

SITRANS I

Supply units and input isolators

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Output isolator HART (FSK)

You can download all instructions, catalogs and certificates for SITRANS I free of charge at the following Internet address:




www.siemens.com/sitransi

Supply units and input isolators

SITRANS I

Product overview

Overview

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Isolating power HART (FSK) 	Isolating power supply for two-wire transmitters	SITRANS I Isolating power supply HART for rail mounting, with intrinsically-safe input.	7/3
Transmitter power supply/input isolator 	Power supply for two-wire transmitters. As input isolator for transformation and electrical isolation of standard signals.	SITRANS I Transmitter power supply/input isolator for rail mounting, adaptable to various applications.	7/5
Output isolator HART (FSK) 	Output isolator for control of actuators	SITRANS I Output isolator HART for rail mounting, with intrinsically-safe output.	7/8

Supply units and input isolators

SITRANS I

Isolating power supply HART (FSK)

Overview



The SITRANS I isolating power supply HART (FSK) is used to supply 2-wire transmitters and was designed for rail mounting (35 mm (1.37 inch)).

The isolating power supply has an intrinsically safe input from 4 to 20 mA and "Intrinsically safe" type of protection EEx ia/ib IIB/IIC.

Benefits

- Power supply status indication through LED on front
- HART (FSK) communication through communication sockets on the front
- Electrical isolation of input, output and power supply
- Intrinsically safe input circuit
- Designed for rail mounting (35 mm (1.37 inch))

Application

The power supply HART (FSK) is used to supply two-wire transmitters that are operated in intrinsically safe areas. It supports communication with digital transmitters through a host computer or HART communicator (hand-held communicator).

Design

The output isolator HART (FSK) is comprised of a compact plastic housing (degree of protection IP20) and is equipped with push-in screw terminals.

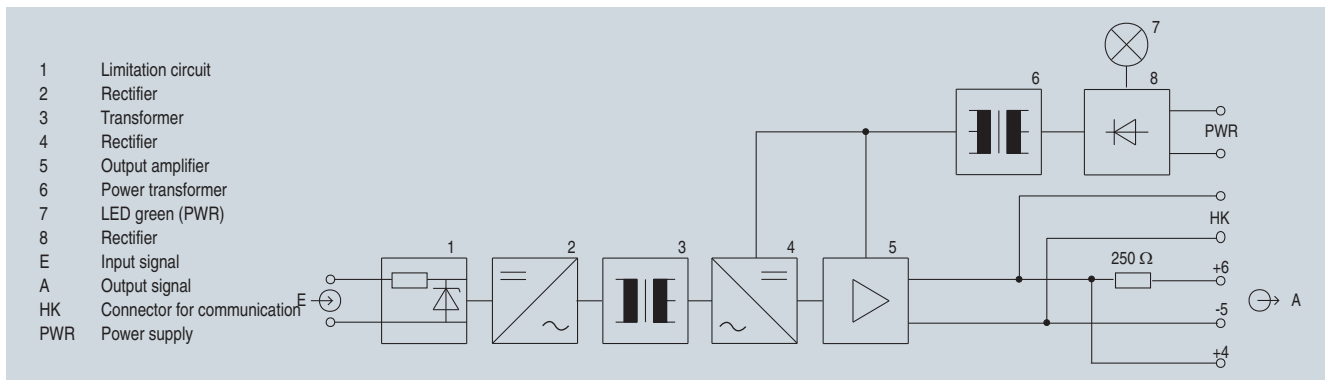
- The output isolator is designed for rail mounting (35 mm (1.37 inch))
- Power is supplied optionally as a flexible low-voltage supply from a wide-input-range power supply unit (95 to 253 V AC) or 24 V AC/DC (universal current).
- On the front are the LEDs for the power supply status indication and the communication sockets for HART (FSK) communication.
- Input, output and power supply are electrically isolated.

Function

Mode of operation

The connected transmitter is supplied intrinsically safe through a limitation circuit (1), rectifier (2) and a transformer (3). The current is mirrored to the output.

