MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

KNICK

P 27000 H1

UNIVERSAL ISOLATED SIGNAL CONDITIONER

Used with the applicable VariTrans P27000 configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Knick P27000 User Manual TA-251.100-KNXX06, English section; adjustable H1 specifications.

Bedienungsanleitung: 1
Instructions for Use: 25
Notice d'utilisation: 49

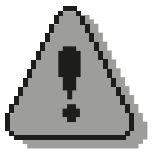
Please read this user manual before installing the device and keep it for further reference.

Knick

VariTrans® P27000
Universal Isolated Signal Conditioner

www.knick.de

1. Safety



The safety alert symbol on the device (exclamation point in triangle) means: Observe instructions!

WARNING! Protection against electric shock

For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent devices.



NOTICE

Take protective measures against electrostatic discharge (ESD) when handling the devices.

NOTICE

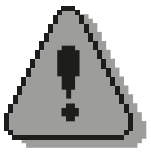
The VariTrans® P27000 universal isolated signal conditioners may only be installed by qualified and specially trained personnel authorized by the operating company. Do not connect the device to the power supply before it has been professionally installed. Do not change the measuring range during operation. Observe national codes and regulations during installation and when selecting cables and lines.

The device must be provided with a means to disconnect it from all operating energy supply sources. The disconnecting device must disconnect all current-carrying conductors. (It must be easily accessible and clearly identifiable by the operator.)

The mains supply must be protected by a fuse of 20 A max.

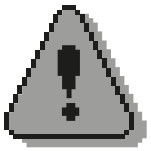
Conditions for Safe Use

The device must be installed in a suitable housing with minimum IP54 protection. The housing, provided by the end user, must be of a type that can only be opened using tools.



WARNING! EXPLOSION HAZARD

Only connect or disconnect electrical equipment when the power is switched off or if the area is known to be non-hazardous.



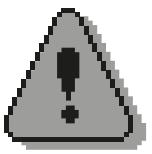
WARNING! EXPLOSION HAZARD

Approval from Knick is required prior to the replacement of any components.

2. Intended Use

The P27000 universal isolated signal conditioners are used for galvanic isolation and conversion of signals in the range from ±20 mV … ±200 V and ±0.1 mA … ±100 mA. Depending on the model, input and output signals are either permanently set, or you can select calibrated ranges by means of DIP switches. The preset measuring ranges do not have to require fine adjustment. Other transmission ranges are continuously adjustable within the aforementioned ranges using potentiometers. Signal transmission is linear. The broad-range power supply enables operation of the devices with voltages from 20 to 253 V AC/DC.

Type H1 is connected by means of pluggable screw terminals, type F1 by means of fixed screw terminals.



Warning Against Misuse

Do not operate the device outside the conditions specified by the manufacturer, as this may result in hazards to operators or malfunctions.

Nameplates

Information on the device configuration can be found on the nameplate. The nameplate is the primary source of information regarding the device specifications. This applies to all adjustable, non-adjustable, and custom devices, as well as to special device models.

VariSoft SW 108 Adjustment Tool

Our VariSoft SW 108 software tool is available for easier adjustment. Download at **www.knick.de** or ask for a CD.

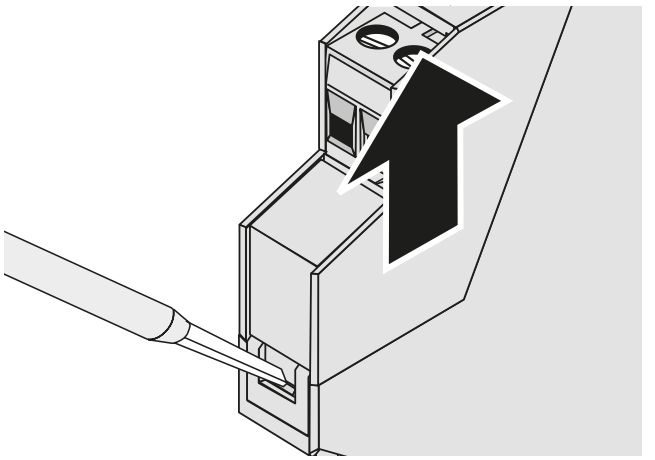
3. Configuration (P27000 F1 and P27000 H1 only)

3.1 Tools

A screwdriver with a width of 2.5 mm is required to open the device and to connect the wires to the screw terminals.

