HEAT INDUSTRIAL

Installation, Operation & Maintenance Instructions Manual

FX Heaters & FX Thermostats

Contents

EXHEAT Industrial can provide versions of this manual in German, French, Italian, Spanish, Portuguese, Polish, Chinese and Russian. These versions can be requested at support@exheat-industrial.com

To maintain the equipment warranty and, if applicable, the Hazardous Area Certification, the instructions contained within this manual must be complied with in full.

Fitting any other device invalidates the hazardous area certification.

1. Contact Details

Sales Enquiries

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2. Description of Equipment

- The EXHEAT Industrial Ltd FX type enclosure heaters and thermostats are designed for the temperature control of small to medium sized enclosures, for anti-condensation, frost protection and ambient temperature maintenance for equipment within hazardous areas.

Certification

- EXHEAT Industrial Ltd holds approvals from North America, Europe and globally through the IECEx scheme for the manufacture of electrical heating and control equipment for use in potentially explosive atmospheres. **Please refer to the certification booklet for the approval certification ordered with this product**.

Construction

- All FX heaters have a hard-anodised aluminium enclosure.
- Flameproof FX Thermostats have a hard-anodised aluminium enclosure and the encapsulated FX thermostat has a polyolefin coated stainless steel enclosure.

Connections

- The live, neutral and internal earth connections to the heaters and thermostats are made using the flying lead that comes pre-installed. The FX range is fitted with 3core 18 AWG cable as standard with an outside diameter of 6.6mm.
- The external earth connection is made by use of proprietary ring crimps to suit a metric fixing and to suit the size of cable installed. See installation diagrams.

Controls

- If fitted with a thermostat, the heater shall de-energise when ambient temperature achieves the fixed set point of the thermostat.
- If supplied with a self-regulating heating element ('SR' suffixed model) the heater shall operate at or below the defined operating temperature regardless of the ambient temperature (provided the ambient operating temperature range is not exceeded).
- If supplied without control, it shall be the user's responsibility to ensure the heater is de-energised if the ambient exceeds the approved maximum operating temperature. Please refer to the certificate and sales literature for ambient operating temperature range.

Mounting

- The FXB range is supplied with a mounting kit that allows the heater to be either rail mounted within an enclosure or affixed directly to an enclosure back plate or wall.
- The FXH range is supplied with fasteners to directly mount the heater as required. Please refer to the general arrangement drawing for the size and position of the fixings.
- Self-regulating heaters in the FX range can be tailored to a specific installation and therefore can be mounted using either direct bolting or a suitable mounting bracket.
- The heater must only be installed in a suitable location by an authorised and competent person.
- FXB fixed power heaters must be mounted to a vertical surface with the fins vertically orientated.
- FXH fixed power heaters may be mounted to a vertical surface with fins vertically orientated or flat to an enclosure base with finned face upward-facing.

- Self-regulating heaters from the FX range may be oriented with fins vertically or horizontally, though optimum performance is achieved through vertical orientation. Self-regulating heaters may be mounted flat on the base of an enclosure providing the following:-
    - FXB models have mounting bolt clearance holes facing upwards
    - FXH models are oriented with the finned side facing upwards
    - FXS self-regulating heaters may be installed in any orientation that the mounting equipment allows in accordance with the supplied mounting instructions, ensuring that the cable gland is below the horizontal (not pointing upwards).
- The FX fixed power heater range is designed for operation in ambient temperatures of -50°C or -60°C to +40°C or +80°C (dependant on power output and T class). The user must ensure that this maximum ambient temperature is not exceeded at any time*.
- The FX self-regulating heater range is designed to operate in ambient temperatures of -50°C or -60°C to +130°C (T4 class) or +180°C (T3 class) *.
- The enclosure to which the heater is to be fitted should not have its covers removed whilst any precipitation, airborne dust or moisture is in the vicinity or when grinding, welding or similar activities are taking place nearby.
- Ensure minimum clearance of 100mm from bottom of heater extrusion to base of enclosure (or wall if mounted horizontally).
- For thermostat mounting, refer to Section 1.

*Please see the certification nameplate & sales literature for the product's ambient range.

Voltage

- Fixed Resistance Heaters - 1 phase: 110V to 277V
- Self-Regulating Heaters - 1 phase: 100V to 140V and 200V to 265V
- Thermostats - 1 phase: 110V to 277V

CAUTION – Check the voltage and current of the heater to ensure it is compatible with the ratings of the supply before energising.

3. Preservation and Storage Instructions

Storage

CAUTION – The following preservation instructions must be adhered to, failure to do so could result in the equipment warranty being invalidated:

- Store the equipment in an inside location that is dry, clean and well ventilated.
  - Store the equipment at between 0°C and +50°C.
  - Ensure that the equipment is not subjected to direct sunlight at ambient temperatures above +30°C.
- Protect the equipment against external sources of vibration and/or impact.
- If practically possible, leave the equipment in its original packaging until required for installation.

4. Pre-installation Instructions

Pre-Installation Inspection

Before carrying out the following inspections, take all electronic components in the product out of circuit. Do this by removing control fuses or by physically disconnecting the electronic components.

- Each heater and or thermostat is manufactured to the highest standard with great care and quality materials. All the goods are thoroughly inspected and tested before leaving the manufacturing plant, and they must be handled with care during storage and installation. Before the installation starts it is advised that the product is checked to ensure the insulation resistance reading is above 2MΩ per element at no less than 500 volts dc.
- Should the product fail this test, isolate the power or control circuits (if installed), and contact the technical help as per section 1 or via our website:

  www.exheat-industrial.com/contact/support
- Before installing, ensure that the supply conforms to the specified voltage on the products nameplate at a nominal variance of +/- 5% of the specified voltage.

Compliance with these instructions is a warranty requirement. Documented evidence must be maintained in the form of a signed checklist. Copies of completed checklists and records will be required in the event of any warranty claim.

