

Temperature control systems

- Industry Standard
- Simple Operation
- Low Cost

MASTIP™ Zone Controls were designed with a multitude of factors in mind, including: interchangeability, simplicity, durability, quality, low cost, etc. These factors have been achieved with the IMP (Intelligent Microprocessor) and AIM (Advanced Intelligent Microprocessor) Series Controllers.

Interchangeable

MASTIP™ Temperature Controllers are interchangeable with most existing systems, including: Athena (SPP), DME, EMI (DME), KONA and IMS. **MASTIP™** offers the most diverse line of controls in the industry; from the Open Loop PMR Module to the top of the line AIM Communication Module, from the smallest single zone portable control to the largest 96 zone control.

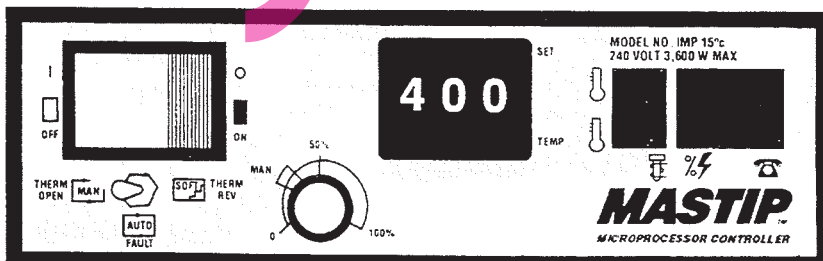
Simplicity

Ease of set-up and operation is engineered into each and every module and system that **MASTIP™** offers. Details such as similar displays, lamps, set-point

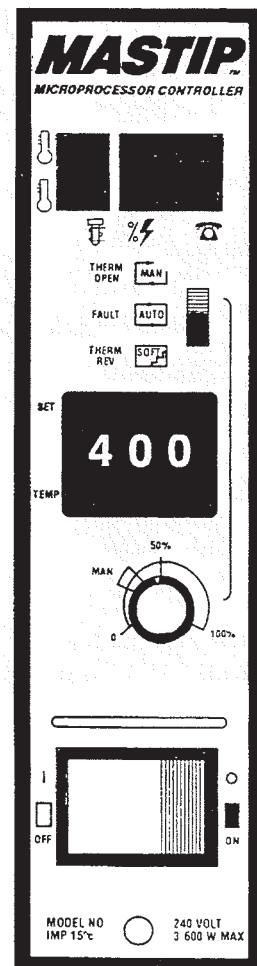
mechanisms, and graphics, make for quick learning and simple operation. In fact, these units are designed so well, that the only adjustment most users will make is the set-point temperature. Even in the event of a thermocouple failure, some modules will provide a % power output through PID to prevent downtime.

Other quality features that are incorporated into **MASTIP™** Temperature Controllers include:

- Practical, plug-in interchangeable modular systems
- Microprocessor-based self-tuning temperature controller
- CompuStep™ Heater Conditioning System
- CompuCycle™ Power Control System
- Built-in diagnostics
- Automatic power hold if thermocouple break
- Self regulating manual power controllers
- Main frames field convertible to global power supply mains



SINGLE ZONE TEMPERATURE CONTROLLER



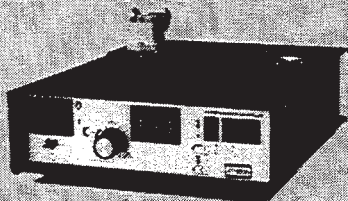
MULTIZONE TEMPERATURE CONTROL MODULE

Single and Multizone temperature control systems

USE FOR YOUR HOT SPRUE BUSHING OR OTHER SINGLE OR DUAL ZONE APPLICATIONS

Use for your hot sprue bushing or other single, dual zone applications.

Single Zone Integral Controller



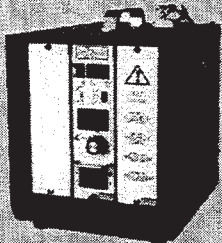
| Model No.** | Frame Connectors |
|-------------|--------------------------|
| PIM1B10 | NEMA - in 5 Pin - out |
| PIM1B15 | NEMA - in 5 Pin - out |

TERMINAL MOUNTING BOXES



| Catalog No. | Used With |
|-------------|-----------------|
| PTC1TB | PIM1B15 MFP1 |
| PTC2TB | MFFMP2 |
| PTCH1TB | MFHP1 |

Single Zone 15 Amp Main Frame*



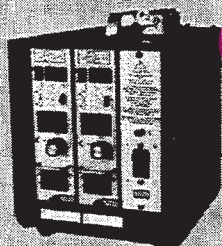
| Model No.** | Frame Connectors |
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| MFP1 | NEMA - in 5 Pin - out |

Single Zone 30 Amp Main Frame*

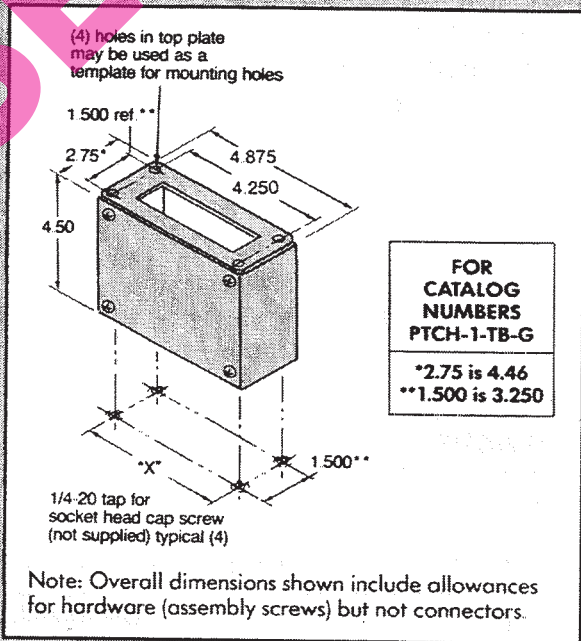


| Model No.** | Frame Connectors |
|-------------|-----------------------------|
| MFHP1 | Clamps - in Clamps - out |

