



## **INSTALLATION, OPERATION AND MAINTENANCE**

### **BEFORE YOU BEGIN INSTALLATION READ THE MANUAL CAREFULLY**

#### **WARNING**

Only qualified personnel, should install and maintain this equipment. Unauthorized alteration or improper maintenance of this unit may release the manufacturer from any warranty claims.

Check all electrical connections to all components within the heater for tightness. Connections can become loose during shipment and handling, this can cause electrical components to burn out.

#### **CAUTION**

The heater must be installed in accordance with the country/regional requirements & regulations. In any event the work must be carried out by a suitably qualified electrician, who will provide a certificate of conformity upon the completion of work. The power supply must be fitted with an RCD.

# IMPORTANT SAFETY INSTRUCTIONS

When using this electrical equipment, basic safety precautions should always be followed, including the following.

1) READ AND FOLLOW ALL INSTRUCTIONS.

2) TO REDUCE THE RISK OF INJURY:

a) The water in a pool or tub should never exceed 40°C (104°F). A water temperature more than 40°C (104°F) is considered unsafe for all persons. Lower water temperatures are recommended for extended use (exceeding 10-15 minutes) and for young children.

b) Excessive water temperatures have a higher potential for causing fetal damage during the early months of pregnancy, pregnant or possibly pregnant women should limit pool or tub water temperatures to lower than 38°C (100°F).

c) Before entering a pool or tub, the user should measure the water temperature at several occupant locations using an accurate thermometer since the tolerance of water temperature-regulating devices may vary as much as  $\pm 3^{\circ}\text{C}$  ( $\pm 5^{\circ}\text{F}$ ).

d) Alcohol, drugs or medications should not be used before or during pool or tub use since their use may lead to unconsciousness with the possibility of drowning.

e) Obese persons and persons with a medical history of heart disease, low or high blood pressure, circulatory system problems, or diabetes should consult a physician before using a pool or tub.

f) Persons using medication should consult a physician before using a pool or tub since some medication may induce drowsiness while other medication may affect heart rate, blood pressure and circulation.

3) SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE.

## **WARNING**

### **DANGER OF HYPERTHERMIA**

Hyperthermia occurs when the internal temperature of the body reaches a level several degrees above the normal body temperature of 37°C (98.6°F). The symptoms of hyperthermia include dizziness, fainting, drowsiness, lethargy and an increase in the internal temperature of the body. The effects of hyperthermia include:

- a) Unawareness of impending hazards;
- b) Failure to perceive heat;
- c) Failure to recognize the need to exit pool or tub;
- d) Physical inability to exit pool or tub;
- e) Fetal damage in pregnant women;
- f) Unconsciousness resulting in a danger of drowning.

WARNING--- The use of alcohol, drugs or medications can greatly increase the risk of fatal hyperthermia in pools and tubs.

# WARNING

Only qualified personnel in accordance with the country/regional requirements & regulations, should install and maintain this equipment. Unauthorized alteration or improper maintenance of this unit may release the manufacturer from any warranty claims. The installation must be in accordance with the instructions in this manual and applicable local plumbing and electrical codes.

## INTRODUCTION

Founded in 1966, Thermalec® Pool and Spa Products was the first company in Britain to manufacture a range of electric heaters specifically for public, commercial and domestic swimming pools and spas. In 1999, Thermalec® joined the Meddings Group of Companies to enhance and diversify the latter's engineering activities whilst allowing Thermalec® to widen its horizons as part of a larger group. Over the years, the Thermalec® electric pool and spa heater has been refined and today has an established name in many areas of the world as the quality heater of first choice. The clever patented design, robust quality and inherent reliability of the Thermalec® electric heater have earned it a position as the market leader in Britain. Thermalec® heaters are also exported to the Middle East, the Far East and Europe, where Thermalec® has gained the confidence of pool builders and operators as a name they can rely on.

Thermalec® pool and spa heaters are designed and built with care at our factory in the Southwest of England. Our overriding objective is the application of half a century of experience, delivering to each and every customer a quality pool heater that will give many long years of safe, efficient and economical service.

The dedication that we apply to the design and building of a truly superlative pool heater extends further. We exchange knowledge and experience with our partners worldwide to ensure the total satisfaction of our customers, both installers and final users. Thermalec® engineers and technicians share their skills, offering guidance, training and support in heater selection, installation and operation. This is particularly for difficult applications such as sea water pools, health spas or hydrotherapy pools – areas in which the performance of Thermalec® pool heaters are especially outstanding.