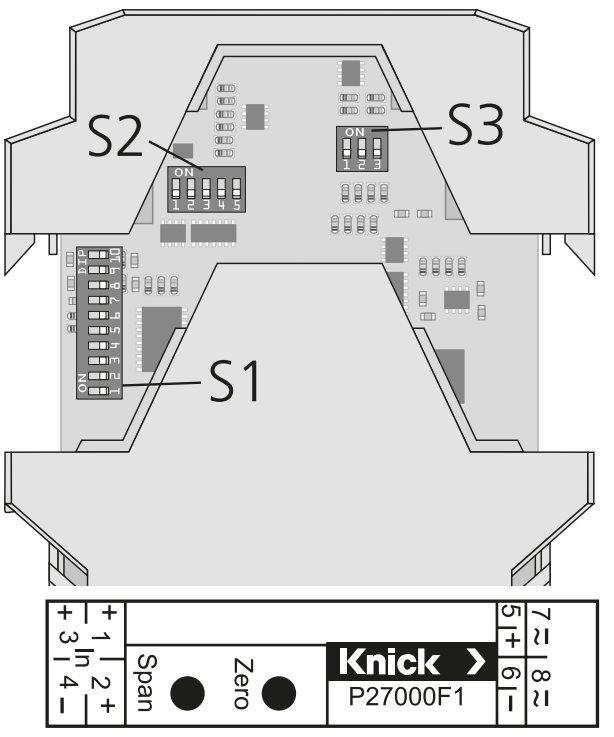
3.2 Opening the Device

Disengage the top part of the housing on both sides using the screwdriver. Pull out the top part of the housing and the electronics section until they lock.



3.3 Settings

Adjust the input and output ranges, offset, and bandwidth using DIP switches S1, S2, and S3 as indicated in the following tables. When selecting a variable gain or offset setting, additional adjustments can be made using the Span (gain) or Zero (offset) potentiometers accessed from the front.



NOTICE

Only use a screwdriver that is properly insulated against the voltage applied to the input when performing fine adjustment of the potentiometers on the front.

Input	**S1**				**S2**				**Terminals**	
Input range	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**+**	**-**
0 ... ± 60 mV								ON	2	4
0 ... ± 100 mV	ON							ON	2	4
0 ... ± 150 mV		ON						ON	2	4
0 ... ± 300 mV	ON	ON						ON	2	4
0 ... ± 500 mV			ON					ON	2	4
0 ... ± 1 V	ON		ON			ON		ON	3	4
0 ... ± 5 V		ON	ON			ON		ON	3	4
0 ... ± 10 V	ON	ON	ON			ON		ON	3	4
0 ... ± 100 V				ON			ON	ON	3	4
0 ... approx. ± 0.3 mA	ON			ON	ON			ON	2	4
0 ... ± 1 mA		ON		ON	ON			ON	2	4
0 ... ± 5 mA	ON	ON		ON	ON			ON	2	4
0 ... ± 10 mA			ON	ON	ON			ON	1	4
0 ... ± 20 mA	ON		ON	ON	ON			ON	1	4
0 ... ± 50 mA		ON	ON	ON	ON			ON	1	4
4 ... 20 mA*	ON	ON	ON	ON	ON			ON	1	4

Switch S2	**4**
Calibrated ranges	ON
Span potentiometer: 0.33 ... 3.30 x full scale value	

* Offset selection (page 5) is not calibrated for the 4 … 20 mA input range.

Output			**S1**			**S3**	
Output range	Output span	End value	**5**	**6**	**7**	**1**	**2**
0 ... ± 10 V	10 V	10 V				ON	ON
2 ... 10 V	8 V	10 V	ON			ON	ON
0 ... ± 5 V	5 V	5 V		ON		ON	ON
1 ... 5 V	4 V	5 V	ON	ON		ON	ON
0 ... ± 20 mA	20 mA	20 mA			ON		
4 ... 20 mA	16 mA	20 mA	ON		ON		

