


TRB - PaxS

Temperature controller - limiter - faultreporting unit



Identification	 II 2G [Ex ib] IIC II 2D [Ex ib] IIIC
Level functional safety	SIL 1
EU- type examination certificate	PTZ 16 ATEX 0027
2 Pt -100 inputs	Three wire technology
Analog output	4-20 mA
Ambient temperature range	0°C - 40°C
Rated current	45 mA
Rated voltage	230 V
Controller	0°C - 400°C
Limiter	0°C - 500°C
Protection degree	IP20 (AG 12 o. 14)
Type of construction	19" Euroboard 3HE/ 14TE or 12TE

Safety temperature limiter

Limiter circuit according to SIL. Designed for the operation of intrinsically safe Pt100 sensors. The operating facility is installed in the safe area. The signalling lines lead into the hazardous area. Comfortable compact unit for temperature control and -monitoring of electrically heated pipelines, containers, tanks, apparatus. For the installation in control rooms and switching rooms.

The TRB-PaxS is used to control and limit thermal processes, in which the most common application area is tracing. This is available with different temperature ranges, which can be up to 500°C. The TRB-PaxS is provided for the use in switch cabinets. The compact electronic Controller-/Limiter unit TRB-PaxS is executed as standard – 19" –card. Optionally a mounting cabinet is available.

Controller with digital display	TRB - P ... axS
Controller without digital display	TRB - PO ... axS

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Warning

The Installation, configuration and commissioning may only be carried out by accordingly trained persons. The on-site installation and safety regulations must be observed.



Proviso

We reserve the right to make technical changes. Changes, aberrations and printing errors do not establish any claim for damage. For safety components and -systems the relevant standards and regulations must be observed as well as the according operating- and mounting instructions.



Installation notes

Possible dangers of ignition, which result from the circuit to be operated and its mounting situation, can only be monitored and secured by this device insofar that the sensors to be connected are evaluated safely. As their attachment and the associated correct acquisition of the safety related important thermal situations of the device represent independent factors, a final safety related assessment of a heating circuit can not result from the EU-type examination certificate of this device. For this purpose also see the notes of the EN 60079-30-1 and EN 60079-30-2. Before the device is taken into operation, the installations must be checked without the equipment. An interchange of connections can lead to the immediate destruction of the unit. Please note the additional mounting instructions on page 9 point 10.

Maintenance

The user has to test the safety function (switching off of the relay contact when exceeding the set limit temperature) in cyclic intervals. The test cycle results from the regulation of the EN 61508 and must be conducted every 5 years.



Notes on installation and operation

For the installation / operation the EN 60079-14 or EN 61241-14 and the respectively applicable installation regulations as well as the generally recognized rules of technology and these operating instructions prevail. Only with the compliance of this and the relevant standards the EC-type examination certificate is valid.

The voltages applied on the multiway connector 2 must be galvanically separated and potential-free, according to the EN 60079-11 or the EN 61241-11.

Alternatively a suitable Ex-i-barrier for the current measuring inputs as well as the current control input can be used.

The safety relevant data of the circuit to be connected must correspond with the technical data or respectively the specifications of the EU-type examination certificate.

The trimmers on the unit serve for the alignment and may not be changed. Otherwist the validity and the warranty of the EC-type examination certificate void.

Repair

Repairs may only be carried out by the manufacturer. Changes, which modify the design of the equipment, result in the void of the validity of the certificate and any warranty claim.

In the case of service the device must be sent back to us.

Read through these operating instructions before you take the equipment into operation. Keep the operating instructions at a place accessible for all users at any time.

Please support us to improve these operating instructions.

We are grateful for your suggestions.

Please contact us for technical queries!

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1.0 DESCRIPTION

Characteristics

- 2 intrinsically safe measuring sensor inputs [Ex ib] IIC
- Certified STL (SIL 1)
- Precise control
- Clear display
- Parameterization easily understandable
- Easy installation
- Remote switch connection for intrinsically safe circuits [Ex ib] IIC
- Analog output for intrinsically safe circuits [Ex ib] IIC
- Standstill monitoring



The TRB-PaxS makes two intrinsically safe Pt100 inputs in 3- wire system available, on which appropriate temperature sensors in the hazardous area can be operated. The measuring sensor inputs are separately designed for controller and limiter and independent. We supply appropriate, certified Pt100 measuring sensors in two basic versions.

Type Ex TF Pt100L as contact sensor with minimum dimensions of 7,4 cm x 2,1 cm x 2,1 cm. Fully encapsulated in an aluminium cabinet with a measuring temperature of up to 200°C.

Type Ex TF Pt100Ks with a measuring sensor tip 5 mm and a length 23 cm. Fully encapsulated in an aluminium cabinet, a stainless steel measuring sensor tip and a measuring temperature of up to 400°C.

Both measuring sensors are particularly safe of interfering voltage. For more information see the product literature Pt-100Ks or Pt-100L.

The unit is fully configurable on site. The complete overview of the operating condition and all functions can be read directly on the frontpanel. The TRB-PaxS consists of a temperature controller and an according to the regulation 2014/34/EU certified safety temperature limiter (STL) with assessment of the functional safety to SIL 1. It provides the user when monitoring thermal processes with a maximum of safety and reliability.

Controlling

The control unit is designed as 2-point regulator and records the temperature via an intrinsically safe PT- 100- sensor in 3- wire system, which is directly connected to the rack (optionally) of the TRB-PaxS. Depending on the temperature at the measuring sensor and the value set as target value, the (intrinsically safe) relay switches at the output of the controller. The target value is set analogue by means of a push button on the front side on a scale and secured with a lock against unintentional adjustment. The true value is shown on a 3 1/2 - digit LED- Display.

