used for timing purposes during injection cycles.

Tab. 24 Graph screen icons



4.3.3 Minicontroller Screen Icons

Icon	Meaning	Description
	Auto Mode	Indicates the zone is in Auto mode.
	Manual Mode	Indicates the zone is in Manual mode.
	Monitor Mode	Indicates the zone is in Monitor mode.
	Locked	Indicates the zone is Locked OFF.
	Sealed	Indicates that the zone is Sealed.
	Condense All Groups	Condenses all Dashboard / Minicontroller screen Groups.
	Expand All Groups	Expands all Dashboard / Minicontroller screen Groups.

Tab. 25 Additional Minicontroller icons



4.4 Screen Locator

4.4.1 Home / Dashboard / Minicontroller Screen

- Dashboard / Minicontroller
 - o Setpoints (Wrench Icon)
 - Setpoints (Temperature related)
 - Mode - Auto, Manual, Monitor
 - Temperature
 - Alarm Deviation low
 - Alarm Deviation high
 - T/C Short Detect Time
 - Seal Temperature
 - High Power Alarm (Watts)
 - Locked Zone - ON / OFF
 - Sealed - ON / OFF
 - Limits
 - Trim Limit
 - Boost Limit
 - Manual Boost Limit
 - Critical Over Temperature
 - Maximum Current
 - Setpoint Minimum
 - Manual Setpoint Maximum
 - Tuning
 - Actual Tuning Used
 - Auto Select Performed
 - Tuning Override - Auto, Heaters with fast response, Heaters with slow response
 - Tuning Type - Temperature Rise and Amperage Output
 - Power Priority - None, 1, 2, 3, 4
 - Firing Mode - Time Proportional, Phase Angle Firing
 - Attenuated by (%)
 - Calibration Offset
 - Groups and Naming
 - Manage Zone Types
 - Rename Zones
 - Groups - Edit Group colors, Delete a Group
 - Add Group
 - Alarms
 - Alarm Settings - Enabled? And Ok to Run?
 - Data - Setpoint and Actual data for all zones
 - Bar Graph - Individual temperature bar for each zone
 - Multiple Bar Graph - Up to four parameters displayed per zone. None, % Output, Current (Amps), Voltage (Volts), Power (Watts), Average Power (Watts), and Resistance (Ohms).
 - Line Graph - Up to four parameters displayed per zone. None, % Output, Current (Amps), Voltage (Volts), Power (Watts), Average Power (Watts), and Resistance (Ohms).



4.4.2 Mold and Process Screen

- Manage Molds
 - Add Quick Mold
 - Mold Wizard
 - Import
 - Load Mold
 - Quick Process
 - Process Wizard
- Materials
 - Database
 - Current Material
 - Search - Trade Name or Abbreviation
 - Custom Material
 - Add New Material
 - Export/Import Custom Material

4.4.3 Mold Doctor Screen

- Fault - Testing all zones simultaneously for faults
- Wiring - Testing all zones sequentially for faults
- Thermodynamic - Analyses the heating and cooling rates of all zones
- Historical - Compares thermodynamic reports
- Tuning
 - Tuning Wizard - Automatically calculates heater tuning values

4.4.4 Settings Screen - General

- System Options
 - Setpoint Units
 - Default Language
 - Disable buzzer
 - Enable ground fault protection
 - Zone output on system power up
 - Enable VNC
 - Display orientation
- Set System Time
- System Updates
- My Profile - Individuals' personal profile
- Network Settings
- User management



4.4.5 Settings Screen – Process and Hardware

- Check Controller Configuration
 - ICM Switch address and Block address
 - Connectors and Pins
- Remote I/O
 - Remote Input Action and Input Delay(s) selections
 - Remote Output Trigger and Output Delay(s) selections
- Connectors and Pins
- Field Calibration - Calibration of temperature modules
- OPC-UA Settings
- System Power and Line Monitor
 - KW information
 - ICM Line Voltage for each Block

4.4.6 Settings Screen – Tools

- Service
 - System Status
 - ICM Data
 - USB
- Reports
 - Fault
 - Wiring
 - Thermodynamic
- Restore Factory Defaults
- I/O Mapping
 - TC Input Swap
 - Output Copy
- Backup / Restore Database
- Find Zones – Locates selected zone output module
- Historical Data
- Simulation Settings

4.4.7 Alarms Screen – Active Alarms

- Alarm History
- Alarm Settings
- Disable buzzer for this session
- Disable buzzer for this controller

4.4.8 Alarms Screen – Activity Log

Shows all controller and user activities.



4.5 Quick Overview of Basic Functions

4.5.1 Changing Individual Zone Setpoints

The temperature setpoint(s) for each zone can be changed individually or as multiple selections.

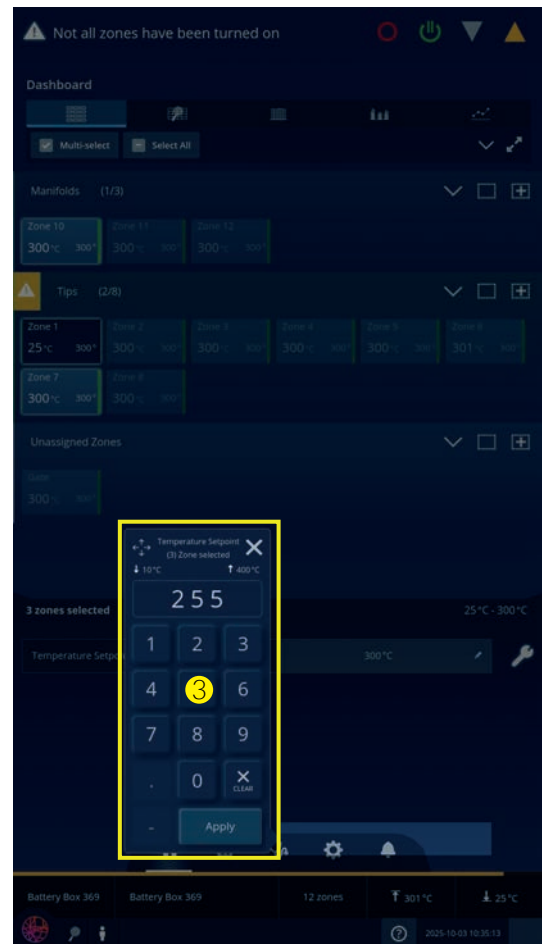
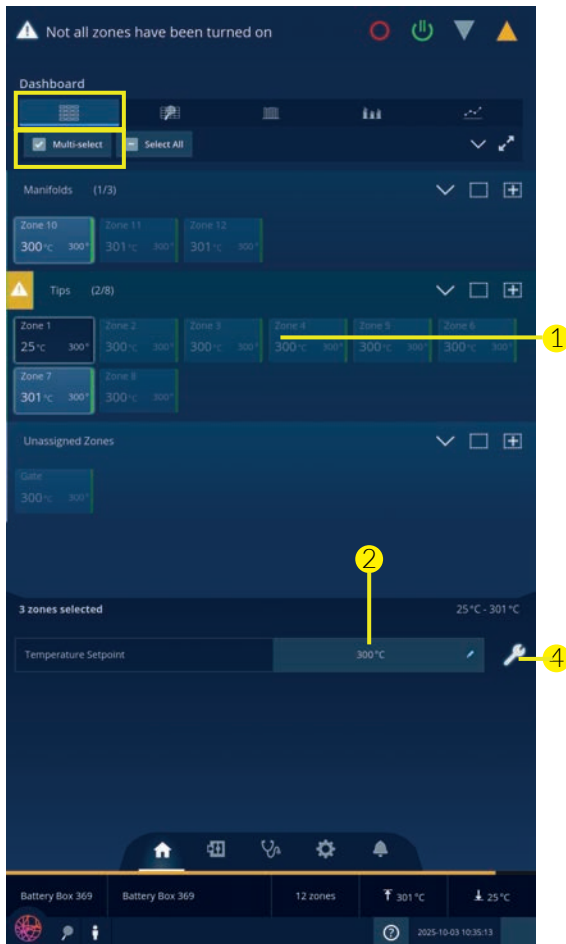


Fig. 19 Select Temperature Setpoint 1/2

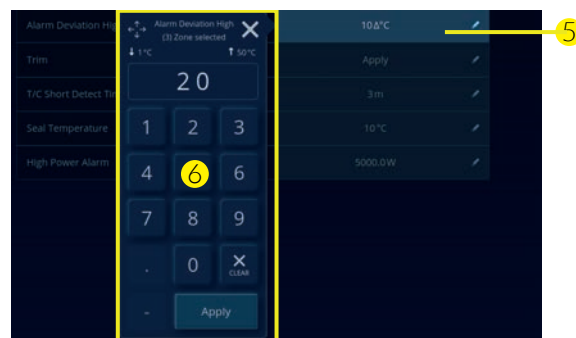


Fig. 20 Select Temperature Setpoint 2/2



1. On the Dashboard / Minicontroller screen, touch “Multi-select” if more than one zone is desired.
2. When selected ①, multiple zones will be highlighted. Zones do not need to be in sequential order. All selected zones will have the same setpoint applied.
3. Touch the Setpoint Change Icon ② and the Setpoint Entry Box will be displayed ③.
4. Enter the new setpoint and then touch “Apply”. A message will display briefly.
5. More settings are available when the setpoint expand button is pressed ④. Choose the specific setpoint mode, or condition to be adjusted. For example, the Alarm Deviation High setpoint.
6. Touch the Alarm Deviation High Change Icon ⑤ and the Entry Box ⑥ will be displayed.
7. Enter the new setpoint and then touch “Apply”. A message will display briefly. The entry inserted in this example is the deviation value from the temperature setpoint.



4.5.2 Turning Zones ON Individually or as a Group

The zones can be heated individually or as multiple selections.

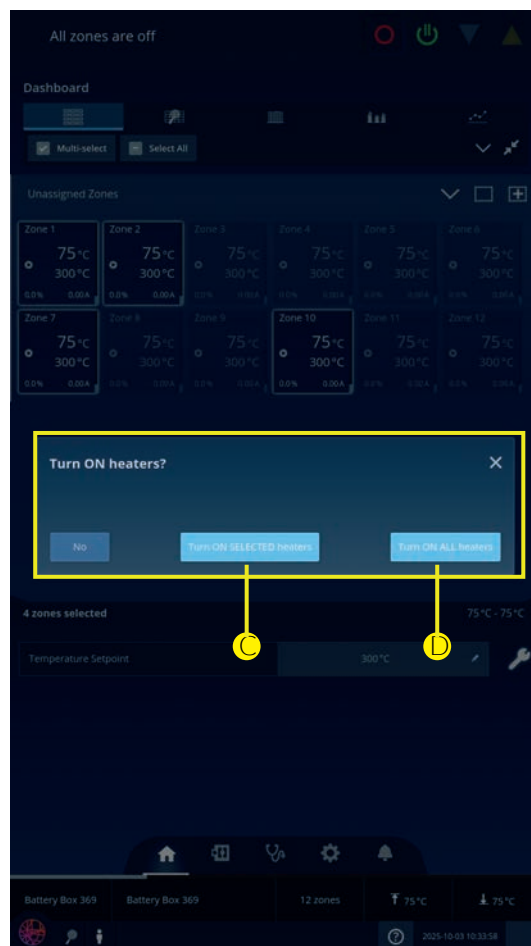
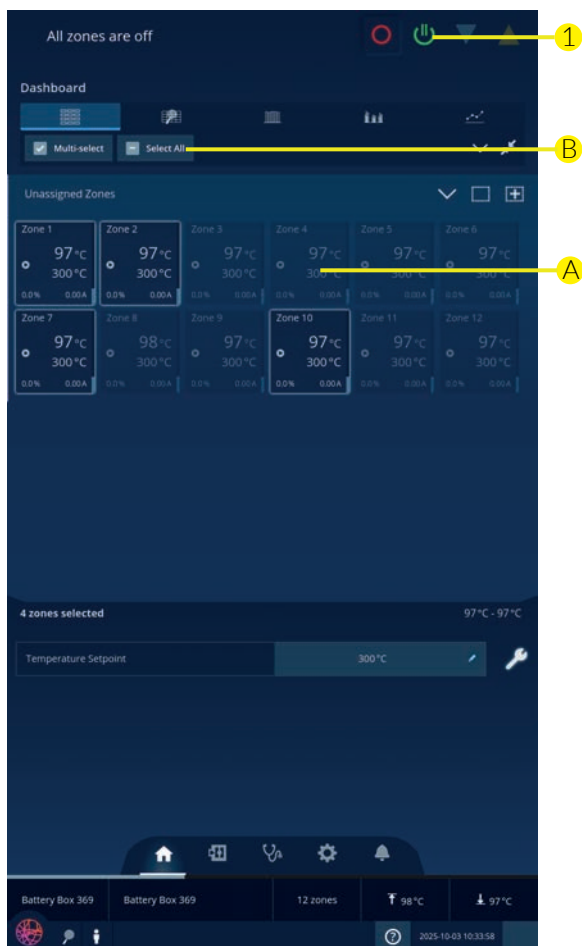


Fig. 21 Turn on all or some zones 1/2

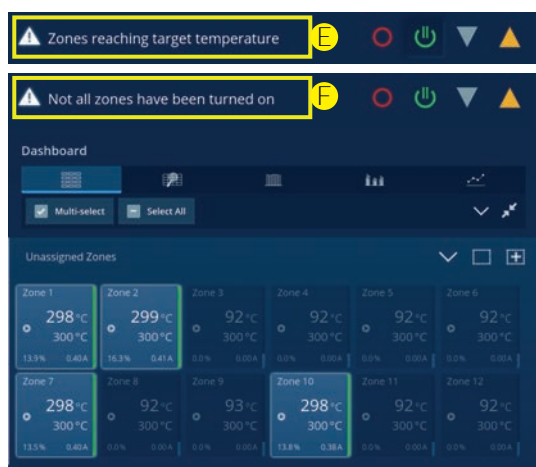


Fig. 22 Turn on all or some zones 2/2



1. On the Dashboard / Minicontroller screen, touch the individual zone(s) to be heated **A** or Select All if all zones are desired.
2. Touch the Heaters ON Icon **1** to start heating the mold.
3. Touch "Turn ON SELECTED heaters" **C** or "Turn ON ALL heaters" **D** to start the heating process.
4. The Zones reaching target temperature message will be displayed during heating up process **E**.
5. Selected zone(s) actual temperature color will change to white when the low deviation alarm setpoint is achieved.
6. Temperature Setpoint and Actual Temperature values are displayed.

NOTICE

Only some zones were heated. Therefore, the status bar shows a warning, and the message "Not all zones have been turned on" is displayed **F**.

NOTICE

7. All zones were heated. Therefore, the status bar is green, and the message "System is up to temperature" is displayed **G**.



4.5.3 Turning Zones OFF Individually or as a Group

The zones can be turned OFF individually or as multiple selections.

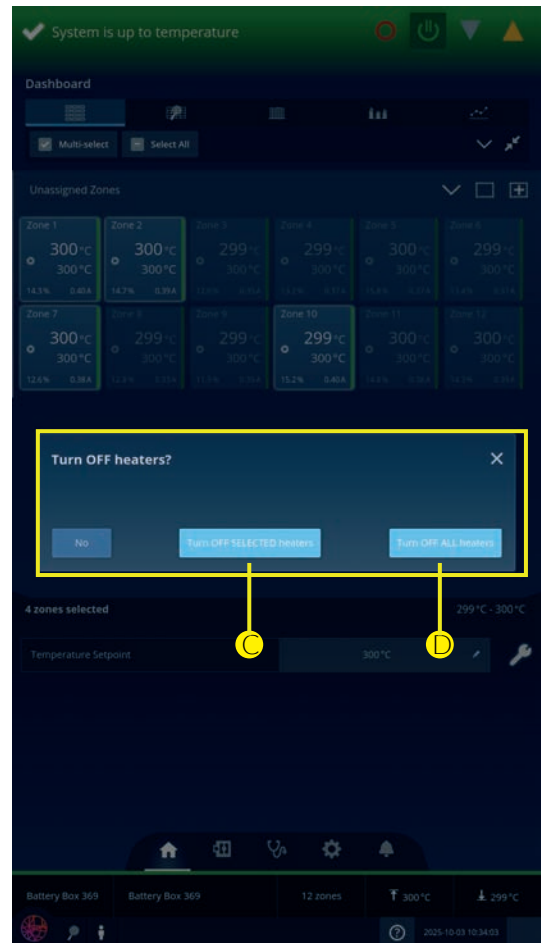
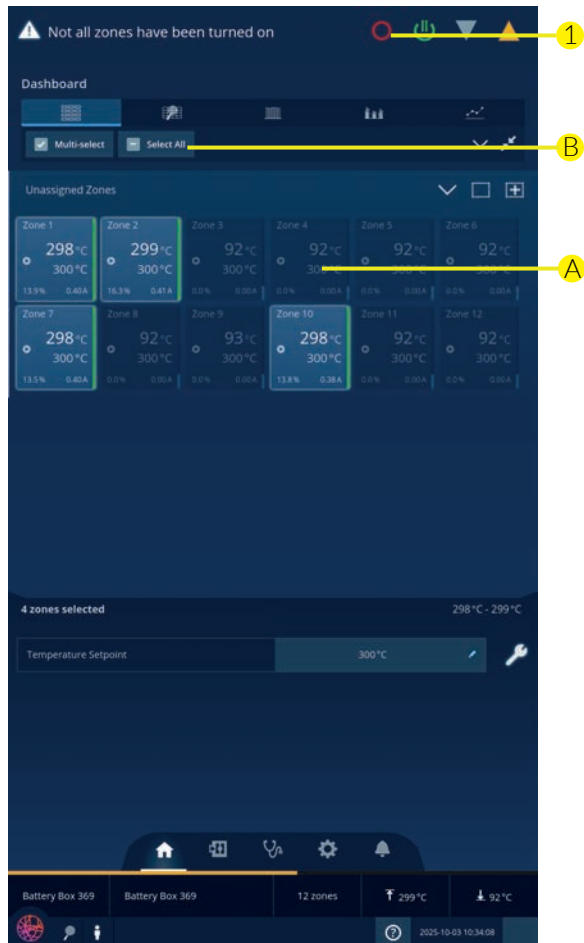


Fig. 23 Turn on all or some zones 1/2

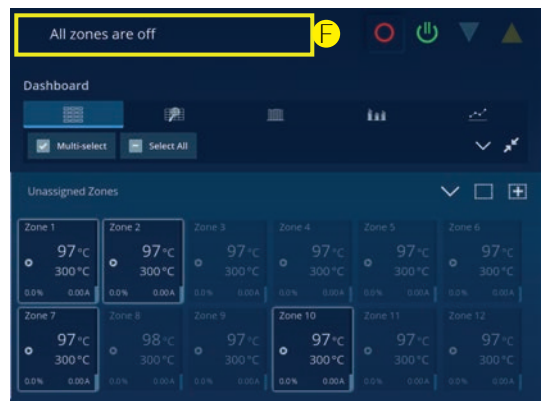
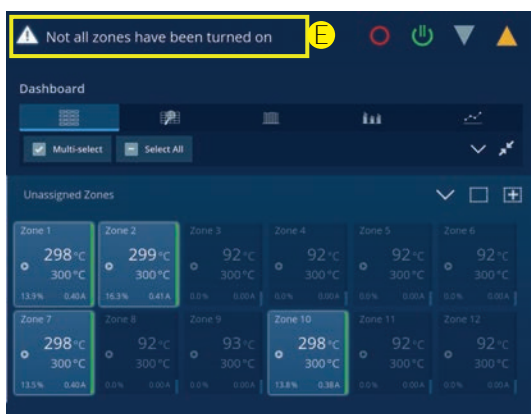


Fig. 24 Turn on all or some zones 2/2



1. On the Dashboard / Minicontroller screen, touch the individual zone(s) to be turned Off **A** or Select All if all zones are desired.
2. Touch the Heaters OFF Icon **1** to stop heating the mold.
3. Touch “Turn OFF SELECTED heaters” **C** or “Turn OFF ALL heaters” **D** to stop the heating process.
4. If some zones remain on, the message “Not all zones have been turned on” is displayed **E**.
5. If all zones are off, the message “All zones are off” is displayed **F**.

4.5.4 Minicontroller Expanded View

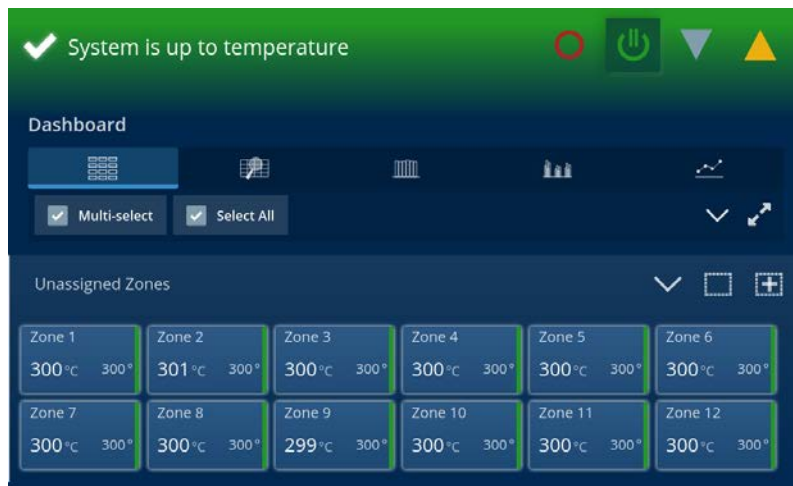


Fig. 25 Minicontroller Expanded View



1. Touch the Expand All Zones Icon to display the Minicontroller Expanded View screen.
2. This screen permits viewing of the actual temperature, setpoint temperature, percentage of output, heater voltage, and actual amperage of each zone.
3. Use the sliding bar on the right side of the screen to view additional zones.

Icon	Meaning	Description
	Auto Mode	The Auto Icon indicates that the zone is operating in Auto mode and the controller is calculating the output percentage based upon the difference of the actual temperature reading to the temperature setpoint of the zone.
Actual Temperature		The actual temperature reading from the zone thermocouple.
Setpoint Temperature		The operating temperature setpoint for the zone.
Percentage of Output		The actual percentage of output being used by the zone heater.
Actual Voltage		The actual heater voltage for the zone.
Actual Amperage		The actual output amperage being utilized by the zone heater.



4. Touch Condense All Zones Icon to return to the previous view.



5 Mold Wizard

This feature provides a step-by-step procedure for setting up all necessary setpoints, selections, and related parameters of the mold and process when a mold is being used for the first time, or after process changes have been made.

5.1 Mold Wizard Procedure

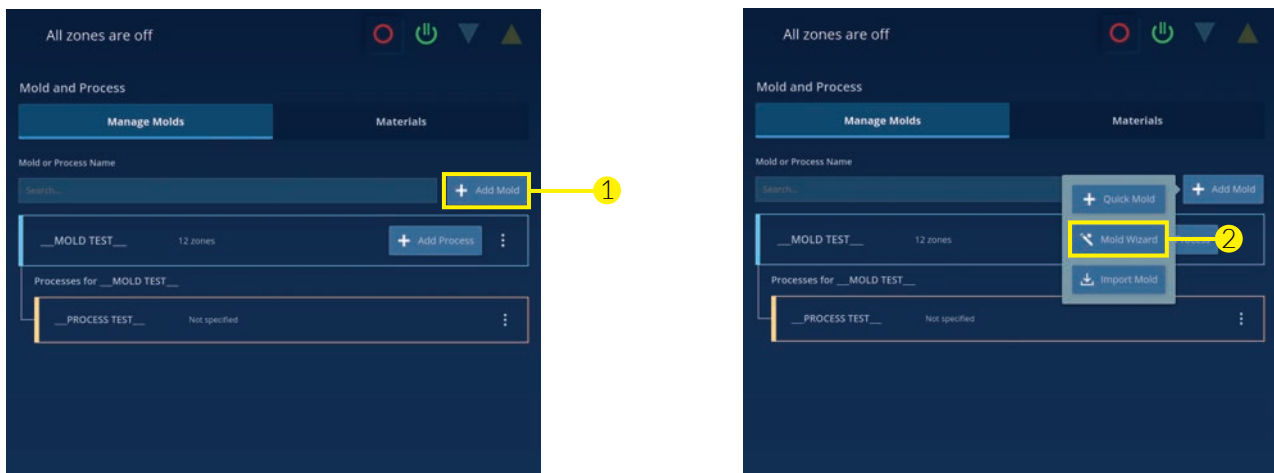


Fig. 26 Quick Mold Setup start

1. After Log In is completed, the message "Set up a mold to continue" will be displayed.
2. Touch "+Add Mold" -> "Mold Wizard" to proceed. This is the more comprehensive setup method.

NOTICE

Only run the Mold Wizard procedure while not making parts and with the tool cooled down. The system will briefly apply 4 % power to all zones to determine heater amperages.



5.2 Mold Set Up - Basic Configuration & Groups

Mold setup in progress

Mold and Process

Basic Configuration & Groups - Step 1 of 3

Exit Next

Mold Name
Use a consistent format for naming that recalls an attribute of the mold. Try formatting it client and part name. Customer Example

Thermocouple Type
J

Select a label for the zone type.

Tips Tips zones are usually located within the Nozzle.	Tips
Manifolds Manifold zones are usually located behind the Nozzle zones within the flow of material.	Manifolds
Monitor Monitor zones are used for data monitoring only and have only thermocouple input. Zones with no T/C output will be...	Monitor
Spare Spare zones have no thermocouple input and no heater connection. These zones will be named Spare and put into...	Spare

Mold setup in progress

Mold and Process

Discovery - Step 2 of 3

Exit Back Done

Zone threshold: Tip < Amps 3.00 A > Manifolds

Test Status

Selected Zones
Select... Clear Selected Apply Selected

Block ID	Type	Sequence#	Actual Temp	Peak Amps	Average Watts	Results
----------	------	-----------	-------------	-----------	---------------	---------

Start discovery?

The system will apply 4% power output to all zones, and while the discovery is in progress you should not start an injection cycle.

Cancel Start discovery

Fig. 27 Mold Wizard Steps 1 and 2

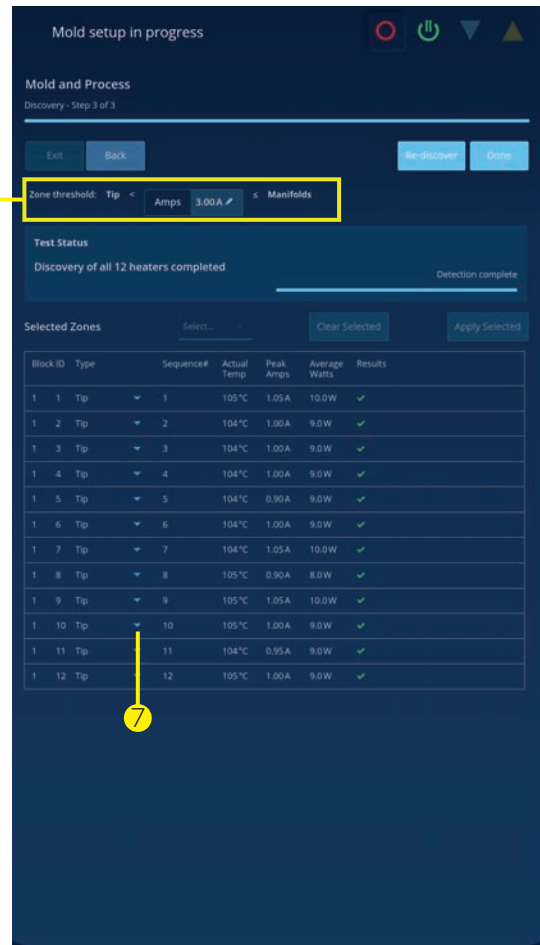


Fig. 28 Mold Wizard Steps 1 and 2

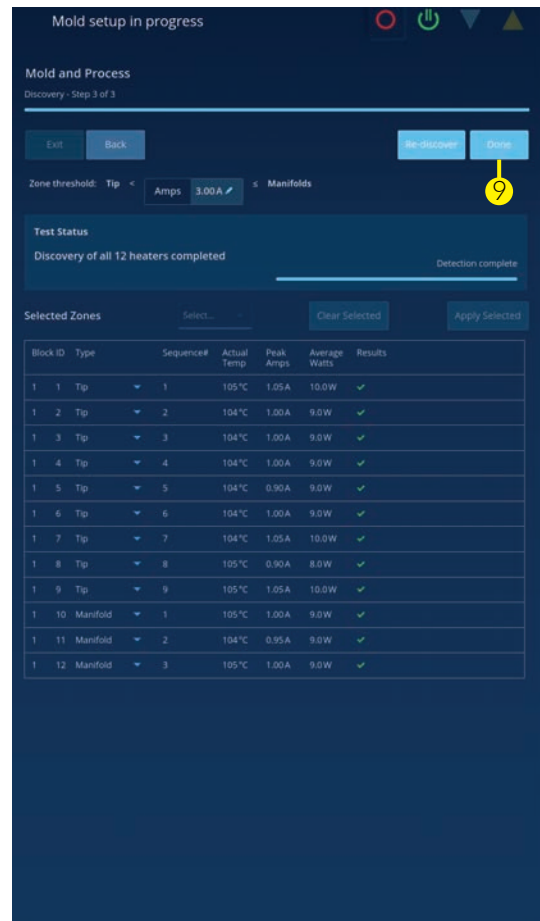
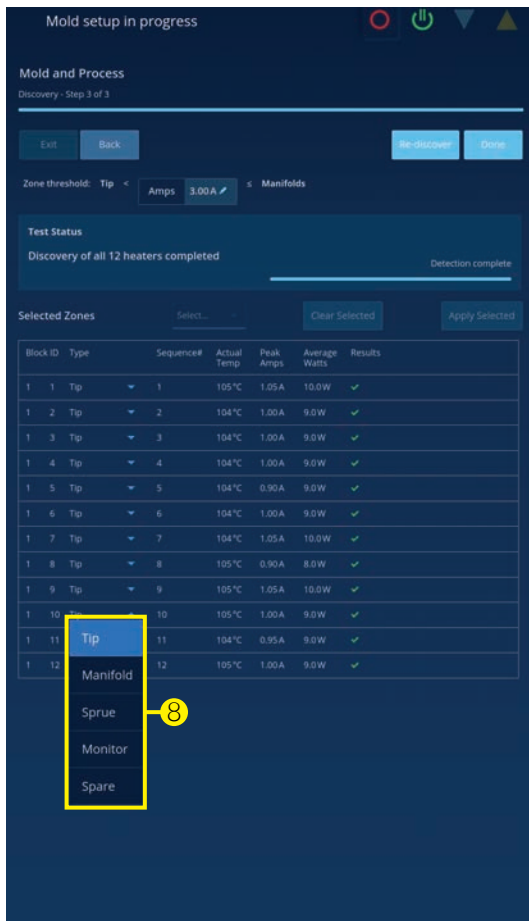


Fig. 29 Mold Wizard Steps 1 and 2

1. Enter Mold Name and Thermocouple Type.
Thermocouple selection is 'J' or 'K' ①.
2. Select a Group Name for each of the zone types ②. See Tab. 26 Zone Group Descriptions for description of each zone type.
3. Touch "Next" when complete.
4. Touch "Start discovery".
5. The system will briefly apply 4 % power to all zones to discover heater amperages.

NOTICE

Power at 4 % output will be applied briefly to each zone to determine the amount of amperage recorded. When the test is complete, the zones will be assigned to the appropriate Group. Actual Temp, Peak Amps and Peak Watts will be reported ⑤.

6. For controller with a large number of zones, use the sliding bar on the right side of the screen to view additional data.
7. To adjust the threshold amps ⑥, touch the Change Setpoint Icon and a Setpoint Entry Box will be displayed.



8. Enter the Tip/Manifold Amps threshold setpoint. The zone will be identified as a Tip if the heater current is less than this setting. The Manifolds will be automatically selected when the heater current is equal to or greater than the threshold setting.
9. You can also manually change the zone type by using the dropdown menu 7.
10. Touch “Re-discover” to recalculate using the adjusted amps, or touch “Done” if readings are correct 9.
11. You are now asked if you want to continue with the process wizard step. Touch “Yes” to continue.