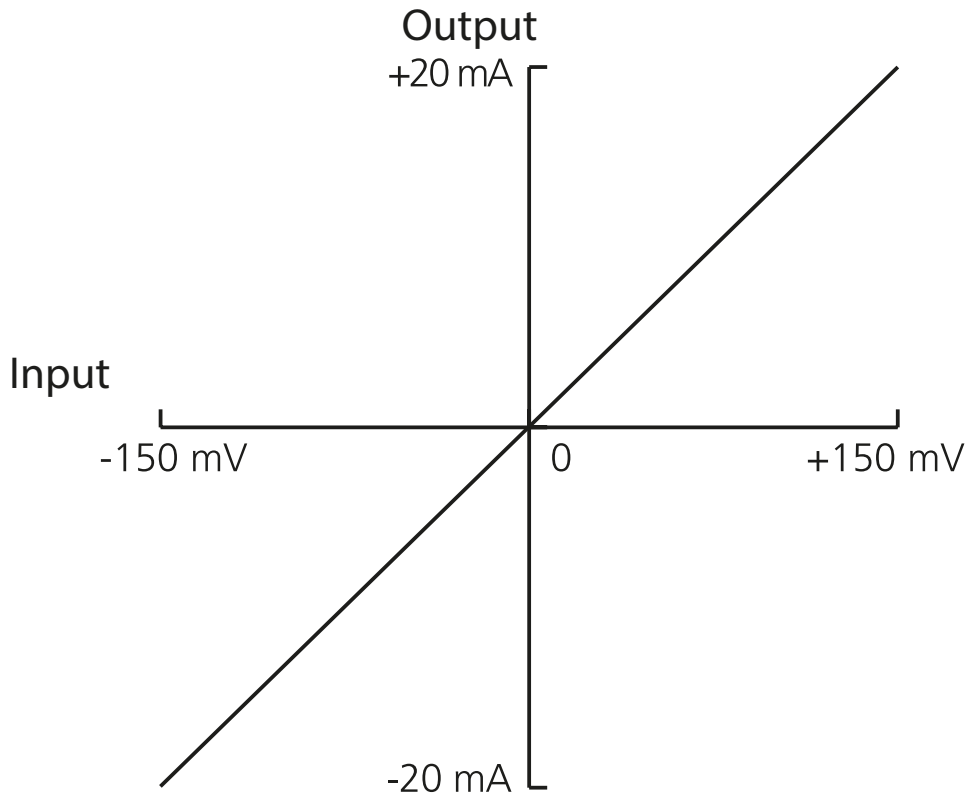
Offset (in % of output span)	**S1**			**S2**
	8	**9**	**10**	**5**
0 %				ON
-100 %	ON			ON
-50 %		ON		ON
+50 %	ON	ON		ON
+100 %			ON	ON
Zero potentiometer: additional ± 25 %				

	Switch S3	**3**
Bandwidth 10 kHz		
Bandwidth 10 Hz		ON

The selected range can be documented on the nameplate and front label.
Factory setting: 0 ... ±10 V / 0 ... ±10 V, 0 % offset, bandwidth 10 kHz.

3.5 Setting Examples

1. Input -150 mV ... +150 mV, output -20 mA ... +20 mA

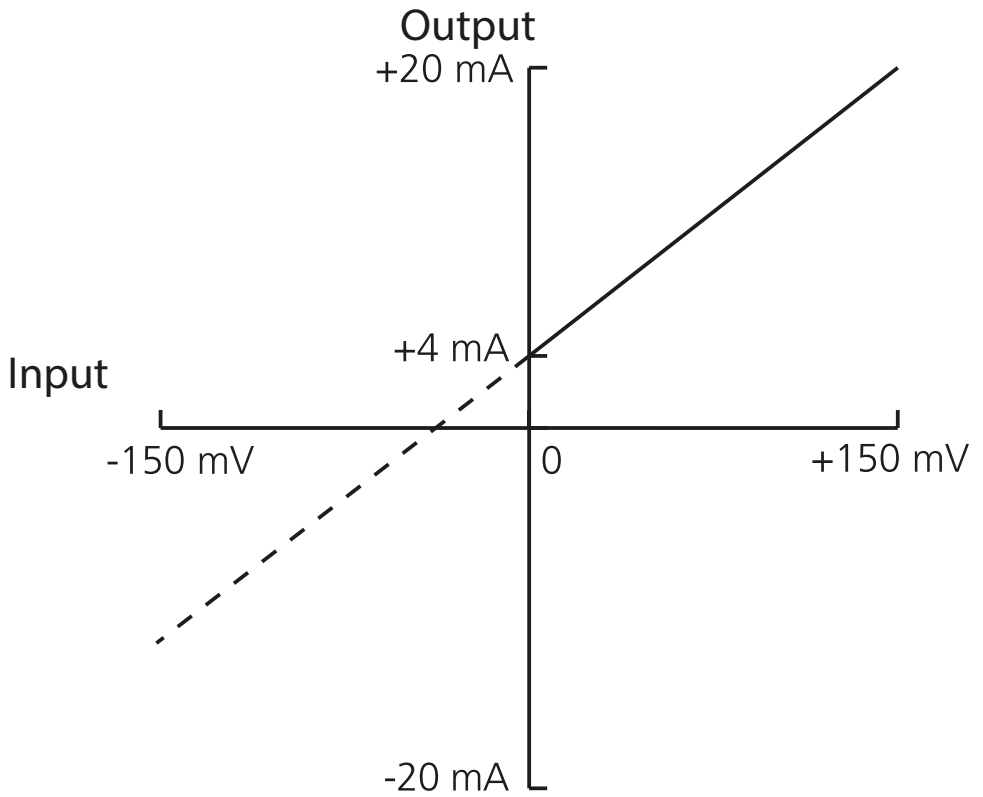


Input	**S1**				**S2**			
Input range	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
0 ... ± 150 mV		ON						ON

Output	**S1**			**S3**	
Output range	**5**	**6**	**7**	**1**	**2**
0 ... ± 20 mA			ON		