At Thermalec®, we are justly proud of our electric pool heaters. In the few pages that follow, you will find outline details of the range and of some of the features that make Thermalec® heaters the natural quality choice for any size or type of pool or spa. This manual provides installation procedures, operating and maintenance instructions and a parts list for the Thermalec® Swimming Pool Heater. Your Thermalec® Electric Swimming Pool Heater has been designed and engineered by British Engineers to provide you with the most advanced highest quality heating system possible. Its operation is the most efficient and pollution-free. Our models are available for every size or make of pool. To ensure a long life of trouble-free service, your Thermalec® swimming Pool Heater should be carefully installed in accordance with the instructions given in this manual. Failure to do so may damage the swimming pool heater and the pool equipment to which it is connected. Only qualified personnel should install and maintain this unit, and, of course, local plumbing and electrical codes have precedence over these instructions.

## DESCRIPTION

The Thermalec® Swimming Pool Heater consists of titanium elements encased in a cast iron heating vessel, the heaters upper external enclosure contains the electrical heating and control system. To help maintain the heater to its optimum level, a brief description of its components and their operation has been added to aid the customer. The cast iron vessel houses the elements. The vessel and heating elements are the only components of this heater that are in contact with the water and has a unique spiral flow of water through it, this promotes efficient heat transfer, minimizes scaling of the elements and the build-up of sediments. The internal design of the heater prevents the direct impingement of cold pool water onto the heating elements, reducing thermal shock, prolonging the service life. If air gets into the

heater, the unique internal weir and baffle arrangement ensures that the air is channeled harmlessly across the top of the heater and across the unheated ends of the elements. This avoids possible element burnout and thermal inefficiency due to wasteful heating of air. The external enclosure is a sheet steel case totally enclosing the electrical components. The enclosure is coated with a rust inhibiting, powder coat finish. The electrical system, which is the nerve center of the unit, can be considered as three separate systems engineered to provide years of service and optimum use of energy. They are as follows:

- a) The heating elements; are mounted via two cold legs through a high-grade PVC plate. These are made from titanium as standard and have an extremely low watts' density
- b) The control system; consists of the breaker switch, high limit thermostat, Pump interlock switch, a temperature controller, magnetic contactors and sequencer (on larger units only). These controls are wired into a control circuit designed to control the temperature of the water leaving the heater. The high-limit thermostat is designed to open the control circuit and cut off the power in the event of excessive temperature. A pump interlock switch is built-in to prevent the pool heater from operating without the pump being energized, we use this because we have found flow switches to be very unreliable.
- c) The main current-carrying components; are the contactors and the breaker. These are wired into circuits which carry the full amperage draw of the elements. The contactors open during a high temperature condition to de-energize the elements. The heater has a temperature controller adjustable up to 45°C (113°F) and has one manual reset type high temperature limit thermostat set at 48°C (118°F).

**Installation: Location**

Thermalec swimming pool heaters are quiet, do not emit exhaust fumes and may be conveniently located in a shed or basement. Normal positioning of the pool heater should be near the pool filtration system. Select a location conveniently close to incoming electrical service and where excessively long piping runs are not required.

Minimum clearance:

	12THR	24THR	36THR	72THR	120THR
Front	36 (914)	36 (914)	36 (914)	36 (914)	36 (914)
Left	*	*	*	*	*
Right	*	*	*	*	*
Top	14 (356)	14 (356)	16 (406)	16 (406)	16 (406)
Back	8 (203)	8 (203)	11 (279)	17 (432)	17 (432)

- \* Required clearance is dependent on plumbing configuration used.
- Dimensions: Inches (mm)
- Temperature control is located on the front side.

## Installation: Plumbing

Pipe the heater as shown in Fig. 1 to the inlet (left) and outlet (right) openings on the side. Connect the heater in line between the filter discharge and pool. The water line coming from the filter should be connected to the heater inlet, and the discharge line to the pool should be connected to the outlet. The pool will not heat properly unless it is plumbed correctly. If plastic pipe is used, it should be suitable for at least 49 °C (120°F). A plumbing bypass around the pool heater is not necessary unless flow rate through the heater exceeds the flow rates stated in Fig.2. Lack of sufficient flow will cause the heater to overheat and trip out. It may be necessary, in larger Olympic-sized or public pools, to use two or more heaters to obtain sufficient kW capacity. If so, the heaters must be placed in parallel, so that each heater takes equal flow.

