mastip™
hot runner solutions


# Meticom TC5H
# Temperature Control System
# User Guide

www.mastip.com

## Safety

Mastip products are designed to be safe and simple to operate. When operating any electrical/electronic equipment, observe standard safety procedures to protect yourself and the equipment. Also ensure that all wiring complies with local regulations.

Mastip Technology recommends that you:

1. Do not apply voltage to a terminal that exceeds the rating specified by that terminal.
2. Do not operate this controller without its covers and panels.
3. Do not operate this controller when wet.
4. Do not operate this controller in an explosive and corrosive atmosphere.
5. Do not supply the voltage that is not within the limit specified.
6. Use only the correct amperage fuse.

Caution: This device contains no user serviceable parts and requires special equipment and specialised engineers for repair. Please contact Mastip for repair or further information.

Warning: The control system must be located to allow free movement of air and limited exposure to heat, dust, dirt, moisture, and corrosive vapours. You must be able to easily access the front panel and the rear panel of the temperature controller.

## Features & Specifications

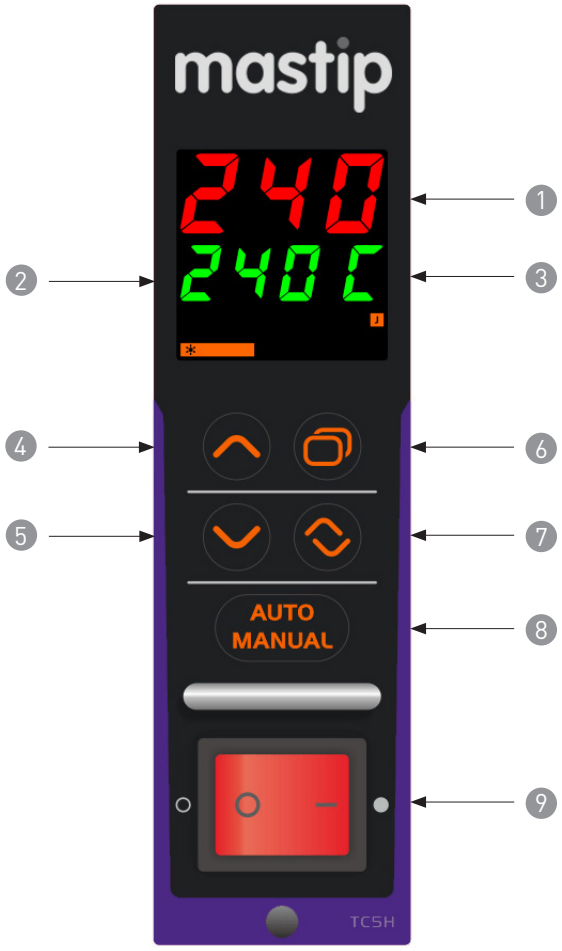
### Features

- Dual lines LCD display
- SV / PV temperature control
- Unit display
- Auto / Manual function
- PID auto temperature control
- Soft start function
- J or K thermocouple types
- ºC or ºF temperature scales
- Six alarm modes
- Zero cross or phase angle trigger output modes
- Over voltage protection
- Current / TRIAC / Fuse break detector
- Thermocouple break and inverse detector
- Thermocouple range 0 - 600ºC or 32 - 999ºF

