



INSTALLATION, OPERATION and MAINTENANCE INSTRUCTIONS FOR HEATREX EXPLOSION-PROOF FLANGE IMMERSION HEATERS

I. GENERAL

HEATREX Explosion-proof Electric Immersion Heaters for Hazardous Locations are CSA, FM and CENELEC Approved for use in areas (external to the mounting flange) that are classified as Class I, Divisions 1 & 2, Groups B, C & D.

The maximum operating temperature ignition code is determined for the operating and mounting requirements of each specific application and is assigned at the time of manufacture. See the data plate for the specific temperature code and mounting orientation assigned to this heater. NEVER operate the heater in an atmosphere with an ignition code temperature lower than the heater marking. NEVER operate the heater mounted in an orientation contrary to its marking.

The maximum external temperature code only applies to external surfaces of the explosion-proof electric immersion heater. The temperature code does not apply to internal components of the heater such as the heating elements or to any parts of the tank or pipe line that the heater is mounted in. The rating of the process, gas or liquid, and the process containing tank or pipeline in which the active portion of the heating elements are located in are to be classified as non-hazardous.

The explosion-proof electric immersion heater terminal enclosure is rated for a minimum operating ambient temperature of -40°C (-40°F) and a maximum operating ambient temperature of 40°C (104°F), unless other wise stamped on the data plate.

For details on the particular hazardous environments having the potential for explosion, refer to Articles 500 through 516 of the National Electrical Code, Section 18 of the Canadian Electrical Code, Part I, or IEC Publication 79-10.

A. The HEATREX Explosion-proof Electric Immersion Heaters are intended to be mounted into a tank or in a pipe line by a mounting flange that mates to the heater mounting flange. The active portion of the heating elements extend into the tank or pipe line to heat the contained gas or liquid. The un-heated portion of the elements extend back through the mounting flange and any reflector shield(s) to enter the terminal enclosure. Operation of the heater requires a remotely mounted, properly coordinated electrical power control panel that contains all of the necessary operation and safety controls.

The element joints at the mounting flange and terminal enclosure are welded or silver soldered pressure tight joints.

A safety high temperature sensing thermocouple is attached to the external surface of the mounting flange. Other safety high temperature sensing thermocouples may be attached to the active portion of the heating element sheath or located to sense the process temperature. These safety temperature sensing thermocouples should be electrically connected per the wiring diagram to the heater electrical power controls so that the heater power is shut off if excessive temperatures are reached.

The heaters are specifically designed for each application and should give years of safe, trouble-free operation when properly installed, operated and maintained.

B. Disassembly of the unit for installation is not required or authorized. When installing:

1. Observe all heater nameplate ratings, warnings and notes.
2. Follow the wiring diagram in making all electrical connections.
3. Keep all electrical connections tight.
4. Keep the heater terminal enclosure and element area clean.
5. Carefully read and comply with all warnings and cautions.

All of the Warnings and CAUTIONS are stated in the following Safety Summary and are repeated through these instructions.

WARNING

HEATREX strongly recommends this heater be installed by qualified personnel familiar with the National Electrical Code and/or the Canadian Electrical Code requirements for hazardous locations as well as any local codes. It is the responsibility of the installer to verify the safety and suitability of the installation.

WARNING

NEVER operate the heater in an atmosphere with an ignition temperature lower than the heater marking.

WARNING

The heater must be mounted, vertical or horizontal, as marked on the data plate to maintain the ignition temperature rating.

WARNING

Disassembly of the unit, for installation, is not required or authorized.

WARNING

Potentially lethal voltages are present. Be sure to lock the branch circuit disconnect switch in the off position and tag the circuit "Out for Maintenance" before working on this equipment.

WARNING

The heater is intended to be electrically connected to a coordinated heater control panel that contains the necessary flange safety high temperature limit control.

WARNING

The flange safety high limit control should not be set higher than the limit control setting shown on the data plate.

WARNING

When connecting the safety high temperature limit sensors, be sure to follow the wiring diagram provided with the heater. The heater must not be operated without the safety high temperature limit cutout(s) properly connected in the circuit.

WARNING

Never operate the heater with the flange safety high temperature limit control set above the nameplate limit setting.

WARNING

Replacement of electrical components should only be done by authorized personnel familiar with the requirements of maintaining electrical equipment in an explosion-hazard area.

WARNING

Replacement electrical components must be obtained from the factory to maintain the hazardous location rating.