For communication with the transmitter, a HART communicator or HART modem can either be connected across the output resistance (at least 250 Ω) or to the communication sockets connected in parallel with the output (HK). The three output terminals enable the output circuit to be connected with or without the internal communication resistance (250 Ω).



Mode of operation of isolating power supply HART (FSK), SITRANS I

Technical specifications

Input

Input signal	4 ... 20 mA
Input resistance	Approx. 320 Ω
Min. voltage available at 20 mA	16 V

Output

Output signal	4 ... 20 mA
Open circuit voltage	< 24 V
Characteristic	Linear

Load

• between +4 and -5	$\leq 750 \Omega$
• between -5 and +6	$\leq 500 \Omega$
Communication	Bidirectional transfer of HART signals
• Communication range	3.6 ... 23 mA
Input monitoring	
• Signal for input short circuit	23 ... 30 mA
• Signal for open circuit	< 3.6 mA

Supply units and input isolators

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Isolating power supply HART (FSK)

Accuracy

(related to full-scale value of output signal)

Linearity	≤ 0.15 %
Output signal ripple	$U_{SS} < 1 \%$
Rise time T_{90}	≤ 0.3 ms
Influencing effect	
• of ambient temperature	≤ 0.2 %/10 K
• of change in load resistance	≤ 0.1 %/100 %
• of change in supply	≤ 0.1 %/10 %

Rated operating conditions

Ambient conditions

Ambient temperature	-20 ... +65 °C (-4 ... +149 °F)
Storage temperature	-40 ... +85 °C (-40 ... +185 °F)
Functional temperature	-25 ... +70 °C (-13 ... +158 °F)

Degree of protection EN 60529

IP20

Electromagnetic compatibility

• Interference immunity	According to EN 50082-2 and NAMUR NE 21
• Emitted interference	According to EN 50081-1

Design

Construction	Compact plastic housing for rail mounting
Weight	Approx. 0.15 kg (0.33 lb)
Dimensions	See "Dimensional drawings"
Enclosure material	PC/GV 25
Electrical connection	Plug-in screw terminals, max 2.5 mm ² (0.098 inch ²)

Power supply

Functional extra-low voltage	According to DIN 57100, VDE 0100 Part 410
• With safe isolation	≤ 50 V AC, ≤ 20 V DC
• Universal current 24 V AC/DC	24 V AC ± 15 %, 47 ... 63 Hz, 20 ... 32 V DC
• AC voltage	95 ... 253 V AC, 47 ... 63 Hz
Power consumption at rated voltage	• < 2.5 W (24 V DC) • < 3 VA (24 V AC) • < 3.5 VA (230 V AC)
Residual ripple within the specified voltage limits	$U_{SS} \leq 2.5 \text{ V}$

Electrical isolation between	• Power supply and input • Power supply and output • Input and output
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Certificates and approvals

Intrinsically safe input circuit	
"Intrinsically safe" type of protection	II (1) G EEx [ia/ib] IIB/IIC
• EC type test certificate	TÜV 99 ATEX 1498

External standards and guidelines

Low-voltage guideline	According to DIN EN 61010
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Selection and Ordering data

Order No.