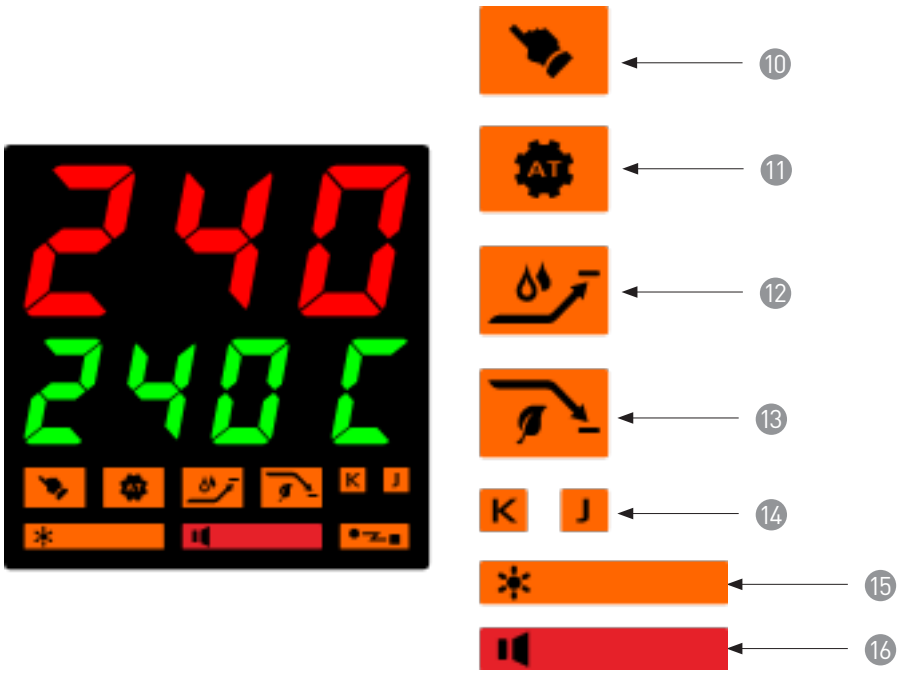
### Specifications

- Power input: 230Vac ± 10%, 50 / 60Hz
- Power consumption: 3W per module
- Output power: 3450W, 15A / 230Vac
- Storage temperature: -20ºC - 70ºC (-4ºF - 158ºF)
- Operation temperature: -10ºC - 50ºC (14ºF - 122ºF)
- Operation Humidity: 10 - 80% RH (non-condensing)
- Control accuracy: ± 0.25%FS
- Measure accuracy: ± 0.25%FS