Zone	Description
Tips	Tip zones are typically located within the Nozzle. Zones with Amps lower than the Tip/Manifold Amps threshold setpoint will be named Tips and placed into that Group. Selection is Tips and Nozzles.
Manifolds	Manifold zones are usually located behind the Nozzle zones within the flow of material. Zones with Amps equal to or greater than the Tip/Manifold Amps setting will be named Manifolds and placed into that Group. Selection is Manifolds and Man.
Monitor	Monitor zones are used for data monitoring only and have only a thermocouple input. There is no heater output zone associated with them. Zones that have thermocouple readings but no output, will be named Monitor and placed into this Group. Selection is Monitor.
Spare	Spare zones have no thermocouple input and no heater connection. These zones will be placed in the Spare Group. Selection is Spare and Unused.

Tab. 26 Zone Group Descriptions



5.3 Process Set Up – Basic Configuration

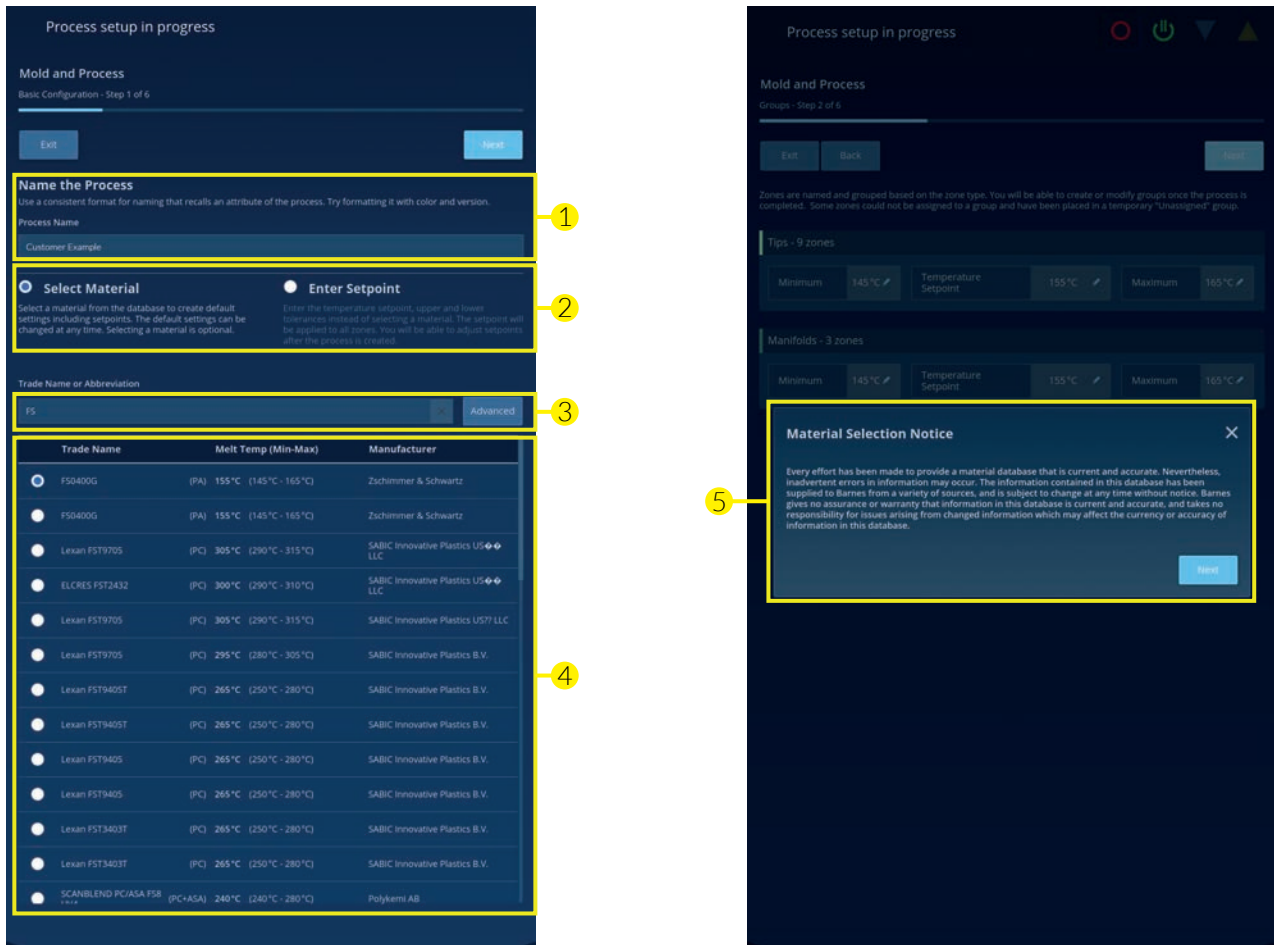


Fig. 30 Process Wizard Step 1

1. Enter a Process Name **1**. Use a consistent format for naming that recalls an attribute of the mold, for example, client and part name. The material might also be included.
2. Select Material or Enter Setpoint **2**.
There are two methods of entering process details. (1) Selecting a material from a database, and (2) by entering temperature setpoints. In this example, the Select Material option is chosen.

NOTICE

Selecting a material is optional and the default settings can be changed at any time if this method is chosen.

3. Choose the Select Material option.
4. Enter a Trade Name or Abbreviation **3** and select the material from the list **4**.
5. The Melt Temp (Min-Max) and Manufacturer are displayed.
6. Select “Next” to proceed.
7. Acknowledge the Material Selection Notice **5**.

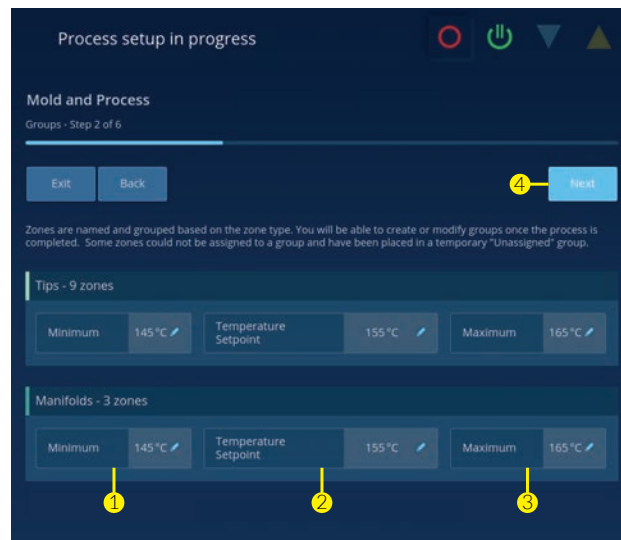


Fig. 31 Process Wizard Step 2

NOTICE

If desired, the pre-selected material temperatures can be adjusted.

1. Touch the Setpoint Change Icon for each, and the Setpoint Entry Box will be displayed.
2. Enter the Minimum temperature setpoint **1**, the Temperature setpoint **2**, and the Maximum temperature setpoint **3**.
3. Touch "Next" when done **4**.

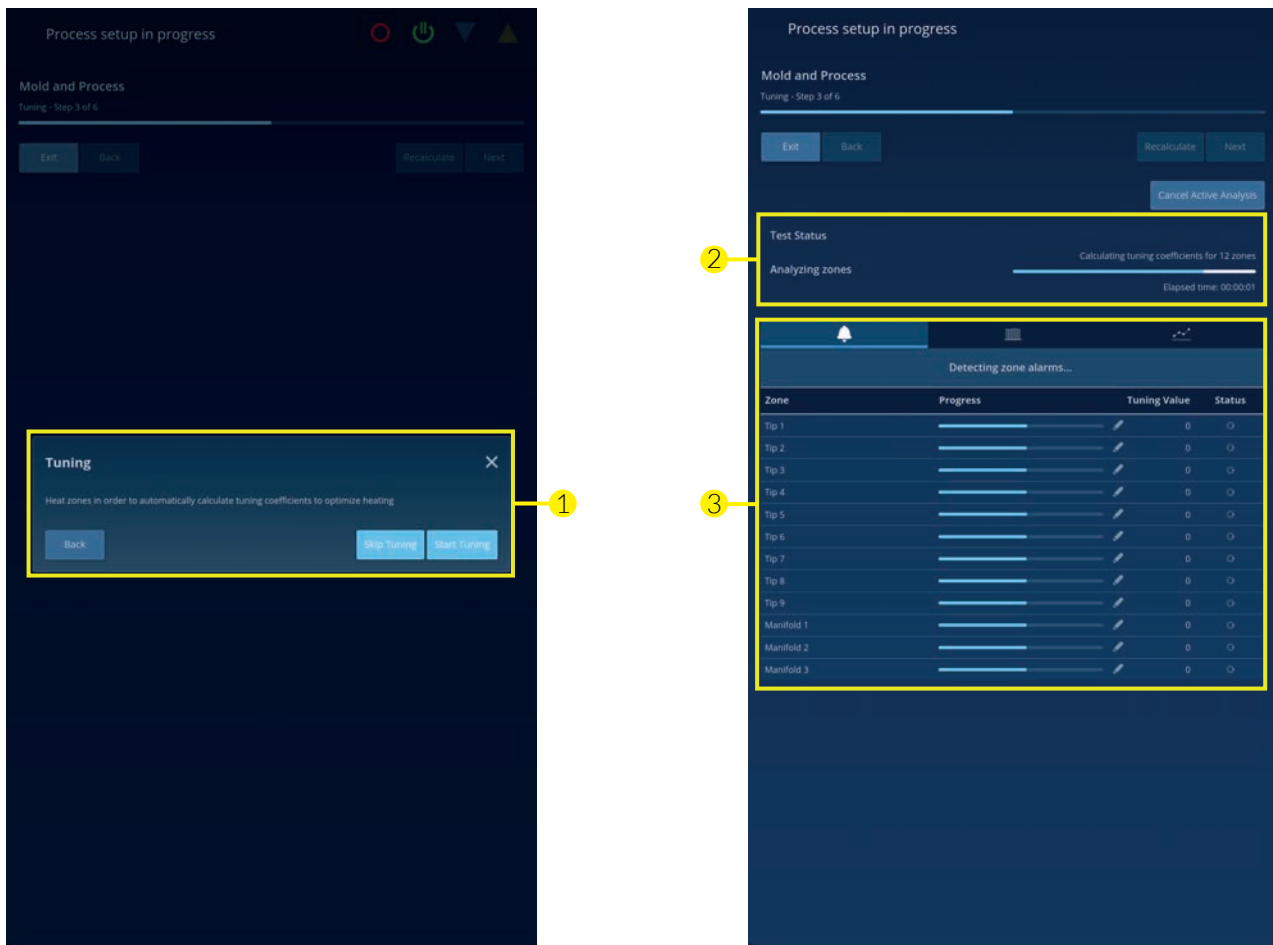


Fig. 32 Process Wizard Step 3

1. Zones are heated in order to automatically calculate tuning coefficients to optimize heating.
2. Select “Start Tuning” to proceed.
3. The progress of the test is displayed 2.

NOTICE

Progress of the Manifold zones is usually slower than that of the Tips due to the higher wattage values.

4. Use the sliding bar on the right side of the screen to view additional data.
5. The test results are displayed 3.
6. Use the sliding bar on the right side of the screen to view additional data.
7. Touch “Next” to proceed.



5.4 Process Set Up - Heat Up

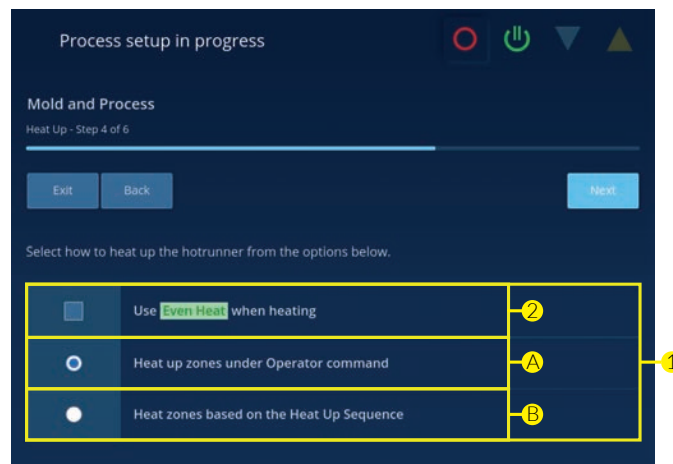


Fig. 33 Process Wizard Step 4

1. Touch the desired hot runner heat up method ①.
2. Touch “Next” when complete.

5.4.1 Use Even Heat When Heating

This function ② forces all zones in the selected group to stay within 11 °C (20 °F) of the coldest zone in that group during start-up. This is commonly used to bring tips up to temperature along with the slowest manifold zone. This ensures that the tips are not at setpoint for a long time waiting for the manifolds to come up to temperature. The zones will remain in Even Heat until they are within 10 °C (20 °F) of their final setpoint.

5.4.2 Heat Up Zones Under Operator Command

This function A permits the Operator to manually turn the zones ON or OFF without a dedicated heat sequence.



5.4.3 Heat Zones Based On The Heat Up Sequence

This function **B** will automatically turn ON groups of zones in a programmable sequence. The function can contain 1-4 stages.

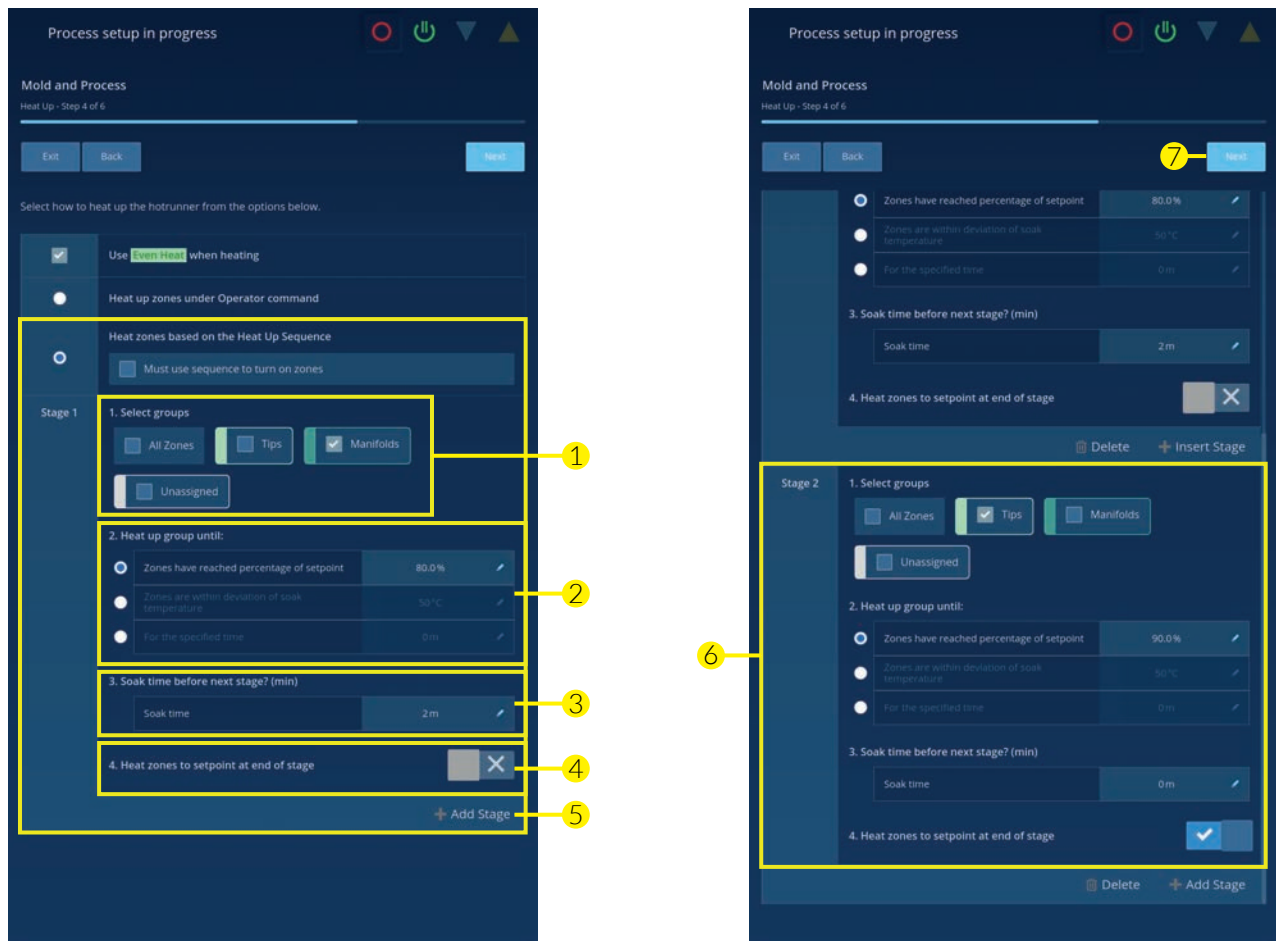


Fig. 34 Process Wizard Heat up Stages (Step 4)

1. Stage 1: Touch the desired Group(s) from selection list **1**, which includes All Zones, Tips, Manifolds, Monitor, and Unassigned.
2. Touch the desired action for Heat up group until **2** : function.
3. Touch the desired action for Soak time before next stage? **3** .
4. If you select to not heat up the zones to 100 % of its setpoint, you can choose to do so at the end of the stage **4** .
5. Touch “+ Add Stage” **5** to add another stage. Use the sliding bar on the right side of the screen to view additional data.
6. Configure all stages as desired **6** .
7. Press “Next” to proceed to the next step **7** .



5.5 Process Set Up - Cool Down

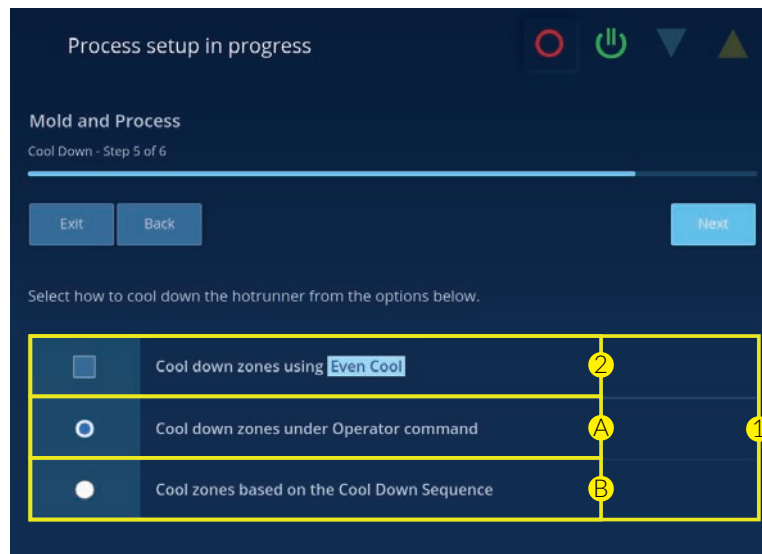


Fig. 35 Process Wizard Step 5

1. Touch the desired hot runner cool down method ①.
2. Touch “Next” when complete.

5.5.1 Cool Down Zones Using Even Heat

This function ② will automatically lower the temperature setpoints of all zones in the selected group. All zones in the selected group will stay within 10 °C (20 °F) of the hottest zone in that group during cool down. All the Manual zones in the Even Cool group will be turned off when the function is started. All zones in the system will be turned off when all the zones in the Even Cool group are lower than the completion point.

5.5.2 Cool Down Zones Under Operator Command

This function ③ permits the Operator to manually turn the zones ON or OFF without a dedicated cool-down sequence.



5.5.3 Cool Zones based on the cool down Sequence

This function **B** will automatically turn OFF groups of zones in a programmable sequence. The function can contain 1-4 stages.

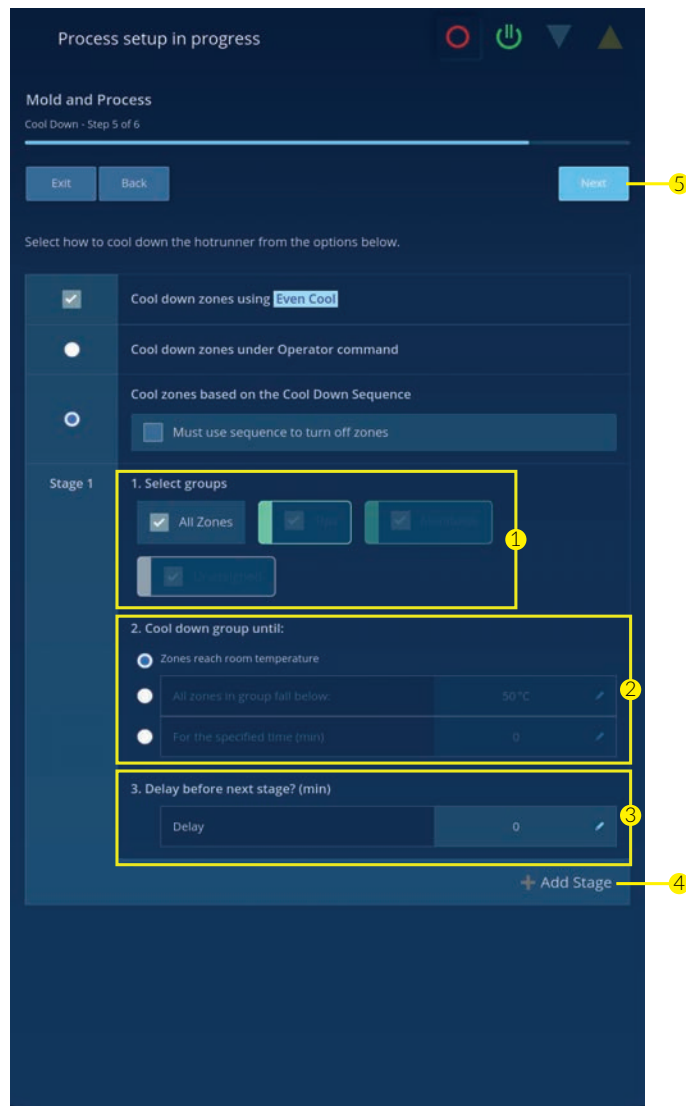


Fig. 36 Process Wizard Cool Down Stages (Step 5)

1. Stage 1: Touch the desired Group(s) from selection list **1**, which includes All Zones, Tips, Manifolds, Monitor, and Unassigned.
2. Touch the desired action for Cool down group until **2**: function.
3. Touch the desired action for Delay before next stage? **3**.
4. Touch "+ Add Stage" **4** to add another stage. Use the sliding bar on the right side of the screen to view additional data.
5. Press "Next" to proceed to the next step **5**.



5.6 Process Set Up - Qualification Settings

The system can monitor for leaks and heat resistance and trigger alerts for any issues. The mold needs to be qualified for the monitoring to work. Qualification is when the system collects data for monitoring, and it takes about 60 minutes. The machine should have stable setpoints and be producing good parts before qualification begins.

It is suggested that the default values be used, and the Plastic Leak Detection and Heater Resistance Monitor features be selected ON.

Material Protection is an optional input from the IMM.

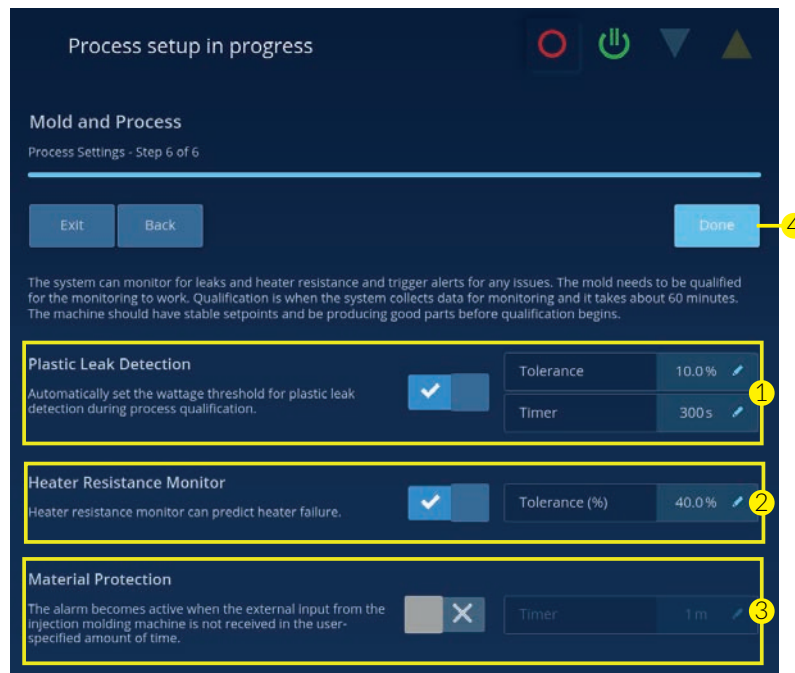


Fig. 37 Process Wizard Qualification Settings (Step 6)

1. Touch "Done" ④ to complete the setup.

5.6.1 Plastic Leak Detection

This feature will automatically set the Watt Alarm Monitor (plastic leak detection) after the zones have heated. It causes a zones Watt Alarm to activate when the wattage of the zone exceeds the normal wattage plus the Tolerance (%) setting. This can be an excellent tool in detecting material leaks in the mold. Typically, when material leaks into the air spaces of a tool, the material acts as a heat sink, pulling heat away from where it is supposed to go. This causes the heaters near the leak to work harder to maintain setpoint which results in more wattage being applied. By detecting this abnormal level of wattage in a zone, the G25 thereby provides an early warning of a leak. Catching the problem early can greatly minimize the time needed to clean up the leak in the tool. Enabling this feature is suggested.

NOTICE

It is possible that an increase in a zone's temperature setpoint will cause the alarm to activate since the zone will pull more wattage. If raising the zone temperature setpoint results in a Watt Alarm, after the temperatures have stabilized for 30 minutes, adjust the High Watt Alarm setpoint.



5.6.2 Heater Resistance Monitor

This feature enables the controller to indicate when a heater is beginning to fail. This is an excellent preventative maintenance tool. Heater resistance is monitored whenever the zone is within 30 °F of the setpoint, and the output is greater than 4 %. If the heater deviates by more than 40 % of its normal (baseline) value, the zones Resistance Monitor Alarm will activate. The alarm should be used as an indicator that the heater has weakened significantly and that it should be replaced as soon as practical. Enabling this feature is suggested.

5.6.3 Material Protection

This feature provides an alarm when the external input from the injection molding machine is not received in user-specified amount of time. It would normally indicate a lack of material.

5.7 Process Set Up – Process Set Up Complete

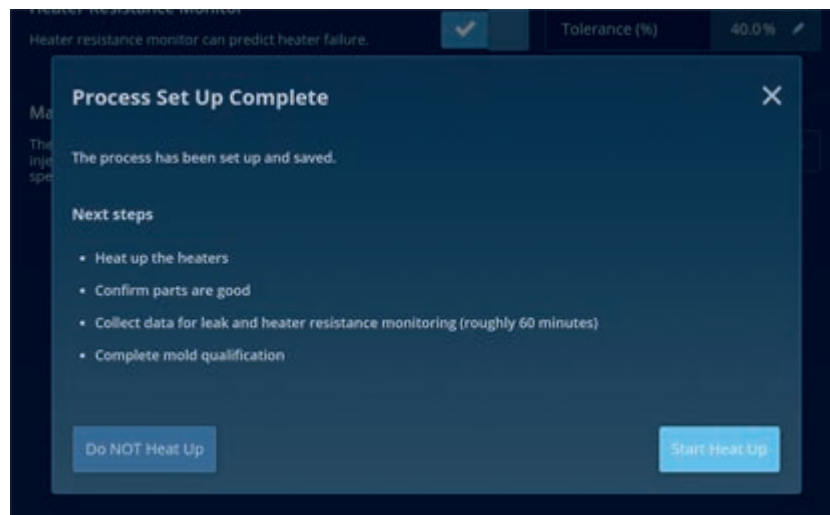


Fig. 38 Process Wizard Completed

1. The process has been set up and saved. Next steps:
 - Heat up the heaters.
 - Confirm parts are good.

NOTICE

Mold Qualification does not start until good parts are confirmed.

- Collect data for leak and heater resistance monitoring (after roughly 60 minutes).
- Complete mold qualification.



2. Touch Start Heat Up to proceed with heating the mold.
Alternate method: Touch the Down Icon to begin the qualification process.

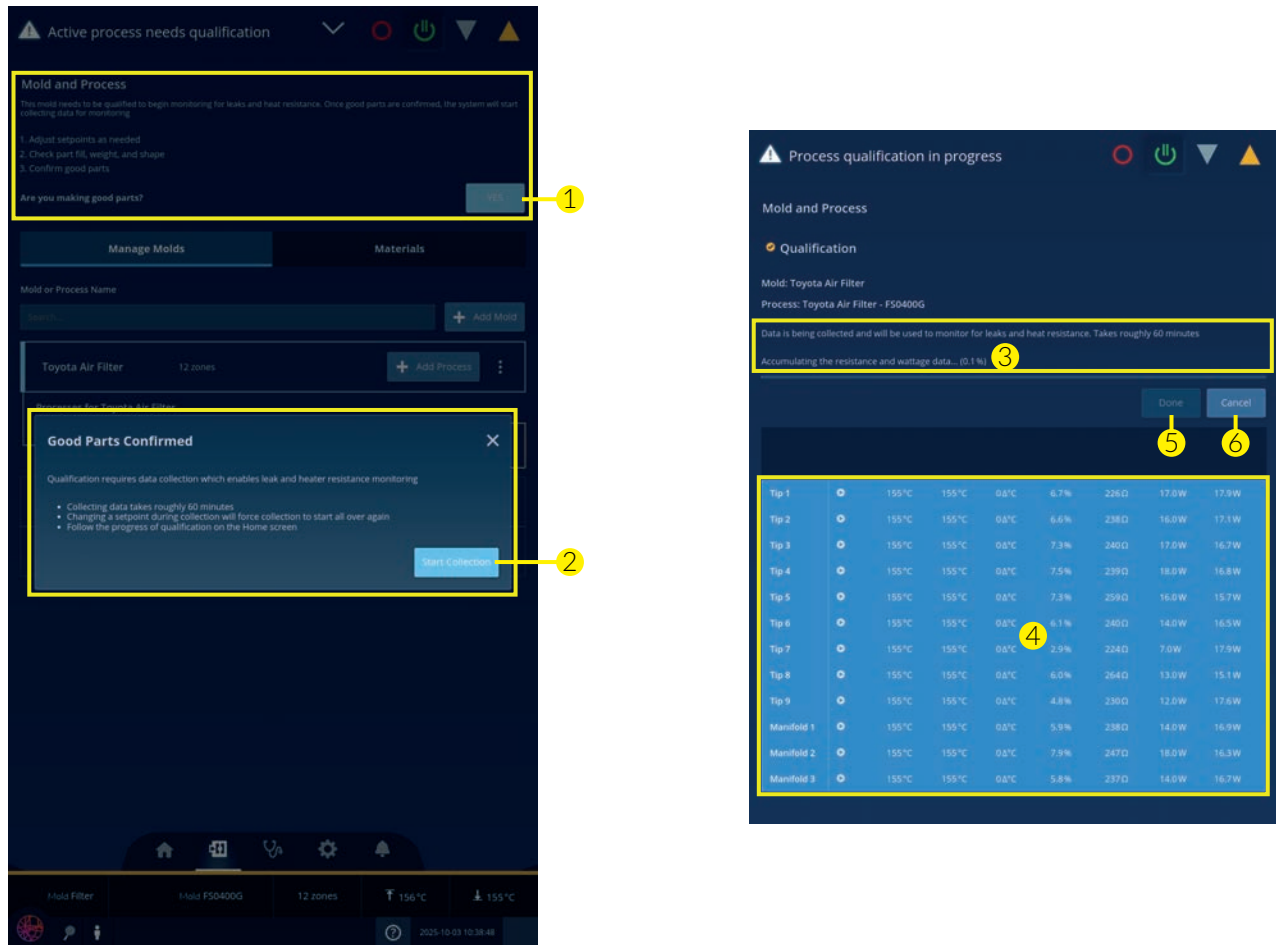


Fig. 39 Confirm good parts

3. If making good parts, touch “YES” and the qualification process will begin. If not making good parts, make any necessary adjustments to the process. After approximately 5 minutes the message will appear again for confirmation.
4. Touch Start Collection to begin the qualification process.

NOTICE

Qualification requires data collection which enables leak detection and heater resistance monitoring.

