

## **OPERATING, INSTALLATION & MAINTENANCE INSTRUCTIONS**

# **Core Type Immersion Heater Batteries**

THESE INSTRUCTIONS SHOULD BE READ AND FULLY UNDERSTOOD PRIOR TO INSTALLATION. THEY SHOULD BE KEPT IN A SAFE AND EASILY ACCESSIBLE PLACE NEAR THE UNIT.

THIS HEATER MUST BE INSTALLED BY A PERSON WITH THE RELEVANT ELECTRICAL QUALIFICATIONS AND EXPERIENCE IN ADDITION TO ANY OTHER APPROPRIATE QUALIFICATIONS AND EXPERIENCE. NO LIABILITY CAN BE ACCEPTED BY ORMANDY ELECTRIC HEATERS FOR ANY INACCURACIES OR OMISSIONS IN THESE INSTRUCTIONS.

THIS HEATER SHOULD BE STORED IN A SAFE PLACE PRIOR TO INSTALLATION TO ENSURE THAT NO DAMAGE TO THE APPLIANCE OR ASSOCIATED COMPONENTS CAN OCCUR.

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## APPLICATION

The NBHE and NBWE range of immersion heater batteries are intended to heat oil and water respectively, however depending on the specification, a variety of other solutions can be heated. The heaters are suitable for use in bulk storage vessels and flow boilers, etc. The removable elements can be inspected or replaced for maintenance purposes, without the need to drain the vessel. This is particularly advantageous where it is not practical to drain the vessel in order to inspect or replace the elements. The elements have a low Watts Density which makes them particularly suitable for use in more arduous conditions. Horizontal mounting is standard although vertical mounted heaters can be supplied. To avoid localised boiling or air locks, care should be taken to ensure that the cold zone extends beyond any neck piece. Refer to the Data Sheet for the detailed specification of the heater.

## CONSTRUCTION

The element sheaths are expanded or welded into the element plate. The element sheaths house the elements which comprise ceramic formers with nickel chrome resistance wire and can be easily withdrawn. Supports are fitted to the element 'bundle' to provide a more rigid structure for multiple elements. Element terminals are interconnected to provide evenly balanced electrical circuits. Earth bonding connections are provided on the element plate and terminal box. These ranges are designed for various operating pressures. The heater generally conforms to B.S.7798.

Refer to the appropriate data sheet for full heater specification .

## INSTALLATION

### MECHANICAL INSTALLATION INSTRUCTIONS

- The heater should be handled with great care . The elements are delicate and even slight knocks can damage the ceramic cores. The heater must only be lifted by putting a sling under the element bundle and using this as a lifting point, along with the element plate.
- The heater is supplied with a gasket, ready to be bolted to the appropriate flange on the vessel. It is not recommended that sealing compounds are used.
- Installation must be carried out with the thermostat (s) uppermost.
- Heaters with immersed lengths of 1200mm and longer should be provided with internal tank support.
- After fitting the heater into the vessel, the system should be filled with water and a check made for leaks around the joint. The Vessel should be filled according to your standard procedure ensuring that all air pockets are purged from the system. **It is important that the elements are immersed at all times during operation.**
- Control thermostats (if fitted) should be set to suit site requirements.  
The control thermostat is provided to regulate the temperature to the desired setting. When the set temperature is reached the heater circuit will switch off until the temperature falls below the differential of the thermostat. When this happens the heater circuit will energise and start the cycle again.
- The High limit manual reset cut-out thermostat should be set at approx. 15<sup>o</sup>C above that of the control thermostat setting. The high limit thermostat is incorporated as a safety device to prevent overheating.  
**It is highly recommended that a high limit thermostat is included in all installations for safety purposes.**
- **If any cleaning or sterilising solutions are to be 'flushed' through the system prior to commissioning, a check should be made to ensure that the solution will not damage the heater.**
- **Warning: Do not cover the heater terminal enclosure.**

## ELECTRICAL INSTALLATION INSTRUCTIONS

All electrical wiring must be carried out by a qualified person and must be comply with the current I.E.E Regulations to B.S.7671.