Offset (in % of output span)	**S1**			**S2**
	8	**9**	**10**	**5**
+0 %				ON

2. Input 0 ... 150 mV, output 4 ... 20 mA

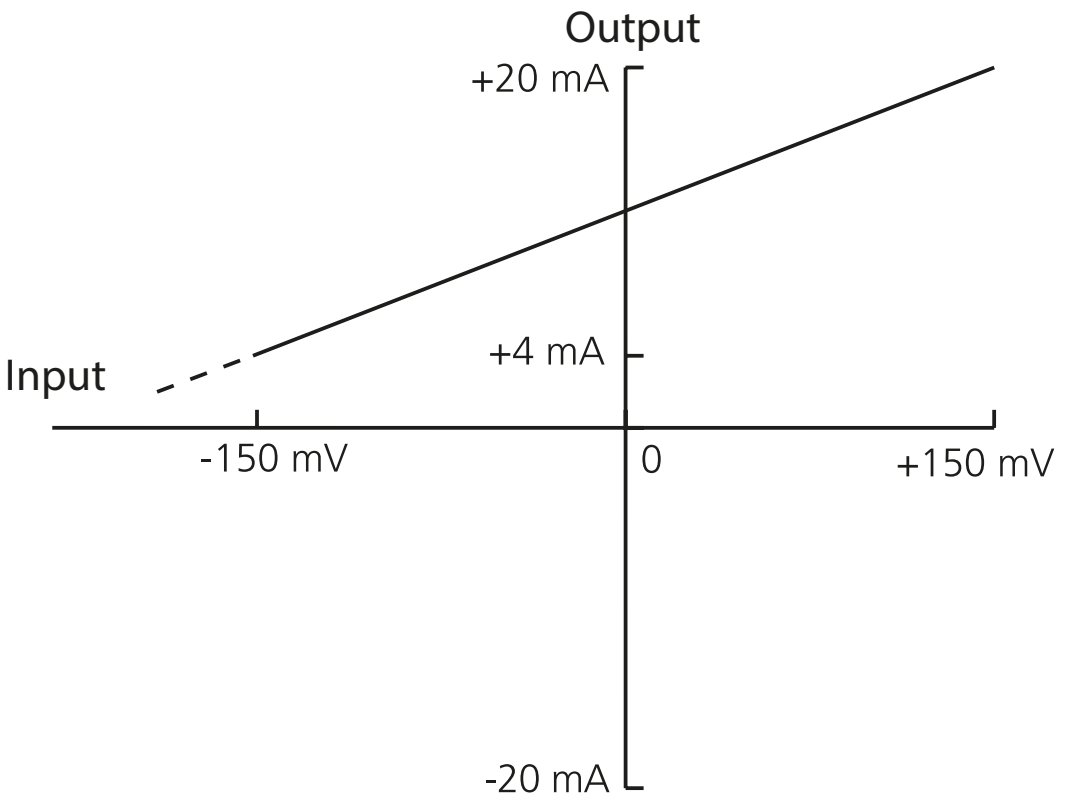


Input	**S1**				**S2**			
Input range	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
0 ... ± 150 mV		ON						ON

Output	**S1**			**S3**	
Output range	**5**	**6**	**7**	**1**	**2**
4 ... 20 mA	ON		ON		

Offset (in % of output span)	**S1**			**S2**
	8	**9**	**10**	**5**
+0 %				ON

3. Input -150 mV ... +150 mV, output 4 ... 20 mA

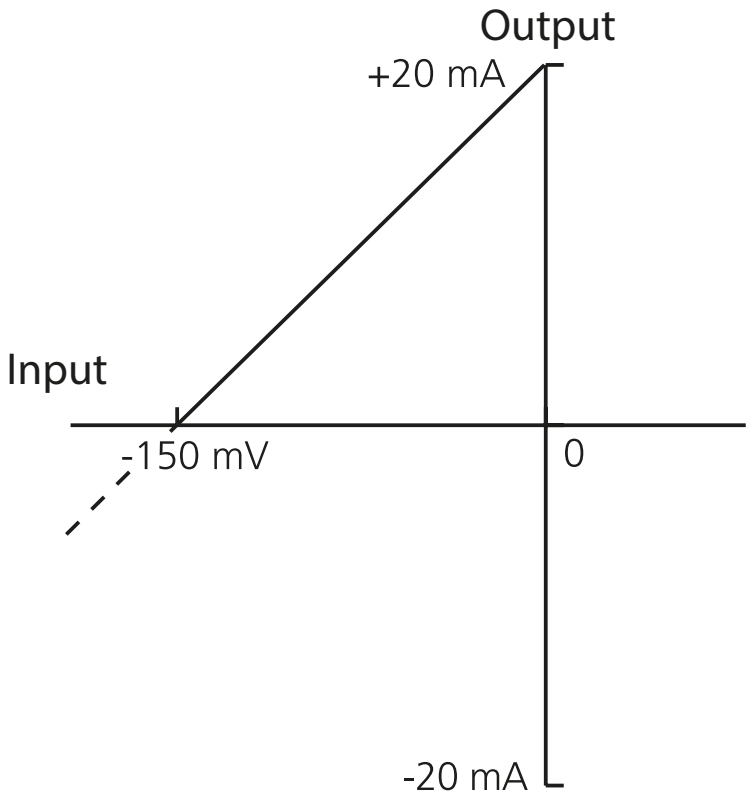


Input	**S1**				**S2**			
Input range	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
0 ... ± 300 mV	ON	ON						ON

