Signal Conditioners

Edition 908837 (US) / 208599 (EU) 11/2010

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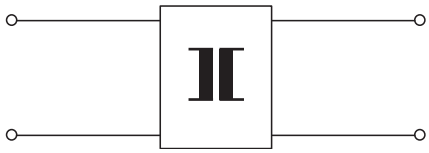
PEPPERL+FUCHS
PROTECTING YOUR PROCESS

With the variety of process control systems available, it is often necessary to convert an input signal into a format that the system will accept. Signal conditioners take signals from an assortment of field instruments such as thermocouples and RTDs, and convert those signals into any of several standard instrument signals (1 V to 5 V, 4 mA to 20 mA, etc.). Signal conditioners are also beneficial to the accurate transfer of these signals, isolation, and the elimination of ground loops.

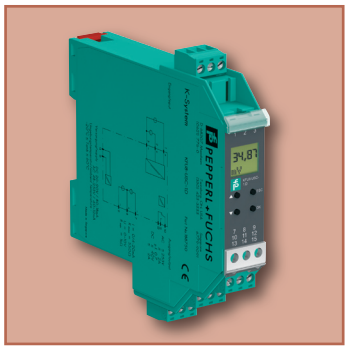
Operating principle



The key to process control is accuracy both in measurement and in signal conditioning. The biggest and most overlooked threat to effective process control is the presence of ground loops. Whenever analog data is transferred through long cable runs, there is a high probability that ground loop problems will occur.
A ground loop exists when multiple earth ground connections are made in a system. A difference in potential between the grounds generates an extraneous current flow in the signal conductor.

The result is commonly known as noise. In its mildest form, noise in the signal line causes measurement offsets, incorrect sensor readings, and general signal corruption. In its most severe form, however, noise contamination can deteriorate communication to a point where control of the process is lost. Isolation between the ground circuits is essential to the prevention of ground loop currents and, therefore, the elimination of noise. Signal conditioners provide the necessary isolation as well as amplification, filtering, and linearity corrections.

K-System 566



- Broad product range
- 3-port galvanically isolated barriers
- SIL rated for safety instrumented systems
- Limit detection
- Logic functions: pushbutton programmable
- Fault detection and alarming
- Loop-powered and analog isolators

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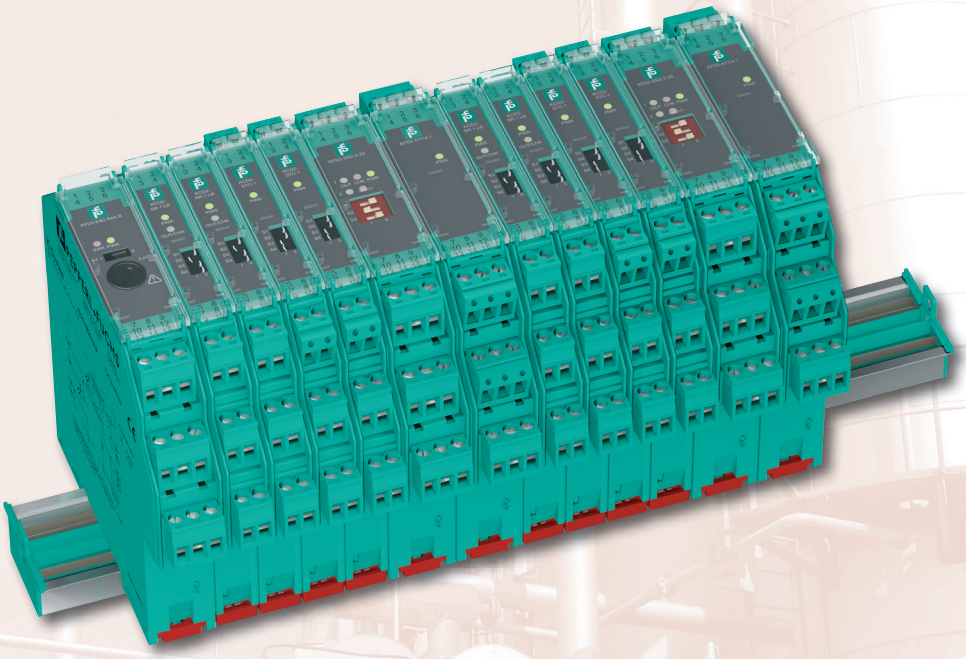
K-System



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Introduction

The K-System consists of wide range of signal conditioners suitable for mounting on 35 mm DIN rail. K-System is easy to specify, integrate and expand and has become synonymous with safety and reliability. Our extensive line of signal conditioner for safety location applications contains over 60 different models, each containing industry leading features and benefits.

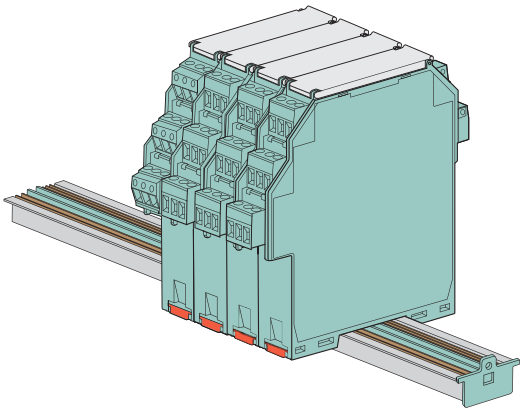

Figure 1 K-System on Power Rail

Housing types

Depending on the functionality and application, K-System has different housing widths. Whether it is the 12.5 mm KC modules or the well-proven 20 mm KF modules, the electrical and mechanical characteristics of the K-System are maintained. This collection of modules provides a wide range of interface barriers that can be combined on Power Rail.

KC module housing

Used for high signal integrity

- Compact housing, only 12.5 mm wide
- Single loop integrity
- Power loss only 0.8 W per device

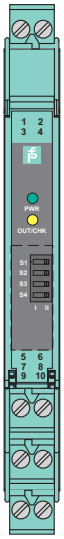

Figure 2 12.5 mm housing (KC module)

KF module housings

Used for high channel density

- 20 mm housing
- Highest packing density on the market
- As low as 5 mm per channel

Figure 3 20 mm housing (KF module)

Used for applications with high functionality

- Logic controls determine and monitor speed, direction of rotation, slip, flow rates and time
- Analog controls monitor transmitter signals, strain gauges, temperature and load cells
- Configured using **PACT***ware*™ or by push button
- Universal power supply

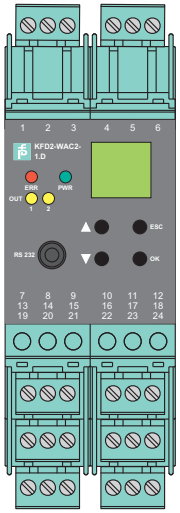

Figure 4 40 mm housing (KF module)

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Supply voltage

K-System signal conditioners are available with different supply voltages. The most widely used rating is 24 V DC; however, 115 V AC and 230 V AC are also available for applications when DC power is not available.
The universal supply units carry the complete range from 20 V DC to 90 V DC and 48 V AC to 230 V AC on the same input terminals. The supported supply voltage for each barrier is identified on the side plate.

Mounting

The K-System is mounted on a 35 mm DIN rail acc. to EN 60715. To reduce wiring and installation costs, Power Rail is the optimum solution.

Low heat dissipation allows vertical or horizontal mounting.

Power Rail

The Power Rail is a plastic insert into a standard DIN rail and contains two leads that deliver power to the modules. Power is sent through the rail by a power feed module that delivers 24 V DC at 4 A. The module uses a 5 A fuse to protect the barriers. The Power Rail virtually eliminates the risk of wiring faults and facilitates easy expansion. Power Rail is available in two versions:

- UPR-03: 3-lead version supplies two leads for power and one lead for error signal
- UPR-05: 5-lead version supplies two leads for power, one lead for error signal and two leads for serial data exchange.

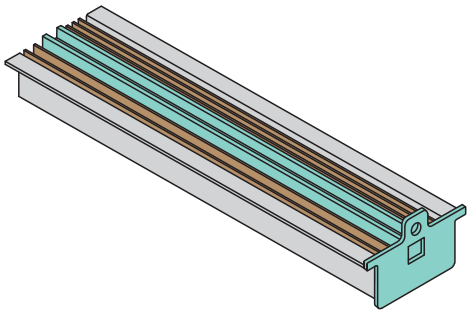

Figure 5 Universal Power Rail UPR-05

Mounting on Power Rail

As shown in the figure, the isolation modules are snapped onto the Universal Power Rail in a vertical downward movement.

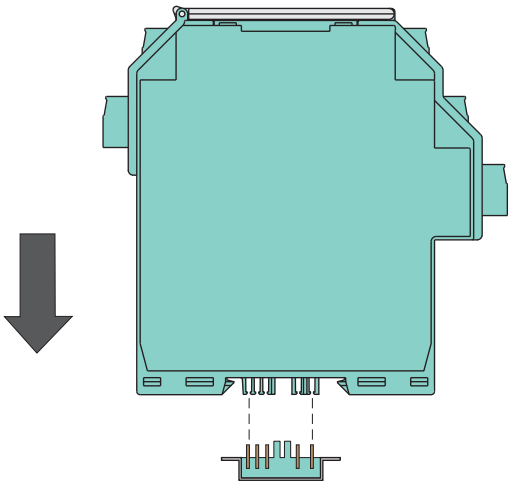

Figure 6 Proper K-System mounting

CORRECT: Device snapped on vertically.

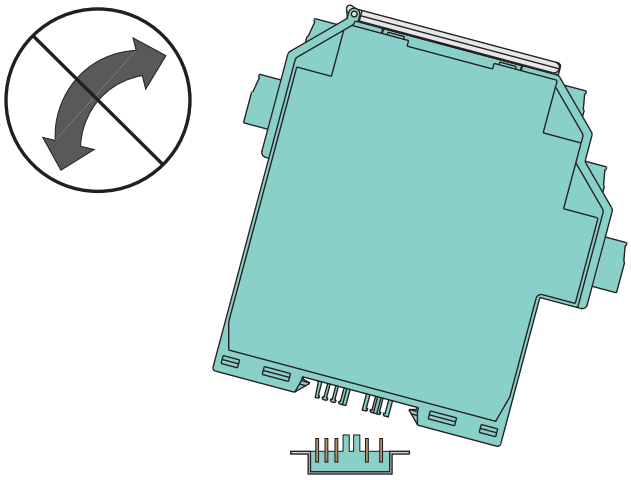

Figure 7 Improper K-System mounting

INCORRECT: Device snapped on from the side.

