



**Mustang Sampling<sup>®</sup>**

# Mustang<sup>®</sup> Heated Regulator & Mustang<sup>®</sup> Joule-Thomson Heated Regulator Installation, Operation & Maintenance



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# SAFETY WARNINGS



Failure to abide by any of the safety warnings could result in serious injury or death.

- Standard for Safety Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements (ANSI/UL 61010-1, 07/12/2004, Ed. 2).
- Standard for Safety Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements (CAN/CSA C22.2 No. 61010-1, 07/01/2004, Ed. 2).
- Standard for Safety Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations (ANSI/UL 1203, 1028/09, Ed. 4).
- Explosion-Proof Enclosures for Use in Class 1 Hazardous Locations Industrial: Industrial Products (CSA C22.2 No. 30-M1986, (G.I. No. 2, 11/1988)).
- System must be de-energized and de-pressurized before and during installation and maintenance or personal injury may result. Follow site requirements for Safety Precaution Rules.
- Do not exceed any equipment pressure, or electrical ratings.
- To reduce the risk of fire or explosion, do not install where the marked operating temperature exceeds the ignition temperature of the hazardous atmosphere(s).
- Heated regulator surface temperature will approach temperature limit specified in technical specifications.
- Select a mounting location so that the system will not be subjected to impact or other damaging effects.
- The hazard location information specifying class and group listing of each system is marked on the nameplate.
- Properly ground all equipment to prevent static electric generation.

## PRODUCT DESCRIPTION - MHR®

The Mustang Heated Regulator (MHR®) prevents liquid condensation from Joule-Thomson cooling in natural gas mixtures when pressure reduction is required. The process temperature is controlled using PID logic throughout the pressure reduction cycle with both pre- and post-regulation heat exchangers along a tortuous path. The final process pressure is set manually using an adjustable regulator control across a specified range.

### APPLICATION

The MHR assembly provides safe and reliable temperature control and pressure reduction essential to ensuring the performance of gas analyzers.

### FEATURES

- Temperature Controller in Class 1, Division 1 & 2, or Zone 1 Exd Enclosure
- Proportional-Integral-Derivative (PID) controller
- Single-stage design
- Piston pressure sensing elements
- 20 micron inlet filter
- Unique Heat Exchange Chamber
- Two section design for easy disassembly from heat plate attachment
- Adjusting Screw with lock nut

### BENEFITS

- Offsets Joule-Thomson cooling providing continuous gas sample conditioning
- Protects analyzers & helps preserve sample integrity
- Prevents condensation
- Minimizes regulator freeze ups
- Maintains outlet pressure during large inlet pressure swings
- Easy to mount in small or densely populated enclosures

## TECHNICAL SPECIFICATIONS - MHR®

Maximum allowable working pressure	3750 psig (258 bar)
Temperature range	-15°F to 300°F (-26°C to 149°C)
Port sizes	1/4" female NPT
Wetted materials	Machined parts: 316 stainless steel/NACE compliant All other metal parts: stainless steel/NACE compliant
Conduit connection	3/4" female NPT
Internal volume	5 cc
Cv Coefficient	0.023
Thermal cut-off	Normally opens at 284°F (140°C) (other ranges available upon request)
Electrical enclosure classification	Class 1, Division 1 & 2, Groups B, C, D
Temperature Controller	<b>Watlow®</b> PID Temperature Controller <b>Oven Industries</b>
Outlet pressure range	0- <b>10</b> (0-0.69 bar) 0- <b>25</b> (0-1.72 bar) 0- <b>50</b> (0-3.45 bar) 0- <b>100</b> (0-6.89 bar) 0- <b>250</b> (0-17.24 bar) 0- <b>500</b> (0-34.47 bar)
Input Supply Voltage options	<b>115</b> VAC, 215 Watts, 50/60 Hz, ± 10% <b>208/230</b> VAC, 215 Watts, 50/60 Hz, ± 10% <b>24</b> VDC, 155 Watts
Seals	<b>James Walker</b> <b>Viton®</b> <b>Kalrez®</b> other materials available upon request
Certification	<b>C</b> - cETLus <b>A</b> - Atex/IECEX

## PRODUCT DESCRIPTION - MJTHR®

The Mustang Joule-Thomson Heated Regulator (MJTHR®) is a four-stage pressure regulator designed to compensate for Joule-Thomson cooling during sample extraction. With a ratio controlled multi-piston design, the MJTHR ensures the first three stages are always functional, even with fluctuations to inlet pressure.