SITRANS I isolating power supply HART (FSK) ▶ **7 NG 4 1 2 2 - 1 A 1 0**

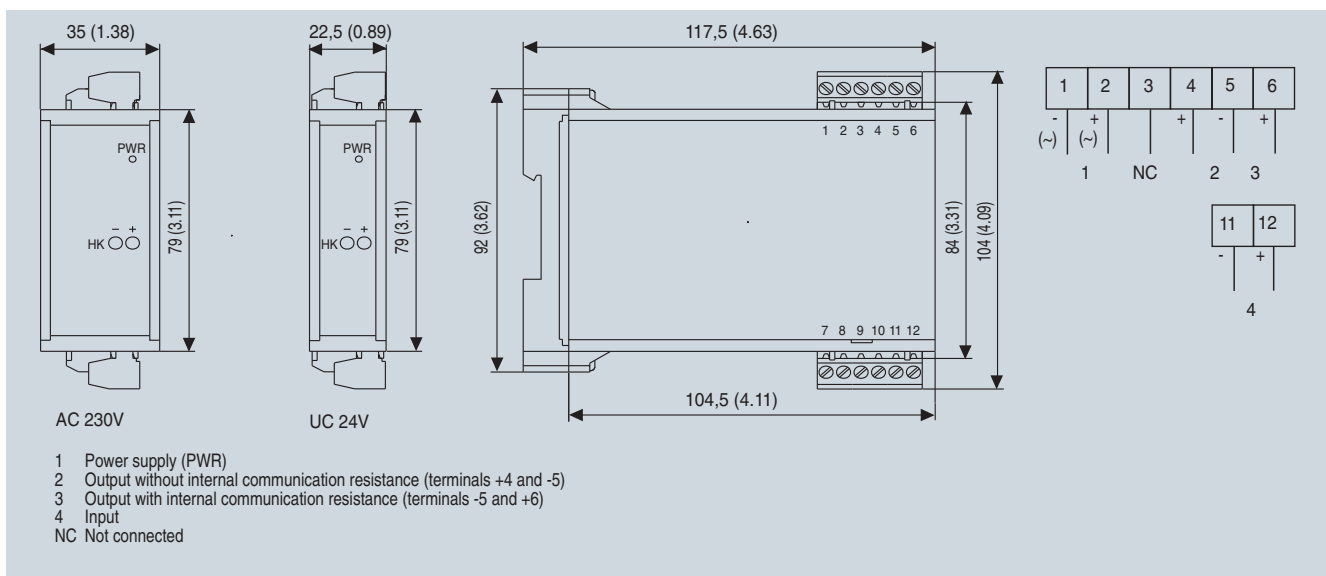
Rail mounted to supply two-wire transmitter, output 4 ... 20 mA, intrinsically safe input 4 ... 20 mA, EEx ia/ib IIB/IIC

Power

• 24 V AC/DC (22.5 mm (0.89 inch) width)	▶	A
• 95 ... 253 V AC (35 mm (1.38 inch) width)	▶	B

▶ Available ex stock

Dimensional drawings



Dimension drawing and connections, isolating power supply HART (FSK), SITRANS I, dimensions in mm (inch)

Overview



The compact SITRANS I combination power supply for transmitters / input isolators is used to supply 2-wire transmitters and was designed for the electrical isolation and transformation of standard signals.

The required input and output signals are selected with the help of the measuring range switch on the front.

Benefits

- Input signal can be selected (supplying, current or voltage output)
- Output signal can be selected (current or voltage output)
- Transfer function can be switched over (0/4 to 20 mA, 0/2 to 10 V to 0/4 to 20 mA, 0/2 to 10 V)
- Electrical isolation between input, output and power supply
- Power supply status indication through LED on front

Application

The 7NG4123 transmitter power supply and input isolator is used for the transformation and electrical isolation of standard signals. When it is implemented as a transmitter power supply, it is used for supplying power and transferring signals to two-wire transmitters.

Design

The 7NG4123 transmitter power supply and input isolator is comprised of a compact plastic housing with degree of protection IP 20 and is equipped with push-in screw terminals.

- The device is designed for rail mounting (35 mm (1.37 inch))
- Power is supplied optionally as a flexible low-voltage supply from a wide-input-range power supply unit (95 to 253 V AC) or 24 V AC/DC (universal current).
- On the front are the LEDs for the power supply status indication and the measuring range switch.
- Input, output and power supply are electrically isolated.