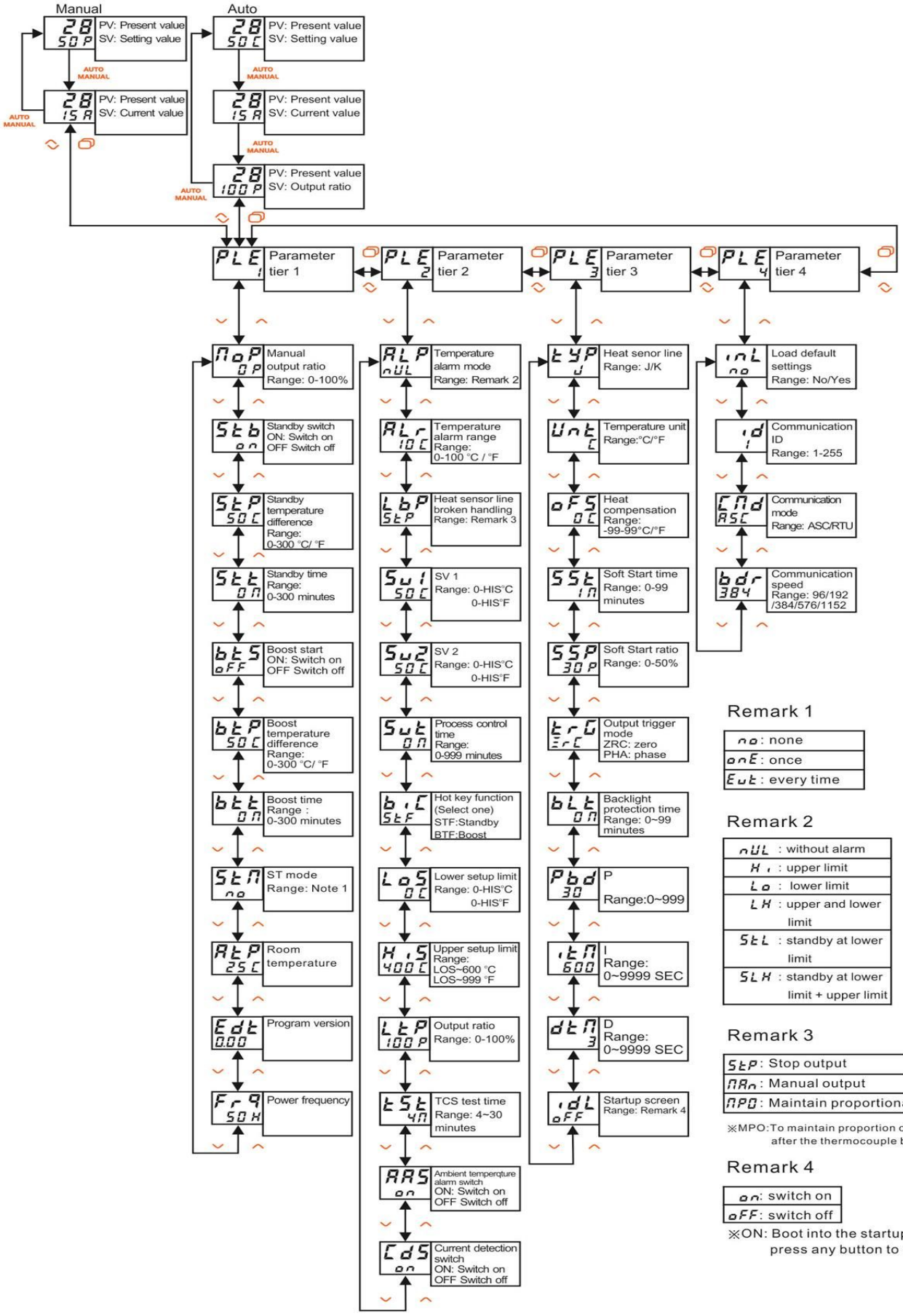
## Face Plate Description




1. Present Value (PV)
2. Set Value (SV)
3. Temperature Unit
4. Increase Key
5. Decrease Key
6. Function Key
7. Set Key
8. Auto/Manual Mode Key
9. Power Switch
10. Manual Output Indicator
11. AT (Auto Tuning) Indicator
12. Soft Start Indicator
13. Standby/Boost Indicator
14. Thermocouple Type
15. Heater Output Indicator
16. Alarm Indicator



## Parameter Flow Chart




### Remark 1

| |
|---|
| no : none |
| onE : once |
| Eut : every time |

### Remark 2

| |
|---|
| nUL : without alarm |
| H, : upper limit |
| Lo : lower limit |
| LH : upper and lower limit |
| StL : standby at lower limit |
| SLH : standby at lower limit + upper limit |

### Remark 3

| |
|---|
| StP : Stop output |
| MAn : Manual output |
| MPO : Maintain proportional output |

※MPO:To maintain proportion of output after the thermocouple broke.

### Remark 4

| |
|---|
| on: switch on |
| oFF: switch off |

※ON: Boot into the startup screen, then press any button to escape.

## Operating Modes

The TC5H unit has a main mode and parameter mode.
Press to switch to parameter mode.

MAIN MODE: The PV window displays the actual temperature value. The SV window displays the set point temperature. Use to adjust SV value.

PARAMETER MODE: In the PV display window the parameter name is displayed.
In the SV display window the parameter value is displayed. Use to modify values.

## Control Modes

AUTO MODE: The unit automatically controls the temperature in a closed loop (PID control).
MANUAL MODE: The user sets the required percentage power for the unit to output. The unit operates in open loop mode.

To switch between manual and auto mode hold down the AUTO MANUAL button for 2 seconds.
Manual mode indicator will light up when in manual mode.

## Soft Start

Condensation due to humidity may cause the heater to burn out. To avoid heater burn out use the soft start function. This function allows the unit to output a low level current to dry out the heater. Use soft start function whenever the unit has been off for a long period of time.

The soft start is controlled by soft start percentage (SSP) & soft start time (SSt) parameters.

