

# **HOTWAT** *Application Guide*

**FLUXO**



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*Full design, installation and commissioning  
capability of turnkey electrical trace  
heating systems and controls for  
instant hot water systems.*

**HEAT TRACE**<sup>TM</sup>  
SETTING THE STANDARDS LEADING THE WAY

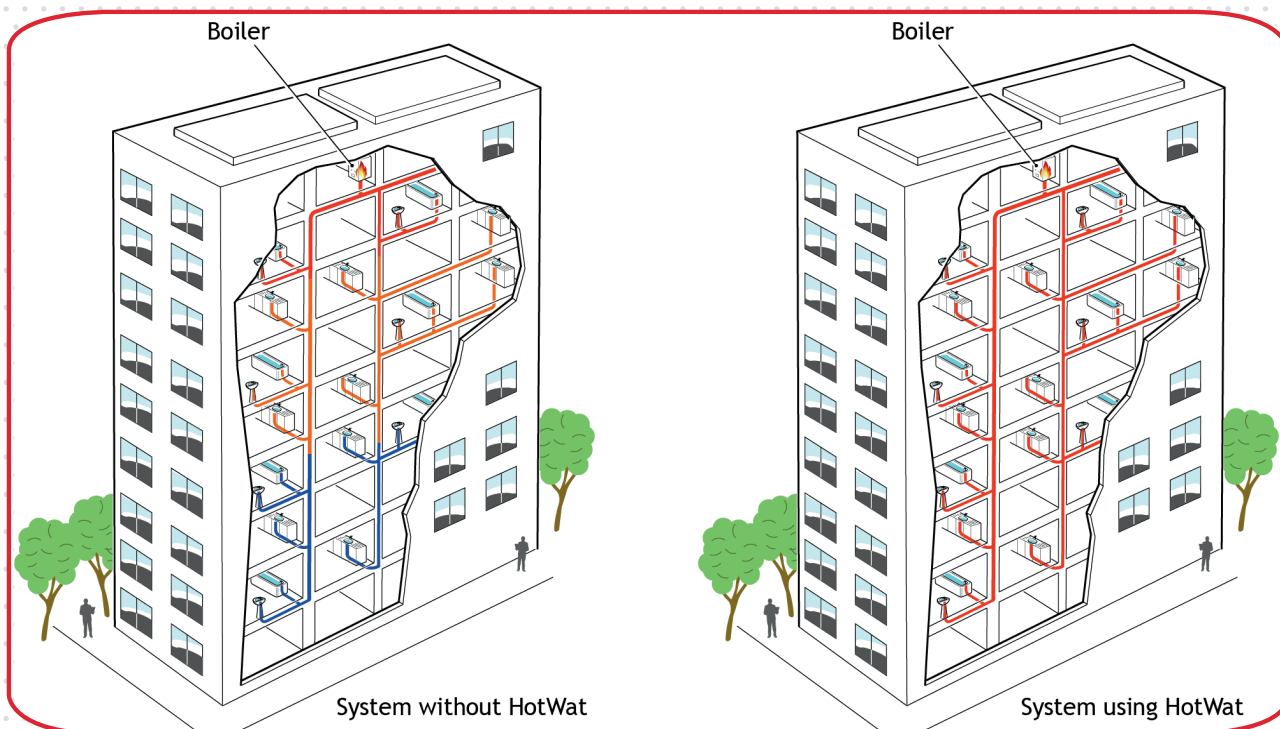
*The* **Heat Tracing Authority**<sup>TM</sup>

## Heat Trace Limited - About Us

Heat Trace Limited is a British manufacturing company with representation in over 50 countries. We provide complete trace heating solutions and are the technological leader in our field. Heat Trace's emphasis on innovation guarantees we remain at the forefront of our industry - providing quality trace heating solutions for over 45 years.

## What is Trace Heating?

Trace Heating, Heat Tracing or Surface Heating is the method of applying heat to pipes and vessels in order to maintain them at a certain temperature by specialised electric cables.



## The Need for Instant Hot Water

Modern living dictates that buildings shall have hot water available whenever and wherever needed - and preferably instantaneously.