Monitoring

A variety of parameters is monitored, such as:

- Temperature and temperature underflow
- Limiter alarm
- Sensor break / - short circuit
- Power failure and heating resistor break (optionally).

To ensure the operating safety the TRB-PaxS has three special functions:

Periodically shut off heating circuits are checked regularly (standstill monitoring)
With the infinitely variable under temperature- monitoring a lapse of the process temperature under the predetermined setpoint can be recorded so early, that the interference possibly can be corrected before the occurrence of a damage.
Overtemperature control with inevitable shutdown of the heating and manual reclosing of the limiter.

Overtemperature – restriction (SIL)

The registration of the limit temperature takes place via an intrinsically safe Pt-100 sensor in 3-wire system, which is connected to the rack (optionally) of the equipment.

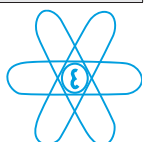
To ensure that the temperature is measured at the warmest point, the sensor must be installed at the correct reference point. If the admissible temperature limit is exceeded or an error occurs (sensor break, -short circuit) within the admissible temperature range, the built-in relay switches the system without delay in a reliable condition. The shutdown will remain active until a manual release is effected by the reset button on the front page of the TRB-PaxS.

At a power failure, without triggering the alarm contact, an automatic release occurs when power returns.

The analog setpoint adjuster for the overtemperature limit is placed on the front. An unintentional or unauthorized adjustment of the limit value is prevented by a sealable transparent cover.

2.0 TECHNICAL DATA

Ambient temperature	0 °C to +40 °C	
Dimensions	19"-europe map 100x160 mm according to DIN 41494	
Type of construction Front panel (Aluminium) (1 TE = 5,08 mm)	Width 12 TE	ca. 61 mm without digital display
	Width 14 TE	ca. 71 mm with digital display
	Height 3 HE	129 mm
	Length	176 mm (with front panel and plug board)
Electrical connection	32-pole multiway connector according to DIN 41612, construction type F	
	Pin assignment d+z (Standard, plug board 1)	
	32-pole plug board according to DIN 41612, pin assignment d+z (optionally, multiway connector 2)	
Cabinet type	Alu-mounting cabinet with terminal strips (210 x 190 mm, T x H), IP20 (optional)	
	19"-subrack according to DIN 41494	
Cabinet protection degree	IP20 / EN 60529 (when ordering the mounting cabinet)	
EU-type examination certificate	PTZ 16 ATEX 0027	
Ignition protection type (gas)	II 2G [Ex ib] IIC	
Ignition protection type (dust)	II 2D [Ex ib] IIIC	
Identification	CE 0344	Ex II 2G [Ex ib] IIC II 2D [Ex ib] IIIC



Voltage regulator SRS

The TRB-PaxS can optionally be supplemented by a voltage regulator for the performance or length adaption of heat tracings.

The planning, construction and subsequent expansion of heater circuits is considerably simplified. The voltage regulator is designed as standard – 19" – card. Optionally a mounting cabinet is available. The product literature for the SRS includes further details. See chapter 7.0 (Application example)

2.1 CONTROL CIRCUIT

Measuring range	-40...200°C -40...300°C -40...400°C
Setting ranges / Scales	0...100°C 0...200°C 0...300°C 0...400°C
Setpoint adjustment	Precision potentiometer lockable, angle of rotation 300°
Lightning protection	1500 W/ms
Switching point accuracy	≤ 1 %
Switching hysteresis	≤ 1 % of the full scale value
Ambient temperature influence	≤ 0,02 % pro K
Linearization error	≤ 0,1 %
Connection lead measurement error	1 K in line 3 x 1,5 mm ² , length 1,0 km
Measuring circuit monitoring	
Conductor break	≥ 200 Ω (depends on the measuring range*)
Line terminal	≤ 50 Ω

* For measuring ranges above 200°C the conductor break is 10 % over the end of the measuring range

2.2 LIMITER CIRCUIT

Setting ranges / Scales	0...200°C 0...300°C 0...400°C 0...500°C
Setpoint adjustment	Precision potentiometer lockable, angle of rotation 300°
Lightning protection	1500 W/ms
Switching point accuracy	≤ 1 %, reproducible 0,2 %
Switching hysteresis	≤ 2 % of the full scale value
Ambient temperature influence	≤ 0,02 % per K
Linearization error	≤ 0,1 %
Connection lead measurement error	1 K in line 3 x 1,5 mm ² , length 1,0 km
Measuring circuit monitoring	
Conductor break	≥ 200 Ω (depends on the measuring range*)
Line terminal	≤ 50 Ω
Keyboard	b2 behind the front panel

* For measuring ranges above 300°C the conductor break is 10 % over the end of the measuring range

2.3 MIN. - MONITORING (INSUFFICIENT TEMPERATURE)

Power failure, conductor break or disconnected machines are not always recorded by the usual protective devices, such as fuses and earth leakage circuit breakers. With the min.-monitoring a decrease of the temperature under a predetermined setpoint can be recorded in time, so that the error can be corrected, if necessary, before a damage occurs. The setting of the temperature switch point is carried out at the min.-scale using a screwdriver. If the undertemperature report responds, the fault relay d3

falls at rest (alarm setting). Additionally the LED's „Min“ and „error“ indicate the alarm condition (see chapter 4.1).

The temperature range is identical with that of the control circuit. To avoid triggering the min.-alarm when starting the heating, the min.-monitoring can be put out of business individually with the control key b2 (see chapter 4.2). For external shutdown of the heating using a remote switch the min.-monitoring is necessarily bridged. (see chapter 2.4).

