

GUIDE LINES FOR THE INTERTEC ATEX HEATER PROGRAM

The INTERTEC ATEX heaters are built in a modular design. They are available in general purpose construction as well as hazardous location certified to about all global standards: IEC , ATEX , GOST , CSA (NRTL) , NEC, GB3638 (China) etc. Bi-standard heaters with multiple certificates that can be used worldwide are available as well.

For ease of heater selection there are a number of questions to answer:

1 CONDUCTION OR CONVECTION

1.1 CONDUCTION

A conduction heater requires significantly less energy than a convection heater with fins. Transfer of heat is much more efficient through contact than through the heating of air. Since the air surrounds the entire equipment inside the enclosure the air acts as a good insulator.

Conduction heaters have a flat surface for good heat transfer; therefore the equipment to which it is fastened must also have a good flat surface for proper heat transfer.

Interpretation

- Test results (5 times more effective than convection heating) A [SL BLOCKTHERM DKA T4](#) bolted to a manifold will freeze protect a normal transmitter installation .
- With INTERSIM
- With an experiment

Please contact our sales department for more information

1.2 CONVECTION

With this application the air is used inside the enclosure as a medium for transferring heat to the equipment

- Advantage: Any application or design can be heated
- Disadvantage: The enclosure must be well insulated to keep heat loss to a minimum. The critical factor being the door or lid seal.

Formula used for calculating heat loss in an Intertec enclosure for freeze protection: $P=K \cdot \Delta T$

There is a 20% safety factor in the K value. "More is better" does not apply to explosion proof heaters. The thermostat must control the over-run temperature so that it does not approach the fusible link temperature.

2 FIXED RESISTANT OR SELF- LIMITING

The surface temperature on an explosion proof heater cannot exceed the temperature class limit of the heater.

This can be accomplished in two ways

2.1 Fixed resistance heaters

The INTERTEC heaters [CP ...THERM](#), (CP= Constant Power) are manufactured with a constant resistance heater cartridge

In these heater cartridges there is a temperature limiter, which will shut down the heater in an over-heating situation.

Possibilities where a T3 temperature class heater should be used.

- Surrounding temperature inside the enclosure should not exceed the temperature listed on the data sheet. Use option TS or TC.. Ex. thermostats
- With convection heaters: good air circulation is necessary with sufficient space around heater for airflow and the fins must not be covered.
- With conduction heaters: heater must be attached to a large mass of metal with a flat surface.

2.2 Self-limiting heaters

The INTERTEC [SL ...THERM](#) heaters use a PTC heater cartridge: PTC-elements (Positive Temperature Coefficient) increase their resistance with a rise in temperature. The higher the resistance, the lower the output.

The heat output at high temperatures becomes very little so that the limit of the T rating can never be reached.

These heaters are normally only used in a relatively small number of applications.

Available conduction heaters:

[SL BLOCKTHERM D.A](#)

also with a fined block

[SL MINITHERM DLA](#)

GUIDE LINES FOR THE INTERTEC ATEX HEATER PROGRAM

3 For Freeze Protection or Temperature Control

2.3 Freeze protection to +20°C

For these applications use the standard convection heaters with TS thermostats

Type		preferred application
MULTITHERM		Vertical next to the transmitter
MINITHERM		Horizontal under the transmitter
VARITHERM		Horizontal under the transmitter
MICROTHERM		Vertical if there is no room for Multitherm

Calculation of power according to the data sheet Heater Selection for INTERTEC Enclosures

3.2 Temperature Control from +20 to +40 °C

For this application heaters with a protection thermostat integrated in the heater cable are available.

Enclosure temperature are controlled by

TAE External Thermostat (s. 4.2)

TC Electronic Temperature Controller (s.4.3)

3.3. Temperature Control over +40 °C

For this application we do recommend

SMART HEATER

to 3.2 and 3.3.

The higher the control temperature the more accurate the temperature control must be as the maintain temperature approaches the T rated temperature.

FOR THESE APPLICATIONS PLEASE CONTACT THE FACTORY.

In many applications a combination of conduction and convection heaters can be used to meet desired temperatures:

For example:(Cabinet to maintain [+120°C with EXP heater](#))

4 Temperature Control

Controlling temperatures has different goals:

- Energy savings
- Constant surrounding air temperature control for accurate instrument measurement
- Plant safety considerations

4.1 TS Thermostat integrated into Cable

Option: Integrated thermostat inside the heater cable

The TS thermostat must not touch the outer wall of the housing.