### APPLICATION

An MJTHR located downstream of a sample probe permits a 4-stage pressure reduction without distorting the composition of a vapor sample. Gas sample integrity is maintained by heating it to at least 30°F above the expected hydrocarbon dew point.

When used in combination with insertion probes, the MJTHR is the most practical means for conforming to the API 14.1 and GPA 2166 standards.

### FEATURES

- Temperature Controller in Class 1, Division 1 & 2, or Zone 1 Exd Enclosure
- Proportional-Integral-Derivative (PID) controller
- Patented multi-stage design
- Preset, ratio controlled stages with user adjusted final stage
- Piston pressure sensing elements
- 20 micron inlet filter
- Unique Heat Exchange Chamber
- Two section design for easy disassembly from heat plate attachment
- Adjusting Screw with lock nut

### BENEFITS

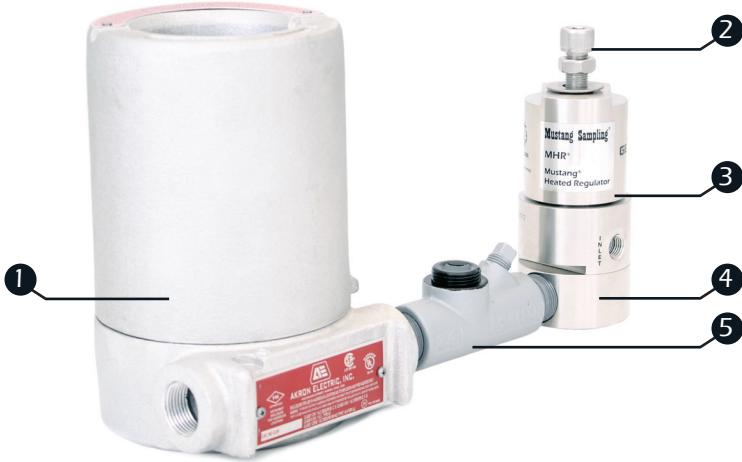
- Offsets Joule-Thomson cooling providing continuous gas sample conditioning
- Protects analyzers & helps preserve sample integrity
- Prevents condensation
- Minimizes regulator freeze ups
- Eliminates the need for multiple regulators in series
- Maintains outlet pressure during large inlet pressure swings
- Easy to mount in small or densely populated enclosures

## TECHNICAL SPECIFICATIONS - MJTHR®

Maximum Allowable Working Pressure	6000 psig (414 bar)
Temperature Range	-15°F to 300°F (-26°C to 149°C)
Port Sizes	1/4" female NPT
Wetted Materials	Machined parts: 316 stainless steel/NACE compliant All other metal parts: stainless steel/NACE compliant
Conduit Connection	3/4" female NPT
Internal Volume	5 cc
Cv Coefficient	0.009
Thermal Cut-off	Normally opens at 284°F (140°C) (other ranges available upon request)
Electrical Enclosure Classification	Class 1, Division 1 & 2, Groups B, C, D
Controller Options	<b>Watlow®</b> <b>Oven Industries</b>
Outlet Pressure Range Options	<b>0-10</b> (0-0.69 bar) <b>0-25</b> (0-1.72 bar) <b>0-50</b> (0-3.45 bar) <b>0-100</b> (0-6.89 bar) <b>0-250</b> (0-17.24 bar) <b>0-500</b> (0-34.47 bar)
Input Supply Voltage Options	<b>115</b> VAC, 215 Watts, 50/60 Hz, ± 10% <b>208/230</b> VAC, 215 Watts, 50/60 Hz, ± 10% <b>24</b> VDC, 155 Watts
Seal Options	<b>James Walker</b> <b>Viton®</b> <b>Kalrez®</b> other materials available upon request
Certification	<b>C</b> - cETLus <b>A</b> - Atex/IECEX