Dual Zone 15 Amp Main Frame*



| Model No.** | Frame Connectors |
|-------------|---------------------------|
| MFFP2 | NEMA - in NEMA - out |
| MFFMP2 | Clamp - in 5 Pin - out |
| MFPR2 | NEMA - in 5 Pin - out |



CABLE

Combination Power and Thermocouple

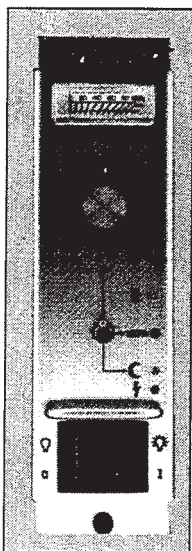
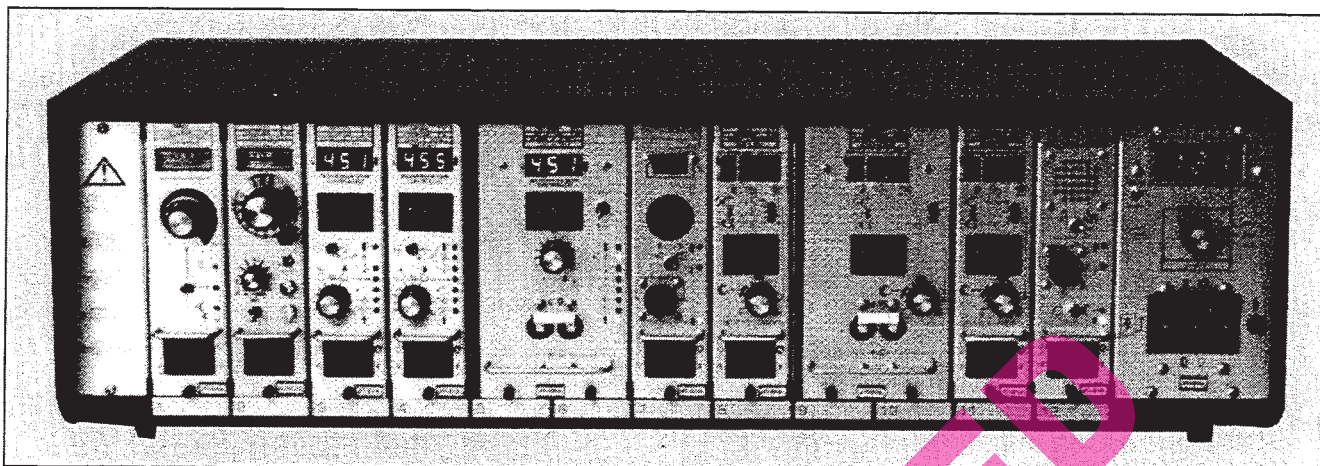
| Catalog No. | Length |
|-------------|---------------|
| MPTC10 | 10ft. (3.05m) |
| MPTC20 | 20ft. (6.10m) |



* Controller modules not included.

** Frame connections included.

Control modules and alarms



PMR

Low cost power control with automatic line voltage compensation. For open loop operation. No thermocouple required.

MODEL PMR15

15 AMP.....

On request only



FC

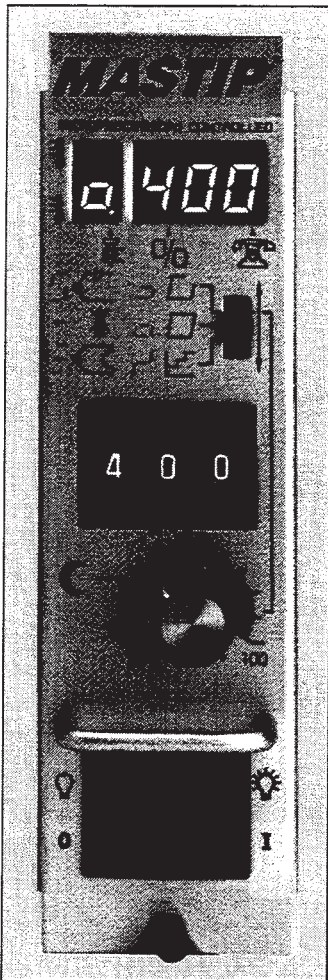
Accurate, low cost temperature control. Analog setpoint, analog deviation meter, automatic or manual operation.

MODEL FC15

15 AMP.....

On request only

SUPER COPIED

IMP series temperature modules**MODEL IMP 15**

15 AMP

MODEL IMP 30

30 AMP

IMP (Intelligent Microprocessor) Series Module provides one of the most technically advanced temperature controls available today. IMP modules use state-of-the-art microprocessor-based circuitry to perform all required PID functions. Units have built-in diagnostics and are fully self-tuning. Setpoint temperatures are maintained without the need to manually preset or adjust the control temperature. Merely set the desired temperature and turn the power on. The module will automatically sense the heat-up rate and control any setpoint temperature deviation.

These modules feature superior versatility, accuracy, reliability and cost efficiency. They are noted for their ease-of-operation and user friendly operation, including simultaneous digital setpoint and digital temperature indication. IMP modules are available in single zone 15 and 30 Amp temperature controllers, as well as for multi-zone temperature control systems. They are compatible with all previous "G" series main frames.

