

Temperature transmitter Ex i

Series 9182



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1 General Information

1.1 Manufacturer

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1.2 Information about the Manual

ID-No.:	9182602330
Publication Code:	2023-04-11·HB00·III·en·03
Hardware version:	C, C/1
Software version:	01-09 or higher

The original manual is the English edition.
They are legally binding in all legal affairs.

1.3 Further Documents

- Cabinet installation guide
- Brief instructions for module parameterising with ISpac Wizard (see ISpac Wizard software)
- FMEDA reports "STAHL 07/07-23 R016" and "STAHL 07/07-23 R017"
- Safety manual 9182 Ex i
- Data sheet 9182 Ex i
- Operating instructions 9182 Ex i
- National information and documents relating to use in hazardous areas (see also chapter 1.4)

For documents in additional languages, see r-stahl.com.

1.4 Conformity with Standards and Regulations

IECEX, ATEX, EU Declaration of Conformity and further national certificates and documents can be downloaded via the following link:

<https://r-stahl.com/en/global/support/downloads/>

Depending on the scope of validity, additional Ex-relevant information may be attached.

IECEX is also available at: <https://www.iecex.com/>

EN 2 Explanation of the Symbols

2.1 Symbols used in this Manual

Symbol	Meaning
	Tips and recommendations on the use of the device
	Danger due to explosive atmosphere






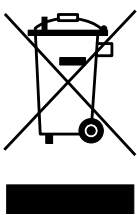
2.2 Warning Notes

Warnings must be observed under all circumstances, in order to minimize the risk due to construction and operation. The warning notes have the following structure:

- Signalling word: DANGER, WARNING, CAUTION, NOTICE
- Type and source of danger/damage
- Consequences of danger
- Taking countermeasures to avoid the danger or damage

	DANGER
	Danger to persons Non-compliance with the instruction results in severe or fatal injuries to persons.
	WARNING
	Danger to persons Non-compliance with the instruction can result in severe or fatal injuries to persons.
	CAUTION
	Danger to persons Non-compliance with the instruction can result in light injuries to persons.
NOTICE	
Avoiding material damage Non-compliance with the instruction can result in material damage to the device and / or its environment.	

2.3 Symbols on the Device

Symbol	Meaning
 0158 05594E00	CE marking in accordance with the current applicable directive.
 02198E00	Electrical circuit certified for hazardous areas according to the marking.
 15649E00	Input
 15648E00	Output
 11048E00	Safety instructions that must always be observed: For devices with this symbol, the corresponding data and/or the safety-relevant instructions contained in this manual must be observed!
 20690E00	Marking according to WEEE Directive 2012/19/EU

3 Safety Notes

3.1 Storage of the Manual

- Read the manual carefully.
- Store the manual at the mounting location of the device.
- Observe applicable documents and operating instructions of the devices to be connected.

3.2 Personnel Qualification

Qualified specialist personnel are required to perform the tasks described in this manual. This primarily applies to work in the following areas:

- Project engineering
- Mounting/dismounting the device
- (Electrical) installation
- Commissioning
- Maintenance, repair, cleaning

Specialists who perform these tasks must have a level of knowledge that meets applicable national standards and regulations.

Additional knowledge is required for tasks in hazardous areas! R. STAHL recommends having a level of knowledge equal to that described in the following standards:

- IEC/EN 60079-14 (Electrical installations design, selection and construction)
- IEC/EN 60079-17 (Inspection and maintenance of electrical installations)
- IEC/EN 60079-19 (Equipment repair, overhaul and reclamation)

3.3 Safe Use

Before assembly

- Read and observe the safety notes in this manual.
- Ensure that the contents of this manual are fully understood by the personnel in charge.
- Use the device in accordance with its intended and approved purpose only.
- Always consult with R. STAHL Schaltgeräte GmbH if using the device under operating conditions not covered by the technical data.
- Make sure that the device is not damaged.
- We are not liable for damage caused by incorrect or unauthorised use of the device or by non-compliance with this manual.



For mounting and installation

- Have mounting and installation performed only by qualified and authorised persons (see chapter "Personnel qualification").
- The device is only to be installed in areas for which it is suited based on its marking.
- During installation and operation, observe the information (characteristic values and rated operating conditions) on the rating, data and information plates located on the device.
- Before installation, make sure that the device is not damaged.
- When used in Zones 2, the intrinsically safe devices of Zones 1, 0, 21 and 20 can be connected to the intrinsically safe signal circuits.
- When used in Zone 2, the device is to be installed in a protective enclosure or in a cabinet according to IEC/EN 60079-0. This enclosure (or cabinet) has a suitable degree of protection (at least IP54).
- The device may only be operated in environments not exceeding degree of pollution 2.
- Interconnecting several devices in a single intrinsically safe circuit can result in different safety characteristic values. This may impair intrinsic safety!
- Electrical circuits with the "Ex i" type of protection can no longer be operated as circuits with this protection type after being operated with circuits with other types of protection.


Commissioning, maintenance, repair

- Only have commissioning and repairs performed by qualified and authorised persons (see chapter "Personnel qualification").
- Before commissioning, make sure that the device is not damaged.
- Only perform maintenance work described in this manual.
- Repair work on the devices must be performed only by R.STAHL Schaltgeräte GmbH.
- For SIL applications observe the safety manual and FMEDA reports.

3.4 Modifications and Alterations

	<p style="text-align: center;">DANGER</p> <p>Explosion hazard due to modifications and alterations to the device! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> • Do not modify or alter the device.
	<p>No liability or warranty for damage resulting from modifications and alterations.</p>

4 Function and Device Design

	<p style="text-align: center;">DANGER</p> <p>Explosion hazard due to improper use! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> • The device may only be used according to the operating conditions described in this manual. • Use the device only for the intended purpose specified in this manual.
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4.1 Function

Application range

The temperature transmitter is used for intrinsically safe operation of temperature sensors or resistance transmitters. Virtually all conventional sensors, such as Pt100, Pt500, thermocouples and potentiometers, can be connected.

Mode of operation

The parameters of the device can be adjusted using the ISpac Wizard software or alternatively by means of a DIP switch (only with Type 9182/.0-5.-11).

4.2 Device Design

	#	Device component	Description
	1	Black/ green terminals	Connection terminals for the safe area
	2	"PWR" LED, green	Auxiliary power indication
	3	"LF1" LED, red	Indication of line fault detection for channel 1
	4	"LF2" LED, red	Indication of line fault detection for channel 2
	5	DIP switch "LF1"	Reset activation of the line fault detection and anti-pumping device of the limiting value for channel 1
	6	DIP switch "ADJ1"	Adjustment of line resistance in channel 1
	7	DIP switch "LF2"	Reset activation of the line fault detection and anti-pumping device of the limiting value for channel 2
	8	DIP switch "ADJ2"	Adjustment of line resistance in channel 2
	9	Blue terminals	Connection terminals for the hazardous area (intrinsically safe Ex i)
	10	Parameterization interface	Configuration of the device by means of ISpac Wizard software Type "9199"
	11	"A" and "B" LED, yellow	Indication for limit contacts for channel 1
18	"A" and "B" LED, yellow	Indication for limit contacts for channel 2	

5 Technical Data

Marking

Type designation	9182/.0-5.-1.
CE marking	CE ₀₁₅₈

Explosion Protection

Version	for all types 9182/.0-5.-1.
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Global (IECEX)

Gas and dust	IECEX BVS 09.0046X Ex ec nC [ia Ga] IIC T4 Gc [Ex ia Da] IIIC
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Europe (ATEX)

Gas and dust	DMT 02 ATEX E 243 X ⊕ II 3 (1) G Ex ec nC [ia Ga] IIC T4 Gc ⊕ II (1) D [Ex ia Da] IIIC
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Certifications and certificates

Certificates	IECEX, ATEX, Brazil (ULB), EAC, India (PESO), Canada (cFM), Korea (KTL), USA (FM, UL)
Ship approval	DNV (EU RO Mutual Recognition), CCS