# PRODUCT DIMENSIONS & PARTS

Mustang® Heated Regulator - MHR®



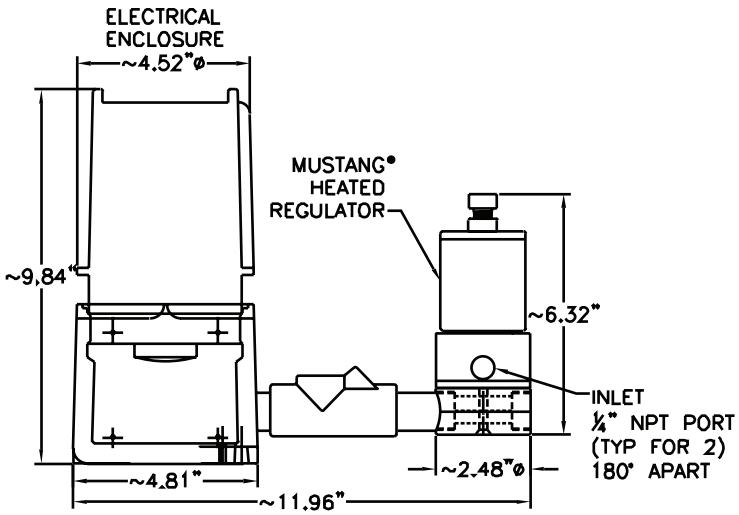
Item Number	Description
1	Explosion-proof Housing with PID Temperature Controller
2	Adjustment Screw
3	Regulator
4	Heat Exchange Chamber
5	Seal Fitting