III. INSTALLATION

A. Site Selection.

- 1.) The HEATREX Explosion-proof Electric Immersion Heaters for Hazardous Locations are designed for use only while permanently mounted in a tank or pipe line in a vertical or horizontal orientation as stamped on the data plate.
- 2.) The site must allow sufficient free space around the heater for safe and easy installation and maintenance access.
 - a.) The minimum pull space allowed should be at least equal to the heaters overall length plus 3 feet.
 - b.) Workspace for heater maintenance should be at least 3 feet all around the mounting flange and terminal box.

- 3.) The elements extending out from the external surface of the mounting flange should not be enclosed or insulated in any manner that would prevent air circulation around the face of the flange and elements. Likewise the terminal enclosure should not be enclosed or insulated.

WARNING

HEATREX strongly recommends this heater be installed by qualified personnel familiar with the National Electrical Code and/or the Canadian Electrical Code requirements for hazardous locations as well as any local codes. It is the responsibility of the installer to verify the safety and suitability of the installation.

WARNING

The heater must be mounted, vertical or horizontal, as marked on the data plate to maintain the ignition temperature rating.

B. Mechanical Installation. Once an acceptable location has been determined, follow these instructions to complete the mechanical installation.

WARNING

Disassembly of the unit for installation is not required or authorized.

- 1.) Lifting eyes are provided to facilitate handling. Do not lift the heater by the heating elements.
- 2.) Do not nick or scratch the mating surfaces of the mounting flanges.
- 3.) Exercise care when installing the heater so as not to damage the heating elements, spacers or temperature sensors.
- 4.) Be sure a gasket rated for the application is installed between the sealing surfaces of the mounting flanges.
- 5.) Be sure all flange bolts are installed and securely tightened.
- 6.) Be sure the element bundle is adequately supported to prevent drooping. For element bundles 30" or less in length, supports are not necessary. For longer element bundles, supports are recommended within 4 1/2" from the U-bend end of the bundle and on maximum 24" centers thereafter. Supports should allow for thermal expansion of the element bundle.
- 7.) Pressure test the installation to make sure there are no leaks at any of the joints.
- 8.) Insure the tank or pipe line is full, and/or the process flow rate is present before operating the heater.

C. Electrical Installation. Follow these instructions to complete the electrical installation:

WARNING

The heater is intended to be electrically connected to a coordinated heater control panel that contains the necessary flange safety high temperature limit controls.

WARNING

When connecting the safety high temperature limit sensor(s), be sure to follow the wiring diagram provided with the heater. The heater must not be operated without the safety high temperature limit cutout(s) properly connected in the circuit.

WARNING

Potentially lethal voltages are present. Be sure to lock the branch circuit disconnect switch in the off position and tag the circuit "out for maintenance" before working on this equipment.

1. Remote, coordinated heater control is required. Follow the wiring diagram and any Code recommendations in making all electrical connections.
2. Use only an approved explosion-proof means of wiring, such as mineral insulated cable or copper conductors in rigid conduit with threaded connections and conduit seals per the CEC, NEC or IEC requirements to make electrical connections to the heater.
3. Follow the NEC and/or CEC and any local electrical and building codes related to the installation and intended use of the heater in an explosion-hazard area.
4. When doing any work on a heater, including the initial electrical connection, disconnect the electrical current at the main branch circuit switch, and lock the switch in the off (open) position and tag the circuit "Out for maintenance" to prevent potential lethal shock hazards.
5. Confirm that the electrical power supply matches the nameplate voltage, phase and amperage rating of the heater to be connected.
6. Ensure conductors are of appropriate gauge size. Size all input conductors according to accepted standards consistent with the temperature rating of the wire being used. Use minimum 75°C rated wire.
7. All thermocouple extension wire must be sized by the length of the run to stay below the maximum lead resistance specified in the control manufacturers instructions. For the United Electric type E931-90675 safety high temperature limit control the extension wire (pair) resistance should be kept below 100 Ohms, excluding the sensor to limit the offset error to 1oF or less. The FENWAL Series 543 limit controls can have a maximum lead resistance of 150 Ohms.
8. Do not run thermocouple extension wire in the same conduit with AC electrical conductors.
9. Proper installation of the heater requires that an adequate grounding conductor be connected to the ground terminal. This terminal is painted green or marked with the letter "G" and is located on the inside of the control enclosure next to the power input

terminals. An external grounding pad is also provided on the terminal enclosure.