After power on if: SV > PV & PV < 120°C & Auto Mode ON & PID tuning function is disabled, the soft start will execute.
Set SSt to zero to disable soft start.

To switch between soft start and manual/auto mode hold down the + buttons for 1 second.

## PID Auto Tuning Function

The PID auto tuning function configures the unit for optimal temperature control in a specific system.
Run PID auto tuning on initial set up or when a heater or thermocouple has been changed.
The optimised PID parameters are stored in the internal memory.

To activate Auto Tuning:
SV - PV (the difference between SV and PV) > 30°C (86°F) and PV - room temperature (the difference between PV and RT) < 30°C (86°F).

During PID auto tuning execution the AT indicator will flash.
On completion of PID Auto Tuning the AT indicator stops flashing and the unit reverts to auto mode.

## Standby Function

Standby operation allows the user to temporarily decrease the temperature by a pre-set amount specified for each zone. This feature can be used to allow the user to spend some time to complete any setup or modification to the operating parameters, or if the mold or molding machine needs to be stopped temporarily. Standby mode reduces the risk of the polymer in the runner system degrading if left at an elevated temperature for too long.

To activate Standby Function ensure parameter setting b.C is set to StF.
Then select either:

1. All modules Standby Mode (use left most module): ( ∧ ) • 2 sec
2. Individual module Standby Mode (on each module): ( ∨ ) • 2 sec

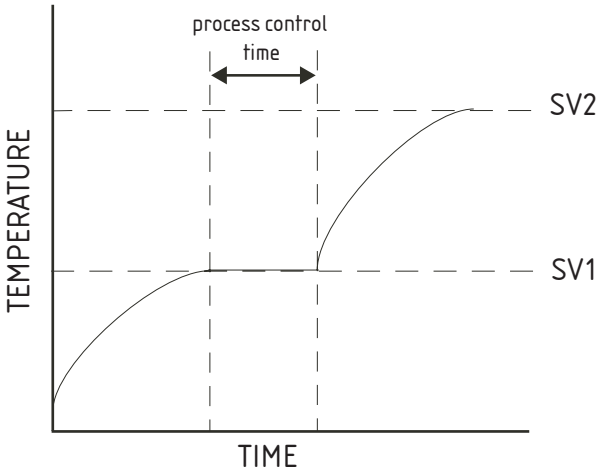
## Boost Function

The Boost function allows the user to temporarily increase the temperature by an amount specified for each zone. This feature can be used where a system may require an elevated temperature to start, and then lowered to the SV temperature when the mold is cycling normally.

To activate Boost Function ensure parameter setting b.C is set to btF.
Then select either:

1. All modules Boost Mode (use left most module): ( ∧ ) • 2 sec
2. Individual module Boost Mode (on each module): ( ∨ ) • 2 sec

## Process Control




On start up the temperature will increase to the set SV1 parameter. It will remain at this temperature for the set process control time (tCt).The temperature will then increase to the set SV2 parameter.

Note: This function only applies if the process control (StC) parameter is YES.

## Before Connecting the Power

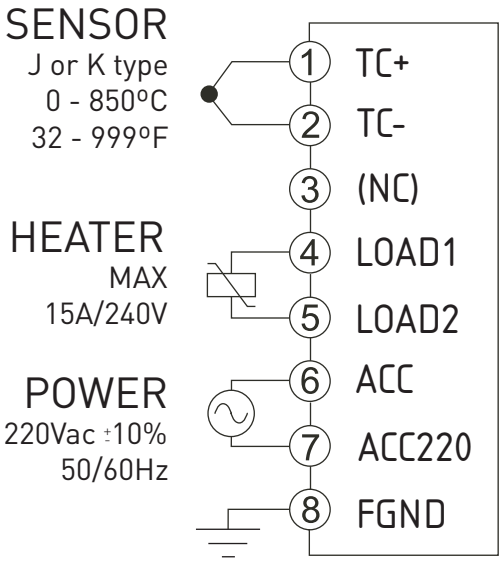
- Use a Mega ohm meter to check each heater lead. Resistance to ground should be greater than 2MΩ @ 600 VDC
- Check the negative (-) and positive (+) thermocouple wires are connected to the correct terminals
- Measure the continuity between negative (-) and positive (+) thermocouple leads with an ohm meter
- Use an ohm meter to measure between heater power leads. Calculate the resistance with the formula below