- We recommend that the insulation of each circuit within the heater is checked prior to installation. The minimum insulation reading between live and earth should not fall below  $1M\Omega$ . Refer to the procedure in the Operational Faults section of this manual if the insulation is below  $1M\Omega$ .
- Refer to the heater wiring diagram prior to wiring
- The immersion heater **must** be connected to fixed wiring.
- The standard wiring is arranged for three phase supplies in either single circuit or multi-stage control. It is essential that the control equipment is compatible with the heater circuit configuration and all components are correctly rated.

Heatrae Industrial can provide control equipment if required.

- Control equipment should consist of :
  - a readily accessible and clearly identified isolating switch.
  - fuse protection on the mains incoming supply, each heater circuit and the control circuit.
  - a contactor controlling each heater circuit. The contactor coil is to be controlled through a control thermostat.
- Ensure all wires are labelled with the phase colour and circuit number (important for future maintenance)
- The control thermostat is normally wired in series with the contactor coil of the contactor switch.
- All parts are bonded by a common earth link requiring the connection of one common earth terminal only.
- Check all electrical connections to ensure that they are tight.
- After all electrical connections have been made replace the heater terminal enclosure.
- Immersion heaters are designed to operate **ONLY** when the heating elements are totally immersed in liquid and **must not** be switched on when the heating elements are exposed to air.
- The vessel must be fully filled with liquid before operating the heater (See mechanical installation procedure).
- The heater will only heat the contents of the tank above the immersion heater.
- Should the vessel be drained at any time and the heater removed, this installation procedure must be repeated before proceeding to switch the heater circuits on.

**WARNING : THIS APPLIANCE MUST BE EARTHED**

## MAINTENANCE

It is recommended that routine periodic checks are performed every 12 months or every 6 months where local water supply is particularly hard or contains a high proportion of solids. All precautions must be taken against electrical shock, in particular by switching off at the mains switch fuse between maintenance checks.

The recommended procedure is as follows :