Mustang® Joule-Thomson Heated Regulator - MJTHR®

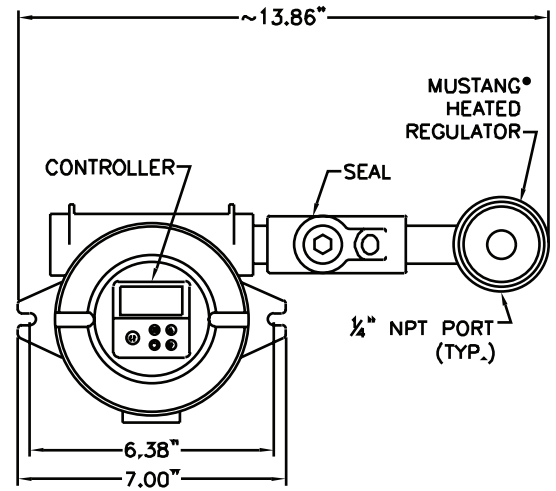




Mustang® Heated Regulator - MHR®

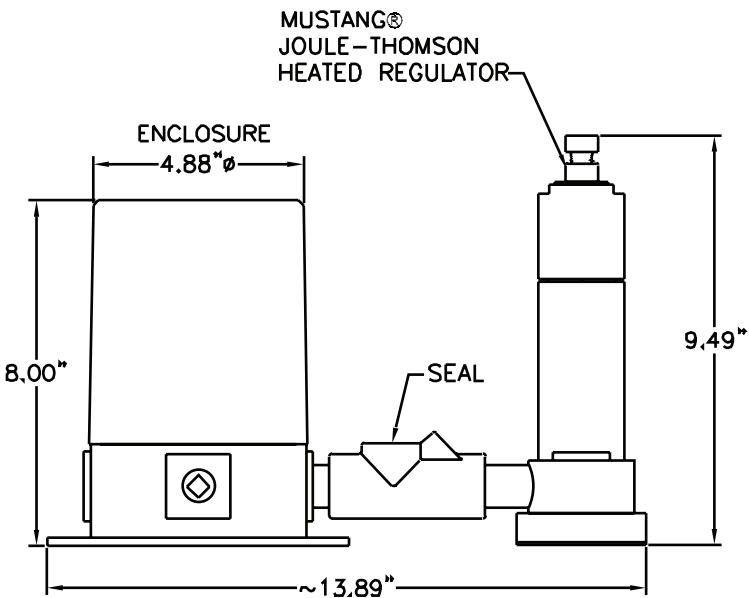


