ERICH OTT

EX HS STB

Top-hat rail safety temperature limiter

Identification	Ex II (2) GD
Level functional safety	**SIL 2**
EUC-type examination certificate	**TÜV13ATEX124201**
1 Pt -100 input	**Three wire technology (Ex E)**
Ambient temperature range	**0°C - 40°C**
Nominal current	**20 mA**
Nominal voltage	**230 V**
Limiter	**0°C - 500°C**
Degree of protection	**IP20**
Design	**Top-hat rail TS 35 4 TE**

Brief description

The product series HS .. defines top-hat rail devices for the safe temperature limitation according to EG 94/9 .
Compact unit for the temperature monitoring and limitation of electrically heated pipelines, containers, tanks, instruments in zone 1. For the installation in measurement consoles and switch rooms on top-hat rail..

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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 complied with.

Proviso

We reserve the right to make technical changes. Modifications, errors and printing errors do not justify any claim for damages. For safety components and systems the appropriate standards and regulations must be observed, as well as the corresponding operation and installation instructions.

Installation instructions

Possible ignition hazards, which result from the heating circuit to be operated and its installation situation, can only be monitored and protected insofar by the available equipment as the sensors to be connected are evaluated properly. As their mounting and the involved correct acquisition of the safety relevant important thermal situations of the device represent independent factors, a concluding assessment of a heating circuit can not be made by the EU-type examination certification of this device. Please also consult the instructions of the EN 60079-30-1 and EN 60079-30-2. The trip limit value should be set so that a temperature follow-up does not lead to the exceeding of the permitted limiting value.

Before the device is taken into operatiion, the installation must be checked without device. An interchange of connections can lead to immediate destruction of the device.
Please pay attention to the further installtion instructions on page 6, point 9.

Maintenance

The operator must check the safety function (shutdown of the relay contact at exceedance of the set limit temperature) at cyclic intervalls. The test cycle results from the regulation of the EN 61508 and must be carried out every three years or alternatively every year. See also point 3.O.

Repair

Repairs may only be carried out be the manufacturer. Modifications, which change the construction of the device lead to the fact that the validity of the certificate and any warranty claim void.

Read this operating manual carefully before you take the device into operation. Keep the operating instructions 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

- Certified STB (SIL2)
- Easy installation on the top-hat rail
- Clear display
- Parameterization easy to understand
- Analog output
- 1 x PT 100 sensor input
- Remote off
- EMC protection
- Illuminated display

The Ex HS STB is approved as control unit for the Ex zones I and II according to 2014/34/EU as certified limiter. The limiter is additionally also certified as safety temperature limiter with SIL 2 according to guideline EN 61508:2001 (functional safety).
The limiter corresponds to the EMC requirements (electromagnetic compatibility) according to EN 61326-1 and EN 61326-3-1.

The limiter provides the user with a maximum of safety and releability during the monitoring of thermal processes.
The control unit disposes of a Pt-100 sensor input and is fully configurable on-site.
The complete view of the operating condition and all functions are immediately visible on the three lined backlit display.
The control unit is designed as single-channel limiter and measures the temperature via a Pt-100 sensor, which is directly connected to the device, in three wire technology. In dependance of the temperature at the sensor and the value set as setpoint value, the relay switches the output of the limiter redundantly.

We supply suitable certified Pt100 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 sensor tip 5 mm and a lenght of 23 cm. Fully encapsulated in an aluminium cabinet, a stainless steel sensor tip and a measuring temperature of up to 400°C.

The sensors are highly safe of interference voltage.
Please take further details from the product literature Pt-100Ks or Pt-100L.

Monitoring

At power failure the limiter relay drops down or rather in rest position. (Open position)
Measuring circuit short circuit and sensor break are detected.

Heating circuit construction

If you want to assemble a heating circuit for the Ex area in top-hat rail installation, we can recommend our controllers and voltage adjusters. A functional schematic can be found under point 9.1. Control units are not necessary for the safe operation of devices or protective systems or contribute to it and they do not come under the view according to 2014/34/EU as the guideline only covers the related equipment, see article 1 (2) of the guideline 2014/34/EU.