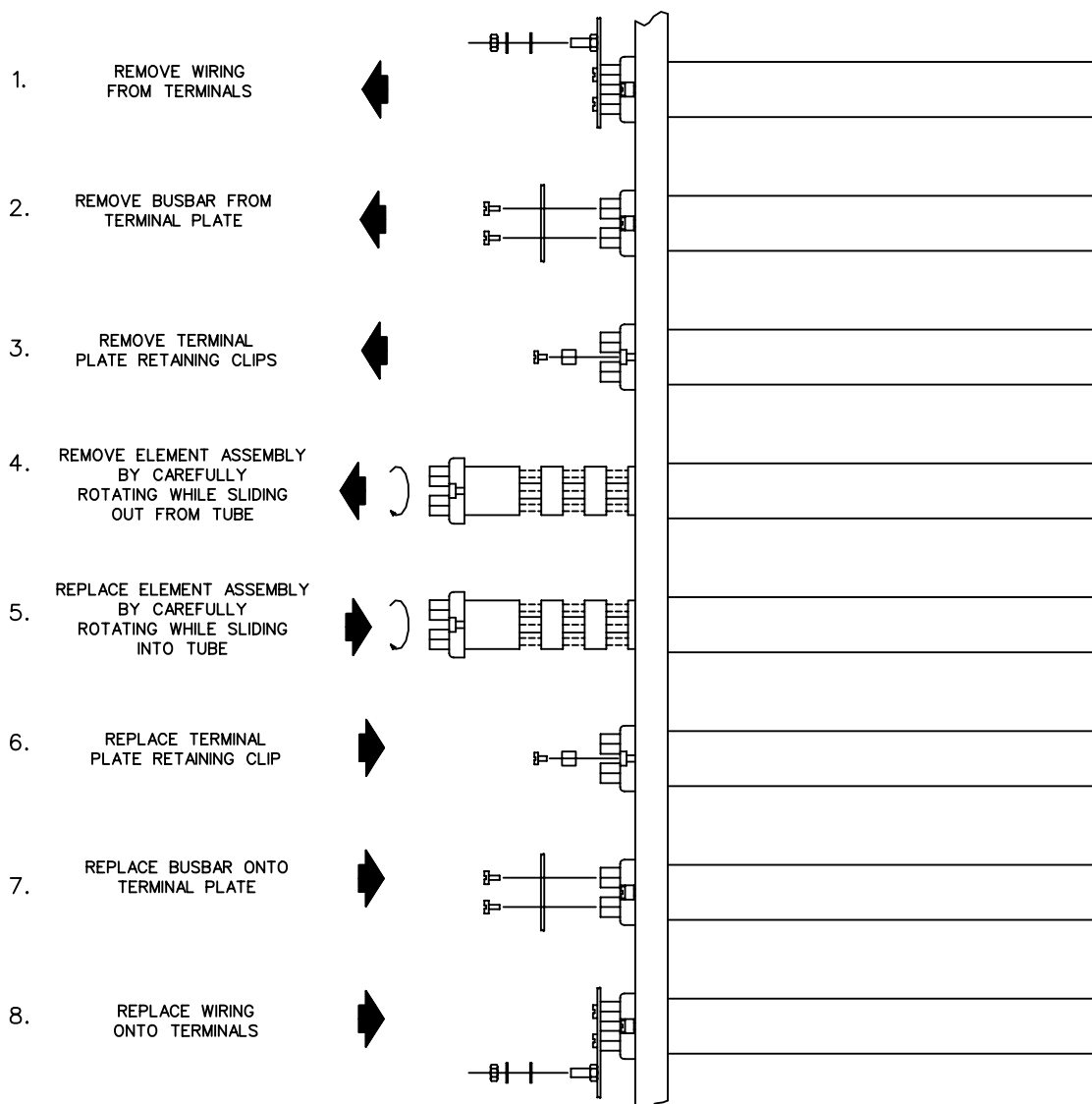
**WARNING : Always isolate electrical power at the mains switch before removing the terminal enclosure.**

1. Isolate electrical power at the mains isolator and remove fuses.
2. Isolate mains Oil or cold water supply.
3. Visually check all water joints, ensuring no leaks are evident.
4. Remove heater terminal cover.
5. Disconnect incoming wiring (line connections) to busbars.
6. Carry out an insulation check on each circuit between live and earth. If readings are below  $1M\Omega$  refer to the insulation improvement procedure in the Operational Faults section of this manual.
7. Remove busbars/interconnecting wiring and carry out resistance checks on all elements to verify element continuity.
8. Elements can be visually inspected by removing from the heater as directed on page 6.
9. Check operation of thermostat (s).
10. We only recommend removing the heater from the vessel if the oil/water is particularly aggressive or contains a high concentration of dissolved solids.

11. Drain vessel and connecting pipes according to your standard procedure before removing the heater. Unbolt the element plate and remove complete assembly from the vessel.
12. Visually inspect heating element tubes for scale formation or corrosion. In extreme cases heavy scaling will cause increased element running temperatures and eventual element failure.
13. Replace any defective parts (Refer to the Spare Parts section of this manual for ordering information).
14. Fit a new flange gasket to the element plate.
15. Refer to the mechanical and electrical installation section for re-fitting heater to vessel.