PID Control

IMP modules provide fully self-tuning, line voltage compensating, automatic closed-loop temperature control over a wide range of operating conditions. A single chip microprocessor performs all the proportional, integral and derivative (PID) control functions required to maintain setpoint temperature. No operator calculations or pre-setting of values is needed.

CompuStep®

If desired, CompuStep, may be used during system start-up to remove moisture from the heater before full power is applied. This function applies low, gradually increasing voltage to the heater over a 5 minute period and then automatically switches the module to normal operation.

CompuCycle®

CompuCycle is a unique method of applying power to the heater. This zero crossover power drive technique improves response time, reduces thermal fatigue and prolongs heater life by applying AC power smoothly and continuously. Sixty-four different power levels are programmed in the CompuCycle drive, which can switch smoothly from one level to another within 0.13 seconds as required to achieve and maintain setpoint temperature. The result is 128 computer controlled power settings available to the operator.

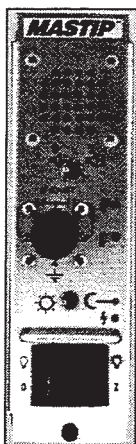
Combined with microprocessor-controlled automatic reset and temperature overshoot suppression, CompuCycle assures that the setpoint is reached and maintained quickly and accurately.

Manual Control

The CompuCycle power drive is also used with the line voltage compensated manual control mode. This mode enables the module to be used for non-thermocouple applications. It can also be used to provide standby or "weekend" heat or to manually control temperature if a thermocouple fails.

Safety and Diagnostics

Diagnostic and protection features incorporated in IMP modules include power "on," power to load, manual mode and over/under temperature, plus indicators and system protection for reversed and open thermocouples.



STANDBY HEAT AND ALARM MODULE (SAM)

(FOR USE WITH IMP ONLY)

The SAM automatically sets all zones for standby, or "weekend" heat, and provides visual and audible alarms for over/under temperature. It can be plugged into any zone of a standard "MFC" communications type frame and occupies 1 zone.

A relay contact connector on the front panel allows for convenient remote control for machine shutdown, warning devices or other auxiliary equipment.

MODEL SAM

IMP series technical specifications

Performance Specifications

| | |
|---|---|
| Control Mode | CompuCycle® system |
| Temperature Range | Ambient to 999°F, or ambient to 535°C |
| Temperature Reset | Automatically corrects reset to within 2°F (1°C) at all settings |
| Control Accuracy | ±1 0°F (±0 5°C) dependent on the total thermal system |
| Temperature Stability | ±0 5% of full scale over the ambient range of 32 to 140°F (0 to 60°C) |
| Calibration Accuracy | Better than 0.2% of full scale |
| Power Response Time | Better than 0 13 seconds |
| Compensated Manual Mode | Maintains constant output power to within 1 % of manually set power level with line voltage variation from 192 to 264 volts. Power control range is from 0 to 100%, using the CompuCycle® system power drive. |
| Over Temperature Indicator | The upper segment of the leftmost display will be "on" and the whole display flashes at about 2 Hz when the temperature error exceeds +30°F (+17°C) |
| Under Temperature Indicator | The lower segment of the leftmost display will be on and the whole display flashes at about 2 Hz when the temperature error exceeds -30°F (-17°C) |
| TC Break Indication | Flashing "—" on the leftmost display (in closed-loop and CompuStep®) |
| TC Reverse Indication | Flashing "==" on the leftmost display (in closed-loop and CompuStep®) |
| TC Reverse Indication | Flashing "—" center segment only of the leftmost display (in closed-loop) |
| CompuStep® System Control Mode | Variable stepping voltage, phase fired |
| CompuStep® System Duration | Approximately 5 minutes |
| CompuStep® System Output Voltage | Steps approximately from 25 V RMS to 170 V RMS with 240 VAC line input |
| CompuStep® System Holding Temperature | 256°F (125 C) |
| CompuStep® System Override Temperature | 200°F (93 C) |
| Operational Mode Priority | a. TC break, TC reverse and No Heat override CompuStep® System b. Manual mode overrides TC break, TC reverse and No Heat |

Output Specifications

| | |
|-----------------------------|--|
| Voltages | 240 VAC nominal, single phase, 120 VAC available |
| Power Capability | 15 Amperes, 3600 watts @ 240 VAC, 1800 watts @ 120 VAC, 30 Amperes, 7200 watts @ 240 VAC |
| Output Switch | Internal solid state triac, triggered by AC zero crossing pulses |
| Overload Protection | Triac and load use high speed fuses. Both sides of AC line are fused. |
| Power Line Isolation | Optically and transformer isolated from AC lines Isolation voltage is greater than 2500 volts. |

Input Specification

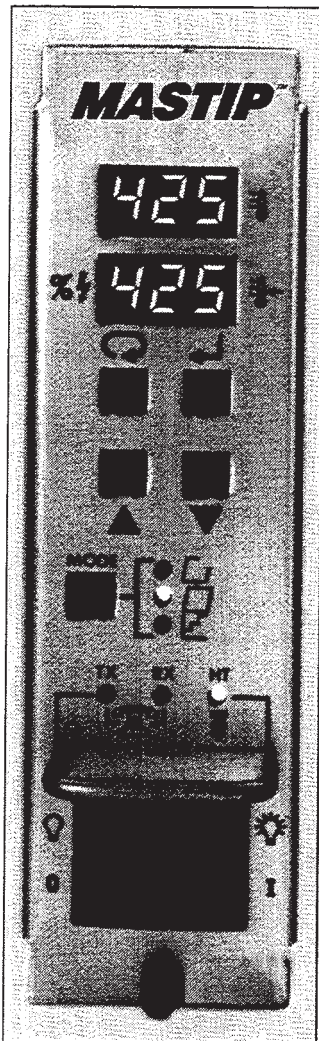
| | |
|-------------------------------------|--|
| Thermocouple (T/C) Sensor | Type J, grounded or ungrounded |
| External (T/C) Resistance | Greater than 1000 Ohms |
| T/C Isolation | Isolated from ground and supply voltages |
| Cold Junction Compensation | Automatic, better than 0 02°F/°F (0 01°C/°C) |
| Input Type | Potentiometric |
| Input Impedance | 22 Megohms |
| Input Protection | Diode clamp, RC filter |
| Input Amplifier Stability | Better than 0.05°F/°F (0 03°C/°C) |
| Input Dynamic Range | Greater than 1000°F (535°C) |
| Common Mode Rejection Ratio | Greater than 100 dB |
| Power Supply Rejection Ratio | Greater than 90 dB |