$$\Omega = V^2 / W$$

## Connecting Input Power to the Mainframe

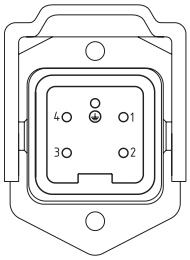
Always check the serial number label to confirm the system voltage.
All main frames are wired for 240 volts, line to neutral 50/60 Hz, 3 phase power.
If single phase operation is required, it must be specified at time of order.
Always check the power supply configuration of the controller matches the supply power configuration.

## TC5H Edge Connector



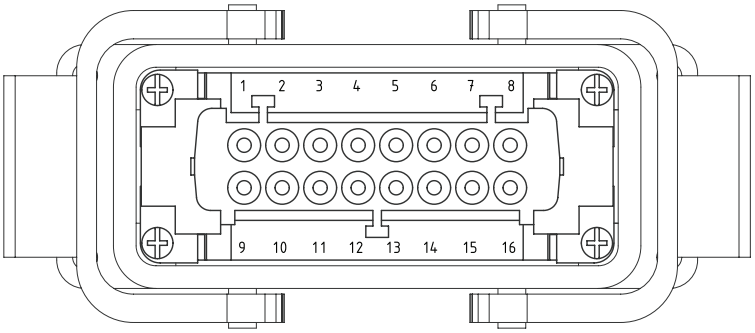
## 5 Pin Female Combination Power and Thermocouple Connector for 1 Zone Controller

10A Max



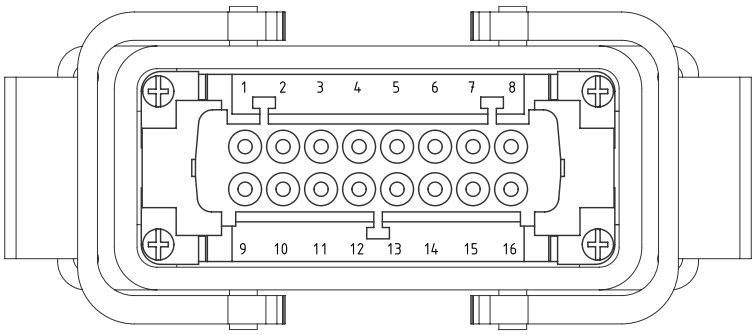

| 1 Zone, 5 Pin Mould Connector | | |
|---|---|---|
| Zone | Pin | Connection |
| 1 | 1 | Power |
| | 2 | Thermocouple + |
| | 3 | Thermocouple - |
| | 4 | Return |
| | ⏚ | Ground |

## 16 Pin Female Combination Power and Thermocouple Connector for 2 Zone Controller



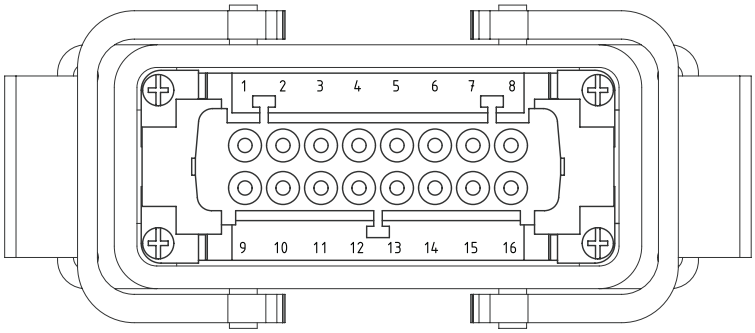

| 2 Zone, 16 Pin Mould Connector | | |
|---|---|---|
| Zone | Pin | Connection |
| 1 | 1 | Power |
| | 2 | Return |
| | 9 | Thermocouple + |
| | 10 | Thermocouple - |
| 2 | 3 | Power |
| | 4 | Return |
| | 11 | Thermocouple + |
| | 12 | Thermocouple - |
| | ⏚ | Ground |