Safety data

Max. voltage U_o	6.5 V
Max. current I_o	19.7 mA
Max. power P_o	32 mW (linear characteristic)
Max. connectable capacitance C_o	
IIC	25 μ F
IIB	570 μ F
Max. connectable inductance L_o	
IIC	90 mH
IIB	330 mH
Internal capacitance C_i	negligible
Internal inductance L_i	negligible
Safety-related maximum voltage	253 V

Explosion Protection

Functional safety (IEC 61508)

Version	9182/10-51-13, SIL 2				
Test report	Exida FMEDA Stahl 07/07-23-R016				
Max. SIL	2				
Safe Failure Fraction SFF	78%				
MTBF	120 years				
PFD _{AVG} at T _[Proof]	T _[Proof]	1 year	3 years	5 years	10 years
	PFD _{AVG}	1.31 x 10 ⁻³	2.54 x 10 ⁻³	3.77 x 10 ⁻³	6.86 x 10 ⁻³
Further information	see safety manual and test report				

Version	9182/10-51-14, SIL 2			
Test report	Exida STAHL 07/07-23 R016 and STAHL 07/07-23 R017			
Max. SIL	2			
Safe Failure Fraction SFF	4 to 20 mA	Limit contact	Parallel limit contact	
	78%	78.4%	81.1%	
MTBF	4 to 20 mA	Limit contact	Parallel limit contact	
	120 years	114 years	114 years	
PFD _{AVG} at T _[Proof]	4 to 20 mA	Limit contact	Parallel limit contact	
	1 year	1.31 x 10 ⁻³	1.14 x 10 ⁻³	9.72 x 10 ⁻⁴
	2 years	2.54 x 10 ⁻³	2.22 x 10 ⁻³	1.89 x 10 ⁻³
	5 years	3.77 x 10 ⁻³	3.30 x 10 ⁻³	2.80 x 10 ⁻³
	10 years	6.86 x 10 ⁻³	5.99 x 10 ⁻³	5.09 x 10 ⁻³
Further information	see safety manual and test report			

Technical Data
Version for all types 9182/0-5.-1.

Electrical data

Auxiliary power

Nominal voltage U_N	24 V DC
Voltage range	18 to 31.2 V
Residual ripple within voltage range	$\leq 3.6 V_{SS}$
Nominal current at U_N	

1 channel 70 mA

2 channels 80 mA

 Power consumption at U_N $\leq 1.9 W$

 Power dissipation at U_N $\leq 1.9 W$

Polarity reversal protection yes

Operation indication LED green "PWR"

Undervoltage monitoring yes (no faulty devices / output states)

Galvanic separation

Test voltages

acc. to standard EN 60079-11

Ex i input to output 1.5 kV AC

Ex i input to auxiliary power 1.5 kV AC

Ex i input to configuration interface 1.5 kV AC

Ex i input to error message contact 1.5 kV AC

acc. to standard EN 50178

Output to auxiliary power 350 V AC

Output to configuration interface 350 V AC

Outputs interconnected 350 V AC

Error message contact to auxiliary power and outputs 350 V AC

Technical Data

Ex i inputs	
At thermocouples	20 V
Configuration	
Interface	
Version	RS232-C
Software	ISpac Wizard 9199
Connection	4-pole plug on the front
Settings	all device functions and diagnostics

Version 9182/0-5.-11

Switch	
Version	12 + 4-pole DIP switches
Settings	Pt100; thermocouple B, E, J, K, N, R, T each with approx. 90 measuring ranges (°C + °F) Pt100 in 2-, 3- or 4-wire connection Output signal 0/4 to 20 mA Line fault monitoring activated / deactivated

Version for all types 9182/0-5.-1.

Ex i Input	The input parameters can be set via parameterising software ISpac Wizard or DIP switch.					
Input for resistance temperature detector	Types	Standard	Basic measuring range	Min. measuring range	Medium resolution	Medium measurement error
	Pt100 Pt500 Pt1000	IEC 60751	-200 to +850 °C	50 K	0.1 K	0.35 K
	Pt250	IEC 60751	-200 to +850 °C	40 K	0.1 K	0.5 K
	Pt2000	IEC 60751	-200 to +850 °C	40 K	0.1 K	0.35 K
	Ni100 Ni500 Ni1000	DIN 43760	-60 to +180 °C	31 K	0.1 K	0.25 K
	Pt100	GOST 6651-94	-200 to +1100 °C	40 K	0.1 K	0.7 K
	M50	GOST 6651-94	-200 to +200 °C	70 K	0.1 K	0.7 K
	M53	GOST 6651-94	0 to +120 °C	70 K	0.1 K	0.5 K
	M100	GOST 6651-94	-200 to +200 °C	40 K	0.1 K	0.45 K
	Type of circuit	2-, 3-, 4-wire circuit				
Linearity	temperature / resistance					
Measuring current	≤ 0.25 mA					
Max. line resistor each core	50 Ω (2-wire connection) 100 Ω (3-, 4-wire connection)					

Technical Data

Input thermocouple	Types	Standard	Basic measuring range	Min. measuring range	Medium resolution	Medium measurement error
	B	IEC 60584	+250 to +1800 °C	314 K	0.1 K	1.2 K
E	-200 to +1000 °C		36 K	0.1 K	0.2 K	
J	-200 to +1200 °C		42 K	0.1 K	0.2 K	
K	-200 to +1370 °C		63 K	0.1 K	0.3 K	
N	-200 to +1300 °C		75 K	0.1 K	0.3 K	
R	-50 to +1767 °C		171 K	0.1 K	0.7 K	
S	-50 to +1767 °C		185 K	0.1 K	0.8 K	
T	-200 to +400 °C		60 K	0.1 K	0.3 K	
L	DIN 43710	-200 to +900 °C	55 K	0.1 K	0.3 K	
U		-200 to +600 °C	48 K	0.1 K	0.3 K	
XK	GOST	-200 to +800 °C	50 K	0.1 K	0.2 K	
Linearity	temperature / voltage					
Max. line resistance per loop	≤ 1000 Ω					
External references	Pt100 2-wire connection (-40 to +85 °C) Constant temperature (-40 to +85 °C)					
Potentiometer input	Potentiometer resistance range	Average measurement fault				
	50 to 500 Ω	0.1 Ω				
	0.5 to 5 kΩ	1 Ω				
	1 to 10 kΩ	2 Ω				
	10 to 100 kΩ *)	-				
	*) with parallel 10 kΩ shunt, no open-circuit monitoring					
Circuit type	3-wire connection					
Measuring current	≤ 0.25 mA					

Technical Data

Version	9182/10-51-14, SIL 2
Output	
Output signal	0/4 to 20 mA (configurable)
Functional range	0 to 21 mA
Connectable load resistance R_L	
1 channel	0 to 750 Ω
2 channels	0 to 600 Ω
Resolution	$\leq 1 \mu\text{A}$
Settling time (10 to 90 %)	$\leq 35 \text{ ms}$
Delay input - output	$\leq 500 \text{ ms}$
Version	9182/.0-50-12 with limit contact and 9182/10-51-14, SIL 2
Limiting values	
Message	2 NO / NC (configurable using ISpac Wizard)
Switching voltage	$\leq \pm 30 \text{ V}$
Switching current (resistive load)	$\leq 100 \text{ mA}$
Switch on resistance	$\leq 2.5 \Omega$ (typical $< 1 \Omega$)
Reclosing lockout	Reset using the DIP switch or "Power-Off" (configurable)

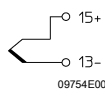
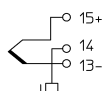
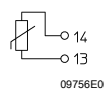
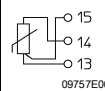
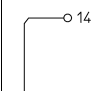
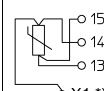
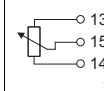
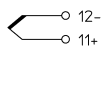
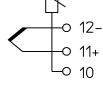
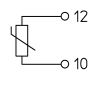
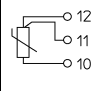
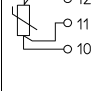
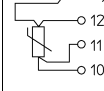
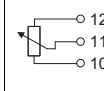
Technical Data

