

SRI- Pt 100 D

Voltage and temperature controller with monitoring



Nominal voltage	230/ 400 V
Operating current	0,3 - 16 A (40 A)
Series fuse	16 A
Voltage controller	5 - 230 V / 20 - 400 V
Measuring sensor	Pt - 100 3- Leiter
Amperemeter	3 - 15 A
Temperature measuring range	100/ 200 °C

Voltage and temperature controller	SRI- Pt 100 D
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Voltage controller

Voltage and temperature controller in single core - teflon- heating conductor. For heating cable with a resistance of 0,1 Ω /m variable lengths from 17 to 310 m are possible.

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Warning

The installation, configuration and commissioning may only be carried out by accordingly trained persons. The local installation and safety regulations must be respected.



Reservation

We reserve the right for technical changes. Aberrations and printing errors do not constitute grounds for any claims to damages. For safety components and systems the relevant standards and regulations as well as the according instruction manual and the assembly instructions should be observed.



Repair

Dismantling takes place in reverse order than the installation. A Repair of the device is not possible concerning the switching element. All other repairs may only take place in the factory of the manufacturer. The basic devices (inserted parts without terminal box) are, capillaries excluded, irreparable. These may only be changed in the factory. An intervention is not permitted. Changes, that modify the design of the device, will cause that the validity of the certificate and any claim for damage void.

Read through this operating manual carefully, before you take the device into operation. Keep the operating manual at a place accessible to all users at any time. Please support us to improve this operating manual. We are grateful for your suggestions.

Please contact us for technical queries!
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1.0 DESCRIPTION

Characteristics

Heating circuit installation with minimal device-related expenditure

Low installation costs

Only 1 cable for power supply



This device has been developed in cooperation with a company, to standardize heatings which are installed by means of single-core Teflon heating conductors. Heating cable resistance 0,1 Ω/m. Variable length 17 - 310 m. To be able to cover a large power range, the design was made for 220 V~ and 380 V~. The heating circuit installation is carried out with a minimum of device-related expenditure. Concerning this see chapter 8.1 and 8.2.. To save assembly costs, the control and monitoring unit is designed so that for the temperature sensor and the power supply of the heating circuit only one cable must be laid. The length of the supply line can be up to 1 km. In order to accommodate subsequent modifications of the heating circuit, the heating circuit can be switched from 230 V~ to 400 V~ with little amendments of the wiring. The pin location is identical for all types of controller. The mixing up of the controller between 230 V and 400 V- types can not lead to a failure at the devices.

2.0 FUNCTION GROUPS OF THE CONTROLLER

1.	Temperature measurement with conductor break monitoring
2.	Voltage controller
3.	Min. current monitoring
4.	Max. current monitoring
5.	Limiter monitoring with safety and voltage breakdown monitoring
6.	Electronic evaluation
7.	Signal relay

3.0 INSTALLATION OF THE HEATING CIRCUIT

For the installation of the heating circuit only the following five components and heat conductor loop are necessary:

1.	Automatic circuit breaker
2.	Circuit breaker
3.	Limiter
4.	Temperature sensor
5.	Controller SRI-Pt 100 D

4.0 TECHNICAL DATA

Nominal voltage	230 V (400 V ~)
Operating current	0,3 -16 A (40 A)
Series fuse	16 A semi time-lag
Voltage controller	5 - 220 V ~ (10 - 400 V ~)
Min. current monitoring	~ 0,5 A *
Max. current monitoring	14,1 A (0,1 /m)*
Ampèremeter	3 - 15 A*
Limiter monitoring	100 - 400 V ~, Ri ~100 k Ω
Ambient temperature	0 - 70 °C
Temperature controller	0 - 100 °C (0 -200 °C)
Measuring sensor	Pt- 100, 3- wire switch
Ripple voltage suppressor	0,8 V ~ (2,2 V _{SS})
Max. disturbing pulse strain	600 Ws
Switching hysteresis	≤ 1,5 %
Switching point	+/- 1 %
Switching capacity relay	230 V ~; 3 (2) A

* other values on request

5.0 PRODUCTION NUMBER

With the continuous serial number the in-house quality management can, in case of repair, find out production month and year. Each device is individually tested and a separate test record is provided. The serial number can be found on the back of the front panel.