Output	**S1**			**S3**	
Output range	**5**	**6**	**7**	**1**	**2**
4 ... 20 mA	ON		ON		

Offset (in % of output span)	**S1**			**S2**
	8	**9**	**10**	**5**
+50 %	ON	ON		ON

4. Input -150 mV ... 0, output 0 … 20 mA

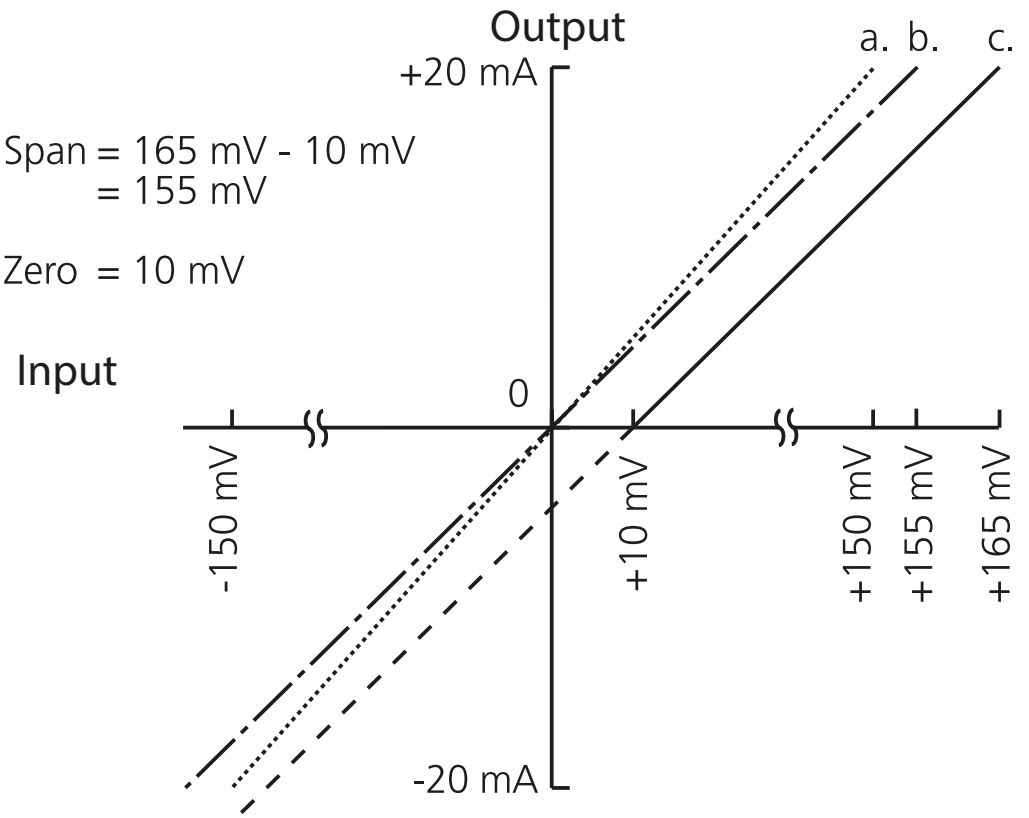


Input	**S1**				**S2**			
Input range	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
0 ... ± 150 mV		ON						ON

Output	**S1**			**S3**	
Output range	**5**	**6**	**7**	**1**	**2**
0 ... ± 20 mA			ON		

Offset (in % of output span)	**S1**			**S2**
	8	**9**	**10**	**5**
+100 %			ON	ON

5. Input +10 mV ... +165 mV, output 0 ... 20 mA



a. Switch on input range 0 ... ±150 mV,
activate span potentiometer,
switch on output range 0 ... ±20 mA and offset 0 %

Input	**S1**				**S2**			
Input range	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
0 ... ± 150 mV		ON						ON
Span potentiometer: 0.33 ... 3.30 x full scale value								

Output	**S1**			**S3**	
Output range	**5**	**6**	**7**	**1**	**2**
0 ... ± 20 mA			ON		

Offset (in % of output span)	**S1**			**S2**
	8	**9**	**10**	**5**
0 %				ON

b. Apply 155 mV to input,
set output to 20 mA using span potentiometer

c. Activate zero potentiometer,

Offset (in % of output span)				**S2**
				5
Zero potentiometer: additional ± 25 %				