Function

Mode of operation

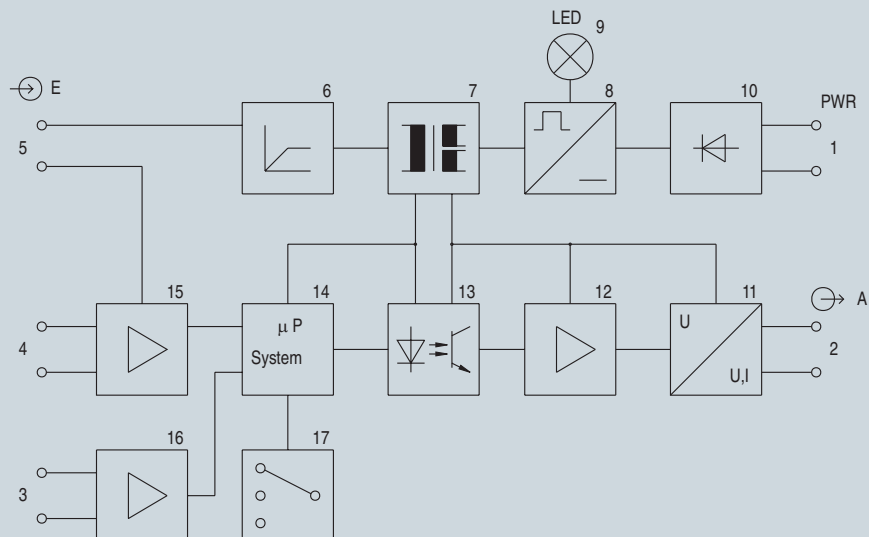
The input signal is applied to the respective input amplifier and converted by a microcontroller in accordance with the transfer function before reaching the output amplifier through an opto-coupler. The signal is amplified and output again as a standard signal (current/voltage).

When operating as a transmitter power supply, the connected transmitter is supplied and the transmitter load current is applied to the input amplifier (1). The transfer function can be switched over with the measuring range switch (0/4 to 20 mA, 0/2 to 10 V to 0/4 to 20 mA, 0/2 to 10 V). Calibration is not necessary because all characteristics are stored in the microcontroller.

The electrical isolation ensures that the power supply, input circuits and output circuits are completely decoupled for low-current transfer of the measured values.

The measuring range is set with the measuring range switch on the front.

- | | |
|-----|--------------------------------|
| A | Output |
| E | Inputs |
| 1 | Power supply |
| 2 | Output |
| 3 | Voltage input |
| 4 | Current input |
| 5 | Supplying input |
| 6 | Limiter |
| 7 | Electrical isolation |
| 8 | Chopper/switching power supply |
| 9 | LED green (PWR) |
| 10 | Rectifier |
| 11 | U/U, I transformer |
| 12 | Output amplifier |
| 13 | Opto-coupler |
| 14 | Microcontroller |
| 15 | Input amplifier (I) |
| 16 | Input amplifier (U) |
| 17 | Range switch |
| PWR | Power supply |



Mode of operation of transmitter power supply and input isolator, SITRANS I

Supply units and input isolators

SITRANS I

Transmitter power supply/input isolator

Plug-in jumpers

Technical drawing showing front and rear views of the transmitter power supply/input isolator. Dimensions are provided in mm (inch): 35 (1.38) for the top width, 22.5 (0.89) for the top width of the right side, and 79 (3.11) for the height. Labels include PWR, PWR-LED, and Range switch.

Range switch (on front plate)			
Position	Input	Output "I"	Output "U"
0	4 ... 20 mA	4 ... 20 mA	2 ... 10 V
1	4 ... 20 mA	0 ... 20 mA	0 ... 10 V
2	0 ... 20 mA	4 ... 20 mA	2 ... 10 V
3	0 ... 20 mA	0 ... 20 mA	0 ... 10 V
4	2 ... 10 V	4 ... 20 mA	2 ... 10 V
5	2 ... 10 V	0 ... 20 mA	0 ... 10 V
6	0 ... 10 V	4 ... 20 mA	2 ... 10 V
7	0 ... 10 V	0 ... 20 mA	0 ... 10 V
8	Not used		
9	Not used (on delivery)		

Plug-in jumpers
The plug-in jumpers are accessed by unscrewing the housing socket.