Hot water is normally provided by a boiler in a centralised re-circulating hot water heating system. After using hot water from an outlet point, the the non-return feed pipe supplying that outlet point remains full of water. This will cool to ambient temperature when left. When hot water is needed again there will be a delay, as the cold water in the pipe is drained and replaced by the water heated from the boiler.

Such a delay is both frustrating and costly, as the water already in the pipe must effectively be heated each time a supply point is used.

## The Solution - HOTWAT

The HOTWAT system provides instant hot water by single pipe temperature maintenance.

HOTWAT is a parallel resistance, self-regulating heating cable designed to compensate for heat losses under/flow and no-flow conditions from hot water distribution systems.

The application of HOTWAT to insulated hot water pipework enables hot water to be available at each supply point and dramatically improves the system efficiency. In addition, the HOTWAT system minimises the risk of Legionnaires disease. Pipework can be heated to a temperature in which such bacteria is instantly killed. This ensures the luxury of heated water alongside safety.

## The Traditional Re-Circulating System

In a traditional system, hot water from supply points is provided by a twin flow and return re-circulation system.

This system has many shortcomings:

- The flow/return re-circulating pipework and thermal insulation has twice the capital expense compared with that of a single pipe system.
- Installation cost is doubled.
- Operating expense is also increased since heat losses are twice those of a single pipe system.
- Maintenance costs are incurred from the introduction of pumps and other items.
- Requires twice the space.
- The system must be balanced.

## The HOTWAT System

The HOTWAT single pipe temperature maintenance system overcomes all of the shortcomings of the traditional re-circulating system.

Maintaining the hot water temperature of a single supply pipe by compensating for heat losses under flow or no-flow conditions.

This results in:

- Half the capital or installation costs.
- Reduced operating costs.
- Requires half the pipe work and half the thermal insulation.
- Maintenance free.
- No balancing required. Reduced waste water and instant hot water availability.

## Cost Benefits

### Capital Costs

Savings are made on installation costs and overall savings when compared with the re-circulation system.

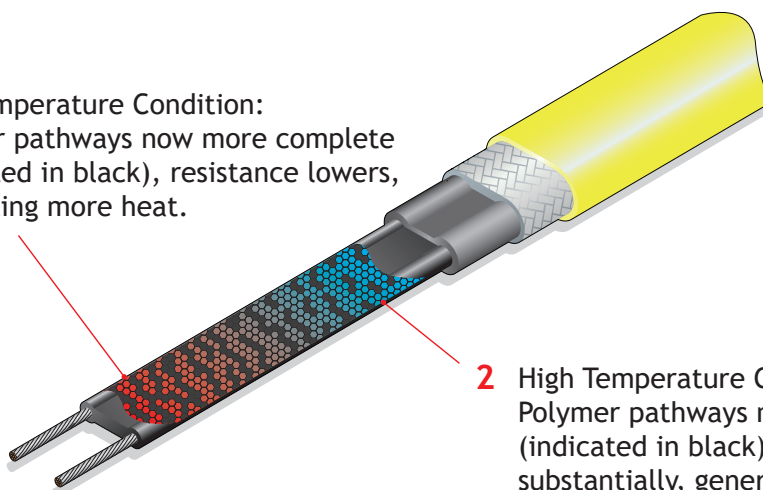
### Operating Costs

Half the pipework operating at reduced maintenance temperatures reduces energy consumption.

Total operating costs of a single pipe HOTWAT system will be less than an equivalent re-circulation system.

HOTWAT's self-regulating properties also contribute to a reduction in operating costs. The system automatically alters its power output to determine the temperature of the cable, ensuring the pipe and its contents are maintained at the required temperature. Therefore, the cable does not consistently use its maximum power unnecessarily.

- 1** Low Temperature Condition:  
Polymer pathways now more complete (indicated in black), resistance lowers, generating more heat.



- 2** High Temperature Condition:  
Polymer pathways now less complete (indicated in black), resistance increases substantially, generating very little heat.

## Product Information

### HOTWAT System

HOTWAT systems are available for installation in all new builds or extensions provided with hot water services - from private dwelling houses, sheltered housing, offices, apartment blocks, commercial buildings, hotels and hospitals.