Version	for all types 9182/.0-5.-1.
Error detection Ex i input	
Open circuit	for resistance thermometers, thermocouples and resistance transmitters > 1 k Ω
Short-circuit	for resistance thermometers with temperature linearisation and resistance transmitters
Behaviour of the output	2.4 mA (configurable 0 to 23 mA or "hold last value")
Settings (switch LF)	activated / deactivated (only 9182/.0-51-11, 9182/10-51-14, 9182/.0-50-12)
Error detection	LED red "LF"
Message of line fault and auxiliary power failure	- contact (30 V / 100 mA) closed to earth in case of error - pac-Bus, potential-free contact (30 V / 100 mA)
Error limits	
	Accuracy, typical data expressed as % of the basic measuring range at U _N , 23 °C
Middle measurement error	≤ 0.1 %
Temperature influence	≤ 0.1 % / 10 K
Electromagnetic compatibility	Tested under the following standards and regulations: EN 61326-1 Use in industrial environment; NAMUR NE 21
Ambient conditions	
Ambient temperature	
Single device	-20 to +70 °C
Group assembly	-20 to +60 °C
	The installation conditions affect the ambient temperature. Observe the "Cabinet installation guide"
Storage temperature	-40 to +80 °C
Relative humidity (no condensation)	≤ 95 %
Use at the height of	< 2000 m

Technical Data

Electrical connection

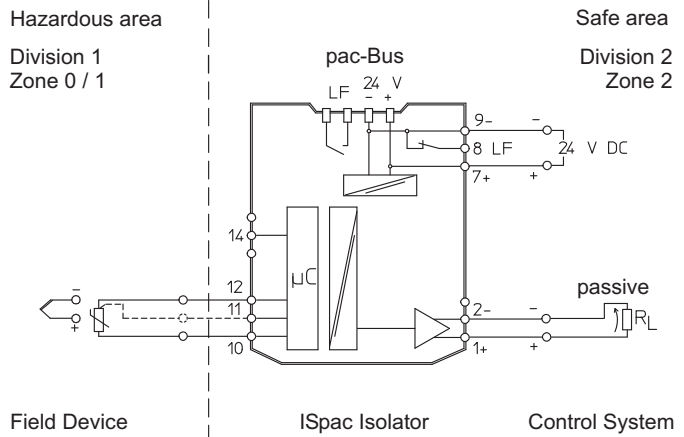
Configuration input

	Thermocouple		Resistance temperature detector				Poten-tiometer
	Reference junction		2-wire	3-wire	4-wire (1 channel)	4-wire (2 channels)	3-wire
	Const. temp.	ext. Pt100					
Channel 2							
Channel 1							

*) Connection of two sensors using 4-wire technology requires an additional external terminal X1

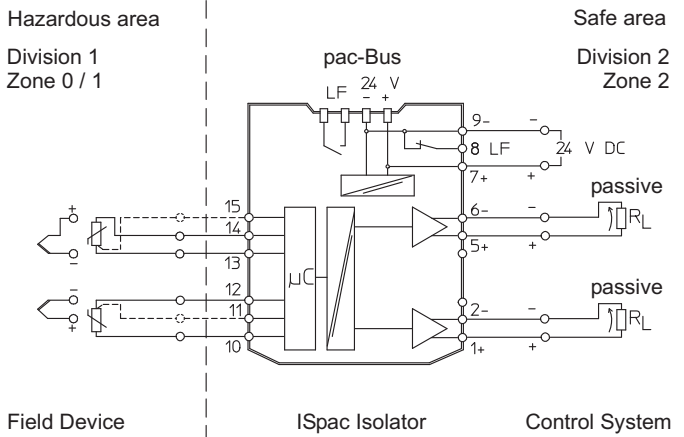
Connection diagram

1 channel, active
9182/10-51-11



06714E01

2 channels, active
9182/20-51-11



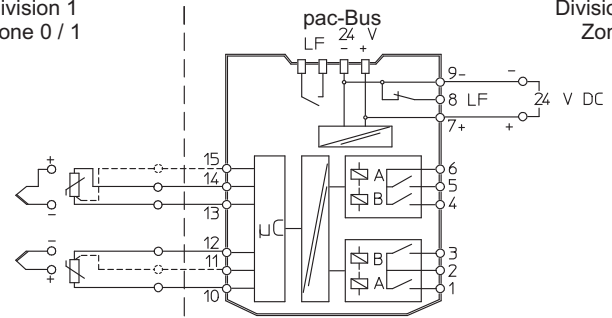
06724E01

Technical Data

2 channels
9182/20-50-12

Hazardous area
Division 1
Zone 0 / 1

Safe area
Division 2
Zone 2



Field Device

ISpac Isolator

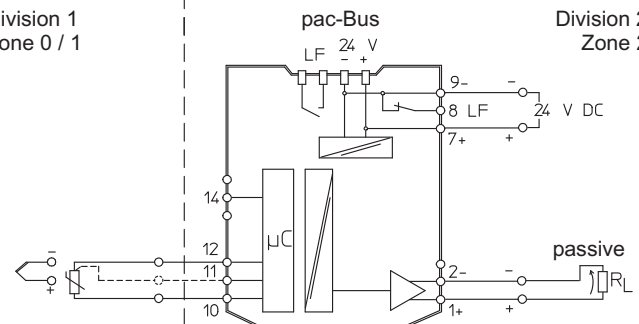
Control System

06728E01

1 channel, active
9182/10-51-13

Hazardous area
Division 1
Zone 0 / 1

Safe area
Division 2
Zone 2



Field Device

ISpac Isolator

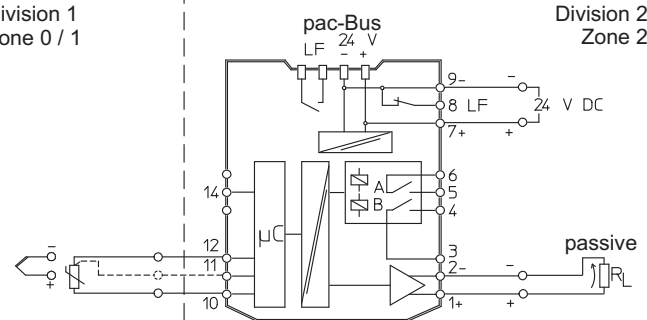
Control System

06714E01

1 channel, active
9182/10-51-14

Hazardous area
Division 1
Zone 0 / 1

Safe area
Division 2
Zone 2



Field Device

ISpac Isolator

Control System

06726E01


Technical Data

Mechanical data

Connection		Screw terminals	Spring clamp terminals
	Single-wire connection		
	- rigid	0.2 to 2.5 mm ²	0.2 to 2.5 mm ²
	- flexible	0.2 to 2.5 mm ²	0.2 to 2.5 mm ²
	- flexible with core end sleeve (without / with plastic sleeve)	0.25 to 2.5 mm ²	0.25 to 2.5 mm ²
	Two-core connection		
	- rigid	0.2 to 1 mm ²	–
	- flexible	0.2 to 1.5 mm ²	–
	- flexible with core end sleeve	0.25 to 1 mm ²	0.5 to 1 mm ²
Weight	approx. 160 g		
Mounting type	on DIN rail (NS35/15, NS35/7.5) or in pac-Carrier		
Mounting orientation	horizontal or vertical		
Degree of protection			
Enclosure	IP30		
Terminals	IP20		
Enclosure material	PA 6.6		
Fire resistance (UL 94)	V0		

For further technical data, see r-stahl.com.

