



power generation

aggregate coating

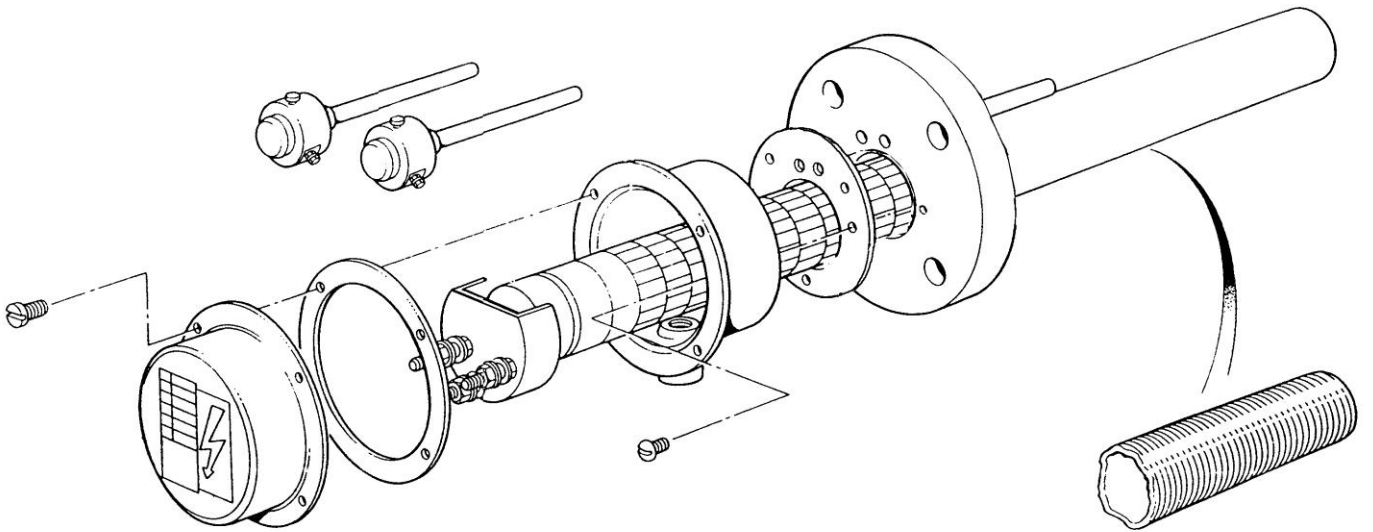
whisky distilling

water treatment

For All Industrial Process Heating Systems

OPERATION AND MAINTENANCE INSTRUCTIONS

"X" Type IMMERSION HEATERS



Immersion Heater variations for Fuel Oils, Water, Chemicals etc.

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Installation Instructions for "X" Type Immersion Heaters with Removable Core Type Elements

1.0 INSTALLATION

The immersion heater supplied is only suitable for horizontal mounting. A special version is required for vertical mounting.

The element tube containing the heater element should, where required, be placed on supports. Guidance is given in quotations or on drawings appropriate to the heater in question.

If a capillary thermostat is fitted to the tank it must be lowered to a height not less than the top of the element tube.

Adequate space must be provided for withdrawal of the equipment from the tank. Withdrawal distance is normally the length of the heater.

2.0 ELECTRICAL CONNECTIONS

One or more cable entry is provided on the terminal box to allow site connection of a suitable supply. All that remains is to connect the cable to terminals on the heating element or as supplied in the junction box. It is then a matter for the installer to connect an appropriate power supply.

Single Phase heaters have two cable connections provided. Either may be "Live" or "Neutral"
Three phase Star connected elements 3 phases have three connections provided.
(Note that on occasion 3 phases may be connected to leave the neutral point floating.)
Three Phase Delta connected elements have three connections provided

Suitable Earthing must be carried out by the installer.

In a single phase system the load carried by the thermostat(s) must be limited to 10A, 2kW loading. These can be directly connected to the heater element(s) for control and safety purposes.

In a three phase system direct connection to the incoming power supply is not recommended, and in most cases will probably be illegal under relevant legislation. Thermostats should be wired through the actuating coil of a suitable contactor or similar device.

Control and Safety Thermostats should always be wired in series.

3.0 METHOD OF OPERATION - Electrical Heaters

Heat is transferred to the liquid by means of a removable ceramic heating element core or cores fitted into a sheath or tube. The element and sheath are closely matched to provide a good fit and therefore good heat transfer.