There are two HOTWAT systems available. HWR-T is simply used to maintain the pipework at approximately 50-60°C, whilst HWP-T is used to maintain 45-70°C during normal operation with an extra disinfection feature at timed intervals to reduce the risks of legionella.

As a company that specialises not only in the manufacture of heating cables, but also a wide array of bespoke control and monitoring electronic equipment; Heat Trace Ltd are ideally placed to provide the most appropriate HOTWAT system according to application conditions.

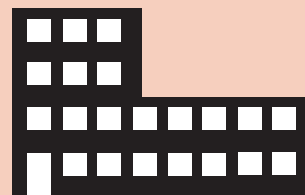
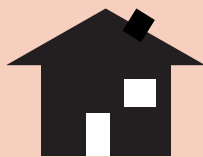
<b>MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE:</b>	+80°C(+176°F)
<b>MAXIMUM PERMISSABLE EXPOSURE TEMPERATURE:</b>	+100°C (+212°F)
<b>MINIMUM INSTALLATION TEMPERATURE:</b>	-40°C (-40°F)
<b>POWER SUPPLY:</b>	12 - 277 VAC



### 100°C HOTWAT

Electrical heating cable for temperature maintenance of hot water services in domestic and commercial buildings

#### Type of Building



Heating Cable Type	HWR-T	HWP-T
Hot Water Supply System	Localised or Centralised	Centralised
Temperature Control System	Fixed Temperature	Variable Control
Electrical Connection System	Universal Termination Kit	Universal Termination Kit
Thermal Pasteurisation	Not Available	BMS Interface
Electrical Supply	230V Nominal	230V Nominal
Typical Maintain Temperature	55°C	70°C
Heating Cable Nominal Output	9W/m at 55°C	9.5W/m at 70°C
Maximum Circuit Length	128m (420ft)	80m (262ft)
Heater Dimensions (mm) +/-0.5	12.7 x 5.95	12.7 x 5.95
Heater Weight	11.8 kg/100m	11.8 kg/100m

For more information, please refer to our HOTWAT Datasheet.



## Design Guide

A HOTWAT system can be designed in 4 steps:

- Step 1 - Determine heating cable type and thermal insulation thickness.
- Step 2 - Calculate heating cable length required.
- Step 3 - Determine circuit protection and feed cable requirements.
- Step 4 - Define the number of system components needed.

### Step 1 - Selection of Heating Cable Type and Thermal Insulation Thickness

Select cable type HWR-T or HWP-T according to whether a fixed or variable maintain temperature is required.

\*Nominal maintain temperatures are achieved based on insulation thickness given in the following tables

System Type	Nominal Maintain Temp (°C)	Thermal Insulation Thickness (mm)	Pipe Size (mm)					
			15	22	28	35	42	54
HOTWAT Regular (HWR-T)	60 fixed	Recommended	25	30	40	50	60	75
	55 fixed	Recommended	20	25	30	40	50	60
	50 fixed	Recommended	15	20	25	30	40	50
HOTWAT Plus (HWP-T)	45 - 70 variable	Recommended	30	40	50	60	75	75

\*The above figures are based on the thermal insulation having a K-Value of 0.038W/mk at 36°C midpoint temperature.

### Step 2 - Calculate the HOTWAT Length Required

Use the following questionnaire to determine the total number of metres required for a HOTWAT installation.

Total Pipework Length = \_\_\_\_\_ m  
add 0.25m per power connection = \_\_\_\_\_ m  
add 1.0m per splice = \_\_\_\_\_ m  
plus 2.5% allowance for cutting = \_\_\_\_\_ m

### Step 3 - Determine Circuit Protection or Power Feed Cable Requirements

Circuit protection is provided by Type C circuit breakers to IEC60898 or equal sized as per the following table (based on 0°C start-up).

Circuit Breaker Size	Maximum Recommended Circuit Length	
	HWR-T	HWP-T
20A	128m	80m

Minimum Number of Circuits = 
$$\frac{\text{Total Cable Length}}{\text{Maximum Recommended Circuit Length}}$$

Outer connecting cables from the supply point to each circuit power connection must be correctly sized to satisfy Electrical Wiring Regulations and local/national standards or codes. Sizing is determined by the maximum allowable volt drop and current carrying capacity of the supply cable.