6 Engineering


NOTICE	
<p>Failure of the devices installed in the cabinet caused by too high ambient temperature!</p> <p>Non-compliance can result in material damage.</p> <ul style="list-style-type: none"> • Install and adjust the cabinet in such a way that it is always operated within the permissible temperature range. • Carefully observe the "Cabinet installation guide". 	
	<p>You can find detailed information about project engineering in the "Cabinet installation guide" (download from r-stahl.com, Product documentation, subitem "Engineering").</p>

7 Transport and Storage

- Transport and store the device only in the original packaging.
- Store the device in a dry place (no condensation) and vibration-free.
- Do not drop the device.

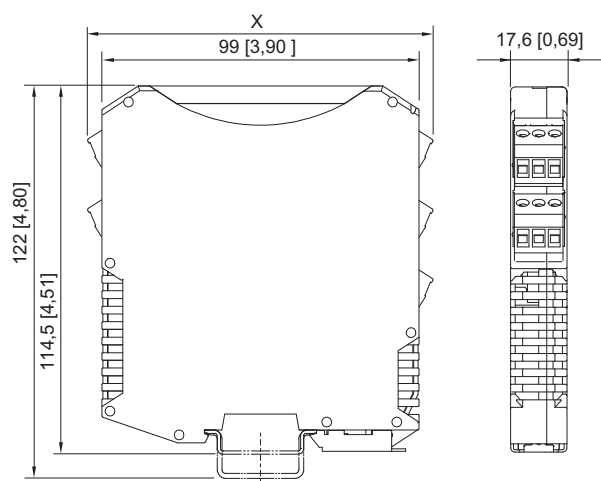
8 Mounting and Installation

The device is approved for use in hazardous areas of Zone 2 with potentially explosive gas as well as in safe areas.

	DANGER
	<p>Explosion hazard due to incorrect installation of the device! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> • Carry out installation strictly according to the instructions and national safety and accident prevention regulations to maintain the explosion protection. • Select and install the electrical device so that explosion protection is not affected due to external influences, i.e. pressure conditions, chemical, mechanical, thermal and electric impact such as vibration, humidity and corrosion (see IEC/EN 60079-14). • The device must only be installed by trained qualified personnel who is familiar with the relevant standards.

8.1 Dimensions / Fastening Dimensions

Dimensional drawings (all dimensions in mm [inches]) – Subject to modifications



	Dimension X
Screw terminals	108 [4.25]
Spring clamp terminals	128 [5.04]

09685E00

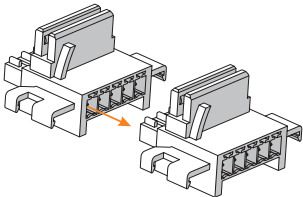
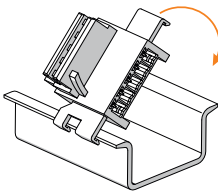
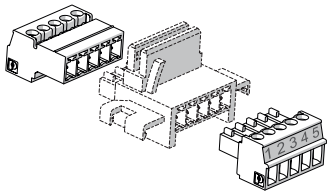
8.2 Mounting / Dismounting, Operating Position

8.2.1 Mounting / Dismounting pac-Bus

The pac-Bus is an accessory which facilitates wiring of the auxiliary power and reading out of the collective error message.

i	The components for the pac-Bus Type 9194 must be ordered separately.
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Mounting

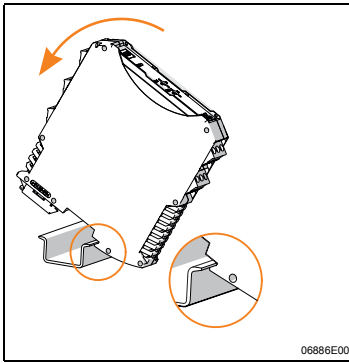
 <p style="text-align: right; font-size: small;">07392E00</p>	<ul style="list-style-type: none"> • Connect the required number of pac-Bus elements.
 <p style="text-align: right; font-size: small;">07391E00</p>	<ul style="list-style-type: none"> • Engage the pac-Bus elements on the DIN rail.
 <p style="text-align: right; font-size: small;">15551E00</p>	<ul style="list-style-type: none"> • Connect the terminal set at the beginning and at the end.

Dismounting

- Proceed in the reverse order to mounting.

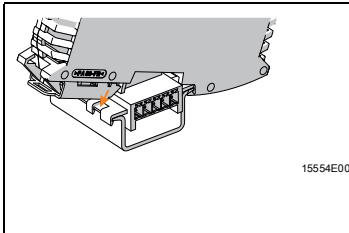
8.2.2 Mounting / Dismounting of the Device on DIN Rail and pac-Bus

Mounting on DIN rail



- Position the device on the DIN rail. When doing so, position the cut-out in the enclosure on the outside edge of the DIN rail.
- Engage the device on the DIN rail.
- When swivelling the device onto the DIN rail, make sure that it is not set at an angle.

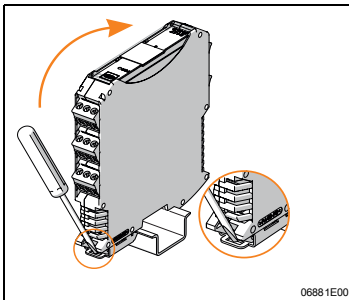
Mounting on pac-Bus



The pac-Bus is equipped with a polarisation guide and the device with a matching slot.

- Position the device as shown in the image. When doing so, position the cut-out in the enclosure on the outside edge of the DIN rail.
- Engage the device on the pac-Bus.

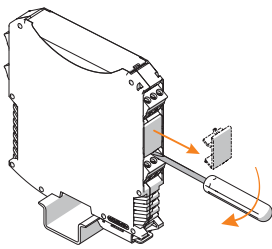
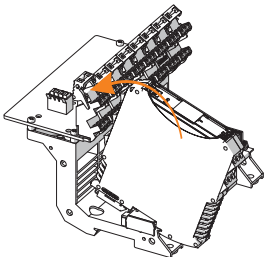
Dismounting



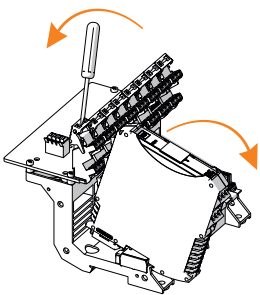
- Pull out the base bolt somewhat using a screwdriver.
- Swivel out the device.

8.2.3 Mounting / Dismounting on pac-Carrier

Mounting

 <p>12813E00</p>	<ul style="list-style-type: none"> • Remove the black and green terminals. • For single-channel devices: remove the covering in terminal slot 2 (between the black and the green terminal).
 <p>15569E00</p>	<ul style="list-style-type: none"> • Position the device on the pac-Carrier. Place the cut-out of the enclosure on the outside edge of the pac-Carrier. • When pivoting the device onto the pac-Carrier, make sure that it is not set at an angle. • Swivel in the device up to the red notch lever. • Close red notch lever by applying diagonal pressure on the lever with the thumb until the lever engages audibly at the device. • Ensure that the red notch lever is engaged.

Dismounting

 <p>15574E00</p>	<ul style="list-style-type: none"> • Swivel out the notch lever using a screwdriver. • Swivel device out of the slot.
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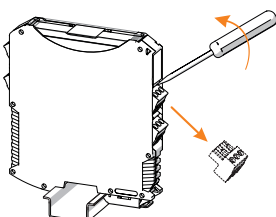
8.2.4 Mounting / Dismounting Pluggable Terminals

All devices are equipped with pluggable terminals.

Mounting

- Plug the terminal into the device until the terminal engages.

Dismounting

 <p>10859E00</p>	<ul style="list-style-type: none"> • Position the screwdriver behind the terminal. • Push out the terminal.
---	---

8.3 Installation



Operation under difficult conditions, such as, in particular, on ships, requires additional measures to be taken for correct installation, depending on the place of use. Further information and instructions on this can be obtained from your regional sales contact on request.