Temperatures above +5 °C would be maintained inside enclosure.

4.2 TAE External Thermostat

If attached to heater with the bracket supplied, accurate control is achieved through temperature feedback.

Temperature control available:

+20, +30, und +40 °C

4.3 TC Electronic Temperature Controller

These electronic controllers have several advantages over standard thermostats:

- No direct contact is required
- Better control through proportional range
- No hysteresis
- Adjustable or fixed settings
- Integrated into the housing for enclosure temperature control
or
- as external temperature sensor.

Option J: inside junction box to save extra Ex box

4.4 SMART HEATER

These heaters are specifically designed for high temperature maintenance. They are controlled with an integrated electronic switch that

- controls enclosure temperature
- keeps the temperature below T rating
- controls the operation

SMART BLOCKTHERM System



1 Application

SMART BLOCKTHERM is a heating system, which consists of an explosion proof electrical heater, and a microprocessor, which manages both the set point while making sure that the Blocktherm heater doesn't over heat.

The SMART BLOCKTHERM System is especially suited for demanding heating applications in areas with explosive atmospheres. For example: to keep analyzers at high temperatures.

The BLOCKTHERM heater heats through conduction and must be in firm contact with the valve block, measure instruments, controlling valve etc. The conduction heating principle is simple, reliable and economical. A conduction heater needs less energy than a finned convection heater.

Conduction of heat through metal is more efficient than heating by means of air. As the air inside the enclosure surrounds the application, it works as an additional insulation.

2 Particular advantages

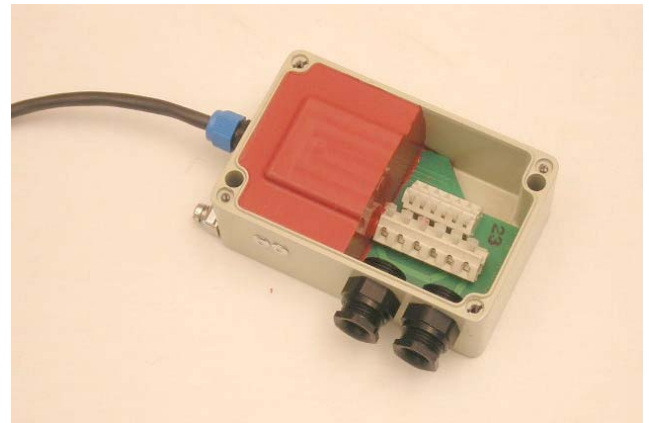
- Energy saving
- Space saving
- Hole pattern according to the ISA / ANSI SP76.00.02 "open architecture" analyser standard.
- The maximum temperature of the heater is managed electronically and a built in temperature sensitive fuse ensures that the maximum allowed temperature never is exceeded. This principle protected by Intertec patent is very reliable and ensures a high safety in terms of explosive protection.
- Very precise temperature set point accuracy through a digital PID controller
- A RS 485 interface enables networking and setting parameters from a PC.
- extensive error monitoring
- Long service life of the controller, as no mechanical switching elements are used (solid state). The calculated failure probability with uninterrupted operation of 10 years is less than 5 %.
- Negligible network regeneration through phase group control with no voltage triac switching
- The set point temperature can be adjusted continuously.
- Industrial design inside an aluminium box.

3 System description

A SMART BLOCKTHERM heating system consists of an electrical heater (BLOCKTHERM HI) and one digital controller (SMART).



The BLOCKTHERM is a block of aluminium. An electrical cartridge heats the block and the heat is conducted to the item, which needs to be heated. Inside the Blocktherm there is a temperature sensor, which reports the heaters inside temperature to the SMART controller.



The controller consists of an electronic section which is completely sealed with silicon and is accessed through a connecting terminal. The SMART controller has 3 analogue inputs:

- One temperature sensor on the chip inside the box.
- One temperature sensor inside the Blocktherm heater
- Option: an intrinsically safe external temperature sensor.