Controls and Indicators

| | |
|-----------------------------|--|
| Setpoint Control | Precision 3 digit pushbutton switch, direct reading; Range: 0 to 999°F (535°C); Resolution: 1°F (1°C) Accuracy: better than 0 5°F (0 3°C) |
| Manual Power Control | Single turn potentiometer, calibrated scale; Range 0-100%; Linearity: 10% |
| Mode Control | 3-position sliding switch selects mode of operation 1 top position - Manual mode 2 middle position - Auto mode 3 bottom position - Auto mode with CompuStep® system |
| Power ON/OFF | Rocker switch, UL, CSA, VDE approved |

Electrical Power Specification

| | |
|---------------------------|---|
| Input Voltage | 240/120 VAC, +10% -20% |
| Frequency | 50Hz± 3Hz, 60Hz, ± Hz |
| DC Power Supplies | Internal generated, regulated and temperature compensated |
| Module Power Usage | Less than 3 watts, excluding load |

AIM series temperature modules

The AIM (Advanced Intelligent Microprocessor) Temperature Control Module represents the state-of-the-art in Hot Runner temperature control technology. Virtually every feature a molder could want is contained in the module, which has been designed to operate independently or with the companion ACM communication module.

The AIM module is compatible with the industry standards IMP, CMP and SMP temperature control modules and G+ mainframes which have been manufactured by Athena for years.

The AIM utilizes the same CompuCycle™ and CompuStep™ features as found in the IMP, CMP, and SMP modules.

CompuStep™ provides gradual phase angle fired voltage during warmup.

CompuCycle™ utilizes zero crossover power to improve response time, reduce thermal fatigue and prolong heater life.

Easy Start-Up Procedure

Turn the module "ON" and it starts up in one of the three predetermined control modes selected by the user.

Designed to Prevent Burning or Hardening of Plastics

The AIM features several new safety improvements that are accessible through the user adjustable parameters.

Lower and upper setpoint limits can be used to prevent the setpoint from being adjusted beyond a safe operating temperature range.

Separately adjustable high and low deviation alarms in 1° increments track a set standard deviation to assure that the operator is aware of any undesirable temperature changes.

In case of an open thermocouple, the operator can program one of three outputs. These outputs are: Output shutdown, Predetermined % power output and Last % power output through PID. Utilization of the last two outputs permits continual operation to insure quality.

To prevent unauthorized parameter changes, the controller maintains a multi-level security "lockout" parameter that the operator uses to prohibit access to the module.

Dual Digital Display

The dual digital display eliminates the parallax error of analog display, enhances the accuracy of the controller and makes information easier to view.

The top display indicates a steady state process temperature and any thermocouple faults.

The bottom display indicates the setpoint temperature and any warning label or status change.

Advance Diagnostics

The diagnostics will automatically inform the user of the following fault conditions: Open thermocouple, Shorted thermocouple, Reversed thermocouple, Open heater, High process temperature and Low process temperature.

Current Monitor

Each AIM module contains a Current monitor which allows the user to monitor the current to the heater.

17 User Adjustable Parameters

The AIM's flexible programming allows the user to modify 17 parameters via the front panel. Once entered the non-volatile memory automatically saves the parameter modifications.

Control Via Front Panel or Communications Interface

The AIM can be monitored and controlled through the front panel or via an external terminal or personal computer.

All user-adjustable parameters are accessible through the communications interface. However, the loss of the external data link does not interfere with the operation of the modules.

MODEL AIM 15

15 AMP.....

MODEL AIM 30

30 AMP.....

AIM series technical specifications

Performance Specifications

| | |
|---|---|
| Auto Control Mode | CompuCycle® system |
| Control Accuracy | ±0.1°F (+0.1°C) dependent on the total thermal system |
| Temperature Range | 32 to 999°F (0 to 537°C) |
| Temperature Stability | ±0.5% of full scale over the ambient range of 32 to 140°F (0 to 60°C) |
| Calibration Accuracy | Better than 0.2% of full scale |
| Power Response Time | Better than 0.5 seconds |
| Process Sampling: | 10 times per second (nominal) |
| °F/°C: | Front panel selectable |
| CompuStep® System Control Mode | Variable stepping voltage, phase fired |
| CompuStep® System Duration | Approximately 6 minutes |
| CompuStep® System Output Voltage | Steps approximately from 25 V RMS to 170 V RMS with 240 VAC line input |
| CompuStep® System Override Temperature | 200°F (93°C) |
| Operational Mode Priority | a. TC open, TC reverse, Shutdown and Open heater override CompuStep® System b. Manual mode overrides TC open, TC reverse |