8.3.1 Electrical Connections

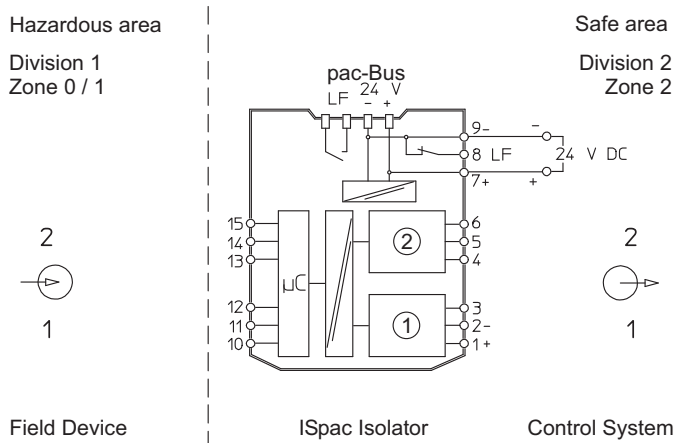
NOTICE

Malfunction or device damage caused by non-shielded field cables.

Non-compliance can result in material damage!

- If the installation has strong electromagnetic sources of interference or the electric lines are longer than 30 m, shielded field cables must be used.
- The shield must be connected to the equipotential bonding of the hazardous area and placed on the shield busses in the enclosure as close to the entry point as possible.
- The shield busses must also be connected to the mounting plate close to the entry point of the field wiring using the shortest possible route.

8.3.2 Schematic Diagram



06658E00

i In the single-channel version, channel 2 is not relevant in the schematic diagram above. For schematic diagrams with active or passive circuitry, refer to the label on the device. For the connection cross-sections of the wiring to be connected, refer to chapter "Technical data".

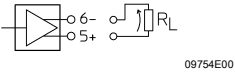
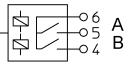
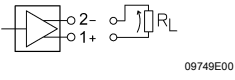
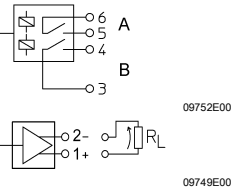
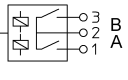
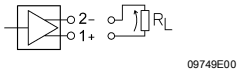
Input wiring (field side)

	Thermocouple		Resistance temperature detector				Potentiometer **)
	Reference junction	ext. Pt100	2-wire	3-wire	4-wire (1 channel)	4-wire (2 channels)	3-wire
Channel 2	 09754E00	 09755E00	 09756E00	 09757E00	 07110E00	 06525E00	 15729E00
Channel 1	 09758E00	 09755E00	 09760E00	 09761E00	 07110E00	 06525E00	 15730E00

*) Connection of two sensors using 4-wire technology requires an additional external terminal X1.

***) For detailed information on the circuitry and user adjustment of potentiometers, refer to chapter 9.2.5.

Output circuit

9182/	/10-51-11 /20-51-11	/10-51-14	/20-50-12	/10-51-13
Channel 2, schematic (2)		-		-
Channel 1, schematic (1)				

A, B: limit value relay A, limit value relay B, configuration, refer to chapter 9.2.4

Line fault detection

The devices have line fault detection for the sensor circuit which can be activated or deactivated.

The limiting values for the detection that are based on the sensor type are listed in the following table:

Resistance temperature detector (RTD)	
Short circuit	Falls below the linearisation curve (with measuring range unit "temperature")
Line breakage at Pt100, Ni100, Cu53, M50, M100	Exceeds value by approx. 1.3 kΩ
Line breakage for all other sensors	Exceeds value by approx. 11 kΩ
Thermocouple	
Line breakage *)	Exceeds value by approx. 1.3 kΩ
Potentiometer	
Short circuit	Resistance below resistance range of the potentiometer **)
Line breakage at potentiometer resistance up to 500 Ω	Exceeds value by approx. 1.3 kΩ
Line breakage at potentiometer resistance > 500 Ω	Exceeds value by approx. 11 kΩ

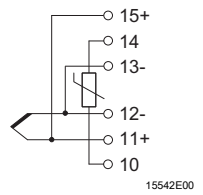
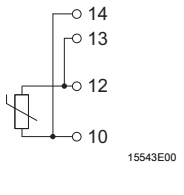
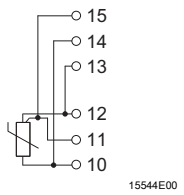
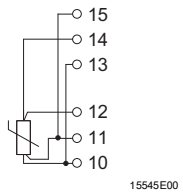
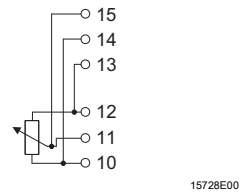
*) When "Typ _ high Rq" thermocouples are used, no line breakage monitoring is carried out, allowing connection of sensor lines at a resistance of more than 1 kΩ (loop). The accuracy that can be achieved depends on the electrical line that is used.

The accuracy that can be achieved depends on the electrical line that is used.

**) Only for 3-wire potentiometer. Requirement: path resistance < 1/10 of the configured resistance range of the potentiometer.

Signal duplication of the input wiring in 2-channel Types 9182/20-5d-1f (d=0.1; f=1.2)

- For two-channel ISpac 9182, both multiplexed Ex i inputs can be switched to a sensor in parallel. Signal duplication is both functional and possible in terms of safety (Ex i).

	Thermocouple	Resistance temperature detector			Potentiometer
	External reference junction	2-wire	3-wire	4-wire	3-wire
Input, 2 channels	 15542E00	 15543E00	 15544E00	 15545E00	 15728E00

8.3.3 Connection of Supply

Type of supply	Connection
Direct supply of the device via 24 V connection	Green terminal "7+" and "9-"
Supply via pac-Bus	pac-Bus terminal "1+" and "2-"

8.3.4 Reference Junction Compensation

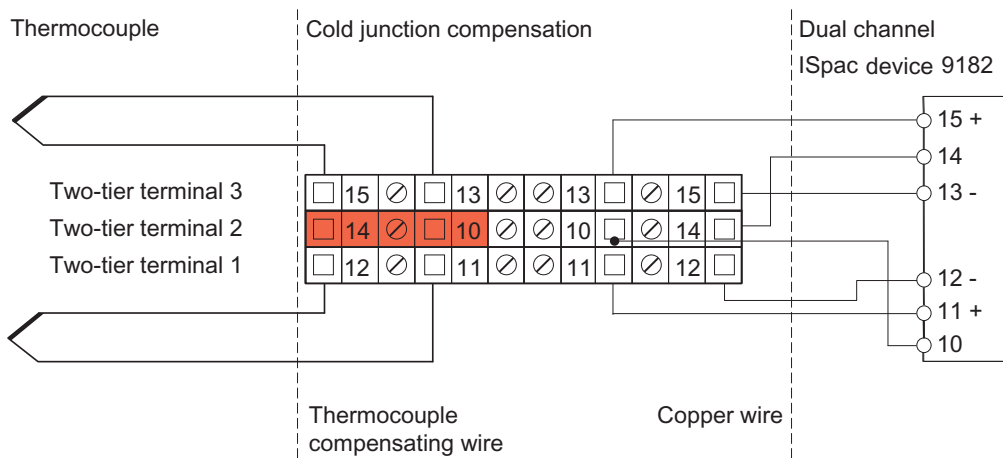
If "external reference junction in two-tier terminal" is selected:

- Set the DIP switch "S2" to "1" or
- and select corresponding setting in the ISpac Wizard.

a) External reference junction

Using the external reference junction in the form of a DIN rail terminal (9191/VS-04) allows a higher accuracy of measurement to be achieved based on temperature thanks to the separation from heat sources.

- Install the reference junction on a DIN rail so that it is spatially separated from heat sources.
- Connect reference junction type 9191/VS-04.
- Guide the compensation line of the thermocouple to the reference junction.



