Features

- 1-channel signal conditioner
- 24 V DC supply
- Thermocouple, RTD, potentiometer or mV input
- Input for PTC thermistor
- Current and voltage output
- Line fault (LFD) and sensor burnout detection
- Accuracy 0.1 %

Function

This signal conditioner provides the galvanic isolation between field circuits and control circuits.

The device has an input for signals of the following field devices:
- resistance thermometers
- thermocouples
- PTC thermistors
- potentiometers
- voltage sources
- field device with its own characteristic

The device provides the following standard signals at the output:
- 0/2 mA ... 10 mA signal
- 0/4 mA ... 20 mA signal
- 0/1 V ... 5 V signal
- 0/2 V ... 10 V signal

This device has an integrated cold junction compensation. You can also implement external cold junction compensation.

A fault is signalized by LEDs.

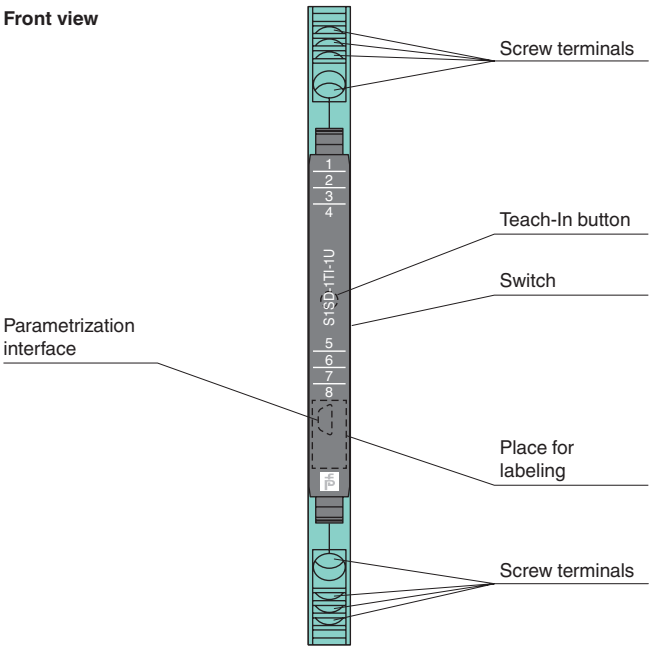
The device is easily configured by the use of DIP switches.

The Teach-In function can be used to teach in the potentiometer start value and end value.

The device can be powered via terminals or Power Bus.

Assembly

Front view



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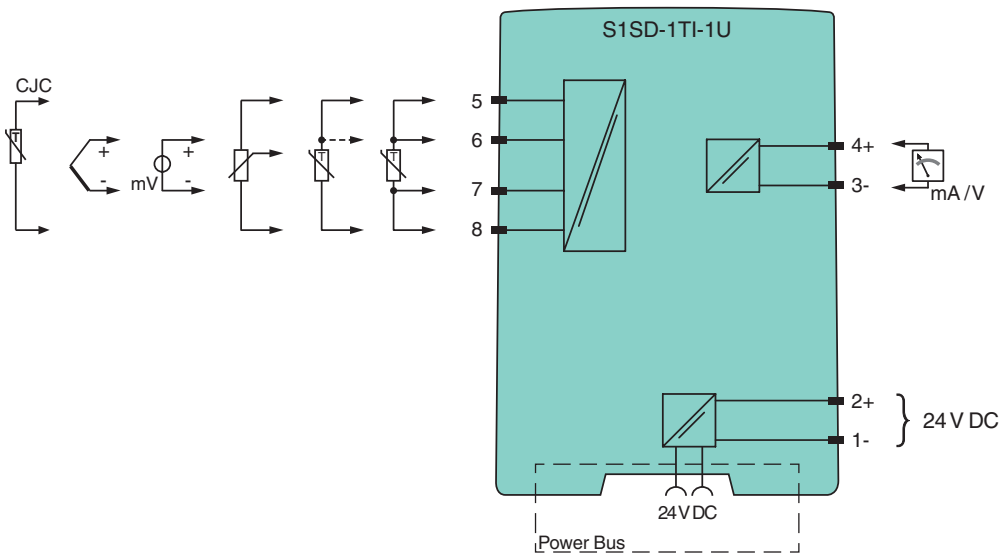
Connection