5.1 TYPE CODE

SRI Pt 100 D 1 2 3 4 5

1	Nominal voltage	
	-	230 V
	3	400 V
	2 P	230 V 2 P

2	Temperature measuring range	
	100	0-100°C
	200	0-200°C

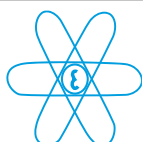
3	max. current limitation	
	-	14,1 A (Standard)
	U	Switchable current monitoring 3,0/6,1/7,6/13,8

4	A	With remote switch ON OFF
	-	Without remote switch ON OFF

5	-	Standard
		Mounting enclosure AG 18-16

Example: Nominal voltage 230 V, Temperature measuring range of 0-100°C, switchable current monitoring, with remote switch, standard version:

SRI Pt 100 D 1 100 U A 5



5.2 RECOMMENDATION ON DEVICES ACCORDING TO THE CIRCUIT DIAGRAM

1.)	Residual current protective switch	Release current: 300 (500) mA
2.)	Temperature sensor:	We supply suitable, certified Pt100 measuring sensors in two basic versions. Both measuring sensors are exceptionally reliable of interference voltage.

Type Ex TF Pt100L as strap-on sensor with minimal 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 sensor tip of 5 mm and a length of 23 cm. Fully encapsulated in an aluminium cabinet, a stainless steel sensor tip and a measuring temperature of up to 400°C.

3.)	Limiters:
Ex TB 120	(only for currents below 10 A)
Ex TRB PS	(also available as Ex-device, and with intrinsically safe Pt-100)
Ex TBK	

Please take further information from the respective product literature. Download on www.erich-ott.de

6.0 MEASURING EQUIPMENT

1. Pt 100

This equipment consists of a filter for the rejection of any alternating voltage for 2,2 V_{SS} and an amplifier with circuit stages. The analysis of the resistance is made by constant current. Due to special switching measures it is guaranteed that, no matter which conductor of the 3-wire switch is disconnected, a monitoring takes place. Because of this it is ensured that measuring line and power supply can be led in only one cable up to 1 km. Three switching stages are available. The first and the third switching stage are fix. The first analyses the conductor short-circuit and the last analyses the conductor break. The switching stage in between compares the adjusted setpoint with the actual value and the heating relay.

2. Voltage regulation

The output voltage at the load is led back via a transformer. A regulating amplifier compares the adjusted setpoint with the actual voltage and regulates it.

3. Min. current monitoring

A current transformer with a rectifier circuit provides a switching stage with a voltage which is proportional with the arithmetic average. The switching stage has a fix setpoint value.. The output signal controls the signal relay.

4. Max. current monitoring

To achieve an effective current value monitoring, including the direct voltage components, which could occur in the case of failure, the load current flows via a shunt. The voltage drop of the shunt is amplified and led to a patented switch, that has a determined setpoint value.

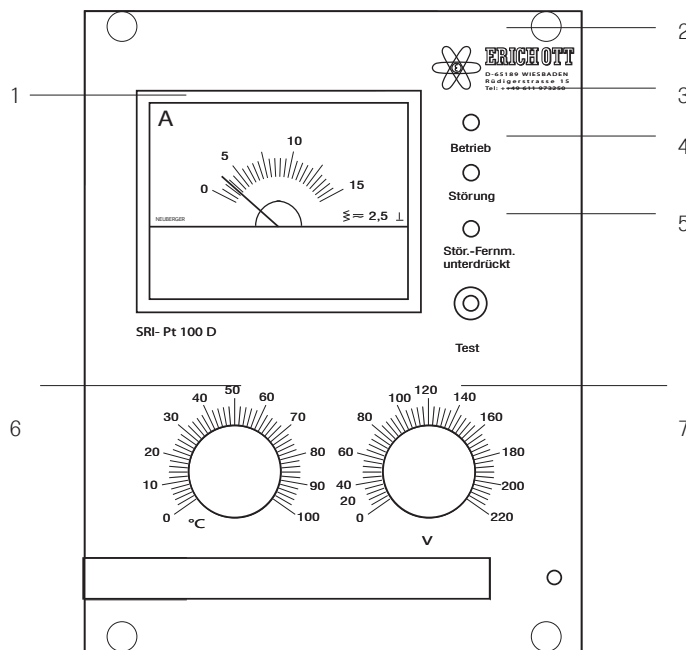
Due to that it is guaranteed that the maximum admissible current for the respective type of cable is monitored (0,1 Ω/m as standard) exactly in all possible cases of failure. (Also a half-cycle).