Input Specifications

| | |
|-------------------------------------|--|
| Thermocouple (T/C) Sensor | Type "J," grounded or ungrounded |
| External (T/C) Resistance | Maximum 100 ohms for rated accuracy |
| T/C Isolation | Isolated from ground and supply voltages |
| Cold Junction Compensation | Automatic, better than 0.02°F/°F (0.01°C/°C) |
| Input Type | Potentiometric |
| Input Impedance | 10 Megohms |
| Input Protection | Diode clamp, RC filter |
| Input Amplifier Stability | Better than 0.05°F/-F (0.03°C/°C) |
| Input Dynamic Range | Greater than 999°F (537°C) |
| Common Mode Rejection Ratio | Greater than 100 dB |
| Power Supply Rejection Ratio | Greater than 70 dB |

Output Specifications

| | |
|-----------------------------|--|
| Voltages | 240 VAC nominal, single phase, 1 20 VAC available |
| Power Capability | 30 Amperes, 7200 watts @ 240 VAC, 15 Amperes, 3600 watts @ 240 VAC, 1800 wans @ 120 VAC, |
| Overload Protection | |
| Power Line Isolation | Triac and load use high speed fuses. Both sides are fused (GGB) |
| Output Drive | Optically and transformer isolated from AC lines. Isolation voltage is greater than 2500 volts. Internal solid state triac, triggered by AC zero crossing pulses |

Controls and Indicators

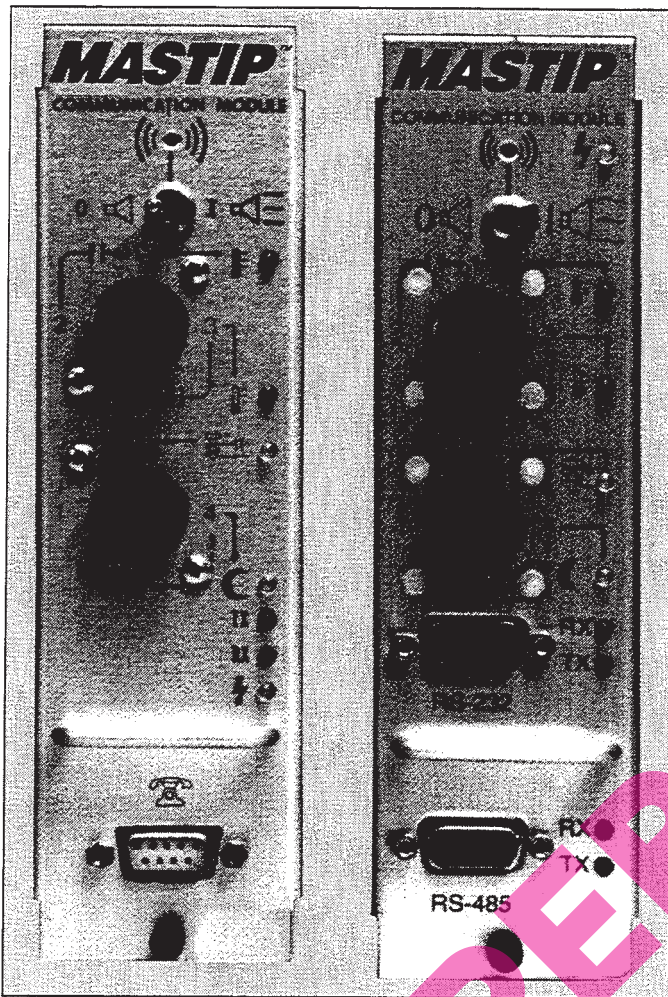
| | |
|--------------------------|--|
| Setpoint Control | Two buttons up or down. |
| % Power Control | Two buttons up or down. |
| Mode Control | Resolution 1F°(1°C) Two buttons up or down Push button switch with LED indicators: 1st position - Manual mode 2nd position - Auto mode 3rd position - Auto mode with CompuStep® |
| Display | Dual 3 digit filtered LED |
| Status Indicators | Ht - Current output Rx - Receive from ACM Tx - Transmit to ACM |
| Power On Off | Rocker switch, UL, CAS, and VDE approved |

Diagnostics

| | |
|------------------------------------|--|
| Over Temperature Indicator | Bottom display will alternate between setpoint temperature and "HI" when the temperature exceeds setpoint temperature by value set in the High Deviation Alarm parameter |
| Under Temperature Indicator | Bottom display will alternate between setpoint temperature and "LO" when the temperature is less than setpoint temperature by value set in the Low Deviation Alarm parameter |
| TC Open Indication | Steady state "o.tc" in the top display |
| TC Reverse Indication | Steady state "r.tc" in the top display |
| Shutdown Indication | Bottom display will alternate between setpoint temperature and "oFF" when an open thermocouple is detected and the controller is set for SHUTDOWN in the Open Sensor Alarm parameter |
| Open Heater Indication | Bottom display will alternate between setpoint temperature and "O,Ht" |
| Idle Setpoint Indication | Bottom display will alternate between setpoint temperature and "I.dL" |
| Remote Setpoint Indication | Bottom display will alternate between setpoint temperature and "r.sp" |
| Automatic Tuning Indication | Bottom display will alternate between setpoint temperature and "Un" when automatic tuning is in progress |

Electrical Power Specifications

| | |
|--------------------------|---|
| Input Voltage | 11 5 to 230 VAC, ±10% |
| Frequency | 50-60 Hz |
| DC Power Supplies | Internally generated, regulated and temperature compensated |
| Model Power Usage | Less than 6 watts, excluding load |

ACM / ASM series temperature controllers

The ACM (PC protocol) and ASM (SPI protocol) communications modules are used in conjunction with Athena's AIM series hot runner temperature controllers. Both provide alarm warning tones and contact closures. Additionally, they allow external contact closures to set all system AIM's to a standby setpoint and/or turn off output power.

Monitors various parameters and provides an audible alarm.