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Power connection to K-System

Conventional power supply without Power Rail

Conventional power supplies create complicated and expensive wiring systems. After all signal conditioners are connected, there is a significant amount of wiring and more wiring must be added for features such as lead breakage and short-circuit monitoring.

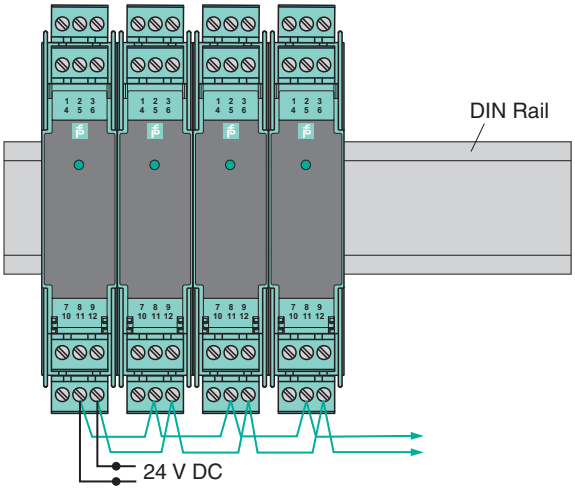

Figure 8 Conventional installation

Power supply with Power Rail

Supply with Power Feed Modules

The Pepperl+Fuchs Power Rail eliminates wiring hassles and reduces expense. The power feed module mounts on the Power Rail for easy and reliable distribution of power to all connected signal conditioners. This method eliminates all of the parallel power wiring necessary on a conventional installation without Power Rail.

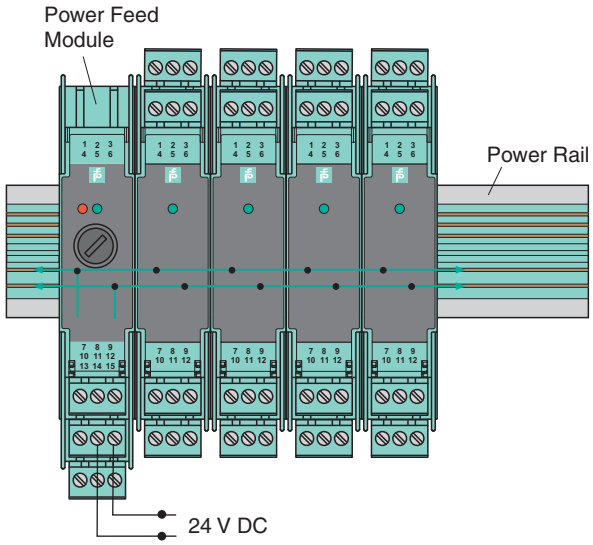

Figure 9 Power Rail installation

Redundant Supply with Power Feed Modules

Two power supplies or a redundant power supply with two power feed modules offers a high degree of safety and reliability. If a power supply is damaged or a fuse opens in a power feed module, the redundant power supply continues to energize the isolator modules through their Power Rail connection.

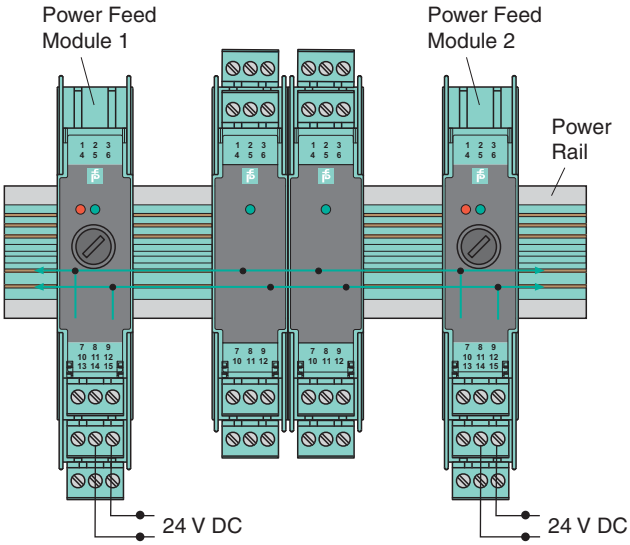

Figure 10 Redundant power connections

Direct Supply with Power Supplies

A complete power solution for a K-System installation is possible by using a 115/230 V AC to 24 V DC/4 A power supply with the KFA6-STR-1.24.4 or by using the KFA6-STR-1.24.500 that provides 24 V DC/500 mA. The power supplies snap-on the Power Rail to easily and efficiently distribute power to the signal conditioners.

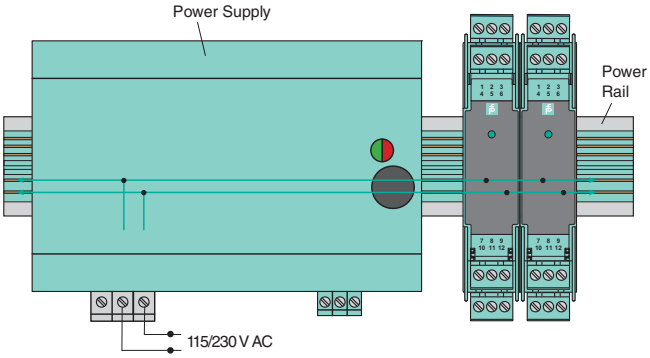

Figure 11 Integrated power supply (4 A)

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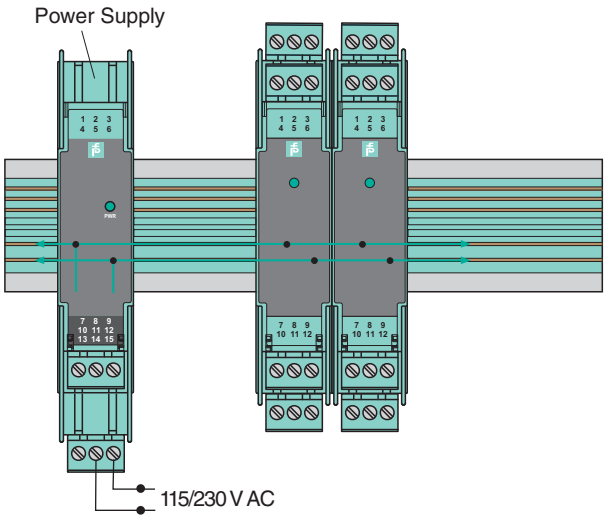

Figure 12 Integrated power supply (500 mA)

Collective error messaging

Collective error messaging enables lead breakage and short-circuit monitoring for isolator modules without additional wiring expenses. During a fault condition of the field circuit, an interrupt signal from an isolator module is transferred to the Power Rail. The power feed module evaluates the signal and transfers the interrupt signal to the control system via a relay contact.

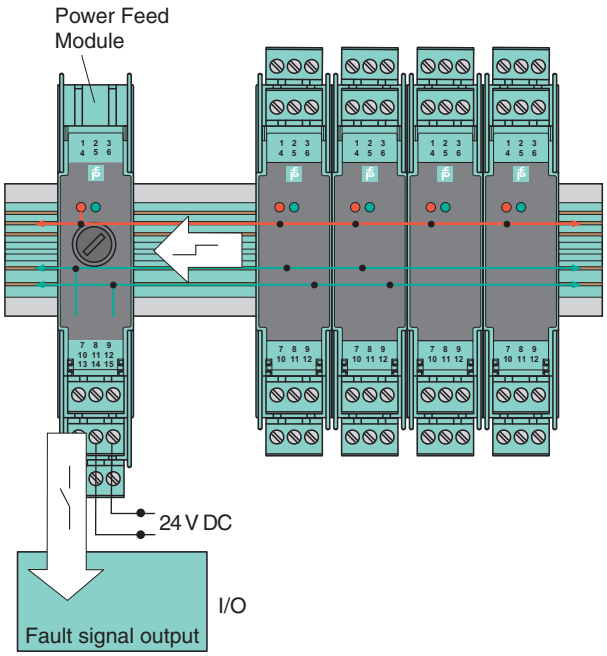

Figure 13 Collective error message via power feed module

Terminal blocks

Removable terminal blocks

The removable terminal blocks simplify control cabinet construction and allow the units to be replaced while they are energized. These screw-secured, cage clamp terminals allow space for the connection of leads with core cross-sections of up to 2.5 mm^2 (14 AWG). The connectors are coded with red pins so misconnection of a terminal block is eliminated. With the KF-CP coding pins (available separately), additional terminal block styles with test sockets or cage spring release can be easily coded and inserted into a signal conditioner.

Figure 14 K-System removable terminal blocks

Terminal designation

Please reference appropriate model for terminal designation.

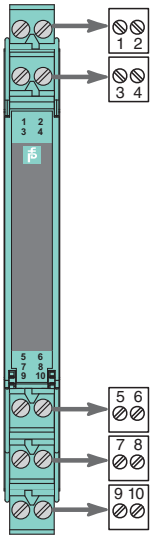

Figure 15 12.5 mm housing (KC module)

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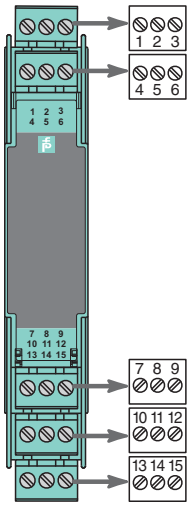

Figure 16 *20 mm housing (KF module)*

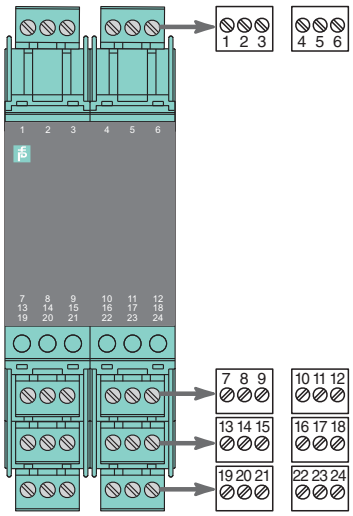

Figure 17 *40 mm housing (KF module)*

Color identification

The color identification of the devices has the following meaning:

- green indicates devices with DC power supply
- black indicates devices with AC power supply
- grey indicates devices with universal power supply of 20 V DC to 90 V DC or 48 V AC to 253 V AC