Release date 2015-04-30 16:58 Date of issue 2015-04-30 276400_eng.xml

General specifications		
Signal type		Analog input
Supply		
Connection		Power Bus or terminals 1-, 2+
Rated voltage	U_n	16.8 ... 31.2 V DC
Power loss		0.8 W
Power consumption		0.9 W
Input		
Connection		terminals 5, 6, 7, 8
PTC		type KT, KTY, ST
Measuring current		approx. 200 µA
Types of measuring		2-, 3-, 4-wire connection
Lead resistance		≤ 100 Ω per lead
Measuring circuit monitoring		sensor breakage, lead breakage, short circuit
RTD		type Pt100, Pt200, Pt500, Pt1000 (EN 60751: 1995) type Ni100, Ni200, Ni500, Ni1000 (DIN 43760)
Measuring current		approx. 200 µA
Types of measuring		2-, 3-, 4-wire connection
Lead resistance		≤ 100 Ω per lead
Measuring circuit monitoring		sensor breakage, lead breakage, short circuit
Thermocouples		type B, E, J, K, N, S, T (IEC 584-1:1995) type L, U (DIN 43710:1985) type C, D (ASTM E988)
Cold junction compensation		external (Pt100) and internal , manually
Lead resistance		≤ 10 kΩ
Measuring circuit monitoring		sensor breakage, lead breakage
Resistor		
Measurement range		0 ... 5 kΩ
Voltage		-100 ... 100 mV -1000 ... 1000 mV
Potentiometer		0.2 ... 50 kΩ
Types of measuring		3-wire connection
Input resistance		≥ 1 MΩ
Output		
Connection		terminals 3-, 4+
Analog voltage output		0/1 ... 5 V , 0/2 ... 10 V , load ≥ 2 kΩ
Analog current output		0/2 ... 10 mA, 0/4 ... 20 mA, load ≤ 600 Ω
Ripple		≤ 10 mV_{eff}
Fault signal		downscale or upscale
Transfer characteristics		
Measuring time		≤ 300 ms
Deviation		≤ 0.1 % of full-scale value
RTD		< 0.1 K/0.05 % of the measured value
Thermocouples		< 0.3 K/0.1 % of the measured value
Voltage		< 0.1 % of the measured value
Potentiometer		< 0.02 % of the measured value
Influence of ambient temperature		< 100 ppm/K of full-scale value
Electrical isolation		
Output/power supply		safe electrical isolation by reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V_{eff} test voltage 3 kV, 50 Hz
Input/Other circuits		safe electrical isolation by reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V_{eff} test voltage 3 kV, 50 Hz
Directive conformity		
Electromagnetic compatibility		
Directive 2004/108/EC		EN 61326-1:2006
Conformity		
Degree of protection		IEC 60529:2001
Protection against electrical shock		EN 61010-1:2010
Ambient conditions		
Ambient temperature		-25 ... 70 °C (-13 ... 158 °F)
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
Mechanical specifications		
Connection type		screw terminals
Core cross-section		≤ 2.5 mm^2 , 14 AWG
Degree of protection		IP20

Release date 2015-04-30 16:58 Date of issue 2015-04-30 276400_eng.xml

Mass	approx. 70 g
Dimensions	6.2 x 97 x 107 mm (0.24 x 3.82 x 4.21 in) , housing type S1
Mounting	on 35 mm DIN mounting rail acc. to EN 60715:2001
General information	
Supplementary information	Statement of Conformity, Declaration of Conformity, Attestation of Conformity and instructions have to be observed where applicable. For information see www.pepperl-fuchs.com.
Accessories	
Designation	optional accessories: - Power Bus POWERBUS-SETL5.250 - Power Bus POWERBUS-SETH5.250 - cover for DIN mounting rail POWERBUS-COV-250 - end cap POWERBUS-CAP - adapter with USB interface S-ADP-USB