- Collecting data takes roughly 60 minutes.
 - Changing a setpoint during collection will force collection to start all over again (another 60 minutes).
 - Follow the progress of qualification on the Mold and Process Qualification screen.
5. Use the sliding bar on the right side of the screen to view additional data.
 6. Progress of the qualification process is shown on the screen ③.
 7. Use the sliding bar on the right side of the screen to view additional data ④.
 8. If the qualification process is complete, touch “Done” ⑤.
 9. You can cancel the qualification process at any time ⑥.



5.8 Minicontroller

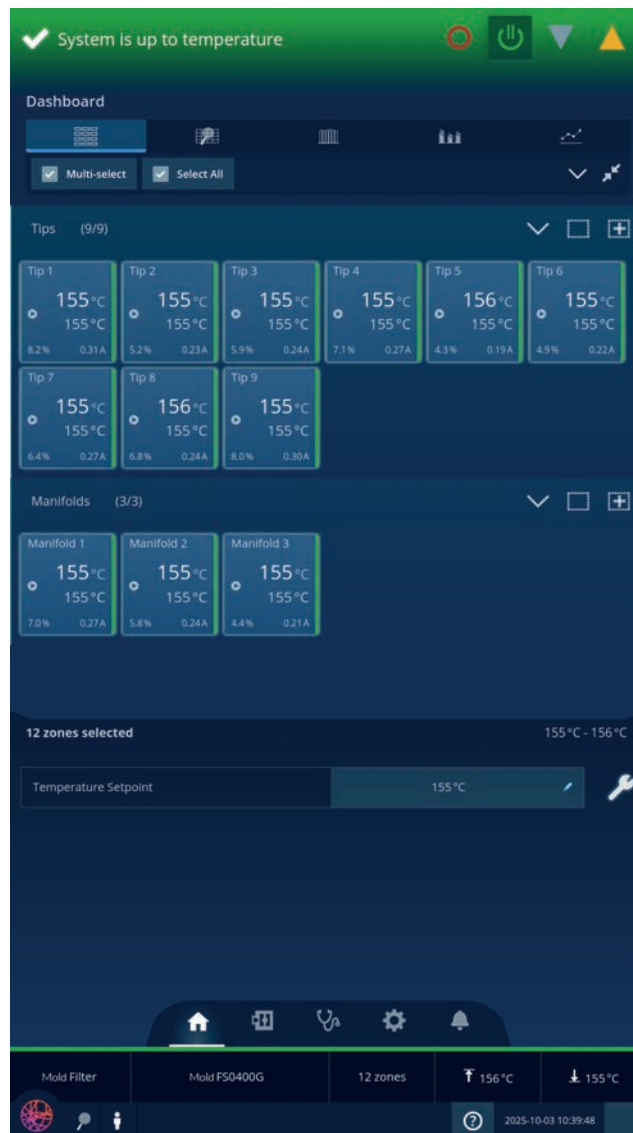


Fig. 40 Minicontroller Expanded View



1. Touch the Expand All Zones Icon  to display the Minicontroller Expanded View screen.
2. This screen permits viewing of the actual temperature, setpoint temperature, percentage of output, heater voltage, and actual amperage of each zone.
3. Use the sliding bar on the right side of the screen to view additional zones.



Icon	Meaning	Description
	Auto Mode	The Auto Icon indicates that the zone is operating in Auto mode and the controller is calculating the output percentage based upon the difference of the actual temperature reading to the temperature setpoint of the zone.
	Actual Temperature	The actual temperature reading from the zone thermocouple.
	Setpoint Temperature	The operating temperature setpoint for the zone.
	Percentage of Output	The actual percentage of output being used by the zone heater.
	Actual Voltage	The actual heater voltage for the zone.
	Actual Amperage	The actual output amperage being utilized by the zone heater.



4. Touch Condense All Zones Icon to return to the previous view.



6 Hot Runner – Additional Functions

6.1 Displaying Settings Selections

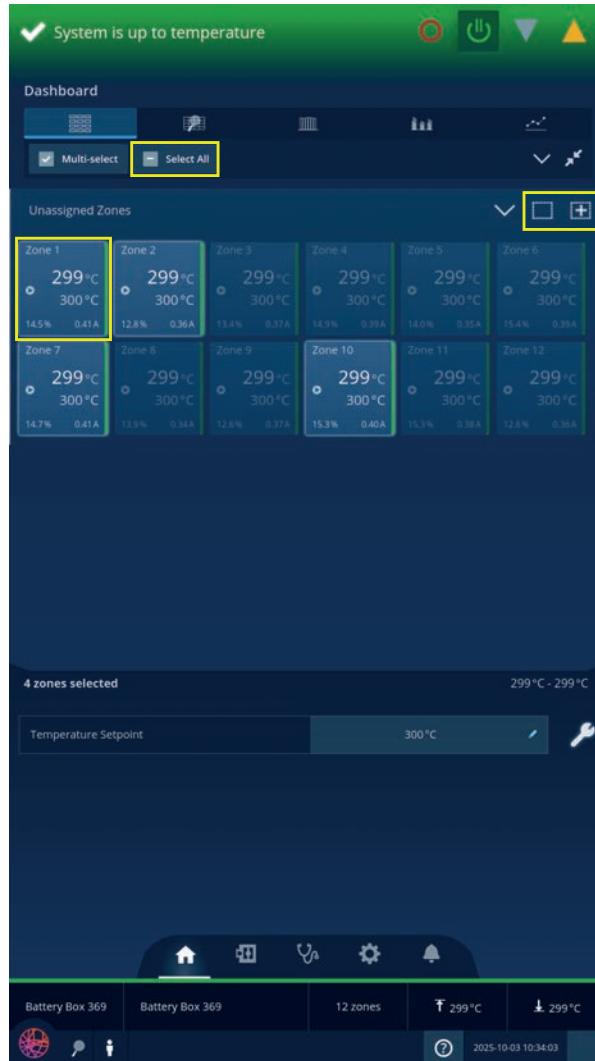


Fig. 41 Selections to Access Setpoints and Selections Screens

The following ways can be used to display the Temperature Setpoints and Settings screens.

Icon	Meaning	Description
	Select All	This will select all zones in the Controller.
	Group Icons	These will select all zones within the Group.
	Zone	Selecting any zone or zones.

Tab. 27 Selection actions



1. Touch the Setpoints Icon to select the Setpoints screens.

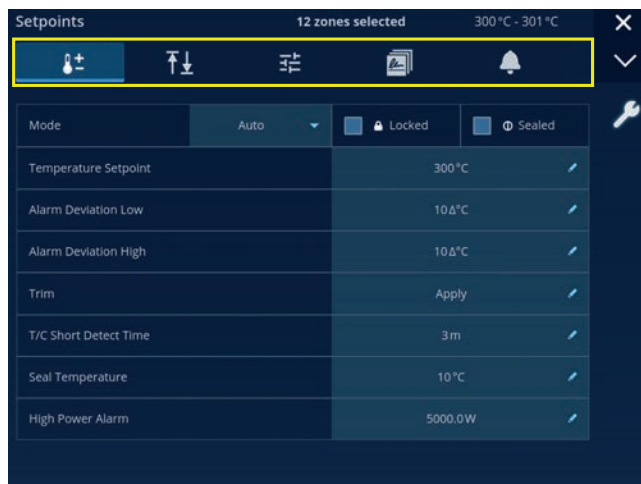


Fig. 42 Setpoints Screen

From this screen, each of the additional screens can be accessed.

Icon	Meaning	Description
	Setpoints	Provides for Temperature, Alarm Deviation Low, Alarm Deviation High setpoints, and selections of Mode (Auto, Manual, Monitor), Trim, TC Short Detection Time, Seal Temperature, High Power Alarm, Locked (ON/OFF), and Sealed (ON/OFF).
	Limits	Provides for Global Limits (Trim, Boost, Manual Boost) and Zone Limits (Critical Over Temperature, Maximum Current, Setpoint Minimum, Setpoint Maximum, Manual Setpoint Maximum) setpoints.
	Tuning	Provides display of Actual Tuning Used, Auto Select Performed, and for selections of Tuning Override, Tuning Type, Power Priority, Firing Mode, Attenuated by (%), Calibration Offset.
	Groups and Naming	Provides for creation and naming of Groups.
	Alarm Settings	Provides for selection of which alarms are active.

Tab. 28 Setpoints screen features



6.2 Setpoints Selection Description

Entry	Description
Auto Mode	Indicates the controller is calculating the output percentage based upon the difference of the actual temperature reading to the temperature setpoint of the zone.
Manual Mode	Indicates that the zone output is not being adjusted automatically. Instead, the output is being manually overridden and is providing a fixed output equal to the Manual % setpoint. NOTICE When the G25 senses that a thermocouple has failed in a zone, it automatically switches that zone to a percentage value which was calculated during the Qualification Process. The percentage applied is based upon the average percentage of the zone output in Auto mode during that 1-hour of operation. This enables the tool to continue making good parts until maintenance can replace the thermocouple in the tool. When a zone is in Manual mode, the output will be internally adjusted to compensate for fluctuations in incoming power, thereby providing consistent power to the heater.
Monitor Mode	The selected zone's temperature will only be monitored and not controlled. In Monitor mode, the selections are limited to High Alarm Setpoint (°C) or (°F), Low Alarm Setpoint (°C) or (°F), Test for high alarm, and Test for low alarm.
Locked	If a zone is not being used it can be locked off so that when all zones are turned ON, it remains in the OFF condition.
Unlocked	If a zone is not being used it can be unlocked so that when all zones are turned ON, it can be turned ON as well.
Sealed/ Unsealed	Problems can occur in a mold cavity that requires one or more Tip/Nozzle zones to be shut down. This shut down is typically done by turning the zone or zones OFF, which then freezes the plastic so that the tip no longer functions. This can, in some instances, cause leakage to occur between the manifold and the tip, because the tip no longer has the thermal expansion necessary to maintain a seal with the plastic at injection pressures. This problem is resolved by maintaining the tip at a temperature below the melting point of the plastic, but high enough to cause enough thermal expansion needed to keep the tip to manifold junction sealed. This temperature is referred to as the Seal temperature. A zone (normally a Tip/Nozzle) can have a sealed state when it is heated to the Seal temperature setpoint (typically around 149 °C (300 °F). All other zones would heat to their normal operating temperatures when commanded ON. The Seal temperature partially heats the zone, but it should prevent fill on injection. The sealed zones can be commanded ON or OFF, and the sealed condition will remain until maintenance can be performed on the mold. There is only one Seal temperature setpoint and it is used for all zones. Sealed zones will participate in the Even Heat function on mold startup, up to the point where they reach the Seal temperature setpoint value.
Temperature Setpoint (°C) or (°F)	This is the Zone operating temperature setpoint.



Alarm Deviation Low (°C) or (°F)	This setpoint determines at what temperature the Deviation Low alarm will activate. The setpoint is subtracted from the temperature setpoint for the zone. For example, an 10 °C setting will cause a zone with a temperature setpoint of 200 °C to alarm below 190 °C and a 20 °F setpoint will cause a zone with a temperature setpoint of 400 °F to alarm below 380 °F. The alarm is only active when the zone is in Auto mode (closed loop) control and the output is turned ON. NOTICE Deviation Low alarms are suppressed during power-up of the zones.
Alarm Deviation High (°C) or (°F)	This setpoint determines at what temperature the Deviation High alarm will activate. The setpoint is added to the temperature setpoint for the zone. For example, an 10 °C setting will cause a zone with a temperature setpoint of 200 °C to alarm above 210 °C and a 20 °F setpoint will cause a zone with a setpoint of 400 °F to alarm above 420 °F. The alarm is only active when the zone is in Auto mode (closed loop) control and the output is turned ON.
Trim (°C) or (°F)	This setpoint determines the amount of trim to be applied to the zone temperature setpoint. Trim is a feature that enables the user to raise or lower the setpoint of a zone or group of zones by a certain number of degrees even if some or all setpoints are different. For example, when making small adjustments to a process, the temperature can be increased or decreased from the temperature setpoint to see the result on the molded part. When applying to a group, each setpoint will be adjusted by the value entered. NOTICE Trim changes the temperature setpoint and does not auto-reset to the original temperature setpoint.
T/C Short Detect Time (Minutes)	Thermocouple short detection is a valuable protection feature. Whenever a zone is calling for 98-100 % output, an internal timer starts for that zone. This is the setting for the timer dedicated to this zone. If the zone's temperature does not increase by at least the default setting of 11 °C / 20 °F before the timer times out, the G25 will activate the Thermocouple Short alarm. The assumption is that the thermocouple is not sensing a heat rise with the maximum output and the thermocouple may be shorted. Another possibility is that the heater is too old or undersized to raise the temperature even with maximum output. NOTICE Setting the timer to 0 minutes on the Setpoints screen disables the feature.
Seal Temperature	This setpoint determines at what temperature the zone will be sealed.



High Power
Alarm
(Watts)

This alarm will activate when the wattage of a zone output is higher than the High Watt Alarm (W) setpoint. The wattage value must be outside the limits for approximately a minute while the temperature is within the high and low deviation alarm setpoints. This can be an excellent tool in detecting material leaks in the mold. Typically, when material leaks into the air spaces of a tool, the material acts as a heat sink, pulling heat away from where it is supposed to go. This causes the heaters near the leak to work harder to maintain setpoint which means more wattage will be applied. By detecting this abnormal level of wattage in a zone, the G25 thereby provides an early warning of a leak. Catching the problem early can greatly minimize the time needed to clean up the leak in the tool. This alarm is activated, an alarm message will be displayed but the Ok to Run output will not be de-energized unless it is selected on the Alarm Settings screen.

NOTICE

It is possible that an increase in the temperature setpoint of a zone will cause the alarm to activate since the zone will pull more wattage. If temperature setpoints are raised, the High Watt Alarm (W) setpoint should also be raised after temperatures have been stabilized for 30 minutes.

Tab. 29 Setpoints screen features



6.2.1 Boost and Standby

6.2.1.1 Boosting Zone Temperatures Individually or as a Group

This is a feature that enables the user to temporarily raise the temperature setpoints for all zones in the selected group of zones (for example Tips, Manifold, Sprue, All). Normally, Boost is used to quickly raise the tip temperatures just before cycling the machine after the tips have been in an idle or standby mode. This helps eliminate any cold slugs that may exist at the gates.

1. Touch the zone or zones to be Boosted. Normally, only the Tips are selected.



2. For a Group, touch the Group Select Icon for the desired Group and it will be highlighted.

NOTICE

Zones must be ON to select Boost.



3. Touch the Boost Icon and a Setpoint Entry Box will be displayed.

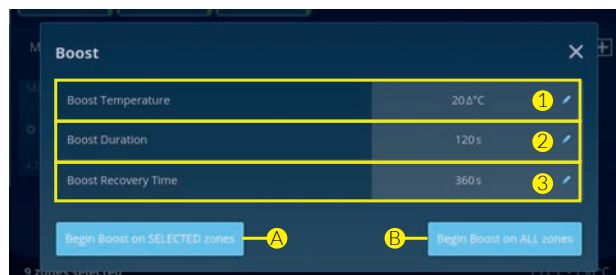


Fig. 43 Boost dialog

4. Adjust the Boost Temperature (°C or °F) ①, Boost Duration (sec) ②, and the Boost Recovery Time (sec) ③ if needed.

Parameter	Description
Boost Temperature (°C) or (°F)	This is the temperature setpoint that the zones will use while in the Boost mode. The temperature of the selected Group of zones will be raised to the Boost Temperature (°C) or (°F) setpoint entry.
Boost Duration (sec)	This setpoint determines the length of time that Boost mode will be active.
Boost Recover Time (sec)	This is a setting that can cause the OK to Run status to be unaffected by the deviation alarms created by the Boost function. This is needed because when Boost is activated, low deviation alarms may become active due to the temperatures being lower than the Boost group setpoints. When Boost times-out, high deviation alarms may occur since the temperatures are now higher than the normal setpoints. It is generally recommended that the Boost Recovery Time be set to approximately three times the Boost time to enable the temperatures to return to their normal setpoints.

Tab. 30 Boost Settings

5. Touch "Begin Boost on SELECTED zones" A to start boosting the Tip zones.



NOTICE

“Begin Boost on ALL zones” **B** will start boost on ALL ZONES, not just the Tip Group which was previously selected.

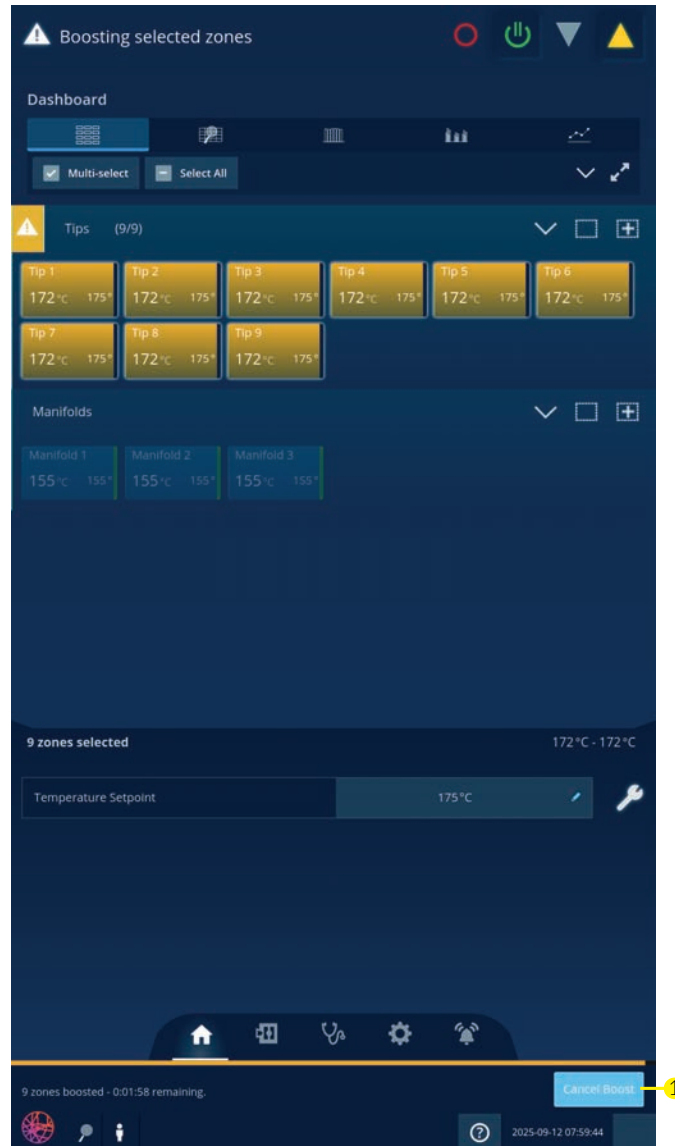


Fig. 44 Boost in progress

- During boosting, the Actual Temperature and Boost Setpoint are displayed for each zone. Also, the number of zones being boosted, and the time remaining are displayed at the bottom of the screen.

9 zones boosted - 0:01:58 remaining.

- When Boost is completed, the selected zones will cool to the normal operating setpoint.
- Touch “Cancel Boost” **1** to stop the function at any time.



6.2.1.2 Standby Zone Temperatures Individually or as a Group

This feature enables the operator to lower (or raise in unusual circumstances) the selected group of zones (for example, Tip, Manifold, Sprue, All) to a predetermined Auto Standby setpoint. Normally, it is used to lower the tip and manifold temperature setpoints when the machine is not cycling. The temperature should be warm enough that the plastic does not freeze and cool enough that the plastic does not quickly degrade.

NOTICE

Zones must be ON to select Standby.

1. Touch the zone or zones to be placed in Standby. Normally, all zones are placed in Standby.



2. For a Group, touch the Group Select Icon for each of the desired Group(s) and they will be highlighted.



3. Touch the Standby Icon and a Setpoint Entry Box will be displayed.

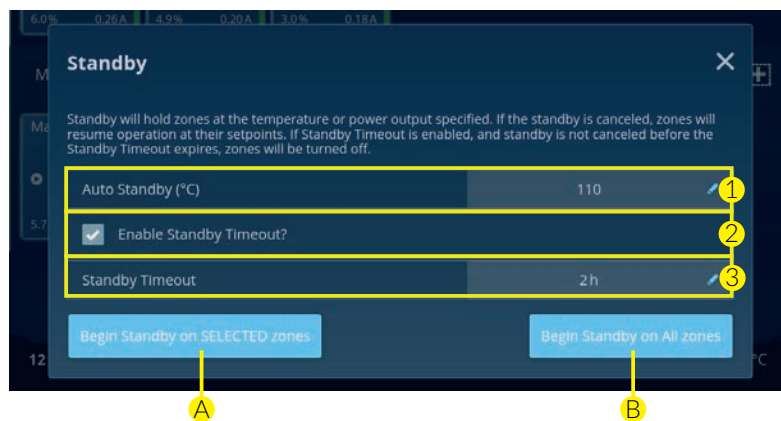


Fig. 45 Standby dialog

4. Enter the Auto Standby (°C) or (°F) ① and Standby Timeout (hours) setpoints ③.

Parameter	Description
Auto Standby (°C) or (°F)	This is the temperature setpoint that the zones will use while in the Standby mode. The temperature of the selected Group of zones will be lowered to the Auto Standby (°C) or (°F) setpoint entry.
Standby Timeout (hours)	This setpoint determines the length of time that Standby mode will be active. When this timer times-out, all zones will be turned OFF.

Tab. 31 Standby Settings

5. Touch “Begin Standby on ALL zones” to start Auto Standby on ALL zones.
6. If only a selection or Group of zones is desired, touch “Begin Standby on SELECTED Zones”.

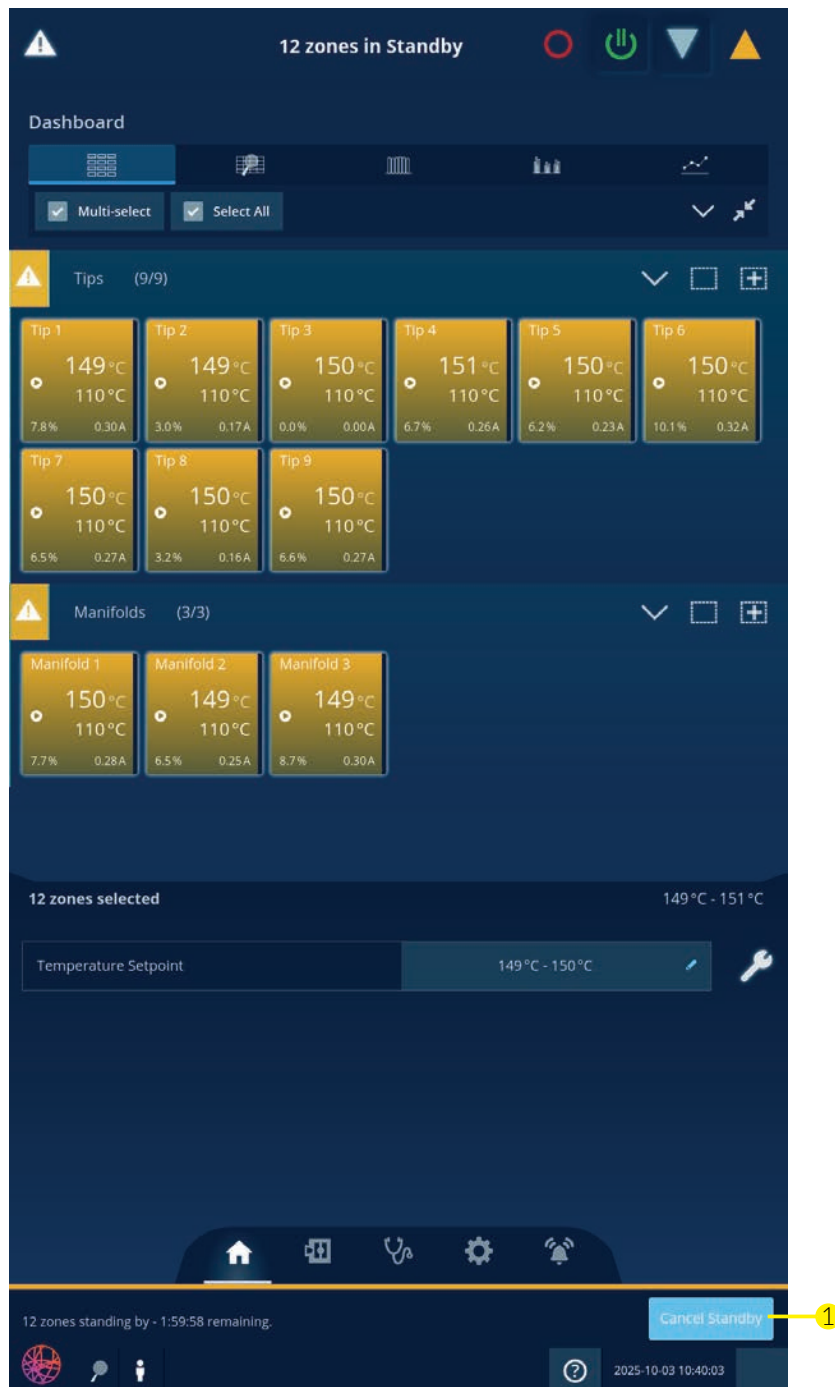


Fig. 46 Standby in progress

7. During standby, the Actual Temperature and Standby Setpoint are displayed for each zone. Also, the number of zones in Standby, and the time remaining are displayed at the bottom of the screen.

12 zones standing by - 1:59:58 remaining.

8. When Standby is completed, the zones will be turned OFF.
9. Touch "Cancel Standby" to stop the function at any time 1.



6.2.2 Limits Selection Descriptions

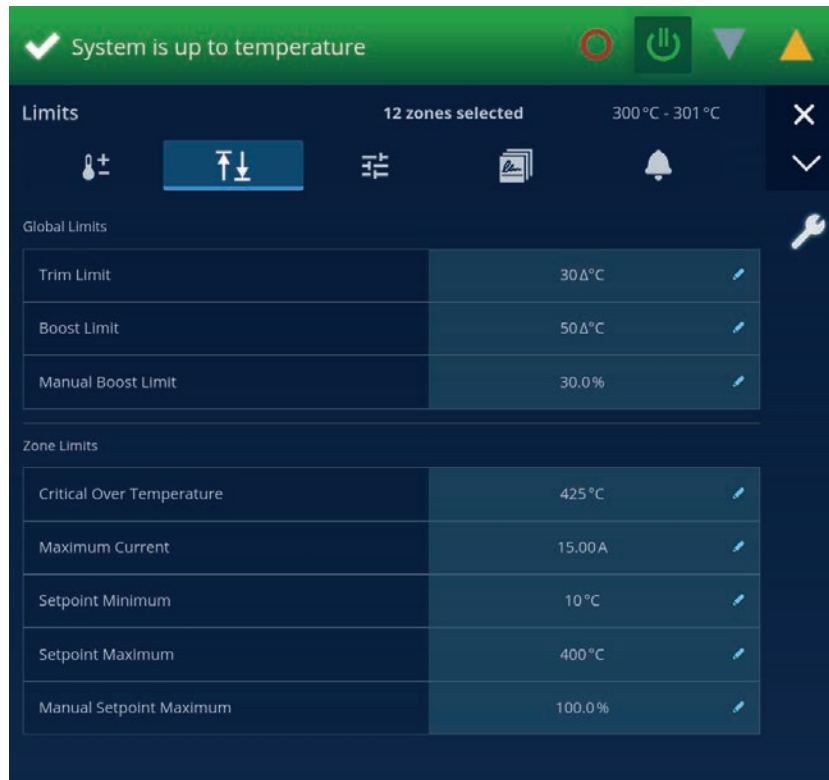


Fig. 47 Limits Configuration

Parameter	Description
Trim Limit (°C) or (°F)	Trim is a feature that enables the user to raise or lower the setpoint of a zone or group of zones by a certain number of degrees even if all the setpoints are different. The Trim Limit setting determines the maximum number of degrees a user can trim (plus or minus) a zone or group of zones at one time. This setpoint does not set the Trim setpoint. It only limits how high the trim setpoint can be set.
Boost Limit (°C) or (°F)	Boost is a feature that enables the operator to temporarily raise the temperature setpoint of a zone or group of zones by a certain pre-set number of degrees (boost) for a pre-set amount of time (boost time). When the time has expired, the setpoints automatically return to their previous values. The Boost Limit determines the maximum number of degrees a user can boost a zone or group of zones. This feature is commonly used to heat tips to ensure that the plastic at the gates is molten before restarting the machine cycling. This setpoint does not set the boost temperature. It only sets the maximum setpoint for the boost temperature.
Manual Boost Limit (%)	When selected, zones that are in the Boost group that are in Manual mode will also be boosted. The Manual Boost Limit % determines the maximum percentage which a user can boost (increase or decrease) a zone or group of zones. When selected, zones that are in the Boost group that are in Manual mode will also be boosted. The Manual Boost Limit % determines the maximum percentage which a user can boost (increase or decrease) a zone or group of zones.

Tab. 32 Global Limits



Parameter	Description
Critical Over Temperature (°C) or (°F)	The G25 Controller will shut off all outputs if the temperature of any zone exceeds this setting. This setting is used to help prevent an uncontrollable zone from rising to a temperature that might damage the tool. It can also provide useful protection in the event of a mis-wired tool. The alarm will remain activated until all temperatures are below the setpoint, and the alarm is acknowledged. NOTICE Do not set the Critical Over Temperature Alarm setting to a value that the controller might exceed under normal circumstances, because all zones will be turned off if it occurs.
Maximum Current (A)	This setpoint can be used for current limiting zones to 15 A that normally pull 15 - 30 A. For example, a zone that would normally pull 23 A would be limited to a maximum of 15 A. For zones that pull less than 15 A, this setpoint still has an application. No current limiting occurs on zones under 15 A, but the heater short alarm will be initiated whenever the current exceeds this setpoint. For example, if a zone normally pulls 3 A, the Maximum Current setting might be set to 4 A. If the zone current exceeds 4 A, the zone's heater short alarm will initiate and the heater bakeout procedure will occur for that zone as long as the condition exists.
Setpoint Minimum (°C) or (°F)	This setpoint limits how low individual zone setpoints can be set. This prevents a user from entering a setpoint too low.
Setpoint Maximum (°C) or (°F)	This setpoint limits how high individual zone setpoints can be set. This prevents a user from entering a setpoint too high.
Manual Setpoint Maximum (%)	The setting limits how high a manual output level can be set on any zone. This setting does not set the manual percentage. It only limits how high it can be set.

Tab. 33 Zone Limits



6.2.3 Tuning Selection Descriptions

The G25 Controller automatically determines its tuning parameters. The Tuning selections enable the user to display existing tuning parameters and to make changes in those unusual situations where tuning needs to be adjusted. Tuning values can be manually changed by entering different numbers in the Tuning Override SP setting box.

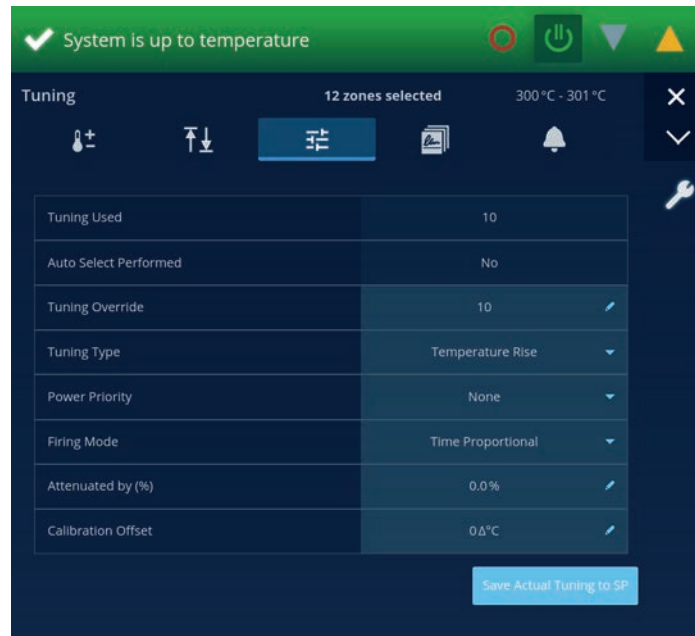


Fig. 48 Tuning Configuration

6.2.3.1 Actual Tuning Used

Displays the actual calculated tuning values in use. One of the key factors in tuning is delay time. This is the measured amount of time that it takes for a change in heater output to be sensed by the thermocouple. Zones with long delay times are considered as slower than other zones. Zones with short delay times are considered as faster than other zones. Manifold zones tend to have more delay than tip zones.

