TC D Digital Temperature Controller

1 Application

The digital electronic temperature controller TC D has been designed to regulate the temperature of instruments or the air temperature in instrument enclosures and protective cabinets. In addition, it electronically limits the surface temperature of the heater.
It can be connected to the following:

- INTERTEC Heater CP ... THERM HI
- All explosion-proof electric heaters
- Serial heat tracing cables in connection with a temperature sensor and limiter TAES

The TC D temperature controller is particularly well suited for sophisticated heating applications in hazardous (potentially explosive) atmospheres and has been specifically designed for high temperature maintenance of analysing equipment.

2 Special Features

- Long life solid state controller with no mechanical switching elements. The calculated failure probability with uninterrupted operation of 10 years is less than 5%.
- The RS 485 interface allows networking in fieldbus networks and setting parameters at the PC via the Modbus RTU protocol.
- Storage and operating temperature ranging from -50° C to +80° C.
- Extensive fault monitoring.
- External status display via a green/red LED.

3 Description

The digital electronic PID controller TC D consists of an electronic section with microprocessor, completely encapsulated in silicone, and a terminal section with EX e terminals. The temperature set point can be adjusted continuously.
If an INTERTEC CP ...THERM HI heater is connected, its surface temperature will be redundantly limited both electronically and by a safety fuse directly 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.
Its three analogue inputs can each be used as an actual value transmitter for the controller.

The light-weight intrinsically safe external KTY temperature sensor can exactly measure and control the temperature of instruments or equipment (e.g. of a manifold).

- The external temperature sensor monitors the temperature of the controller inside the housing
- The NTC sensor at the heating coil limits the heater temperature electronically
- In addition, all values can be displayed and logged via the INTERTEC Smart Heater software

The actuator consists of a triac which, uses phase group control with no voltage triac switching, thus minimizing power line fluctuations.
In extended mode the controller can serve as a temperature monitor with adjustable process temperature limit switch.

4 Explosion Protection

EC Examination Certificate	PTB 04 ATEX 2022 X
IEC Scheme Certificate	IECEx PTB 08.0011X
Marking	II 2 G Ex mb II T4 II 2 D Ex tD A21 IP66 T130°C
CSA Type of Protection	Cl.I and II,Zone 1 and 2, Gr.IIC, Div. 2, Gr. A, B, C, and D
CSA Certificate	LR 43674
EAC Certificate	Yes

5 Technical Data

Nominal voltage	230V*
Nominal power	60W … 2300 W*
Operating temp.range	-50°C to +80°C *
Connection cable	2 x M20
Ingress Protection	IP66
Material	Seawater-proof aluminium; powder-coated
Dimensions (HxWxD)	57 x 125 x 80 mm

* see also 8

6 Options

Exx	Intrinsically safe external sensor xx = cable length in m
KLE	Additional cable entry for fieldbus connection
120V	Nominal voltage 120V AC

Further options upon request, e.g.

- Other operating voltages
- Other designs of sensor

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7 Parameter

For factory programming, please specify the following parameters when placing an order:

Parameter	Standard value
Set point	50 °C
Temperature class of the heater	T3
Address in the RS485 network	0
Power frequency	50 Hz at 230 V, 60 Hz at 120 V

8 Temperature

Please note that at higher temperatures full power cannot be applied to the controller. The controller may be mounted outside the heated cabinet.

Room temperature to	Imax	120 V AC	230 V AC
+40°C	10 A	1200 W	2300 W
+50°C	8,7 A	1050 W	2000 W
+65°C	6,5 A	780 W	1500 W
+80°C	4,4 A	530 W	1000 W

I_{min} = 250 mA

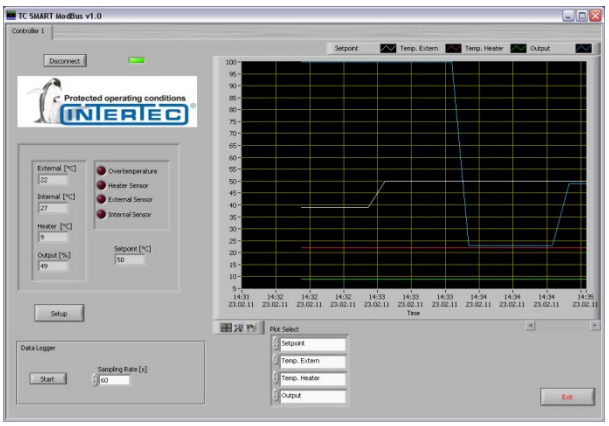
At temperatures below -12°C, the controller switches to “cold start mode“, which means that the output switches to 100 percent power until the temperature of the circuit board exceeds – 5 °C. In very cold climatic conditions it should therefore be ensured that the connected heater heats the controller as well. If a permanent operating temperature of more than – 12 °C cannot be guaranteed, the controller must be heated separately.

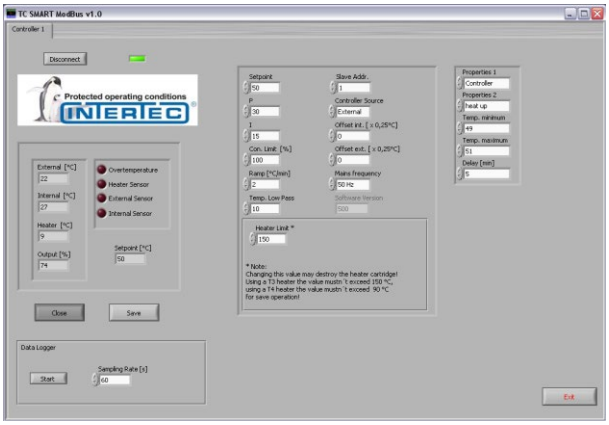
9 Test and Adjustment Software

The "SMART HEATER Software Set“ consists of:

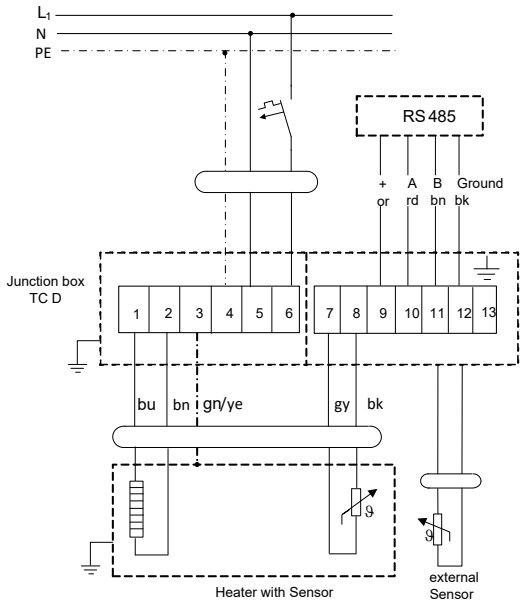
- Interface converter USB to RS485
- CD-ROM with software.

With your PC or laptop, the actual states and values of the TC D can be shown and some parameters be changed:
Up to 31 TC D controllers can be connected to the RS485 interface. All controllers can be operated and monitored from a PC.





10 Electric wiring



bu= blue bn= brown gy= grey gn/ye= green/yellow or= orange rd= red

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