Further technical data:

Setting ranges / Scales	0...100/ 200/ 300/ 400°C
Setpoint adjustment	Precision potentiometer; with screwdriver; angle of rotation 300°
Switching point accuracy	≤ 1 %, reproducible 0,2 %
Switching hysteresis	≤ 2 % of the full scale value

2.4 REMOTE CONTROL SWITCH CONNECTION

Via the remote control switch connection all controller combinations can be switched on and off externally. This is for example an advantage, if a procut pump fails and a stoppage radiator shall be switched on automatically. If the remote switch loop is closed, the heating is interrupted, if the contact is open it is switched on or depending on the setting of the control buttons in the front panel. At external shutdown of the heating the min.-monitoring will be forcibly taken out of service in order to avoid a response of the fault signal. The triggering may only be carried out through suitable, intrinsically safe circuits, according to the electrical data or the indications in the EC-type examination certificate.

2.5 ANALOG OUTPUT (I) 4 – 20 mA

All control cards have a linearized, temperature analogue current output of 4 bis 20 mA according to the indication range (e.g. 0 to +200 °C), when required also from 0 to 20 mA (e.g. -40°C to +200°C). At the output a temperature indicator, a temperature recorder or similar can be connected. If the 4-20 mA output remains open, this has no influence on the controller.

2.6 AUTOMATIC RECLOSING AFTER POWER FAILURE 10-20 SEC

Upon supply voltage failure all previous functions switch on again automatically 10 - 20 seconds after power is restored, if the limiter is not blocked by an over temperature trip. This saves the maintenance personnel from reclosing (limiter resetting) each controller by hand.

2.7 ERROR MESSAGE AT POWER FAILURE

When tapping the controller supply after the machine and / or the fault current protection switch, a contact of the fault relay d3 can be used for the network monitoring.. This method makes an additional auxiliary contact on the machine an or RCD superfluous. and simplifies the circuit complexity. Relais d3 is established in quiescent current circuit and is at rest during power failure. Please note the electrical characteristics of the relay.

2.8 MONITORING OF PERIODICALLY SHUT-OFF HEATINGS

If a heater is operated only occasionally (space heater) or is shut off after the frost period, disturbances can occur during the time in which the heater is not used that are not noticed until the next commissioning. To ensure a constant and also faster interference fix, our controller units are equipped with an automatic, which switches on the heater in a six hour rythm for about two minutes. Thus an occurred error can be discovered and removed quickly. Requirement for this monitoring is however that both, controller and heating circuit, are kept ready for use. If this function is not required, please specify when ordering.

2.9 FAULT RELAY d3

The fault relay basically responds to every dysfunction (decrease in rest position). It is assembled with two floating changeover contacts. If a collective alarm loop is led over the maker, it can be overridden via the sliding switch b3 with the heating turned off to avoid activating a collective alarm (see chapter 4.3).

2.10 HEATING CONDUCTOR-MONITORING (OPTIONALLY) (only via multiway connector 2 for model TRB - PleaxS)

The heating conductor break monitoring is makes sense at any place where the interruption of a heating conductor does not lead inevitably to the tripping of the isolation or earth leakage monitoring (undercurrent release).

Principle of operation

The heating conductor flow is directed to the controller via 1 to 3 current transformers with a maximum secondary current of 1 A and there it is compared with the firmly adjusted minimum current of 150 mA. We advise to feed in a minimum current of 300 mA. Due to this errors in the measured value aquisition also do not activate malfunction messages, in consequence of very small phase control angle. If the lower threshold value has come below, alarm is activated by the fault relay d3 and the LED „conductor break“ (see chapter 4.0 LED no. 11)
For this purpose also see chapter 4.3 (sliding switch B3 on the printed circuit board) and chapter 4.4 (switch S5). Herewith the interruption of a collective alarm loop can possibly be avoided when switching off individual heating circuits. Please also pay attention to page 1 „notes on installation and operation“.

2.11 EXTERNAL RATED VALUE (OPTIONALLY) (only via power strip 2 for version TRB - PleaxS)

4-20 mA comply with 0...100 % of each sector of the built-in reference value potentiometer. This input is galvanically separated from the remaining circuits. Shifting from internal reference value is carried out by use of switch S5 (see chapter 4.4).

3.0 ELECTRICAL DATA

Supply current circuit		
Power strip 1 Pin 2 d+z, 18z	Rated voltage	230 V \pm 10%, 48-62 Hz
	Rated current	45 mA
Fuse	80 mA time lag	
Examination category	II	

Analog output actual value		
Power strip 1 d20 / d22	For certificated, intrinsically safe circuits Ex ib IIC	
	Rated current	0-20 mA / 4-20 mA
	max. power	122 mA
	max. voltage	15,8 V
	max. output	482 mW
	max. exterior inductivity	2 mH
	max. exterior capacity	510 nF

Remote switch		
Power strip 1, d20 / z20	For certificated, intrinsically safe circuits Ex ib IIC	
	max. power	16,3 mA
	max. voltage	5,4 V
	max. output	75 mW
	max. exterior inductivity	2 mH
	max. exterior capacity	2,32 μ F

Pt 100 input temperature controller		
Power strip 1 d30; d32; z32	For certificated, intrinsically safe circuits Ex ib IIC	
	max. power	31,1 mA
	max. voltage	7,5 V
	max. output	Tube characteristic trapeze-shaped
	max. exterior inductivity	3 mH
	max. exterior capacity	1,125 μ F
	Measuring power	6 mA
	Rated voltage	1,6 V (0,3 V)

Pt 100 input temperature limiter		
Power strip 1 d28; d26; z26	For certificated, intrinsically safe circuits Ex ib IIC	
	max. power	31,1 mA
	max. voltage	7,5 V
	max. output	Tube characteristic trapeze-shaped
	max. exterior inductivity	3 mH
	max. exterior capacity	1,125 μ F
	Measuring power	6 mA
	Rated voltage	1,6 V (0,3 V)