2.0 GENERAL TECHNICAL DATA

Setting range	0 °C to + 500 °C	
Temperature measuring range	-50 °C to + 500 °C	
Ambient temperature range	0 °C to + 40 °C	
Nominal voltage	230 V / alternatively 24 V/ 48 V	
Degree of protection	IP 20 / EN 60529	
Dimensions		
Length	71,5 mm	
Width	42,5 mm	
Height	68 mm	
Type		
Plastic housing for top-hat rail TS 35	4 TE	3 lines LCD display
Electrical connection	Terminal strip in raster 5,08	
	Conductor cross-section up to 2,5 mm	
Certificates		
Level functional safety	SIL 2	
EU-type examination certificate	TÜV13ATEX124201	
Identification	CE 0344	Ex II (2) GD

2.3 TECHNICAL DATA LIMITER SIL 2

Measuring range	-50…500°C
Setting ranges / scales	0…500°C
Setpoint adjustment	10 gear offset trimmer behind the front panel
Limiter resetting	Pushbutton behind the front panel
ESD protection	according to DIN EN 61340-5-1
Measuring accuracy	0,2°C or rather 1 digit
Switching point accuracy	1 °C
Switching hysteresis	< 2 K
Ambient temperature influence	≤ 0,02 % per K
Supply line measuring error	1 K for cable 3 x 1,5 mm², length 1,0 km
Releasing time	30 ms
Fault tolerance	30 ms
Measuring circuit monitoring	
Cable breakage	≥ 300 Ω
Open-circuit	-50°C = 80 Ω

3.0 ELECTRICAL DATA 230 V MODULE

Power supply circuit	
Nominal voltage	230 V ± 15%, 48-62 Hz
Nominal current	20 mA
Fuse	80 mA (1A for switching power supply version)
Protection class	II

PT-100 input	
1 PT 100 input	Three wire technology
max. Strom	4,6 mA
max. Spannung	5 V
max. Leistung	5,7 mW
Messstrom	1 mA

Limiter relay	
1 potential-free maker	
Nominal voltage	230 V
max. current	10 A

Fail safe relay	
1 potential-free maker	
Nominal voltage	230 V
max. current	3 A

Safety integrity level limiter SIL 2 (test-cycle 3 years)	
Parameter	
PFH	4,35 E-07
PFD	5,08 E-03

Safety integrity Level Begrenzer SIL 2 (Testzyklus 1 Jahr)	
Parameters	
PFH	3,37E-07
PFD	1,41E-03

4.0 LIMITER EXCESS TEMPERATURE

The limit value adjuster is located behind the front panel and can be adjusted by use of a screwdriver.
After having adjusted the limiter setpoint, it must be secured against unaufhorized adjusting. This is carried out by using a sealing which is included in the scope of delivery. The released limiter can be resetted by using a proper tool for the pushbutton situated behind the frontpanel.

(Information: The shutdown limit value must be adjusted so that a temperature overrun does not leat to an exceeding of the permissible limit value.

4.1 AUTOMATICAL RECONNECTION AFTER POWER FAILURE 5 SEC.

At power supply failure all previous function switch on again automatically after voltage return, if the limiter is not blocked by an overtemperature release. This saves the maintenance personnel from the swit´ching on each single limiter by hand (limiter resetting).

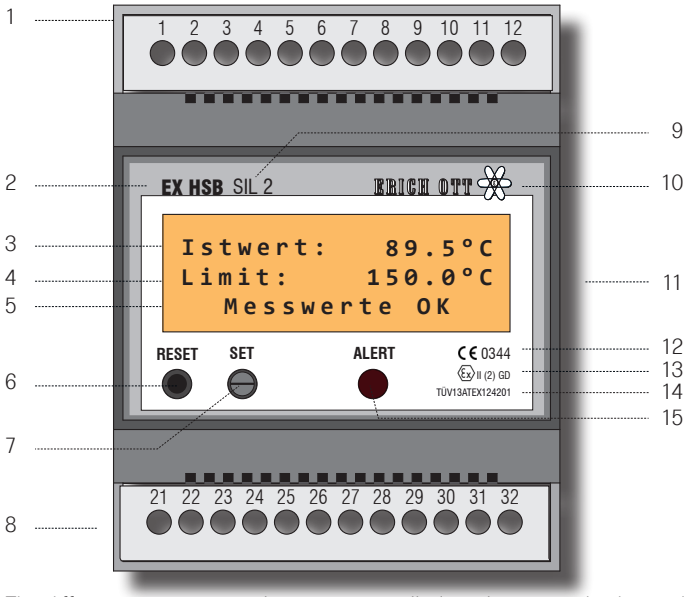
4.2 FAULT REPORT AFTER POWER FAILURE

The relay is built up in closed current circuit and falls in rest position at power failure. The electrical data of the relay must be observed. The fail safe relay responds in general to any dysfunction (drop in rest position). It is equipped with a potential-free maker.