Release date 2015-04-30 16:58 Date of issue 2015-04-30 276400_eng.xml

Configuration

Configuration using DIP switches

Use the DIP switches to configure the device. Via the DIP switches you can select only a limited number of sensors. A wider range of sensors you can select via software configuration. The following options are available:

Input	S1				
	1	2	3	4	5
PT100					
PT1000	ON				
Ni100		ON			
Resistor	ON		ON		
4-wire					
3-wire				ON	
2-wire					ON
Potentiometer	ON		ON	ON	ON
Typ J	ON	ON			
Typ K			ON		
CJC internal					
CJC external				ON	
CJC OFF					ON
+100 mV		ON	ON		
+1000 mV		ON	ON		ON
PC-Programming	ON	ON	ON		

Release date 2015-04-30 16:58 Date of issue 2015-04-30 276400_eng.xml

Start value				S1				
Temp	Res	Poti	mV	6	7	8	9	10
-200 °C	0 Ω	0 %	-100 mV	ON				
-175 °C	50 Ω	1 %	-90 mV		ON			
-150 °C	100 Ω	2 %	-80 mV	ON	ON			
-125 °C	150 Ω	3 %	-70 mV			ON		
-100 °C	200 Ω	4 %	-60 mV	ON		ON		
-75 °C	250 Ω	5 %	-50 mV		ON	ON		
-50 °C	300 Ω	6 %	-45 mV	ON	ON	ON		
-25 °C	350 Ω	7 %	-40 mV				ON	
0 °C	400 Ω	8 %	-35 mV					
25 °C	450 Ω	9 %	-30 mV	ON			ON	
50 °C	500 Ω	10 %	-25 mV		ON		ON	
75 °C	550 Ω	11 %	-20 mV	ON	ON		ON	
100 °C	600 Ω	12 %	-15 mV			ON	ON	
125 °C	650 Ω	13 %	-10 mV	ON		ON	ON	
150 °C	700 Ω	14 %	-5 mV		ON	ON	ON	
175 °C	750 Ω	15 %	0 mV	ON	ON	ON	ON	
200 °C	800 Ω	20 %	5 mV					ON
225 °C	850 Ω	25 %	10 mV	ON				ON
250 °C	900 Ω	30 %	15 mV		ON			ON
275 °C	950 Ω	35 %	20 mV	ON	ON			ON
300 °C	1000 Ω	40 %	25 mV			ON		ON
350 °C	1500 Ω	45 %	30 mV	ON		ON		ON
400 °C	2000 Ω	50 %	35 mV		ON	ON		ON
450 °C	2500 Ω	55 %	40 mV	ON	ON	ON		ON
500 °C	3000 Ω	60 %	45 mV				ON	ON
550 °C	3500 Ω	65 %	50 mV	ON			ON	ON
600 °C	4000 Ω	70 %	60 mV		ON		ON	ON
650 °C	4500 Ω	75 %	70 mV	ON	ON		ON	ON
700 °C	-	80 %	80 mV			ON	ON	ON
800 °C	-	85 %	90 mV	ON		ON	ON	ON
900 °C	-	90 %	-		ON	ON	ON	ON
1000 °C	-	Teach-in	-	ON	ON	ON	ON	ON