The ACM or ASM communications modules offer ease of use and security with a technologically advanced design. All of the Advanced Intelligent Microprocessor's (AIMTM) user-adjustable parameters can be viewed or changed by a remote terminal or computer via the ACM or ASM module. If the process temperature rises above or below set values, the module's internal high/low deviation alarms will sound. The AIM's parameters can be continually monitored to ensure operating efficiency. This allows the operator to promptly modify parameters to meet the system's needs.

Acts as link between AIM modules and computer.

Up to 99 AIM modules can be monitored and controlled. By processing and storing all incoming data, the ACM and ASM communications modules provide information and control capability to a remote system operator.

Standard ACM Features:**Six easy-to-read screens.**

When the ACM is connected to a terminal, all incoming information is displayed within a screen format. No additional software is needed. The ACM automatically makes all information available through six different screens: System Configuration, All Zone Monitor, Group 1 Monitor, Group 2 Monitor, Command Help or Heater Current.

User-friendly command formats.

To accommodate different user styles and proficiency levels, computer terminal commands can be entered using three different command formats. Quick-entry commands utilize a single letter. Verbose commands utilize a complete word. Hot-key commands utilize the Control key and a single letter.

One command views a zone's operational status.

The ACM's programming allows a single letter command to read and display the complete status information of any desired zone.

Operational programs.

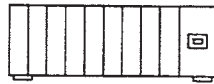
Users can generate their own programs that will permit them to control, monitor, and data log all accessible AIM parameters.

Mainframe configurations

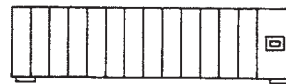
The configurations illustrated below provide a wide selection of zone capacities to suit almost any control application. The 5,8 and 12 zone frames use individual frame sections. The 16 thru 48 zone frames use 2,3 or 4 frame sections rigidly fastened together into one prewired integral unit which requires only one main AC power input connection. The Current/ Voltage Monitor option will be factory installed and must be ordered at same time as Main Frame. If accessory modules are used (SAM, ACM or TAF), order MFC main frames.



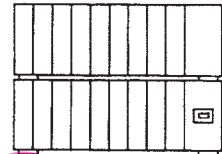
**MF05
MFC05**



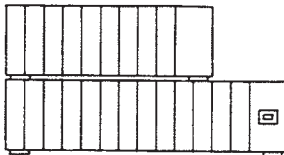
**MF08
MFC08**



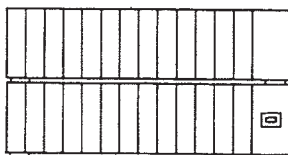
**MF12
MFC12**



**MF16
MFC16**



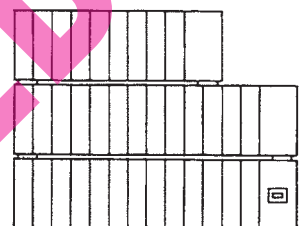
**MF20
MFC20**



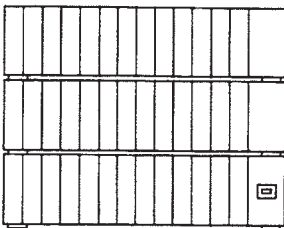
**MF24
MFC24**



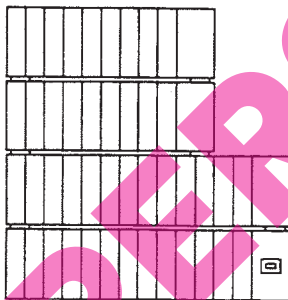
**MF28
MFC28**



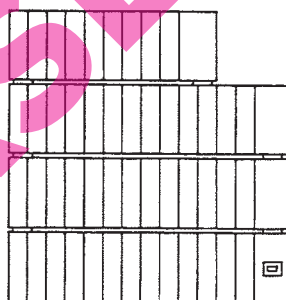
**MF32
MFC32**



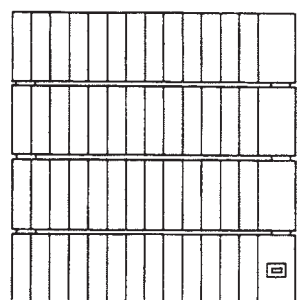
**MF36
MFC36**



**MF40
MFC40**



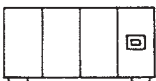
**MF44
MFC44**



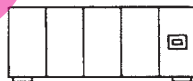
**MF48
MFC48**

30 Amp Main Frames*

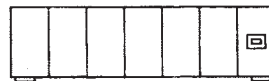
The 3 configurations illustrated below provide 2,3 or 5 zones of 30 Amp control for higher wattage heater applications. The Current/Voltage Monitor option will be factory installed and must be ordered at same time as Main Frames. If accessory modules are used (SAM, ACM or TAF), order MFC main frames.



MFH2



MFH3



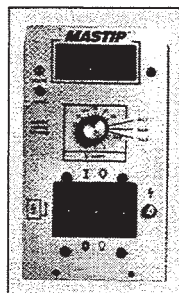
MFH5

***NOTE:** Blank panel(s) should be ordered to cover unused zones in frames. Combinations frames to accommodate both 15 and 30 Amp modules are available on special orders.

CV Monitor

Supplied in place of the standard breaker/disconnected panel, this unit will provide the operator with additional information.

- Voltage supplied from each phase.
- Ability to select an individual zone to monitor current.