## 16 Pin Female Combination Power and Thermocouple Connector for 4 Zone Controller



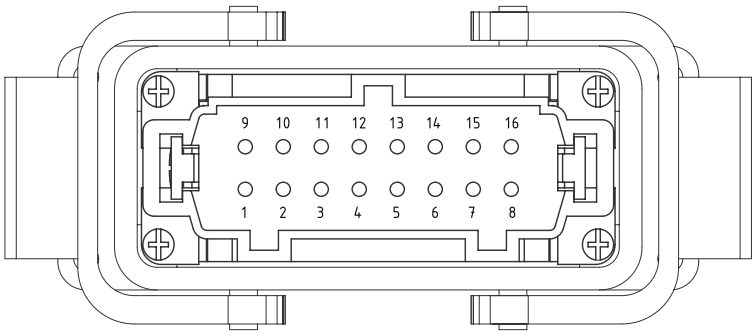

| 4 Zone, 16 Pin Mould Connector | | |
|---|---|---|
| Zone | Pin | Connection |
| 1 | 1 | Power |
| | 2 | Return |
| | 9 | Thermocouple + |
| | 10 | Thermocouple - |
| 2 | 3 | Power |
| | 4 | Return |
| | 11 | Thermocouple + |
| | 12 | Thermocouple - |
| 3 | 5 | Power |
| | 6 | Return |
| | 13 | Thermocouple + |
| | 14 | Thermocouple - |
| 4 | 7 | Power |
| | 8 | Return |
| | 15 | Thermocouple + |
| | 16 | Thermocouple - |
| | ⏚ | Ground |

## 16 Pin Female Power Connector for 6 Zone Controller



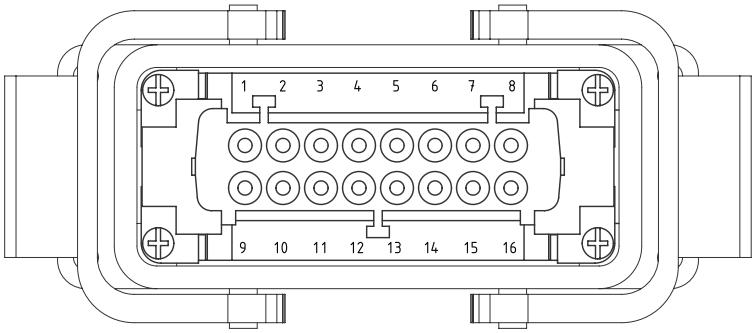

| 6 Zone, 16 Pin Mould Connector | | |
|---|---|---|
| Zone | Pin | Connection |
| 1 | 1 | Power |
| | 9 | Return |
| 2 | 2 | Power |
| | 10 | Return |
| 3 | 3 | Power |
| | 11 | Return |
| 4 | 4 | Power |
| | 12 | Return |
| 5 | 5 | Power |
| | 13 | Return |
| 6 | 6 | Power |
| | 14 | Return |
| | ⏚ | Ground |

