



## **INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS FOR THE WORLD HEAT RANGE OF ELECTRIC FLOW HEATERS**

### **1.0 DESCRIPTION**

World Heat range of Electric Flow Heaters are typically used on closed heating systems such as radiator heating circuits for space heating requirements. However, they are also a very effective heat source for swimming pools and can be used as a pre-heat/back-up for Domestic Hot Water (DHW) Storage Calorifiers and boilers during periods of high demand. Electric Flow Heaters have also been used as a back-up during periods of boiler maintenance to ensure that service is not disrupted. An electric immersion heater is used to heat the water as required. World Heat are able to offer three main types of electric immersion heater including; Fixed Element, Replaceable Element and Removable Core Element.

World Heat manufacture Electric Flow Heaters in the following materials; Solid Copper, Mild Steel, Stainless Steel (various grades) and Galvanised Mild Steel. The standard range covers 30 kW to 800 kW.

**WARNING: This equipment may use dangerous high voltage and can present an electrical shock hazard.**

- **Only suitably qualified personnel should carry out installation and commissioning of this equipment.**
- **Ensure that the equipment is correctly earthed.**
- **Ensure that the equipment is fully powered down before attempting any work on the unit.**
- **The equipment must be installed to relevant standard and good practices, only appropriate tools should be used.**

### **2.0 PED INFORMATION**

The World Heat standard range of Electric Flow Heaters are designed and manufactured in accordance with the requirements of the Pressure Equipment Directive 2014/68/EU. As per the requirements of the directive, units that fall within the SEP (Sound Engineering Practice) category are not supplied with a CE Mark. Units that fall within categories I to IV are CE Marked and provided with the necessary markings, certification and inspectorates.

It is the responsibility of the user and/or installer to ensure that the unit is installed and operated safely, and in accordance with the instructions detailed within this document.

### **3.0 COSHH**

Research has suggested that there are no specific items to highlight during normal operating conditions. However, during manufacture, dye-penetrant may be used as part of our pre-inspection process of welds. It is therefore essential that adequate flushing and sterilization is carried out before use and that the quality of water produced is to an acceptable standard.

### **4.0 INSTALLATION**

#### **4.1 LIFTING AND HANDLING**

- a) Lifting lugs, where fitted, should be used for lifting. If the unit has been supplied as part of a skid-mounted package, the unit should be lifted from the skid-base.



- b) For units without lifting lugs, the user must arrange suitable lifting arrangements (i.e. the use of slings, lifting eyes etc.) to avoid damaging the vessel or its attachments during installation, taking into consideration the weight and design of the unit.
- c) Where fitted, insulation should not be used for lifting purposes.
- d) Due to the insulation and case characteristics, care should be taken when lifting and handling the unit to prevent damage.
- e) Avoid the use of lifting straps where insulation is fitted, as they may damage or crush the insulating material or case.
- f) Do not lift the unit using chains which are directly in contact with the unit shell or control panel (if supplied).
- g) Do not allow operatives to stand on the flow heater shell or control panel (if supplied).
- h) Care should be taken so as to not damage the control panel or wiring (if supplied).

**WARNING: When lifting, please ensure a clean lift of the unit using the lifting lugs or skid-base provided. The cradles/skid-base are not designed for pivoting during lifting/siting/installation. Units should be kept in the upright position.**

#### 4.2 STORAGE – *If storing the unit for any period of time before installation*

- a) Upon receipt of the unit, please check the packaging to ensure that it has not been damaged during transport. Any damage to the packaging should be fixed or replaced as necessary.
- b) Due to the electrical aspect of the unit, it must be stored indoors within a dry frost-free environment with ambient temperatures between 4°C and 40°C.
- c) The integrity of the packaging should be checked monthly. Should the external seal be found to have broken or its condition found to have deteriorated (i.e. become wet, hardened or split), the packaging should be repaired or replaced.
- d) Once sited and the packaging has been removed, the condition of the unit should be thoroughly examined for any signs of corrosion or contaminant ingress.

#### 4.3 SITING

- a) Unless specified at enquiry stage and specifically ordered to suit an external installation, the unit must be sited indoors.
- b) Foundations or plinths must be firm and level to prevent settling, pipe strain or distortion of shell.
- c) Unless specified at enquiry stage and specifically ordered, the unit must be installed in a level position.
- d) Ensure that there is sufficient maintenance space surrounding the unit.

#### 4.4 INSTALLATION

- a) Protective covers and plugs may be fitted to connections to protect them in transit, these must be removed prior to use.
- b) If a connection is not required for any reason, the connection must be sealed appropriately.
- c) Check for any signs of contaminant ingress which have got into the unit during transportation or storage on site.
- d) Pipe-work connected to the unit must be adequately supported to prevent any loads being transmitted to the vessel. Consideration must be taken with regards to thermal expansion through the use of bends and expansion joints.
- e) Isolation valve should be fitted to the pipe-work prior to the heater shell (EXCLUDING THE VENT CONNECTION) to facilitate future maintenance and servicing.



- f) To avoid corrosion, use appropriate pipe materials to suit the heater shell material.
- g) To connect to the heater shell screwed connections, a suitable thread sealant should be used.
- h) To connect to the heater shell flanged connections, bolts should be tightened in a diametrically opposite sequence in order to load the flanges evenly onto the gasket. The gasket should be suitably chosen for the application.
- i) A suitable safety relief valve should be fitted to prevent over-temperature and over-pressure. The discharge should be piped away to a safe disposal point, preferably an air break and tundish so that the discharge is unrestricted and easily visible.