CURRENT/VOLTAGE MONITOR

(Factory Installed) Add "CV" to Main Frame Part No.

| # ZONES |
|---------|
| 2 (30A) |
| 3 (30A) |
| 5 (30A) |
| 5 (15A) |
| 8 |
| 12 |
| 16 |
| 20 |

| # ZONES |
|---------|
| 24 |
| 28 |
| 32 |
| 36 |
| 40 |
| 44 |
| 48 |

System components

| # Zones | CABLES | | CONNECTORS | | TERMINAL BOXES** | | |
|--------------------------|---------------------------|-------------------------|-------------------|-------------------|------------------|-----------------------|-----------------------|
| | Mold Power | Thermocouple | Mold Power Input* | Thermocouple | Power Input | Thermocouple | Combination |
| 15 AMP Main Frame | | | | | | | |
| 5 | 1-MPC5CXX† | 1-TC5CXX† | 1-PIC5 | 1-MTC5 | 1-PTC512TB | 1-MTC5TB | 1-PTC5TB |
| 8 | 1-MPC8CXX† | 1-TC8CXX† | 1-PIC8 | 1-MTC8 | 1-PTC512TB | 1-MTC8TB | 1-PTC8TB |
| 12 | 1-MPC12CXX† | 1-TC12CXX† | 1-PIC12 | 1-MTC12 | 1-PTC512TB | 1-MTC12TB | 1-PTC12TB |
| 16 | 2-MPC8CXX† | 2-TC8CXX† | 2-PIC8 | 1-MTC8 | 2-PTC512TB | 2-MTC8TB | 2-PTC8TB |
| 20 | 1-MPC8CXX† 1-MPC12CXX† | 1-TC8CXX† 1-TC12CXX† | 1-PIC8 1-PIC12 | 1-MTC8 1-MTC12 | 2-PTC512TB | 1-MTC8TB 1-MTC12TB | 1-PTC8TB 1-PTC12TB |
| 24 | 2-MPC12CXX† | 2-TC12CXX† | 2-PIC12 | 2-MTC12 | 2-PTC512TB | 2-MTC12TB | 2-PTC12TB |
| 28 | 2-MPC8CXX† 1-MPC12CXX† | 2-TC8CXX† 1-TC12CXX† | 2-PIC8 2-PIC12 | 2-MTC8 1-MTC12 | 3-PTC512TB | 2-MTC8TB 1-MTC12TB | 2-PTC8TB 1-PTC12TB |
| 32 | 1-MPC8CXX† 2-MPC12CXX† | 1-TC8CXX† 2-TC12CXX† | 1-PIC8 2-PIC12 | 1-MTC8 2-MTC12 | 3-PTC512TB | 1-MTC8TB 2-MTC12TB | 1-PTC8TB 2-PTC12TB |
| 36 | 3-MPC12CXX† | 3-TC12CXX† | 3-PIC12 | 3-MTC12 | 3-PTC512TB | 3-MTC12TB | 3-PTC12TB |
| 40 | 2-MPC8CXX† 2-MPC12CXX† | 2-TC8CXX† 2-TC12CXX† | 2-PIC8 2-PIC12 | 2-MTC8 2-MTC12 | 4-PTC512TB | 2-MTC8TB 2-MTC12TB | 2-PTC8TB 2-PTC12TB |
| 44 | 1-MPC8CXX† 3-MPC12CXX† | 1-TC8CXX† 3-TC12CXX† | 1-PIC8 3-PIC12 | 1-MTC8 3-MTC12 | 4-PTC512TB | 1-MTC8TB 3-MTC12TB | 1-PTC8TB 3-PTC12TB |
| 48 | 4-MPC12CXX† | 4-TC12CXX† | 4-PIC12 | 4-MTC12 | 4-PTC512TB | 4-MTC12TB | 4-PTC12TB |
| 30 AMP Main Frame | | | | | | | |
| 2 | 1-MPCH23CXX† | 1-TC5CXX† | 1-PICH23 | 1-MTC5 | 1-PTCH23TB | 1-MTC5TB | 1-PTCH23TB |
| 3 | 1-MPCH23CXX† | 1-TC5CXX† | 1-PICH23 | 1-MTC5 | 1-PTCH23TB | 1-MTC5TB | 1-PTCH23TB |
| 5 | 1-MPCH5CXX† | 1-TC5CXX† | 1-PICH5 | 1-MTC5 | 1-PTCH5TB | 1-MTC5TB | 1-PTCH5TB |

*Includes Crimp Connectors

**Order Power Input and Thermocouple Boxes, or Combination Box

†RePlace "XX" in part number with "10" for 10 ft. or "20" for 20 ft.

Cables and accessories

CABLES Special and custom cables available.



| Thermocouple Cables | | |
|---------------------|-------------|-------|
| 10ft (3.05) | 20ft (6.10) | ZONES |
| TC5C10 | TC5C20 | 5 |
| TC8C10 | TC8C20 | 8 |
| TC12C10 | TC12C20 | 12 |



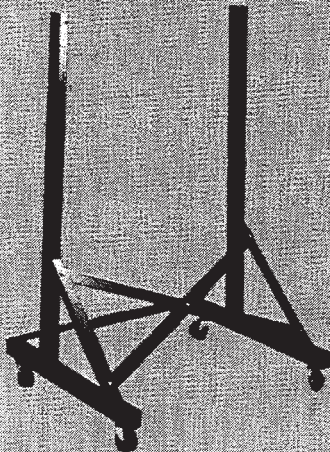
| Power Cables | | |
|--------------|-------------|-------|
| 10ft (3.05) | 20ft (6.10) | ZONES |
| MPC5C10 | MPC5C20 | 5 |
| MPC8C10 | MPC8C20 | 8 |
| MPC12C10 | MPC12C20 | 12 |



| High Power Cables | | |
|-------------------|-------------|-------|
| 10ft (3.05) | 20ft (6.10) | ZONES |
| MPCH23C10 | MPCH23C20 | 2-3 |
| MPCH5C10 | MPCH5C20 | 5 |