Insulation Resistance Tester (heater only)

- An insulation resistance testers leads should be applied between the phase(s) and earth. A reading of greater than 2MΩ at no less than 500 volts dc should be recorded.
- For fixed duty heaters, use the continuity (Ohms) setting and check to ensure that the resistance of the element matches or is approximately equal to the results as per the electrical test certificate that would have been sent with the heater.
- For self-regulating heaters, use the continuity (Ohms) setting and check to ensure that the resistance of the element is within the following range (at 20°C): -

Model	Ω
FXB-SR-350	62 -210
FXB-SR-240	90 – 280
FXB-SR-220	110 – 340
FXB-SR-130	150 – 465
FXH-SR-200	110 – 340
FXH-SR-100	150 – 465
FXH-SR-80	330 – 1020
FXH-SR-50	450 - 1400

5. Installation Instructions

Should deviation from original design parameters occur, or change of original design structure be required, please refer back to EXHEAT Industrial Ltd for consultation prior to installation.

- Refer to the relevant code of practice for the equipment:
  - *IEC/EN 60079-14* for selection and installation or the relevant global equivalent.
  - *IEC/EN 60079-17* for inspection and maintenance of electric apparatus for use in potentially explosive atmospheres or the relevant global equivalent.

- Carefully remove the packaging from each product and check for damage. Immediately report any damage to EXHEAT Industrial Ltd (please keep this IOM and the additional certification booklet for future reference).
- Ensure that the product is correctly installed in a suitable location by authorised and competent persons.
- The FX heater or thermostat should be securely fixed in position using the mounting holes or supplied bracket, adhering to the correct orientation where applicable.
- Before operating the equipment, have the installation approved by the site authorised person who is responsible to ensure that the installed system is safe for operation.
- Ensure compliance with any instructions and information provided in this manual and on the drawings/certification supplied, also be aware of any additional warning that may be present on the product on any warning labels.
- The installer and the end user shall ensure that the unit has free and unrestricted air flow to allow natural convection to occur at all times. DO NOT COVER the heater or thermostat and do not allow anything to rest on, or against it. NOTE: Ensure that a minimum of 100mm is below the heater and 50mm to the sides.
- The product shall only be energised within its allowed ambient parameters, please check the sales literature and certification for the products ambient temperature range.
- Before energising the product, ensure that the supply conforms to the specified voltage on the products nameplate at a nominal variance of +/- 5% of the specified voltage.

It is the client's responsibility to ensure that safe systems of work are used by all personnel operating and maintaining the equipment, including testing when 'live'.

If there is any uncertainty about these points, contact EXHEAT Industrial Ltd for advice.

Failure to comply could result in the Hazardous Area Certificate being invalidated.

Electrical Supply Connection

- Refer to wiring diagrams in Section 11.
- Before connection ensure that the electrical supply corresponds with that specified on the nameplate label.
- Ensure the heater is correctly wired to a suitably protected and rated power supply.
- Ensure all power connections, terminations and enclosures are in accordance with the relevant EN IEC 60079 / global standards.
- To energise the heater/thermostat, simply connect the power supply and energise.

  Attached flying lead from the FX heater must be terminated within suitably certified terminals. The flying lead should not be cut shorter than 100mm of visible cable protruding from the cable gland.
- FXT thermostat lead must not be cut shorter than 100mm from cable gland.

WARNING – Check nameplate for correct voltage and classification.

Earth Connections

WARNING – These heaters and thermostats MUST BE EARTHED.

- The external earth connection on the FX range of enclosure heaters must be made using the supplied fittings and in accordance with the appropriate installation drawing in Section 11.
- As their design can vary, the external earth connection on self-regulating heaters in the FX range can be made using the methods for the FX heaters described above or through a similar method using the supplied bonding kit.
- The FXT-M does not require an external earth connection.

Earth-fault Protection

For safety reasons, it is essential to limit the magnitude and duration of earth-fault currents. It is impractical to cover all possible systems, however note that, regardless of which system is used, the product must be protected by a suitable device wired to shut down the product in the event that a component fails to earth. Suitable devices include a residual current device (RCD) – this is the preferred method and should be used whenever possible – or an insulation monitoring device.

- Maximum recommended setting for the RCD: 300mA/10mS. The duration time of 10mS (ten milliseconds) ensures that any fault is detected within a single cycle of a thyristor system (where applicable).
- Maximum recommended setting for the insulation monitoring device: Insulation resistance is not greater than 50 ohms per volt of rated voltage.

Ensure that the equipment is earthed in accordance with the plant earthing philosophy.

Before commissioning the equipment, the completed installation should be approved by an authorised & competent person to ensure that it has been carried out correctly and that the system is safe for commissioning.

Before energising the circuit, check that all the relevant requirements, and any special conditions of use have been adhered to.

FX heaters and thermostats MUST NOT be subjected to direct sunlight at ambient temperatures above 30°C.

6. Operating Instructions

General

Electrical equipment must be designed, tested and installed such that, when it is used correctly, health and safety risks are kept to a minimum. The client must be provided with information about any necessary safety conditions, warned of any possible hazards that may arise during normal operation and told how to avoid them.

The end-user must ensure that the following is adhered to:

- Any employees working on the equipment are authorised & competent in the proper working procedures to ensure safety. The plant must be maintained in a safe condition.
- Ensure that all protective packaging is removed carefully and visually inspect product for any transit damage.
- The heaters and thermostats must be handled with care and stored in clean and dry conditions, as per section 3.
- All prevailing rules, regulations and bylaws in force at the time and place of installation must be observed.
- Refer to the relevant code of practice for the equipment:
  - IEC/EN 60079-14 for selection and installation or the relevant global equivalent.
  - IEC/EN 60079-17 for inspection and maintenance of electric apparatus for use in potentially explosive atmospheres or the relevant global equivalent.
- Ensure that any special conditions for use detailed on the Hazardous Area Certification are complied with (see additional certification booklet supplied with this product).
- Any modification not carried out by EXHEAT Industrial Ltd could invalidate certification and warranty.

CAUTION – There is the potential for electrostatic discharge and such painted surfaces should only be cleaned with a damp cloth.