Front View

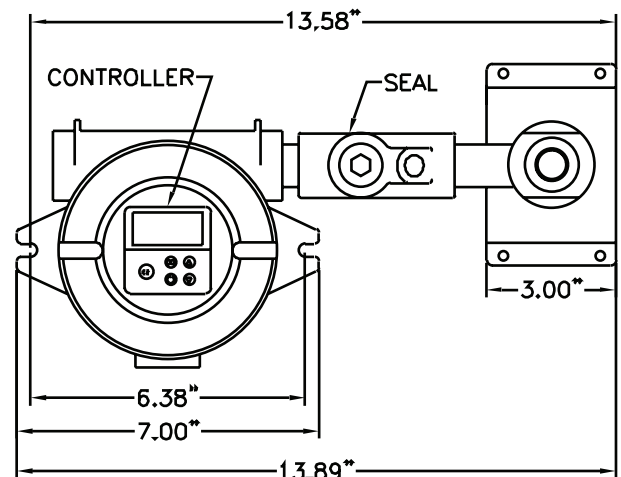


Side View

Mustang® Joule-Thomson Heated Regulator - MJTHR®

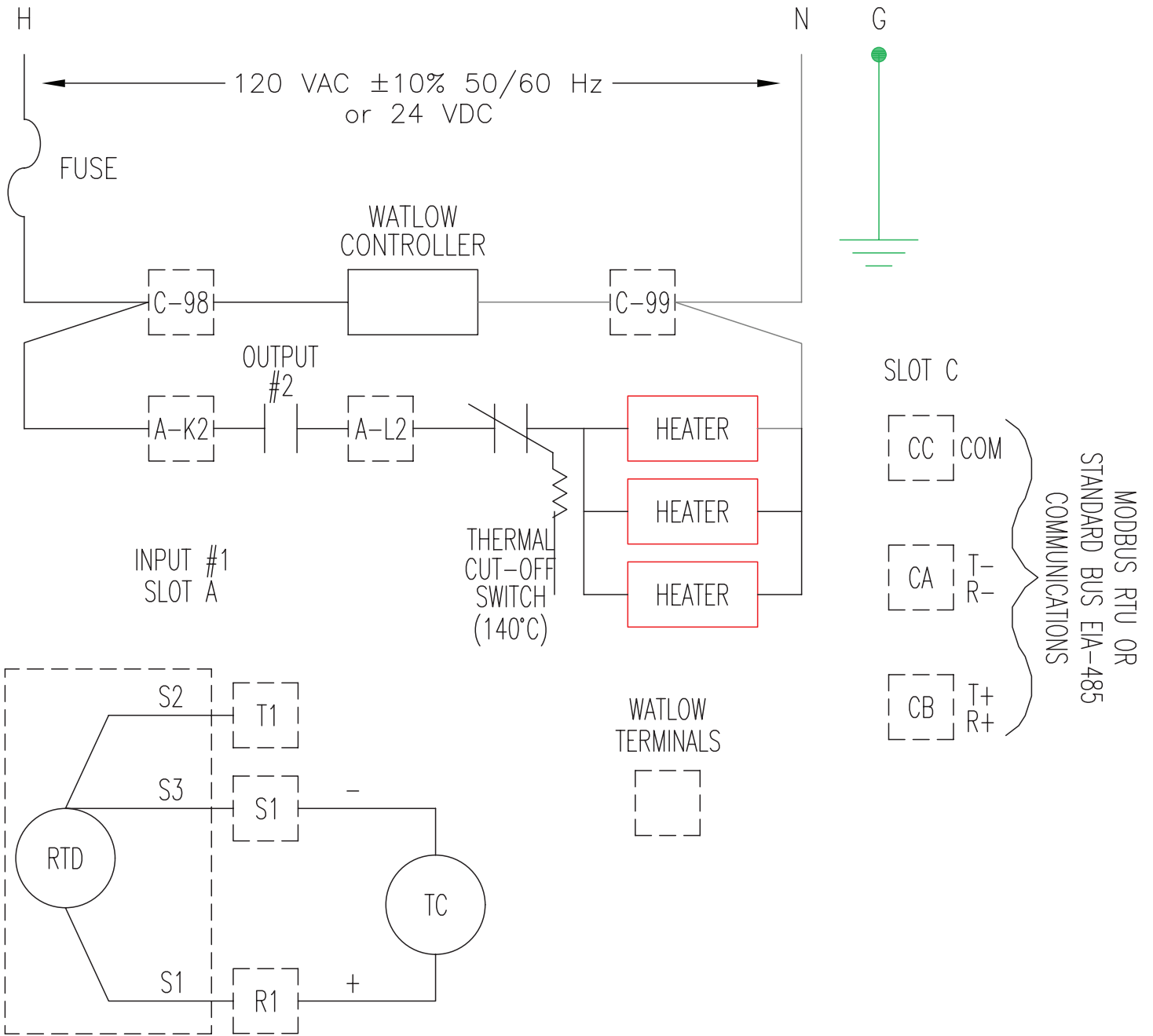