Apply 10 mV to input, set output to
0 mA using zero potentiometer

3.6 Adjustment Aid for All Input and Output Values

Definitions:
In_{min} = lowest input value
In_{max} = highest input value
Out_{min} = lowest output value
Out_{max} = highest output value
OS = output span (from table on p. 7)
EV = upper end value (from table on p. 7)

1. Select Out_{min} and Out_{max} within the output range on the device (according to table on p. 7).
2. Calculate the following auxiliary variables:

$$\text{Factor } F = \frac{Out_{max} - Out_{min}}{In_{max} - In_{min}} \qquad \text{Input range IR} = \frac{OS}{F}$$

$$\text{Offset OF} = \frac{Out_{min} - (In_{min} \times F) - EV + OS}{OS} \times 100\%$$

3. Set all DIP switches to OFF
4. Set the calculated input range IR, the output range, and offset OF using DIP switches.

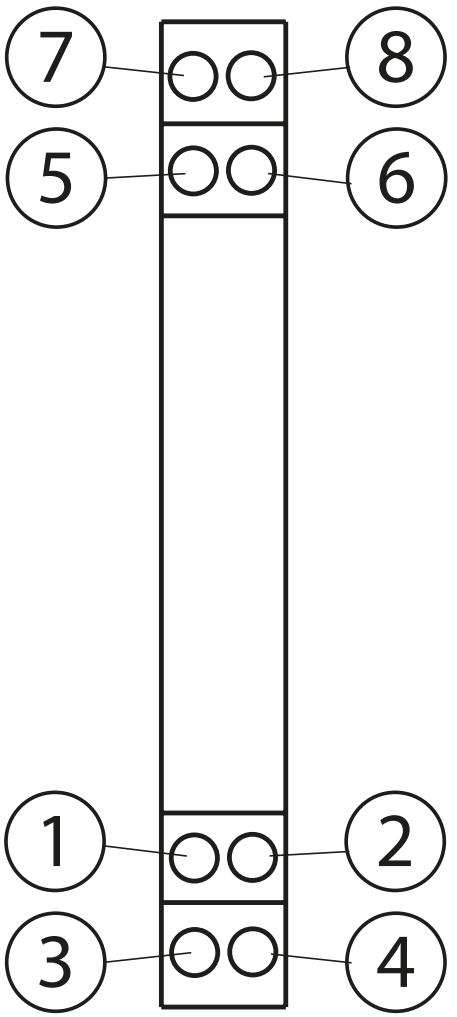
4a. If the calculated offset OF does not correspond to an offset that can be set using the DIP switches, set the closest possible offset (see table on p. 7) and activate the zero potentiometer (switches S 2-5 OFF). Short-circuit the input and adjust the output to Out_{min} - (In_{min} x F).

4b. If the calculated input range IR does not correspond to a range that can be set using the DIP switches, set the largest possible range within 0.33 x IR ... 3.30 x IR (see table on p. 6) and activate the span potentiometer (switches S 2-4 OFF). Modulate the input with a value ≠ 0 (see table on p. 6 for terminals) and adjust the output to the required value (e.g., apply In_{max}, adjust to Out_{max}).

4. Assembly

The universal isolated signal conditioners are mounted on standard TS 35 rails.

5. Electrical Connection



Terminal Assignments

1 Input +> 5 mA
2 Input +≤ 500 mV / ≤ 5 mA
3 Input +> 500 mV
4 Input –

5 Output +
6 Output –
7 Power Supply ≂
8 Power Supply ≂

Conductor cross-section max. 2.5 mm^2
Multi-wire connection max. 1 mm^2
(two wires with equal diameters)
AWG 30-12, tightening torque 0.7 Nm
Wiring has to be suitable for a
temperature of min. 75 °C.

NOTICE

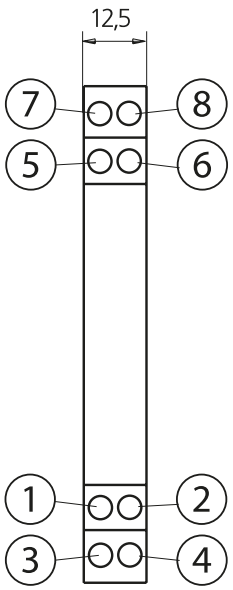
Do not operate inputs for current and voltage simultaneously!
For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent devices.