Output I: all jumpers in position "I" (on delivery)
Output U: all jumpers in position "U"

Rear view

Plug-in jumpers, transmitter power supply and input isolator, SITRANS I, dimensions in mm (inch)

Technical specifications

Input

Input isolator

Input signal

- Current 0/4 ... 20 mA
- Voltage 0/2 ... 10 V

Input resistance

- Current 60 Ω
- Voltage $\geq 1 \text{ M}\Omega$

Max. permissible input current 30 mA

Max. permissible input voltage 15 V

Transmitter power supply

Input signal

- Current 4 ... 20 mA
- Supplied voltage $\geq 15 \text{ V}$ with 20 mA

Signal limiting

- Current $\leq 30 \text{ mA}$
- Voltage $\leq 21 \text{ V}$

Output

Output signal

- Current 0/4 ... 20 mA
 - Voltage 0/2 ... 10 V
- Characteristic Rising, linear

Load

- With current $\leq 750 \Omega$
- With voltage $\geq 2 \text{ k}\Omega$

Signal limiting

- Current $\leq 30 \text{ mA}$
- Voltage $\leq 21 \text{ V}$

Output response

With short-circuit or open-circuit input

- Output 4 ... 20 mA or 2 ... 10 V: (input 4 ... 20 mA or 2 ... 10 V) 3.4 ... 3.6 mA or 1.7 ... 1.8 V
- Output 4 ... 20 mA or 2 ... 10 V: (input 0 ... 20 mA or 0 ... 10 V) 4 mA or 2 V
- Output 0 ... 20 mA or 0 ... 10 V: (input not relevant) 0 mA or 0 V

With short-circuit across input (supplying)

- For load $\leq 600 \Omega$ $\geq 22 \text{ mA}$ or $\geq 11 \text{ V}$

Supply units and input isolators

SITRANS I

Transmitter power supply/input isolator

Accuracy

(related to full-scale value of output signal)

Linearity	≤ 0.1 %
Zero point/amplification	≤ 0.1 %
Long-term stability	≤ 0.05 %/year
Output signal ripple	≤ 1 %
Rise time T_{90}	≤ 150 ms
Influencing effect	
• of ambient temperature	≤ 0.15 %/10 K
• of change in load resistance	≤ 0.1 %/100 %
• of change in supply	≤ 0.05 %/10 %

Design

Construction	Plastic housing
Weight	Approx. 0.2 kg (0.44 lb)
Dimensions	See "Dimensional drawings"
Enclosure material	PC/GV 25
Electrical connection	Plug-in screw terminals, max 2.5 mm ² (0.098 inch ²)

Rated operating conditions

Ambient conditions

Ambient temperature	-20 ... +65 °C (-4 ... +149 °F)
Storage temperature	-40 ... +85 °C (-40 ... +185 °F)
Functional temperature	-25 ... +70 °C (-13 ... +158 °F)
Degree of protection EN 60529	IP20
Electromagnetic compatibility	
• Interference immunity	According to EN 50082-2 and NAMUR NE 21
• Emitted interference	According to EN 50081-2

Power supply

Functional extra-low voltage	According to DIN 57100, VDE 0100 Part 410
• With safe isolation	AC < 50 V, DC < 120 V
• Universal current 24 V AC/DC	24 V AC ± 10 %, 47 ... 63 Hz, 18 ... 32 V DC
• AC voltage	95 ... 253 V AC, 47 ... 63 Hz
Power consumption at rated voltage	• 1.9 W (24 V DC) • 2 VA (24 V AC) • 3.5 VA (230 V AC)
Residual ripple within the specified voltage limits (DC)	$U_{ss} \leq 2.5$ V

External standards and guidelines

Low-voltage guideline	According to DIN EN 61010
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Selection and Ordering data

Order No.