4.3 REMOTE SWITCH CONNECTION

By activating the remote switch contact the limiter is switched into a safe condition. That means, the limiter and fail safe reley drops down. The limiter thus out of service. After release of the device it functions just like after voltage return. This means that the system is in operating status, when the limiter switches on again. This function serves for maintenance purposes, such as steam cleaning of pipes. The reclosing is time-lagged.

5.0 FRONT PANEL



The different operating conditions are signalled via the status display and the fault signal light.

1	12 screw terminal blocks (upper connection)
2	Type designation
3	Set value
4	Actual value
5	Status display with plain text message
6	Reset button behind the front panel (resetting by ujse of tool)
7	Set (10 gear jackscrew potentiometer)
8	12 screw terminal blocks (lower connection)
9	Performance level (only HS STB)
10	Manufacturer
11	Serial number (side part)
12	Test number (supervising institute DEKRA)
13	Ex labelling and type of ignition protection
14	Inspecting authority EU-type examination certificate
15	Error alarm LED red

Limiter adjustment

Adjustment of the limiter setpoint temperature by use of a scewdriver at the front panel (SET) Pos. 7.
Resetting of the limiter by pushing the RESET button behind the front panel (RESET) Pos. 6

5.1 SIGNALLING DURING COMISSIONING

Start up screen

2-seconds period:	
Line 1	Erich Ott
Line 2	65189 Wiesbaden
Line 3	+49 611 761393

then

2-seconds period:	
Line 1	Limiter SIL2
Line 2	PT100 - analog
Line 3	version x.xx

The first 10 seconds after power up of the device the software is blocked. This is indicated via the display „PWR UP„ in line 3. Not until then the actual and setpoint values are indicated.

5.2 SIGNALLING IN THE CASE OF FAILURE

Digital display

Limiter released		
Line 3	Beg. ausgeloest	Limiter is released
Line 3	Reset moeglich	a released limiter can be resetted
Line 3	Fern Aus	active at remote off
Line 3	Fuehler Fehler!	at short circuit or interruption of the sensor line or rather not within the measuring ranges

Device error	
Line 1	Internal error
Line 2	Please send in
Line 3	ERROR CODES

Red LED

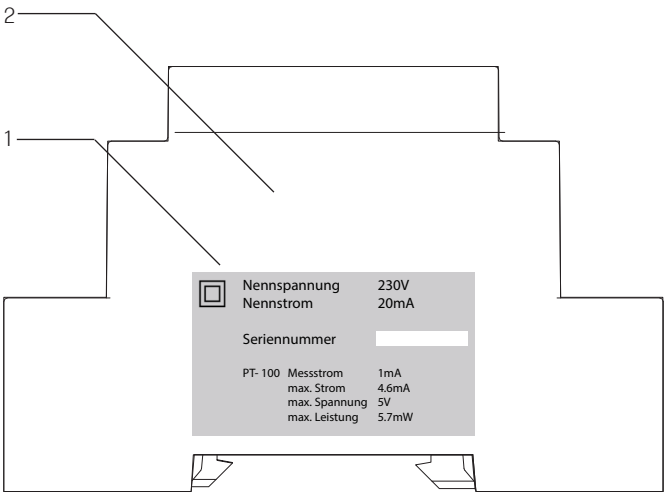
Signalling (ALERT) pos.15:		
Permanent lighting red LED	Failure signal / limiter released	
Blinking red LED	Limiter resetting possible	

(At device errors in line 3 of the digital display (pos. 5) a failure signal is superimposed. Please document this.)

6.0 SERIAL NUMBER

1 The serial number can be found on the lateral surface of the device

2 The manufacturing date is readable by means of the inspection plate.



Each unit is routine-tested and a seperate inspection record is prepared.

6.1 TYPE CODE

EX HS STB | 1 | | 2 | | 3 |

1	-	Standard
	FA	Remote off (Remote switch)
2	Voltage	
	-	230 V AC (Standard version with transformer)
	S 230V	230 V (Version switching power supply)
	S 24V	24 V DC (Version switching power supply)
	S 48V	48 V DC (Version switching power supply)
3	Display	
	-	Back-lit display Colour: amber (standard)
	D	No display illumination - highly reflective display - (Minimum self-heating optimal in combination with switching power supply)