The tuning number displayed indicates that the zone is set up as the following:

Tuning Number	Description
0	Standard tuning. The G25 Controller will determine the setpoint based upon the temperature rise.
1	Controller displays this value when using standard tuning and zone behaves like a Tip. This setpoint is identical a setpoint of 10.
2	Controller displays this value when using standard tuning and zone behaves like a Manifold. This setpoint is identical to a setpoint of 20.
10 to 17	Tip (17 is slowest setting).
20 to 27	Manifold (27 is slowest setting).
-27 to -20	Fast Tip (-27 is fastest setting).
-17 to -10	Fast Manifold (-17 is fastest setting).

Fig. 49 Tuning Parameter



The user can select between the manually selected Tuning Override SP setpoint, Temperature Rise tuning, or Amperage Output tuning. Temperature Rise tuning is the normal autotuning method. If there is an issue with a zone oscillating, Amperage Output tuning or Tuning Override SP can be selected for that zone.

6.2.3.2 Auto Select Performed

Indicates that the Auto Select Tuning values were calculated using the Auto Select Tuning procedure: Yes or No.

6.2.3.3 Tuning Override

1. Zone(s) in any group can be selected individually or as a complete group.
2. Touch Tuning Override and drop-down list will provide the following selections: Tips, Manifolds, and Auto Select.

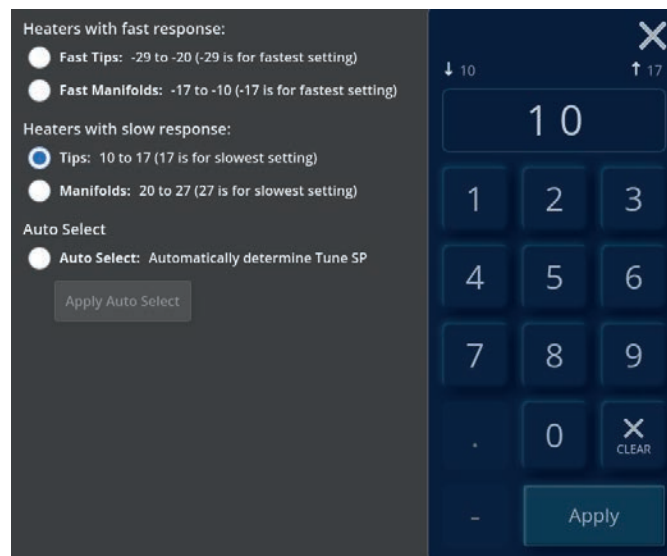


Fig. 50 Tuning Override

Tuning Override is normally set to zero. A setting of zero indicates that the controller is automatically tuning the zone and is displaying the calculated tuning value in the Actual Tuning Used area. If there is any setting other than 0, the controller will use that tuning setting instead of what the controller is calculating. For example, if the Tuning Override SP is set to 0 then the Actual Tuning calculated value would normally be 1 for Tips and 2 would be a more common number for Manifolds and Sprue zones.

If the user decides to enter a setting other than 0 for one or more zones, here is a tuning suggestion:

1. Determine the amount of temperature swing in the zone that is being changed.
For example, assume that Man 3 has an oscillation of 7 °F below setpoint to 8 °F degrees above set point. This would be a swing of 15 °F.
2. Divide the temperature swing by 3 if using °F (use 1.7 if using °C). For a swing of 15 °F, the answer would be 5 °F.
3. Add that to the value shown in the Actual Tuning area (assume for this example that the Actual Tuning value is 2). A value of 1 also represents a value of 10, and a value of 2 also represents a value of 20. Therefore, for our example, add 5 to 20 and enter a setpoint in the Tuning Override SP of 25.
4. If this makes the oscillation worse, subtract the number from Step 2 to the value shown in the Actual Tuning area. For our example, a Tuning Override SP of 15 would be entered.

The true effect of a tuning change will not be apparent until a major setpoint change is introduced or until the zone is turned off and back on again.



6.2.3.4 Auto Select

This setpoint is used to re-tune the selected group. The setpoint must be 120 °C (216 °F) degrees more than the actual temperature value to initiate a tune. The auto tune will pick from 16 different tuning values based on the thermodynamics of the zone.

Manifold zones will receive a value of (20 ~ 27). Tip zones could receive values of (+10, +11, -20, -21, -22, -23, -24, -25, -26, -27). If the auto tune routine is unable to complete its calculation of the tuning (for example, Even Heat is in use), the tuning setpoint will be set to +10. The controller will attempt to tune again the next time the zones are heated.

Once the auto tune procedure is completed a  “check” will appear on the Tuning Wizard Progress screen and indicate the Tuning Values that were calculated.

Zone	Progress	Tuning Value	Status
Tip 1		11	
Tip 2		10	
Tip 3		12	

Fig. 51 Tuning Progress, Value, and Status

6.2.3.5 Tuning Type

Provides selection of Temperature Rise tuning or Amperage Output tuning. Temperature Rise tuning is the most used and is the default setting. If there is an issue with a zone oscillating, Amperage Output tuning can be selected for that zone.

6.2.3.6 Temperature Rise Tuning

This is the normal autotuning method and should only be changed when oscillations occur. The G25 Controller does not require an upset to the system or oscillations on start-up to make its calculations.

6.2.3.7 Amperage Output Tuning

This is an alternate method of tuning that can be used if the regular autotuning method is not providing excellent results. The G25 Controller will use a value of 1 or 10 (the normal values for a tip zone) if the maximum amperage of the zone is 4 amps or less. A value of 2 or 20 (the normal values for a manifold zone) will be used if the maximum amperage of the zone is above 4 amps. The value selected will be displayed in the Actual Tuning area.

6.2.3.8 Power Priority

A drop-down list will provide the following selections: None, 1, 2, 3, 4.

“Low mass” or extremely small hot runner nozzles are a unique challenge to control. To smooth the power and ultimately the melt heat history, the G25 Controller utilizes Power Priority. Power Priority smooths the power output fluctuations on individual zones. Users have the option to manually apply a Power Priority setpoint from 1 (light effect) to 4 (heavy effect), providing unparalleled control for applications where it is most needed.



6.2.3.9 Firing Mode

Firing mode is used by the Output Module to determine when to Turn on the SCR to apply voltage into the heater based upon the calculated PID Output.

A drop-down list will provide the following selections: Time Proportional and Phase Angle Firing:

Mode	Description
Time Proportional	With Time Proportional Mode, the zone output SCR is switched on at the beginning of the Zero Cross of the AC line cycle. This delivers voltage into the heater for entire half lines of voltage. For a PID output of 20 %, approximately one out of five half line cycles will be gated to the heater. Time Proportional Mode is acceptable for most heaters. Some zones that have a very high wattage density that operate at low percent output to hold production temperature may give more stable temperature control with phase angle fire mode.
Phase Angle Firing	Phase Angle Firing Mode delivers voltage to the heater every half line in as calculated by the PID Output. The SCR is turned on at a specific point within the AC line cycle to deliver the appropriate power into the heater as set by the PID. Phase Angle Firing Mode is used when the zone is first turned on to allow detection of a shorted heater. Once the heater has been determined to be correct, the zone will transition into Time Proportional firing if that is the zone setting.

Tab. 34 Firing mode Settings

6.2.3.10 Attenuated by (%)

A Setpoint Entry Box will be displayed.

This is another tool to handle unusual tuning situations. It is, in effect, a load limiter in the sense that it limits the highest percentage output that a zone can deliver. If the Attenuation % setpoint for a zone is 0 %, there will be no attenuation on the output. 100 % is maximum attenuation. For example, a setpoint of 20 % would cause the zone to provide 80 % of whatever the controller would normally provide.

In this instance, if the controller calculates that the PID output should be 60 %, an Attenuated Output setpoint of 20 % would cause the output to be 48 % (80 % of 60) instead of 60 %.

6.2.3.11 Calibration Offset

A Setpoint Entry Box will be displayed.

6.2.3.12 Save Actual Tuning to Setpoint

1. Touch to enable saving of the actual tuning to setpoint.
2. A drop-down box will appear.
3. Touch "Yes" to save.



6.2.4 Groups and Naming Selection Descriptions

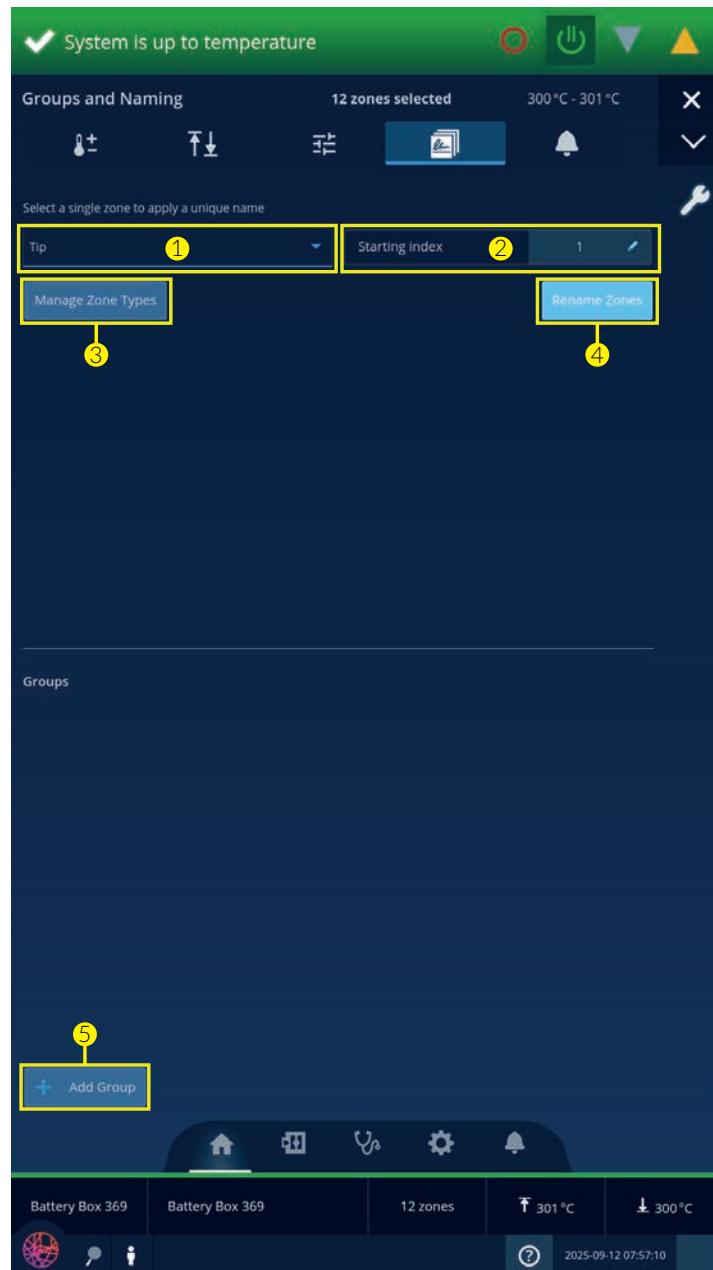


Fig. 52 Zone Names and Groups

Function	Description
① Name Selection	Provides access to the list of zone names Custom, Tip, Manifold, Sprue, Spare, and Monitor. Custom names can be added to this list.
② Starting index	This is the starting zone number. Usually "1".
③ Manage Zone Types	This allows for the addition of custom names or renaming of existing zones.
④ Rename Zones	This selection renames the selected zones to the new or custom name.
⑤ Add Groups	This allows for the creation of custom groups to organize zones.

Tab. 35 Zone Management Functions



6.2.4.1 Creating a New Group Name and Color

1. Touch Multi-select for individual zones or Select All for all zones.
2. Touch the zones to be included in the Group. Zones will be highlighted.
3. Touch the Group Name **1** from the drop-down list and the Starting Index number **2** (usually “1”).
4. Touch Rename Zones **4**.
5. Touch Add Group **5** to add the Group Color.



Fig. 53 Add Group

6. Touch the desired color **7**.
7. Touch Add Group to create the Group **8**.

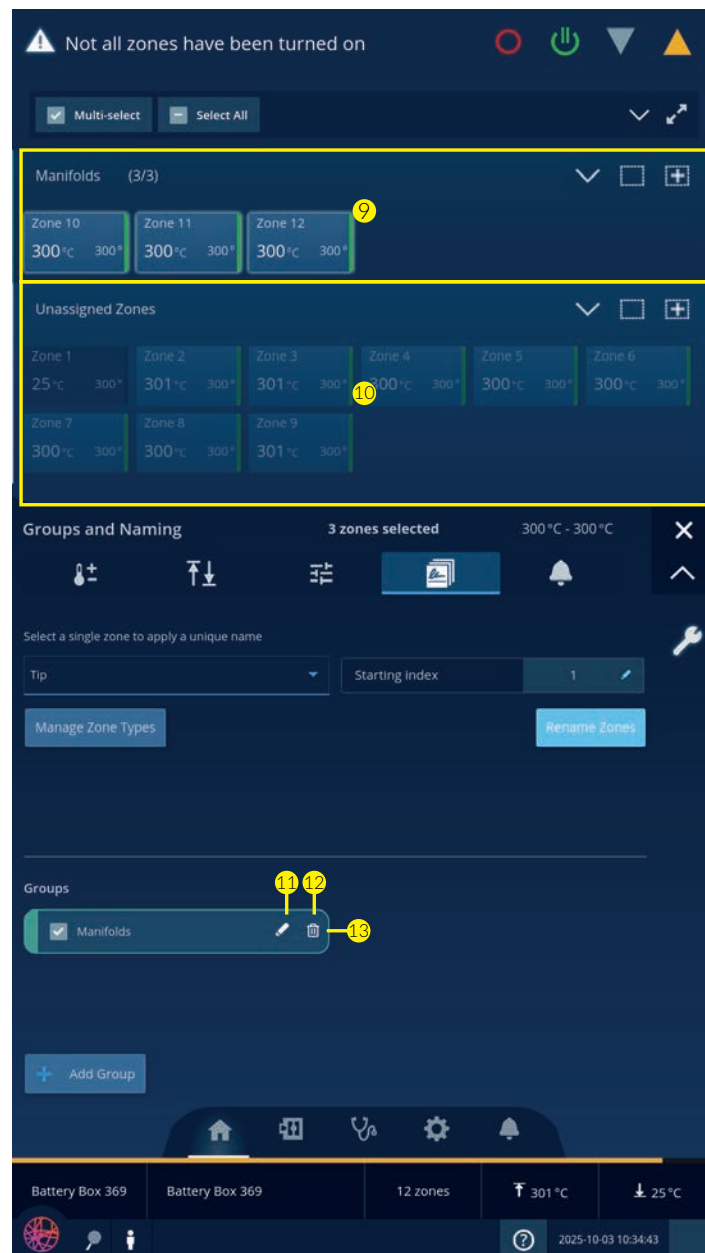


Fig. 54 Added one group

8. The Tip group has been created ⁹ and the remaining Unassigned Zones ¹⁰ can be used to create additional groups using the same procedure.

NOTICE

When adding another group, the previous group must first be de-selected.
Touch the Exit Icon or de-select the Select All function to do this.

9. Touch the Setpoint Icon ¹¹ to edit the group, or the Delete Icon ¹² to delete the group.

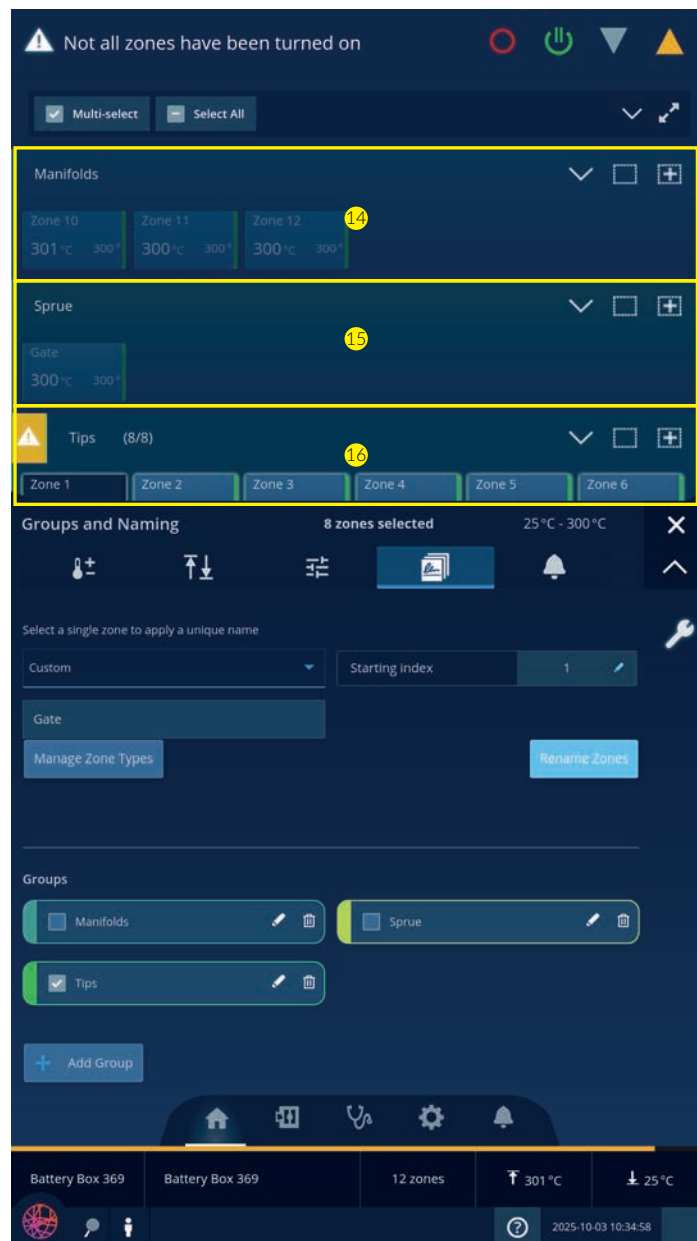


Fig. 55 All Groups added

10. Creation of the Tip, Sprue, and Manifold groups is complete.

NOTICE

Spare zones are not displayed.



6.2.4.2 Revising a Zone Name and/or Creating a Custom Name

1. From the Minicontroller screen, touch the zone to be changed.
2. Touch the Adjustment Icon to display the Setpoints selections.
3. Touch the Groups and Naming Icon to display the Groups selections.
4. Touch the Down Icon to display the zones.
5. Confirm that only the desired zone is selected.
6. Touch the new zone name or create a custom name from the drop-down list ① and enter the Starting Index number (usually “1”) ② and enter the Starting Index number (usually “1”).

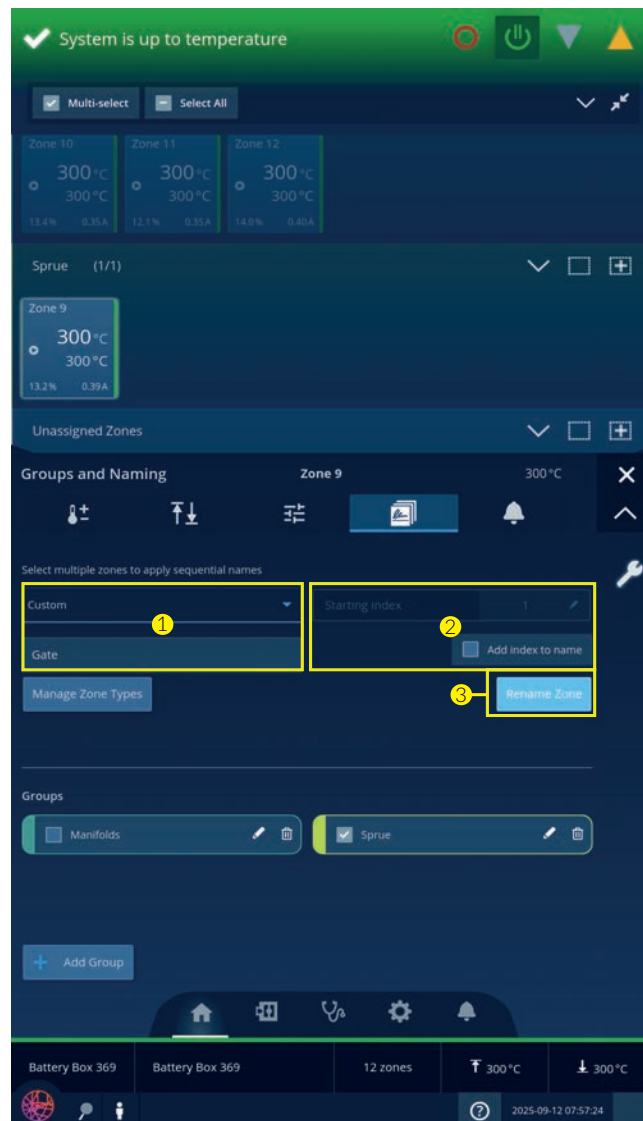


Fig. 56 Custom zone name

7. Touch Add Index to zone ② if desired and it will be added to the new name.
8. After entering the desired or custom name, touch Rename Zone ③.
9. New zone name has been added ④.



Fig. 57 Custom zone name applied

10. Touch the Exit Icon to close the Groups and Naming screen.

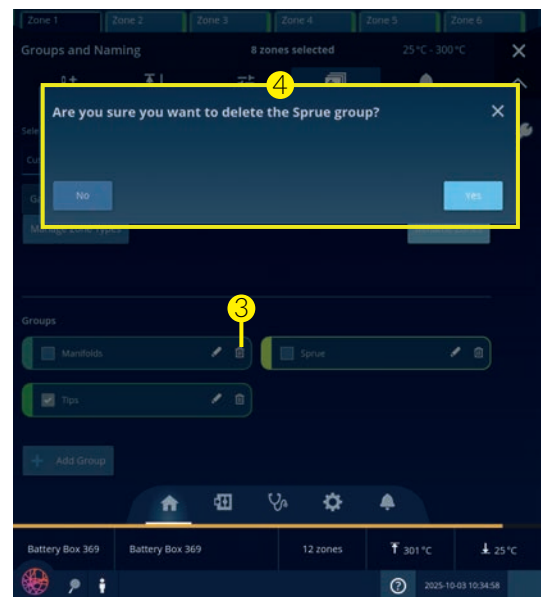
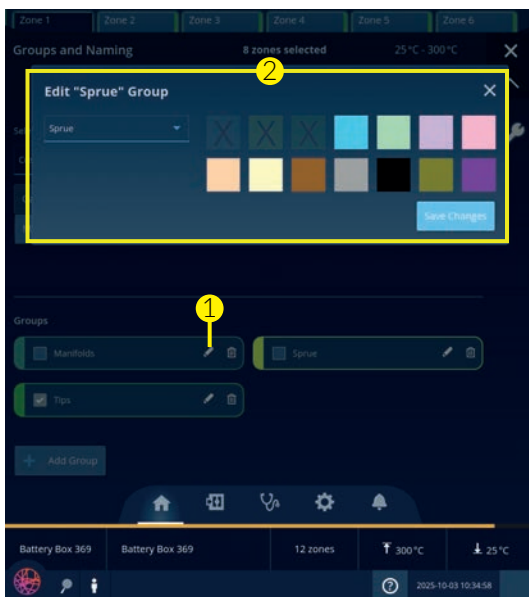


Fig. 58 Edit or delete groups

6.2.4.3 Editing a Group

1. Touch the Setpoint Icon to edit the group ①.
2. The Group Name or Group Color can be edited ②.
3. Touch “Save Changes” when done.

6.2.4.4 Deleting a Group

1. Touch the Delete Icon to delete the group ③.
2. The confirming message “Are you sure you want to delete the (Sprue) group?” will be displayed ④.
3. Touch “Yes” to confirm, or “No” to cancel.



6.2.5 Alarm Settings Selections

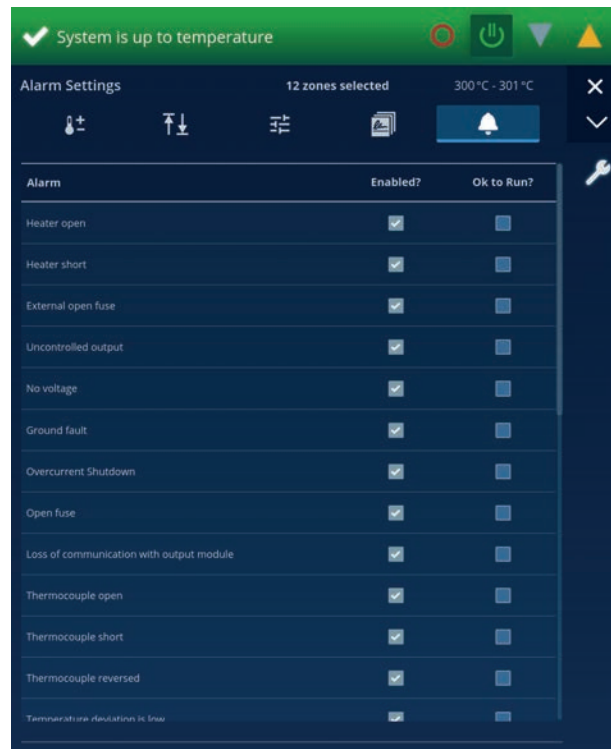


Fig. 59 Zone alarm settings

The Alarm Settings screen provides for selection of the response to a fault condition on each individual alarm.

Item	Description
Enabled?	If Enabled is selected, the fault will display an error message at the top of the screen and activate the Audible Alarm Buzzer.
Ok to Run?	If Ok to Run is selected, the fault will de-activate the Ok to Run remote output to the IMM which, depending upon the IMM programming, may cause a Cycle Stop condition.

Tab. 36 Alarm Settings

Use the sliding bar on the right side of the screen to view additional data.

NOTICE

The Ok to Run? selection for the Leak Detection (High Wattage Alarm) and Heater Resistance alarms are usually not selected so that only the message will be displayed and the Audible Alarm Buzzer enabled.



6.2.6 Alarm Activated

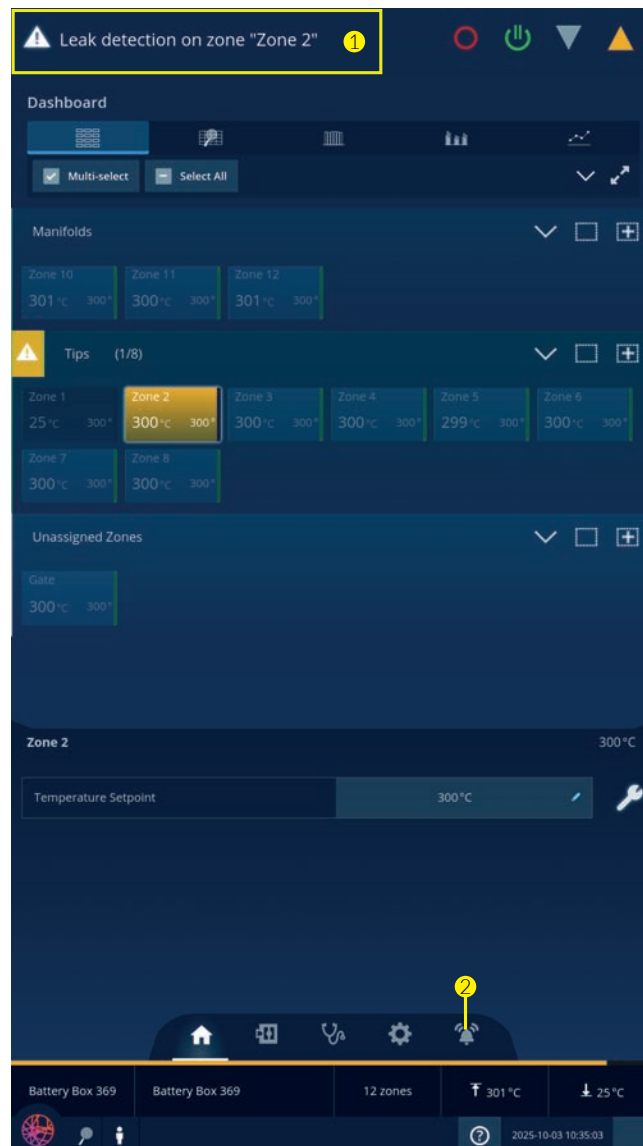


Fig. 60 Zone alarm - Leak Detection Alarm

Whenever a zone fault is detected, the banner at the top ¹ of the display will display a message to indicate the fault detected. The Alarm Icon at the bottom of the screen will become animated ². Touch the Alarm Icon to view additional information.

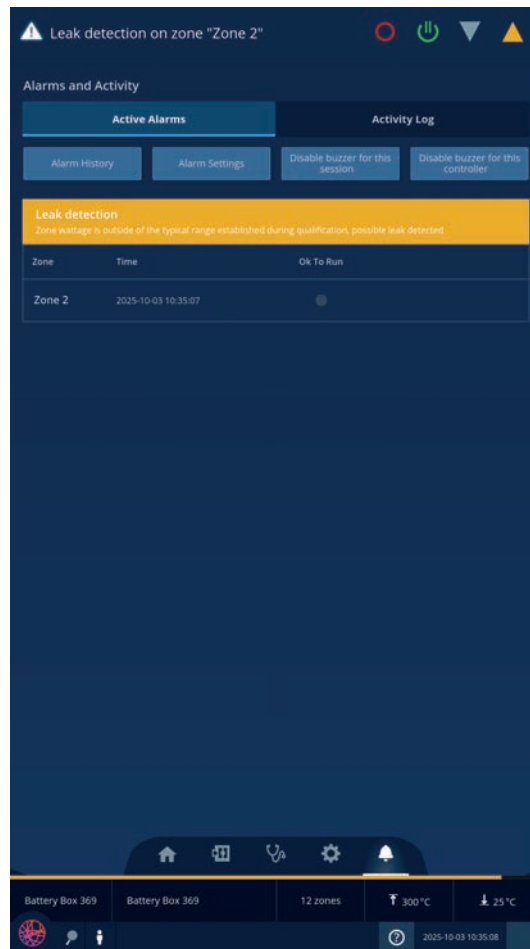


Fig. 61 Alarm Page - Leak Detection Alarm

Details are provided to assist in determining the corrective action necessary.

6.2.7 Alarm Descriptions

6.2.7.1 Heater Open Alarm

This alarm is active when the zone is turned on and the Output Power Module senses a load of less than 0.2 amperes. This can be caused by a blown heater or open cable circuits.

6.2.7.2 Heater Short Alarm

This alarm is active when the zone is turned on and the Output Power Module senses a heater load greater than the maximum rating of the module. The default setting for the alarm is just above 15 A, but this can be changed by changing the Maximum Current setpoint.



On startup, the G25 Controller employs a very effective heater bake out procedure. The G25 Controller initially provides a very low voltage (1-5 VAC) to the heater while monitoring the current. If the current is within expected limits, the voltage will ramp up to full voltage over a few line cycles while the current is continuously monitored. If at any point the current draw exceeds expected limits, the Heater Short Alarm will be activated, and the very low voltage cycle will be repeated. The G25 Controller “bakes out” the heater by providing the low voltage pulse to the heater. Once the heater is dry, the G25 Controller will ramp the zones output to full voltage within a few line cycles while continuing to monitor the current draw. During regular operation, the G25 Controller continues monitoring for heater shorts.

A major benefit of this approach is that the G25 Controller continuously measures the actual current and applies the bake out procedure only when required. Another benefit is that the use of a low voltage output during heater bakeout avoids heater damage often caused by controllers that cannot adjust the voltage level. If an actual short is detected, the zone can instead be selected OFF and then LOCKED OFF.

6.2.7.3 Open Fuse Alarm

This alarm is active when the zone is turned on and the Output Power Module senses that the output load fuse is open. All output fuses are ultra-fast 20 A type. The Line (L1, L2, L3) side fuses and the Return (R1, R2, R3) side fuses are located on the Output Power Module circuit board.

6.2.7.4 Uncontrollable Output Alarm

This alarm is activated if the G25 Controller determines that a zone is heating when the zone is calling for zero output. This can occur if an output triac / solid state relay on the Output Power Module has failed in the conducting mode. If the problem persists, the temperature may climb and activate the Critical Over Temperature Alarm as well. When the alarm is active, the Output Power Module with the “uncontrollable zone” will shut OFF all zones on that module with the use of a relay on the module. The alarm can be cleared by toggling the alarming zone’s operating mode between Auto and Manual modes.