The output signal is led to a relay. This relay shortcircuits the PE and the phase via a 270 Ω resistor. The fault current that flows through that releases the fault current protective switch. A PTC- resistor prevents an impermissible temperature rise in the case of failure.

5. Limiter

In order that the limiter can be directly switched with the limiter in the load current, the alarm switch for the limiter is designed as potential-free voltage monitoring, that makes the signal available for the control electronics via an optocoupler.. Voltage drop means signifies the alarm state. Hereby automatic fuse monitoring and fault current release as well as possible voltage breakdown monitoring are given at the same time..

7.0 FUNCTIONS ON THE FRONT PANEL



1	Ampèremeter
2	Display operational conditions
3	Failure indication
4	Failure remote alarm suppressed
5	Switch (see chapter 7.2)
6	Temperature
7	Voltage

7.1 FUNCTION SIGNALLINGS ON THE FRONT PANEL

	Front panel text	LED	Signal significance
2	Operation	gelb	Heating current switched on
3	Failure	rot	Failure
4	Failure remote alarm suppression	rot	Switch in switch position "Failure remote alarm suppression"

7.2 SWITCH

a) Switch position "Test":

As many times at heatings the product temperature is above the adjusted setpoint temperature and thereby the heating is switched off latently, can, by using the switch in position "test" the heating be switched on. via the ampèremeter it is controlled, if the respective nominal current flows. At the same time all three LED's light up. This switch setting is tentative..

b) Switch position "remote alarm suppression"

If the heating is taken out of order, the controller is dead in the most cases, that means when making a buzz alarm loop a trouble report is available. (Series connection of all alarm contacts of the controllers). To make sure that no specific measures must be taken to close the alarm loop, the fault signal relay is shortcircuited in this position.

7.3 TEMPERATURE RISE

The refrigeration unit is chosen in a size that the device can be operated with a continuous current of 16 A at an ambient temperature of 60 °C.

7.4 CONTROL AND SIGNAL LOGIC 6

The control- and signal logic monitors if, upon the command "heating on", a current flows. When exceeding the setpoint temperature the Min-monitoring is switched off. In addition the electronic analyses the signals of the conductor break and the conductor end as well as those of the limiter. The relay operates in closed-current position. The control electronics inhibits the cycle times which act during the transient oscillation and swinging of the rectifiers.

8.0 CONNECTION DIAGRAM

Type of device:

SRI-Pt 100 D 2P ..