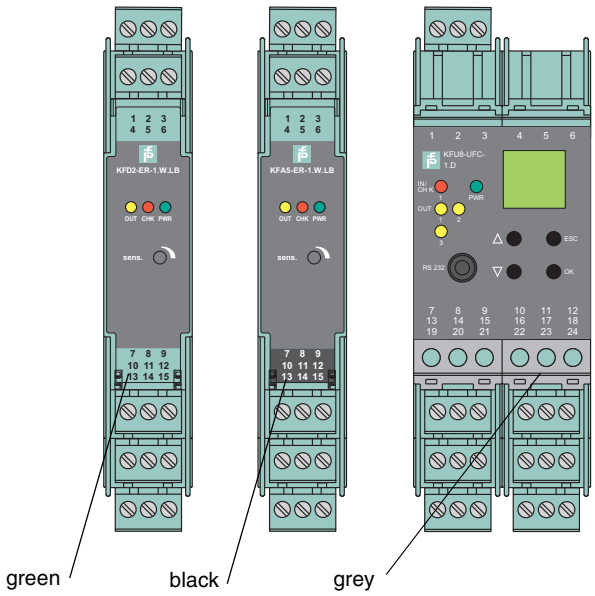

Figure 18 *Color identification of devices*

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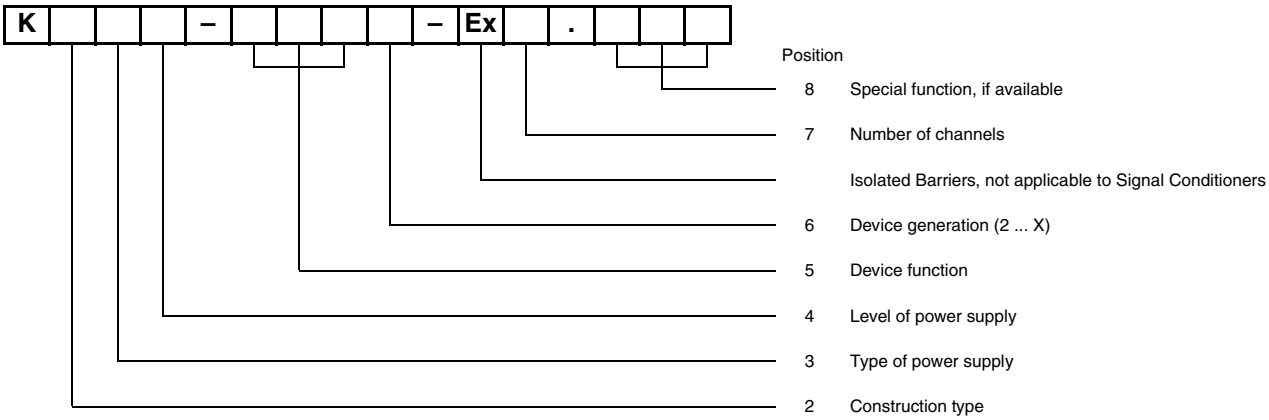
Model number description



Position 1	K	=	K-System
Position 2	C	=	Version with removable terminals, 12.5 mm width
	F	=	Version with removable terminals, 20 mm or 40 mm width
	H	=	Version without removable terminals, 20 mm or 40 mm width
Position 3	D	=	DC power supply
	A	=	AC power supply
	U	=	AC-/DC power supply
Position 4	0	=	without power supply
	2	=	24 V
	4	=	100 V
	5	=	115 V
	6	=	230 V
	8	=	20 V DC to 90 V DC, 48 V AC to 253 V AC
Position 5	CC	=	Converter for current/voltage
	CD	=	Current driver, active
	CR	=	Transmitter power supply device, current output
	CRG	=	Transmitter power supply device with limit value output
	CS	=	Current driver, passive
	DU	=	Switch amplifier, timer relay
	DWB	=	Rotational speed monitor, logic control unit
	EB	=	Power feed module
	ELD	=	Ground fault detection
	ER		Conductivity switch amplifier
	FF	=	RS 232 repeater
	GS	=	Trip amplifier for current/voltage
	GU	=	Universal trip amplifier
	GUT	=	Temperature converter with trip values
	HLC	=	HART Loop Converters
	HMM	=	HART Multiplexer Master
	HMS	=	HART Multiplexer Slave
	PT	=	Potentiometer converter
	RC	=	Converter for resistors
	RCI	=	Solenoid driver
	RO	=	Relay module
	RR	=	Repeater for resistance measuring sensor
	RSH	=	Relay module in safety application
	SCD	=	SMART current driver
	SCS	=	SMART current driver/repeater
	SD	=	Solenoid driver
	SH	=	Safety switch amplifier
	SL	=	Solenoid driver module with logic input
	SOT	=	Switch amplifier with passive, potential free transistor output
	SR	=	Switch amplifier with relay output
	SRA	=	Switch amplifier with relay output, 2:1 operation mode
	SRT	=	Switch amplifier with active transistor and relay output
	ST	=	Switch amplifier with active transistor output
	STC	=	SMART transmitter power supply with current output
	STR	=	Power supply
	STV	=	SMART transmitter power supply with voltage output
	TR	=	Converter for resistance measuring sensor
	TT	=	Converter for thermocouple/mV
	UFC	=	Universal frequency converter
	UFT	=	Frequency converter with direction and synchronization monitoring
	USC	=	Universal signal converter with trip values
	UT	=	Universal temperature converter
	VC	=	Converter for current/voltage
	VCR	=	Transmitter power supply, repeater for current/voltage
	VD	=	Solenoid driver
	VM	=	Solenoid driver
	VR	=	Voltage repeater
	WAC	=	Converter for strain gauges

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Safety information

The corresponding data sheets, the Declaration of Conformity, the EC-Type Examination Certificate and applicable certificates (see data sheet) are an integral part of this document.

Intended use

Laws and regulations applicable to the usage or planned purpose of usage must be observed. Devices are only approved for proper usage in accordance with intended use. Improper handling will result in voiding of any warrantee or manufacturer's responsibility.

These devices are used in C&I technology for the galvanic isolation of C&I signals, such as 20 mA and 10 V unit signals, and also for the adaptation and/or standardization of signals.

The devices are not suitable for the isolation of signals in power engineering, unless this is specifically referred to in the respective data sheet.

Protection of operating personnel and the system is not ensured if the product is not used in accordance with its intended use.

Installation and commissioning

Commissioning and installation must be carried out by specially trained and qualified personnel only.

Installation of the interface devices in the safe area

The devices are constructed to satisfy the IP20 protection classification and must be protected from adverse environmental conditions such as water spray or dirt exceeding the pollution degree 2.

The devices must be installed outside the hazardous area!

Installation and commissioning of the interface devices within Zone 2/Div. 2 of the hazardous area

Only devices with the corresponding manufacturer's Declaration of Conformity or separate certificate of conformity can be installed in Zone 2/Div. 2.

The individual data sheets indicate whether these conditions are met.

For US and Canada installations, in Zone 2/Div. 2 follow the NEC and CEC wiring methods. The enclosure must be able to accept Zone 2/Div. 2 wiring methods. The referenced product certification control drawing must be observed.

For all other applications, the devices should be installed in a switch or junction box that:

- meets at least IP54 in accordance to EN 60529.
- meets to the requirements of resistance to light and resistance to impact according to EN 60079-0/ IEC 60079-0.
- meets to the requirements of thermal endurance according to EN 60079-15/IEC 60079-15.
- must not cause ignition danger by electrostatic charge during intended use, maintenance and cleaning.

The EC-Type Examination Certificates, standard certificates/approvals or the manufacturer's Declaration of Conformity should be observed. It is especially important to observe the "special conditions" if these are included in the certificates.

Repair and maintenance

The transfer characteristics of the devices remain stable over long periods of time. This eliminates the need for regular adjustment. Maintenance is not required.

Fault elimination

No changes can be made to devices that are operated in hazardous areas. Repairs on the device are not allowed.

Isolation coordinates for installations for galvanic isolation according to EN 50178 and EN 61140

The devices of the K-System are electronic equipment for use in secluded electrical operating sites where only skilled personnel or electrically instructed personnel will have admission or access.

The devices are assessed for pollution degree 2 and overvoltage category II according to EN 50178.

Connect only power supplies to power feed modules, which provide protection against direct contact (e. g. SELV or PELV).

For additional details, see data sheets.

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Technical data

Electrical data

Control circuit signals

- 0/4 mA to 20 mA signal level acc. to NE43
- Current output HART compatible
- Current input HART compatible
- Digital output: active or, passive electronic output 100 mA/30 V, short circuit protected
- Relay output 2 A, minimum load 1 mA/24 V
- Logic level 24 V acc. to IEC 60946
- Functional isolation or safe isolation acc. to EN 50178 and NAMUR NE23

For additional details, see data sheets.

Field circuit signals

- Transmitter power supply up to 17 V DC
- Current input HART compatible
- Pt100, in 2-, 3-, (4-)wire technology
- Resistor 0 Ω to 400 Ω with freely definable characteristic
- Potentiometer
- Thermocouples of all types, internal cold junction, external reference
- Current output HART compatible
- Digital input NAMUR EN 60947-5-6

For additional details, see data sheets.

Mechanical data

Mounting

- Snap-on 35 mm standard DIN rail acc. to EN 60715. Can be mounted horizontally or vertically, side by side.
- Panel mount: The lugs on the base of the modules must be extended and used for mounting purposes with 3 mm screws.
- K-MS mounting base for screw attachment

Housing material

Polycarbonate (PC)

Dimensions

Housing drawings please refer to www.pepperl-fuchs.com.

Protection degree

IP20 acc. to EN 60529

Connection

- KH*-modules:
  self-opening connection terminals for max. core diameter of 1 x 2.5 mm^2 (14 AWG)
- KF*-and KC*-modules:
  removable connector with integrated self opening device terminals for leads of up to a max. of 1 x 2.5 mm^2 (14 AWG)

Fire protection class

Housing: V2 according to UL 94 standard. (Unless stated otherwise all details relate to the reference conditions.)

Labeling

place for labeling on the front side, label:

- KC-modules (12.5 mm): 22 mm x 9 mm
- KF-modules (20 mm): 22 mm x 16.5mm
- KF-modules (40 mm): 18 mm x 8 mm

Ambient conditions

Ambient temperature

-20 °C to 60 °C (-4 °F to 140 °F)

Exceptions see data sheets.

