



# INSTALLATION and OPERATION INSTRUCTIONS FOR

## AVR3 Series Steam Heated Vaporizing Regulator

## AVR4 Series Electrically Heated Vaporizing Regulator

### AVR4 Series Certifications

CLASS I  
GROUPS A, B, C & D  
C US LR99181  
CE 0344 Ex 11 2 G  
EExd IIC T3  
KEMA 03ATEX2359

Parker Hannifin, Veriflo Division  
2801 Arrowhead Drive  
Carson City, Nevada 89706  
USA

1. Approved for use in explosive atmospheres.
2. ATEX Related Drawing: Changes must be made in accordance with 54099313.
3. Ref: ATEX Schedule Drawing 54013150
4. Ref: CSA File # LR 99181

**1. Installation and Operation Instructions for  
AVR3 Series Steam Heated Vaporizing Regulator  
AVR4 Series Electrically Heated Vaporizing Regulator**

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**I. Statement of Liability**

WARNING - FAILURE, IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Veriflo Division of Parker Hannifin Corporation, its representatives and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that the user analyze all aspects of its application and review the information concerning the product in the current product catalog. Due to the variety of operating conditions and applications for this product, you, the customer, through your own analysis and testing, are solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

**II. Safety**

Observe all safety rules when connecting or operating this device with any electrical and/or pressure system.

This device is to be installed and operated by trained personnel only.

The user should not assume that all safety measures are indicated in this manual, or that other such measures may not be required.

Servicing and repairs to this equipment should be made by Veriflo/Parker authorized personnel only. Use Veriflo/Parker replacement parts only.

**III. Operating Conditions**

The product requires no specific orientation but should be securely mounted for safe operation. Both Junction Box mounting holes and Regulator panel mount are provided.

The AVR4 is designed to operate continuously at ambient temperatures from -20C to 40C.

Electrical input is designed for 120VAC or 240VAC, 50/60 Hz.  
Power: 40, 100, 150 and 200 Watts  
Maximum sample gas input is 3500 psig (24 MPa).

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**IV. Installation - Figure 1**

1. Mount regulator and heater assembly securely.
2. Install inlet (HP), outlet (LP) and, if applicable, auxiliary (AUX LP) connections:

CAUTION - AVR3 and AVR4 regulators are marked with maximum rated inlet pressure and regulated pressure range. Accessories such as gauges, relief valves or special fittings may be assembled to the regulator and may have lower rated pressures. Always observe the lowest pressure rating when connecting accessories to the regulator or connecting the regulator to any pressure source.

Use Teflon (TFE) tape or sealant for pipe threaded connections if appropriate for the application.

Parker low volume internal compression fittings do not require lubrication or sealant.

Test all connections for leakage.

3. AVR4 ONLY - Install heater power connections - Figure 2:

RECOMMENDATIONS - Conductors should be 18 awg minimum. Use #6 spade or ring lugs for AC wiring. Use #8 ring lug for ground connections. Insulation should be rated in excess of junction box internal temperature. Shield ground should be connected to junction box housing or ground. Flexible cabling or wiring should be strain relief clamped at junction box housing entry.

For installations in the European Union (EU)

The cable entry device shall be certified in type of explosion protection flameproof enclosure "d", suitable for the conditions of use and correctly installed.

For external earthing or bonding a cable lug shall be used so that the conductor is secured against loosening and twisting and that contact pressure is permanently secured.

CAUTION - Observe all legal, regulatory and industrial requirements for AC wiring.

Connect external ground (#8 green screw) if required.

Loosen junction box cover setscrew (1/16" internal hex) and remove cover.

Connect AC Supply ground to #8 green ground screw.

Connect AC Supply to #6 "AC IN" terminals -  
connections have no polarity assigned

Verify AC Supply voltage and recheck connections before applying power.

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4. AVR4 ONLY - Verify heater operation - Figure 2:

Connect 0-250 VAC analog or non-auto ranging voltmeter across heater leads (brown wires).

Turn temperature control to mid-range.

Apply AC power.

Voltage should drop when set point is reached and then cycle.

Adjust temperature control to approximate setting desired - temperature scale is reference only and must be set with application in process - see 5. below

Replace junction box cover and tighten cover setscrew.

5. AVR4 ONLY - Adjust Temperature - Figure 2:

The approximate temperature set during installation does not account for the mass flow or thermodynamic properties of the media or for environmental conditions. The process temperature must be established with the AVR4 installed and operating at desired inlet and outlet pressures and with the media flowing at the desired rate.