Provided the preceding conditions are adhered to, the equipment should be safe for use under normal operating conditions.

It is virtually impossible to achieve conditions which are completely hazard-free when working on energised circuits. Responsibility for safe conduct of the authorised & competent person or persons operating on the equipment rests with those under whose authority they act.

Operating Instructions

- The heater with optional thermostat is to be used to raise & maintain the temperature within a small or medium sized enclosure for the purpose of temperature maintenance, frost protection or anti-condensation.
- Once installed and the power is energised, no adjustment to the heater or thermostat is required.
- The FX range is designed to operate within an ambient temperature range, the user must ensure that the minimum and maximum ambient temperatures are not exceeded at any time. **Please refer to the certification booklet for the approval certification ordered with this product, which will include the special conditions of use and ambient temperatures**.

CAUTION – Check the voltage and current of the heater to ensure it is compatible with the ratings of the supply before energising.

Warnings

- The heaters and thermostats are sold as sealed units, do not attempt to remove the cable gland or open thermostats. Doing so will invalidate certification and warranty.
- The heater must be earthed using the green and yellow cable in the power supply lead and externally via the external earth tab/bolt.
- Do not cover the heater/thermostat.
- Isolate the heater and thermostat from the power supply before commencing any maintenance work.
- Do not add to, remove from or modify the heater or thermostat in any way.
- Do not repair the heater/thermostat, please contact EXHEAT Industrial Ltd. if the heater is damaged.
- There is the potential for electrostatic discharge and as such surfaces should only be cleaned with a damp cloth.
- The maximum inrush current (on self-regulating variants) that can occur on energizing is 10A. This must be taken into account when integrating these heaters into a circuit. Circuit protection must be selected accordingly.

7. Maintenance Instructions

General Safety Precautions

The end-user must ensure that maintenance, installations, commissioning and testing of the equipment is only carried out by authorised and competent persons.

The following rules must be adhered to:

- All prevailing site safety regulations shall be adhered to at all times.
- Check for hazardous gas & dust before and during any maintenance activity.
- Fully isolate the equipment from the electrical supply before and whilst any work is being carried out.
- Before starting maintenance work, isolate the equipment completely.
- Before touching the heaters, allow sufficient time for the body to cool down after electrical isolation.
- Do not work on the equipment when it is energised.
- Be aware of hazards which may arise when working on energised equipment, and take all necessary precautions.
- Familiarise all persons working on the equipment with the instructions and information provided within this manual.

The following preventative maintenance should be carried out at the recommended intervals shown below, for any replacement parts, please contact EXHEAT Industrial Ltd.

Compliance with these maintenance instructions is a mandatory requirement. Documented evidence must be maintained in the form of a signed checklist. Copies of completed checklists and records will be required in the event of a warranty claim.

If the heaters and/or thermostats are not used for more than three months, they must be tested for insulation resistance before being energised.

Three-monthly Maintenance Inspections

- Generally inspect the equipment for external damage or signs of deterioration.
- Ensure that the product is clear of obstruction and that the airflow remains unrestricted.

Six-monthly Maintenance Inspections

The following should be undertaken every six months in addition to the three-monthly maintenance inspections above:

- Isolate the electrical supply.
- Ensure that electrical terminations are undamaged and secure.
- Once cold, measure the insulation resistance of the heater. Use a 500V dc Insulation Resistance Tester to take a reading between the earth and the phase terminals. The reading should be greater than 2MΩ. If it is not, refer to section 4.
- Earth continuity must be maintained between all earth points and the main structure, ensure that any earth conductors are correctly and securely fitted between all earth points and main structure.

Annual Inspections and Long Term Storage Inspections

Ensure that the following inspections are carried out if equipment is in storage or in use for a year or more:

- Maintain preservation as per Section 3.
- Undertake the three-monthly and six-monthly inspections as above.
- Inspect for low insulation resistance, as section 4.

- If equipment is being left unused for a period greater than three months, undertake the 6-monthly maintenance before energising
- Check for component failure in line with section 4, if there is component failure or low insulation resistance, contact EXHEAT Industrial Ltd for further advice.

8. Fault Finding, Correction and Spares

FX Range

See Maintenance instructions for procedures relating to these faults.

Fault	Check	Resolution
Heater(s) fails to achieve required design air temperature	• Isolated power supply. • Is the ambient temperature greater than that required (thermostat has turned off)? • The designed heating output is less than the required amount.	Contact EXHEAT Industrial Ltd for advice.
Air temperature too high (FX heater with inline thermostat)	• Temperature control device set points correct – check inline thermostat Does the thermostat switch the heating equipment correctly?	Check with the installer.
Air temperature too high (FX heater with remote thermostat)	• Temperature control device set points correct – check remote thermostat • Does the thermostat switch the heating equipment correctly?	Check with the installer.
Earth leakage trip	Limiting earth-fault currents (magnitude and/or duration) is essential for safety. The earth-fault protection device is intended to provide critical safety protection if there is current leakage to earth. Fully investigate and rectify any trip condition **before** resetting the system and operating the unit again.	Where an earth leakage trip has occurred, isolate the unit and: • Check insulation resistance is according to Section 4. • Check settings of earth leakage protection device are according to Section 5.

Spares

Failure Type	Meantime Between Failures	Estimated Replacement Time	Spares Lead Time
Replacement Mounting Kit	When Required	5 minutes	2 weeks

9. COSHH Statement

Health and Safety Information

There are no hazardous or toxic substances applied with this order as defined in COSHH (control of substances hazardous to health) regulations (2002).

10. General Arrangement Drawings

Refer to Section 11 for earth connection detail.