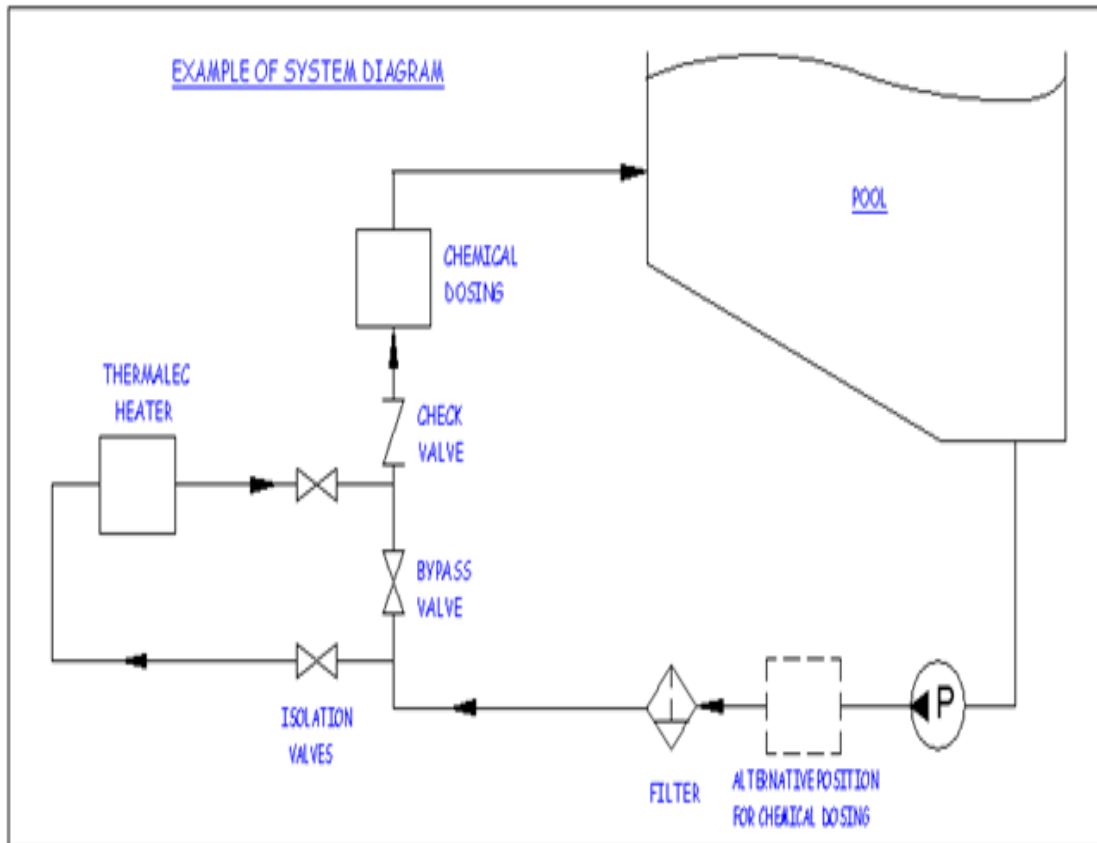


Fig. 1

The maximum flow rates are only recommended flow rates to minimize scale formation and to reduce wear on the elements. The heater is fitted with a pressure relief valve set to lift at 2 Bar (29 psi). Maximum flow rates throughout your system will depend on your system configuration.

<b>Flow Rate</b>	<b>30 kW</b>	<b>36 kW</b>
Hard water maximum - use bypass above this rate - minimise scale formation	4000 gal/hr 303 l/min	4000 gal/hr 303 l/min
Soft water maximum - use bypass above this rate - improves element life	2000 gal/hr 152 l/min	2000 gal/hr 152 l/min
Minimum	600 gal/hr 50 l/min	720 gal/hr 60 l/min

Fig 2.

**DRAINAGE:** A method of draining water away from the heater and other equipment is provided. The heater should be flushed at the end of each swimming season. During flushing or servicing, water may be spilled and could cause damage to the floor or other equipment. A drain valve has been fitted to the vessel to aid you.

Flow direction through the heater is left to right, allowing the temperature controller to sense the temperature coming from the pool. The direction may be changed by reversing the probes of the control thermostat, the safety thermostat and the C7 temperature indicator, as follows:

- a) Switch heater circuit breakers to OFF;
- b) Switch main power supply and pump interlock supply to OFF;
- c) Remove main cover;
- d) Reverse the three probes. Controller probe is situated on the left-hand end of the element plate; the C7 temperature indicator and the safety thermostat probe on the right (marked with a short length of white sheathing).
- e) Reinststate the top cover before reconnecting connecting electrical supplies.