Loosen junction box cover setscrew (1/16" internal hex) and remove cover. Establish process media flow conditions.

Set temperature control to setting desired -  
Temperature scale is reference only.  
Turn adjustment CW to raise temperature.  
Turn adjustment CCW to lower temperature.

Reinstall junction box cover and lock with setscrew.

6. AVR3 ONLY - Install steam heater connections:

Heater connections have no assigned flow direction.

Use Teflon (TFE) tape or sealant for pipe threaded connections if appropriate for the application.

Test connections for leakage.

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7. AVR3 ONLY - Temperature Adjustment:

The process media temperature is effected by the mass flow and thermodynamic properties of the media and by environmental conditions. The process temperature must be established with the AVR3 installed and operating at desired inlet and outlet pressures and with the media flowing at the desired rate.

The media temperature of the AVR3 is controlled by the energy flow of the steam supplied. The controllable variables are flow, temperature and pressure.

8. Adjust regulator outlet pressure (LP) - Figure 1:

The regulator is set at 0 psig and no flow at the factory. The process outlet pressure should be set under actual inlet pressure and media flow conditions.

Apply process inlet pressure (HP).

Remove tamperproof nut (1/2" hex).

Initiate flow -

Turn stem (1/8" internal hex) slowly clockwise (CW) to raise outlet (LP) to desired pressure.

Establish process media flow conditions.

Adjust process outlet pressure (LP) -

Turn stem clockwise (CW) to raise outlet pressure.

Turn stem counter-clockwise (CCW) to lower outlet pressure.

Reinstall tamperproof nut to lock setting.

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V. Maintenance

CAUTION - Replace all damaged, worn and/or corroded parts.  
Use Veriflo/Parker replacement parts only.

1. Cleaning Heater - Figure 3.

Note - the heater assembly or regulator must be dismantled and free to separate approximately 2" (5 cm).

AVR3 ONLY - Shutoff steam supply and allow unit to cool to safe handling temperature.

AVR4 ONLY - Shutoff electrical power and allow unit to cool to safe handling temperature.

Shutoff inlet (HP) and outlet (LP) pressure.

Vent outlet so as not to exceed safe pressure limits -see Para V.2.,  
Supply Pressure Effect

Disconnect media and/or heater connections as necessary.

Loosen and remove three (3) 3/8-16 bolts (9/16" hex) from heater collar.

Pull heater housing from the regulator body.

Use a suitable probe to remove screen from heater cavity in regulator body.

Clean heat transfer threads with 5/8-24 UNF thread die and/or wire brush.

Clean or replace screen.

Replace housing seal and outer o-ring.

Install heater collar and tighten 3/8-16 bolts evenly -  
torque to 18-22 in-lb (2.0-2.5 Nm)

Remount heater and regulator assembly securely.

Reinstall all connections.

Test all connections for leakage before returning the unit to service.

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**2. AVR4 ONLY - Heater/Controller Replacement - Figure 2.**

Note - Heaters and controllers have a finite life and do require replacement. If, however, an extraordinary failure is suspected, determine and repair the cause of failure before replacing the heater and controller.

Shutoff electrical power and allow unit to cool to safe handling temperature.

Loosen junction box cover setscrew (1/16" internal hex) and remove cover.

Disconnect AC Supply and ground connections.

Loosen terminal block connections - two (2) 6-32 x 3/16" slotted head screws and two (2) 6-32 x 1/4 male/female standoffs (1/4" hex).

Remove controller.

Disconnect heater leads and slip heater out of housing.

Before installing replacement units, verify that power rating and supply voltage are correct.

Slip replacement heater into housing, install controller and reconnect heater leads as shown in Figure 2. Carefully route wiring clear of junction box cover threads.

Connect AC Supply ground to green ground screw.

Connect AC Supply to "AC IN" terminals -  
connections have no polarity assigned

Verify AC Supply voltage and recheck connections.

Verify heater operation per Para III.4. above.

Replace junction box cover and tighten cover setscrew.

**3. All other service operations must be carried out by Veriflo/Parker authorized repair personnel.**

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**VI. Regulator Operation**

1. Regulator Outlet Settings -

The outlet pressure of a regulator is a function of the mechanical setting, the inlet supply pressure and the flow rate. A decrease in inlet pressure will cause an increase the regulator's outlet pressure - see Para V.2., Supply Pressure Effect. An increase in flow rate will cause a drop in outlet pressure - see Para V.3., Flow Curves. The AVR3 and AVR4 regulators are set at the factory to 0 psig. The outlet pressure must be adjusted under installed conditions.