SITRANS I transmitter power supply / input isolator ▶ **7 NG 4 1 2 3 - 1 N 0 0**

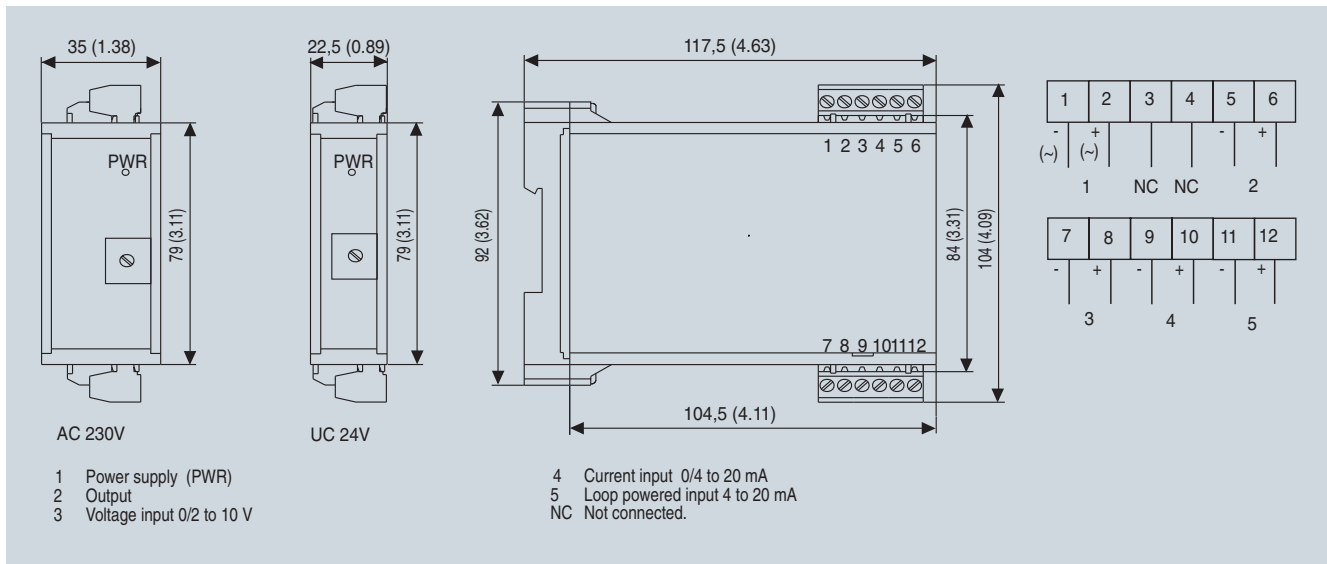
Rail-mounted to supply two-wire transmitters and electrical isolation and transformation of standard signals
Input/output signals can be selected as required via measuring range switch on front

Power supply

- 24 V AC/DC (22.5 mm (0.89 inch) width) ▶ **A**
- 95 ... 253 V AC (35 mm (1.38 inch) width) ▶ **B**

▶ Available ex stock

Dimensional drawings



Dimension drawing and connections, transmitter power supply and input isolator, SITRANS I, dimensions in mm (inch)

Supply units and input isolators

SITRANS I

Output isolator HART (FSK)

Overview



The SITRANS I output isolator HART (FSK) is used to control actuators and designed for rail mounting (35 mm (1.37 inch)).

The output isolator has an intrinsically safe output from 4 to 20 mA and "Intrinsically safe" type of protection EEx ia/ib IIB/IIC.

Benefits

- Power supply status indication through LED on front
- HART (FSK) communication through communication sockets on front
- Electrical isolation of input, output and power supply
- Intrinsically safe output circuit
- Designed for rail mounting (35 mm (1.37 inch))

Application

The output isolator HART (FSK) electrically isolates an input current signal which originated in the non-intrinsically safe area from the intrinsically safe output circuit. It supports bidirectional communication between an actuator and a host computer or HART communicator (hand-held communicator).

Design

The output isolator HART (FSK) is comprised of a compact plastic housing (degree of protection IP20) and is equipped with push-in screw terminals.

- The output isolator is designed for rail mounting (35 mm (1.37 inch))
- Power is supplied optionally as a flexible low-voltage supply from a wide-input-range power supply unit (95 to 253 V AC) or 24 V AC/DC (universal current).
- On the front are the LEDs for the power supply status indication and the communication sockets for HART (FSK) communication.
- Input, output and power supply are electrically isolated.