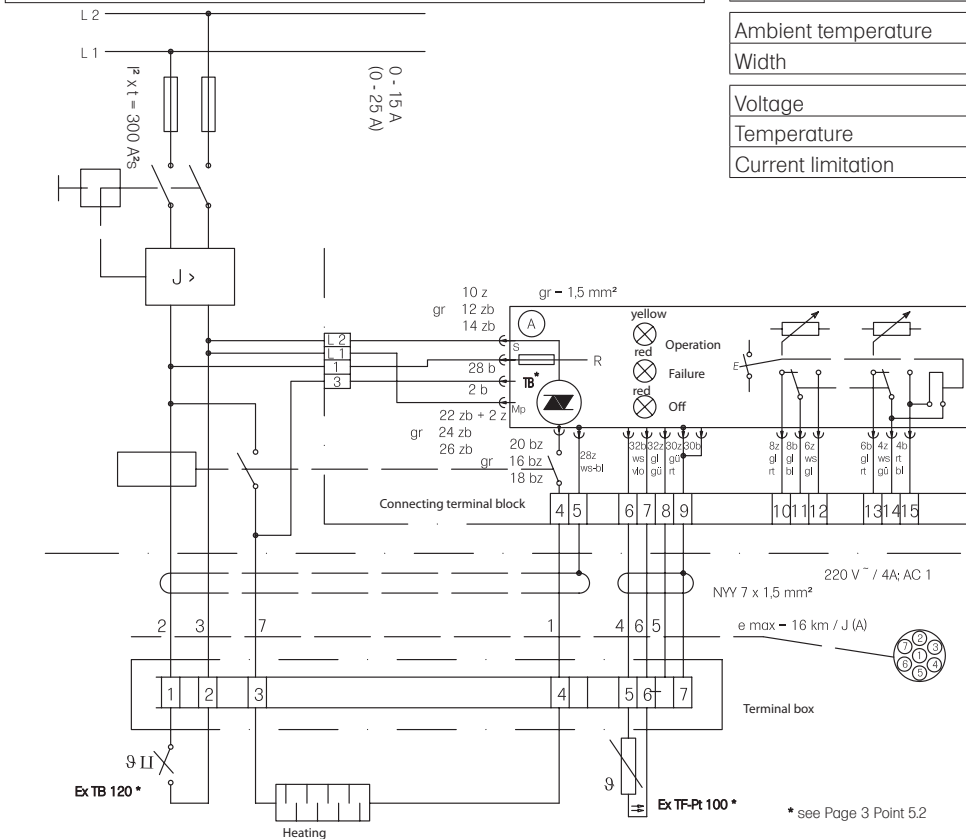
Current limitation generates earth leakage L1 against ground by means of 300 Ω. This must release FI. Check during commissioning.

Fault: Closed current circuit	
1.	TL-shutdown
2.	Heating "on" and current $\leq 0,5$ A
3.	Measurement lead break ($\geq 180 \Omega$)
4.	Measurement lead end ($\leq 50 \Omega$)

Measurement:	
3-wire switch max. 1,5 km (3 x 1,5 mm ²)	

:		
1.	Pt 100	600 Ws
2.	L + X	je 1 Sicherung 0,5 A

Ripple voltage suppression 0,8 V~ at the input of the Pt 100



7.5 EXTERNAL "ON- OFF"

In order that the controllers can also be taken out of order in groups (central thermostat), this input is galvanically separated.

If this equipment is included, the contact signal relay 8z, 8b, 6z is not applicable.

Störung

Switch (tentative):	
1.	Check: Heating "On"
2.	Fault signal only at LED (red)

Out of order (latching):

1.	Pilot lamp red: Off
2.	Terminal 13 + 14 bridged

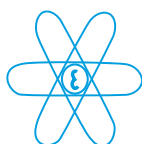
During commissioning by use of oscillograph between 30b and 32b, 32z, 30z. check ripple voltage, max. 2,2 V_{SS} (the larger the ripple voltage, the smaller the switching hysteresis)

Only valid for signal/ noise ratio

Technical data:

Ambient temperature	0 - 70°C
Width	18 TE
Voltage	0 - 380 V
Temperature	0-100°C
Current limitation	14,1A + 5% (for cable 0,1 Ω/m)

* see Page 3 Point 5.2



8.1 DRAWING 607/1 230 V~ 1 PHASES

Type of device:
SRI-Pt 100 D

Fault: Closed current circuit	
1.	TL-shutdown
2.	Heating "On" and current $\leq 0,5$ A
3.	Measurement lead break ($\geq 180 \Omega$)
4.	Measurement lead end ($\leq 50 \Omega$)