Front View

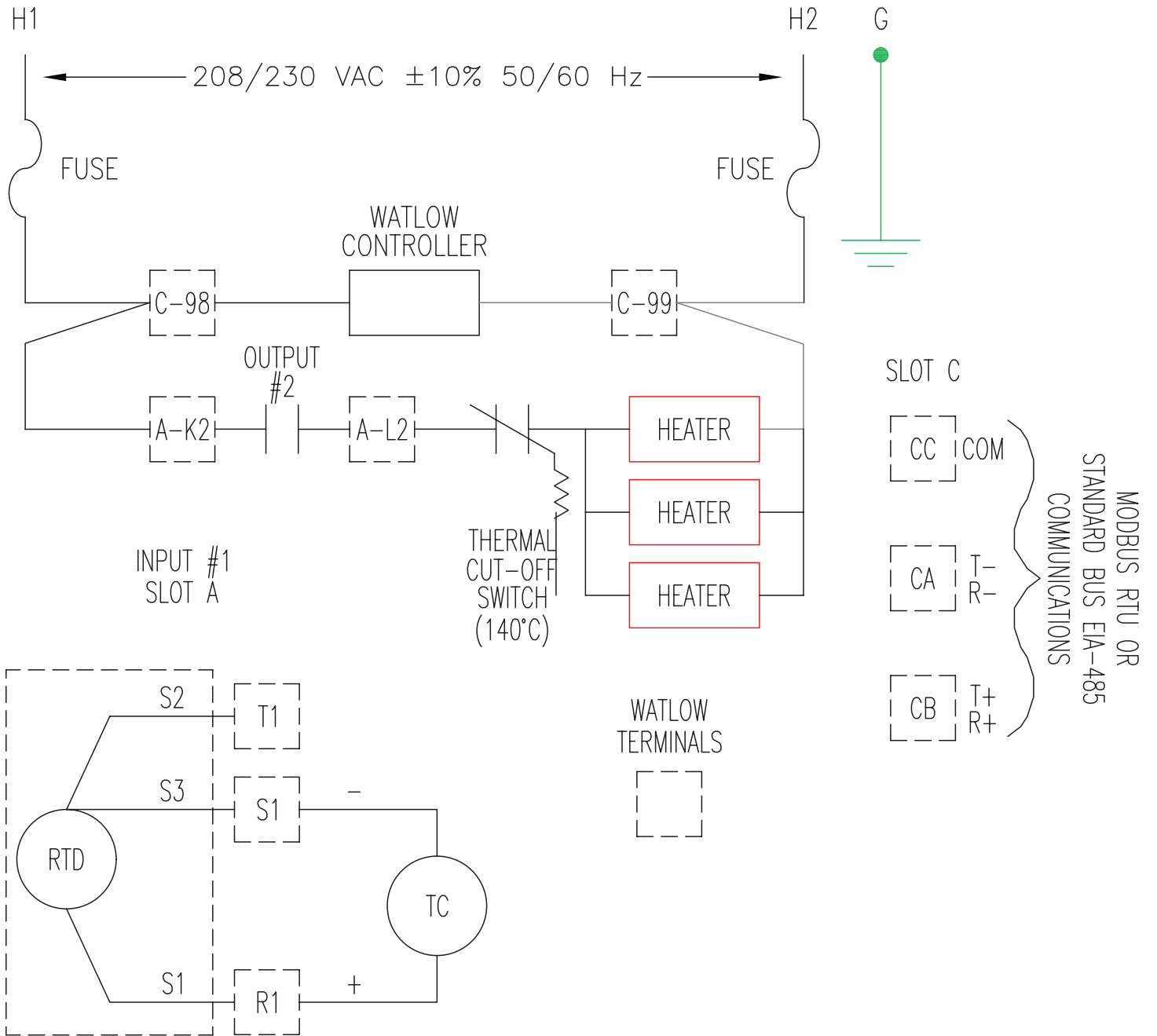


Side View

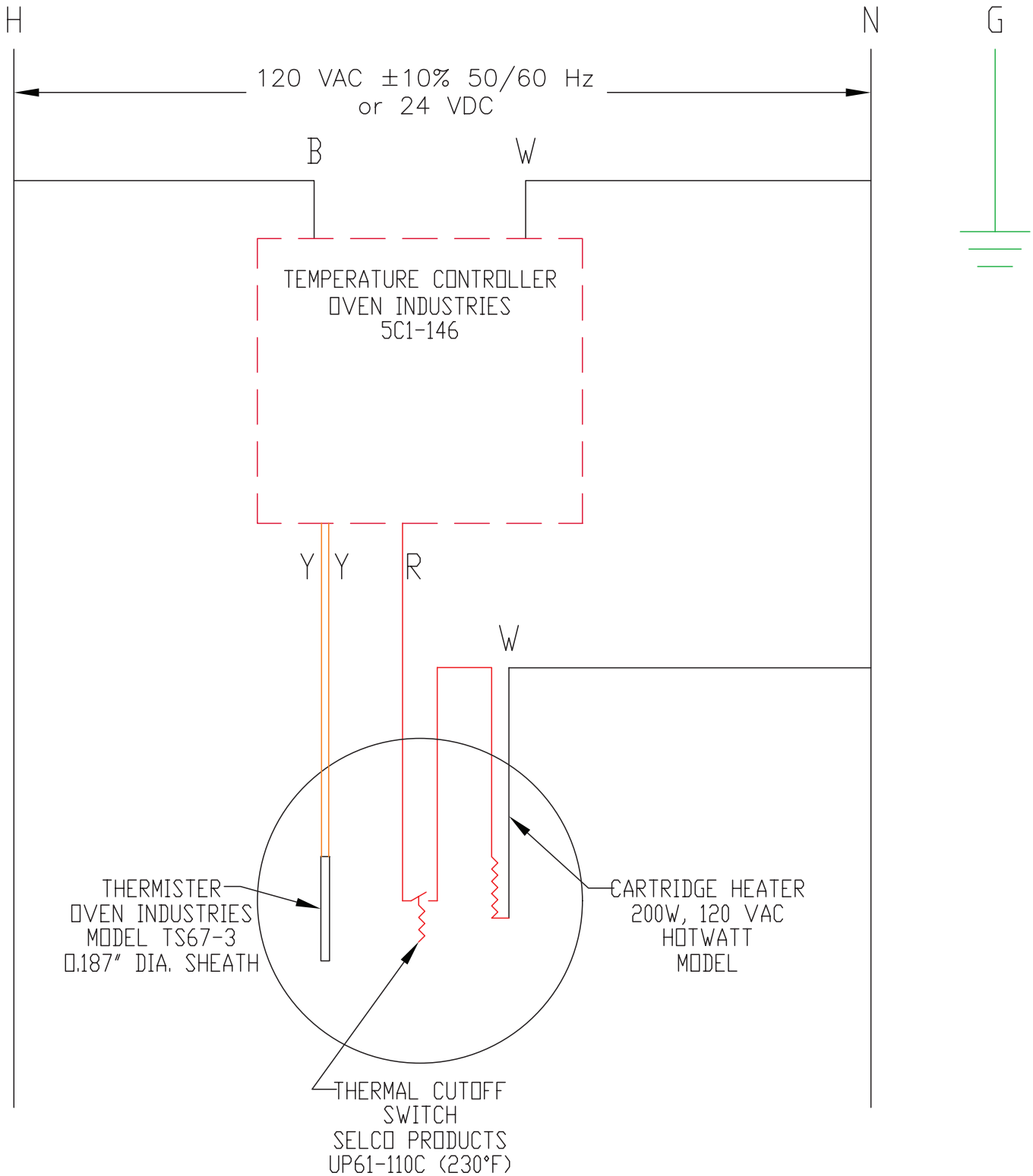
# ELECTRICAL SCHEMATIC - 120 VAC, 24 VDC