FXB Mounting Arrangement

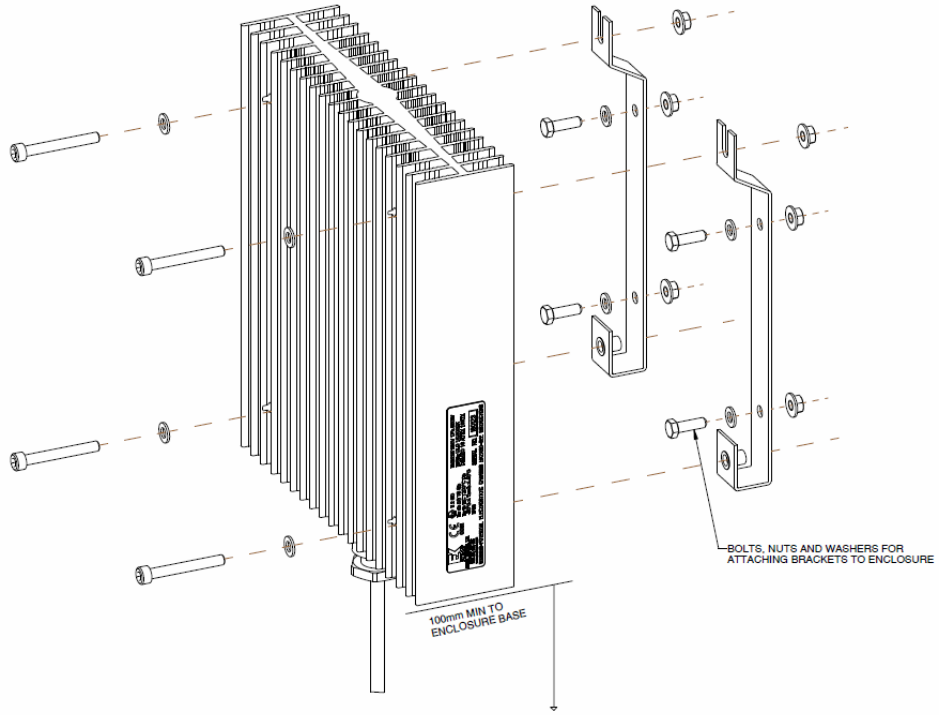


Fig.1 FXB mounting arrangement

FXH (225mm) Mounting Arrangement

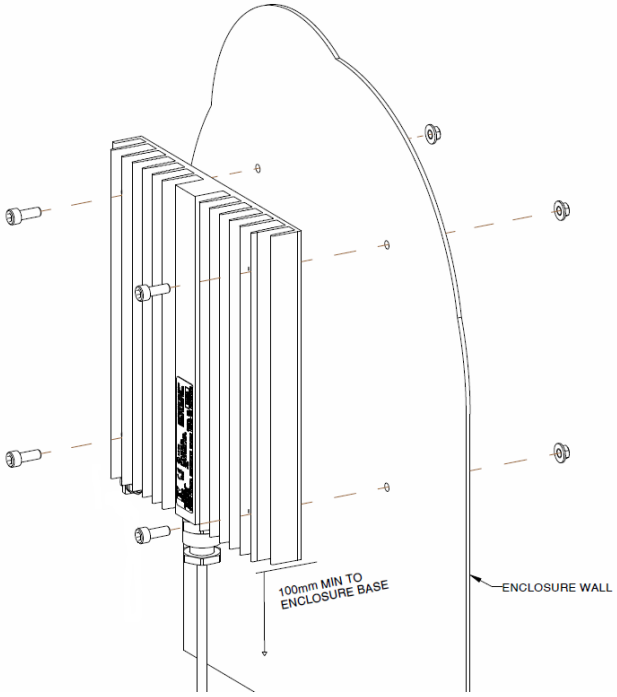


Fig.2 FXH (225mm) mounting arrangement

FXH (90mm) Mounting Arrangement

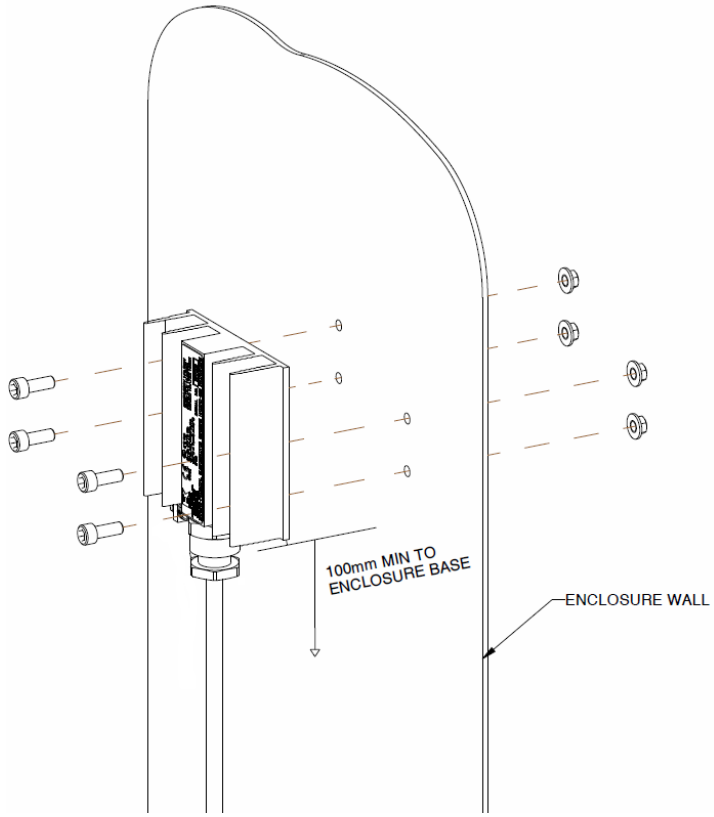


Fig.3 FXH (90mm) mounting arrangement – EXHEAT Industrial Ltd