Measurement:	
3-wire switch max. 1,5 km	

Protective switch:		
1.	Pt 100	600 Ws
2.	L + X	for each fuse 0,5 A

Ripple voltage suppression 0,8 V~ at the input of the Pt 100

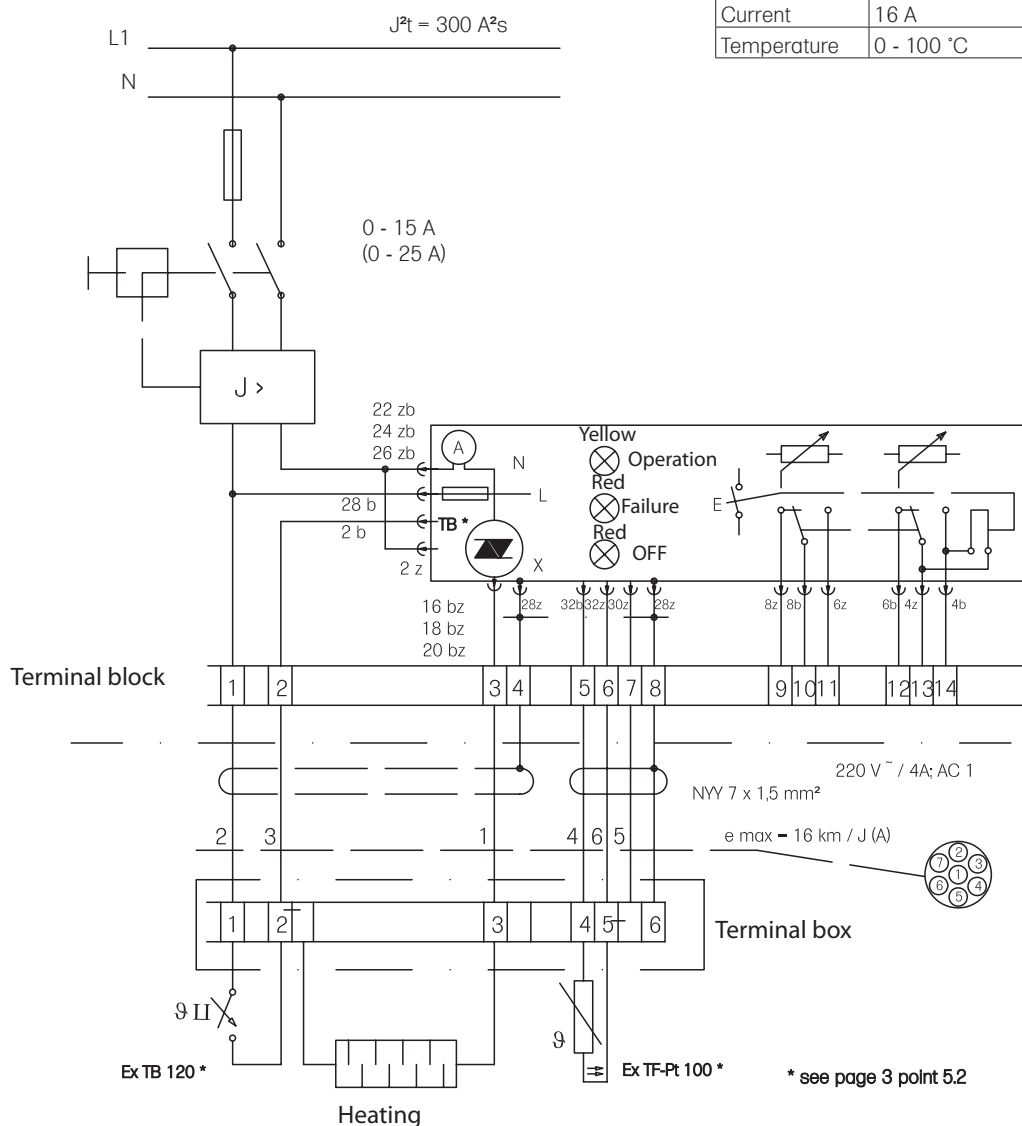
Fault	
Switch (tentative):	
1.	Check: Heating "On"
2.	Fault signal only on LED (red)

Out of order (latching):	
1.	Pilot lamp red: Off
2.	Terminal 13 + 14 bridged

During commissioning by use of oscillograph between 30b and 32b, 32z, 30z. check ripple voltage, max. $2,2 V_{SS}$ (the larger the ripple voltage, the smaller the switching hysteresis)

Only valid for signal/noise ratio

Technical data:	
Ambient temperature	0 - 70°C
Width	18 TE
Voltage	0 - 230 V
Current	16 A
Temperature	0 - 100 °C



* see page 3 point 5.2

8.2 DRAWING 607/2 380 V~

Type of device

SRI-Pt 100 D 3 ..