Thermostats are required to comply with the various standards in operation, particularly BS799 and any updates of this standard. Any heating system without a minimum of one safety thermostat or cut-off device present in circuit is both dangerous and illegal in the UK.

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4.0 SETTING OF THERMOSTATS - Electric Heaters

General

Thermostats fitted have adjustable scales covering the temperature range required. Each thermostat is fitted in a pocket which enables replacement without draining down the vessel contents.

It should be noted that in most cases the thermostat will sense a higher temperature than the bulk temperature since it will be in close proximity to the convective flow of liquid from the heater element sheath.

Control Thermostat

The setting can be varied as required either by hand using the dial supplied or by using an electrical screwdriver.

For submersion heaters the Control thermostat may be a capillary type hung from the tank roof or a standard type inserted in the tank wall. Generally these will have Weathertight terminal chambers attached. Setting follows the same procedure as for standard thermostats.

Master Thermostat

Where required, one master, or safety, thermostat is fitted to each heater in compliance with British Standards. This thermostat has a reset button clearly visible.

The setting can be varied as required but should be 15-20°C above the Control setting. If the fluid temperature exceeds this value the thermostat will automatically switch off the entire circuit. It is necessary to manually reset this thermostat after correction of any fault. It is not recommended to fit the safety thermostat within the element terminal box of a submersion heater since any fault requiring a reset will involve removing the entire heater assembly.

For submersion heaters the Safety thermostat may be a capillary type hung from the tank roof or a standard type inserted in the tank wall. Generally these will have Weathertight terminal chambers attached. Setting follows the same procedure as for standard thermostats.

5.0 MAINTENANCE

Maintenance is limited to checking that electrical connections remain clean tight and dry, and electrical testing of the installation. If the earth insulation and where applicable the phase/phase insulation of the unit is not better than 1 ohm then the element must be removed and further tested. If the unit has been subjected to a period of disuse in a damp environment, gentle drying may correct any poor insulation values.

5.1 GENERAL OVERHAUL

NOTE THAT THERE IS NO NEED TO REMOVE THE HEATER FROM THE TANK UNDER NORMAL CIRCUMSTANCES. ONLY IF THE INSTALLATION IS FAULTY OR THE HEATER IS VERY OLD SHOULD THIS BE NECESSARY.

- (a) Isolate heater electrically
- (b) Drain tank / vessel contents if necessary
- (c) Remove terminal box lid
- (d) Disconnect incoming cables from terminal block and release conduit connections.
- (e) Remove flange fixing nuts and remove heater unit and inspect sheath(s) and flange plate for scale and corrosion. Remove any scale by wire brushing.
- (f) Examine electrical connections for soundness. There is no need to remove heating elements unless an electrical fault has been reported.
- (g) Replace heater unit.

Installation Instructions for "X" Type Immersion Heaters with Removable Core Type Elements

6.0 SPARES ORDERING INFORMATION

It is essential when ordering spares to quote **all** the details given on the nameplate :

SERIAL NUMBER DATE KILOWATT RATING

6.1 THERMOSTATS

If a thermostat is faulty in any way it must be returned to our factory for inspection. Standard thermostats are available from stock but others may have an extended delivery, therefore the holding of emergency spares is recommended.

6.2 HEATING ELEMENTS

Replacement heater elements can be obtained from our factory within a matter of days provided that the ordering information above is supplied.

Elements are easily removed by referring to Section 1 - Installation - for information.

7.0 FAULT CORRECTION

7.1 POOR CONTROL CHARACTERISTICS

Reset thermostats in accordance with Section 4.
Control differentials do not usually exceed $\pm 6^{\circ}\text{C}$ and in most applications $\pm 3^{\circ}\text{C}$ is obtained.

7.2 CONSTANT FUSE FAILURE

Check earth insulation and phase/phase insulation of heater unit. Resistance should be better than 1 ohm when cold. See Section 5 - Maintenance