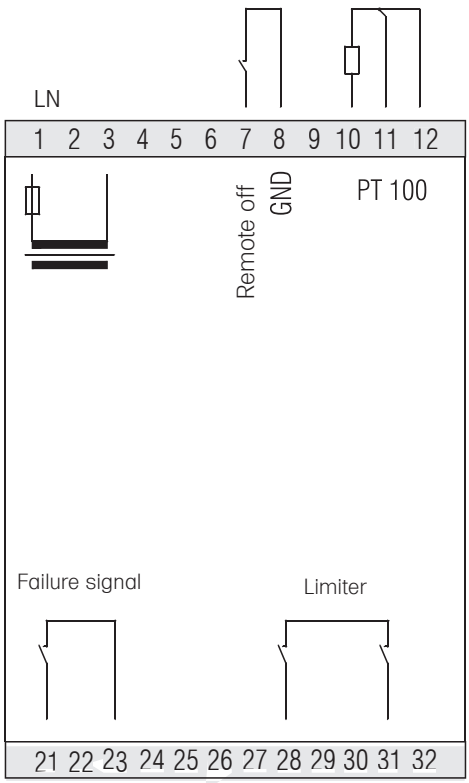
Versions with switching power supply should be preferred at unfavorable installation situations.

Example:
Standard limiter with remote off monitoring

EX HS STB | FA | | 1 |

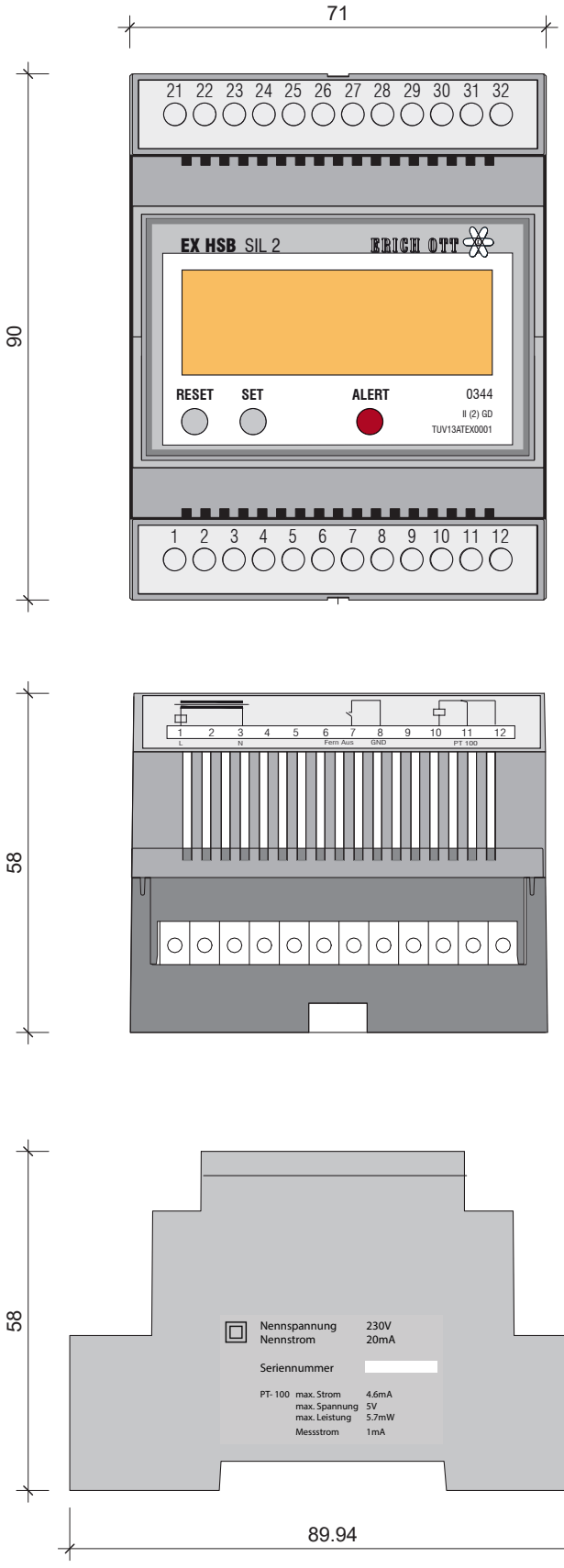
7.0 CONNECTION DIAGRAM LIMITER

Remote off optionally available.



8.0 DIMENSIONS

Dimensions (nominal)



9.0 INSTALLATION

Pt100 connection
The PT100 must be connected in 3-wire technology, to achieve the indicated safety, tolerance included.