FXT-DI Thermostat Mounting Arrangement

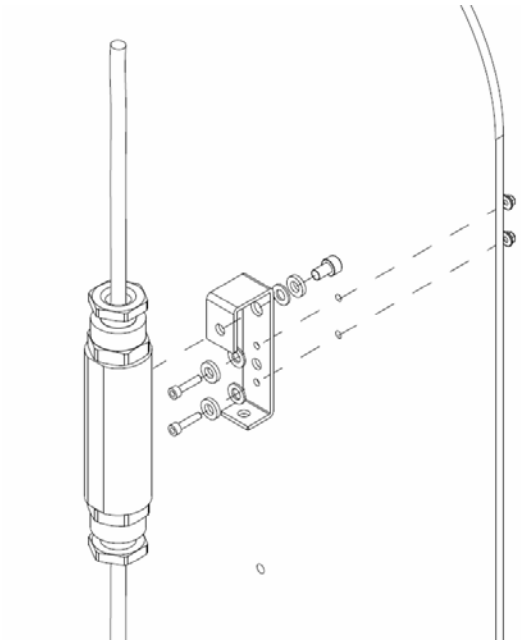


Fig.4 FXT-DI mounting arrangement – EXHEAT Industrial Ltd

FXT-DI Thermostat & Heater Mounting Arrangement

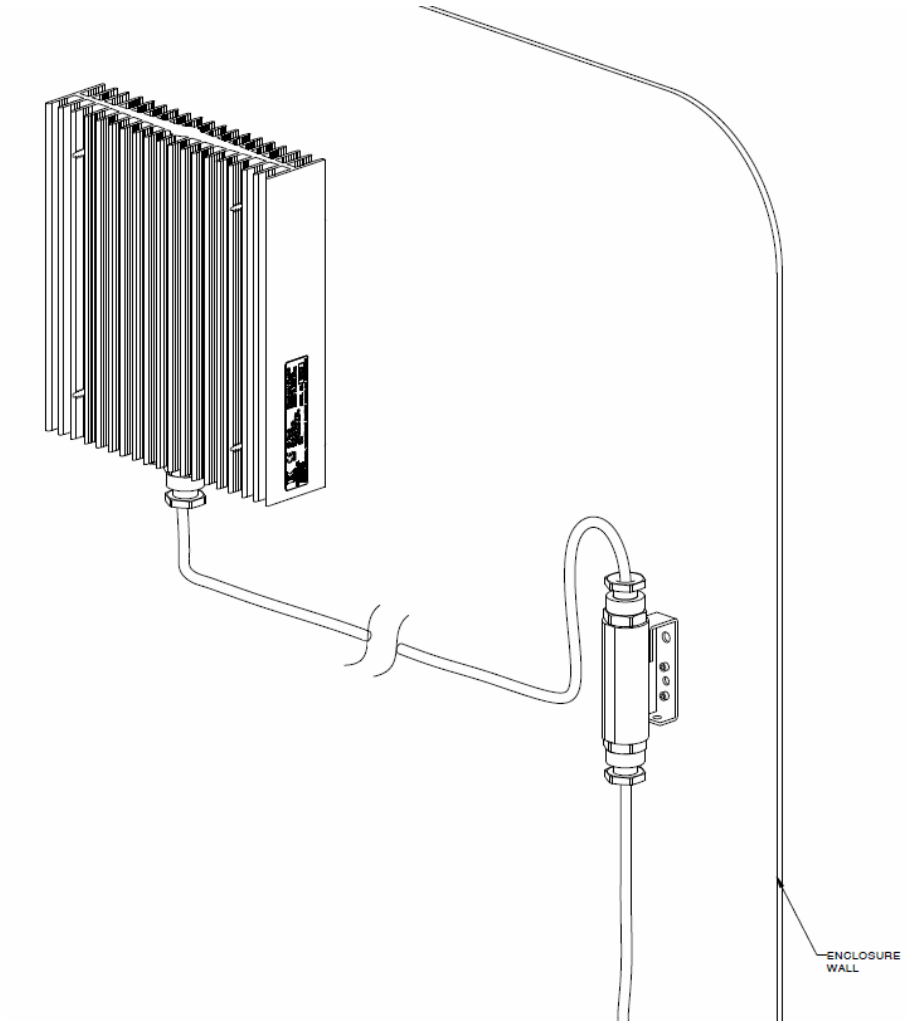


Fig.5 FXT-DI Thermostat & heater mounting arrangement – EXHEAT Industrial Ltd.