Release date 2015-04-30 16:58 Date of issue 2015-04-30 276400_eng.xml

End value				S2					
Temp	Res	Poti	mV	1	2	3	4	5	6
-150 °C	100 Ω	10 %	-	ON					
-125 °C	150 Ω	15 %	-		ON				
-100 °C	200 Ω	20 %	-	ON	ON				
-75 °C	250 Ω	25 %	-			ON			
-50 °C	300 Ω	30 %	-	ON		ON			
-25 °C	350 Ω	35 %	-		ON	ON			
0 °C	400 Ω	40 %	-	ON	ON	ON			
25 °C	450 Ω	45 %	-				ON		
50 °C	500 Ω	46 %	-	ON			ON		
75 °C	550 Ω	47 %	-		ON		ON		
100 °C	600 Ω	48 %	100 mV						
125 °C	650 Ω	49 %	95 mV	ON	ON		ON		
150 °C	700 Ω	50 %	90 mV			ON	ON		
175 °C	750 Ω	51 %	85 mV	ON		ON	ON		
200 °C	800 Ω	52 %	80 mV		ON	ON	ON		
225 °C	850 Ω	53 %	75 mV	ON	ON	ON	ON		
250 °C	900 Ω	54 %	70 mV					ON	
275 °C	950 Ω	55 %	65 mV	ON				ON	
300 °C	1000 Ω	56 %	60 mV		ON			ON	
325 °C	1050 Ω	57 %	55 mV	ON	ON			ON	
350 °C	1100 Ω	58 %	50 mV			ON		ON	
350 °C	1150 Ω	59 %	45 mV	ON		ON		ON	
400 °C	1200 Ω	60 %	40 mV		ON	ON		ON	
425 °C	1250 Ω	61 %	35 mV	ON	ON	ON		ON	
450 °C	1300 Ω	62 %	30 mV				ON	ON	
475°C	1400 Ω	63 %	25 mV	ON			ON	ON	
500 °C	1500 Ω	64 %	20 mV		ON		ON	ON	
525°C	1600 Ω	65 %	15 mV	ON	ON		ON	ON	
550 °C	1700 Ω	66 %	10 mV			ON	ON	ON	
575 °C	1800 Ω	67 %	5 mV	ON		ON	ON	ON	
600 °C	1900 Ω	68 %	0 mV		ON	ON	ON	ON	
625 °C	2000 Ω	69 %	-5 mV	ON	ON	ON	ON	ON	
650 °C	2100 Ω	70 %	-10 mV						ON
675 °C	2200 Ω	71 %	-15 mV	ON					ON
700 °C	2300 Ω	72 %	-20 mV		ON				ON
725 °C	2400 Ω	73 %	-25 mV	ON	ON				ON
750°C	2500 Ω	74 %	-30 mV			ON			ON
775 °C	2600 Ω	75 %	-35 mV	ON		ON			ON
800 °C	2700 Ω	76 %	-40 mV		ON	ON			ON
825 °C	2800 Ω	77 %	-45 mV	ON	ON	ON			ON
850°C	2900 Ω	78 %	-50 mV				ON		ON
875 °C	3000 Ω	79 %	-55 mV	ON			ON		ON
900 °C	3100 Ω	80 %	-60 mV		ON		ON		ON
925 °C	3200 Ω	81 %	-65 mV	ON	ON		ON		ON
950 °C	3300 Ω	82 %	-70 mV			ON	ON		ON
975 °C	3400 Ω	83 %	-75 mV	ON		ON	ON		ON
1000 °C	3500 Ω	84 %	-80 mV		ON	ON	ON		ON
1025 °C	3600 Ω	85 %	-85 mV	ON	ON	ON	ON		ON
1050 °C	3700 Ω	86 %	-90 mV					ON	ON
1075 °C	3800 Ω	87 %	-	ON				ON	ON
1100 °C	3900 Ω	88 %	-		ON			ON	ON
1125 °C	4000 Ω	89 %	-	ON	ON			ON	ON
1150 °C	4100 Ω	90 %	-			ON		ON	ON
1175 °C	4200 Ω	91 %	-	ON		ON		ON	ON
1200 °C	4300 Ω	92 %	-		ON	ON		ON	ON
1225 °C	4400 Ω	93 %	-	ON	ON	ON		ON	ON
1250 °C	4500 Ω	94 %	-				ON	ON	ON
1275 °C	4600 Ω	95 %	-	ON			ON	ON	ON
1300 °C	4700 Ω	96 %	-		ON		ON	ON	ON
1325 °C	4800 Ω	97 %	-	ON	ON		ON	ON	ON
1350 °C	4900 Ω	98 %	-			ON	ON	ON	ON
1375 °C	5000 Ω	99 %	-	ON		ON	ON	ON	ON

Release date 2015-04-30 16:58 Date of issue 2015-04-30 276400_eng.xml

End value				S2					
Temp	Res	Poti	mV	1	2	3	4	5	6
1400 °C	-	100%	-		ON	ON	ON	ON	ON
1425 °C	-	Teach-in	-	ON	ON	ON	ON	ON	ON

Output	S2			
	7	8	9	10
0 V ... 5 V	ON	ON		
0 V ... 10 V		ON		
4 mA ... 20 mA	ON			
0 mA ... 20 mA				

Characteristic				
rising				
falling			ON	

Diagnostics				
downscale				ON
upscale				

Factory settings: all switches in position OFF

Configuration using software

Use software to configure the device. Configuration must be permitted by setting the DIP switches. See table.