## Standard Design Parameters

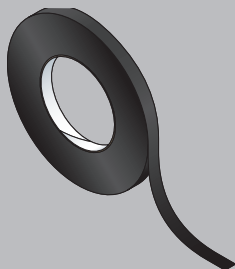
HOTWAT systems can be provided for various design conditions. Information contained within this brochure is based on standard design parameters listed below.

Pipe material.....Copper or Steel  
 Building Ambient Temperature.....+ 18°C  
 Thermal Insulation K-Value.....0.038W/mK at 36°C mid-point temp  
 Supply Voltage.....230 VAC

When other design parameters apply, contact your local Heat Trace Representative

### Step 4 - Determine System Components

#### Fixing Tape



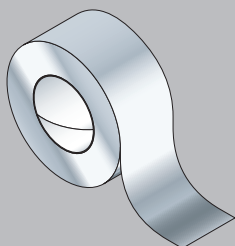
Ref: FT/HTP  
 (Copper / Steel Pipe)

Adhesive tape in 33m rolls for fixing HOTWAT heating cable with circumferential ties at 300mm centres.

Number of Rolls of FT/HTP per 100m of Pipe:

Pipe Size (mm)	15	22	28	35	42	54
Number of Rolls	2	2	3	3	4	4

#### Fixing Tape



Ref: FT/ALUM  
 (Plastic / Stainless Steel Pipe)

Aluminium adhesive foil tape in 45m rolls for fixing HOTWAT heating cable longitudinally along its entire length

Number required:  
 1 roll per 45m of pipework

#### Warning Label

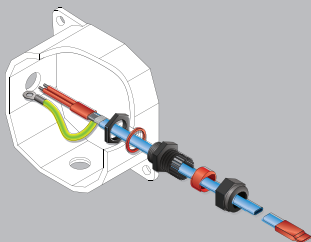


Ref: CL

'Electric Heat Tracing' warning label for fixing by insulation contractor at 6m intervals to outside of insulation cladding.

Number required:  
 1 label every 6 metres of pipework

#### UTK 344



Ref: UTK 344  
 This kit contains:

- PGS3
- BPS4
- BES4
- RTV0.5

These termination kits and the cable that enters them should be fixed to a secure mounting point.

The termination devices should be positioned outside the insulation, and the installer should ensure they are not exposed to UV radiation.

## Control Equipment

HOTWAT REGULAR is an uncontrolled system where the heat output from the heating cable is in thermal balance with heat losses from the pipework.

This occurs at a maintain temperature of 50-60°C (HWR-T) within a building at 18°C for the standard and reduced specifications respectively.

The only control devices required for HWR-T systems is over current circuit breakers and earth leakage protection devices (mcb/rcd/mcbo/rcbo).

HOTWAT PLUS is a high integrity engineered system. The control items would normally be incorporated within a custom built local display panel providing over-current protection and earth leakage protection.



## Control Panels

Control panels are available upon request. An example of a typical control panel is a mild steel enclosure, with 7" touchscreen HMI, door interlocked isolator and 24V circuit 'Healthy' and 'Common' alarm lamps.

### System Features include:

- Temperature Control
- Current Monitoring
- Communication and Reporting
- Alarms and Faults

For further information on system capabilities please contact [info@heat-trace.com](mailto:info@heat-trace.com)