Fault: Closed current circuit	
1.	TL-shutdown
2.	Heating "On" and current $\leq 0,5$ A
3.	Measurement lead break ($\geq 180 \Omega$)
4.	Measurement lead end ($\leq 50 \Omega$)

Measurement:	
3- wire switch max. 1,5 km (3 x 1,5 mm ²)	

Protective switch:		
1.	Pt 100	600 Ws
2.	L + X	for each fuse 0,5 A

Ripple voltage suppression 0,8 V~ at the input of the Pt 100

Fault:	
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Switch (tentative):	
1.	Check: Heating "On"
2.	Fault message only on LED (red)

Out of order (latching):	
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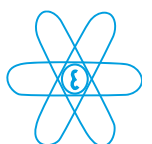
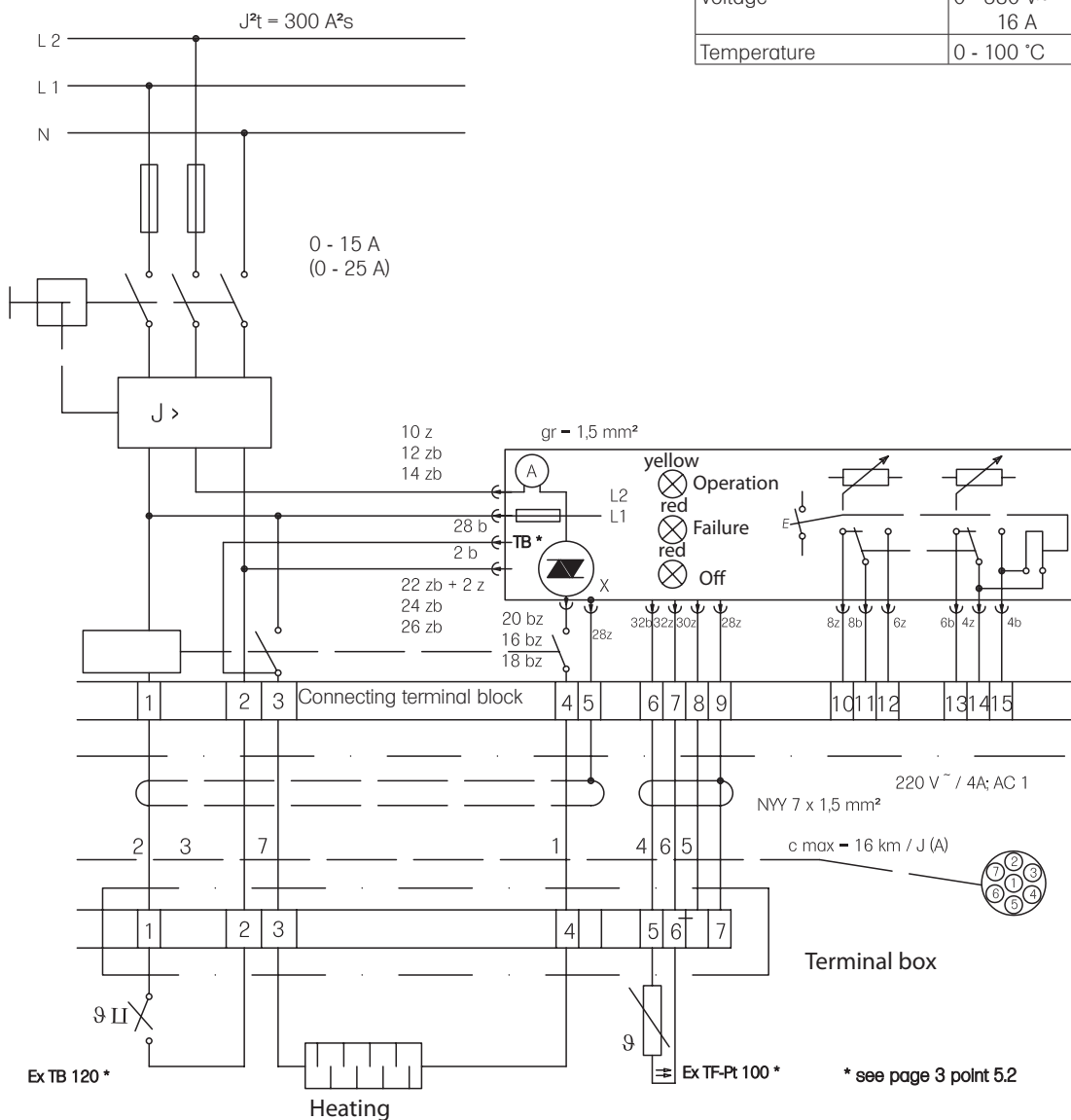
1.	Pilot lamp red: Off
2.	Terminal 13 + 14 bridged