## 16 Pin Male Thermocouple for 6 Zone Controller



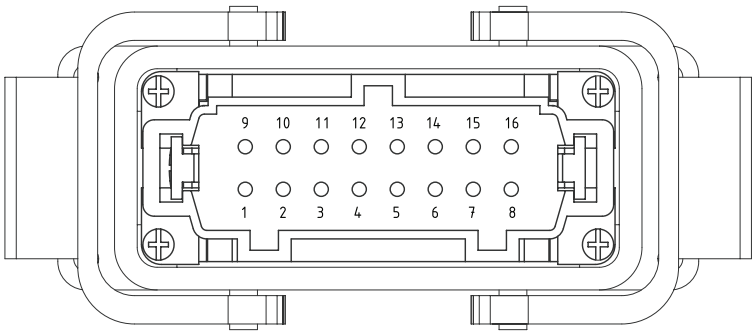

| 6 Zone, 16 Pin Mould Connector | | |
|---|---|---|
| Zone | Pin | Connection |
| 1 | 1 | Thermocouple + |
| | 9 | Thermocouple - |
| 2 | 2 | Thermocouple + |
| | 10 | Thermocouple - |
| 3 | 3 | Thermocouple + |
| | 11 | Thermocouple - |
| 4 | 4 | Thermocouple + |
| | 12 | Thermocouple - |
| 5 | 5 | Thermocouple + |
| | 13 | Thermocouple - |
| 6 | 6 | Thermocouple + |
| | 14 | Thermocouple - |
| | ⏚ | Ground |

## 16 Pin Female Power Connector for 8 Zone Controller



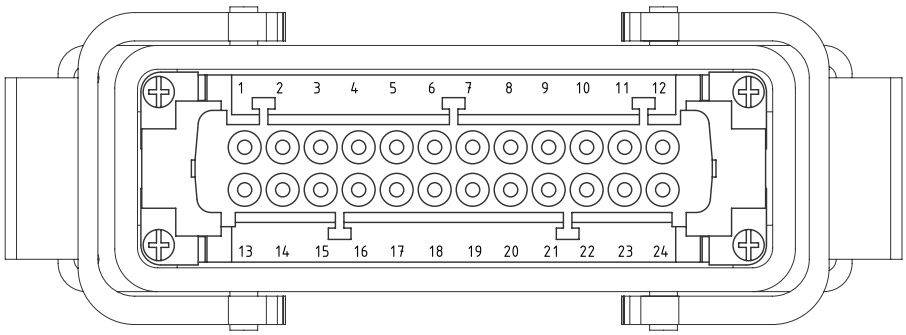

| 8 Zone, 16 Pin Mould Connector | | |
|---|---|---|
| Zone | Pin | Connection |
| 1 | 1 | Power |
| | 9 | Return |
| 2 | 2 | Power |
| | 10 | Return |
| 3 | 3 | Power |
| | 11 | Return |
| 4 | 4 | Power |
| | 12 | Return |
| 5 | 5 | Power |
| | 13 | Return |
| 6 | 6 | Power |
| | 14 | Return |
| 7 | 7 | Power |
| | 15 | Return |
| 8 | 8 | Power |
| | 16 | Return |
| | ⏚ | Ground |

## 16 Pin Male Thermocouple for 8 Zone Controller



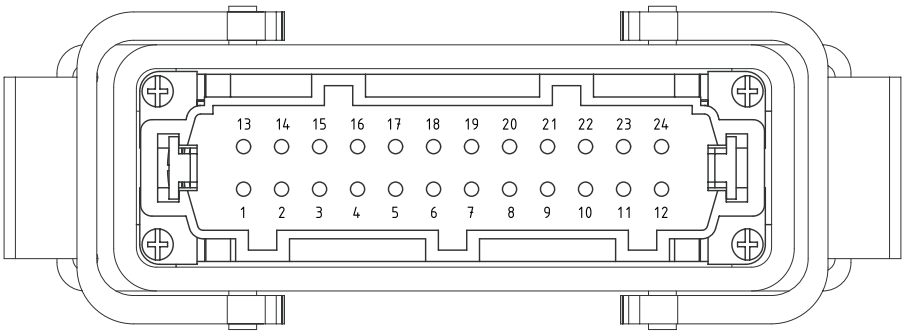

| 8 Zone, 16 Pin Mould Connector | | |
|---|---|---|
| Zone | Pin | Connection |
| 1 | 1 | Thermocouple + |
| | 9 | Thermocouple - |
| 2 | 2 | Thermocouple + |
| | 10 | Thermocouple - |
| 3 | 3 | Thermocouple + |
| | 11 | Thermocouple - |
| 4 | 4 | Thermocouple + |
| | 12 | Thermocouple - |
| 5 | 5 | Thermocouple + |
| | 13 | Thermocouple - |
| 6 | 6 | Thermocouple + |
| | 14 | Thermocouple - |
| 7 | 7 | Thermocouple + |
| | 15 | Thermocouple - |
| 8 | 8 | Thermocouple + |
| | 16 | Thermocouple - |
| | ⏚ | Ground |