5.1 Power Supply

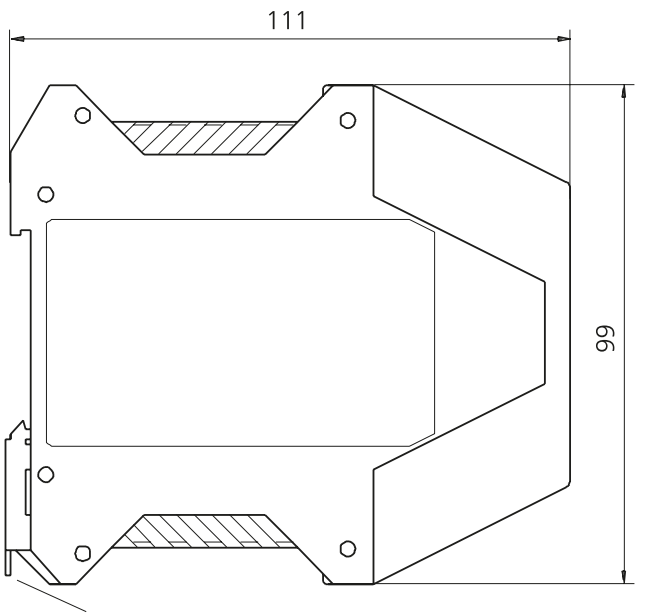
22 ... 230 V AC/DC ± 10 %; 0.9 W; AC 48 ... 62 Hz; 2.5 VA;
(overvoltage category II)

6. Dimensions

• Type F1: with fixed screw terminals

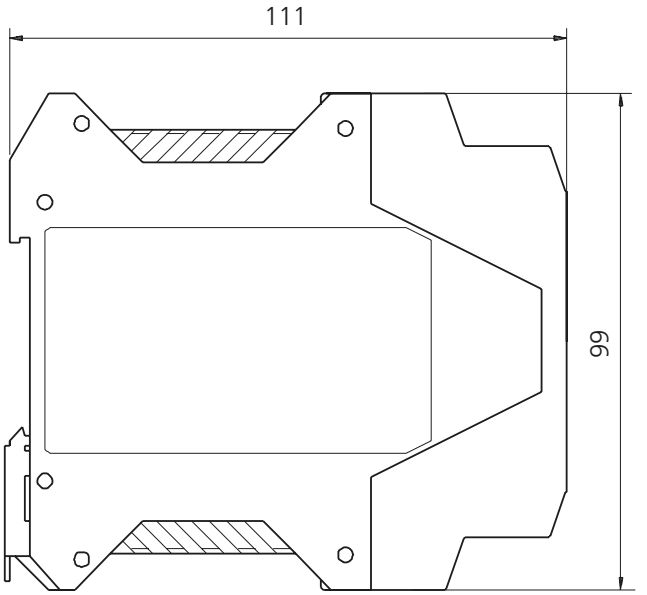


Screw terminals



Metal interlock to attach to mounting rail

• Type H1: with pluggable screw terminals



7. Declarations, Certificates, and Approvals



Special conditions and danger points!
Observe the safety information and instructions on safe use of the product as outlined in the product documentation.



CE Mark
Attaching the CE marking to the product means that the product satisfies the applicable requirements specified in the European Union harmonization legislation.



Combined UL mark for Canada and the United States
UL Listed: File No. E340287, Standard: UL 61010-1,
CAN/CSA C22.2 No. 61010-1



Conformity Mark for the Maritime Sector
DNV CLASS GUIDELINE DNV-CG-0339
Certificate No. TAA00002HA
Ships, offshore units,
high speed and light craft
Location classes:
Temperature B, Humidity B,
Vibration B, EMC B, Enclosure A



Conformity Mark for the United Kingdom of Great Britain and Northern Ireland
UK Conformity Assessed

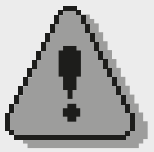
8. Order Information

Adjustable Devices		**Order No.**	
		with pluggable screw terminal	with fixed screw terminal
P27000 universal isolated signal conditioner, adjustable		P27000 H1	P27000 F1
Non-Adjustable Devices		**Order No.**	
Input	Output	with pluggable screw terminal	with fixed screw terminal
0 ... ±20 mA	0 ... ±20 mA	P 27016 H1	P 27016 F1
0 ... ±20 mA	0 ... ±10 V	P 27018 H1	P 27018 F1
0 ... ±60 mV	0 ... ±20 mA	P 27056 H1	P 27056 F1
0 ... 60 mV	4 ... 20 mA	P 27057 H1	P 27057 F1
0 ... ±60 mV	0 ... ±10 V	P 27058 H1	P 27058 F1
0 ... ±150 mV	0 ... ±20 mA	P 27066 H1	P 27066 F1
0 ... 150 mV	4 ... 20 mA	P 27067 H1	P 27067 F1
0 ... ±150 mV	0 ... ±10 V	P 27068 H1	P 27068 F1
0 ... ±300 mV	0 ... ±20 mA	P 27076 H1	P 27076 F1
0 ... 300 mV	4 ... 20 mA	P 27077 H1	P 27077 F1
0 ... ±300 mV	0 ... ±10 V	P 27078 H1	P 27078 F1
0 ... ±500 mV	0 ... ±20 mA	P 27086 H1	P 27086 F1
0 ... 500 mV	4 ... 20 mA	P 27087 H1	P 27087 F1
0 ... ±500 mV	0 ... ±10 V	P 27088 H1	P 27088 F1
0 ... ±1 V	0 ... ±20 mA	P 27096 H1	P 27096 F1
0 ... 1 V	4 ... 20 mA	P 27097 H1	P 27097 F1
0 ... ±1 V	0 ... ±10 V	P 27098 H1	P 27098 F1
0 ... ±10 V	0 ... ±20 mA	P 27036 H1	P 27036 F1
0 ... ±10 V	0 ... ±10 V	P 27038 H1	P 27038 F1