ACCESSORIES

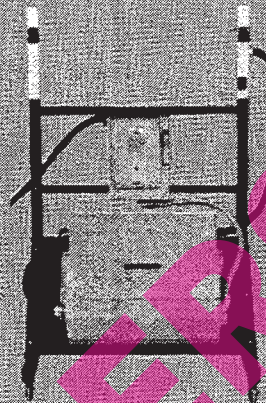
UNIVERSAL FLOOR STAND



A floor stand holding from one to four Main Frames is available. It includes casters and mounting hardware.

| CATALOG NO. |
|-------------|
| MFS5812 |

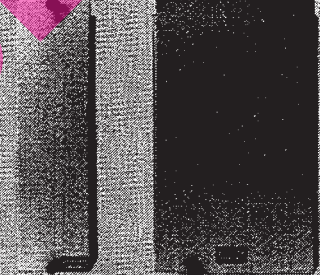
TRANSFORMER KITS



Transformer kits are fully wired and include enclosed transformer (480 VAC 3Øin, 240 VAC 3Øout) with adjustable voltage taps, power cable to main frame, disconnect switch, extra fuses, and floor stand with all hardware. Other transformers are available for your particular power requirements.

| CATALOG NO. | POWER CAPACITY |
|-------------|----------------|
| TK6-1A | 6 KVA |
| TK9-1A | 9 KVA |
| TK15-1A | 15 KVA |

CLOSURE PANELS



Must be used to cover unused zones in main frames. MFB10 for use on single unused zones. MFB20 for use on two unused zones. Supplied with push-pull panel fasteners.

| CATALOG NO. | # ZONES |
|-------------|---------|
| MFB10 | 1 |
| MFB20 | 2 |

MODULE REPLACEMENT FUSES



| CATALOG NO. | AMPS | QTY |
|-------------|------|-----|
| ABC15 | 15 | 5 |
| A25x30 | 30 | 5 |

INSULATED CRIMP CONNECTORS

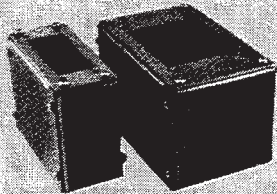


| CATALOG NO. | AMPS | QTY |
|-------------|------|-----|
| HWCC-1 | 15 | 36 |
| HWCC-2 | 30 | 20 |

For easy splicing of mold power input connector leads to heater leads.

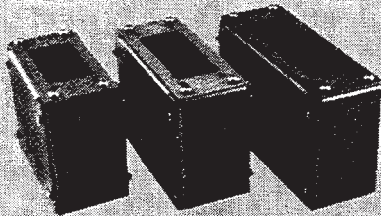
Terminal boxes and connectors

TERMINAL MOUNTING BOXES



Terminal Mounting Boxes for Mold Power Input Connectors

| Catalog Number | "X" | "Y" |
|----------------|-------|-------|
| PIC-512-TB | 4.250 | 4.875 |
| PICH-23-TB | 4.990 | 5.614 |
| PICH-5-TB | 6.052 | 6.676 |



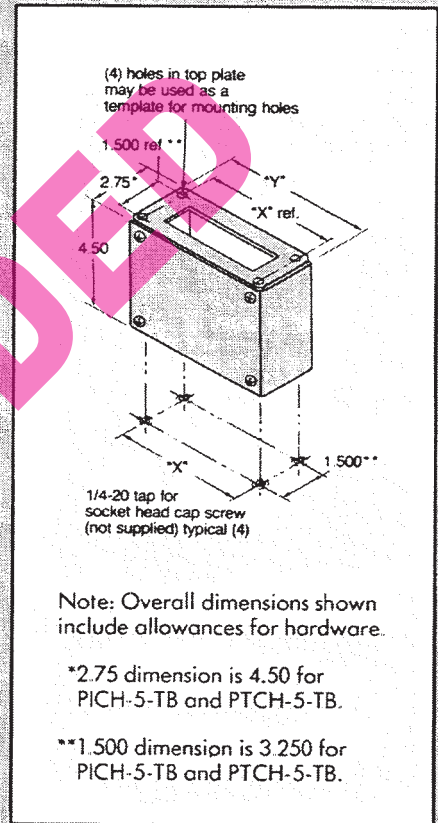
Terminal Mounting Boxes for Thermocouple Connectors

| Catalog Number | "X" | "Y" |
|----------------|-------|-------|
| MTC-5-TB | 4.250 | 4.875 |
| MTC-8-TB | 4.990 | 5.614 |
| MTC-12-TB | 6.052 | 6.676 |



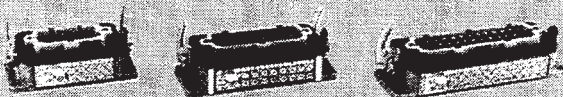
Combination Terminal Mounting Boxes

| Catalog Number | "X" | "Y" |
|----------------|--------|--------|
| PTC-5-TB | 8.031 | 8.655 |
| PTC-8-TB | 8.843 | 9.467 |
| PTC-12-TB | 9.906 | 10.530 |
| PTCH-23-TB | 9.906 | 10.530 |
| PTCH-5-TB | 10.437 | 11.061 |



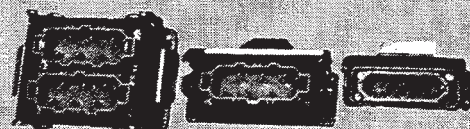
CONNECTORS

T/C CONNECTORS



| #ZONES | PART NO. | |
|--------|----------|--|
| 5 | MTC5 | |
| 8 | MTC8 | |
| 12 | MTC12 | |

MOLD POWER/INPUT CONNECTORS



| #ZONES | AMPS | PART NO. |
|--------|------|----------|
| 5 | 15 | PIC5 |
| 8 | 15 | PIC8 |
| 12 | 30 | PIC12 |
| 2-3 | 30 | PICH23 |
| 5 | 30 | PICH5 |