Storage temperature

-40 °C to 90 °C (-40 °F to 194 °F)

Reference conditions for adjustment

20 °C (68 °F)

Relative humidity

max. 95 % without moisture condensation

Vibration resistance

acc. to EN 60068-2-6, 10 Hz to 150 Hz, 1 g, high crossover frequency

Shock resistance

acc. to EN 60068-2-27, 15 g, 11 ms, half-sine

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Conformity with standards and directives

General

- EMC acc. to NAMUR NE21 and EN 61326
- LEDs acc. to NAMUR NE44
- Software acc. to NAMUR NE53
- Switch-on pulse suppression
- Devices K*D2:
  - Supply voltage 20 V DC to 30 V DC via Power Rail or supply terminals
  - Fault signals via Power Rail
- Devices K*A and K*U:
  - Supply voltage 115 V/230 V AC ±10 %
- Safety devices acc. to VDE 0660 T.209, AK acc. to DIN 19250

Digital inputs/outputs in accordance with NAMUR

The standards references for this interface have changed many times:

German standard (old): **DIN 19234**: Electrical distance sensors – DC interface for distance sensors and switch amplifiers; 1990-06

European standard (old): **EN 50227**: Low voltage switch gear and control gear – control devices and switching elements – proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 1996-10

German version (old): **DIN EN 50227**: Low voltage switch gear – control devices and switching elements – proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 1997, German nomenclature VDE 0660, part 212

Current designation: DIN EN 60947-5-6: Low voltage switch gear – control devices and switching elements – proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 2000, German nomenclature. VDE 0660 part 212

Current IEC designation: IEC 60947-5-6: Low voltage switch gear and control gear – part 5-6: Control circuit devices and switching elements – DC interface for proximity sensors and switching amplifiers (NAMUR), 1999.

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Switch Amplifiers

Model Number	Channels	Function Timer	Input (Field)			Output (Control System)		Supply		SIL	Page
			NAMUR Sensor/ Dry Contact	3-wire Sensor	Line Fault Detection	Relay	Error Message Output	24 V DC	115 V AC/ 230 V AC		
KCD2-SR-1.LB	1		■		■	2	■	■		2	579
KCD2-SR-2	2		■		■	2		■		2	580
KFD2-SR2-2.2S	2		■		■	2x2		■		2	581
KFU8-SR-1.3L.V	1	■		■		2		■	■		582
KFA6-SR-2.3L	2			■		2			■		583

Frequency Converters

Model Number	Functions			Input (Field)		Output (Control System)				Supply		SIL	Page
	Speed Monitor	Frequency Conversion	Special Functions	NAMUR Sensor/ Dry Contact	Line Fault Detection	Relay	Transistor (Passive)	Error Message Output	0/4 mA ... 20 mA	24 V DC	115 V AC/ 230 V AC		
KFD2-SR2-2.W.SM	■		■	■	■	2				■		2	584
KFD2-DWB-1.D	■			■	■	2		■		■		2	585
KFU8-DWB-1.D	■			■	■	2		■		■	■	2	586
KFD2-UFC-1.D	■	■	■	■	■	2	1	■	1	■		2	587
KFU8-UFC-1.D	■	■	■	■	■	2	1	■	1	■	■	2	588
KFD2-UFT-2.D	■	■	■	■	■	2	2	■	1	■			589
KFU8-UFT-2.D	■	■	■	■	■	2	2	■	1	■	■		590

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Conductivity Switch Amplifiers

Model Number	Channels	Function	Input (Field)		Output (Control System)		Supply		SIL	Page
		Measurement of Conductivity	Line Fault Detection	Resistance	Relay	Error Message Output	24 V DC	115 V AC/ 230 V AC		
KFD2-ER-1.5	1	■			1		■			591
KFD2-ER-1.6	1	■			1		■			592
KFA5-ER-1.5	1	■			1			■		593
KFA5-ER-1.6	1	■			1			■		594
KFA6-ER-1.5	1	■			1			■		595
KFA6-ER-1.6	1	■			1			■		596
KFD2-ER-1.W.LB	1	■	■	■	2	■	■			597
KFD2-ER-2.W.LB	2	■	■	■	2	■	■			598
KFA5-ER-1.W.LB	1	■	■	■	2	■		■		599
KFA5-ER-2.W.LB	2	■	■	■	2	■		■		600
KFA6-ER-1.W.LB	1	■	■	■	2	■		■		601
KFA6-ER-2.W.LB	2	■	■	■	2	■		■		602

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Technical data

Supply	
Rated voltage	19 ... 30 V DC
Power consumption	≤ 500 mW
Input	
Rated values	acc. to EN 60947-5-6 (NAMUR)
Open circuit voltage/short-circuit current	approx. 10 V DC/approx. 8 mA
Switching point/switching hysteresis	1.2 ... 2.1 mA/approx. 0.2 mA
Line fault detection	breakage I ≤ 0.1 mA, short-circuit I ≥ 6.5 mA
Pulse/Pause ratio	≥ 20 ms/≥ 20 ms
Output	
Output I	signal; relay
Output II	signal or error message; relay
Contact loading	253 V AC/2 A/cos Φ> 0.7; 126.5 V AC/4 A/cos Φ> 0.7; 30 V DC/2 A resistive load
Minimum switch current	2 mA/24 V DC
Energized/De-energized delay	≤ 20 ms/≤ 20 ms
Mechanical life	10^7 switching cycles
Transfer characteristics	
Switching frequency	≤ 10 Hz
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	12.5 x 114 x 119 mm (0.5 x 4.5 x 4.7 in), housing type A2

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Dry contact or NAMUR inputs**
- **Relay contact output**
- **Fault relay contact output**
- **Line fault detection (LFD)**
- **Housing width 12.5 mm**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner transfers digital signals (NAMUR sensors/mechanical contacts) from the field to the control system.

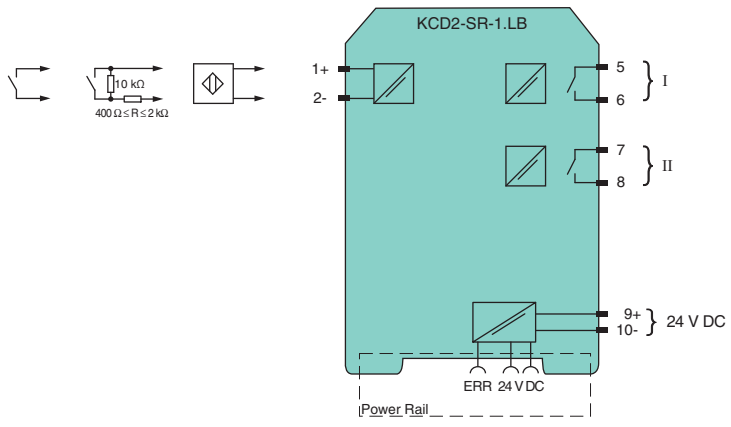
The proximity sensor or switch controls a form A normally open relay contact for the load. The normal output state is reversed using switch S1. Switch S2 allows output II to be switched between a signal output and an error message output. Switch S3 enables or disables line fault detection of the field circuit.

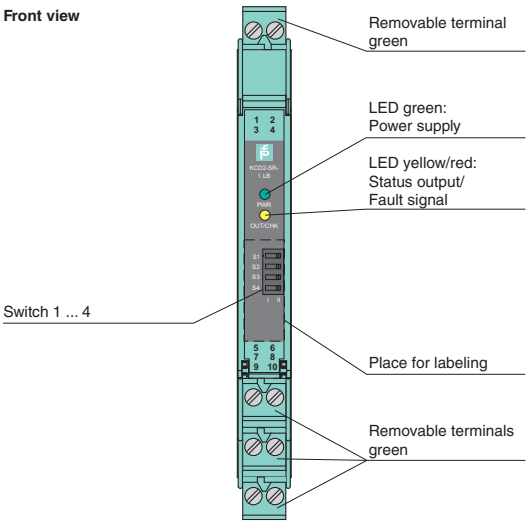
During an error condition, relays revert to their de-energized state and LEDs indicate the fault according to NAMUR NE44.

A unique collective error messaging feature is available when used with the Power Rail system.

Due to its compact housing design and low heat dissipation, this device is useful for detecting positions, end stops, and switching states in space-critical applications.

Diagrams





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Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Dry contact or NAMUR inputs**
- **Relay contact output**
- **Line fault detection (LFD)**
- **Housing width 12.5 mm**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner transfers digital signals (NAMUR sensors/mechanical contacts) from the field to the control system.

The proximity sensor or switch controls a form A normally open relay contact for the load. The normal output state can be reversed using switches S1 and S2. Switch S3 is used to enable or disable line fault detection of the field circuit.

During an error condition, relays revert to their de-energized state and LEDs indicate the fault according to NAMUR NE44.

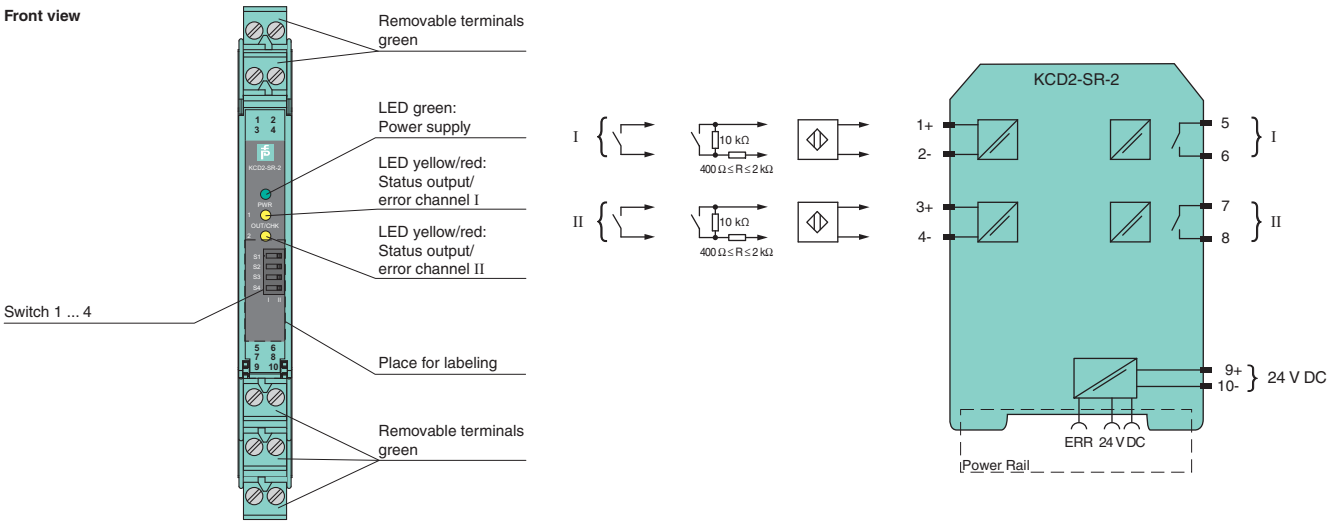
A unique collective error messaging feature is available when used with the Power Rail system.