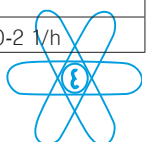
Relay d1 (Controller)		
Power strip 1 d4; z4; z6	1 floating changeover-contact	
	Rated voltage	230 V
	Max. power	5 A (3 A bei $\cos\varphi \geq 0,7$)
	Max. output	100 VA

Relay k1 (Limiter)		
Power strip 1 d8; d6; z8		
	Rated voltage	230 V
	Max. power	5 A (3 A bei $\cos\varphi \geq 0,7$)
	Max. output	100 VA

Relay d3 min.-monitoring and heating conductor break		
Power strip 1 d12; z10; z12 d14; d16; z14		
	Rated voltage	230 V
	Max. power	5 A (3 A bei $\cos\varphi \geq 0,7$)
	Max. output	100 VA

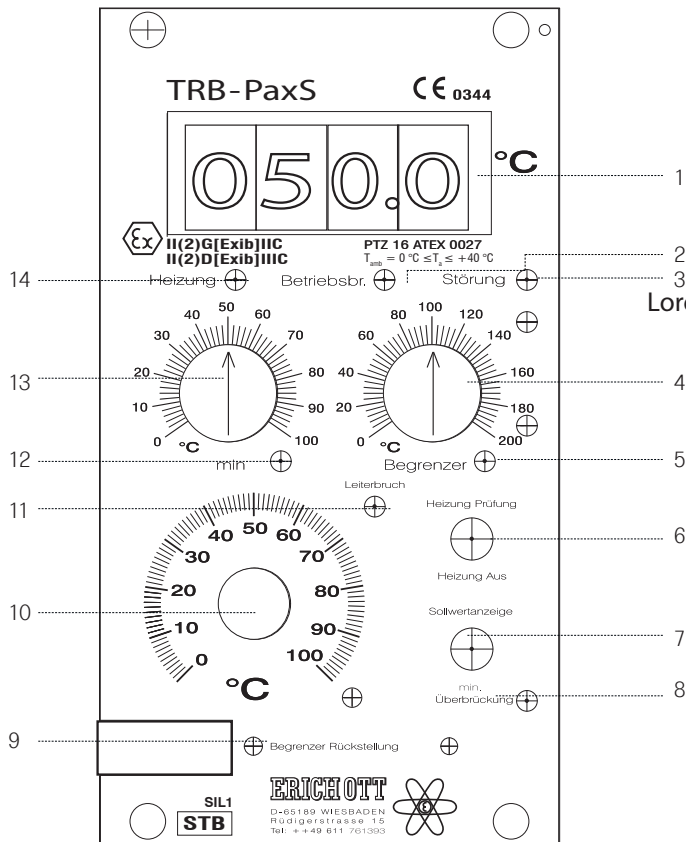
Power strip 2		
Safety low voltage 24 V (Floating input, galvanically separated in line with EN 60079-11. $U_m \leq 28$ V)		
PH1	z22	d22
PH2	z24	d24
PH3	z26	d26
Exterior reference value 4-20 mA 5,5 V (Floating input, galvanically separated according to EN 60079-11)		
+	d32	
-	z32	

SIL 1 Safety integrity Level		
Parameters		
SFF	PFH	PFD
50.36%	7.88 . 10 ⁻⁷ 1/h	1.73 . 10 ⁻² 1/h



4.0 FUNCTIONS ON THE FRONT PANEL

The different operating conditions are displayed by seven (without current monitoring six) electroluminescent diodes in assorted colours.



1	LED Display
2	Display operational conditions
3	Fault indicating display (generally)
4	Threshold value adjuster limiter
5	Display limiter tripping
6	B1 combination switch heating check / OFF
7	B2 switch Min. temperature override
7	Switch reference value display (only TRB-PieaxS)
8	Display Min. temperature override
9	S1 release button limiter
10	Reference value adjuster controller
11	Display heating conductor break (optionally)
12	Display Min. temperature deviation
13	Threshold value adjuster Min. temperatur
14	Display heating ON

4.1 FUNCTION SIGNALING ON THE FRONTPANEL

	Front panel text	LED	Signal meaning
2	Ready for use	green	Limiter energized, no error
14	Heating	yellow	Heating switched on, no error
3+11	Conductor break	red	Heat conductor open-circuited
3+12	Min	red	Min.-temperature undershot
8	Min.-override	red	Min.-monitoring out of order
3	Error	red	Temperature overriding limiter circuit
			Measurement line cut / break in the controller / limiter circuit
			Min.-temperature undershot
3+5	Limiter	red	Heat conductor open circuited (undercurrent signal)
			Temperature overriding in the limiter circuit
			Measurement line cut / break in the limiter circuit
			limiter relay not resetted

NOTE: If all light-emitting diodes have gone out, rather the voltage supply for the controller is interrupted or there is an interior failure in the controller (fuse or other).

4.2 KEY SWITCHES ON THE FRONTPANEL

KEYSWITCH B1

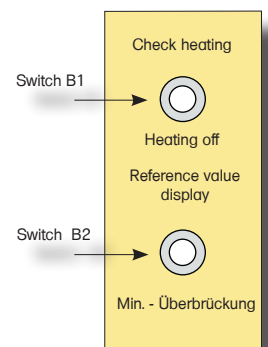
With the upper switch position the heating is switched on by hand for examination (current control). Its advantage is, that a calibrated reference value must not be adjusted for the heating check. At the same time the light-emitting diodes are checked in this position. In the lower switch position the heating is switched off and the min.-monitoring (subnormal temperatur) is adjusted out of order.

KEYSWITCH B2

With the upper switch position changes between the actual value and the reference value indicator on the TRB -PieaxS. The lower switch position makes it possible to individually override the min.-monitoring, for example during the heating-up phase.

Limiter reset S1

The reset of the limiter relay K1 is carried out by use of tools at the switch S1 located behind the frontpanel. Due to this the limiter can be put into operation again after a triggering and the elimination of the cause.