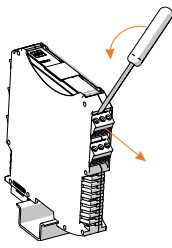
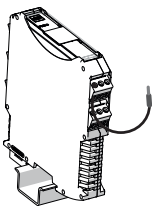
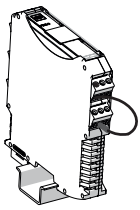
15577E01

b) External reference junction in compact screw terminal used with the device for single-channel types


- Use external reference junction 9191/VS-05 if little space is available in the cabinet for the installation of external reference junctions.
- Do not use reference junction type 9191/VS-05 for the two-channel 9182 (refer to the data sheet for the ordering data for compact screw terminals).

i	<ul style="list-style-type: none"> • When using the reference junction 9191/VS-05, the typical measurement error of +/- 1K has to be considered. • Unfavourable mounting orientations (several devices mounted without ventilation vertically on DIN rail) can cause a measurement error of up to +/- 2K. Observe the error limiting values specified in the data sheet.
----------	--

Installation

 <p style="text-align: right; font-size: small;">15578E</p>	<ul style="list-style-type: none"> • Remove the detachable connection terminal for the intrinsically safe channel #1 (connections 10, 11, 12) using a screwdriver.
 <p style="text-align: right; font-size: small;">06884E00</p>	<ul style="list-style-type: none"> • Install the reference junction 9191/VS-05 instead of the pre-installed connection terminal.
 <p style="text-align: right; font-size: small;">06883E00</p>	<ul style="list-style-type: none"> • Connect the unconnected cable end of the reference junction 9191/VS-05 to connection 14 of the connection terminal installed underneath.

9 Parameterization and Commissioning

	DANGER
	<p>Explosion hazard due to incorrect installation! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> • Check the device for proper installation before commissioning. • Comply with national regulations.

Before commissioning, ensure the following:

- Installation of the device according to regulations.
- The electrical lines are connected correctly.
- The device and connection lines show no signs of damage.
- Tight seat of the screws at the terminals.
Correct tightening torque: 0.5 to 0.6 Nm.

9.1 Replacement of the Device

- If replacing this with a device that has an identical design, readjust the DIP switch and parameterise it using ISpac Wizard, if necessary.

9.2 Parameterizations

9.2.1 User Adjustment of the Operating Modes


All operating modes can be adjusted using the ISpac Wizard 9199 software.

The variants (9182/a0-5d-11 a=1.2; d=1.9) can also be adjusted using the DIP switch.

The temperature transmitter Type 9182 must be parameterised according to the application using:

- the lateral DIP switch "S2" or
- the ISpac Wizard software

Lateral 12-pole DIP switch

	<p>The user adjustment through software can be carried out once all lateral DIP switches have been set to "OFF."</p> <p>Modification of the 12-pole DIP switch "S2" (lateral) during operation will not become effective until after a short interruption of the auxiliary power supply (PWR-ON Reset)!</p>
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DIP switch settings

0 = OFF 1 = ON	12-pole DIP switch (lateral)												4-pole DIP switch (at the front)			
Switch "S2"	12	11	10	9	8	7	6	5	4	3	2	1	LF1	ADJ1	LF2	ADJ2
PC programming *)	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x
Line fault detection																
Channel 1: OFF													0*)			
Channel 1: ON													1			
Channel 2: OFF															0*)	
Channel 2: ON															1	
Output																
0 to 20 mA		0														
4 to 20 mA		1														
Ex i Input																
Pt100:																
2-wire **)																
Adjustment possible	0									0	0	0		0		0
without adjustment	1									0	0	0		0		0
3-wire	1									0	0	0		1		0
4-wire	1									0	0	0		0		1
Thermocouple:																
E										0	0	1				
Type E										0	1	0				
Type J										0	1	1				
Type K										1	0	0				
Type N										1	0	1				
Type R										1	1	0				
Type T										1	1	1				
Reference junction																
Reserved	0															
External	1															
Measuring range																

*) Default setting upon delivery

**) refer to chapter 8.3.2

	S2 -								Pt 100			Thermocouple B		Thermocouple E		Thermocouple J		Thermocouple K		Thermocouple N, R		Thermocouple T							
	10	9	8	7	6	5	4				°C			°C			°C			°C			°C			°C			
56	0	1	1	1	0	0	0	100	150	°C	600	1700	°C	100	900	°C	200	600	°C	100	1200	°C	500	800	°C	50	400	°C	
57	0	1	1	1	0	0	1	100	200	°C	700	1000	°C	150	250	°C	200	650	°C	200	300	°C	500	900	°C	100	150	°C	
58	0	1	1	1	0	1	0	100	250	°C	700	1100	°C	150	300	°C	200	700	°C	200	400	°C	500	1000	°C	100	200	°C	
59	0	1	1	1	0	1	1	100	300	°C	700	1200	°C	150	400	°C	200	750	°C	200	500	°C	500	1100	°C	100	250	°C	
60	0	1	1	1	1	0	0	100	400	°C	700	1300	°C	150	500	°C	250	350	°C	200	600	°C	500	1200	°C	100	300	°C	
61	0	1	1	1	1	0	1	100	500	°C	700	1400	°C	150	600	°C	250	400	°C	200	700	°C	500	1300	°C	100	350	°C	
62	0	1	1	1	1	1	0	100	600	°C	700	1500	°C	150	700	°C	250	450	°C	200	800	°C	500	1400	°C	100	400	°C	
63	0	1	1	1	1	1	1	150	200	°C	700	1600	°C	150	800	°C	250	500	°C	200	900	°C	600	800	°C	150	200	°C	
64	1	0	0	0	0	0	0	150	250	°C	700	1700	°C	150	900	°C	250	550	°C	200	1000	°C	600	900	°C	150	250	°C	
65	1	0	0	0	0	0	1	150	300	°C	800	1100	°C	200	300	°C	250	600	°C	200	1100	°C	600	1000	°C	150	300	°C	
66	1	0	0	0	0	1	0	150	400	°C	800	1200	°C	200	400	°C	250	650	°C	300	1200	°C	600	1100	°C	150	350	°C	
67	1	0	0	0	0	1	1	150	500	°C	800	1300	°C	200	500	°C	250	700	°C	300	400	°C	600	1200	°C	150	400	°C	
68	1	0	0	0	1	0	1	150	600	°C	800	1400	°C	200	600	°C	250	750	°C	300	500	°C	600	1300	°C	200	250	°C	
69	1	0	0	0	1	0	1	150	700	°C	800	1500	°C	200	700	°C	300	400	°C	300	600	°C	600	1400	°C	200	300	°C	
70	1	0	0	0	1	1	0	200	300	°C	800	1600	°C	200	800	°C	300	450	°C	300	700	°C	700	900	°C	200	350	°C	
71	1	0	0	0	1	1	1	200	400	°C	800	1700	°C	200	900	°C	300	500	°C	300	800	°C	700	1000	°C	200	400	°C	
72	1	0	0	1	0	0	0	200	500	°C	900	1200	°C	300	400	°C	300	550	°C	300	900	°C	700	1100	°C	250	300	°C	
73	1	0	0	1	0	0	1	200	600	°C	900	1300	°C	300	500	°C	300	600	°C	300	1000	°C	700	1200	°C	250	350	°C	
74	1	0	0	1	0	1	0	200	700	°C	900	1400	°C	300	600	°C	300	650	°C	300	1100	°C	700	1300	°C	250	400	°C	
75	1	0	0	1	0	1	1	200	800	°C	900	1500	°C	300	700	°C	300	700	°C	300	1200	°C	700	1400	°C	300	350	°C	
76	1	0	0	1	1	0	0	300	400	°C	900	1600	°C	300	800	°C	300	750	°C	400	500	°C	800	1000	°C	300	400	°C	
77	1	0	0	1	1	0	1	300	500	°C	900	1700	°C	300	900	°C	350	450	°C	400	600	°C	800	1100	°C	-100	100	°F	
78	1	0	0	1	1	1	0	300	600	°C	1000	1300	°C	400	500	°C	350	500	°C	400	700	°C	800	1200	°C	-40	160	°F	
79	1	0	0	1	1	1	1	300	700	°C	1000	1400	°C	400	600	°C	350	550	°C	400	800	°C	800	1300	°C	0	100	°F	
80	1	0	1	0	0	0	0	300	800	°C	1000	1500	°C	400	700	°C	350	600	°C	400	900	°C	800	1400	°C	0	200	°F	
81	1	0	1	0	0	0	1	400	500	°C	1000	1600	°C	400	800	°C	350	650	°C	400	1000	°C	900	1100	°C	0	250	°F	
82	1	0	1	0	0	1	0	400	600	°C	1000	1700	°C	400	900	°C	350	700	°C	400	1100	°C	900	1200	°C	25	125	°F	
83	1	0	1	0	0	1	1	400	700	°C	1100	1400	°C	500	600	°C	350	750	°C	400	1200	°C	900	1300	°C	50	300	°F	
84	1	0	1	0	1	0	0	400	800	°C	1100	1500	°C	500	700	°C	450	550	°C	500	600	°C	900	1400	°C	50	500	°F	
85	1	0	1	0	1	0	1	500	600	°C	1100	1600	°C	500	800	°C	450	600	°C	500	700	°C	1000	1200	°C	150	750	°F	
86	1	0	1	0	1	1	0	500	700	°C	1100	1700	°C	500	900	°C	450	650	°C	500	800	°C	1000	1300	°C				
87	1	0	1	0	1	1	1	500	800	°C	1200	1500	°C	600	700	°C	450	700	°C	500	900	°C	1000	1400	°C	reserved			
88	1	0	1	1	0	0	0	-600	700	°C	1200	1600	°C	600	800	°C	450	750	°C	500	1000	°C	1100	1300	°C				
89	1	0	1	1	0	0	1	-600	800	°C	1200	1700	°C	600	900	°C	550	750	°C	500	1100	°C	1100	1400	°C				
90	1	0	1	1	0	1	0	-100	100	°F	200	1000	°F	-100	100	°F	-100	100	°F	500	1200	°C	-40	160	°F				
91	1	0	1	1	0	1	1	-40	160	°F	0	10	mV	-40	160	°F	-40	160	°F	-100	100	°F	0	100	°F				
92	1	0	1	1	1	0	0	0	100	°F	0	20	mV	0	100	°F	0	100	°F	-40	160	°F	0	200	°F				
93	1	0	1	1	1	0	1	0	200	°F				0	200	°F	0	200	°F	0	100	°F	0	250	°F				
94	1	0	1	1	1	1	0	0	250	°F				0	250	°F	0	250	°F	0	200	°F	25	125	°F				
95	1	0	1	1	1	1	1	25	125	°F				25	125	°F	25	125	°F	0	250	°F	50	300	°F				
96	1	1	0	0	0	0	0	50	300	°F				50	300	°F	50	300	°F	25	125	°F	50	500	°F				
97	1	1	0	0	0	0	1	50	500	°F				50	500	°F	50	500	°F	50	300	°F	150	750	°F				
98	1	1	0	0	0	1	0	150	750	°F				150	750	°F	150	750	°F	50	500	°F	200	1000	°F				
99	1	1	0	0	0	1	1	200	1000	°F				200	1000	°F	200	1000	°F	150	750	°F							
100	1	1	0	0	1	0	0	0	500	Ω				-100	100	mV	-50	50	mV	200	1000	°F							
101	1	1	0	0	1	0	1							-50	50	mV	0	50	mV										
102	1	1	0	0	1	1	0							0	50	mV	0	100	mV										
103	1	1	0	0	1	1	1							0	100	mV													
104																						
127	1	1	1	1	1	1	1																						