Due to its compact housing design and low heat dissipation, this device is useful for detecting positions, end stops, and switching states in space-critical applications.

Technical data

Supply	
Rated voltage	19 ... 30 V DC
Power consumption	≤ 600 mW
Input	
Rated values	acc. to EN 60947-5-6 (NAMUR)
Open circuit voltage/short-circuit current	approx. 10 V DC/approx. 8 mA
Switching point/switching hysteresis	1.2 ... 2.1 mA/approx. 0.2 mA
Line fault detection	breakage I ≤ 0.1 mA, short-circuit I ≥ 6.5 mA
Pulse/Pause ratio	≥ 20 ms/≥ 20 ms
Output	
Output I	signal; relay
Output II	signal; relay
Contact loading	253 V AC/2 A/cos Φ > 0.7; 126.5 V AC/4 A/cos Φ > 0.7; 30 V DC/2 A resistive load
Minimum switch current	2 mA/24 V DC
Energized/De-energized delay	≤ 20 ms/≤ 20 ms
Mechanical life	10^7 switching cycles
Transfer characteristics	
Switching frequency	≤ 10 Hz
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	12.5 x 114 x 119 mm (0.5 x 4.5 x 4.7 in), housing type A2

Diagrams



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Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power consumption	< 1.3 W
Input	
Rated values	acc. to EN 60947-5-6 (NAMUR)
Open circuit voltage/short-circuit current	approx. 8 V DC/approx. 8 mA
Switching point/switching hysteresis	1.2 ... 2.1 mA/approx. 0.2 mA
Line fault detection	breakage I ≤ 0.1 mA, short-circuit I > 6 mA
Pulse/Pause ratio	≥ 20 ms/≥ 20 ms
Output	
Collective error message	Power Rail
Output I, II, III, IV	channel 1, 2; relay
Contact loading	50 V AC/1 A/cos Φ > 0.7; 40 V DC/1 A resistive load
Minimum switch current	1 mA/24 V DC
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Mechanical life	10^8 switching cycles
Transfer characteristics	
Switching frequency	≤ 10 Hz
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Dry contact or NAMUR inputs**
- **2 x 2 relay contact outputs with AND logic**
- **Line fault detection (LFD)**
- **Reversible mode of operation**
- **Up to SIL2 acc. to IEC 61508**

Function

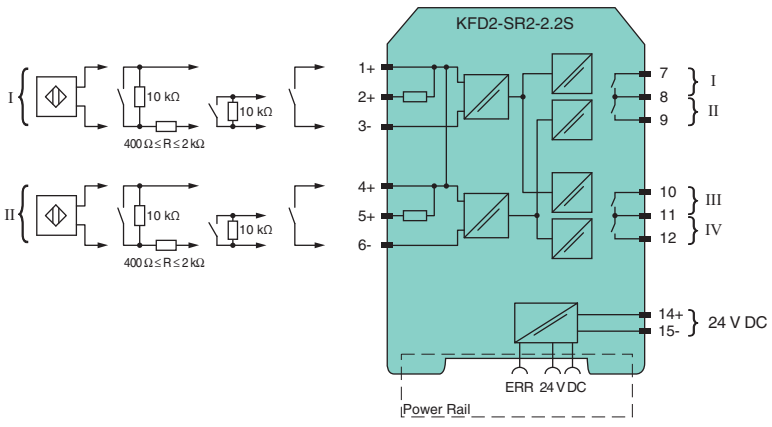
This signal conditioner transfers digital signals (NAMUR sensors/mechanical contacts).

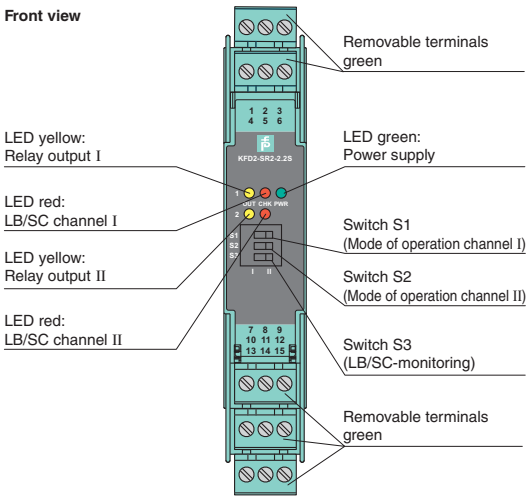
Each sensor or switch controls two form A normally open relay contacts. The normal output state can be reversed using switches S1 and S2. Switch S3 is used to enable or disable line fault detection of the field circuit.

During an error condition, the relays revert to their de-energized state and the LEDs indicate the fault according to NAMUR NE44.

A unique collective error messaging feature is available when used with the Power Rail system.

Diagrams





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Features

- **1-channel signal conditioner**
- **AC/DC wide range supply**
- **3-wire PNP/NPN sensor or push-pull input**
- **2 relay contact outputs**
- **Adjustable energized/de-energized delay**

Function

This signal conditioner converts the state of 3-wire sensors (PNP or NPN) or sensors with push-pull output stages into two relay outputs.

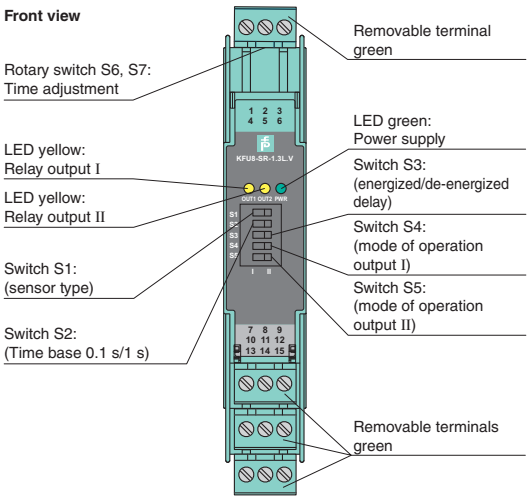
It has one input and two form C changeover relay outputs.

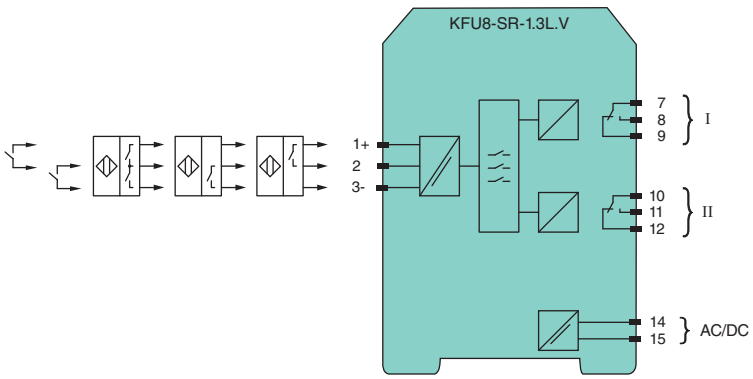
The switch amplifier has an adjustable energized/de-energized delay for the relay outputs.

Technical data

Supply	
Rated voltage	20 ... 48 V DC or 90 ... 253 V AC, 45 ... 65 Hz
Power consumption	≤ 4.5 W
Input	
Rated values	22 ... 24 V DC/100 mA
Short-circuit current	≤ 125 mA
Switching point	PNP: 0-signal: < 12.5 V, 1-signal: > 13.5 V NPN and push-pull output: 0-signal: < 4.5 V, 1-signal: > 5.5 V
Output	
Output I, II	signal; relay
Contact loading	250 V AC/2 A/cos Φ≥ 0.7; 125 V AC/4 A/cos Φ> 0.7; 40 V DC/2 A
Mechanical life	20 x 10^6 switching cycles
Electrical life	0.2 x 10^6 switching cycles (40 V DC, 2 A, ohmic) 0.4 x 10^6 switching cycles (253 V AC, 2 A, cos Φ= 1) 0.25 x 10^6 switching cycles (253 V AC, 2 A, cos Φ= 0.7)
Minimum load	50 mW, 5 V DC
Energized/De-energized delay	≤ 90 ms/≤ 90 ms
Transfer characteristics	
Switching frequency	≤ 5 Hz for delay 0 s adjustable energized/de-energized delay: 0 ... 79 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 166 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams





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Technical data

Supply	
Rated voltage	90 ... 253 V AC, 45 ... 65 Hz
Power consumption	≤ 7 W
Input	
Rated values	22 ... 24 V DC/100 mA
Short-circuit current	110 mA
Switching point	0-signal: < 5 V 1-signal: > 13 V
Output	
Output I, II	
Contact loading	250 V AC/4 A/cos Φ > 0.7; 40 V DC/2 A resistive load
Energized/De-energized delay	max. 6 ms
Mechanical life	10^7 switching cycles
Transfer characteristics	
Switching frequency	≤ 10 Hz
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **2-channel signal conditioner**
- **230 V AC supply**
- **3-wire PNP/NPN sensor or push-pull input**
- **Relay contact output**
- **DIP switch selectable functions**
- **Minimum/maximum control**

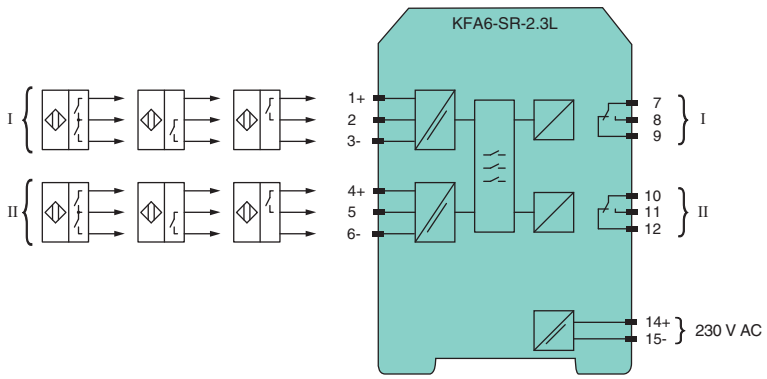
Function

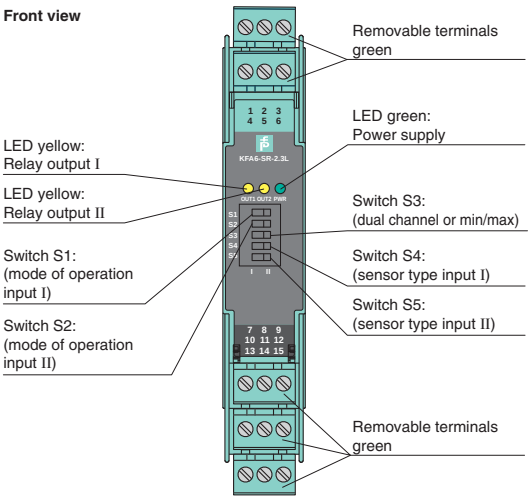
This signal conditioner converts the state of 3-wire sensors (PNP or NPN) or sensors with push-pull output stages into a relay output.