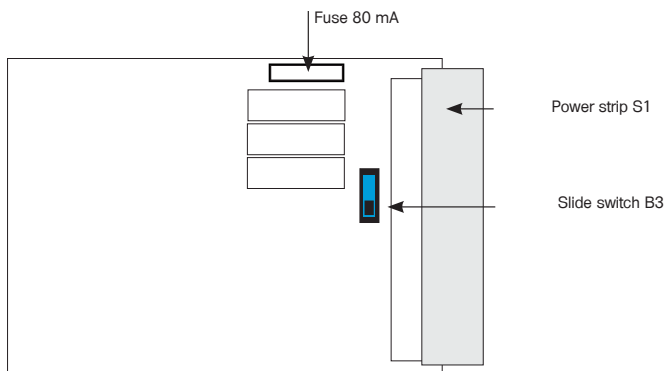


4.3 SLIDE SWITCH B3 ON THE PRINTED CIRCUIT BOARD

With the slide switch on the printed circuit board (close to power strip) an operating contact of the focal fault relay can be shorted-out. Because of this the cut-off of a collective alarm loop is possibly stopped when switching off individual heating circuits.

Illustration of the switch positions (viewed from the power strip):

To the left	The second make contact of d3 is bridged contacts d16; z14
To the right	Make contact open



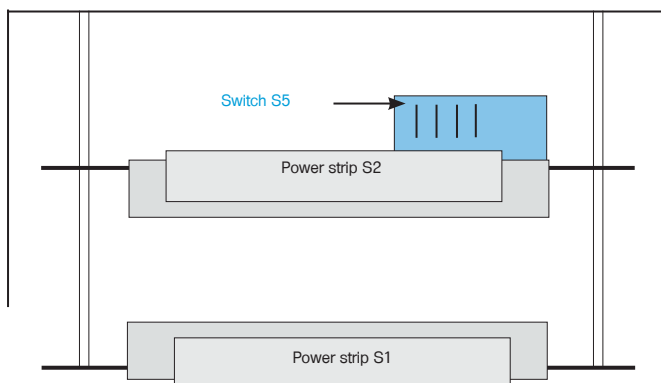
Europe card 19" motherboard

4.4 SWITCH S5 FOR EXTERIOR REFERENCE VALUE INPUT AND CURRENT MONITORING

With the switches S5.1 to S5.3 on the upper circuit-board the individual phases of the current monitoring can be controlled. With the switch S5.4 you can switch between external and internal reference value guide. With the button B2 (see chapter 4.2 key switches on the front panel) the reference value can be switched on the display.

	Current monitoring			Reference value
	S 5.1	S 5.2	S 5.3	S.5.4
OFF	Phase 3 on	Phase 2 on	Phase 1 on	internal
ON	Phase 3 off	Phase 2 off	Phase 1 off	external

Schirmblech



5.1 PRODUCTION NUMBER

On the basis of the consecutive serial number month and year of manufacture can be determined by the interoffice qualification management in the case of repair. Each single device is individually tested and a separate test report is issued. The serial number can be found on the back side of the frontpanel, see chapter 12.0.

5.0 TYPE CODE

TRB - P 1 2 3 4 5 6 7 8

1	-	standard
	O	without display

2	-	standard
	i	current monitoring (not for Sil units)
	ie	external reference value input and current monitoring

3	-	standard
	ax	intrinsically safe PT-100 input

4	-	standard
	S2a	powerstrips compatible with old devices, see table chapter 8 Old devices

5	-	no safety temperature limiter or old device
	S	safety temperature limiter (SIL 1)

6	-	controller temperature range 0 - 100 °C (standard)
	2	controller temperature range 0 - 200 °C
	3	controller temperature range 0 - 300 °C
	4	controller temperature range 0 - 400 °C

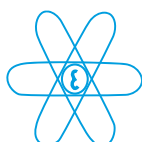
7	-	limiter temperature range 0 - 200 °C (Standard)
	3	limiter temperature range 0 - 300 °C
	4	limiter temperature range 0 - 400 °C
	5	limiter temperature range 0 - 500 °C

8	-	standard
	AG 14	14 TE for devices with display
	AG 12	12 TE for devices without display
	AG x	optional width for 19" cards

Example:

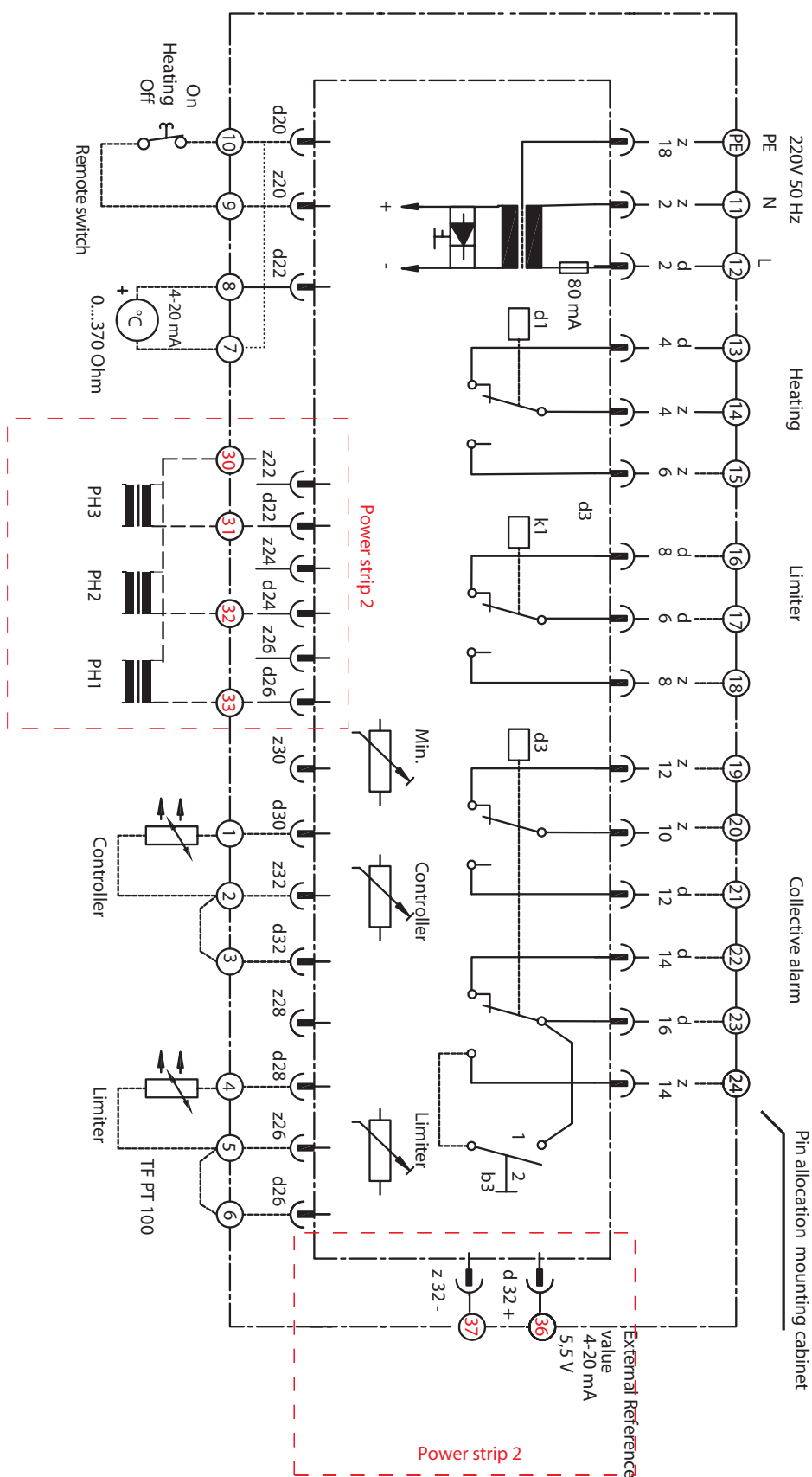
Device with display, without external reference value input, with intrinsically safe Pt100- input, with standard power strip, with safety temperature limiter, temperature range controller 0-200 °C, temperature range limiter 0-300 °C, standard cabinet size:

TRB - P 1 2 ax 4 S 2 3 8



6.0 CONNECTION DIAGRAM

According to type of appliance the power strip 2 is in place. The clamps on the mounting cabinets are build up corresponding to the type of device.
See price list for scope of delivery.