Pipe connections are stub flanges to suit 2" (36kW) nominal bore pipe (uPVC or ABS). If using ABS, the solvent jointing compound must be suitable for both materials. Reducers may be fitted to suit smaller pipes. It is not necessary to fit unions either side of the heater as the stub flanges are easily disconnected from the heater, by removing the nuts securing the aluminium backing flanges to the heater. In very tight installations, the studs themselves may be unscrewed

## Electrical Installation

- a) Check heater label for rating to insure the heater matches your electrical supply.
- b) **CHECK ELECTRICAL CONNECTIONS TO ALL COMPONENTS** within the heater for tightness. These can become loose during shipment and handling.
- c) Check components for any moisture, rust, or dust which may have accumulated during shipping, and clean or dry where necessary.

All pool heaters covered in this manual have integral thermostats, contactors and sequencers where required.

Wiring diagrams included show internal wiring and required field connections for various models. Consult your local electrical code for proper wire and conduit sizes, and other local requirements.

Do not connect the pool heater to, or operate at a voltage other than the voltage rated on the heater label.

Wires of adequate size are to be fed from a fused disconnect switch or circuit breaker with an ampere rating of 125% of the ampere rating shown on heater label. Connect power conductors to the power distribution block inside the heater. All other internal connections are completed and tested at the factory.

Overcurrent protection must also be provided in the form of a Miniature Circuit Breaker (MCB). Due to the continuous high load that will be drawn, MCBs should be rated at least 20% higher than of the current shown below.

<b>Specific Electrical Supply</b>	<b>30 kW</b>	<b>36 kW</b>
400V – Three Phase (UK)	42 Amps	50 Amps
Two Phase / Split Phase	L1 63 Amps L2 63 Amps	63 Amps 87 Amps
380V – Three Phase (Euro)	46 Amps	55 Amps

### Connect Pool Heater to Power Supply

To connect to the power supply, your installer needs only to protect the main supply lines, either with a circuit breaker or fused disconnect switch.

The size and specification of the cable to the heater should be decided by consulting the local regulations. To minimize the effects of volt-drop, the plant room should be located as close as possible to the main electrical supply.

The supply cable enters via the removable plate at the back of the heater. The plate should be drilled out to suit the size of cable gland used. Under no circumstances should cable be installed through the metal plate without the use of a gland. To access the terminals, remove the heater cover and the plastic terminal cover.

All 36THR heaters are delivered configured for Three-phase operation. The neutral and earth conductors must also be connected to the appropriate terminals.

It is vital that all wires are firmly terminated into each terminal. Ensure that the cable is of sufficient diameter to ensure a good clamp is made. After termination, check all the cables for tightness.

The heater will not operate without a pump interlock supply that switches 230V ON when the filter pump is running. The live of this supply should be connected to terminal A and the neutral to terminal B of the heater. The supply must be taken from the last device switching the pump to ensure that the heater will switch off at the same time as the filter pump.

This pump interlock supply can also be used to further control the operation of the heater. A time switch can be fitted to interrupt the supply to terminal A; ensuring that it can only come on during specific periods of cheap electricity. This is detailed on drawing APH 1319, together with arrangements for an override switch allowing the filter pump to be run continuously.

### **Startup Procedure**

- a) Make sure that the pump is on and that there is at least the minimum flow of water through the pool heater (IAW Fig.2). The heating elements will burn out if allowed to operate without sufficient water flow.
- b) Ensure heaters switch is turned off. Check temperature control setting is turned down, also, examine wiring for loose connections, etc.
- c) Turn on power at main disconnect switch.
- d) Turn up the heating controller to desired level.

If the high temperature manual reset switch shuts off the heater, disconnect power at disconnect switch and determine the cause before resetting.

### **The Control Panel**

The control Panel has 6 indicating lights on the heater model. The lights are as follows:

<i>Heater Status Lights</i>	
Light	Description (when illuminated)
Large or right hand red	Heater has power.
Large or left hand amber	Pump interlock supply OK.
Small or left hand red	Control circuit has power.
White	Excess temperature trip OK
Amber	Pump interlock relay OK.
Green	Heating elements energized.