It has two inputs and two form C changeover relay outputs.

The device can be used either as dual channel signal conditioner or as a two-point level controller.

Diagrams





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Features

- **1-channel signal conditioner**
- **24 V DC supply**
- **PNP/push-pull, dry contacts or NAMUR inputs**
- **Selectable frequency trip values**
- **2 relay contact outputs**
- **Start-up override**
- **Selectable mode of operation**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner is a zero speed/standstill monitor that accepts input frequency pulses and triggers an output when the frequency drops below a selected value.

Two startup override values are available. This unit can also be used to determine rotation direction.

During an error condition, relays revert to their de-energized state and LEDs indicate the fault according to NAMUR NE44.

The available diagnostic LEDs show rotation detection, limit trip indicator, power on, and hardware error indication.

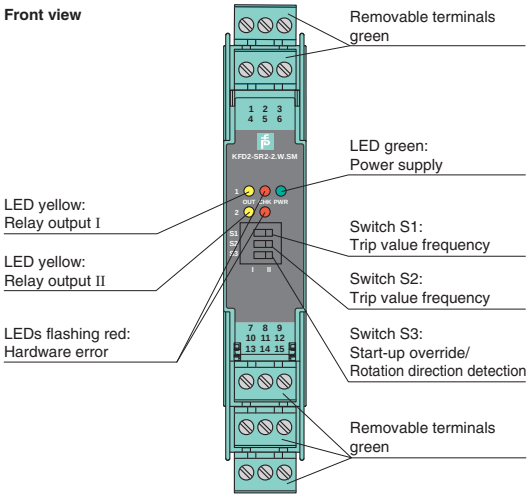
The unit is easily programmed via switches mounted on the front of the unit.

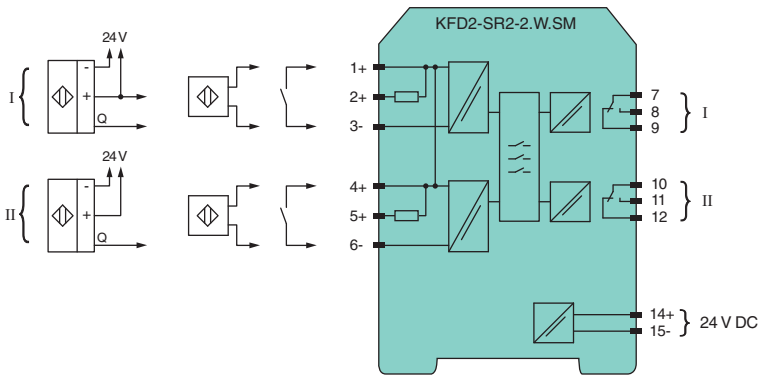
For additional information, refer to www.pepperl-fuchs.com.

Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power consumption	≤ 1.5 W
Input	
Rated values	acc. to EN 60947-5-6 (NAMUR)
Switching point/switching hysteresis	x ≤ 1.2 mA or x ≥ 2.1 mA/approx. 0.9 mA
Control input	sensor power supply approx. 8.2 V, impedance 1.2 kΩ
Lead monitoring	not available
Pulse duration	> 200 µs for standstill monitoring, > 250 µs for rotation direction detecion
Output	
Relay	2 changeover contacts
Contact loading	253 V AC/2 A/cos Φ > 0.7; 40 V DC/2 A resistive load
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Mechanical life	5 x 10^6 switching cycles
Trip value f_{max}	for standstill monitoring: 0.1 Hz; 0.5 Hz; 2 Hz; 10 Hz adjustable via DIP switch (S1 and S2)
Transfer characteristics	
Accuracy	± 5 %
Start-up override	5 seconds or 20 seconds, programmable
Frequency range	≤ 2 kHz
Rotation direction detection	90° phase difference between pulse input signal 1 and 2, overlapping ≥ 125 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Connection	plug-in terminals
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams





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Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power loss/power consumption	≤ 1.8 W/1.8 W
Input	
Input I	sensor acc. to EN 60947-5-6 (NAMUR) or mechanical contact
Open circuit voltage/short-circuit current	22 V/40 mA
Input resistance	4.7 kΩ
Switching point/switching hysteresis	logic 1: > 2.5 mA; logic 0: < 1.9 mA
Pulse duration	> 50 µs
Input frequency	0.001 ... 12000 Hz
Lead monitoring	breakage I ≤ 0.15 mA; short-circuit I > 4 mA
Input II	startup override: 1 ... 1000 s, adjustable in steps of 1 s
Active/Passive	I > 4 mA (for min. 100 ms)/I < 1.5 mA
Open circuit voltage/short-circuit current	18 V/5 mA
Output	
Collective error message	Power Rail
Output I, II	signal; relay
Contact loading	250 V AC/2 A/cos Φ≥ 0.7; 40 V DC/2 A
Mechanical life	5 x 10^7 switching cycles
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Transfer characteristics	
Input I	
Measurement range	0.001 ... 12000 Hz
Output I, II	
Response delay	≤ 200 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	300 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3
Data for application in connection with Ex-areas	
Statement of conformity	Pepperl+Fuchs
Group, category, type of protection, temperature classification	Ⓔx II 3G Ex nA nC IIC T4

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Dry contact or NAMUR inputs**
- **Input frequency 1 mHz ... 12 kHz**
- **2 relay contact outputs**
- **Start-up override**
- **Configurable by keypad**
- **Line fault detection (LFD)**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner monitors for an overspeed or underspeed condition of a digital signal (NAMUR sensor/mechanical contact) by comparing the input frequency to the user programmed reference frequency.

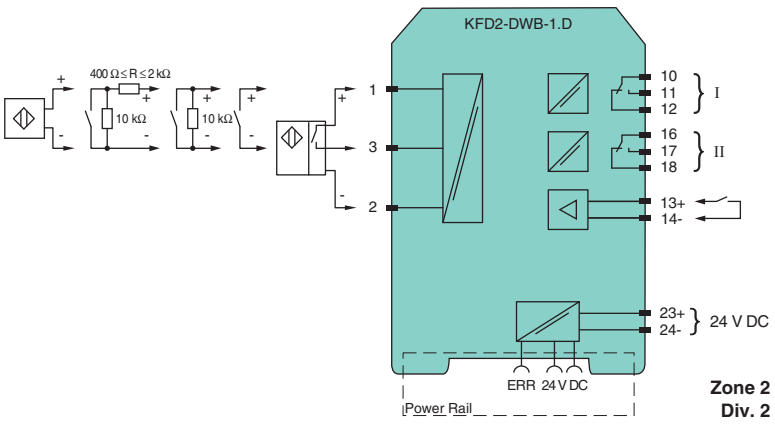
An overspeed or underspeed condition is signaled via the relay outputs. Line fault detection of the field circuit is indicated by a red LED, Power Rail and/or relay. The startup override feature sets relay outputs to default conditions programmed by the user for up to 1,000 seconds.

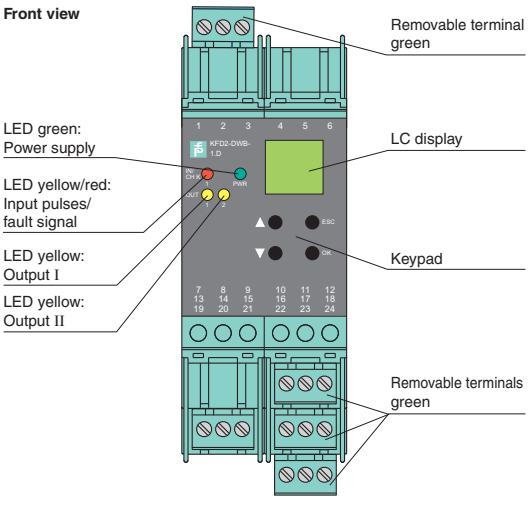
The unit is easily programmed by the use of a keypad located on the front of the unit.

A unique collective error messaging feature is available when used with the Power Rail system.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Diagrams





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KFU8-DWB-1.D

Overspeed/Underspeed Monitor

Features

- **1-channel signal conditioner**
- **AC/DC wide range supply**
- **Dry contact or NAMUR inputs**
- **Input frequency 1 mHz ... 12 kHz**
- **2 relay contact outputs**
- **Start-up override**
- **Configurable by keypad**
- **Line fault detection (LFD)**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner monitors an overspeed or underspeed condition of a digital signal (NAMUR sensor/mechanical contact) by comparing the input frequency to the user programmed reference frequency.

An overspeed or underspeed condition is signaled via the relay outputs. Line fault detection of the field circuit is indicated by a red LED and/or relay. The startup override feature sets relay outputs to default conditions programmed by the user for up to 1,000 seconds.

The unit is easily programmed by the use of a keypad located on the front of the unit.