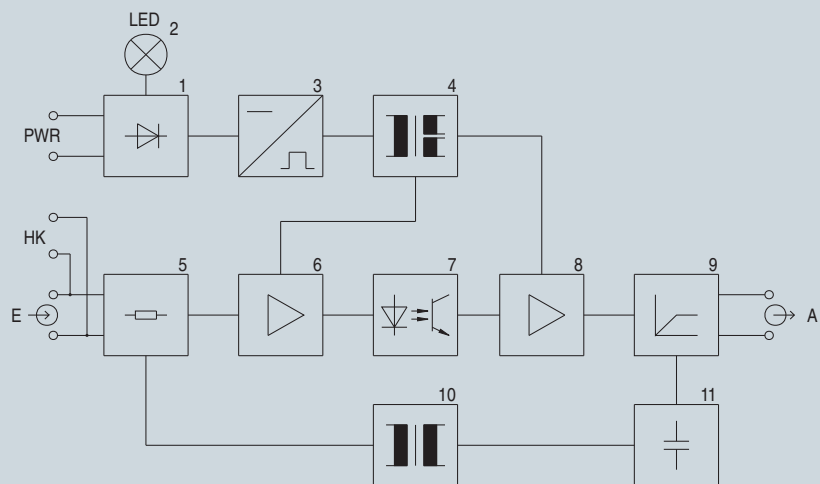
Function

Mode of operation

The input current signal is filtered and amplified. After pulse-width modulation, the input signal is transferred to the output side through an opto-coupler. A low pass filter followed by an amplifier transforms the signal into a standardized output variable.

The communication signals of a connected HART communicator are separated from the signal at the input, transferred electrically isolated to the output and added to the output signal again. Transmission through frequency shift keying is bidirectional and independent of the signal path. The HART communicator can either be connected across the input resistance (at least 250 Ω) or to the communication socket on the non-intrinsically safe side.

- 1 Rectifier
 - 2 LED green(PWR)
 - 3 Chopper
 - 4 Transformer
 - 5 Communications resistor
 - 6 Input amplifier
 - 7 Electrical isolator
 - 8 Output amplifier
 - 9 Ex limiter
 - 10 Communication isolator
 - 11 Signal coupling
- E Input signal
A Output signal
HK Front connector for communication
PWR Power supply



Mode of operation of the output isolator HART (FSK)

Supply units and input isolators

SITRANS I

Output isolator HART (FSK)

Technical specifications

Input

Input signal	
• Current	4 ... 20 mA
Transferred from HART (FSK) signals in the Ex zone	
Input resistance current HART (FSK)	≤ 270 Ω
Communication range	3.6 ... 22 mA

Output

Output signal	4 ... 20 mA
Characteristic	Trapezoidal
Load	≤ 750 Ω
Output response	
Settings	4 ... 20 mA / 4 ... 20 mA
• for short circuit at input	0 mA
• for open-circuit input	0 mA
Signal limiting	< 27 mA

Accuracy

(related to full-scale value of output signal)

Linearity	≤ 0.1%
Output signal ripple	< 1%
Rise time T ₉₀	≤ 100 ms
Influencing effect	Related to full-scale value of output signal
• of ambient temperature	≤ 0.1 %/10 K
• of change in load resistance	≤ 0.1 %/100 %
• of change in supply	≤ 0.01 %/15 %

Design

Construction	Compact plastic housing for rail mounting
Weight	Approx. 0.15 kg (0.33 lb)
Dimensions	See "Dimensional drawings"
Enclosure material	PC/GV 25
Electrical connection	Plug-in screw terminals, max 2.5 mm ² (0.098 inch ²)

Rated operating conditions

Ambient conditions

Ambient temperature	-20 ... +65 °C (-4 ... +149 °F)
Storage temperature	-40 ... +85 °C (-40 ... +185 °F)
Functional temperature	-25 ... +70 °C (-13 ... +158 °F)
Degree of protection EN 60529	IP20
Electromagnetic compatibility	
• Interference immunity	According to DIN EN 50082-2 and NAMUR NE 21
• Emitted interference	According to DIN EN 50081-2