## FAULT – FINDING

**Safety Warning.** The electrical supplies to the heater are potentially lethal. All maintenance and repair operations should be carried out by trained personnel, supported by appropriate safe systems of work. Before removing the top cover ensure that, both the main power supply and, the pump interlock supply, are both isolated.

**Excess Temperature Trip.** If all lights are on, apart from the white, amber and green, and the temperature controller does not engage the heater; this could indicate that the excess temperature thermostat has tripped. Before resetting investigate why heater has overheated and the setting of the excess temperature thermostat which should be 48 degrees.

**Controller Drift.** The calibration of the controller drifts over time, requiring the value set on the dial to be gradually increased to maintain the same actual temperature in the water. Please contact your heater supplier to adjust this.

**Contactors Frequently Switching.** Switching of the contactors every few minutes indicates that the direction of water flow could be incorrect. The flow of water is designed to travel from left to right in the heater. Consult instructions on how to reverse the flow.

**Protective Devices on Supply Trip.** If RCD has tripped, first check that other equipment in the installation has not caused the trip, then check heating elements for insulation resistance. If MCB has tripped, check it is correctly rated.

**Noise.** Excessive “buzzing” when heating indicates small amounts of rust on the pole faces of the contactor. Electrical contact cleaner should be applied to the affected area.

**Pool Not Reaching Desired Temperature.** If the status lamps are lit as described on the previous page and the contactors can be heard engaging, then the heater can be said to be operating correctly. If the pool does not reach the required temperature after an appropriate number of hours, then the current drawn by the heater should be checked using a clip-on ammeter. An alternative method is to set the temperature control several degrees above normal and use the main supply meter to check how many Units (kWh) the heater consumes in an hour. This figure should be slightly above the kW rating of the heater, allowing for the filter pump and other domestic equipment on the same supply. If the consumption is less than the rating of the heater then the issue is elsewhere in the system, for example:

- Low voltage supplied to the heater, indicating that cable diameter is too small or run is too long.
- Inadequate mixing of the warm water from the heater with the cooler water in the pool, leading to a layer of warmer water forming at the height of the inlets. To cure, alter the direction of the pool inlet jet downwards.
- Incorrect setting of any time switches fitted to heater or filter pump.
- Time switches are not synchronised with the main electrical supply meter.
- Lack of water flow caused by insufficient pump head, or blockages in the pipe-work.

## 9) Annual Cleaning

Yearly, before winter, the pool heater should be drained and cleaned. More frequent checks may be required if pool water contains sediment or any amount of foreign matter.

- a) Switch heater OFF.
- b) Switch main power supply and pump interlock supply to OFF.
- c) Remove main cover and check main and contactor terminals for tightness.

d) Apply Electrical contact cleaning spray (or similar) to all electrical components, particularly the contactors.

e) Close heater isolation valves.

f) Empty vessel using drain valve.

g) Remove drain valve locking screw and check for debris at the bottom of vessel with 6mm dowel rod.

If rod cannot be fully inserted, then consideration should be given to opening the vessel to remove debris.

If the pool is to be kept in semi-operation during the winter, then the heater may only be left full of water if the filter pump is fitted with a frost-stat.

**Warranty. The heater is guaranteed for two years against faulty workmanship or materials. This does not cover damage caused by incorrect commissioning & maintenance or by other neglect of the heater.**

**The manufacturer will replace or repair, at its discretion, any faulty units or components returned to the company for inspection. Proof of purchase may be required. The manufacturer will not be liable in cases of incorrect installation of the heater, inappropriate use or neglect of the heater.**

### **Water Quality**

The water quality must be within the following limits:

PH. 6.8 - 8.0, TA (Total alkalinity) 80 - 140ppm (parts per million)

Chloride Content MAX: 150 mg/litre

Free Chlorine: 2.0 mg/litre

Total Bromine: Max 4.5 mg/litre

Total Dissolved Solids (TDS) / Calcium hardness 200 - 1,000ppm

Thermalec® heaters are suitable for use with salt water pools with a salt concentration up to 8000ppm (8g/litre).

Water chemistry is complicated if in doubt seek expert advice.

### **RoHS Compliance Statement**

Meddings Thermalec Limited certify that our Electric Swimming Pool Heater Range complies in accordance with RoHS Directive 2011/65/EU on the restriction of hazardous substances. Waste of Electrical / Electronic Equipment

This product complies with EU directive 2012/19/EU. Do Not dispose of this product as unsorted household waste.

By ensuring this product is disposed of correctly you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product.