6.2.7.5 Thermocouple Open Alarm

This alarm is activated when at least one of the thermocouple input wires is open. The zone will display “***” in the temperature display area of the affected zone. This alarm is only active in Auto mode (closed loop) control. When a thermocouple fails on a zone, the zone output will switch to a “learned” manual output that has been determined by averaging the zones’ recent output level. This enables the G25 Controller to continue to make parts in the Manual mode until the operator shuts power OFF to the G25 Controller or changes the manual percentage output of the zone. In this case, the zone can be put into Manual mode and run with an operator selectable percent output (manual) setpoint.



6.2.7.6 Thermocouple Short Alarm

A thermocouple may have its leads pinched or shorted together somewhere between the thermocouple junction at the mold and the hot runner temperature controller. When this occurs, the temperature reading will be that of the shorted location and not the temperature at the thermocouple tip. This alarm will activate when the temperature climbs less than 11 °C (20 °F) while the output has been at 98 % or higher for a time duration determined by the T/C short Detection Time setpoint.

NOTICE

Setting the timer to 0 minutes disables the feature.

6.2.7.7 Thermocouple Reversed Alarm

If a thermocouple wire is installed with the plus and minus leads reversed, applying heat will result in a decrease in the temperature reading while the actual temperature is rising. When the temperature reading goes below 0 °F (occurs when the actual temperature is approximately 140 °F), the Thermocouple Reversed Alarm is activated. This alarm will cause the zone to shut off. The alarm is only active in Auto mode (closed loop) control.

6.2.7.8 Ground Fault Alarm

The G25 Controller checks each Output Power Module for excessive current to ground the first time any zone in that module is turned ON. A ground fault test will be performed on all zones when any of the zones is initially turned ON. If any other zone is turned on later, no additional ground fault test will occur. The Ground Fault Alarm will activate anytime a ground fault is detected. The module will still turn ON unless Enable Ground Fault Protection is enabled. If Enable Ground Fault Protection is enabled and a ground fault is detected, all zones on the module will remain OFF until the ground fault issue is resolved.

6.2.7.9 Deviation High Alarm

This alarm is activated whenever the measured temperature value is more than the Temperature Setpoint plus the Deviation High Alarm Setpoint selected by the user. The alarm is only active when the zone is in Auto mode (closed loop) control and the output is turned ON.

6.2.7.10 Deviation Low Alarm

This alarm is activated whenever the measured temperature value is less than the Temperature Setpoint minus the Deviation Low Alarm Setpoint selected by the user. The alarm is only active when the zone is in Auto mode (closed loop) control and the output is turned ON.

NOTICE

Deviation Low alarms are suppressed during power-up of the zones. The Deviation Low alarms are given the lowest priority on the Active Alarm screens and are displayed below any other active alarms.



6.2.7.11 Critical Overtemp Alarm

This alarm is active when any zone in the G25 Controller exceeds the Critical Over-Temperature Alarm Setpoint selected by the user. When activated, the G25 Controller shuts OFF all zones. The alarm will remain activated until all temperatures are below the setting and the Reset Critical Overtemp Alarm button on the right side of the screen is pushed to clear the alarm. This alarm is useful in situations where the user has a mis-wired tool, causing power to be incorrectly applied to one or more zones.

6.2.7.12 High Watt Alarm

This alarm will activate when the wattage of a zone output is higher than the user-selectable High Watt Alarm Setpoint. The wattage value must be outside the limits for approximately a minute while the temperature is within the High and Low Deviation Alarm setpoints. This can be an excellent tool in detecting material leaks in the mold. This feature can be activated during Process Set Up. The alarm can also be Enabled or Disabled on the Alarm Settings screen.

6.2.7.13 Resistance Monitor Alarm

This is a unique feature that enables the controller to indicate when a heater is beginning to fail. This is an excellent preventative maintenance tool. Heater resistance is monitored whenever the zone is within 3 °F of the setpoint, and the output is greater than 4 %. If the heater deviates by more than 40 % of its normal (base-line) value, this alarm will activate. This feature can be activated on the Mold Monitor screen. This alarm will cause the alarm light to light, but will not change the status of the alarm contacts. If the user wants the alarm contacts to change when this alarm is active, the setting can be changed.

6.2.7.14 Material Protection Alarm

This alarm appears on the screen only if the user has selected this feature on the Mold and Process screen. The alarm becomes active when the external input from the injection molding machine is not received in the user-specified amount of time. The alarm timer does not start until the zones have risen far enough to clear the low deviation alarms. Zones that are assigned to the Remote Standby Group will be put in Standby while this alarm is active.

6.2.8 OK to Run Contact

The controller can provide a normally open contact closure to the injection molding machine to denote that the mold is heated and is ready for injection. The OK to Run contact is OPEN (not OK) when one or more of the following is true:

- The controller is not powered.
- The interlink cable between the controller and the injection molding machine is not connected.
- Any unlocked zone is off.
- There is an active zone alarm within the controller that is used to turn OFF this output. An exception to this can occur when the controller is in or has just completed a Boost operation. The deviation alarms momentarily created in the boosted zones will be ignored for the length of time designated in the Boost Recovery Time setting. This gives the process time to recover from a Boost without changing the status of the OK to Run contact.
- All the zones in the controller are locked off.
- Any Monitor zone is in alarm.

The OK to Run contact is CLOSED (OK) when all the following are true:

- There is a least one zone that is not Locked OFF.
- All the unlocked zones are turned ON.
- There are no active zone alarms within the controller that are used to turn OFF this output.



6.2.9 General Troubleshooting Examples

Symptom or Error Message	Possible Causes	Action
Active Alarms.	1. See Section 6.2.5 Alarm Settings Selections for details of individual alarms.	1. Take appropriate action to clear the alarm.
Significant temperature overshoot during start-up.	1. Too much separation between thermocouple and heater. 2. Possible improper tuning.	1. Check proper layout and sizing of thermocouple and heater. 2. See at the Maintenance & Troubleshooting Manual for details regarding possible tuning adjustments.
Temperature fluctuation is high.	1. Possible improper tuning.	1. See at the Maintenance & Troubleshooting Manual for details regarding possible tuning adjustments.
Temperature fluctuates rapidly between setpoint and -10 – -20 °F (-5.5 – -11 °C).	1. A broken or loose thermocouple wire will cause erratic fluctuations. 2. A loose thermocouple or heater will cause consistent fluctuations. 3. The thermocouple may have AC power wired to them.	1. Check the thermocouple wiring and connections. 2. Check the thermocouple and heater. 3. Check the thermocouple for an AC power component.
Temperature fluctuation is greater than thermally possible. For example, erratic steps of +/- 20 degrees or greater.	1. Loose thermocouple wiring. 2. The thermocouple may have AC power wired to them. 3. An ungrounded thermocouple.	1. Check the thermocouple wiring and connections. 2. Check the thermocouple for an AC power component. 3. Ground only ungrounded TC's.
Zone indicates correct temperature, but molded part indicates actual temperature is too high.	1. Celsius selected on controller instead of Fahrenheit. 2. Type K thermocouple used when Type J is selected on controller. 3. Thermocouple not placed where true part temperature can be detected. 4. A thermocouple may be assigned to more than one zone.	1. Change °C to °F. 2. Match J or K selection to mold thermocouples and TC cable in use. 3. Evaluate thermocouple location. 4. Check thermocouple assignments.
Sudden Zone temperature increase at the start of injection. Exceeds setpoint and heater % output drops to "0" for short period during each injection cycle.	1. Shear heat causing rise in temperature.	1. Consider lowering setpoints of upstream zones, reducing injection pressure, or both.
Zone over temperature while heater % output is very low.	1. Shear heat causing rise in temperature. 2. Zone mis-wired or receiving heat from another zone's heater.	1. Consider lowering setpoints of upstream zones, reducing injection pressure, or both. 2. Run Wiring Analysis test. See Section 6.3.2 Wiring Analysis of Instruction Manual for details regarding this test.



Zone temperature exceeds setpoint while heater % output is normal.	1. Mis-wired zone.	1. Run Wiring Analysis test. See Section 6.3.2 Wiring Analysis of Instruction Manual for details regarding this test.
Zone below temperature while heater % output is very high.	1. Melt entering zone too cold or heater power inadequate. 2. Shorted thermocouple.	1. Increase temperature in upstream zones or install higher wattage heater. 2. Shorted thermocouple alarm will activate.
Zone above temperature setpoint while heater % output is high.	1. Output Triac/SCR may have shorted.	1. Put zone in Manual and enter 0 % output setpoint. If temperature continues to rise, turn AC Power Main Circuit Breaker to OFF (Lock Out / Tag Out) and replace output module.
Zone above temperature setpoint while heater % output is "0".	1. Output Triac/SCR may have shorted.	1. Put zone in Manual and enter 0 % output setpoint. If temperature continues to rise, turn AC Power Main Circuit Breaker to OFF (Lock Out / Tag Out) and replace output module.
Approximately 1/3 of the zones are below temperature or have no output current.	1. One of the three phases of incoming power have been lost or running at too low of a voltage.	1. Check incoming line voltages. 2. When available, check status of incoming power LEDs on controller enclosure.
One zone high temperature with very low heater % output while another zone has persistent low temperature with high heater % output.	1. Mis-wired zone in mold power or thermocouple cable.	1. Run Wiring Analysis test. See Section 6.3.2 Wiring Analysis of the Instruction Manual for details regarding this test.
Zone does not achieve setpoint.	1. Thermocouple short. 2. Thermocouple short alarm active but thermocouple not shorted indicates a possible old or undersize heater. 3. Heater output may be mis-wired, causing output power going to more than one zone. 4. Mis-wired thermocouple. 5. Heater output may have a partial short to ground, bleeding off some of the current to the heater. 6. Thermocouple not placed where true part temperature can be detected. 7. Incoming power may be low on one or more phases.	1. Thermocouple short alarm will activate. 2. Replace heater. Increasing the thermocouple short alarm delay may temporarily resolve the issue. See Section 6.1 Displaying Settings Selections of the Instruction Manual for how to change the timer setting. 3-5. Run Wiring Analysis test. See Section 6.3.2 Wiring Analysis of the Instruction Manual for details regarding this test. 6. Evaluate thermocouple location. 7. Check incoming line voltages.

Fig. 62 General Troubleshooting Examples



6.2.10 Checking Mold Power and Thermocouple Cables



Fig. 63 Multimeter from Fluke - Model 27-II/28-II

6.2.10.1 Check the Cables

1. Detach heater and thermocouple cables from the mold. Use a multi-meter to check resistance from pin to pin on the mold connector.
 - Thermocouples should read 3-75 ohms at room temperature. Readings of 100 ohms or greater would be a candidate for replacement. If there is no continuity (open line), this would indicate a possible broken connection or open T/C.
 - Heaters should read greater than 12.8 ohms (15-amp module). If there is no continuity (open line), this would indicate a possible broken connection or open heater. For heaters, compare actual resistance to specification resistance.
2. Reattach the Thermocouple cable to the mold and then detach it from the controller.
Check resistance from pin to pin on the cable.
 - Thermocouples should read 3-75 Ω at room temperature. Readings of 100 Ω or greater would be a candidate for replacement. If there is no continuity (open line), this would indicate a possible broken connection or open T/C. The connection may be broken in the cable, or the connectors/pins are not making contact.
 - Heaters should read greater than 12.8 Ω (15-amp module). If there is no continuity (open line), this would indicate a possible broken connection or open heater. For heaters, compare actual resistance to specification resistance.
3. Reattach the Mold Heater cable to the mold and then detach it from the controller.
Check resistance from pin to ground on the cable.
 - No continuity (open line) is a normal condition. Some resistance indicates a problem such as a shorted heater. The wires are either shorted in the cable or the connector pin(s) are shorted to ground.
4. After performing the above checks, if everything is fine the problem may in the controller.



6.2.10.2 Lockout / Tag-Out



! WARNING

Lockout / Tag-Out

Always lockout / tag-out the main power breaker before removing or installing any modules or other hardware.

- See Section 1.19 Lockout / Tag-Out Instructions and Procedures for details.

1. Turn Main Disconnect OFF and lock-out/tag-out.
2. Locate problem module.
3. Check fuses on the module.
4. Swap bad module into a known good location.
5. Remove lock-out/tag-out and turn Main Disconnect ON.
6. Test the zone. If the problem follows the module, replace the module.
7. If the problem stays with the original zone, then the problem is between the module and the connectors on the rear of the enclosure.

NOTICE

If the problem is not resolved, you need technical assistance, or you need spare parts, contact the factory service support team. For warranty replacement parts, the controller serial number (located on the cabinet) must be supplied.



6.2.11 Data and Graphic Selections

The data and setpoints of the individual zones can be displayed with a variety of different visualizations.

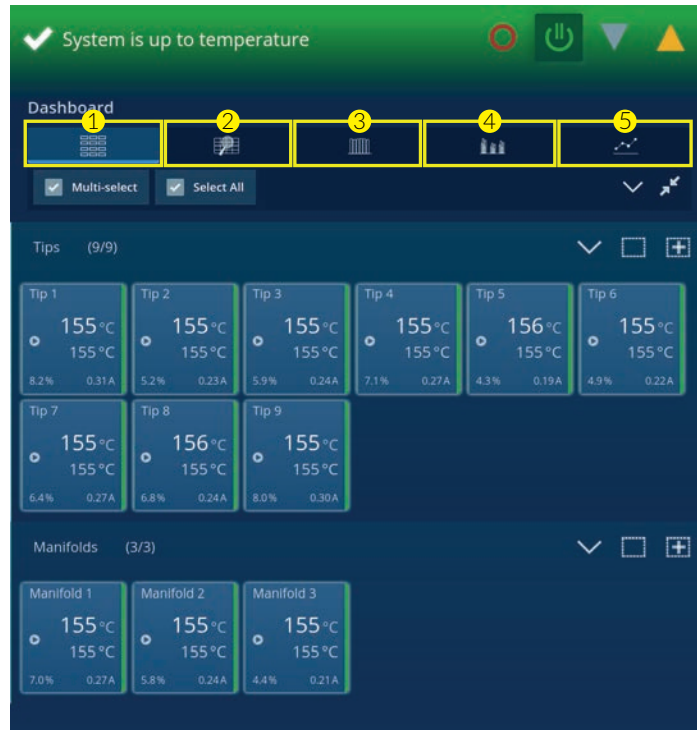


Fig. 64 Dashboard / Minicontroller Screen

- ① Dashboard / Minicontroller
- ② Setpoint and Actual Data Screen
- ③ Bar Graph Screen
- ④ Expanded Bar Graph Screen
- ⑤ Line Graph Screen



6.2.11.1 Setpoint and Actual Data Screen

1. On the Minicontroller screen, touch the Data Icon **2** to view the setpoint and actual data information.

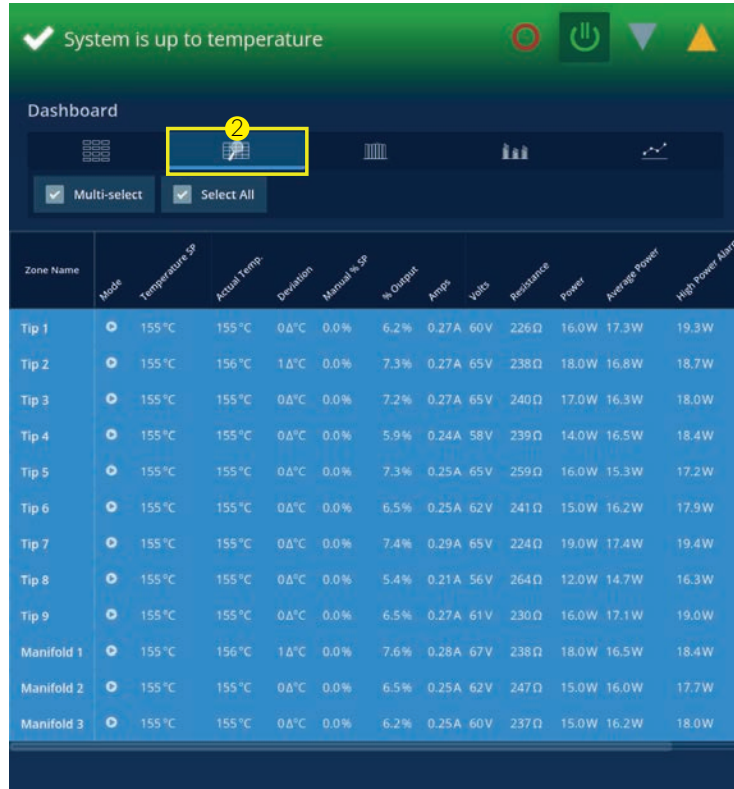


Fig. 65 Setpoint and Actual Data Screen

2. The Setpoints and Actual Values are displayed. Use the sliding bar on the right side of the screen (or swipe up) to view additional data on controllers with a largernumber of zones.
3. Use the sliding bar on the bottom of the screen (or swipe left) to view additional values of each zone.



6.2.11.2 Bar Graph Screen

1. Touch the Bar Graph Icon ③ to display individual bars for each zone.

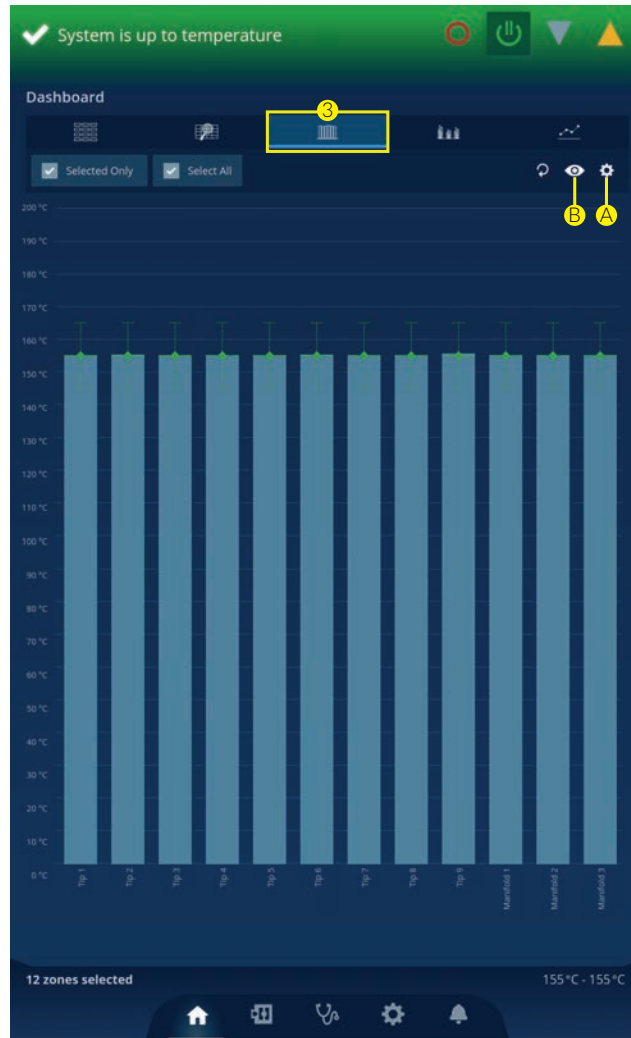


Fig. 66 Bar Graph Screen

2. Touch the Graph Settings Icon ④.

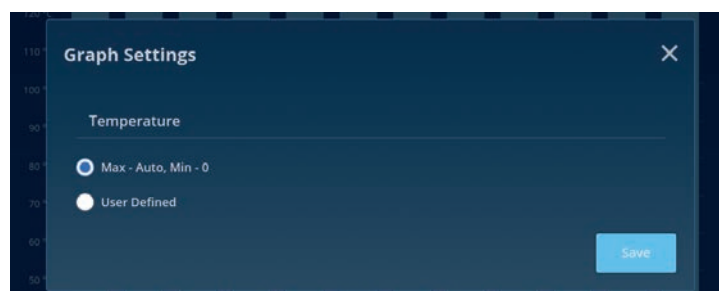


Fig. 67 Bar Graph Settings

3. Touch the desired setting, and then touch "Save" to save the selection.

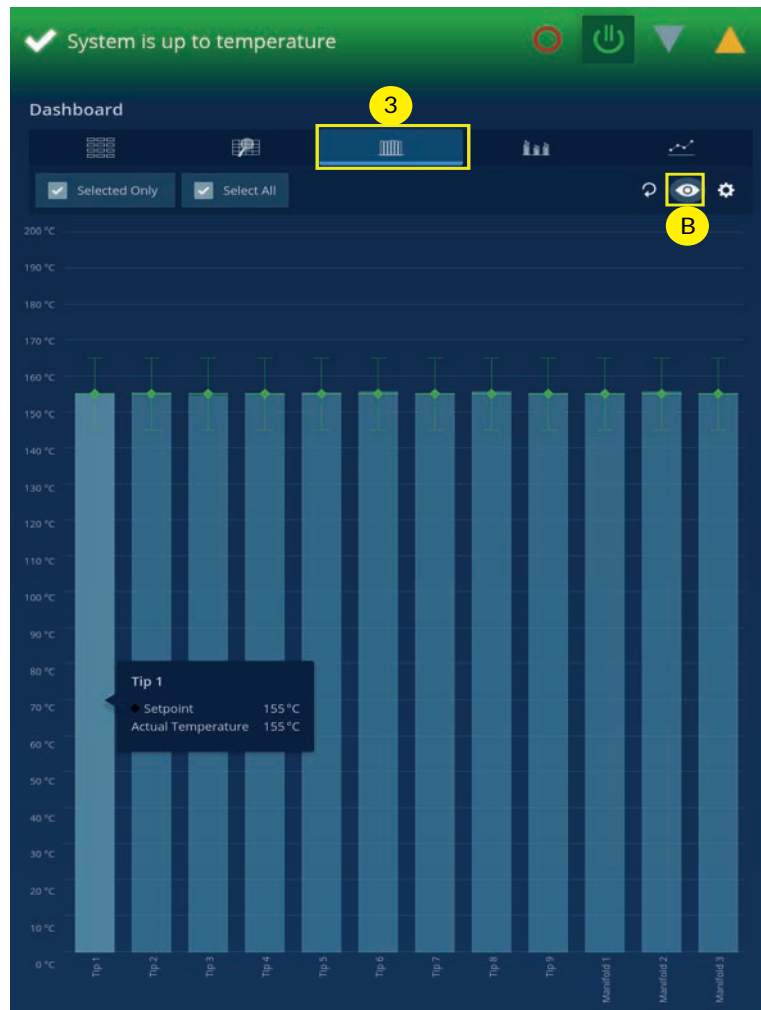


Fig. 68 Bar Graph Selection

4. Touch the View Graph Data Icon **B** to view the Setpoint and Actual Temperature values of each zone.
5. Touch the desired zone to display the values.
6. Double press a zone (bar) to change setpoint conveniently.



6.2.11.3 Expanded Bar Graph Screen

1. Touch the Expanded Bar Graph Icon **4** to display selectable color-coded bars for data of each zone.



Fig. 69 Expanded Bar Graph Screen

2. Touch the Graph Settings Icon **A**. Touch the desired setting for each color, and then touch “Save” to save the selections.

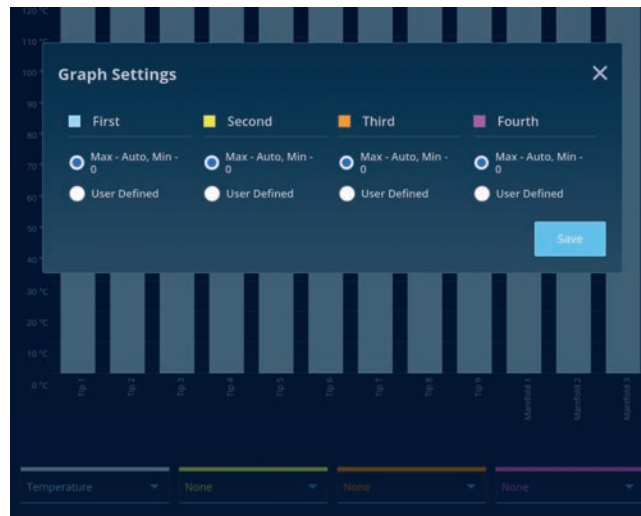


Fig. 70 Expandend Bar Graph Settings

3. Touch the desired Bar Color selection  and a drop-down list will be displayed. Selections are: None, Temperature, % Output, Current (Amps), Voltage (Volts), Power (Watts), Average Power (Watts), and Resistance (Ohms). Color-coded data is displayed on each side of the screen for each of the selections.

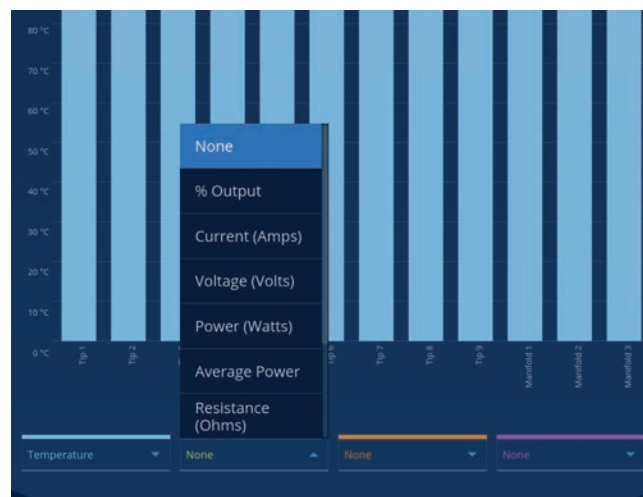


Fig. 71 Expandend Bar Graph add plot

4. Touch the View Graph Data Icon  to view the Setpoint and Actual Temperature values of each zone.
5. Touch the desired zone to display the values.



Fig. 72 Expandend Bar Graph add plot



6.2.11.4 Line Graph Screen

1. Touch the Line Graph Icon **5** to display individual lines for each zone.

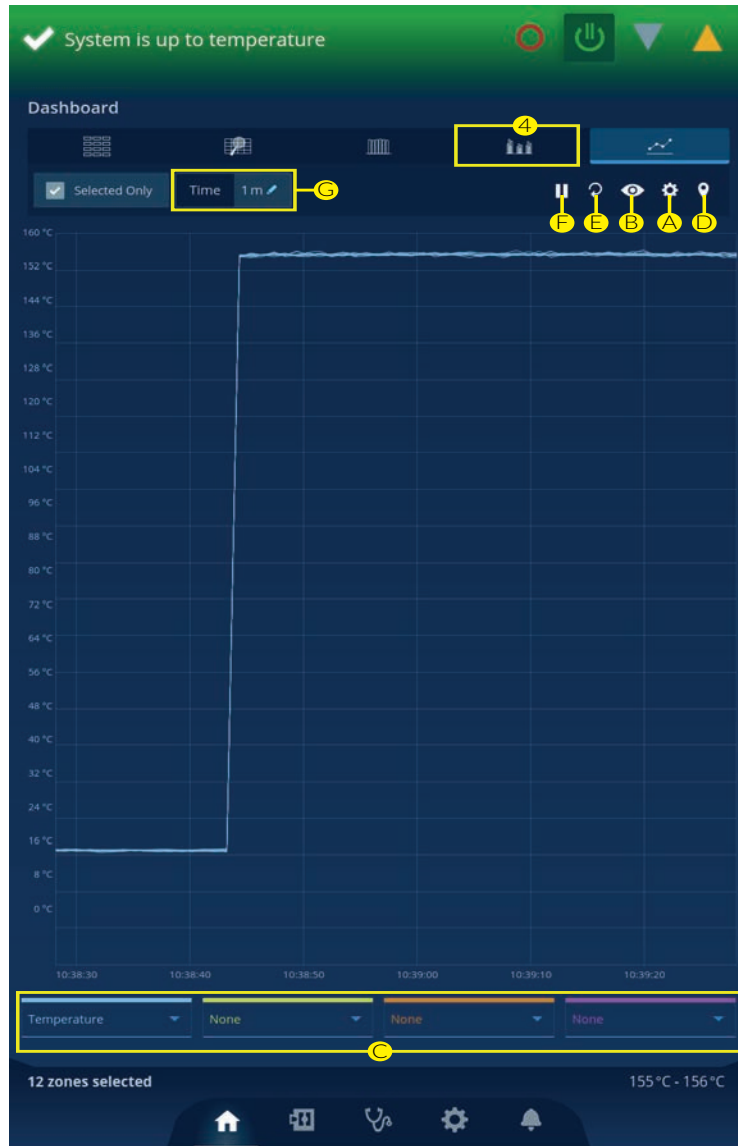


Fig. 73 Line Graph Screen

2. Touch the Graph Settings Icon **A**. Touch the desired setting for each color.

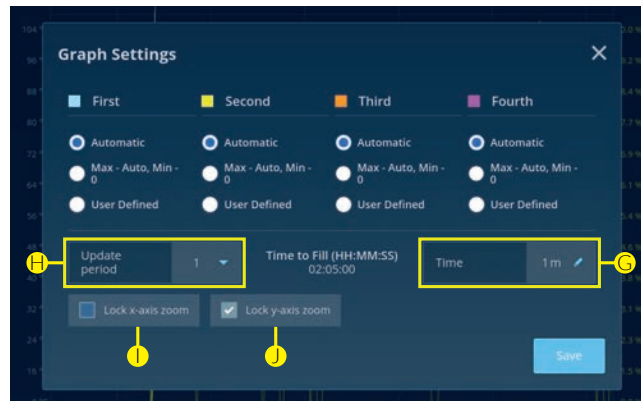


Fig. 74 Line Graph Settings

3. Select the Update period **H** (1, .5, or .1 sec), and the “Time to Fill (HH:MM:SS)” will be calculated.
4. Select the Time (min) **G**. This is the segment which is displayed on the screen.
5. If desired, select the Lock x-axis zoom **I**, and Lock y-axis zoom **J**.
6. Touch “Save” to save the selections.
7. Touch the desired Bar Color selection and a drop-down list will be displayed.
Selections are: None, Temperature, % Output, Current (Amps), Voltage (Volts), Power (Watts), Average Power (Watts), and Resistance (Ohms).
8. Color-coded data is displayed on each side of the screen for each of the selections.
9. Return to the Minicontroller or Bar Graph screen to select an individual zone for viewing.
10. Touch the Mark Graph Icon **D** to indicate the start of a segment. For example, this could mark the start of an injection cycle.
11. Touch Pause Graph Icon **F** to pause the graph, or - if paused - the Start/Restart Graph Icon to restart the graph.

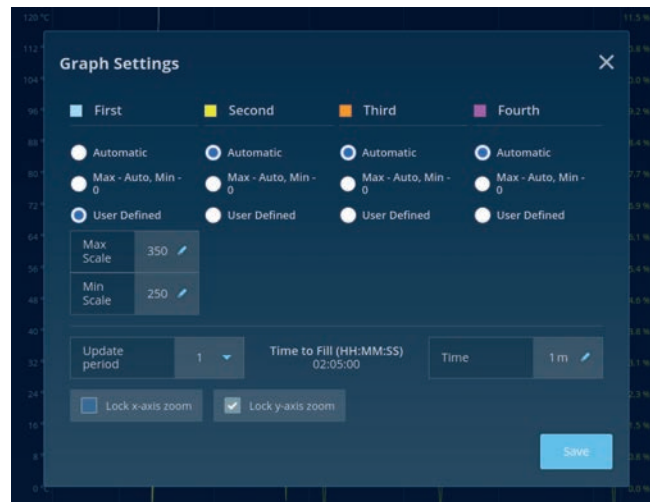


Fig. 75 Changed Line Graph Settings

12. Touch the Graph Settings Icon **A** to adjust the Scale Maximum and Scale Minimum settings.
13. Touch the User Defined selection on the desired color and a keypad will be displayed.
14. To reset the graph after zooming, hit the Refresh Graph icon **E**.



6.3 Mold Doctor® Selections

6.3.1 Fault Analysis

This test detects open thermocouples, reversed thermocouples, shorted thermocouples, shorted heaters, open heaters, open fuses, uncontrolled output, and ground faults. It is similar to the Wiring Analysis except that it does not check for cross-wiring of zones. It turns ON all zones at the same time.