## 24 Pin Female Power Connector for 12 Zone Contoller




| 12 Zone, 24 Pin Mould Connector | | |
|---|---|---|
| Zone | Pin | Connection |
| 1 | 1 | Power |
| | 13 | Return |
| 2 | 2 | Power |
| | 14 | Return |
| 3 | 3 | Power |
| | 15 | Return |
| 4 | 4 | Power |
| | 16 | Return |
| 5 | 5 | Power |
| | 17 | Return |
| 6 | 6 | Power |
| | 18 | Return |
| 7 | 7 | Power |
| | 19 | Return |
| 8 | 8 | Power |
| | 20 | Return |
| 9 | 9 | Power |
| | 21 | Return |
| 10 | 10 | Power |
| | 22 | Return |
| 11 | 11 | Power |
| | 23 | Return |
| 12 | 12 | Power |
| | 24 | Return |
| | ⏚ | Ground |

## 24 Pin Male Thermocouple Connector for 12 Zone Controller




| 12 Zone, 24 Pin Mould Connector | | |
|---|---|---|
| Zone | Pin | Connection |
| 1 | 1 | Thermocouple + |
| | 13 | Thermocouple - |
| 2 | 2 | Thermocouple + |
| | 14 | Thermocouple - |
| 3 | 3 | Thermocouple + |
| | 15 | Thermocouple - |
| 4 | 4 | Thermocouple + |
| | 16 | Thermocouple - |
| 5 | 5 | Thermocouple + |
| | 17 | Thermocouple - |
| 6 | 6 | Thermocouple + |
| | 18 | Thermocouple - |
| 7 | 7 | Thermocouple + |
| | 19 | Thermocouple - |
| 8 | 8 | Thermocouple + |
| | 20 | Thermocouple - |
| 9 | 9 | Thermocouple + |
| | 21 | Thermocouple - |
| 10 | 10 | Thermocouple + |
| | 22 | Thermocouple - |
| 11 | 11 | Thermocouple + |
| | 23 | Thermocouple - |
| 12 | 12 | Thermocouple + |
| | 24 | Thermocouple - |
| | ⏚ | Ground |

## Troubleshooting

| Problem | Check Item |
|---|---|
| No action after switching on the Power | • Check power mains is turned ON<br>• Check power phase for correct connection |
| Temperature control is not steady | • Execute PID Auto Tune |
| Temperature sensor wire breakage/reverse alarm | • Check for wire breakage or reverse connection on thermocouple |
| Temperature sensor wire short circuit alarm | • Check Temperature Sensor for correct wiring<br>• Check Temperature Sensor for short circuit |
| Control Circuit Anomaly Alarm | • Check heater for open circuit<br>• Check for loose wiring connection<br>• Check Control Module (TRIAC)<br>• Replace Control Module |
| Fuse Blown Alarm | • Replace fuse |

## Alarm Messages

| Displayed | Code | Description |
|---|---|---|
| - - - | - - - | Temperature Sensor Wire Breakage |
| tCr | TCR | Temperature Sensor Wire reversed connection |
| tCS | TCS | Temperature Sensor Wire short circuit |
| HtS | HTS | Heater short circuit |
| LPA | LPA | Control circuit abnormal |
| oLd | OLD | Overload |
| FSb | FSB | Fuse open circuit |
| EEP | EEP | EEPROM Error |
| Hi | HI | Upper limit alarm |
| Lo | LO | Lower limit alarm |

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