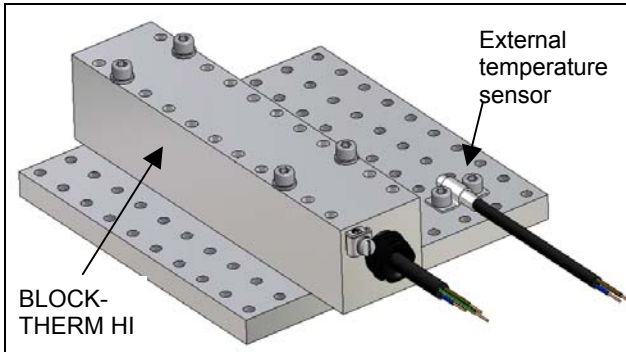
4 How to order

SMART controller with CP Blocktherm 500 T3 HI.
SMART controller with CP Blocktherm 500 T4 HI.



SMART BLOCKTHERM System

5 Installation and temperature management



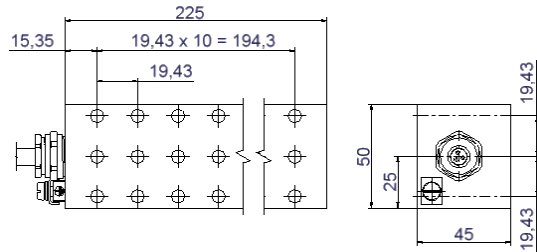
The Blocktherm heater transmits its' heat through conduction. Therefore when installed, it shall be firmly attached to an even surface which conducts heat well (metal). The heater should be fastened with 4 screws.

The SMART controller has two different controlling loops. One supervises the temperature of the heater and the second the temperature set point. For the set point two different temperature sensors can be used. Either the internal sensor, which is positioned inside the SMART controller or the optional external sensor. If the internal sensor is used, the SMART controller has to be placed where the set point needs be controlled and the maximum temperature set point is then +80°C. The external sensor is recommended.

6 Technical data BLOCKTHERM HI

Version	DPA 500 T3 HI	DPA 500 T4 HI
Ignition protection class	II 2 GD EEx d II C T3 or T4	
Temperature class	T3	T4
EC examination certificate	PTB 02 ATEX 1041 X	
Nominal voltage	230 V	
Nominal power	500 W	
Temperature range	-50 to +180°C	
Protection degree	IP 68, NEMA 4X	
Material:	sea water proof aluminium; black anodized	

6.1 Technical data BLOCKTHERM HI



7 Technical data SMART Controller

Height x width x depth	57 x 125 x 80 mm
Nominal voltage	230 V AC .. 250 V AC
Minimum power	60 W
Maximum power	2000 W
Maximum Temperature	max. 80°C (box)
Gable gland	2-3 x M20
Protection degree	IP 65
Material	sea water proof aluminium; coated
Ignition protection class	EEx med IIC T4
EC Examination certificate	PTB04ATEX 2022X

7.1 The SMART controllers' functionality

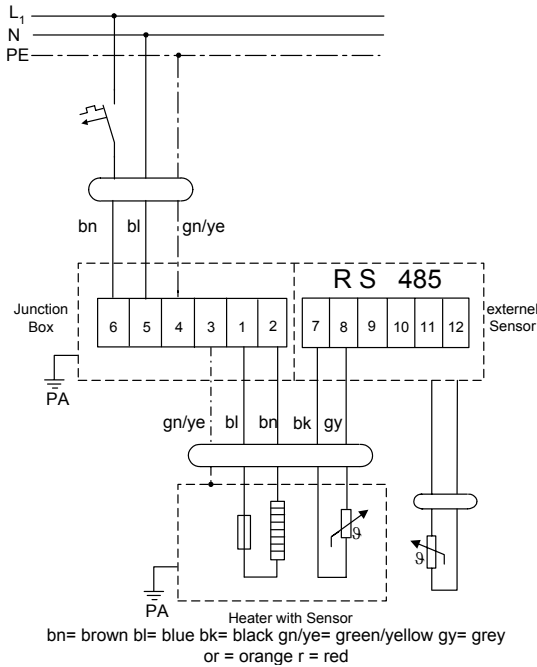
- PID-Controller
- Temperature management

The controller consists of an integrated triac which, when switching, is making use of phase group control with no voltage triac switching. A thermistor (NTC) is used as a temperature sensor. The electronics are completely sealed.