The device is equipped with a programming socket on the front. A corresponding adapter is available as an accessory. This adapter can be used to configure the device. The software is available to download from www.pepperl-fuchs.com.

The following options are available:

- You can choose from a wider range of sensor types.
- You can adjust the start value and end value in smaller increments.

Fault signals on the output

Characteristic	Diagnostics	Output range [1]	Underrange	Overrange	Fault signal
rising S2.9 = OFF	upscale S2.10 = OFF	0 ... 20 mA 4 ... 20 mA 0 ... 5 V 0 ... 10 V	0 mA 3.8 mA 0 V 0 V	20.5 mA 20.5 mA 5.125 V 10.25 V	22 mA 22 mA 5.5 V 11 V
	downscale S2.10 = ON	0 ... 20 mA 4 ... 20 mA 0 ... 5 V 0 ... 10 V	0 mA 4 mA 0 V 0 V	20 mA 20 mA 5 V 10 V	0 mA 4 mA 0 V 0 V
falling S2.9 = ON	upscale S2.10 = OFF	20 ... 0 mA 20 ... 4 mA 5 ... 0 V 10 ... 0 V	20.5 mA 20.5 mA 5.125 V 10.25 V	0 mA 3.8 mA 0 V 0 V	22 mA 22 mA 5.5 V 11 V
	downscale S2.10 = ON	20 ... 0 mA 20 ... 4 mA 5 ... 0 V 10 ... 0 V	20 mA 20 mA 5 V 10 V	0 mA 4 mA 0 V 0 V	0 mA 4 mA 0 V 0 V

[1] Other output ranges react analogous to the table.

Release date 2015-04-30 16:58 Date of issue 2015-04-30 276400_eng.xml

LED indicators

LED	Status	Description
green LED	Off	No power supply
	On	Normal functionn
red LED	Flashing rapidly	Device is in teach-in mode
	Flashing slowly	Line fault or faulty teach-in
	On	Device fault

Teach-in function

The teach-in function can be used to teach in the potentiometer start value and end value.

There are two ways of teaching in the potentiometer using the teach-in function:

- Automatic teach-in of the device in drag mode
- Manual teach-in of the start value and end value

The taught-in values remain stored under the teach-in setting. The start value is 0 % and the end value is 100 % by default.

Starting the teach-in function

Use the teach-in button located behind the cover on the front of the device to teach in the device.

1. Configure the device using the DIP switches on the side of the device.
2. Press and hold the teach-in button for longer than 3 seconds.
   The red LED will flash rapidly.
3. Automatic teach-in: Move to the start value and end value. Both values are automatically recorded in the device.
   or
   Manual teach-in: Move to the first end stop and press and hold the teach-in button for around 0.5 seconds. Move to the second end stop and press and hold the teach-in button for around 0.5 seconds.

Ending the teach-in function, saving the start value and end value

Press and hold the teach-in button for longer than 3 seconds.
The red LED no longer flashes. The values are saved.

Ending the teach-in function without saving the start value and end value

Press and hold the teach-in button for longer than 6 seconds.
or
Switch off the device.
The red LED no longer flashes. The values are not saved.

Teach-in fault

If the span between the start value and the end value is too small, the red LED will flash slowly again after saving the values.

Possible reasons for this include:

- The slider has not moved in drag mode.
- The second end stop is too close to the first end stop.

In the event of an error, the teach-in function must be performed again in its entirety.

Release date 2015-04-30 16:58 Date of issue 2015-04-30 276400_eng.xml