FXT-DR Thermostat Mounting Arrangement

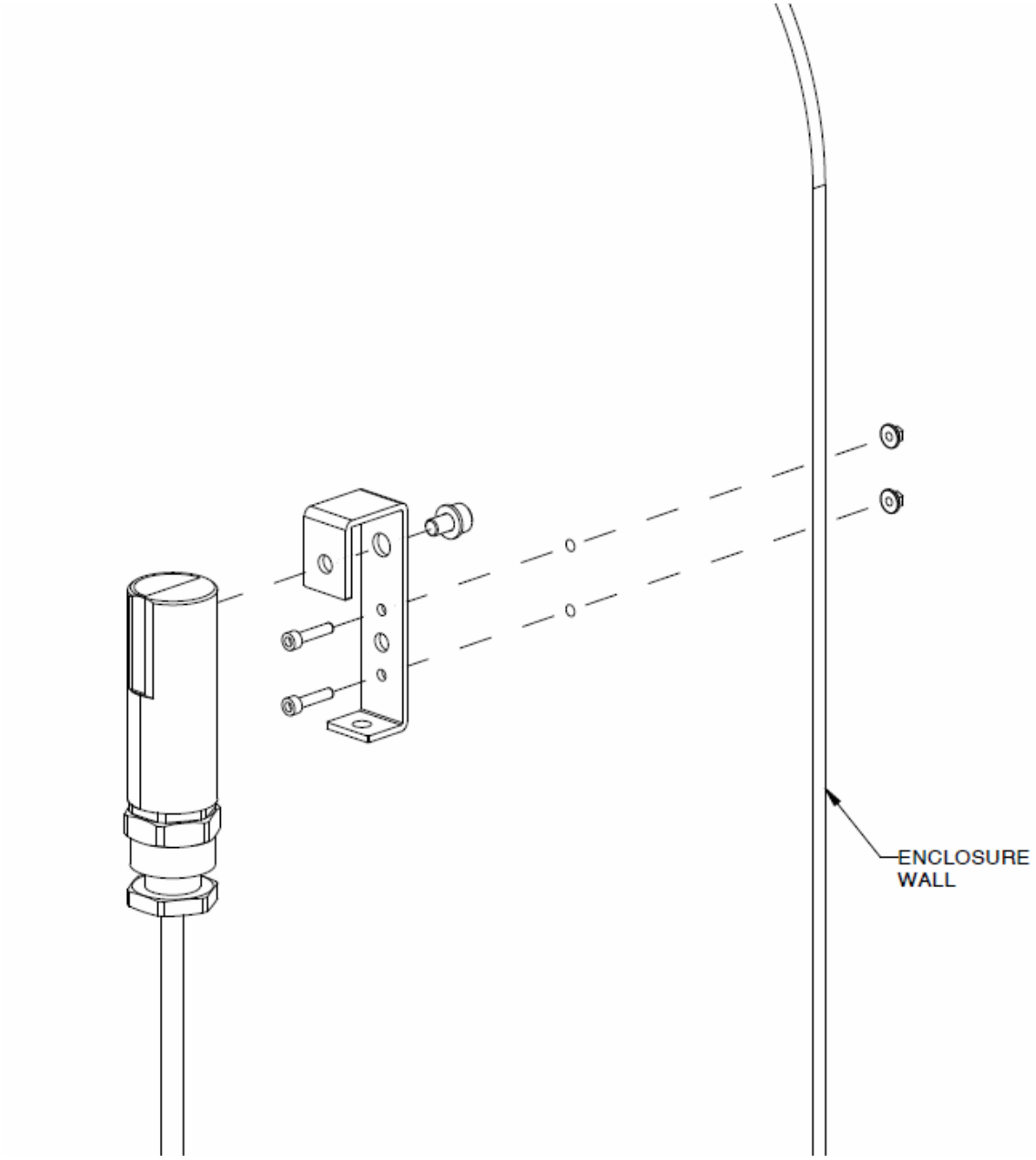


Fig.6 FXT-DR Thermostat mounting arrangement – EXHEAT Industrial Ltd

FXT-M Thermostat Mounting Arrangement

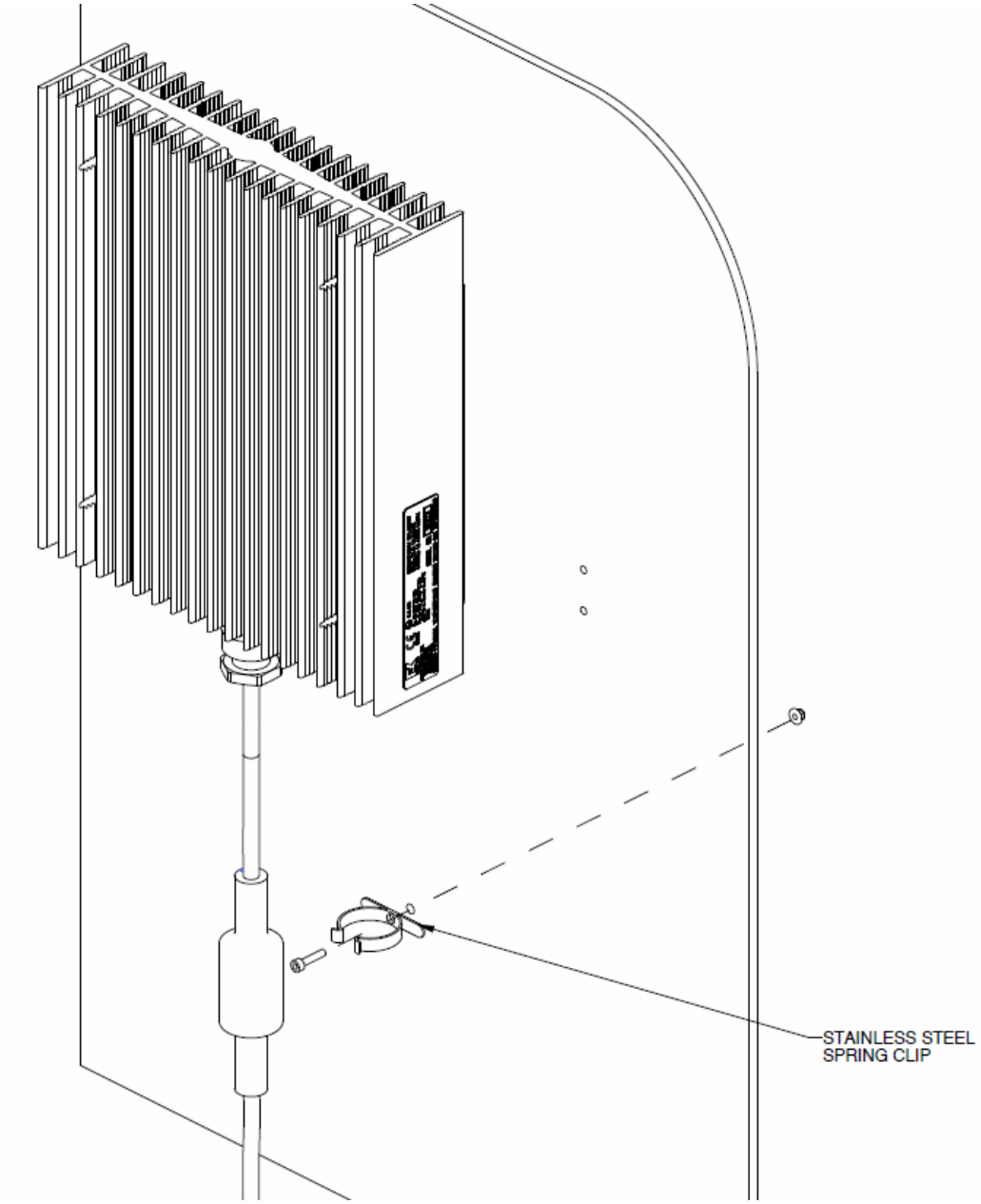
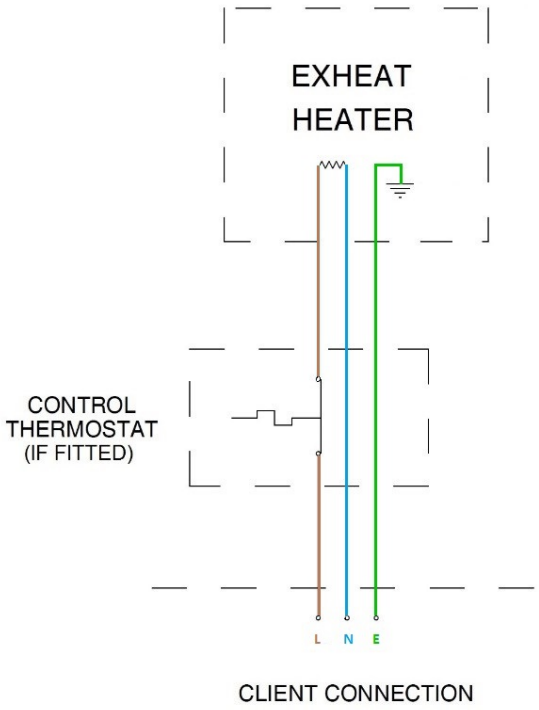