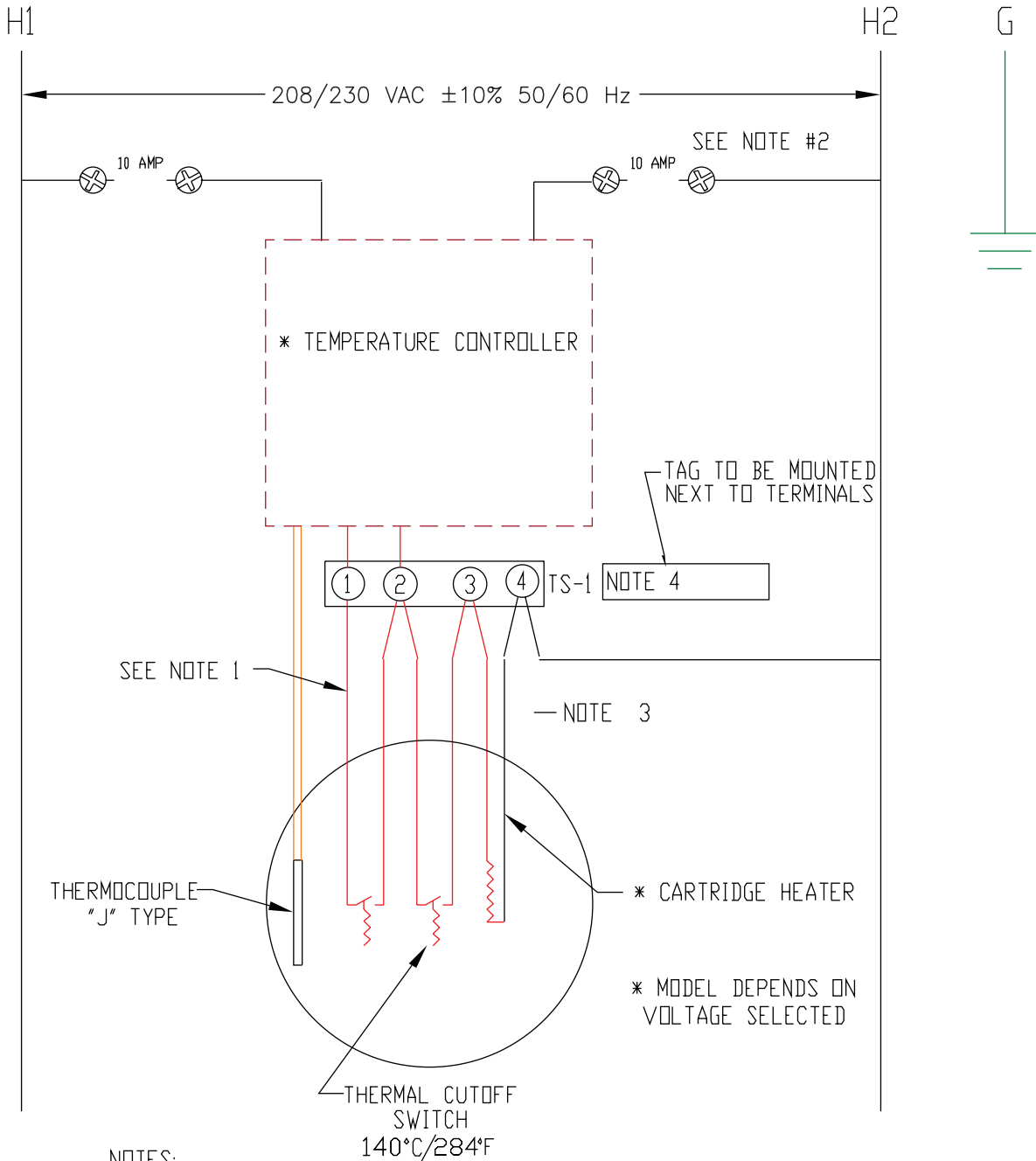
# ELECTRICAL SCHEMATIC - 208/230 VAC



# WIRING DIAGRAM - 120 VAC, 24 VDC



# WIRING DIAGRAM - 208/230 VAC



NOTES:

1. REDUNDENT OVER TEMPERATURE SWITCH (OPTIONAL)
2. PRESENT WHEN SUPPLY IS 208VAC OR 230VAC
3. ALL WIRING TO HEATER MUST MEET OR EXCEED MINIMUM INSULATION REQUIREMENTS.
4. WIRE INSULATION TO BE RATED AT MINIMUM 200°C OR HIGHER, TYPE FEPB, PFA, TFE, FIBERGLASS.

# INSTALLATION INSTRUCTIONS

## NOMENCLATURE

- Watlow Controller—Temperature controller for the heated regulator
- Regulator adjustment screw—pressure set point adjuster
- Terminal Strip—Location of internal wire landing points
- Thermocouple—Type of temperature sensor implemented

## TOOLS REQUIRED

- Flat or Phillips Head Screwdriver

## INSTALLATION

The Mustang® Heated Regulator assembly can be mounted in any position. Preferred position is with the heater block at the bottom so heat can rise into the body of the regulator.