2. Supply Pressure Effect -

A regulator's outlet pressure is effected inversely by changes in it's inlet pressure. The supply pressure effect for the AVR series regulators is approximately 0.5 psig (3.5 kPa) increase in outlet pressure for every 100 psig (690 kPa) decrease in inlet pressure.

The effect can be hazardous when shutting down the inlet supply. Care must be taken to maintain flow or vent the outlet when decreasing the inlet pressure to protect against increases in outlet pressure.

3. Flow Curves -

Under conditions of constant ambient conditions and inlet pressure the decrease in outlet pressure as a function of increasing flow rate is a repeatable regulator characteristic. The graphical representation of this relationship is a flow curve. Although a flow curve is plotted for a given set of conditions, it can be interpreted to describe performance under other conditions. Typical flow curves are presented in the product brochures:

Catalog 4512            AVR3 Series Steam Heated Vaporizing Regulator  
Catalog 4512            AVR4 Series Electrically Heated Vaporizing Regulator  
See Parker Hannifin, Veriflo Website [www.parker.com/veriflodivision](http://www.parker.com/veriflodivision)

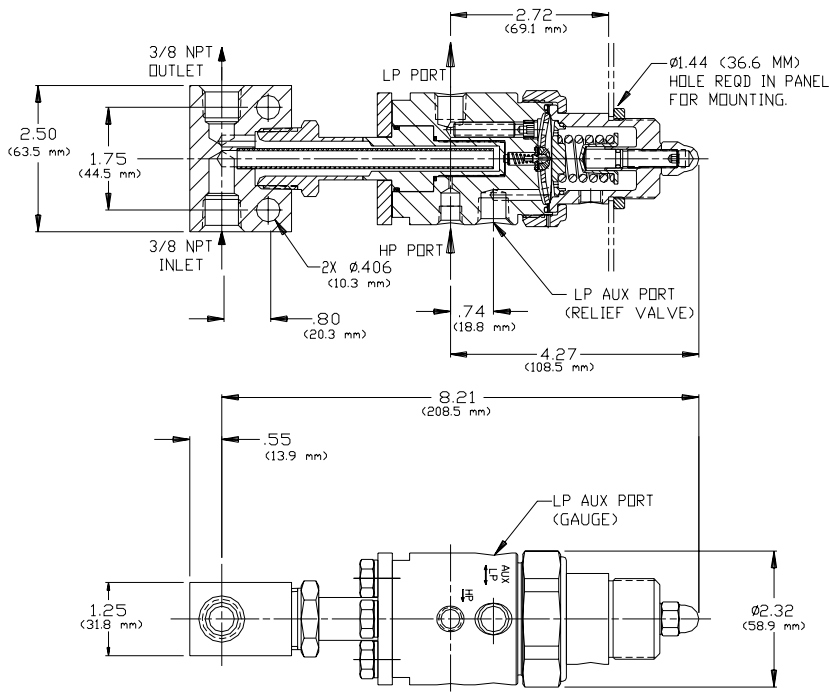
4. Lockup (Creep) -

The lockup pressure is the rise in outlet pressure which occurs when flow is reduced to zero while maintaining inlet pressure. This reflects the force required to seal off the regulator. The lockup pressure for an AVR3 or AVR4 regulator with PCTFE seat is under 2 psi (13.8 kPa) with 1500 psig (10.3 kPa) inlet. Other seat materials may result in higher lockup pressures.