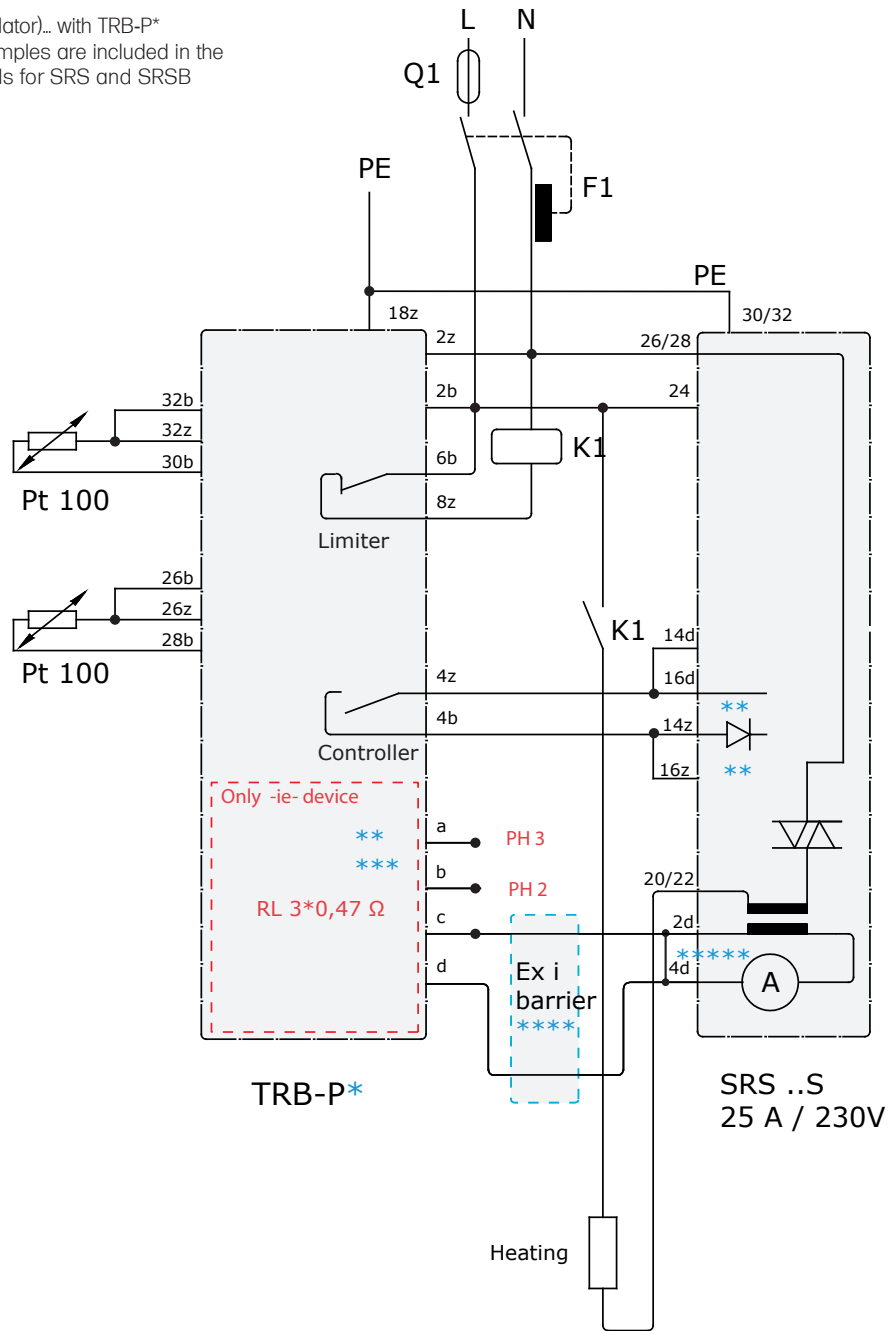


7.0 APPLICATION EXAMPLE

Contact control

SRS (voltage regulator)... with TRB-P*

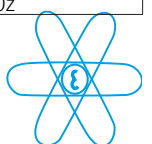
Further wiring examples are included in the operating manuals for SRS and SRSB



* for Ex- design ...d instead of ...b

**

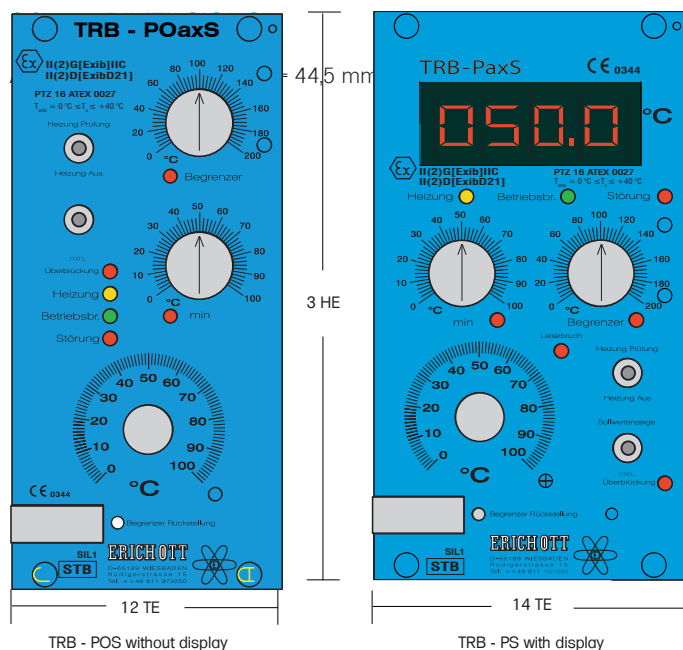
Pin allocation of the current transformer input				
	Power strip 2			Power strip 1
	STB (SIL) BVS 07 ATEX F001	STB (SIL) + [Ex ib] IIC ZELM 03 ATEX 0140	Old units*** [Ex ib] IIC Zelm 03 ATEX 0140	nicht Ex***
a	22b	22d	8d	22z
b	24b	24d	10d	24z
c	26b	26d	12d	24b
d	22z, 24z, 26z	22z, 24z, 26z	8d, 10d, 12d	28z, 30z



8.0 OVERVIEW OF ALL AVAILABLE DEVICES

	Availability	Ignition protection type	Safety temperature limiter (SIL 1)	PT 100 3- conductor with conductor break/ closure	Actual value output controller 4-20 mA	ext. reference value conduct controller 4-20 mA	Current monitoring 1/3 phase	Display	Pin allocation power strip 1	2. power strip	Pin allocation power strip 2
TRB- P	X	nicht Ex		X	X			X	b/z		
TRB - PO	X	nicht Ex		X	X				b/z		
TRB- P S	X	Ex II 2 GD	X	X	X			X	b/z		
TRB- PO S	X	Ex II 2 GD	X	X	X				b/z		
TRB - Pie S	X	Ex II 2 GD	X	X	X	X	X	X	b/z	X	b/z
TRB - POie S	X	Ex II 2 GD	X	X	X	X	X		b/z	X	b/z
TRB- P axS	X	Ex II 2 GD [Ex ib] IIC	X	X	X			X	d/z		
TRB- PO axS	X	Ex II 2 GD [Ex ib] IIC	X	X	X				d/z		
TRB- PieaxS	X	Ex II 2 GD [Ex ib] IIC	X	X	X	X	X	X	d/z	X	d/z
TRB-POieaxS	X	Ex II 2 GD [Ex ib] IIC	X	X	X	X	X		d/z	X	d/z
TRB-Pax	Ersatz	EEx ib IIC		X	X			X	d/z		
TRB-POax	Ersatz	EEx ib IIC		X	X				d/z		
TRB-Piax	Ersatz	EEx ib IIC		X	X		X	X	d/z	X	d/z
TRB-POiax	Ersatz	EEx ib IIC		X	X		X		d/z	X	d/z

*** for 1-phase-operation bridge a-c (Only for TRB- P.. VDE)
 **** only for Ex i units (TRB-P.ax..)
 ***** only for TRB-P.. units without current monitoring



10.0 INSTALLATION

Installation site

The device must be built-in and used so that the safe function is not disturbed by electromagnetic influences. Depending on the installation site it is recommended to effectuate an according lightning protection concept. Recommended is the classification of at least LPZ 2 gemäß EN 62305-4 for the switchboard. The according junctions of the safe areas must be protected through corresponding overvoltage protection devices.