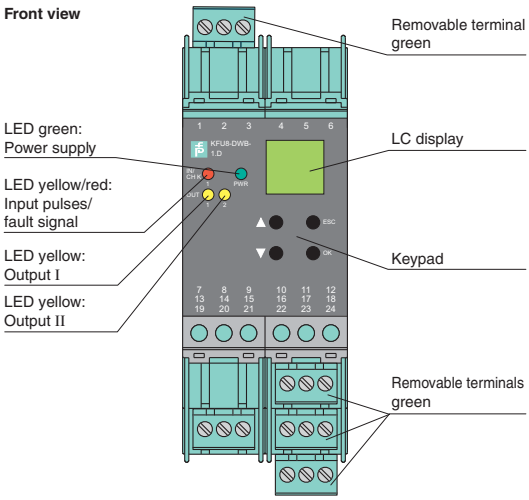
For additional information, refer to the manual and www.pepperl-fuchs.com.

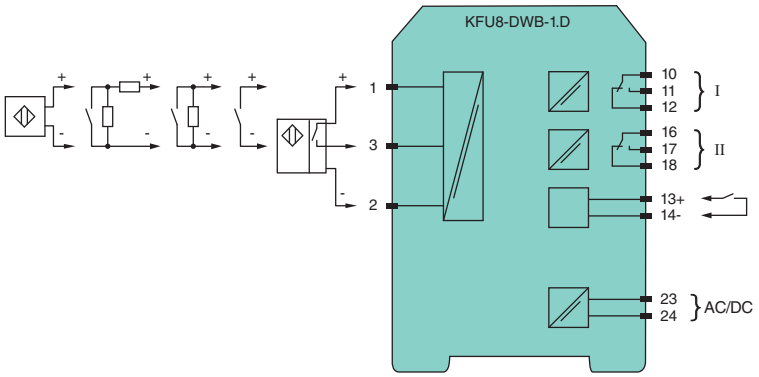
Technical data

Supply	
Rated voltage	20 ... 90 V DC/48 ... 253 V AC 50 ... 60 Hz
Power loss/power consumption	≤ 1.8 W; 2 VA/1.8 W; 2 VA
Input	
Lead monitoring	breakage I ≤ 0.15 mA; short-circuit I > 6.5 mA
Input I	sensor acc. to EN 60947-5-6 (NAMUR) or mechanical contact
Open circuit voltage/short-circuit current	22 V/40 mA
Input resistance	4.7 kΩ
Switching point/switching hysteresis	logic 1: > 2.5 mA; logic 0: < 1.9 mA
Pulse duration	> 50 µs
Input frequency	0.001 ... 12000 Hz
Lead monitoring	breakage I ≤ 0.15 mA; short-circuit I > 4 mA
Input II	startup override: 1 ... 1000 s, adjustable in steps of 1 s
Active/Passive	I > 4 mA (for min. 100 ms)/I < 1.5 mA
Open circuit voltage/short-circuit current	18 V/5 mA
Output	
Output I, II	signal; relay
Contact loading	250 V AC/2 A/cos Φ ≥ 0.7; 40 V DC/2 A
Mechanical life	5 x 10^7 switching cycles
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Transfer characteristics	
Input I	
Measurement range	0.001 ... 12000 Hz
Output I, II	
Response delay	≤ 200 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	300 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3

Diagrams

Front view





Edition 908837 (US) / 208599 (EU) 11/2010

Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power loss/power consumption	≤ 2 W/2.2 W
Input	
Input I	sensor acc. to EN 60947-5-6 (NAMUR) or mechanical contact
Pulse duration	> 50 µs
Input frequency	0.001 ... 12000 Hz
Lead monitoring	breakage I ≤ 0.15 mA; short-circuit I > 4 mA
Input II	startup override: 1 ... 1000 s, adjustable in steps of 1 s
Active/Passive	I > 4 mA (for min. 100 ms)/I < 1.5 mA
Output	
Collective error message	Power Rail
Output I, II	signal; relay
Contact loading	250 V AC/2 A/cos Φ≥ 0.7; 40 V DC/2 A
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Output III	electronic output, passive
Contact loading	40 V DC
Signal level	1-signal: (L+) -2.5 V (50 mA, short-circuit/overload proof) 0-signal: blocked output (off-state current ≤ 10 µA)
Output IV	analog
Current range	0 ... 20 mA or 4 ... 20 mA
Open loop voltage	≤ 24 V DC
Load	≤ 650 Ω
Fault signal	downscale I ≤ 3.6 mA, upscale ≥ 21.5 mA (acc. NAMUR NE43)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	300 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3
Data for application in connection with Ex-areas	
Statement of conformity	Pepperl+Fuchs
Group, category, type of protection, temperature classification	⟨Ex⟩ II 3G Ex nA nC IIC T4

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Dry contact or NAMUR inputs**
- **Input frequency 1 mHz ... 12 kHz**
- **Current output 0/4 mA ... 20 mA**
- **Relay and transistor output**
- **Start-up override**
- **Line fault detection (LFD)**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner is an universal frequency converter that changes a digital input (NAMUR sensor/mechanical contact) into a proportional free adjustable 0/4 mA ... 20 mA analog output and functions as a switch amplifier and a trip alarm.

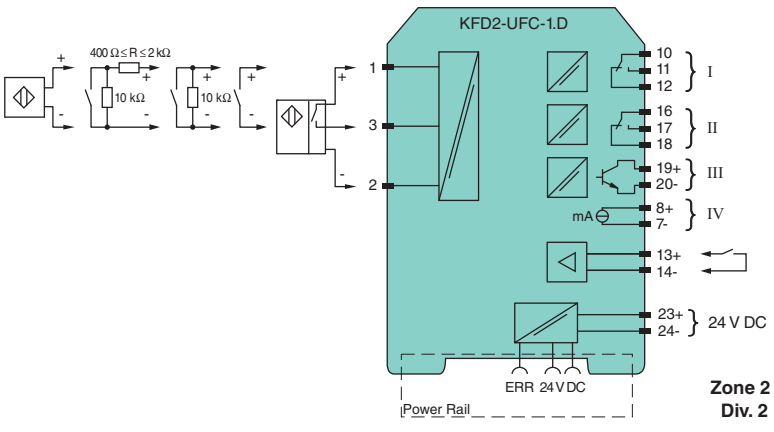
Also the functions of the switch outputs (2 relay outputs and 1 potential free transistor output) are easily adjustable [trip value display (min/max alarm), serially switched output, pulse divider output, error signal output].

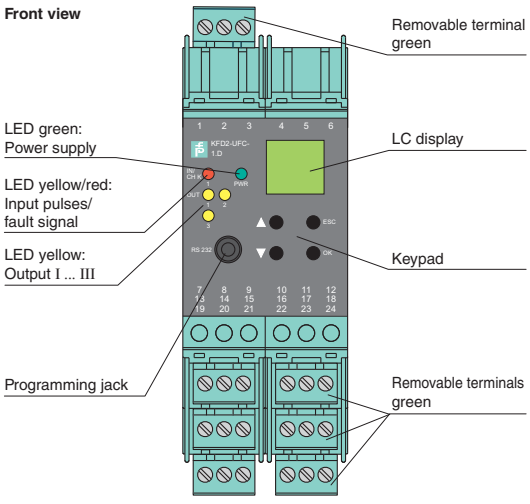
The unit is easily programmed by the use of a keypad located on the front of the unit or with the **PACT***ware*™ configuration software.

Line fault detection of the field circuit is indicated by a red LED and through the collective error output via Power Rail.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Diagrams





Edition 908837 (US) / 208599 (EU) 11/2010

Features

- **1-channel signal conditioner**
- **AC/DC wide range supply**
- **Dry contact or NAMUR inputs**
- **Input frequency 1 mHz ... 12 kHz**
- **Current output 0/4 mA ... 20 mA**
- **Relay and transistor output**
- **Start-up override**
- **Line fault detection (LFD)**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner is an universal frequency converter that changes a digital input (NAMUR sensor/mechanical contact) into a proportional free adjustable 0/4 mA ... 20 mA analog output and functions as a switch amplifier and a trip alarm.

Also the functions of the switch outputs (2 relay outputs and 1 potential free transistor output) are easily adjustable [trip value display (min/max alarm), serially switched output, pulse divider output, error signal output].

The unit is easily programmed by the use of a keypad located on the front of the unit or with the **PACT***ware*™ configuration software.

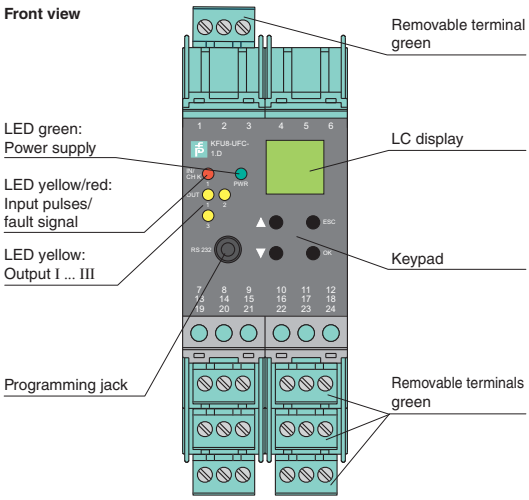
Line fault detection of the field circuit is indicated by a red LED.

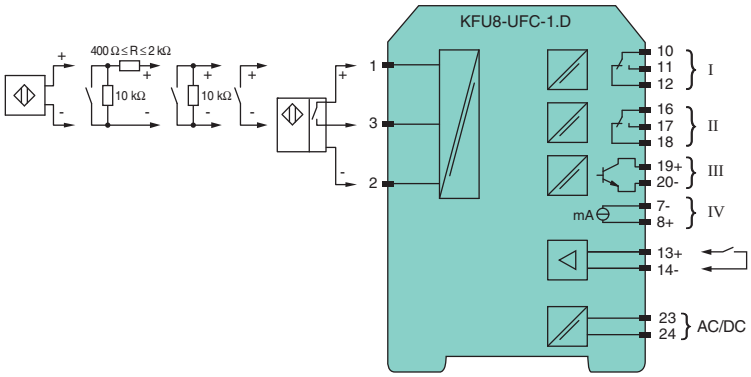
For additional information, refer to the manual and www.pepperl-fuchs.com.