SMART BLOCKTHERM System

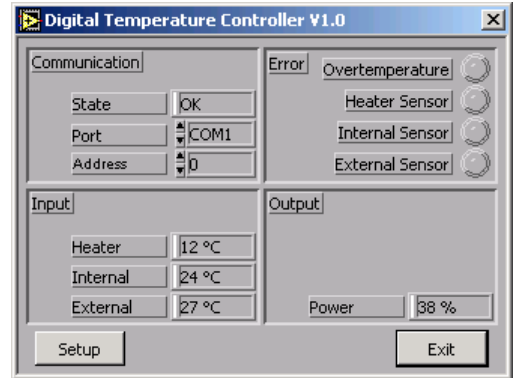
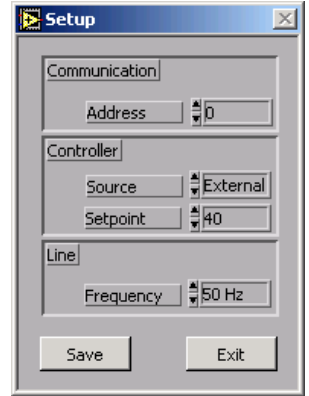
7.2 Electric wiring



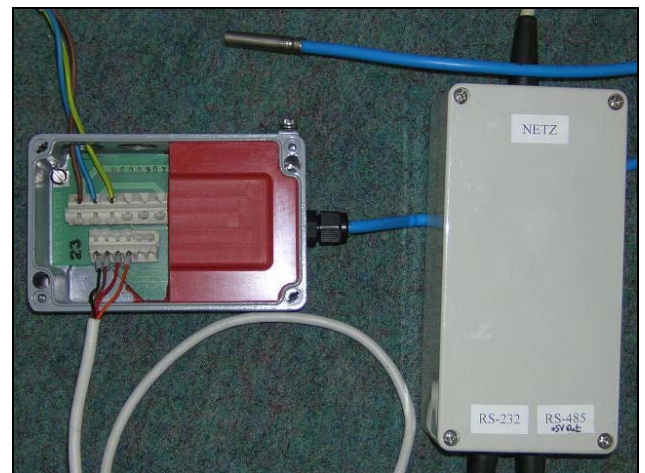
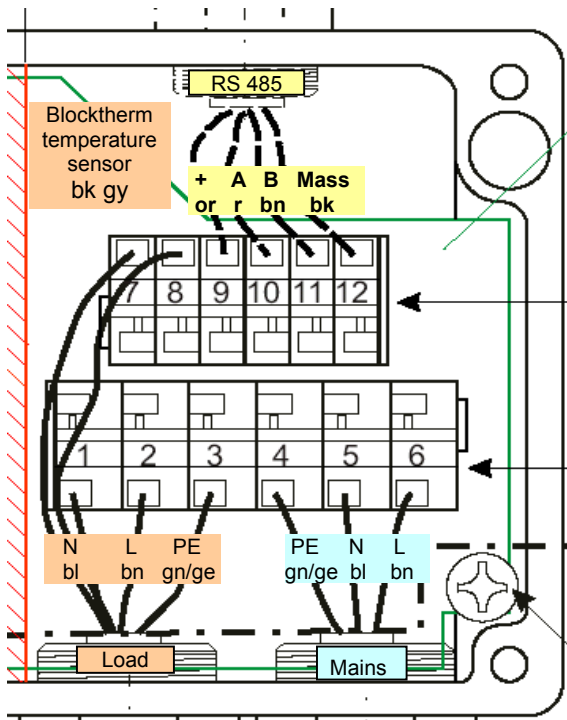
The SMART controllers' Software

The set TC Soft consists of:

Interface converter
RS232 / RS485 and the
necessary software



From the interface converter



VARITHERM HI "Smart Heater" with Digital Temperature Controller

1 Application

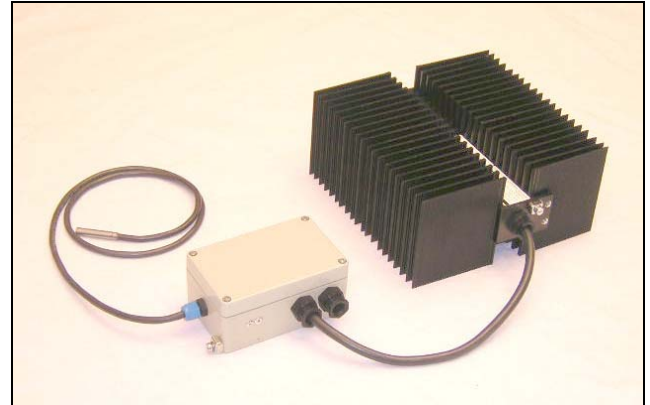
...THERM HI "smart heater" is a system consisting of an explosion-proof electric heater and a microprocessor, designed to control the air temperature in instrument enclosures and protective cabinets and to limit the surface temperature of the heater.

The "option E" is equipped with an intrinsically safe sensor, thus allowing measurement and accurate regulation of the temperature of the instruments and equipment (e.g. of manifolds).

... THERM HI heaters are designed to solve sophisticated and complex heating problems in hazardous areas, and in particular for high temperature maintenance of analyzing equipment.

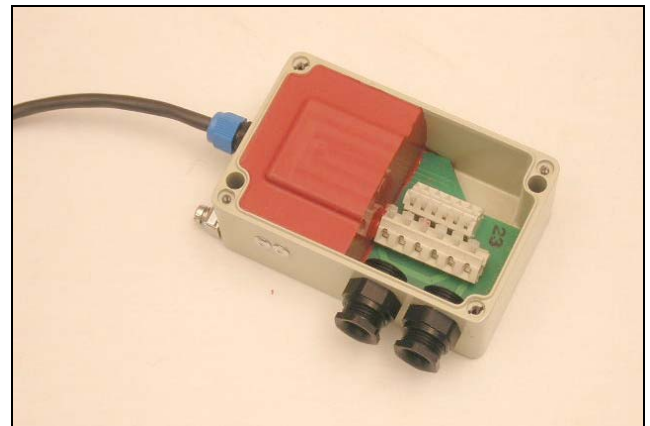
2 Special Features

- The surface temperature of the heater is redundantly limited both electronically as well as by a safety fuse at the heat source. This patented concept ensures very safe operation and at the same time guarantees a high level of safety for explosion protection.
- A digital PID controller provides precise temperature control.
- The RS 485 interface allows networking in fieldbus networks and parameterizing at the PC.
- Extensive fault monitoring.
- Long life of the controller, as no mechanical switching elements are used (solid state). The calculated failure probability with uninterrupted operation of 10 years is less than 5 %.
- Storage and operating temperature ranging from - 55 °C to + 80 °C.
- Negligible network regeneration through phase group control with no voltage triac switching
- The temperature set point can be adjusted continuously
- Industrial design inside an aluminium terminal box



3 Description

A ... THERM HI heating system basically consists of an electric heater body (heating block or finned heater) and a controller in an aluminium housing. The two parts can be separated (e.g. for installation). The heater can be made the same form as any INTERTEC ATEX heater with fixed resistance, i.e. VARITHERM, MULTITHERM, BLOCKTHERM etc.



The controller consists of an electronic section with microprocessor, completely encapsulated in silicone, and a terminal section with EEx e terminals. The controller has three analogue inputs:

- An integrated temperature sensor at the housing for the room temperature
- A temperature sensor in the heating coil of the heater serving as temperature limiter
- Optionally: an intrinsically safe external temperature sensor

VARITHERM HI "Smart Heater" with Digital Temperature Controller

4 Function

- PID controller
- Temperature limiter

It consists of an integrated zero voltage switch, a triac as switching element and a thermistor (NTC) as sensor. The electronics are completely encapsulated. The sensor is integrated into the housing.

5 Models and Technical Data

Dimensions (H x W x D)
 57 x 75 x 80 mm 57 x 125 x 80 mm
 Nominal voltage 230 V AC .. 250 V AC
 Minimum load 60 W
 Maximum load 2000 W
 Maximum permissible ambient temperature 80 °C
 Cable entry 2 x PG 11
 Protection degree IP 65
 Material: seawater-proof aluminium, painted
 Type of ignition protection EEx med IIC T4
 EC type test certificate PTB 04 ATEX 2022X

6 Test and Adjustment Software

TC Soft Set consisting of:

- Interface converter RS232 to RS485 with voltage supply
- Software