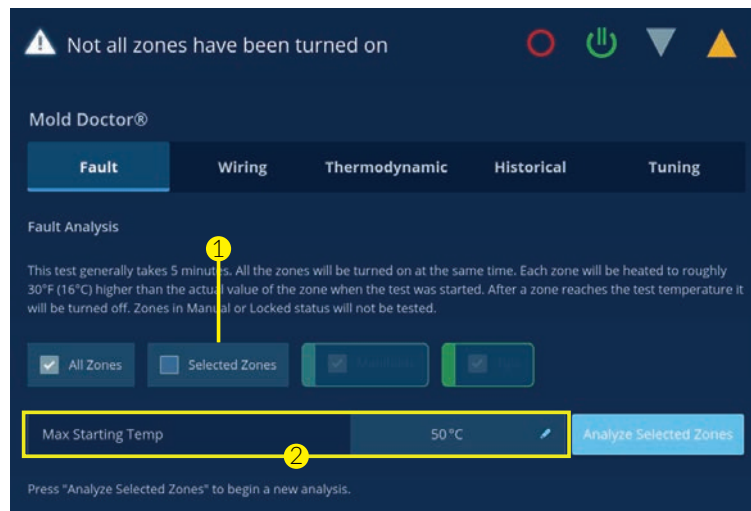


Fig. 76 Mold Doctor - Fault Analysis



1. Touch the Mold Doctor® Icon  to access the Fault Analysis screen.
2. In this example, the Tips Group was selected on the Minicontroller screen or on the mold doctor screen directly.
3. Touch Selected Zones  to continue.



Fig. 77 Mold Doctor - Select Zones

4. Select the Zones you want to analyze and touch “Save”.

NOTICE

If any zone exceeds its setpoint, a message will be displayed and analyzing will not start until the temperature is below this setpoint. All Zones must be OFF.

5. Touch “Analyze Selected Zones” to start the procedure.

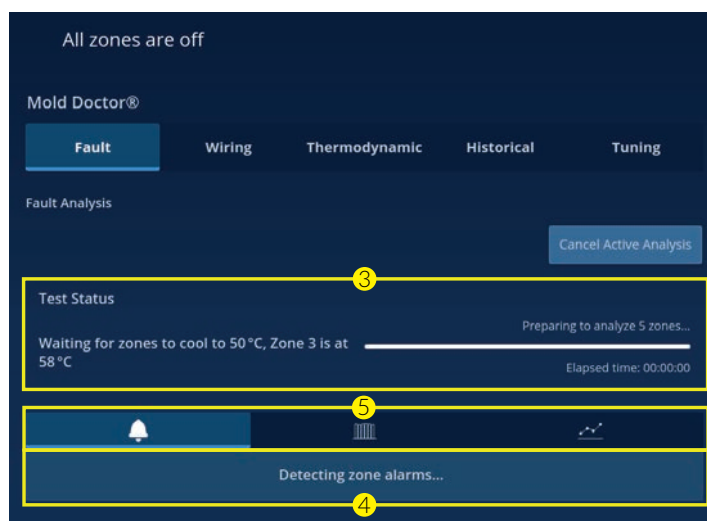


Fig. 78 Mold Doctor - Fault Analysis in Progress

6. The Test Status will be displayed ③ and detected faults are displayed ④. You can also view the current temperature in each zone via the tab selection ⑤.
7. Analysis is complete.

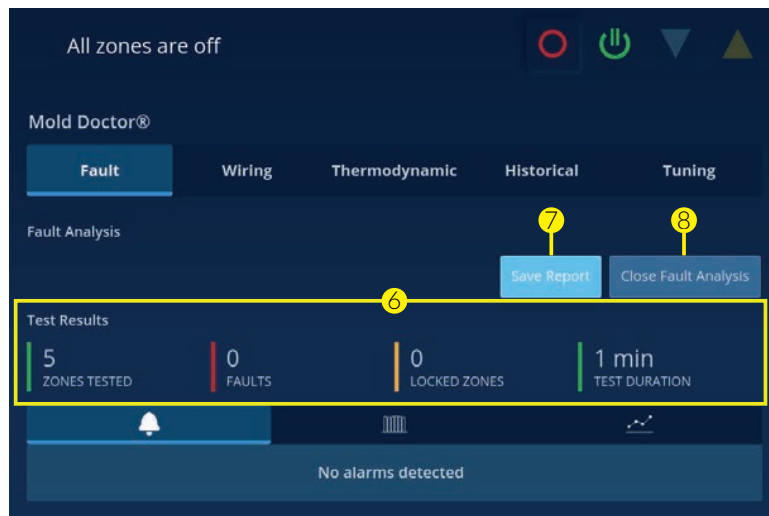


Fig. 79 Mold Doctor - Fault Analysis Completed

8. A brief Test Results report is displayed (6).
9. For a more detailed report, touch “Save Report” (7)

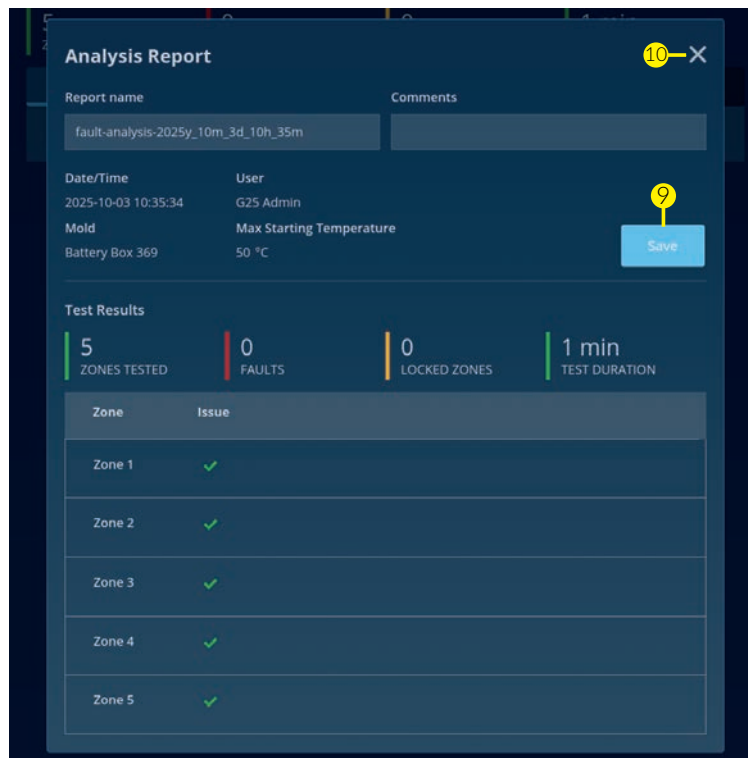


Fig. 80 Mold Doctor - Fault Analysis Report

10. This report provides details for each zone.
11. Use the sliding bar on the right side of the screen to view additional data.
12. Touch “Save” to memorize the report (9).
13. Touch the × to close the report (10).
14. Touch “Close Fault Analysis” (8).

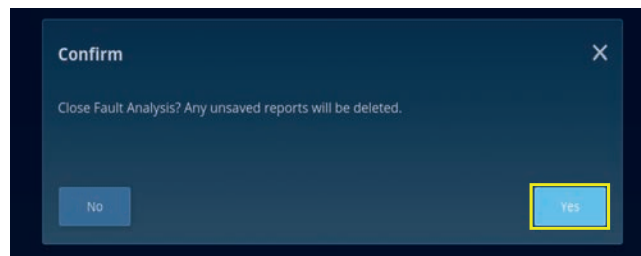


Fig. 81 Mold Doctor - Fault Analysis Close Confirmation

15. Touch “Yes”.



6.3.2 Wiring Analysis

This test detects open thermocouples, reversed thermocouples, shorted thermocouples, shorted heaters, open heaters, open fuses, uncontrolled output, and ground faults. It also detects cross-wired zones, which cause one zone to heat another zone. The G25 Controller powers up the first zone of the group(s) selected, determines if the zone is heating and then determines if any other zone is heating. Once the testing of the first zone is completed, it repeats the same test for every remaining zone in the group(s).

1. Touch the zone or zones to be analyzed.
2. For a Group, touch the Group Select Icon  for the desired Group and it will be highlighted.
3. Touch the Mold Doctor® Icon  to access the Wiring Analysis screen.

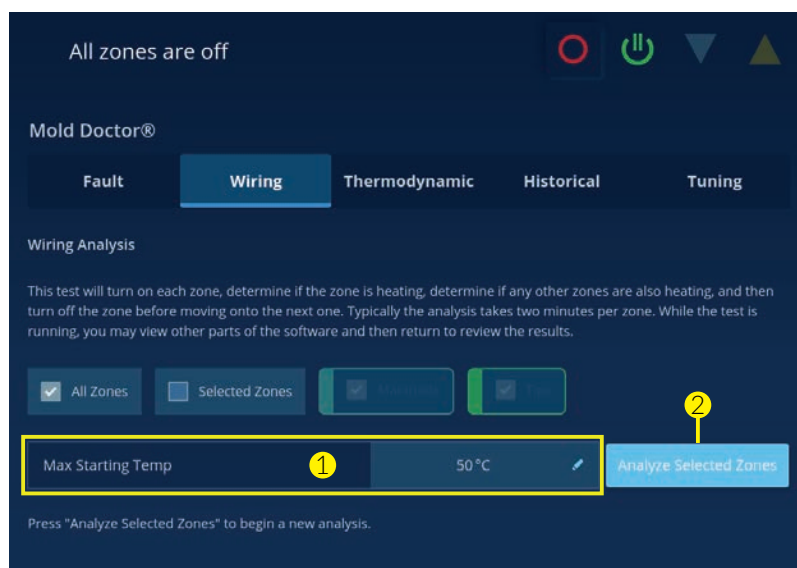


Fig. 82 Mold Doctor - Wiring Analysis

4. In this example, the Tips Group was selected on the Minicontroller screen.
5. Touch “Selected Zones” to continue.
6. Touch “Save”.
7. Enter the Max Starting Temp (°F or °C) ①.

NOTICE

If any zone exceeds this setpoint, a message will be displayed and analyzing will not start until the temperature is below this setpoint. All Zones must be OFF.

8. Touch “Analyze Selected Zones” to start the procedure ②.

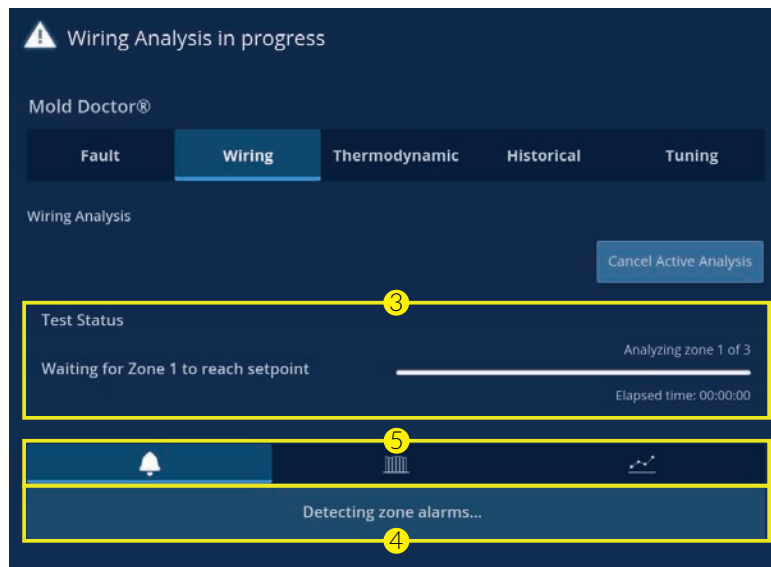


Fig. 83 Mold Doctor - Wiring Analysis in Progress

9. The Test Status will be displayed 3 and detected faults are displayed 4.
10. You can also view the current temperature in each zone via the tab selection 5.

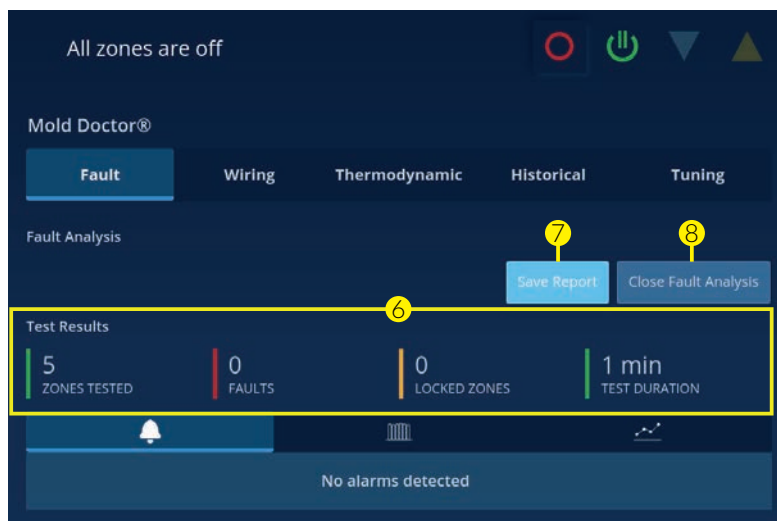


Fig. 84 Mold Doctor - Wiring Analysis Completed

11. Analysis is complete.
12. A brief Test Results report is displayed 6.
13. For a more detailed report, touch "Save Report" 7.



Analysis Report 10 X

Report name: wiring-analysis-2025y_10m_3d_10h_36m

Comments:

Date/Time: 2025-10-03 10:35:47
User: G25 Admin
Mold: Max Starting Temperature
Battery Box 369: 50 °C

9 **Save**

Test Results

3 ZONES TESTED | 0 FAULTS | 0 LOCKED ZONES | 1 min TEST DURATION

Zone	Issue
Zone 1	✓
Zone 2	✓
Zone 3	✓

Fig. 85 Mold Doctor - Wiring Analysis Report

14. This report provides details for each zone.
15. Use the sliding bar on the right side of the screen to view additional data.
16. Touch “Save” to memorize the report 9.
17. Touch the × to close the report 10.
18. Touch “Close Wiring Analysis” 8.

Confirm X

Close Wiring Analysis? Any unsaved reports will be deleted.

No **Yes**

Fig. 86 Mold Doctor - Close Wiring Analysis Confirmation

19. Touch “Yes”.



6.3.3 Thermodynamic Analysis

This procedure provides information that can be useful for a variety of personnel. While providing preventative maintenance information such as heater resistance of each zone, it also indicates heating and cooling rates of each zone for process engineering personnel. With this test, the key is to locate zones that are inconsistent when compared with similar zones. For example, if one tip is heating up at a much slower rate than similar tips, it may be an indication that the heater is starting to burn out or that the thermocouple and heater have different spacing than other tips. A review of heater resistances or percent outputs for the suspicious zones may further indicate the problem is with the heater.



1. Touch the Mold Doctor® Icon to access the Thermodynamic Analysis screen.

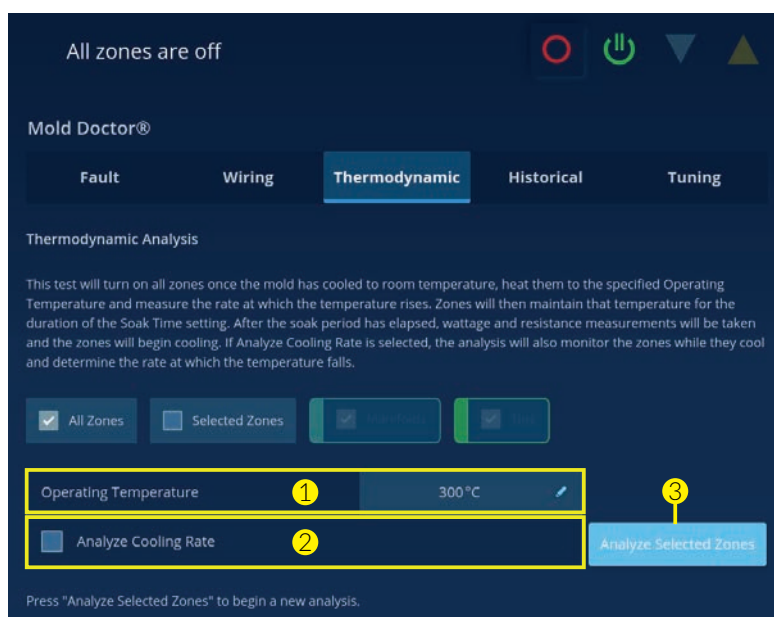


Fig. 87 Mold Doctor - Thermodynamic Analysis

2. If all zones are to be analyzed, touch All Zones.
3. If only a Group or specific zones are to be analyzed, touch the desired Group or for specific zones, touch Selected Zones.
4. Zones will be displayed for confirmation of selection. In this example, only four zones will be analyzed.
5. Touch the zones to be selected.
6. Touch “Save”.
7. Enter the Operating Temperature (°F or °C) 1. This value is usually the normal operating temperature for this mold.

NOTICE

All Zones must be OFF.

8. Optional: Touch Analyze Cooling Rate to select if desired 2.
9. Touch “Analyze Selected Zones” to start the procedure 3.

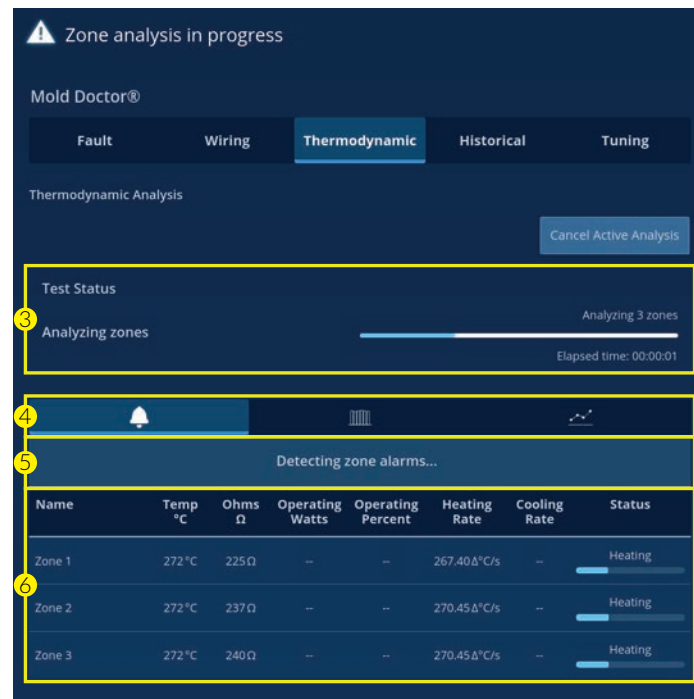


Fig. 88 Mold Doctor - Thermodynamic Analysis in Progress

10. The Test Status will be displayed ③. More detail and determined thermodynamic properties are displayed in ⑥. You can also view current zone alarms ⑤ and the current temperature in each zone via the tab selection ④.

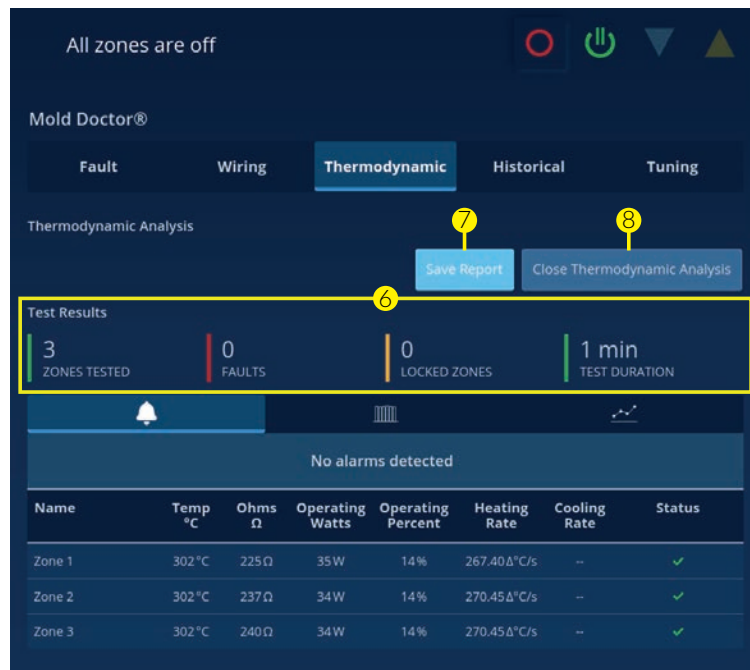


Fig. 89 Thermodynamic Analysis Completed

11. Analysis is complete.
12. A brief Test Results report is displayed 6.
13. For a more detailed report, touch "Save Report" 7.



Fig. 90 Mold Doctor - Thermodynamic Analysis Report

14. This report provides details for each zone.
15. Use the sliding bar on the right side of the screen to view additional data on larger reports.
16. Touch "Save" to memorize the report 9.
17. Touch the x to close the report 10.
18. Touch "Close Thermodynamic Analysis" 8.

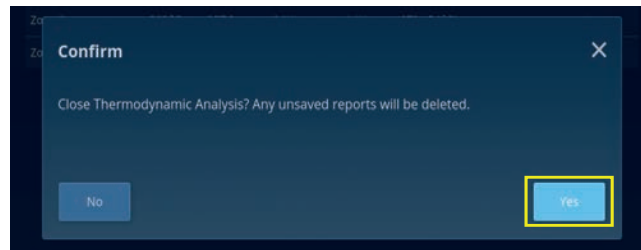


Fig. 91 Close Thermodynamic Analysis Confirmation

19. Touch “Yes”.
20. If you have created more than one report, you can compare these using the Historical Analysis feature (see Section 6.3.4 Historical Analysis).



6.3.4 Historical Analysis

This procedure can be used to view saved Thermodynamic Analysis files and to automatically compare any two Thermodynamic Analysis tests. Changes in heater resistances, output percentages and other data could be an early indication that a heater is about to fail. To get the most out of this report, the two Thermodynamic Analysis tests being compared should be completed under similar conditions. For example, if cooling rate data is being compared, it is important that the same water temperature and water flow rates are used in the two Thermodynamic Analysis tests. Otherwise, it would be expected that the test results would vary.



1. Touch the Mold Doctor® Icon to access the Historical Analysis screen.

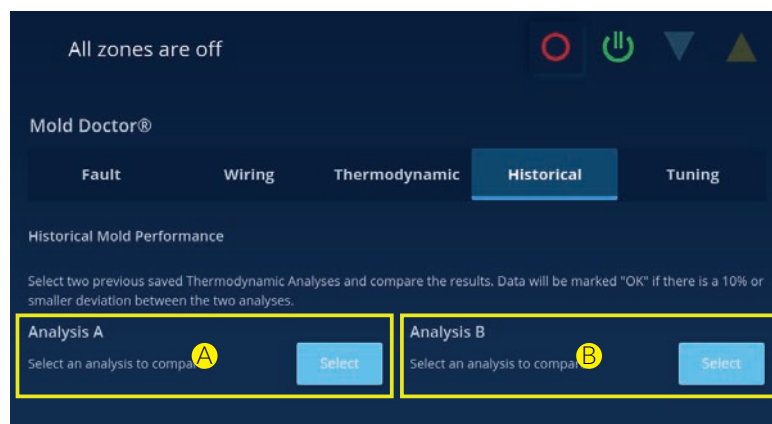


Fig. 92 Mold Doctor - Historical Analysis

2. Touch “Analysis A” Select to display the list of reports.

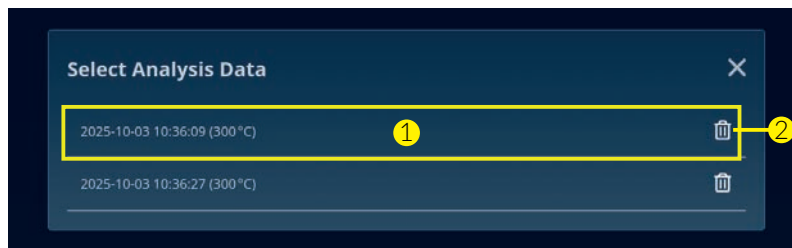


Fig. 93 Mold Doctor - Historical Analysis Select Report

3. Touch the first (older) report ①.
4. In case you want to delete a report, touch the trash icon ②.
5. Touch “Analysis B” Select to display the list of reports.
6. Touch the second (newer) report.
7. After selecting the second report, the two reports will be compared, and the Historical Mold Performance report will be displayed.

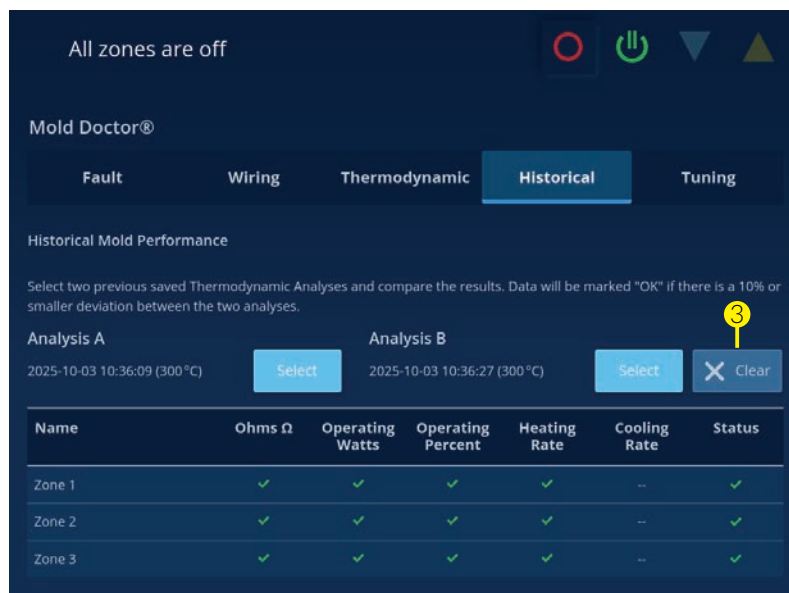


Fig. 94 Mold Doctor - Historical Analysis Comparison

8. Data will be check marked as “OK” if there is a 10 % or smaller deviation between the two analyses.
9. To clear both selected reports, touch “× Clear” ③.



6.3.4.1 Tuning Wizard

This procedure can be used to automatically calculate tuning coefficients to optimize heating.

NOTICE

Even Heat settings will be ignored during this analysis.



1. Touch the Mold Doctor® Icon to access the Tuning Wizard screen.
2. Touch Tuning to select the Tuning Wizard screen.

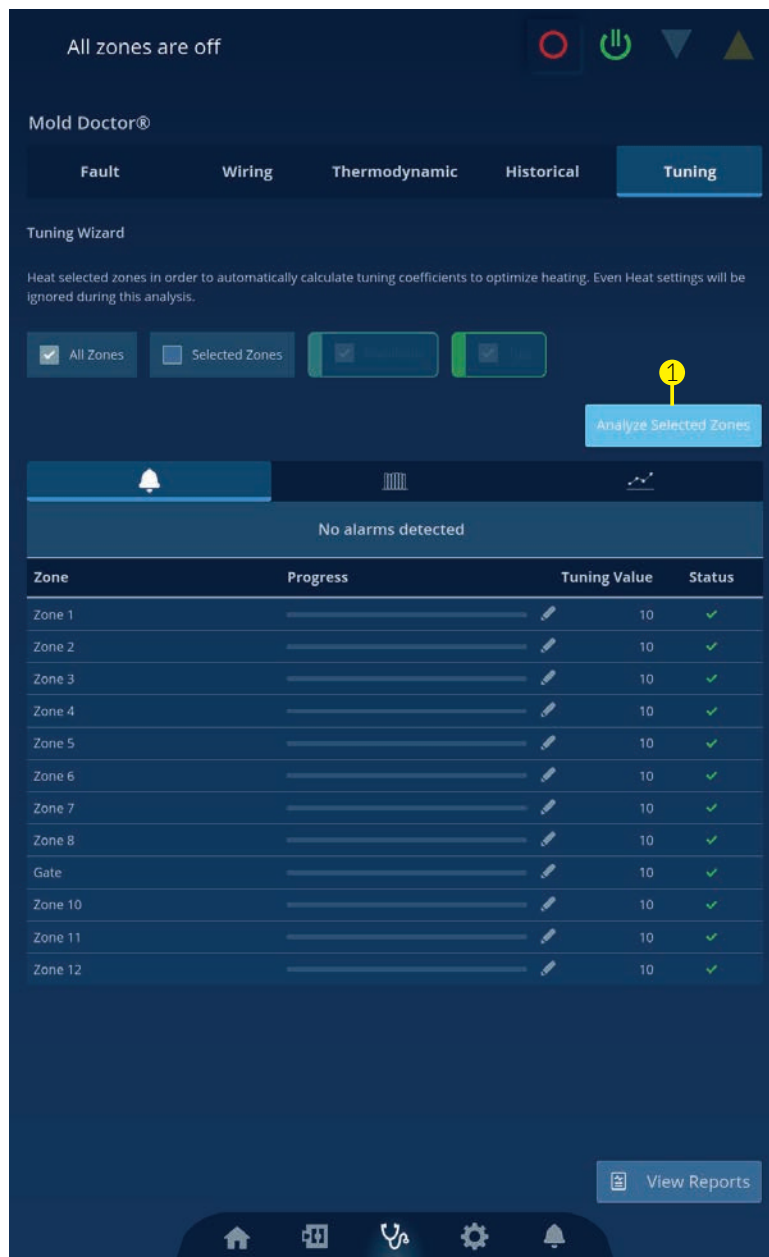


Fig. 95 Mold Doctor - Tuning Analysis



3. Touch All Zones. Groups or individual zones may also be selected if desired.
4. Touch “Analyze Selected Zones” ① to begin the procedure.

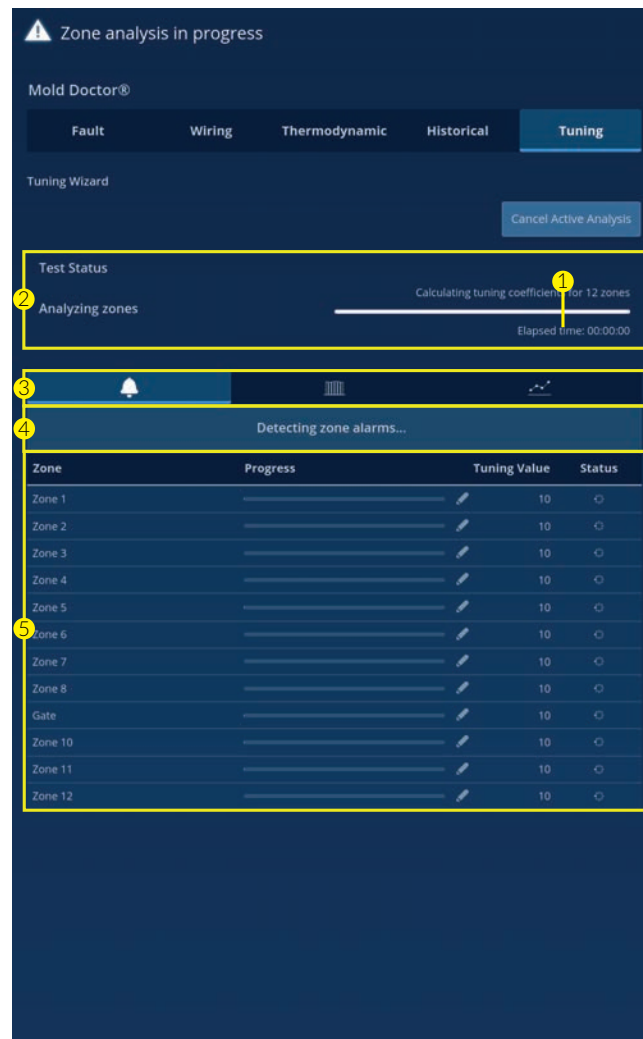


Fig. 96 Mold Doctor - Tuning Analysis in Progress

5. The progress will be displayed ②. More detail are displayed in ⑤. You can also view current zone alarms ④ and the current temperature in each zone via the tab selection ③.
6. Use the sliding bar on the right side of the screen to view additional data on larger reports.