Power supply

Functional extra-low voltage	According to DIN 57100, VDE 0100 Part 410
• With safe isolation	AC < 50 V, DC < 120 V
Universal current 24 V AC/DC	24 V AC ± 10%, 47 ... 63 Hz, 18 ... 32 V DC
AC voltage	95 ... 253 V AC, 47 ... 63 Hz
Power consumption at rated voltage	<ul style="list-style-type: none"> • < 1.4 W (24 V DC) • < 2 VA (24 V AC) • < 3.2 VA (230 V AC)
Residual ripple within the specified voltage limits (DC)	U _{ss} ≤ 2.5 V
Electrical isolation between	<ul style="list-style-type: none"> • Power supply and input • Input and output • Power supply and output

Certificates and approvals

	Intrinsically safe output circuit
"Intrinsically safe" type of protection	II (1) G EEx [ia/ib] IIB/IIC
• EC type test certificate	TÜV 99 ATEX 1480

External standards and guidelines

Low-voltage guideline	According to DIN EN 61010
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Selection and Ordering data

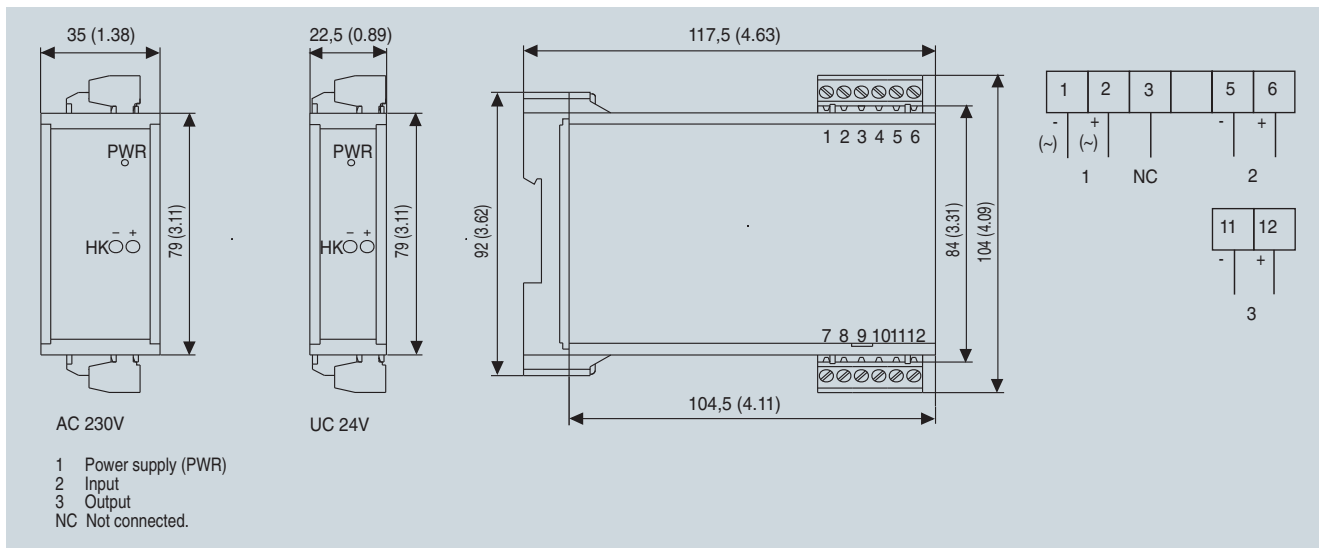
	Order No.
SITRANS I output isolator HART	7 NG 4 1 3 0 - 1 A 1 1
Rail-mounted, input 4 ... 20 mA, intrinsically safe input 4 ... 20 mA, EEx ia/ib IIB/IIC	
Power supply	
• 24 V AC/DC (22.5 mm (0.89 inch) width)	A
• 95 ... 253 V AC (35 mm (1.38 inch) width)	B
▶ Available ex stock	

Supply units and input isolators

SITRANS I

Output isolator HART (FSK)

Dimensional drawings



Dimension drawing and connections, output isolator HART (FSK), SITRANS I, dimensions in mm (inch)