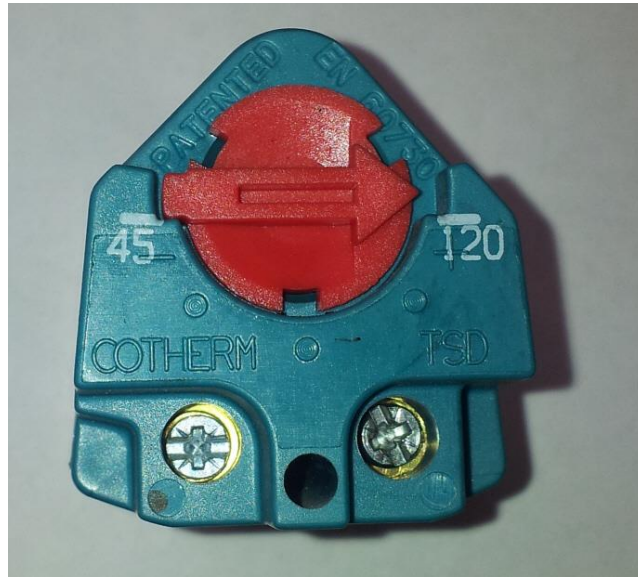
7.3 MASTER THERMOSTAT TRIPS OUT

Before manually resetting the master (Safety) thermostat carefully check the cause of the trip. This could be :

- (a) Thermostat setting is too low and responds to temperature build up when heater is shut down or switched off. Set the thermostat at least 15 - 20°C above the storage temperature required.
- (b) Failure of control thermostat to open circuit (switch OFF) on rise in liquid temperature.

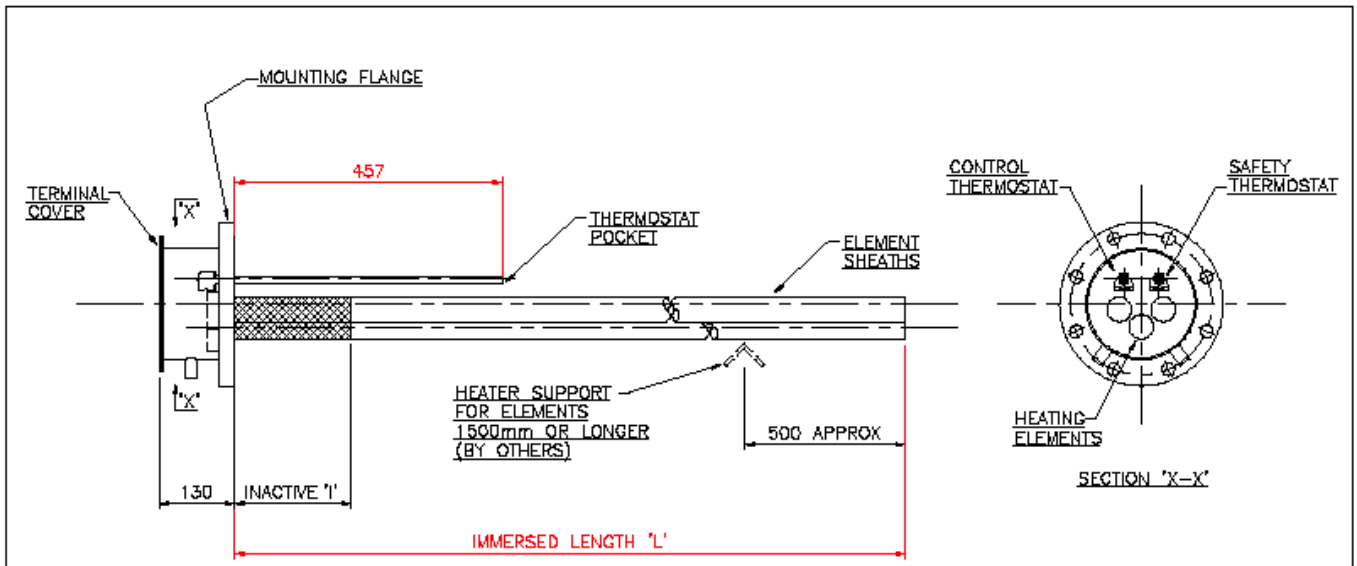
Note that it is highly unusual for thermostats to fail since they are by nature extremely simple devices. Therefore if the master thermostat is suspected of failure, due consideration must be given to the possibility of problems elsewhere in the system, such as low fluid level.

Typical Control Thermostat




Typical Safety / Manual Reset Thermostat





GENERAL LAYOUT OF 'X' SERIES IMMERSION HEATER
 MULTIPLE TUBE c/w CONTROL & SAFETY THERMOSTATS

TYPE	LOAD	LENGTH 'L'	INACTIVE 'I'	MOUNTING FLANGE

Rev F	Rev D	Rev B	 A.K. WAUGH LIMITED 49 DALRETTEN AVENUE, GLASGOW, G15 1TE.	DRAWN	A. WAUGH	
Rev E	Rev C	Rev A		TITLE	DATE	26/07/08
					SCALE	N/A
					DRAWING No.	XGEN-08
					REVISION	0