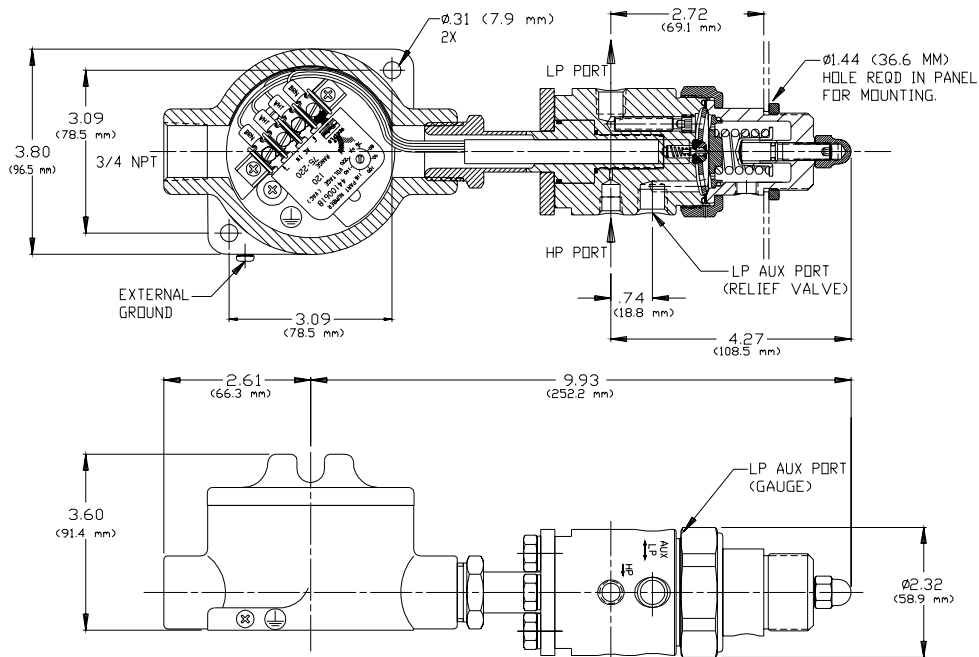
The lockup pressure of a regulator is a measure of the condition of the regulator seat. As the seat becomes contaminated or otherwise degraded, lockup pressure increases. As failure progresses, the regulator outlet pressure can rise to dangerous levels at supposed shutoff. For this reason it is advised that a regulator always be used in conjunction with an inlet shutoff valve. Always service regulators when abnormal lockup pressure is noted.



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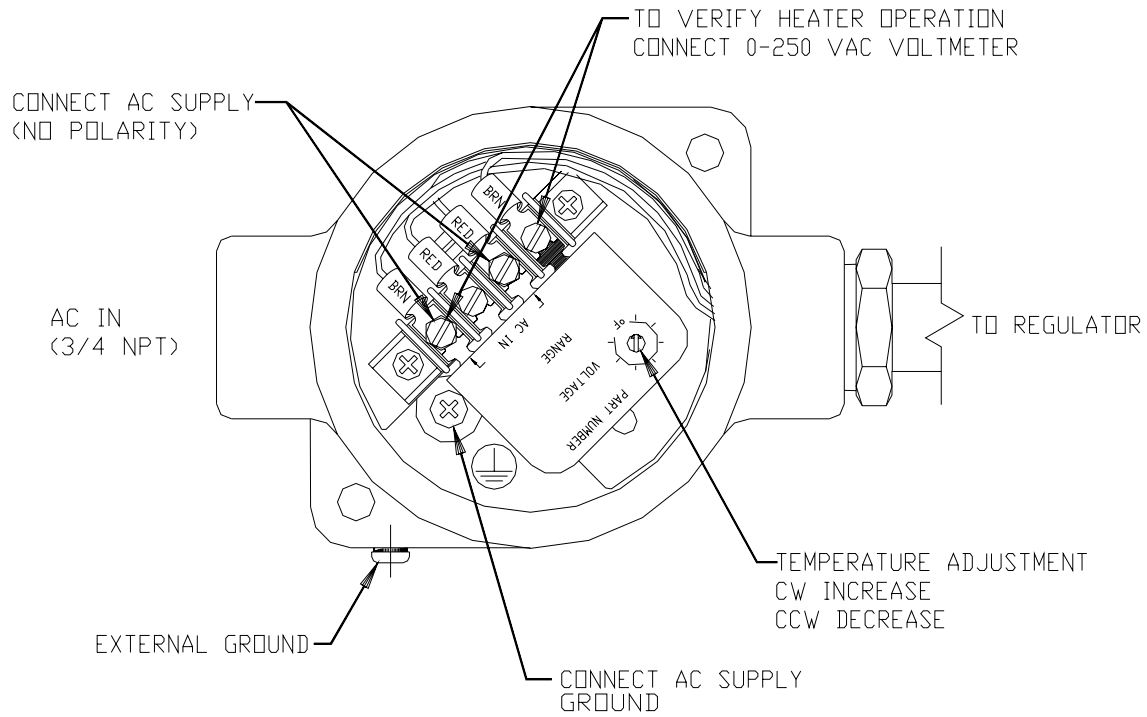