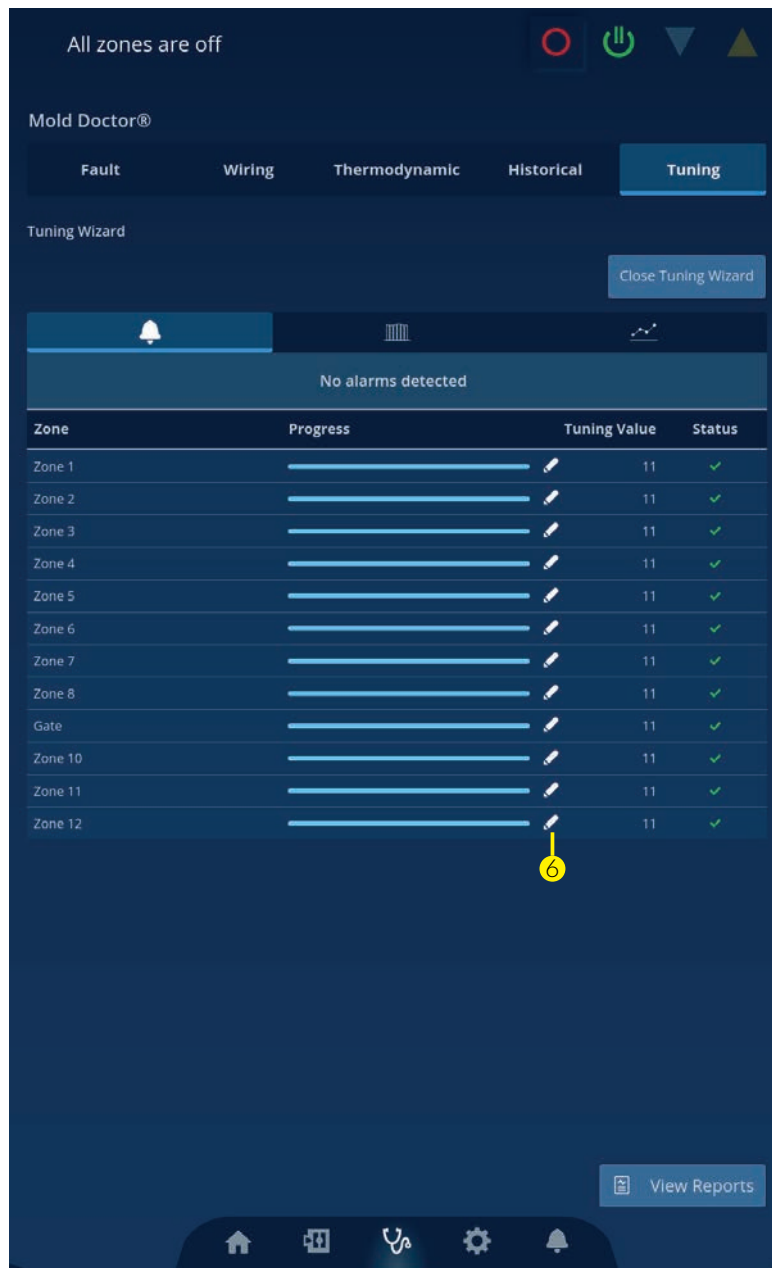


Fig. 97 Mold Doctor - Tuning Analysis Completed

7. Optional: You can fine tune the tuning values after the analysis is completed by selecting the adjustment



icon **6**. Specify the category of the zone **7** and adjust the tuning value **8** accordingly. Press Save **9** to save the changes.

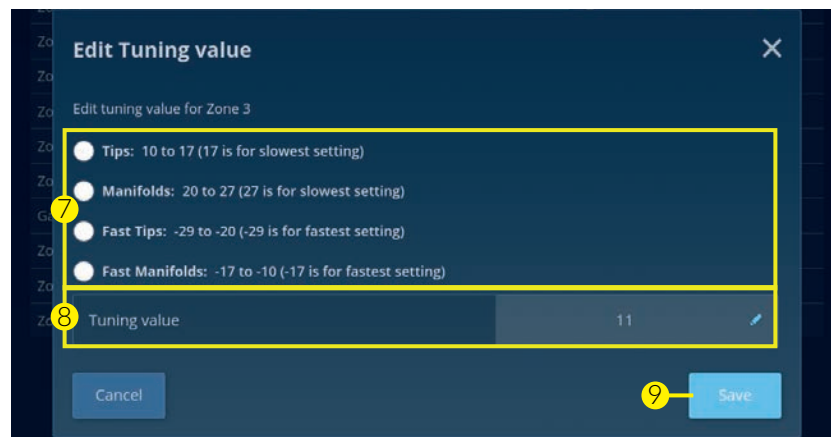


Fig. 98 Mold Doctor - Tuning Analysis Edit Tuning Values

8. Touch "Close Tuning Wizard".

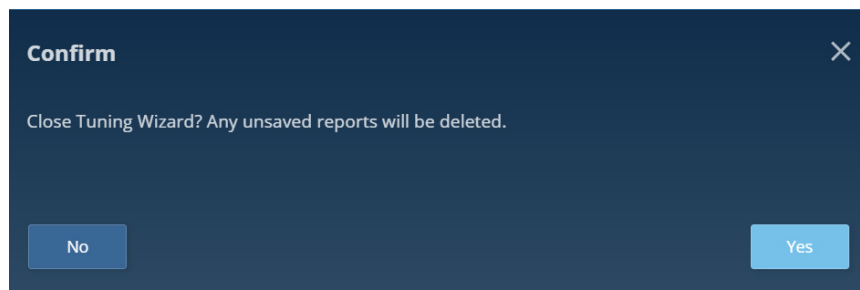


Fig. 99 Mold Doctor - Close Tuning Analysis Confirmation

9. Touch "Yes".



6.3.5 Settings Screen Selections

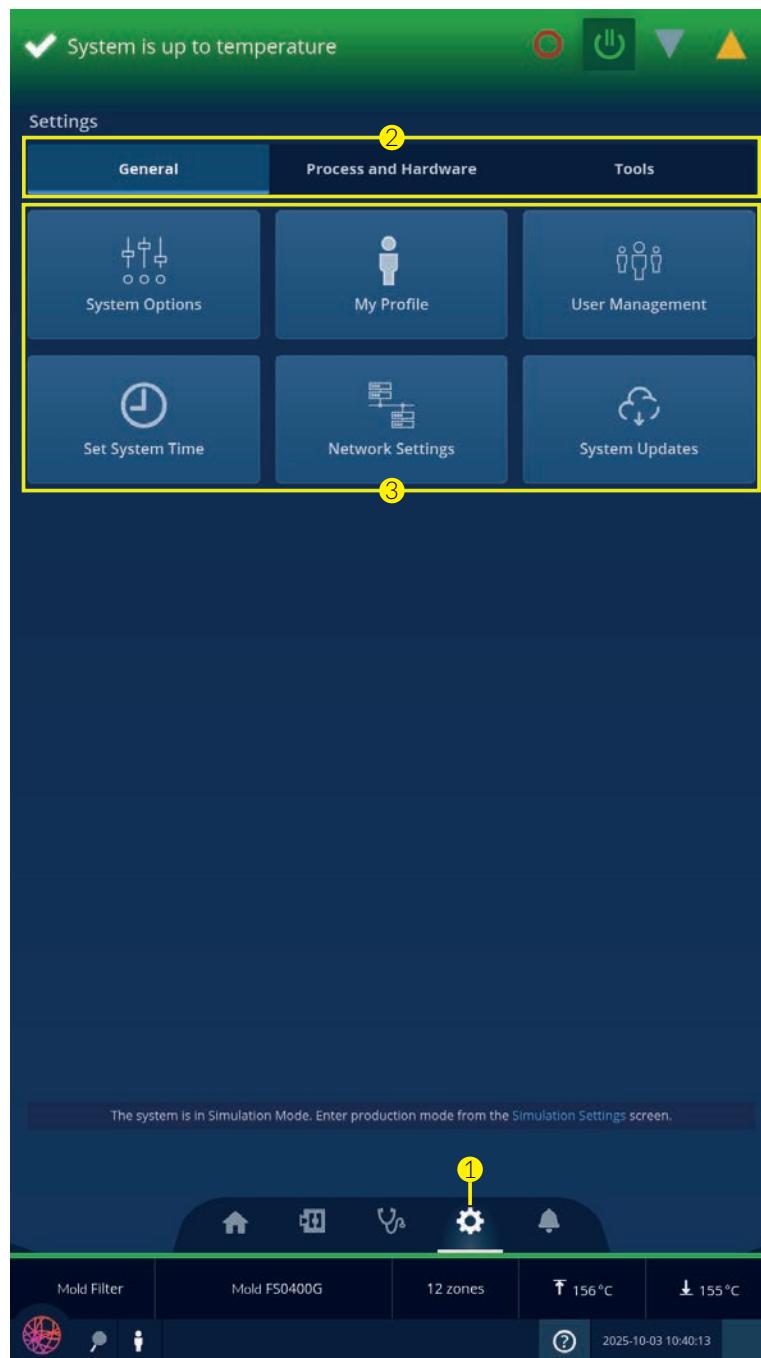


Fig. 100 Settings - General

1. Touch the Settings Icon ① to display the Settings screen.
2. Touch the desired Group of settings ② and target setting ③.



6.3.5.1 General > System Options

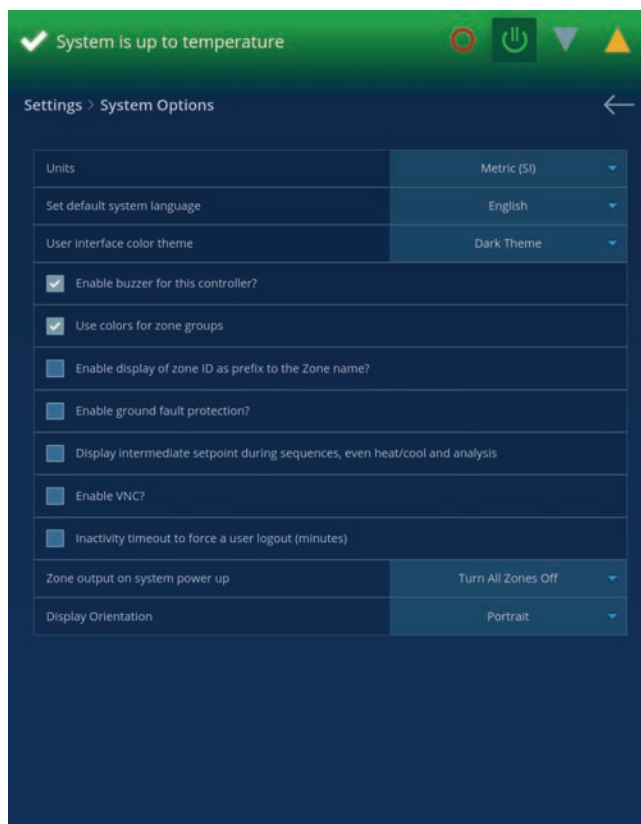


Fig. 101 Settings - System Options

Option	Selections
Units	US Customary Units, Metric (SI), and Custom (specify for each metric individually).
Set Default System language	English, German, Chinese, ...
User Interface Color Scheme	Dark Theme, Light Theme.
Enable buzzer for this controller?	Enable or disable buzzer.
Use colors for zone groups	Enable or disable color coding of zone groups.
Enable display of zone ID as prefix to zone name?	Enable or Disable ID.
Enable ground fault protection?	Enable or Disable protection.
Display intermediate setpoint during sequences, even heat/cool and analysis	Enable or Disable setpoint.
Enable VNC?	Enable or Disable VNC.
Inactivity timeout to force a user logout	Enable or Disable timeout.
Zone output on system power up	Turn All Zones Off, Turn All Zones On, and Ask the Operator.
Display Orientation	Portrait, Landscape Right, Landscape Left, Upside Down.

Fig. 102 System Options Settings



6.3.5.2 General > Set System Time



Fig. 103 Settings - Set System Time

Option	Description
Set System Time	Year, Month, Day, Hour (24 h, 12 h), Minutes, Seconds.
Load Default Time	Restore the default system time settings.

1. Touch the Setpoint Icon on the desired selection to display a Setpoint Entry Box.
2. Touch “Save” when done.

6.3.5.3 General > System Updates

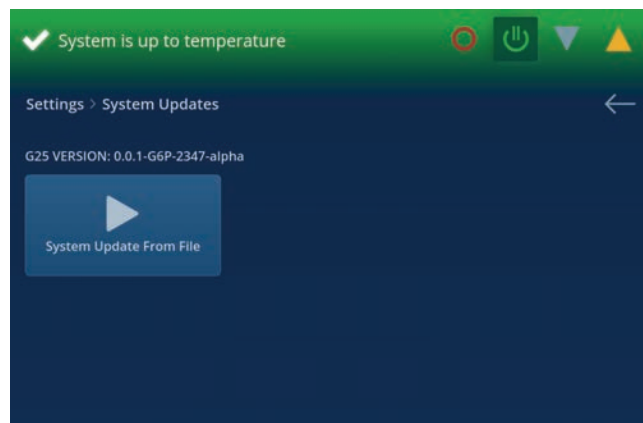


Fig. 104 Settings - System Updates

System update can be installed from a USB drive.

1. Ask Gammaflux for the latest system update file.
2. Place the update file on the root directory of a FAT32 formatted USB drive.
3. Insert the USB drive into the controller's USB port and select “Install System Update from File”.
4. Select the update file from the file browser and touch “Install”.
5. The controller will verify the update file and prompt to install the update.
6. Follow the on-screen instructions to complete the update process.



6.3.5.4 General > My Profile

Fig. 105 Settings – My Profile Screen

1. This screen provides entry of individual profiles for each person having access to the controller.
2. Touch “Save” when done.

Option	Description
User Login ID	Unique username for each user.
First / Last Name	Name of the user.
Email	Email address of the user.
Change Password	Permits changing of an existing password.
Language	English, German, Chinese, ...
Units	US Customary Units, Metric (SI), and Custom (specify for each metric individually).
User DateTime Preference	Different Date and Time formats.
Use temperature precision of 0.1 degrees?	When selected, the temperature values and setpoint will be displayed as xxx.x degrees.



6.3.5.5 User Management

Details of this screen are available in the G25 Maintenance and Troubleshooting Manual.

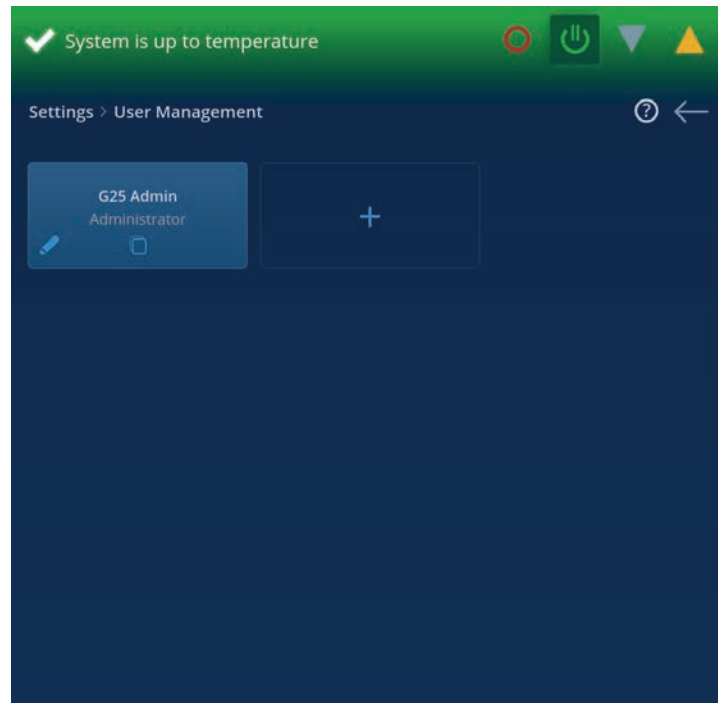


Fig. 106 Settings - User Management

6.3.5.6 General > Network Settings

Details of this screen are available in the G25 Maintenance and Troubleshooting Manual.

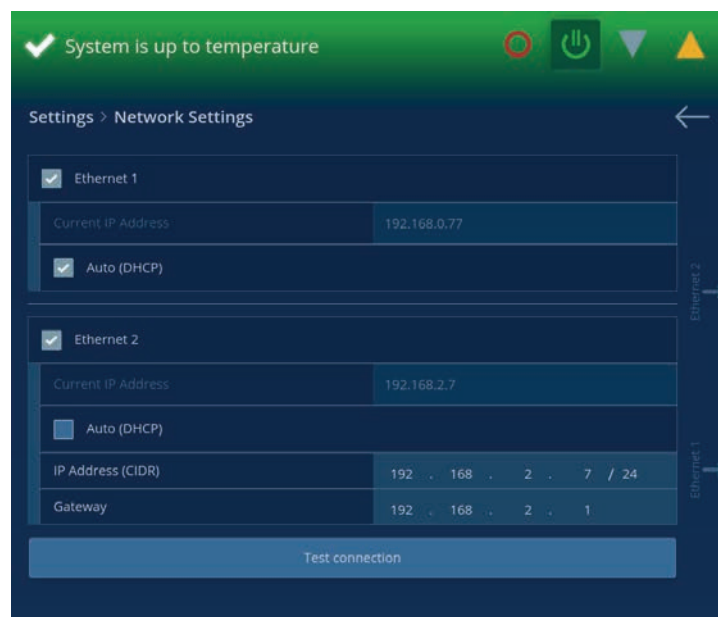


Fig. 107 Settings - Network Settings



6.3.6 Process and Hardware

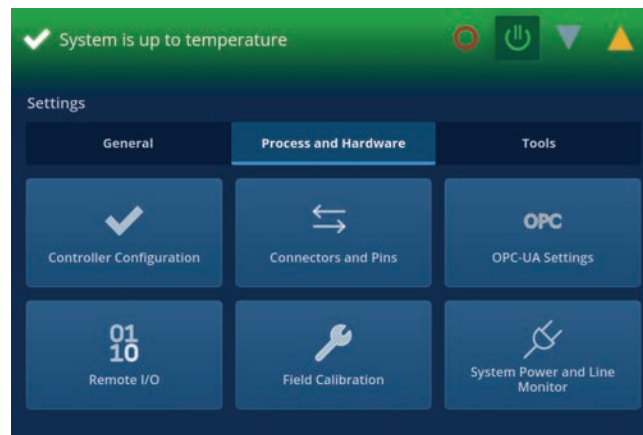


Fig. 108 Settings - Process and Hardware

6.3.6.1 Controller Configuration

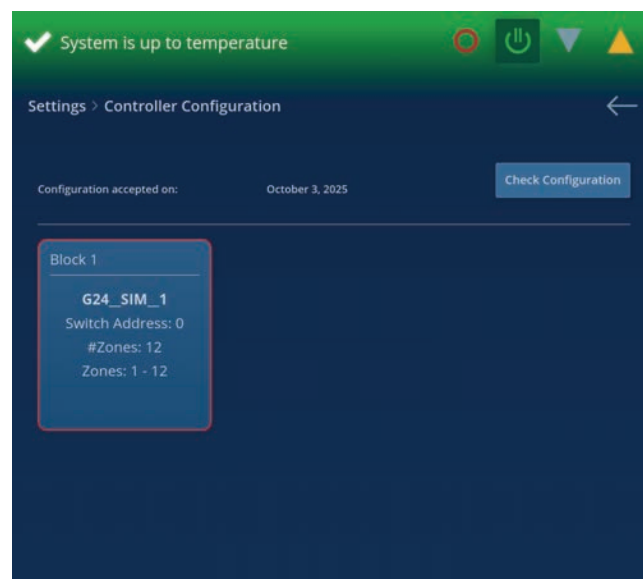


Fig. 109 Settings - Controller Configuration

Option	Description
Details of Configuration accepted on	Is displayed.
Configuration accepted by	Is displayed.
Details of each Block in the System	Block Number, Switch Address, # of Zones, and which zones are included.
Check Configuration	Use this to confirm the current configuration.

Tab. 37 Controller Configuration Settings



6.3.6.2 Process and Hardware > Remote I/O

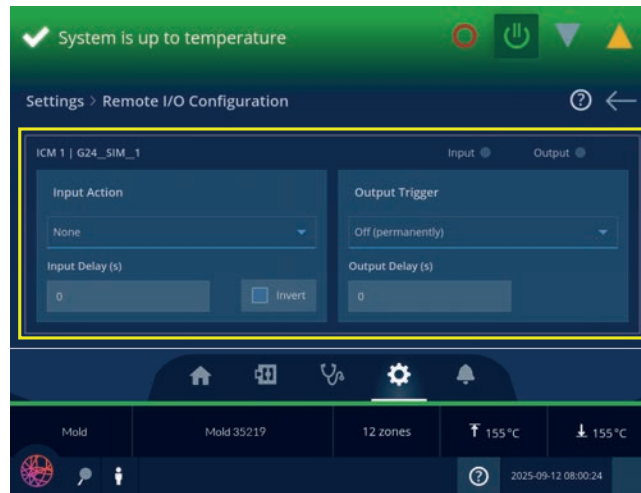


Fig. 110 Settings - Remote I/O

Option	Description
ICM Module Number and Serial Number	Details of the ICM Module Number and Serial Number are displayed for each ICM in the System. There is (1) Input and (1) Output on each ICM, with two of each being the maximum unless special options have been included.
Input Action	These are 24 VDC input signals from the IMM. Selections: None, E-stop, Control Inhibit, Control Allow, Standby, Sequence Start Trigger, Sequence Cool Trigger, IMM Ready.
Input Delay (s)	Input delay time before feature is activated.
Invert	Inverts the input signal action.
Selections:	ON to Activate or OFF (Inverted) to Activate.
Output Trigger	These are 24 VDC signals from the Controller to the IMM. Selections: None, Off (permanently), On (permanently), Ok to Run, Alarm, Buzzer, and All zones off.
Output Delay (s)	Delay time before feature output is activated.

Tab. 38 Remote I/O Settings



6.3.6.3 Process and Hardware > Connectors and Pins

This screen is used to configure the Input Connector, Input Pins, Output Connector, and Output Pins on the Controller. Details of this screen available in the G25 Maintenance and Troubleshooting Manual.

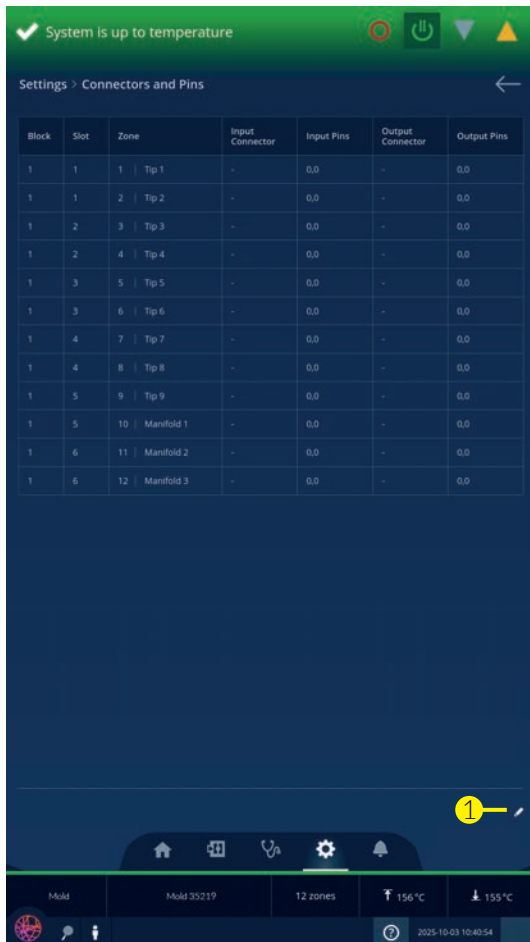


Fig. 111 Settings - Connectors and Pins



6.3.6.4 Process and Hardware > Field Calibration

This screen is used to calibrate the temperature modules in the field. These modules are mounted on the ICM-module(s). Details of this screen available in the G25 Maintenance and Troubleshooting Manual.



Fig. 112 Settings - Field Calibration



6.3.6.5 Process and Hardware > OPC-UA Settings

Details of this screen are available in the G25 Maintenance and Troubleshooting Manual.

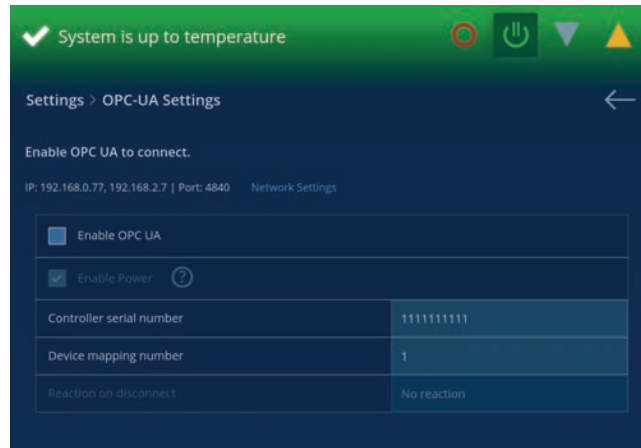


Fig. 113 Settings – OPC-UA Screen

6.3.7 Process and Hardware > System Power and Line Monitor

This screen displays the kW Instant, kW Average, kW Min, and kW Max system power readings. Also the Line 1, Line 2, and Line 3 controller voltages, and Heatsink and Ambient temperatures of each Block in the controller.



Fig. 114 Settings - System Power and Line Monitor



6.3.8 Tools

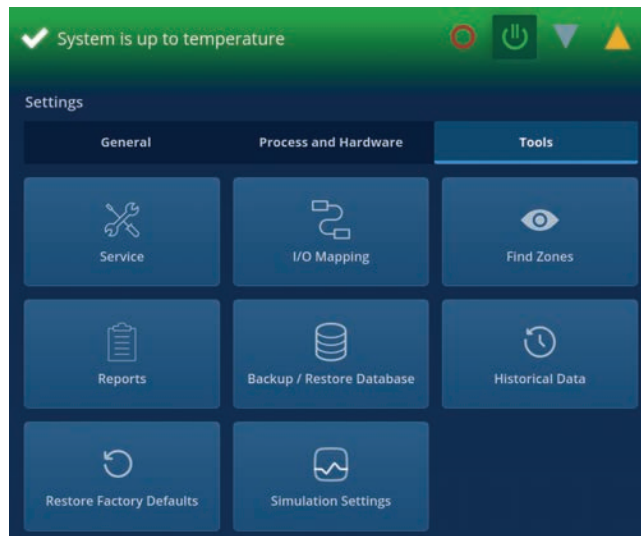


Fig. 115 Settings - Tools and Diagnostics

6.3.8.1 Tools > Service

This screen provides data and information regarding the System Status, Connection Health, and Service Status.

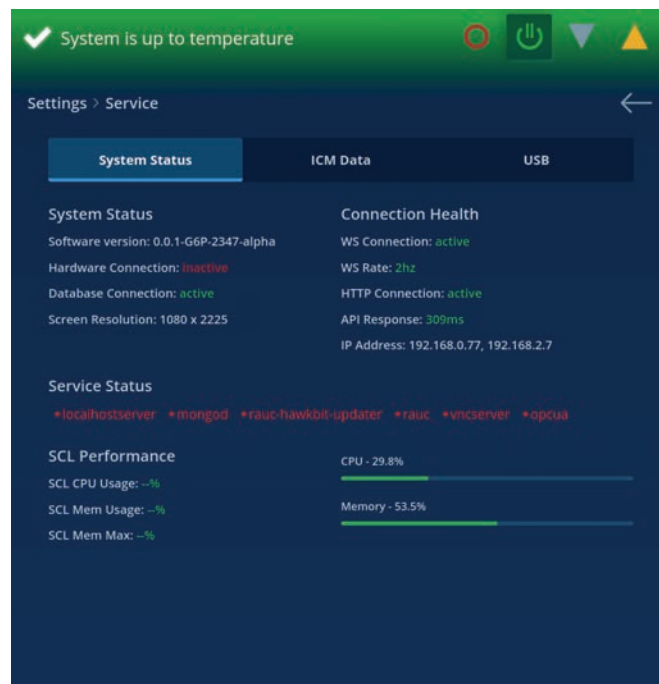


Fig. 116 Settings - Tools - Service - System Status



6.3.8.2 Tools > ICM Data

This screen provides data for System evaluation and troubleshooting by engineering staff. Details of this screen available in the G25 Maintenance and Troubleshooting Manual.

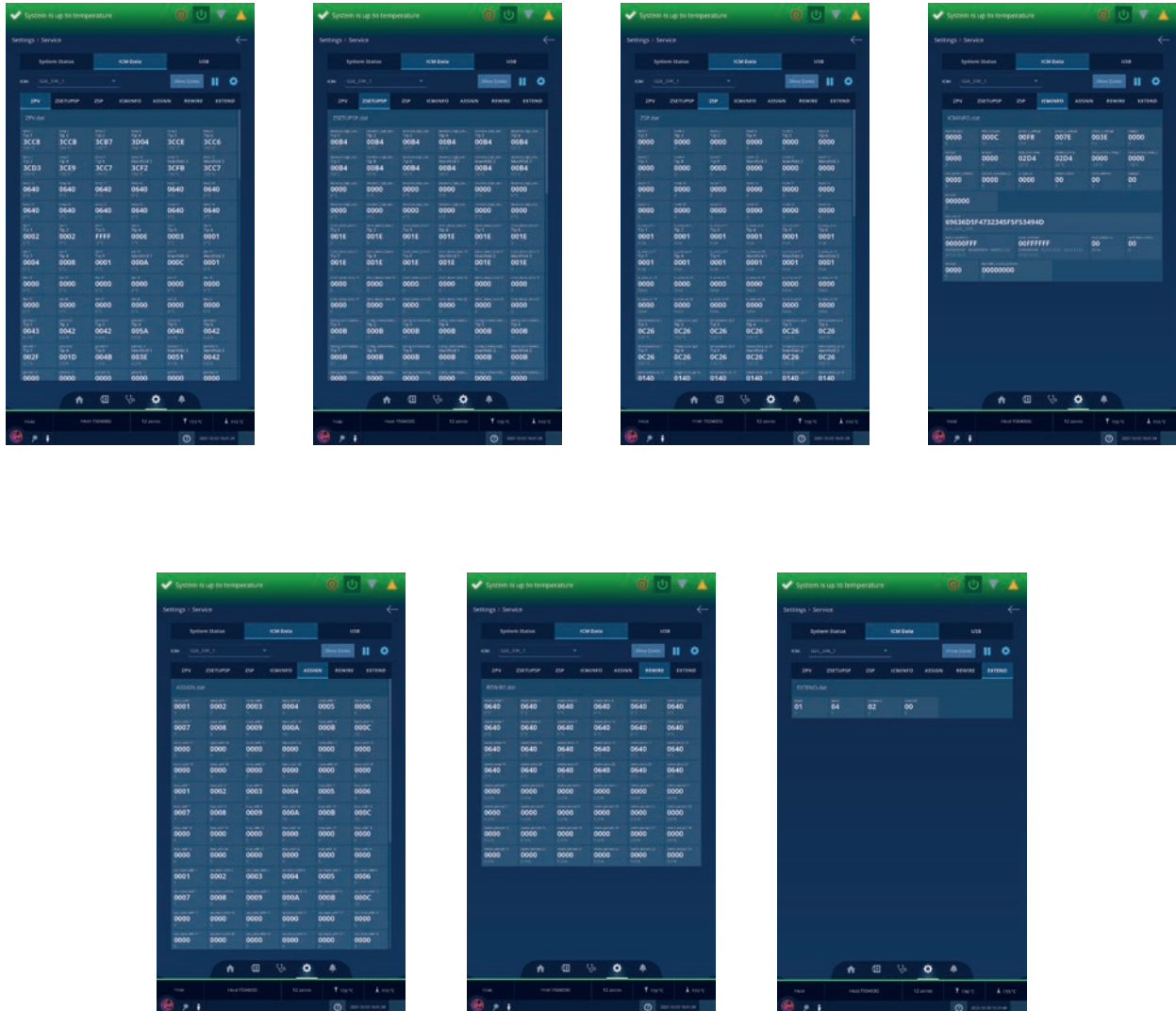


Fig. 117 Settings - Tools - Service - ICM data



6.3.8.3 Tools > USB

This screen provides data for System evaluation and troubleshooting by engineering staff. Details of this screen available in the G25 Maintenance and Troubleshooting Manual.

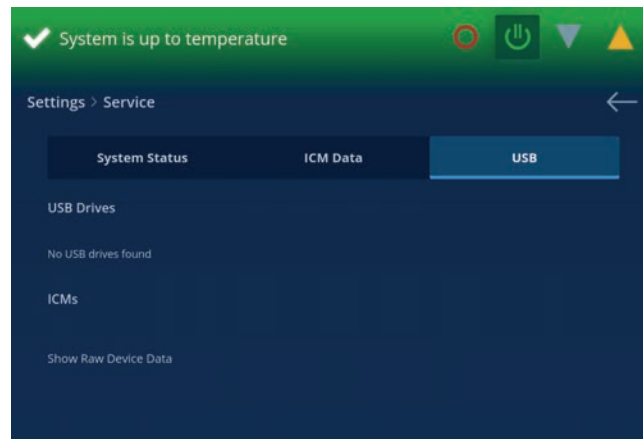


Fig. 118 Settings - Tools - Service - USB

6.3.9 Tools > Reports

This screen provides viewing of Fault, Wiring, and Thermodynamic reports.