15800E01

9.2.2 2-Wire Adjustment in Resistance Thermometers

For resistance thermometers in a 2-wire connection, an adjustment to the line resistance must be performed before operation:

- **Short-circuit the resistance thermometer close to the sensor.**
- Check whether the adjustment function is active: the lateral DIP switch "S2" must be in position "OFF" (default setting upon delivery).
- Adjustment of the line resistance using the DIP switch "ADJ1" (channel 1) or "ADJ2" (channel 2) at the front: switch the respective switch within approx. 10 seconds as follows: OFF - ON - OFF - ON - OFF.
- The green "PWR" LED flashes for 5 seconds if the adjustment has been carried out successfully. If the adjustment has not been carried out successfully, the green "PWR" LED switches off briefly.

9.2.3 Potentiometer Connection

a) Connection type 3-wire

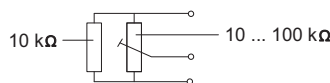
- The measurement "potentiometer" corresponds to a 3-wire potentiometer measurement.
- The relative tap value is measured.
- Select the potentiometer using the ISpac Wizard.
- Measuring range can be adjusted within 0 to 100%. Minimum span of 10%.

Potentiometer (3-wire)	Resistance range of the potentiometer
Transmitter 500 Ω	50 to 500 Ω
Transmitter 5000 Ω *)	500 to 5000 Ω
Transmitter 10000 Ω	1 to 10 kΩ
Transmitter 100 kΩ	10 to 100 kΩ

*) Faulty text in ISpac Wizard software.

Special circuitry when connecting potentiometers between 10 to 100 kΩ:

Schematic



07504E00

Connect the potentiometer using a 10 kΩ shunt. (The shunt resistance must correspond to the requirements of IEC/EN 60079-14.)

i	It is not possible to detect a line breakage with this connection type. Deactivate the line fault detection using the corresponding DIP switch.
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b) Connection type 2-wire and 4-wire

- Select the suitable RTD sensor in the measuring range "Ohm" for the 2-wire or 4-wire connection type.
- The absolute value of the RTD sensor resistor is measured.
- Select the RTD sensor using ISpac Wizard.

Potentiometer (2/4-wire)	Resistance range of the potentiometer	RTD sensor selection
Transmitter 500 Ω	0 to 600 Ω	Pt100
Transmitter 5000 Ω *)	0 to 5000 Ω	Pt1000
Transmitter 10,000 Ω	0 to 10 kΩ	Pt2000

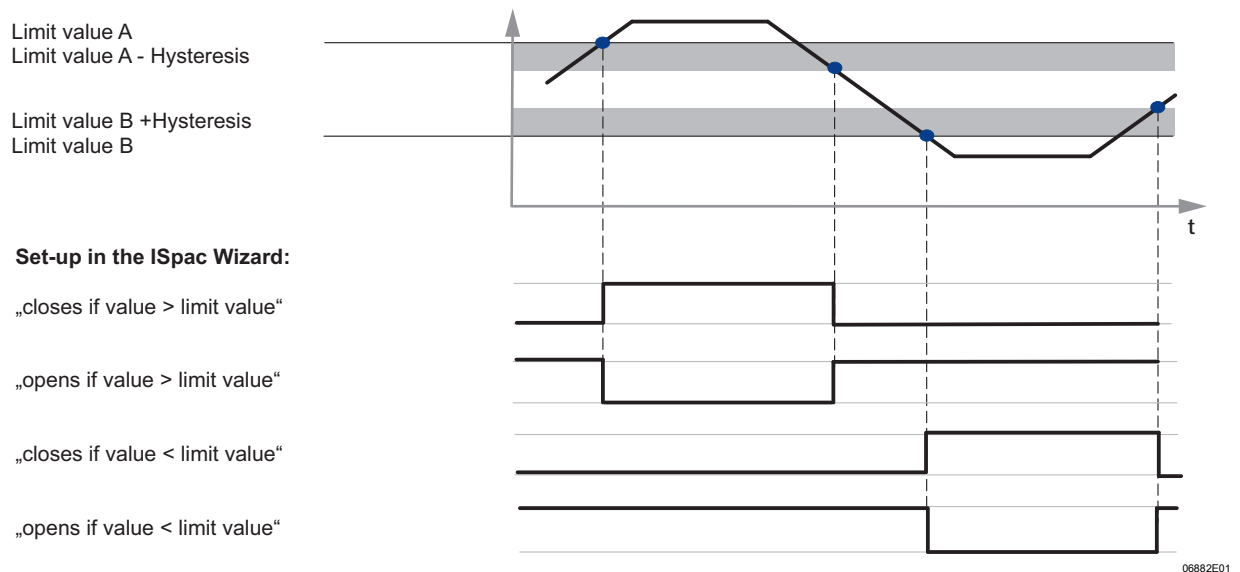
*) Faulty text in ISpac Wizard software.

