



SMART FLUID HEATER System

1 Application

Heating of fluids to an exactly controlled temperature in hazardous areas.

2 Special Features and Advantages

- Very high efficiency, almost all of the energy is transferred into the fluid,
- Due to a compact modular sandwich construction based in Intertec standard items, very flexible solutions are possible,
- Any substance (oil, gas, food, aircraft fuel, liquid chemicals etc) which is fluid, can be heated.
- Any tubing material can be chosen for the media used
- a digital PID controller which manages the outlet fluid temperature with great accuracy and also supervises the temperatures of the electrical heaters used,
- can be net worked and managed on computer network,
- extensive fault monitoring possible
- long life solid state controller with no mechanical switching elements, the calculated failure probability with uninterrupted operation of 10 years is less than 5%,
- storage and operating temperatures ranging from -50 C to + 180 C

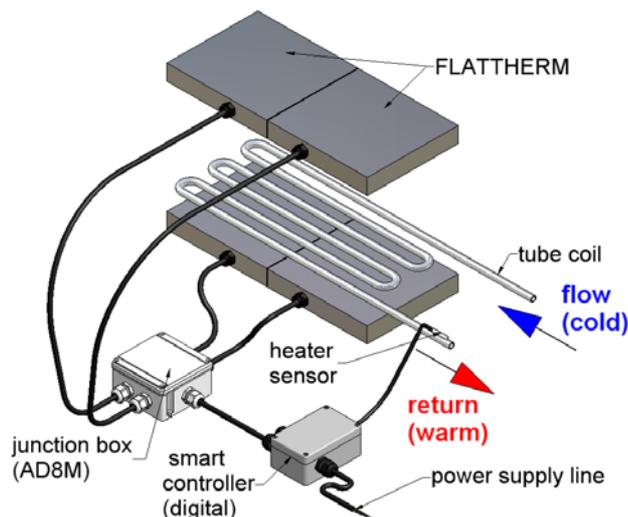
3 Description

The SMART FLUID HEATER System is a system specially designed to heat fluids in hazardous areas. Its' modular design based on Intertec standard products, enables a tailor made customer application at reasonable cost. The system is based on one or several aluminium FLAT THERM conduction heaters sandwiched around a tube that can be made of any appropriate material like stainless steel aluminium, copper Hastelloy etc., creating an electric heat exchanger.

The intrinsic safe temperature sensor is placed at the fluid outlet, the fluid outlet temperature can be controlled very accurately with short response time.

4 System Components

- Digital controller [TC xD](#)
- Heater [FLAT THERM xKA](#)
- Aluminium counter plate
- Tubing heat exchanger
- [INTERTEC enclosure](#) as insulation



5 Technical System Data

Class of Protection	II 2 GD EEx dm IIC T3 / T4 IP 65 T 135°C, T 200°C
EC- type examination certificate	PTB 02 ATEX 1041 X, PTB 04 ATEX 2022 X
Hazardous Location Rating	CI I Div I Grp ABCD T3 or T4
CSA file Nr	LR 43674
Nominal voltage	120 or 230V AC
Fluid flow rate	As desired
Inlet temperature	As desired
Outlet temperature	<ul style="list-style-type: none"> • T4: ≤ 90°C • T3: ≤ 150°C
Physical system size	Depends on the application



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6 System application

The SMART FLUID HEATER System is shipped as a complete ready to use system which is designed to meet the most various challenges. The necessary system power and the tubing heat exchanger diameter and length is determined for the specific application which mainly depends on:

- the fluids' physical properties, i.e. heat capacity
- flow rate
- inlet temperature
- desired outlet temperature

Once the power requirement is determined, the complete system is built around the core.

7 A very flexible modular System

The SMART FLUID HEATER System is a modular system which can be adapted to any specific application. There is no limitation of how much power can be built into the system. The only limitation is the temperature class specific limits:

- Maximum fluid temperature for T4: $\leq 90^{\circ}\text{C}$
- Maximum fluid temperature for T3: $\leq 150^{\circ}\text{C}$

Within these temperature limits, the system can be designed for applications within a wide range. From the small test facility with a flow rate of 0,1 liter per hour to applications with a high flow rate. In principle, there are no limits of the SMART FLUID HEATER Systems power capacity.

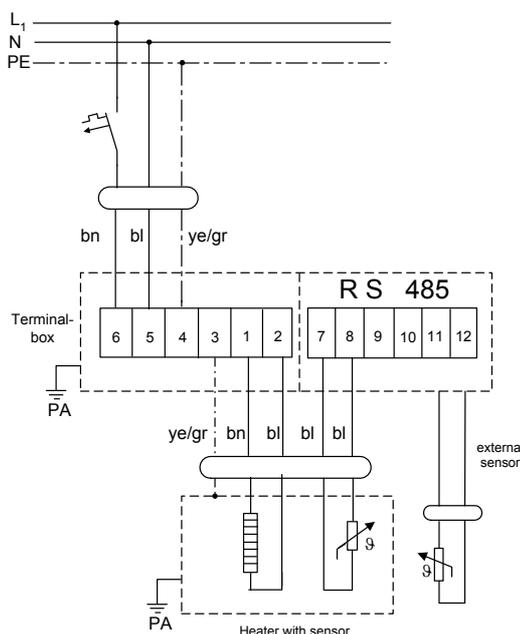
8 Temperature management

On the outlet pipe, a sensor is placed and it reports the outlet temperature to the SMART digital temperature system controller. Through this technical solution, a high accuracy of the outlet temperature will be kept and maintained. The inlet temperature and the flow rate may change, the SMART controller will supervise the overall system and will keep the desired outlet temperature within a narrow tolerance. Also, if the flow rate would be reduced to nil, the SMART controller would respond at once: Reduce power and thereby protect the heating system and the fluid from over heating. The SMART controller is delivered with a sound setting of its' controlling parameters. But, through software, an application specific setting may tried out and implemented to meet specific needs: Temperature tolerance or reaction capability if the input temperature or flow rate changes rapidly. In fact, the SMART controller is at its' best when the temperature controlling task is exceedingly difficult.

9 Piping

Connect the SMART FLUID HEATER System inlet and outlet pipes to the existing pipe system which supplies the needed pressure and flow rate to keep the fluid in motion. The SMART FLUID HEATER System will then inject the necessary energy to reach the desired out let temperature set point.

10 Electric Wiring Diagram



The above electrical wiring diagram is valid for a system up till 500 W with one heater. For more powerful systems with more than one heater an individually designed wiring diagram is supplied.

11 Enclosure

Depending on the core system size, the SMART FLUID HEATER System is equipped with any suitable INTERTEC standard enclosure. This enables the system to be used in/out doors, to be mounted in vehicles, ships or anywhere where there is access to electrical power and a need to heat fluids in a hazardous area.