**Note : If the system is to be 'flushed' through with solutions intended to sterilise or de-scale, a check should be made to ensure that the solution will not damage the heater.**

### ELEMENT REPLACEMENT PROCEDURE



**WARNING : Always isolate electrical power at the mains switch before removing the terminal enclosure.**

- A) Isolate electrical power at the mains isolator and remove fuses.
- B) Remove heater terminal cover.
- C) Disconnect wires from busbars (line connections).
- D) Follow steps shown in the above diagram.
- E) Prior to replacing an element, ensure the inside of the element tube is completely dry.
- F) Once the faulty element (s) has been replaced, replace wires to busbars (line connections).
- G) Replace terminal cover.
- H) Fill vessel and check for leaks (see installation procedure).
- I) Switch 'ON' power to the heater.

## OPERATIONAL FAULTS

**Always isolate electrical power at the mains switch before removing the terminal enclosure.**

### • Lower Than Expected Heat Output

Check :

- a) If control thermostat has been incorrectly set.
- b) If there is an error in the initial sizing of the heater.
- c) If there is a fuse failure or fault in the control gear.
- d) If one or more of the heating elements has failed.

### • Heater Not Operating

Check :

- a) If High Limit Thermostat has operated. This may be re-set by depressing the button, only after locating and rectifying the cause of the excessive temperature. i.e. probably a failure of the control thermostat or control gear.
- b) Main Fuses.
- c) Main Electrical Supply.
- d) Control Thermostat for failure in 'open' position.
- e) Contactor operation and contactor coil fuse. Fault in contactor or control gear.
- f) Wiring to heater (No loose connections).
- g) Element continuity (resistance) - If faulty order replacements (See spare parts section).

### • Water Overheating

Check :

- a) Control Thermostat setting - may be too high.
- b) Control Thermostat for failure in 'closed' position.

### • Constant Fuse Failure

When fuses constantly fail, it is recommended that the following be adopted :

- a) Ascertain which item (s) the fuse protects i.e. heater circuit etc..
- b) Once established, thoroughly check relevant circuit with test meter to determine if any elements have gone to earth.

#### • **Faulty Elements**

The following procedure should be carried out if the elements are suspect :

1. Check earth insulation from live to earth. This should be above 1 MegaOhm.
2. Check phase to neutral resistance (Star) or phase to phase resistance (Delta). These readings should correspond to those on the test certificate.

If these readings are found to be incorrect, remove busbars and repeat the above procedure for each individual element in order to identify the faulty element (s).

Element failure may be caused due to moisture in the element tube. If an element is not operating, remove from the heater as directed on page 6, check the coil in the element is not broken. If the coil is damaged, a replacement element will have to be ordered.

#### • **Low Element Insulation**

1. The terminals on the end of each element can be dried to remove any moisture. e.g. with a hairdryer or similar device.
2. If an RCD is being used this can be disconnected for a short time while the heater is switched on to allow the insulation readings to increase.
3. To maintain the insulation during periods of low use it is advisable to switch the heater on in the tank, in water, approximately once a month for 48 hours.
4. The tube can be dried thoroughly and sachets of Silicon Desiccant added to prevent further moisture built up.

## **SPARE PARTS & REPLACEMENTS**

To ensure the proper and safe operation of the heater it is important that all spares and replacement parts are to be ordered from Ormandy Electric Heaters quoting the model number and serial number of the heater.

#### **SPARE PARTS LIST**

- Removable core heating element/s
- Flange Gasket
- Control thermostat
- High Limit Thermostat

## **GUARANTEE**

The manufacturer will make good, by repair or at his option by the supply of a replacement, defects which, after proper installation, appear in the goods, within a period of twelve calendar months after the goods have been delivered and arise solely from faulty design, materials or workmanship. Provided always that defective parts are promptly returned by the user free to the manufacturer's works, unless otherwise arranged, the repaired or new parts will be repaired or new parts will be delivered by the manufacturer free of charge.

The policy of Ormandy Electric Heaters is that of continuous improvement and development, the right is therefore reserved to change specifications without notice.

**KEEP THESE OPERATING INSTRUCTIONS IN A SAFE PLACE FOR FUTURE REFERENCE**