- There is no short-circuit signalling for this connection type.
- The measuring range can be adjusted within the range.

9.2.4 Adjustments of Limiting Values for Relay

Configure the trip amplifier function using the ISpac Wizard software.

The following illustration shows possible adjustments of the limit contacts for relays A and B. This is an example; other assignments are possible.



If a line fault is detected, the limit value relays drop out (for an exception, refer to chapter 9.2.5).

9.2.5 Anti-Pumping Device

Configure the anti-pumping device using the ISpac Wizard software.

If a limiting value is reached, the anti-pumping device ensures that the limit contact remains in working position ("ON" or "OFF") even if the process variable that caused the response is no longer valid.

This function is used to detect whether the value exceeds or falls below the specified limiting values.

Selection in ISpac Wizard	Description of the function "anti-pumping device"
"Deactivated"	Default setting - function is off.
"Activated - PWRST"	If the event occurs, the set operating modes ("ON" or "OFF") are maintained. The anti-pumping device is reset by actuating the DIP switch "LF1" or "LF2" (OFF-ON-OFF or ON-OFF-ON) or brief switching off and on of the device. In case of a line fault, the limit value relays switch to the parameterised operating mode, for example "Off if value > limiting value", the limit value relay drops out if the auxiliary power failure occurs.
"Activated"	Regardless of the configured operating mode ("On" or "Off"), the contact goes to the "Off" position. The "Contact off" occurrence is maintained. The anti-pumping device remains unaffected even after interruption of the power supply. The anti-pumping device is only reset if the DIP switch "LF1" or "LF2" (OFF-ON-OFF or ON-OFF-ON) at the front is actuated. Limit value relays drop out if line faults occur, irrespective of the currently set operation mode.

9.2.6 Adjustment of the Line Fault Detection

i	<p>The switch "LF" = OFF forces the line fault detection to "OFF."</p> <p>Requirement: The line fault detection must be activated using the ISpac Wizard 9199 software. Otherwise, the line fault detection cannot be activated by the DIP switch "LF" = ON.</p>
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Factory setting:

- Configuration software "LF" = ON
- DIP switch "LF" = OFF

Truth table for activation/deactivation of the line fault detection

DIP switch	Parameterising software	Effect
OFF	OFF	OFF
ON	OFF	OFF
OFF	ON	OFF
ON	ON	ON

9.3 Commissioning

i	Modification of the user adjustments via the ISpac Wizard software or the DIP switches is also permitted during operation in Zone 2 as well as with connected, intrinsically safe input signals.
----------	--

10 Operation

10.1 Operation

Possible adjustments during operation

i	Modification of user adjustments for the different operating modes, the line fault detection via the ISpac Wizard software or the DIP switches is also permitted during operation in Zone 2 as well as with connected, intrinsically safe input signals.
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For a detailed description of the function of the DIP switches and the possible adjustments using the ISpac Wizard software, refer to chapter "Parameterisation and commissioning".

10.2 Indications

The corresponding LEDs on the device indicate the operating state of the device (see also the "Function and device design" section).

LED	Colour	LED "ON"	LED "OFF"
"PWR" LED	green	Device is supplied with auxiliary power	Device is not in operation, power supply not available
"LF1" LED *)	red	Line fault in signal of channel 1	No line fault in signal of channel 1
	Flashes	Outside of measuring range	
"LF2" LED *)	red	Line fault in signal of channel 2	No line fault in signal of channel 2
	Flashes	Outside of measuring range	
"A" LED	yellow	Limit contact A active	Limit contact A not active
"B" LED	yellow	Limit contact B active	Limit contact B not active

*) Activation of the line fault detection for channel 1 or channel 2 using the DIP switch "LF1" or "LF2"

10.3 Troubleshooting

For troubleshooting, refer to the following troubleshooting guide:

Error	Cause of error	Troubleshooting
"PWR" LED (green) is off	<ul style="list-style-type: none"> Auxiliary power failure Polarity reversal of the auxiliary power supply Defective miniature fuse 	<ul style="list-style-type: none"> Check the polarity of the auxiliary power supply. Check the wiring of the auxiliary power supply. If the fuse is defective, have the device repaired.
"PWR" LED (green) blinks (constantly or at intervals of 5 to 10 seconds)	Defective device	Send the device in for repair.
Faulty output signals	<ul style="list-style-type: none"> Incorrect connection of the sensor Incorrect setting of the DIP switch The device is programmed via PC, but the DIP switches are not in the "OFF" position 	<ul style="list-style-type: none"> Check the connections. Adjust the DIP switch correctly. Set the DIP switch "S2...1" to the "OFF" position.
Line compensation is not functioning	<ul style="list-style-type: none"> Compensation disabled Line resistance is too high 	<ul style="list-style-type: none"> Set the DIP switch "S2" to the "OFF" position. Perform compensation. Bridge the sensor.
LED "LF" (red) is on	Line fault at the input	Check the connections.
LED "LF" (red) is flashing	Outside of measuring range	Configure the measuring range accordingly.

If the error cannot be eliminated using the mentioned procedures:

- Contact R. STAHL Schaltgeräte GmbH.

For fast processing, have the following information ready:

- Type and serial number of the device
- Purchase information
- Error description
- Intended use (in particular input / output wiring)

11 Maintenance, Overhaul, Repair

11.1 Maintenance


- Consult the relevant national regulations to determine the type and extent of inspections.
- Adapt inspection intervals to the operating conditions.

During maintenance of the device, check at least:


- whether the clamping screws holding the electric lines are securely seated,
- whether the device has cracks or other visible signs of damage,
- whether the permissible ambient temperatures are observed,
- whether the device is used according to its designated use.

11.2 Overhaul

The device does not require regular maintenance.

	Observe the relevant national regulations in the country of use.
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11.3 Repair

	DANGER
	<p>Explosion hazard due to improper repair! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> • Repair work on the devices must be performed only by R. STAHL Schaltgeräte GmbH.

11.4 Returning the Device

- Only return or package the devices after consulting R. STAHL!
Contact the responsible representative from R. STAHL.

R. STAHL's customer service is available to handle returns if repair or service is required.

- Contact customer service personally.

or

- Go to the r-stahl.com website.
- Under "Support" > "RMA" > select "RMA-REQUEST".
- Fill out the form and send it.
You will automatically receive an RMA form via email. Please print this file off.
- Send the device along with the RMA form in the packaging to R. STAHL Schaltgeräte GmbH (refer to chapter 1.1 for the address).

12 Cleaning

- To avoid electrostatic charging, the devices located in potentially explosive areas may only be cleaned using a damp cloth.
- When cleaning with a damp cloth, use water or mild, non-abrasive, non-scratching cleaning agents.
- Do not use aggressive detergents or solvents.

13 Disposal

- Observe national and local regulations and statutory regulation regarding disposal.
- Separate materials when sending it for recycling.
- Ensure environmentally friendly disposal of all components according to the statutory regulations.

14 Accessories and Spare Parts

NOTICE

Malfunction or damage to the device due to the use of non-original components.

Non-compliance can result in material damage.

- Use only original accessories and spare parts from R. STAHL Schaltgeräte GmbH.



For accessories and spare parts, see data sheet on our homepage r-stahl.com.