9. Specifications

Input Data	
Inputs Voltage	(See also 8. Order Information) Configurable from 20 mV ... 200 V and switchable in calibrated steps: 60 mV, 100 mV, 150 mV, 300 mV, 500 mV, 1 V, 5 V, 10 V, 100 V, unipolar/bipolar
Current	Configurable from 0.1 mA ... 100 mA and switchable in calibrated steps: 0.3 mA, 1 mA, 5 mA, 10 mA, 20 mA, 50 mA unipolar/bipolar and 4 … 20 mA[1)]
Input resistance Current input:	
Ranges ≤ 5 mA	Approx. 100 Ω
Ranges > 5 mA	Approx. 5 Ω
with voltage input:	Approx. 1 MΩ
Input capacitance Current input:	Approx. 1 nF
with voltage input:	
Ranges ≤ 500 mV	Approx. 1 nF
Ranges > 500 mV	Approx. 500 pF
Overload capacity Current input	
Ranges ≤ 5 mA	≤ 100 mA
Ranges > 5 mA	≤ 300 mA
with voltage input:	
Ranges ≤ 500 mV	Limited by 36 V suppressor diode, permitted continuous current ≤ 20 mA
Ranges > 500 mV	Limited by 250 V suppressor diode, permitted continuous current ≤ 3 mA

Output Data	
Output	(See also 8. Order Information) 20 mA, 5 V, 10 V unipolar/bipolar and 4 ... 20 mA, 1 ... 5 V and 2 ... 10 V, calibrated selection
Offset	-100 %, -50 %, 0 %, 50 %, 100 % of span of the selected output range
Load With output current: With output voltage:	 ≤ 12 V[2)] (600 Ω at 20 mA) ≤ 10 mA (1 kΩ at 10 V)
Offset	20 µA or 10 mV
Ripple	< 10 mV_{rms}
General Data	
Adjustment range ZERO pot	±25 % span of selected output range
Adjustment range SPAN pot	0.33 ... 3.30 x full scale value of selected input range (max. V_{in} = 200 V)
Gain error	< 0.08 % of measured value
Temperature coefficient[3)]	< 50 ppm/K full scale
Cutoff frequency	> 10 kHz, < 10 Hz switchable
Test voltage	5 kV AC across input and output 4 kV AC across output and power supply
Working voltage[4)] (basic insulation)	1 kV~ for overvoltage category II and pollution degree 2 according to EN 61010-1 For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent devices.

Protection against electric shock[4)] 	Protective separation according to EN 61140 through reinforced insulation according to EN 61010-1 for overvoltage category II and pollution degree 2. Working voltages: up to 600 V AC/DC across input and output, up to 300 V AC/DC across output and power supply, up to category II and pollution degree 2. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent devices.
EMC[5)]	EN 61326
Surge withstand	5 kV, 1.2/50 µs, according to IEC 255-4
Ambient temperature 	Operation -10 ... +70 °C Transport and storage -40 ... +85 °C
Ambient conditions	Stationary, weather-protected application Relative humidity 5 ... 95 %, no condensation Barometric pressure: 70 ... 106 kPa, altitude up to 2000 m water or wind-driven precipitation (rain, snow, hail) excluded
Power supply 	22 ... 230 V AC/DC ± 10 %; 0.9 W; AC 48 ... 62 Hz, 2.5 VA (overvoltage category II)
Design	Modular housing, see dimension drawings Type H1 with pluggable screw terminals Type F1 with fixed screw terminals
Protection	IP 20
Weight	Approx. 150 g

Explosion protection 	US:	Class I Div.2 GRP A,B,C,D T4 Class I Zone 2 AEx nA IIC T4
	Canada:	Class I Zone 2 Ex nA IIC T4 X Class I Div.2 GRP A,B,C,D T4

1) Offset selection not calibrated for the 4 … 20 mA input range
2) Higher output load on request
3) Average TC in specified operating temperature range -10 ˚C … +70 ˚C
4) cULus certification: Working voltage (basic insulation) up to 600 V,
   working voltage (reinforced insulation) up to 300 V across input and output, each for overvoltage category II and pollution degree 2
5) Slight deviations are possible while there is interference