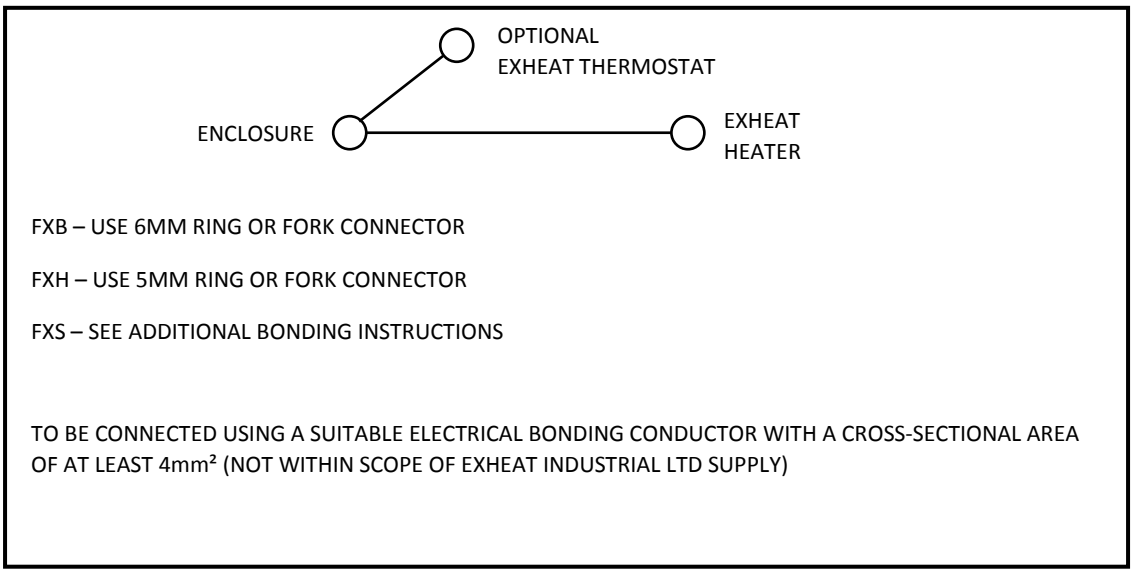
Fig.6 FXT-M Thermostat mounting arrangement – EXHEAT Industrial Ltd

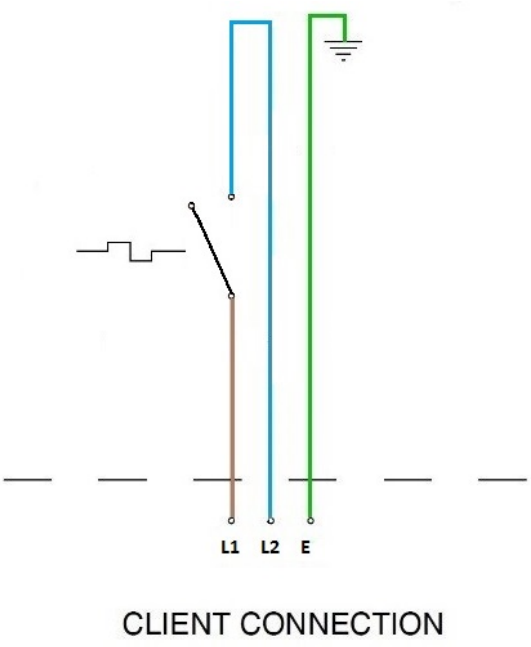
11. Wiring Diagrams & Bonding Arrangement



Live	Brown
Neutral	Blue
Earth	Green/Yellow

Fig.4 FX electrical wiring diagram





Live 1	Brown
Live 2	Blue*
Earth	Green/Yellow

*Blue cable to be marked as live-out. Brown heat shrink may be used.