During commissioning by use of oscillograph between 30b and 32b, 32z, 30z. check ripple voltage, max. $2,2 V_{SS}$ (jthe larger the ripple voltage, the smaller the switching hysteresis)
Only valid for signal/noise ratio

Technical data:	
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Ambient temperature	0 - 70°C
Width	18 TE

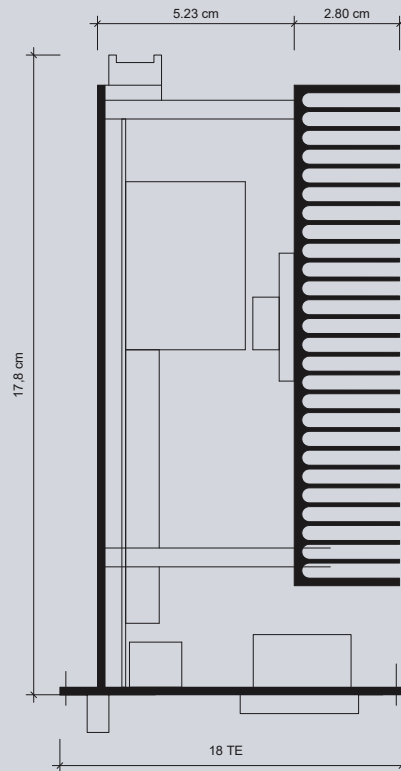
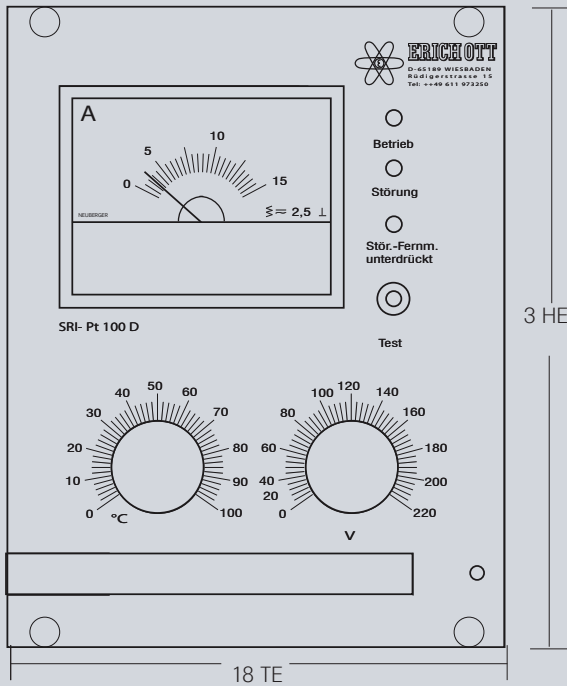
Voltage	0 - 380 V~ 16 A
Temperature	0 - 100 °C





9.0 DIMENSIONS

Euro board	100 x 160
Width of controller	18 TE
Male multipoint connector	according to DIN 41612, design F, 32- pole b, z



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