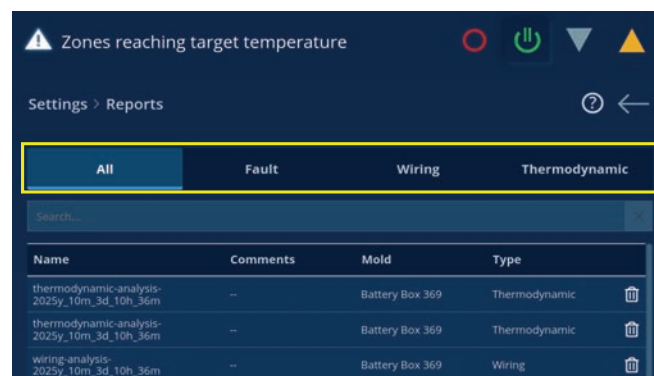


Fig. 119 Settings - Tools - Reports



6.3.10 Tools > Restore Factory Defaults

This screen provides for restoring of the factory default settings.
Details of this screen are available in the G25 Maintenance and Troubleshooting Manual.

NOTICE

Deletion of any or all the listed items cannot be reversed.

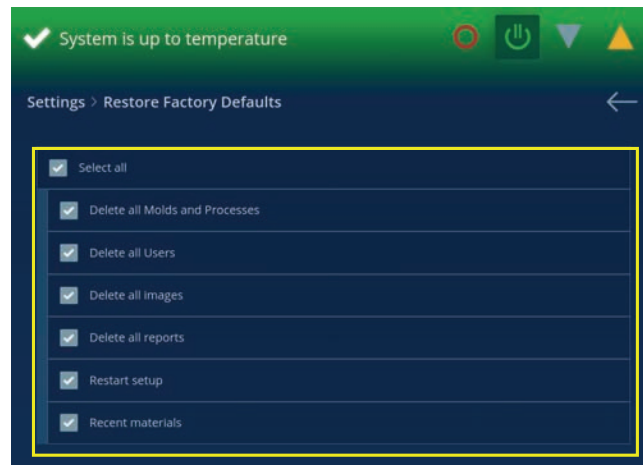


Fig. 120 Settings - Tools - Restore Factory Defaults

1. Select which settings to restore to factory defaults.
2. Touch “Yes” to proceed.
3. Confirm the action by touching “Yes” on the prompt again.

6.3.11 Tools > I/O Mapping

This screen provides access to the T/C Input Swap and Output Copy functions of the controller.

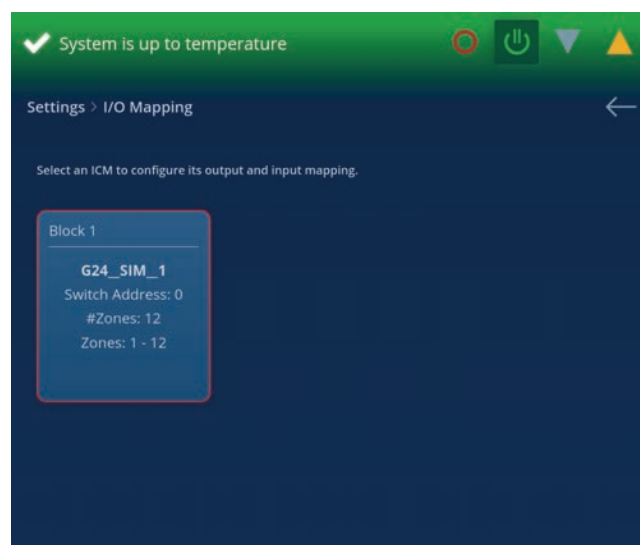


Fig. 121 Settings - Tools - I/O Mapping



T/C Input Swap

1. Touch the Block which contains the zone(s) to be swapped to proceed.

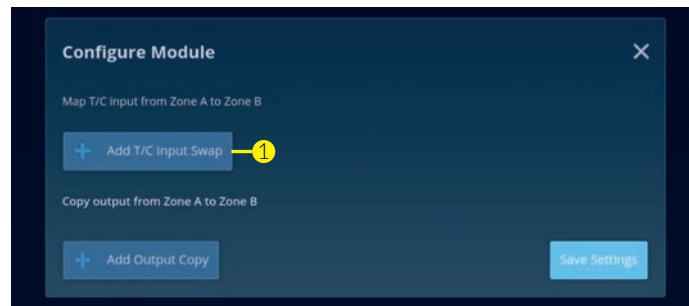


Fig. 122 I/O Mapping - T/C Swap and Output Copy

2. Touch “Add T/C Input Swap” ① and the Zone A ② and Zone B ③ selections will be displayed.

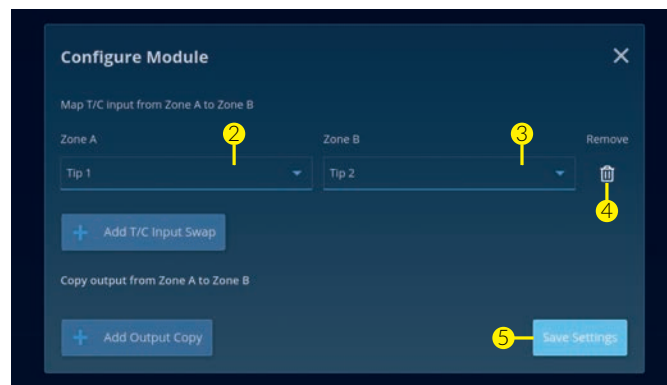


Fig. 123 I/O Mapping - T/C Swap Added

3. Touch the Expand Icon to display the zones which can be selected.
4. Select the zones to be swapped and then touch “Save Settings” ⑤.
5. Touch the Delete Icon ④ to Remove (delete) any entries.

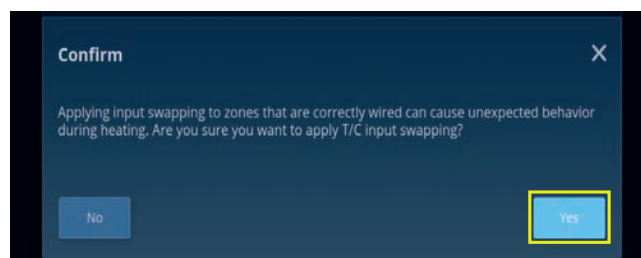


Fig. 124 I/O Mapping - T/C Swap Confirm Dialog

6. Touch “Save Settings” to confirm removal.

NOTICE

Applying input swapping to zones that are correctly wired can cause unexpected behavior during heating. Are you sure you want to apply T/C input swapping?



Output Copy

1. Touch the Block which contains the zone(s) to be copied to proceed.
2. Touch “Add Output Copy” ① and the Zone A ② and Zone B ③ selections will be displayed.

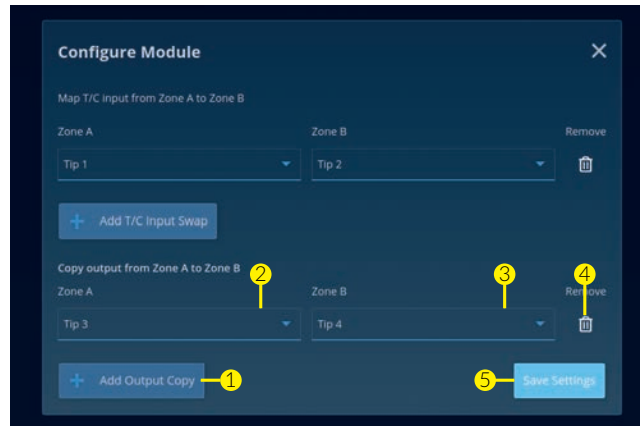


Fig. 125 I/O Mapping - Added Output Copy

3. Touch the Expand Icon to display the zones which can be selected.
4. Select the zones to be copied and then touch “Save Settings” ⑤.
5. Touch the Delete Icon ④ to Remove (delete) any entries.
6. Touch “Save Settings” ⑤ to confirm removal.

6.3.12 Tools > Backup / Restore Database

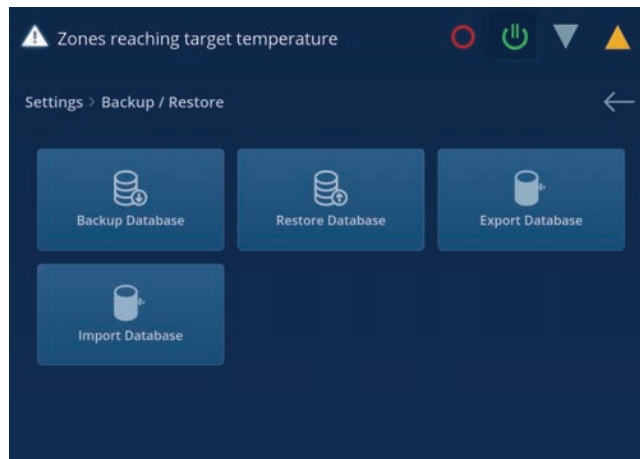


Fig. 126 Settings - Tools - Backup / Restore Database



On device backup and restore

1. Touch Backup Database to begin procedure.

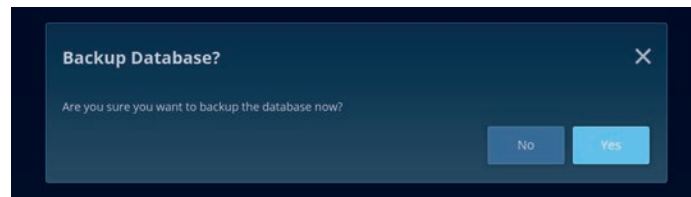


Fig. 127 Backup / Restore Database - Backup Database

2. Touch “Yes” to confirm creating the backup.
3. Creating the backup may take several minutes. Do not turn off the controller during this time.

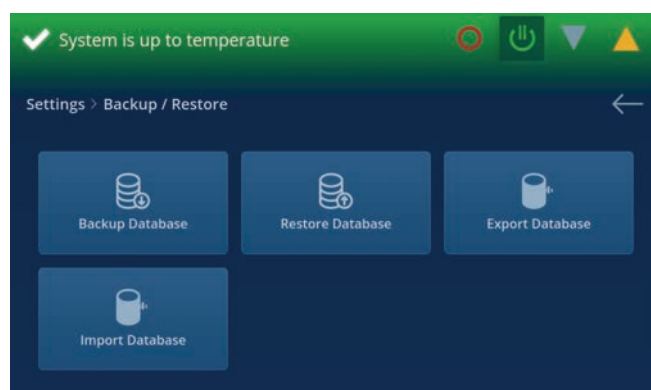


Fig. 128 Backup / Restore Database - Backup Progress

4. When a backup is available, touch “Restore Database” to begin procedure.

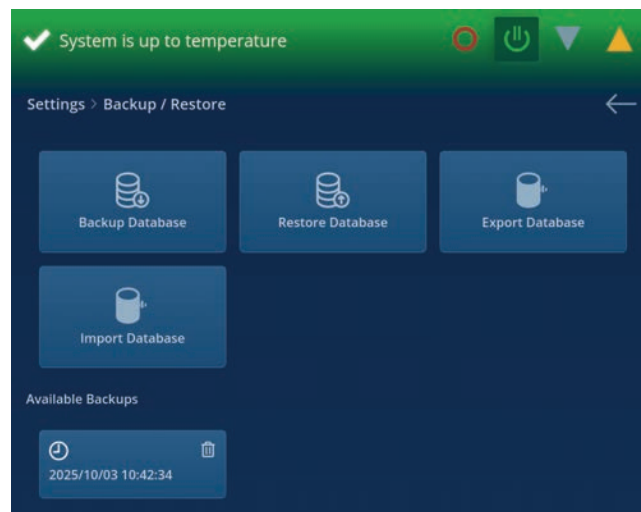


Fig. 129 Backup / Restore Database - Restore Database

5. Select the desired backup from the provided list and touch “Restore”.

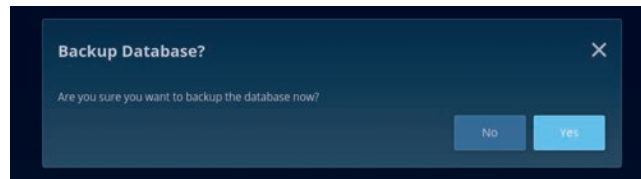


Fig. 130 Backup / Restore Database - Restore Database Dialog

6. Touch “Yes” to confirm restoring the backup.
7. Restoring the backup may take several minutes. Do not turn off the controller during this time.

Export / Import via USB drive

1. Insert a FAT32 formatted USB drive into the controller’s USB port.
2. Touch Export Database to begin procedure.

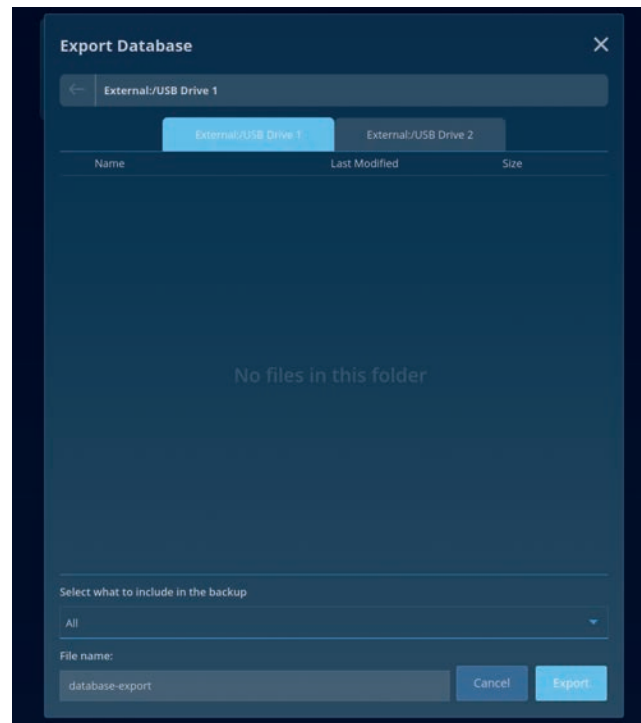


Fig. 131 Backup / Restore Database - Export Database

3. Select the desired data to be exported.
4. Then choose the desired location on the USB drive and a filename.
5. Touch “Export”.
6. If a USB drive with a valid database backup is inserted, touch Import Database to begin procedure.

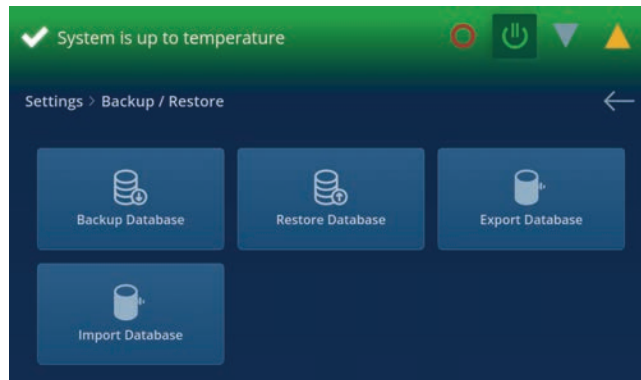


Fig. 132 Backup / Restore Database - Import Database

7. Select the desired backup from the list and confirm overriding of the current database.

6.3.13 Tools > Find Zones

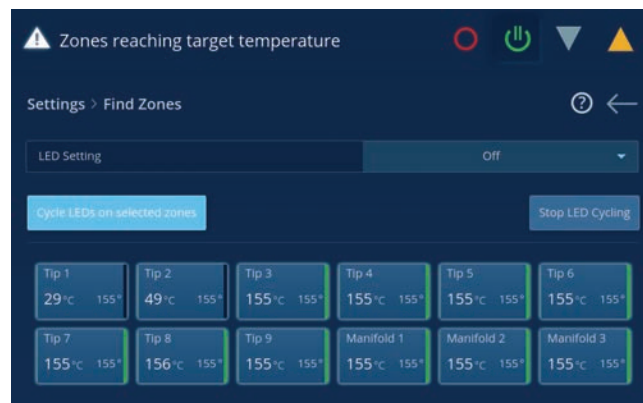


Fig. 133 Settings - Tools - Find Zones

1. Touch at least one zone to display the LED Setting selections.

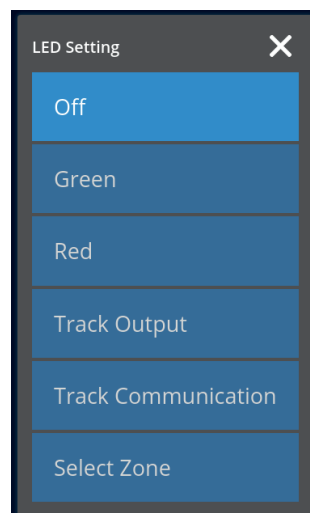


Fig. 134 Find Zones - LED Options



Option	Description
Off	Selected zone(s) LED will be turned off.
Green	Selected zone(s) LED will be illuminated green.
Red	Selected zone(s) LED will be illuminated red.
Track Output	Selected zone(s) LED will light up when the corresponding heater is active.
Track Communication	Selected zone(s) LED will light up when the ICM communicates to the output module.

Tab. 39 Find Zones Settings

2. Touch Cycle LEDs on selected zones to start LED cycling.
3. Touch Stop LED cycling to stop LED cycling.



6.3.14 Tools > Historical Data

This screen allows to store process data in regular intervals for later retrieval and analysis. Details of this screen available in the G25 Maintenance and Troubleshooting Manual.

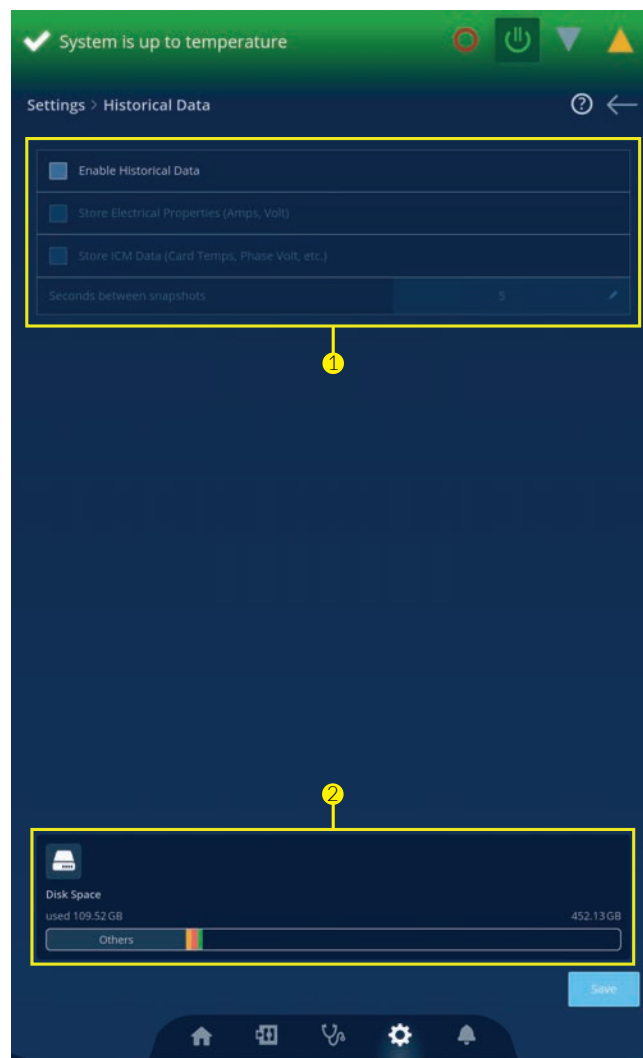


Fig. 135 Settings - Tools - Historical Data

1. Enable or Disable Historical Data logging **1**. This will store the current process data including zone temperatures and setpoints in the chosen time interval.
2. Decide if you also want to include electrical properties for each zone.
3. Decide if you also want to include ICM data (such as Card temperature and Supply voltage).
4. Since the database can grow quite large over time, you can monitor the available space on the controller **2**.
5. Once the remaining disk space is less than 5 %, the oldest data will be deleted automatically.



6.4 Favourites

6.4.1 Search Function

To quickly find specific settings or features, you can use the search function.

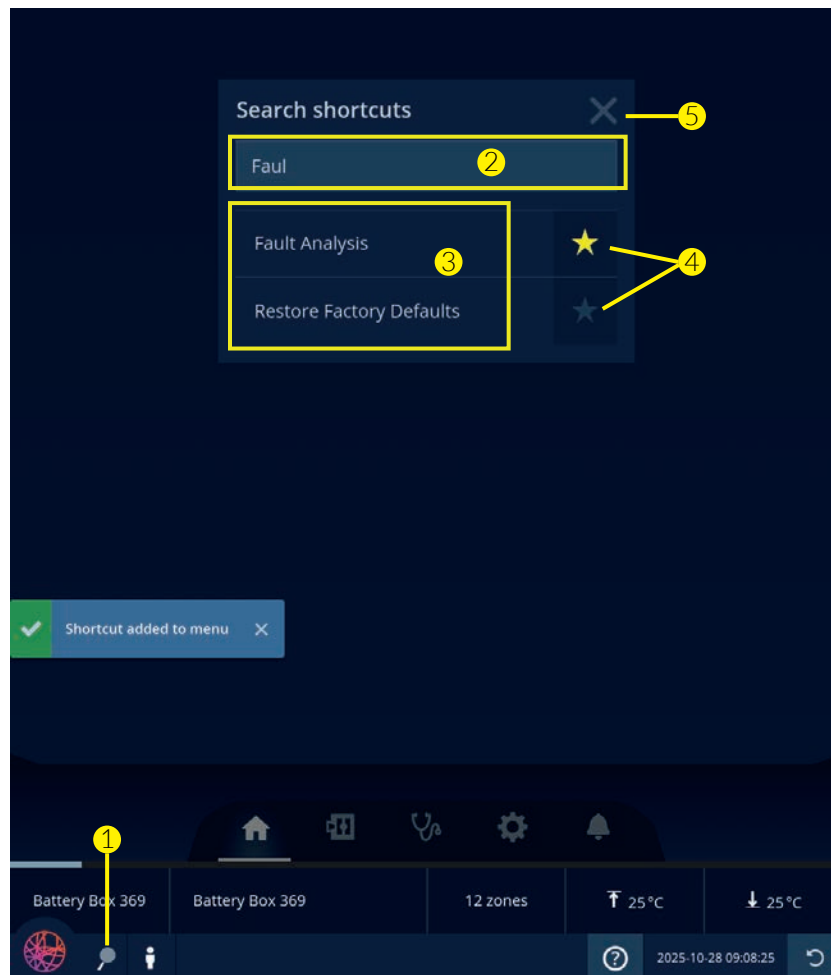


Fig. 136 Search Menu

1. To access it, touch the  icon in the bottom left corner of the screen ①.
2. Afterwards type the feature or setting you are looking for into the search bar ②.
As you type, the list of results will update to match your search term.
3. Click on the desired feature or setting in the results list ③ to navigate directly to it.
4. To close the search menu, touch the  icon ⑤.



6.4.2 Favourites

1. To add a feature or setting to your “Favourites” list, first open the search menu as described above.
2. Then, touch the  icon next to the desired feature or setting from the search results  .
This will add it to your “Favourites” list for quick access later.

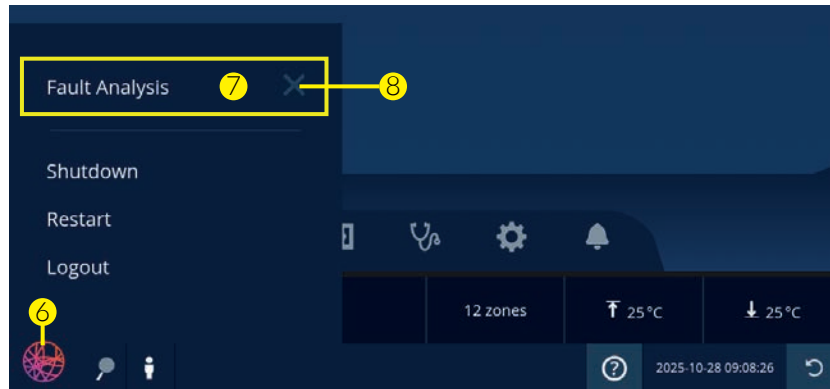


Fig. 137 Favourites Menu

3. To access the “Favourites” list, touch the  icon  in the bottom left corner of the screen.
4. To navigate to the desired feature or setting, touch the corresponding item from the list .
5. To remove it from the list of favourites, first open the menu as described above.
6. Then, touch the  icon next to the desired feature or setting .



7 Further information

7.1 Extinguish burning components



WARNING

Hazard due to electric shocks and burns when extinguishing

Electric shocks and burns can occur if the components are not extinguished in accordance with the instructions.

- Only trained persons may extinguish the components with fire extinguishers provided by the operator.
- The use of water fire extinguishers may result in the transfer of electricity during extinguishing if components are still energized.
- The use of carbon dioxide fire extinguishers can cause asphyxiation in confined spaces without ventilation.
- The power supply to the controller and the injection molding machine must be disconnected. The capacitors of the controller may need to discharge for 5 minutes.
- A minimum distance must be kept when extinguishing to avoid burns and electric shocks.

1. Remove all persons from the danger area.
2. Inform the company fire department.
3. Disconnect the power supply to the Temperature Controller and the Injection Molding Machine.
4. If necessary, discharge the capacitors of the controller for 5 minutes.
5. Extinguish the controller with the fire extinguisher provided by the operator, taking into account the minimum distance.
6. You have extinguished the Temperature Controller components.

7.2 Transport components

Transport the Temperature Controller components only in the original packaging.

Observe all ambient conditions from the technical data.

Do not expose the Temperature Controller components to direct sunlight.

Do not throw or drop the packaging containing the Temperature Controller components.

Make sure that the packaging is not damaged. Replace the damaged packaging.

Do not expose the packaging to moisture.

7.3 Store components

Store the Temperature Controller components only in the original packaging.

Observe all ambient conditions from the technical data.

Do not expose the Temperature Controller components to direct sunlight.

Storage must take place inside a building. Outdoor storage is not permitted.



7.4 Acceptance of delivery

Upon receipt, check the delivery for accuracy, completeness and possible damage.
Contact the manufacturer immediately if there is a complaint.
Complain about the faulty delivery to the deliverer.

7.5 Cleaning components



⚠ DANGER

Danger to Life by Electric Shock

The electrical cables connected to the Controller System, Injection Molding Machine and Hot-Runner are under high voltage.

Serious personal injury or death can result from electrical contact.

- Electrical equipment may only be operated, maintained and cleaned by trained electricians.
- Verify that all power source connections are properly grounded.
- In emergency case switch all systems off.
- When working on the Temperature Controller, always observe the 5 safety rules of electrical engineering to prevent personal injury and damage to property.



⚠ WARNING

Hazard due to hot surfaces

If the skin comes into contact with the hot injection mold, burns may occur.

- Wear protective clothing: thermal gloves, thermal apron and face shield to protect against burns.
- When working on the hot runner system outside of the manifold plates, pay special attention to warning labels that indicate the hot surfaces.
- Allow the hot surfaces to cool before starting work.





! WARNING

Hazard due to hot plastic

Never operate valve gates with the injection molding machine safety doors open. Serious injuries from hot plastic are possible.

- Before entering the mold, make sure that the residual pressure has been released from the hot runner system.
- Do not operate the valve gates if there are persons in front of the hot runner nozzles or the valve gate areas.
- Wear the appropriate personal protective equipment.



Prerequisites:

- The injection molding machine and the Temperature Controller are switched off.
- All relevant power supplies are disconnected.
- The injection molding machine is open enough to reach all components.
- There are no persons in the danger zone.
- Fresh cleaning cloth, soap and warm water.

NOTICE

Do not use aggressive cleaning substances such as gasoline or solvents in order to avoid damage to the Temperature Controller components.

1. Clean all components with the slightly soaked cleaning cloth and some soap.
2. Dry all cleaned components completely.
3. Put the components and the injection molding machine back into operation.
4. You have cleaned the components.



7.6 Dispose components

Disposal of Temperature Controller should involve the recycling of basic materials.

Disposal must not be made via the residual waste.

The manufacturer rejects any responsibility for health and safety risks to personnel or other damages caused by the reuse of individual parts for a purpose other than the originally specified purpose.

- Remove electrical components and process through your recycling program.
- Dismantle cables and dispose them in accordance with local environmental regulations.

NOTICE

Metal parts must be separated for recycling (scrapping, collection points).

It is necessary to comply with the instructions from competent firms authorized to dispose of the specific materials.

7.7 Dispose of packaging materials

Packaging materials (e.g. paper, cardboard, carton and plastic foil) are important raw materials.

Dispose of the packaging materials in an environmentally friendly manner and recycle them.

7.8 Dispose electric

Disposing of the electric devices can be done via a recycling center. Alternatively, they can be dropped off at electronics stores. Do not dispose the device with the residual waste.

If there is sensitive data on the memory of the device, it must be deleted or the memory must be destroyed before disposal.

8 Frequently Asked Questions

Question	Answer
Can the controller work with both "J" and "K" type thermocouples?	Yes. This is a User Management selection. NOTICE The thermocouple cable type must match the selection used as an incorrect type will generate inaccurate temperature readings which may cause damage to the mold.
Can the controller be converted from DELTA mains power to WYE mains power (or the reverse)?	Yes. This requires some wiring changes. NOTICE Depending upon the specific controller configuration, the main circuit breaker may need to be replaced as well as the input power cable to meet electrical standards. Please contact Barnes Molding Solutions for details.
Can additional mold heater zones be added in the field?	Case by Case. Since additional hardware and wiring would be required, the ability to add zones depends upon the specific controller configuration. Contact Barnes Molding Solutions for details.
Where is the serial number located and how to read it?	The serial number is located on a nameplate attached to the controller enclosure, usually on the rear side. It is in the format of 0222-48999-01. 0222 indicates February of 2022, 48999 is the order number, and 01 indicates the controller number (for example: 02 is the second controller on the same order number).



What are the symptoms of an un-grounded thermocouple problem?	This problem is often indicated by temperature fluctuations that are erratic and greater than thermally possible. The temperature is moving faster than is "thermally possible". An example would be immediate temperature readings of 400, 420, 380, 410, etc. This indicates that the temperature value reported is not accurate. For corrective measures, refer to the Troubleshooting and Maintenance Manual.
When should the Power Priority™ feature be utilized?	This feature is often used on "low mass" or extremely small hot runner nozzles to smooth the power output fluctuations and ultimately the melt heat history. See Section 6.2.3.8 Power Priority for additional details.
How to manually adjust temperature control tuning?	When the Mold Wizard feature is used to set up a mold, and all the required steps are completed successfully, the optimum temperature tuning values that were determined during the mold heat up process will be saved. However, if some additional adjustment is desired, the Tuning Override setpoint can be used for this purpose. See Section 6.2.3.3 Tuning Override for additional details regarding how and when to use this function.
What is Watt Alarm Monitor (Plastic Leak Detection) and why should it be used?	When the Mold Wizard feature is used to set up a mold, and all the required steps are completed successfully, the Plastic Leak Detection feature will automatically determine and save the average wattage of each zone. It will cause the Watt Alarm to activate when the wattage of the zone exceeds the normal wattage plus the Tolerance (%) setting. This can be an excellent tool in detecting material leaks in the mold. Typically, when material leaks into the air spaces of a tool, the material acts as a heat sink, pulling heat away from where it is supposed to go. This causes the heaters near the leak to work harder to maintain setpoint which results in more wattage being applied. By detecting this abnormal level of wattage in a zone, the G25 Controller thereby provides an early warning of a leak. Catching the problem early can greatly minimize the time needed to clean up the leak in the tool. See Section 5.6.1 Plastic Leak Detection for additional details.

Tab. 40 Frequently Asked Questions

9 Legal Disclaimer

The descriptions and instructions contained in this documentation are intended to make it easier for you to use our product. However, no legal obligations or guarantees by the manufacturer going beyond the supplier agreement can be derived from the statements and descriptions included in the documentation; only the order and our order confirmation in connection with our General Terms and Conditions shall be authoritative with regard to the contractual relationship with the customer.

Descriptions and technical data contained in the documentation in particular do not constitute trade descriptions in a legal sense. The manufacturer shall not be liable for any damage resulting from errors in the documentation, in particular claims for compensation for damage other than to the delivered item itself.

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