Fig.5 FX Remote thermostat wiring diagram

FXB Electrical Bonding Arrangement

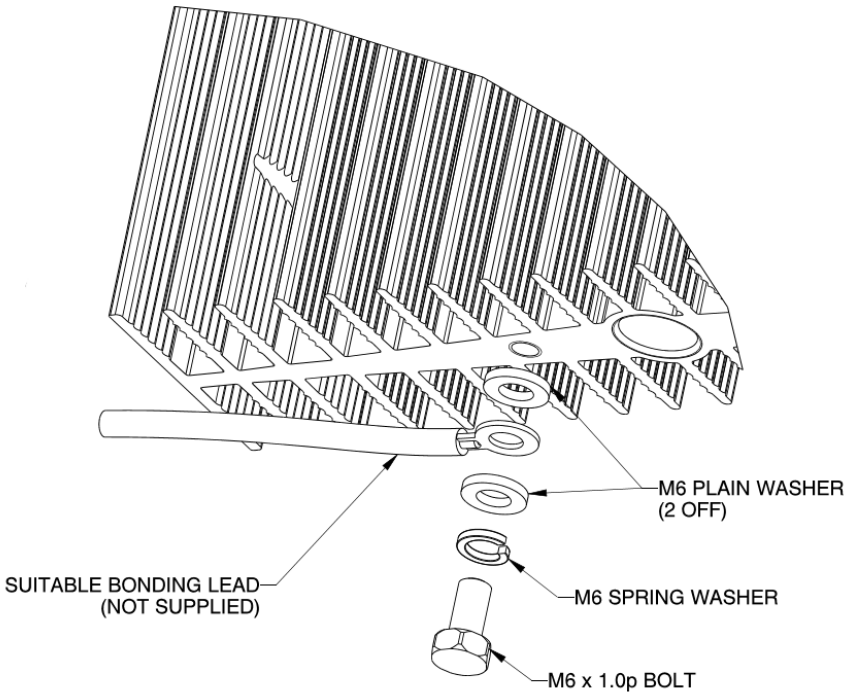


Fig.6 FXB electrical bonding arrangement

FXH Electrical Bonding Arrangement

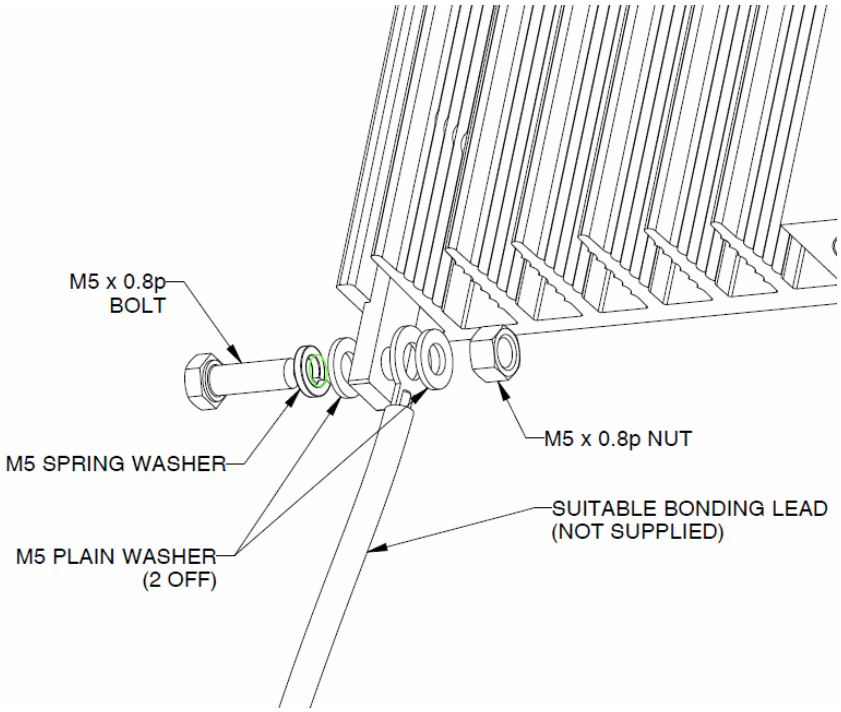


Fig.7 FXH electrical bonding arrangement

FXT-DR/DI Electrical Bonding Arrangement

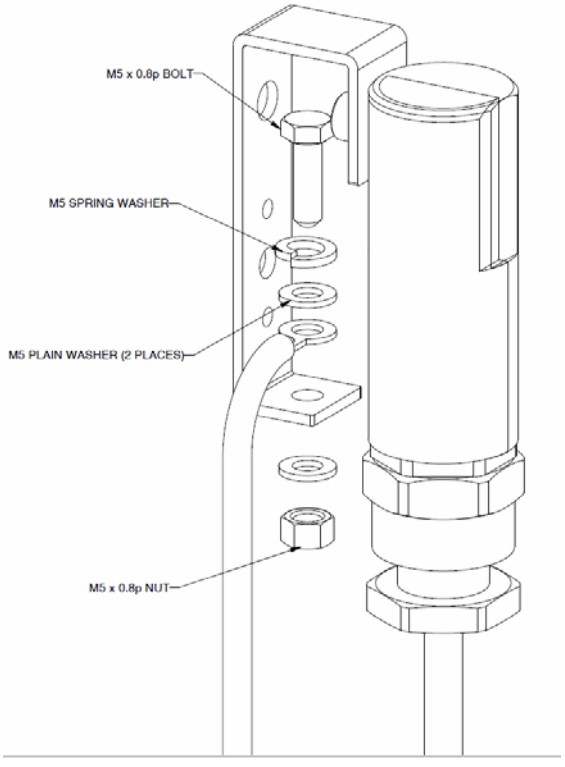


Fig.8 FXT-DR/DI electrical bonding arrangement

12. Routine Maintenance Inspection Record

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ROUTINE MAINTENANCE INSPECTION RECORD

FX Range of Heaters and Thermostats

Serial No	
Description	
PO No	
Reference No	

	Inspection Checklist	**Status Codes**	**Name**	**Date**	**Comment**
	3 Monthly Inspection				
a	Check equipment for external damage or signs of deterioration				
b	Check for dust build up or restricted air flow and clean				
	6 Monthly Inspection (in addition to 3 Monthly Inspection)				
c	Check that all electrical connections are undamaged and tight including any spare unused terminals.				
d	Check the heaters insulation resistance				
e	Check that earth bonding conductors are correctly fitted and undamaged				
	12 Monthly Inspection (in addition to 3 & 6 Monthly Inspections)				
f	Check resistance values, including individual element resistance if it's down on IR				

Carry out the inspection in accordance with relevant standards concerning inspection and maintenance of electrical installations in non-hazardous or hazardous areas whichever is applicable.

Verified	**Installation**	**Energised**	**EXHEAT Industrial Ltd**
Name			
Signature			
Date			

Document: Inspection Check List

www.exheat-industrial.com

3rd Edition (May 2018)

Author: J. Brown

FX Heater and Thermostat – IOM_English

Refer to EXHEAT Industrial Ltd website for latest edition.

(www.exheat-industrial.com/product)