**AVR3 OUTLINE DRAWING**

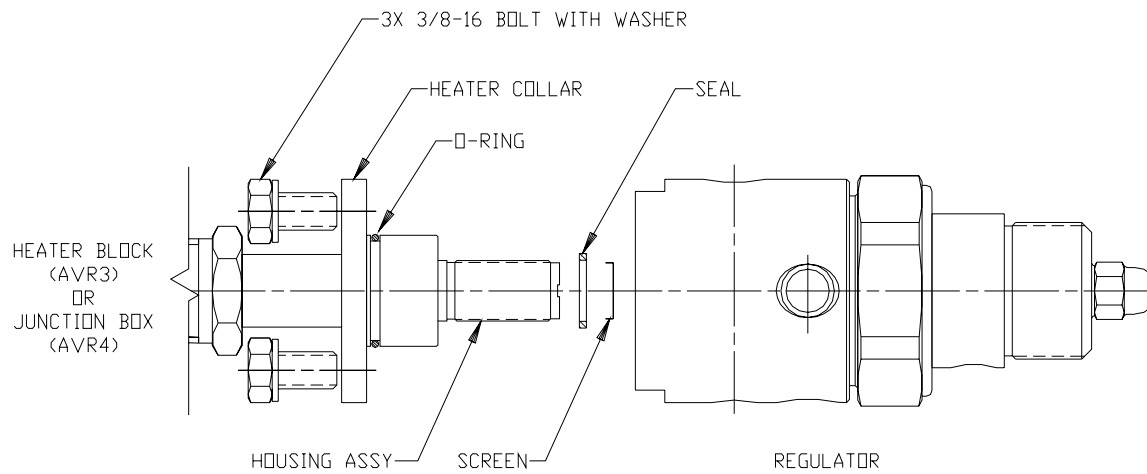


**AVR4 OUTLINE DRAWING  
 FIGURE 1**

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**AVR4 JUNCTION BOX  
 FIGURE 2**



**AVR3 & AVR4 EXPLODED VIEW  
 FIGURE 3**

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**VII. Voltage and Power Rating Configurations - AVR4 Only**

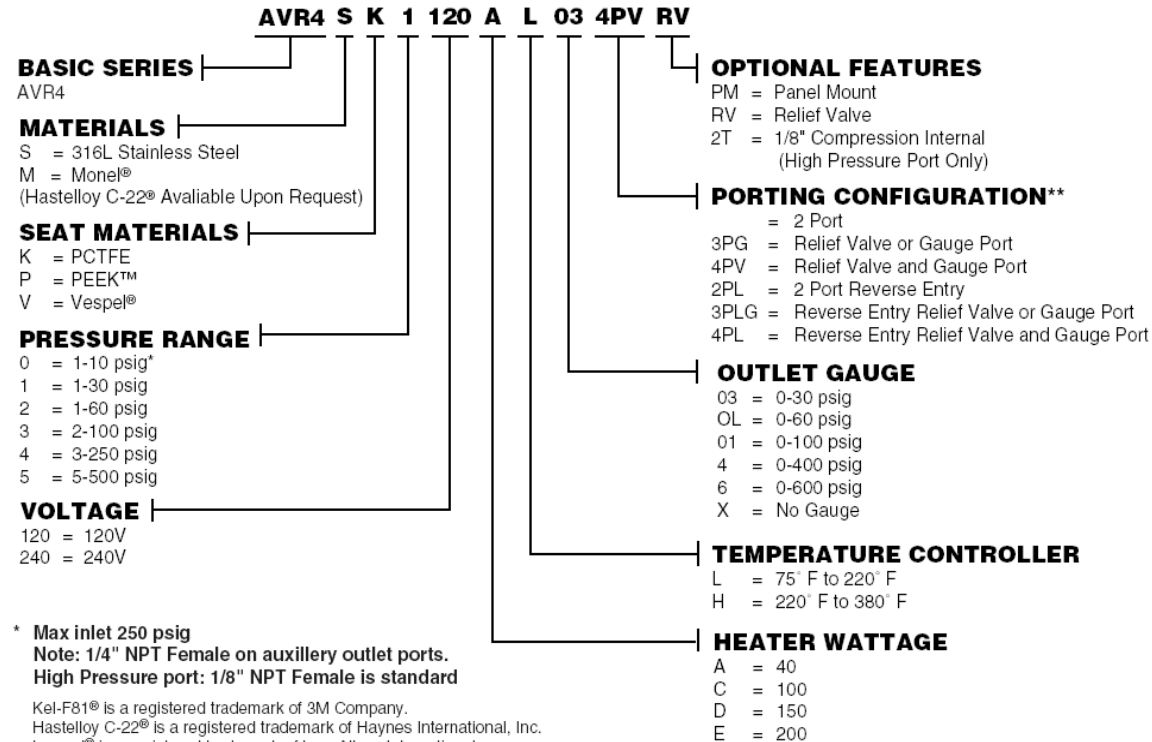
The heater ratings used in the product series are:

- 40 Watt, 120 VAC, 50-60 Hz
- 40 Watt, 240 VAC, 50-60 Hz
- 100 Watt, 120 VAC, 50-60 Hz
- 100 Watt, 240 VAC, 50-60 Hz
- 150 Watt, 120 VAC, 50-60 Hz
- 150 Watt, 240 VAC, 50-60 Hz
- 200 Watt, 120 VAC, 50-60 Hz
- 200 Watt, 240 VAC, 50-60 Hz

The temperature controller units are designed to accommodate low (75F - 220F) and high (215F - 380F) range applications. The unit is a completely encapsulated component with a temperature adjustment control.

The Veriflo AVR4 Series Vaporizing Regulator may be configured in one of two voltages, four heater wattages and two temperature ranges:

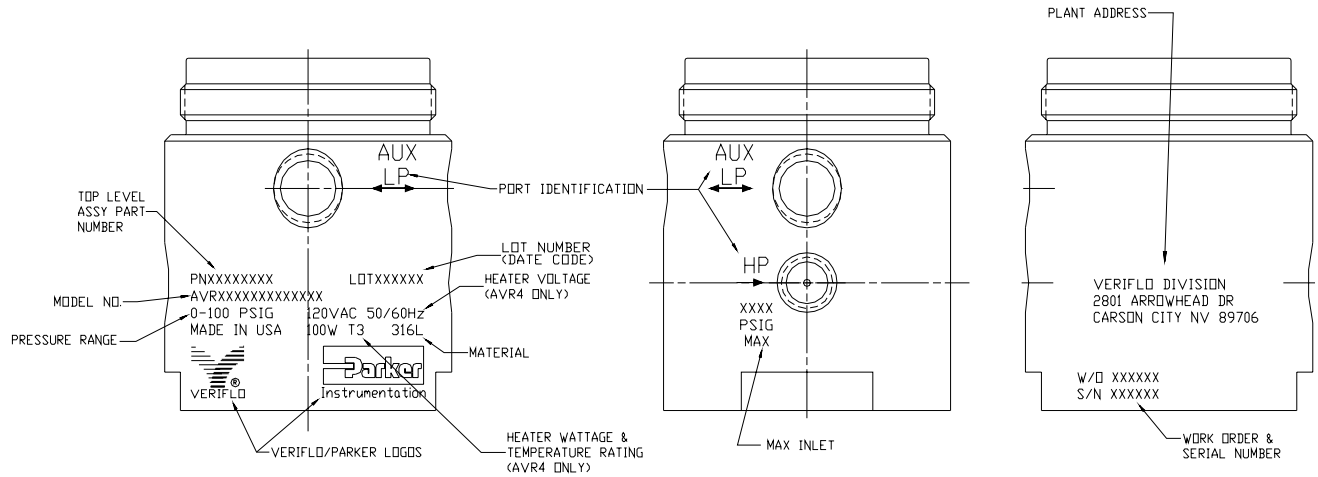
The AVR4 Series Vaporizing Regulator Model Configurations are configured from the ordering information in the Sales Literature as shown below.



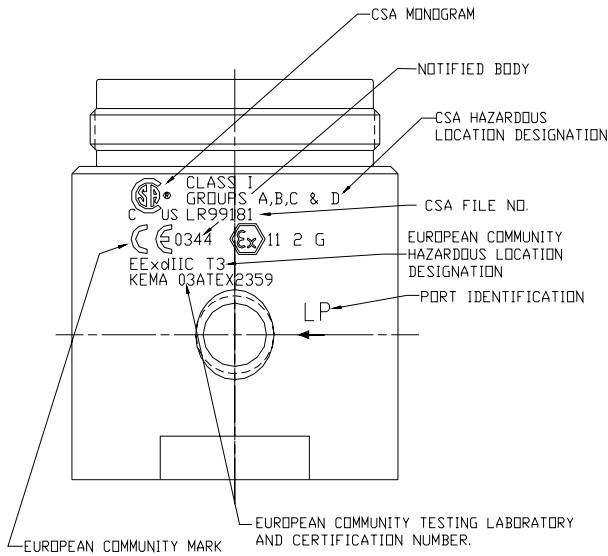
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**VIII. Product Marking**

AVR3 & AVR4 Marking:



**Additional Marking - AVR4 Only**



**Additional Marking - AVR3 Only**