1. Mount the Model MHR® assembly in accordance with previous cautions and warnings outlined in the safety warnings section.
2. Perform the electrical hook up with de-energized conductors.
3. Verify the unit that you are hooking up to matches voltage wise with the power supply that you are connecting. Damage to the unit can occur if the wrong source power is applied.
4. A seal fitting is required for the power input connection to the controller enclosure to maintain its electrical hazard classification rating.
5. For 120 volt single phase input power: Connect the “hot” wire to wiring terminal #1. Connect the “Neutral” wire to wiring terminal #2. Connect the earthing (ground) wire to the green screw in the bottom of the enclosure.
6. For 208 or 230 volt single phase input power: Connect one “hot” wire to wiring terminal #1. Connect the second “hot” wire to wiring terminal #2. Connect the earthing (ground) wire to the green screw in the bottom of the enclosure.
7. For 24 vdc input power: Connect the positive wire to wiring terminal #1. Connect the negative wire to wiring terminal #2. Connect the earthing (ground) wire to the green screw in the bottom of the enclosure.
8. A seal fitting is required between the controller enclosure and the MHR heater block.
9. Externally connect earthing (grounding) conductors from assembly to equipment ground connections.
10. Connections from the controller to the heater block are pre-wired from the factory. Terminal 1 is pre-wired to terminal 90 on the Watlow controller and Terminal 2 is pre-wired to terminal 99 on the Watlow controller. If replacement or troubleshooting is required, refer to the electrical schematic supplied with the unit.

## ADJUST THE TEMPERATURE SET POINT

The temperature controller comes from the factory set to 120°F unless otherwise specified. If a different temperature is required, refer to the Watlow Temperature Controller operation manual for the complete setup and adjustment procedures.

## SET REGULATOR PRESSURE

Apply input pressure and adjust the regulator adjustment screw until the desired output pressure is attained. The nut on the adjustment screw may be used to secure the adjustment screw at its set point.

## OPERATION INSTRUCTIONS

1. Close the cover on the controller enclosure.
2. Turn on the electrical supply to the controller.
3. Allow a few minutes for the system temperature to stabilize.
4. The pressure set point may have to be adjusted once the temperature has stabilized.
5. Seal the seal fittings if the controller is functioning as desired.
6. Verify that the sample stream supply is shut off.
7. Verify that the power to the controller is off.
8. Install the Watlow supplied software (EZ-Zone Configurator) on a laptop or other computer.
9. Connect to the Watlow controller using a RS-485 adapter (B&B Electronics Model 485SD9 TB or equal). Plug the adapter into the serial port. Select the serial port on the computer to be used (i.e. COM 1-COM17). The other end connects to the RS-485 terminals.
10. On the computer, start program "EZ-Zone Configurator."
11. Turn power on to the controller.
12. Establish communication with the Watlow controller.
13. Set its address to "1" or user preference.
14. Set the regulator temperature set point to the recommended temperature.
15. Initially set the regulator temperature at \_\_\_°F (\_\_\_°C).
16. For all other Watlow parameter settings, refer to the EZ-Zone User's Manual.
17. Slowly turn in the sample fluid low to full open to the regulator.
18. Adjust the regulator adjusting screw to obtain the desired output pressure.
19. Once sample fluid is being regulated, monitor the regulator temperature to verify that the controller is maintaining the set point temperature.
20. Verify the pressure and flow to the remote gas chromatograph or analyzer.
21. Once the flow is correctly established to the analyzer or gas chromatograph, document the flow value. Do not adjust the flow value unless a calibration check is made on the analyzer.
22. Do not leave power on for extended periods of time without flow through the unit.

## MAINTENANCE INSTRUCTIONS

1. Once system is operational, no routine maintenance is required.
2. Monitoring of flow and temperature values is recommended at least annually.

## Analytically Accurate® **TECHNOLOGY**

### **About Mustang Sampling**

Mustang Sampling, LLC is the innovator of Analytically Accurate® solutions within sample conditioning systems. We provide custom solutions of products and services globally to the Natural Gas, Natural Gas Liquids (NGL), and Liquefied Natural Gas (LNG) industries. Mustang Sampling continues to pioneer integrated control systems, allowing our customers to maintain phase stability from sample extraction at the source through sample analysis. Our products are continuously improved and subjected to the highest quality standards which provides our customers with the best sample conditioning solutions.

Mustang Sampling, LLC  
43 Ritmore Glen  
Ravenswood, WV 26164  
P: +1 304 273 5357  
F: +1 304 273 2531

[info@MustangSampling.com](mailto:info@MustangSampling.com)  
[www.MustangSampling.com](http://www.MustangSampling.com)

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