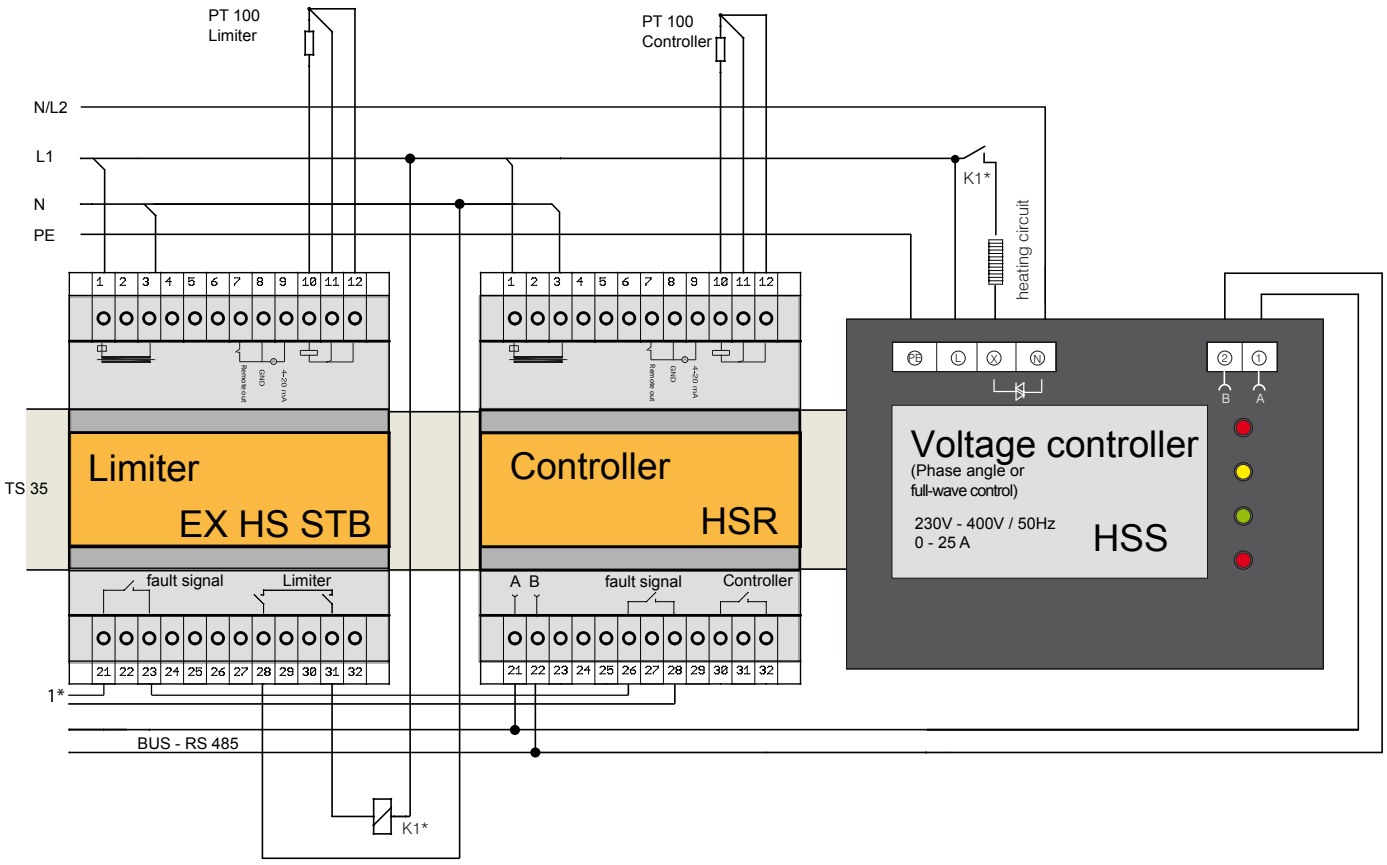
Tolerances (see also point 2.1. Technical data limiter)

Measuring accuracy	0,2°C or rather 1 digit
Switching point accuracy	1 °C
Switching hysteresis	<2 K

Heat accumulation
Heat accumulation problems should be paid attentions to during the installation of the top-hat rail devices. The ambient temperature range of max. 40°C must be observed. See installation example:
For a reducement of the exhaust heat difficulty the versions with switching power supply can be recommended. The self-heating is reduced to approx. 15° Kelvin above the ambient temperature at this.

Vibration
The equipment is designed for the intended use accrding to the guideline 2014/34/EU and the harmonized standards. Fluctuating stress must not be assumed. The device does not generate any vibrations.

9.1 CONNECTION EXAMPLE



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