Compound circuits and suppression arrangements

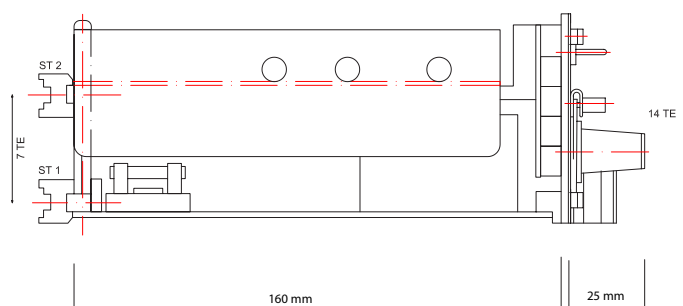
PE-conductor and N-conductor must be led separately from the switchboard. When this compound is dissolved in the switchboard, the insulation value must be $\geq 0,5$ kV and checked.

Reference value adjustments

Set the min.-reference value adjuster as specified by the respective process. The min.-reference value adjuster should nevertheless be set with a value minimum 5 K below the desired temperature of the controller.

Limiter adjustment

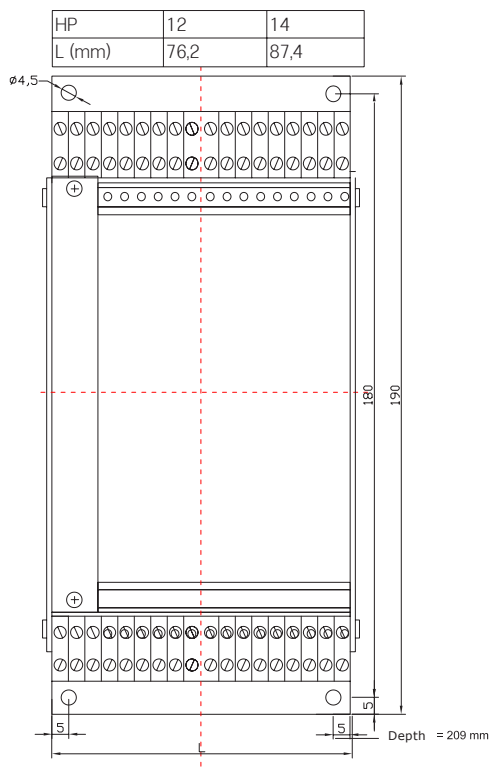
To meet all requirements of the EN 60079-7 the limiter adjustment must be fused by use of the sealing screws on the limiter cover, so that an adjustment during operation can not take place subsequently.



11.0 MOUNTING CABINET FOR 19"-CONTROLLER CARDS

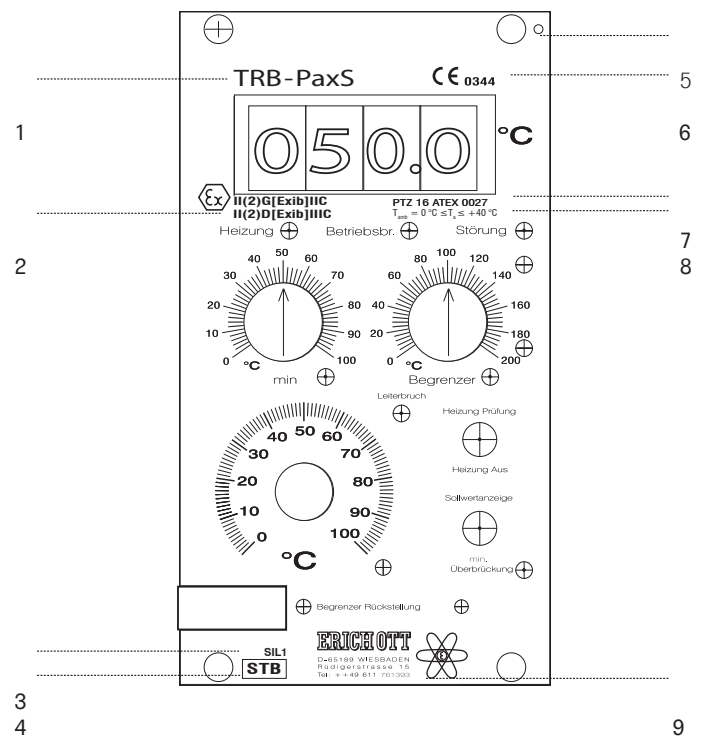
19"-devices are generally stored in an appropriate rack. In cases, in which only individual controllers are installed, the effort for such a collective cabinet is not worth the bother. For this we have developed a special mounting cabinet, which is optimally suited for specifications. It consists basically of 1,5 mm intensive aluminium sheets, which can be varied widthwise optionally. On the baseplate on the top and at the bottom one support rail TS15 is located, individually equipped with small terminal blocks 2,5 mm². The terminals are already attached to the receptacle ex works. For the intrinsically safe connections blue terminals are provided respectively on one side, which are wired with the Ex i-sensor inputs. The mounting of the cabinet is carried out by use of four drilled holes in the baseplate. Two continuous ventilation grills serve as upper and lower casing wall and enable a good heat removal, for example with thermically high loaded thyristor controllers. The cabinet protects all round against contact of voltage-carrying parts. Due to a safety distance of the unloaded side of the card to the cabinet wall the following formula for the fixation of the individual cabinet width results:

Front panel width of the 19"- card + 18 mm = width of the mounting cabinet. The dimensions depth and height (210 mm x 190 mm) do not vary. Please take the terminal connection for our standard controller combinations from the connection plan (see chapter 6), the ordering information

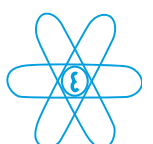


from the selection table (see chapter 5).

12.0 NAMEPLATE



1-	Type code	5-	Back side: Production number
2-	Ex- qualification and ignition protection type	6-	Supervising agency
3-	Functional safety 1	7-	Inspecting authority, EU-type examination certificate
4-	Safety temperature limiter	8-	Supervisory temperature (0-40°C)
		9-	Manufacturer



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