10. Refer to the wiring diagram to ensure that all connections are as required.
11. Check and confirm all connections are securely fastened.
12. Ensure that input conductors and conduit have adequate strain relief at installation.
13. Before application of electrical power, recheck all connections to ensure compliance with the wiring diagram and any code requirements. Remove any foreign objects from the terminal enclosure. Reinstall cover tightly.
14. See operating instructions, Section V, before operating the heater.

IV. FIELD INSTALLED CONTROLS

WARNING

The heater is intended to be electrically connected to and controlled by a coordinated heater control panel that contains the necessary flange safety high temperature limit control(s).

WARNING

When connecting the safety high temperature limit sensor(s), be sure to follow the wiring diagram provided with the heater. The heater must not be operated without the safety high temperature limit cutout(s) properly connected in the circuit.

1. If the heater controls are not supplied by HEATREX the control supplier must include an approved ANSI type J thermocouple input temperature control for the flange safety high temperature sensor as well as other controls for heating element sheath and/or process safety high temperature sensors. The output of the safety high temperature limit controls must be electrically connected to the heater power control(s) so as to shut the heater off if the flange high limit control, or other safety high temperature control outputs are actuated.
2. United Electric type E931-90675, or FENWAL Series 543 (or approved equal) high temperature limit controls are approved for use with this heater.
3. Contact the factory for co-ordination of any field installed controls. Field installed controls not shown on the wiring diagram may void the HEATREX warranty and the agency certification.

WARNING

The flange safety high limit control should not be set higher than the limit control setting shown on the data plate.

V. OPERATION

The HEATREX Explosion-proof Electric Immersion Heaters may be operated normally at ambient temperatures of 104°F (40°C) or less, unless otherwise marked, and in atmospheres containing less than 21% oxygen by volume, and as classified on the nameplate. All of these conditions must be met before attempting to operate the heater. The heater should never be operated in an oxygen-enriched atmosphere or at ambient temperatures above the marked maximum ambient temperature or 104°F, (40°C). At higher ambient conditions the safety high temperature limit cutouts may activate. If this occurs, the installation should include some means to de-energize the heater during high ambient conditions, such as an automatic temperature control thermostat or a manually operated disconnect switch, to prevent excessive cycling of the controls.

WARNING

NEVER operate the heater in an atmosphere with an ignition temperature lower than the heater marking.

WARNING

The heater must be mounted, vertical or horizontal, as marked on the data plate to maintain the ignition temperature rating.

WARNING

Never operate the heater with the flange safety high temperature limit control set above the nameplate limit setting.

A. Initial Operation. Check to make sure the mechanical and electrical installation is complete and that it is safe to operate the heater.

B. Normal Operation.

- a.) Inspect the heater installation for loose bolts, covers, signs of overheating or corrosion that could impair the ability of the heater to operate safely.
- b.) Perform the operation steps per the instructions provided with the remote heater control panel.
- c.) Place the heater in service.

VI. MAINTENANCE

A. Electrical

WARNING

Potentially lethal voltages are present. Be sure to lock the branch circuit disconnect switch in the off position and tag the circuit "out for maintenance" before working on this equipment.

WARNING

Replacement of electrical components should only be done by authorized personnel familiar with the requirements of maintaining electrical equipment in an explosion-hazard area.

WARNING

Replacement electrical components should be obtained from HEATREX to maintain the hazardous location rating.

1. Annually inspect all terminal connections and visible insulation for damage, looseness, fraying, etc., as applicable. Tighten any loose terminals and replace or repair damaged or deteriorated insulation.

2. If reduced heat output is suspected verify the condition of the heating elements by using an ammeter to check the current draw of each input line. All input lines should draw approximately equal current which should agree with nameplate rating. If they do not, one or more of the heating elements could be burned out.

B. Mechanical

1. Check the terminal enclosure, and conduit connections for evidence of water leaks or moisture collection. Tighten connections and check the cover "O" ring as required.

2. The explosion-proof control box is designed with threaded joints and metal-to-metal contact at the cover joint to prevent an explosion. Do not attempt to install gasket material of any type at these joints.

3. Annually check the tightness of all mounting bolts and nuts.

4. Should there be any evidence of fluid or gas leakage from the mounting flange, or element joints the heater should be repaired immediately. Contact the factory for instructions.

VII. REFERENCE DATA

A. Wiring Diagrams. Please refer to the enclosed wiring diagrams in making all electrical connections to the heater and in performing any required maintenance.

B. Data Plate Information. The data plate contains the catalog number and rating information. Please copy this information down and have it available when communicating with the factory.

Keep these instructions for future reference.



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