#### NOTE REGARDING IMMERSION HEATERS

Each immersion heater is tested before despatch from the factory and is ready for installation. The immersion heaters, once tested, are thoroughly dried but moisture may collect in the heater during transportation or storage on site. Therefore, it is important that an insulation test is carried out across each element to earth before connecting the heater to mains power.

If the insulation resistance is lower than 50,000  $\Omega$  (Ohms), the heater must be dried out prior to connection to mains power.

The voltage should not exceed 25% of the working voltage.

The heater should be switched off at regular intervals to prevent overheating.

For further information, please refer to the model specific IOMs supplied separately.

#### NOTE REGARDING CONTROL PANELS

Prior to commissioning, ensure that all control circuitry and main circuit connections are tight. Remove all loose items from inside the panel and items fastened to the unit cables.

Please refer to the unit specific wiring diagrams and local regulations to determine the power supply required. If a control panel has not been included within our scope of supply, ensure that the heater thermostat's maximum current is not exceeded.

To avoid damage to the heater elements, do not allow the heater to run dry. A level switch can be provided as part of our controls package to prevent this.

### 5.0 COMMISSIONING & OPERATION

Do not operate the equipment at pressures or temperatures in excess of those specified on the nameplate of the unit. Do not subject the heater shell to conditions of vacuum or partial vacuum. For example, partial vacuum may occur if the secondary inlet or vent is restricted during draw off or drain down.

1. Test the control system with the mains power live and the main isolator switched to ON.
2. Connect the thermostats and switch ON the main isolator switch. As the system is cold, the contactor should close and heater ON lamp should light.
3. Remove one wire from the control thermostat and the contactor should open switching OFF the heater lamp.
4. Replace the wire to the control thermostat and repeat the process for the safety thermostat.



a) Assumptions

- It is assumed that the secondary pipe-work is already full of water.
1. All isolating valves isolating the unit from the system should be closed and the immersion heater and any secondary circulation pumps turned off.
  2. Close the unit drain valve.
  3. Open the fill connection and slowly fill the unit with cold water.
  4. Carefully open the secondary flow and return valves.
  5. Switch on the secondary circulation pump.
  6. Reconnect the immersion heater.
  7. With the control thermostat still disconnected, operate the contactor with the TEST switch. This will give manual control of the heater stages.
  8. If satisfactory, reconnect the control thermostat.
  9. Allow the unit to heat up.
  10. Adjust the temperature control gradually and ensure that the correct operating temperature is maintained.
  11. Check that the heater switches off by reducing the temperature on the control thermostat.

Whilst the unit is operating, check that all of the gaskets supplied with the unit are effective. Some bolt tightening may be required after the unit has been subjected to its first heating cycle and subsequently maintained.

Following installation and commissioning, it is advisable to remove, clean and reassemble any strainers prior to operation.

When the unit is taken out of operation, all fluids must be drained from the vessel to prevent freezing or possible corrosion.

## 6.0 MAINTENANCE

Annual maintenance of the unit should consist of internal inspection of the heater shell and inspection of the gaskets supplied as part of the unit. As per guidelines regarding Legionella bacteria proliferation, it is recommended that the shell internals are cleaned. Site insurers may also require annual inspection of the shell conditions.

In order to drain the unit down to carry out annual maintenance;

1. It is assumed that all isolating valves isolating the unit from the system are open.
2. Switch off the immersion heater and any secondary circulating pumps.
3. Isolate the unit by closing the isolating valves installed.
4. Allow the heater to cool to a safe temperature.
5. On sealed systems, reduce the residual pressure within the unit by manually operating the safety valve.  
**Please Note: Some water will be produced by the safety valve.**
6. Open the manual vent valve and allow air into the unit during drain down.  
(If the unit is open vented and shares a common vent with other units, isolate the vessel from the common vent using a 3-way valve and vent to atmosphere).
7. Ensure that the drain is piped away appropriately to a designated drain point before opening drain valve and allowing the vessel contents to drain.



(If the drain connection is positioned on the side of the unit, it will not completely drain the unit. The residual water should be pumped or siphoned out appropriately).

8. The shell internal condition should be inspected by removing the immersion heater to allow visual examination.
9. Re-fill the unit as per the instructions provided in Section 5.0 of this document.

Check the heater thermostats every 12 months by removing and testing the contact resistance and comparing the switch point by immersion in hot water using a separate thermostat.

#### NOTE REGARDING IMMERSION HEATERS

Please contact our technical department for a copy of the immersion heater IOMs specific to the unit installed; please quote the vessel serial number in order for our team to provide the correct instructions.

#### 6.1 FAULT FINDING

If a loss of performance is observed, the following are possible causes;

- Scale deposited on the heater surfaces (externally)

Constant circulation throughout the unit minimises the risk of fouling. We recommend that the heater elements are periodically checked for evidence of scale. Hard untreated water causes scale to accumulate quicker than soft treated water. Special heater element materials can be provided by request to suit specific water conditions.

#### 7.0 RECYCLING

For details on the end of life disassembly, recycling and disposal requirements of the unit, please consult the general assembly drawing and technical data sheet issued at quote/order stage, to determine the materials used.

All materials should be disposed of responsibly and in accordance with local regulations.

Please contact our technical team for further information.

#### 8.0 SPARES

World Heat recommends the following spares for a standard Electric Flow Heater;

- Set of Heater Gaskets
- Immersion Heater Elements (if applicable)
- Control Panel Lamps (if control panel supplied)
- Control Panel Fuses (if control panel supplied)
- Control Panel Contactors (if control panel supplied)
- Control Panel Circuit Breakers (if control panel supplied)

Please contact our sales department for recommended spares and availability, please quote the vessel serial number in order for our sales team to correctly specify the spares required.