## Powertrimming

### Variable temperature settings

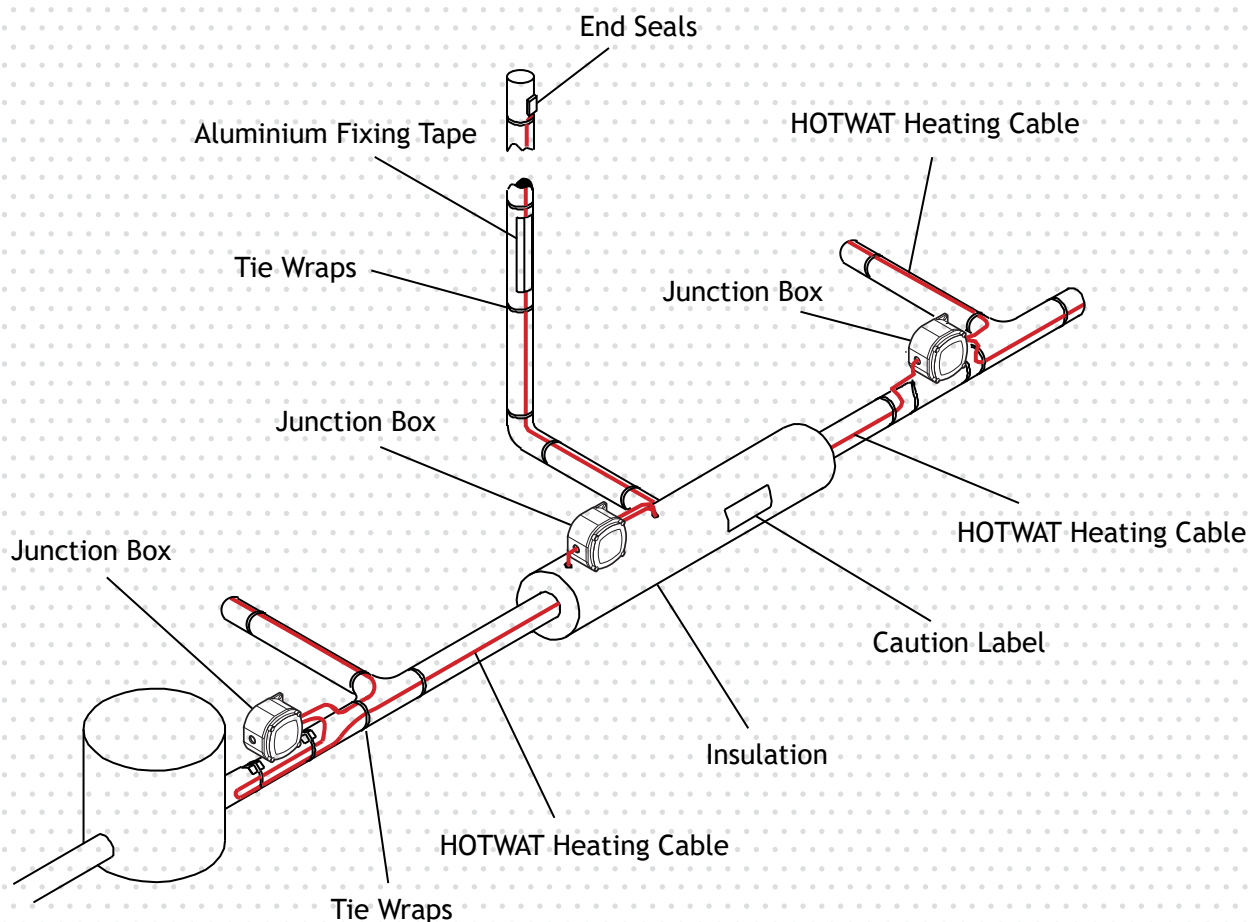
Greater system flexibility is provided by the addition of variable system temperature settings. Where required, different parts of a building can be programmed to maintain different temperatures. Control is provided by a technique known as Powertrimming.

## Building Management System (BMS)

HOTWAT interface directly with the BMS for programmed temperature changes or thermal pasteurisation.

The BMS can be programmed to automatically apply full power for thermal pasteurisation of pipework. This may be applied, for example, for three hours (minimum) when there is little demand for hot water; eg. weekends, nights.

## Installation

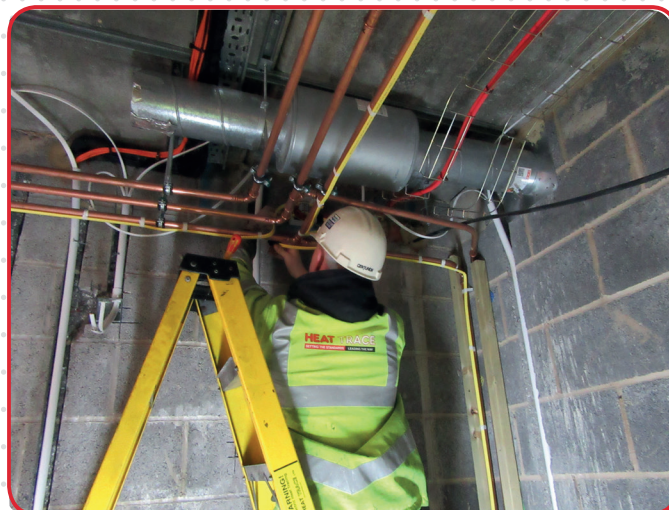


### Case Study

Heat Trace Limited have previously completed a project that included the full design, supply, installation and commissioning of HOTWAT cables at a school in Berkshire, United Kingdom.

The project was completed as part of an extension to the existing school building. HWR-T cables were used for a hot water maintenance system to maintain water pipes at a continuous 55°C.

Over 1,200 metres of HOTWAT heating cable were used to maintain copper pipework throughout the extended school building. No control system was required, as the heating system was controlled by design.





## Design & Engineering Services

### Design

All design work is carried out in accordance with the latest National and International heat tracing standards. Using Evolution, Heat Trace's own state-of-the-art electric heat tracing design software, ensures that system design complies with the latest national and international standards. Heat Trace are specialists in all types of electric heat tracing systems for use in both SAFE and HAZARDOUS areas. All systems are designed to comply with BS EN ISO IEC 62395-2.

### Consultancy

From Concept through to Commissioning - Heat Trace offers a full turnkey project capability. This includes the initial enquiry through site surveys to final client handover, plus maintenance contracts where applicable.

### Bespoke Software

Heat Trace's Evolution Design Software empowers our partners, be they customers, distributors or engineering houses, to produce safe, reliable, competitive and detailed heat tracing system designs. Designs for freeze protection, temperature maintenance and heat raising of pipes, tanks and vessels are all possible, calculating stabilised designs and temperature control requirements where appropriate. The completed design package can then be assembled and presented, either as a quotation, or tender document, for submittal to the client, all from within a single software package. Evolution Web is also available on the Heat Trace website and the Evolution Mobile App is available from Google Play Store. Both these versions can be used for heat loss calculations and product selection.

### Installation

Fully qualified electrical installation and site supervision engineers are available to ensure that systems are installed in full accordance with the specified design. Systems conform to National and International standards and codes of practice.



### Commissioning

Our commissioning engineers will carry out final inspection and testing, ensuring system operation is in accordance with the design specification, prior to handing over to the client.

### Project Management

Dedicated Project Managers will ensure the smooth operation and completion of all projects.

### Maintenance

Annual Maintenance Contracts are available to ensure the system always remains at its optimum operating efficiency.

### Personnel Training

Training in product knowledge, system design, installation and maintenance procedures can be provided, either on-site, or at one of our company premises. Alternatively, ETHIC-GLOBAL (the Electric Heat Tracing Industry Council) offers accreditation with E-Academy. This is intended to provide an on-line resource for heat tracing design education and learning. Basic and Advanced courses are available.

### Quality Management

Heat Trace's quality management system, certified to ISO 9001:2015 and BS EN ISO IEC 80079-34 includes design, development, manufacture, supply and installation of electric surface heating systems.



## NOTES

This image shows a full page of blank handwriting practice paper. It features approximately 28 evenly spaced horizontal red lines across the entire page, providing a guide for letter height and placement. The background is plain white, and there are no margins, text, or other markings present.

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### **WORLDWIDE REPRESENTATION**

Heat Trace is represented throughout the world in over 50 countries. Our network of Affiliate Offices, Partner Companies, Distributors and Agents work, both independently and jointly, with our Corporate Headquarters, resulting in an integrated team of heat tracing and surface heating specialists having a global capability.

For full details of overseas offices please contact Heat Trace Limited direct.

# **HEAT TRACE™**

**SETTING THE STANDARDS LEADING THE WAY**

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