Technical data

Supply	
Rated voltage	20 ... 90 V DC/48 ... 253 V AC 50 ... 60 Hz
Power loss/power consumption	≤ 2 W; 2.5 VA/2.2 W; 3 VA
Input	
Input I	sensor acc. to EN 60947-5-6 (NAMUR) or mechanical contact
Pulse duration	> 50 µs
Input frequency	0.001 ... 12000 Hz
Lead monitoring	breakage I ≤ 0.15 mA; short-circuit I > 4 mA
Input II	startup override: 1 ... 1000 s, adjustable in steps of 1 s
Active/Passive	I > 4 mA (for min. 100 ms)/I < 1.5 mA
Output	
Output I, II	signal; relay
Contact loading	250 V AC/2 A/cos Φ≥ 0.7; 40 V DC/2 A
Mechanical life	5 x 10^7 switching cycles
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Output III	electronic output, passive
Contact loading	40 V DC
Signal level	1-signal: (L+) -2.5 V (50 mA, short-circuit/overload proof) 0-signal: blocked output (off-state current ≤ 10 µA)
Output IV	analog
Current range	0 ... 20 mA or 4 ... 20 mA
Open loop voltage	≤ 24 V DC
Load	≤ 650 Ω
Fault signal	downscale I ≤ 3.6 mA, upscale ≥ 21.5 mA (acc. NAMUR NE43)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	300 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3

Diagrams





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Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power consumption	2.5 W
Input	
Input I, II	sensor acc. to EN 60947-5-6 (NAMUR) or mechanical contact
Open circuit voltage/short-circuit current	8.2 V/10 mA
Switching point/switching hysteresis	logic 1: > 2.5 mA; logic 0: < 1.9 mA
Pulse duration	≥ 250 µs, overlap on direction of rotation signal: ≥ 125 µs
Input frequency	rotation direction monitoring 0.001 ... 1000 Hz slip monitoring 10 ... 1000 Hz
Lead monitoring	breakage I ≤ 0.15 mA; short-circuit I > 4 mA
Input III, IV	
Active/Passive	I > 4 mA (for min. 100 ms)/I < 1.5 mA
Open circuit voltage/short-circuit current	18 V/5 mA
Output	
Collective error message	Power Rail
Output I, II	signal; relay
Contact loading	250 V AC/2 A/cos Φ≥ 0.7; 40 DC/2 A
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Output III and IV	signal; electronic output, passive
Contact loading	40 V DC
Output V	analog
Current range	0 ... 20 mA or 4 ... 20 mA
Open loop voltage	max. 24 V DC
Load	max. 650 Ω
Fault signal	downscale I ≤ 3.6 mA, upscale I ≥ 21.5 mA (acc. NAMUR NE43)
Programming interface	
Interface	RS 232
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	300 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3

Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Dry contact or NAMUR inputs**
- **Input frequency 1 mHz ... 1 kHz**
- **Current output 0/4 mA ... 20 mA**
- **Relay and transistor output**
- **Start-up override**
- **Line fault detection (LFD)**

Function

This signal conditioner analyzes 2 digital signals (NAMUR sensor/mechanical contact) and functions as a rotation direction indicator, slip monitor, frequency monitor or synchronization monitor.

Each proximity sensor or switch controls a passive transistor output. The 2 relay outputs indicate if the input signal is above or below the trip value or the rotational direction.

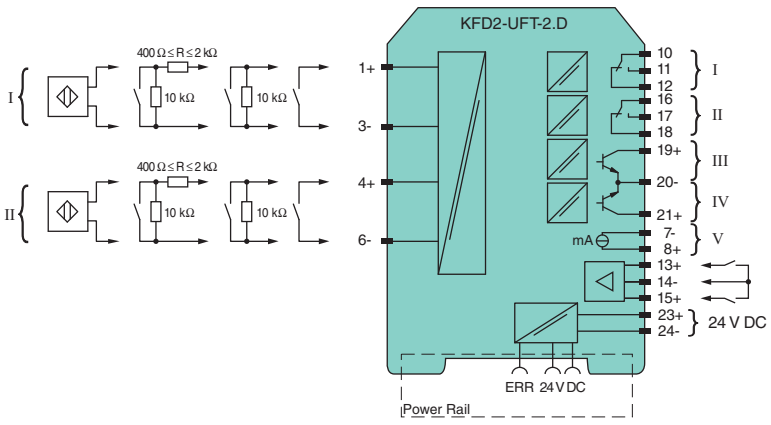
The analog output can be programmed to be proportional to the input frequency or slip differential.

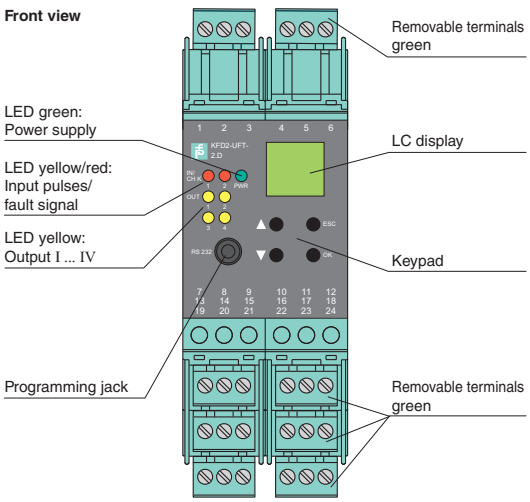
The unit is easily programmed by the use of a keypad located on the front of the unit or with the **PACT***ware*™ configuration software.

Line fault detection of the field current is indicated by a red LED and through the collective error output via Power Rail.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Diagrams





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KFU8-UFT-2.D Frequency Converter with Direction and Synchronization Monitor

Features

- **2-channel signal conditioner**
- **AC/DC wide range supply**
- **Dry contact or NAMUR inputs**
- **Input frequency 1 mHz ... 1 kHz**
- **Current output 0/4 mA ... 20 mA**
- **Relay and transistor output**
- **Start-up override**
- **Line fault detection (LFD)**

Function

This signal conditioner analyzes 2 digital signals (NAMUR sensor/mechanical contact) and functions as a rotation direction indicator, slip monitor, frequency monitor or synchronization monitor.

Each proximity sensor or switch controls a passive transistor output. The 2 relay outputs indicate if the input signal is above or below the trip value or the rotational direction.

The analog output can be programmed to be proportional to the input frequency or slip differential.

The unit is easily programmed by the use of a keypad located on the front of the unit or with the **PACT***ware*™ configuration software.

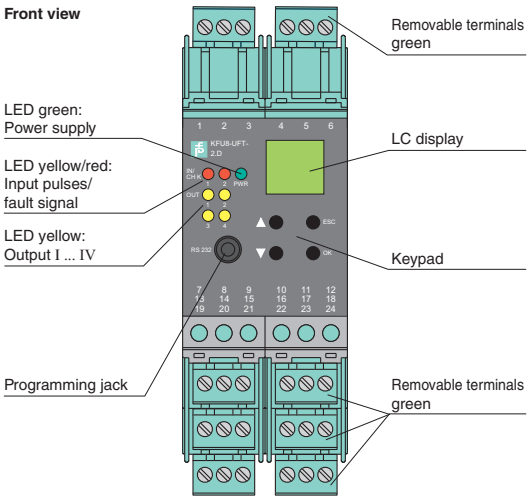
Line fault detection of the field current is indicated by a red LED.

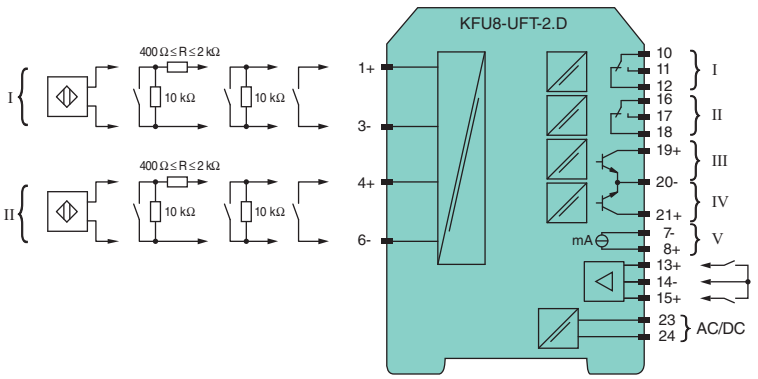
For additional information, refer to the manual and www.pepperl-fuchs.com.

Technical data

Supply	
Rated voltage	20 ... 90 V DC/48 ... 253 V AC 50 ... 60 Hz
Power consumption	2.5 W/4 VA
Input	
Input I, II	sensor acc. to EN 60947-5-6 (NAMUR) or mechanical contact
Open circuit voltage/short-circuit current	8.2 V/10 mA
Switching point/switching hysteresis	logic 1: > 2.5 mA; logic 0: < 1.9 mA
Pulse duration	≥ 250 µs, overlap on direction of rotation signal: ≥ 125 µs
Input frequency	rotation direction monitoring 0.001 ... 1000 Hz slip monitoring 10 ... 1000 Hz
Lead monitoring	breakage I ≤ 0.15 mA; short-circuit I > 4 mA
Input III, IV	
Active/Passive	I > 4 mA (for min. 100 ms)/I < 1.5 mA
Open circuit voltage/short-circuit current	18 V/5 mA
Output	
Output I, II	signal; relay
Contact loading	250 V AC/2 A/cos Φ≥ 0.7; 40 DC/2 A
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Output III and IV	signal; electronic output, passive
Contact loading	40 V DC
Output V	analog
Current range	0 ... 20 mA or 4 ... 20 mA
Open loop voltage	max. 24 V DC
Load	max. 650 Ω
Fault signal	downscale I ≤ 3.6 mA, upscale I ≥ 21.5 mA (acc. NAMUR NE43)
Programming interface	
Interface	RS 232
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	300 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3

Diagrams





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Technical data

Supply	
Rated voltage	20 ... 30 V DC
Input	
Open circuit voltage/short-circuit current	approx. 10 V AC (approx. 1 Hz)/approx. 5 mA
Control input	min./max. control system: terminals 1, 2, 3 on/off control system: terminals 1, 3
Response sensitivity	1 ... 30 kΩ, adjustable via potentiometer (20 turns)
Output	
Output	1 changeover contact
Contact loading	253 V AC/2 A/cos Φ> 0.7; 40 V DC/2 A resistive load
Energized/De-energized delay	approx. 1 s/approx. 1 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 110 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Level sensing input**
- **Adjustable range 1 kΩ ... 30 kΩ**
- **Latching relay output**
- **Minimum/maximum control**

Function

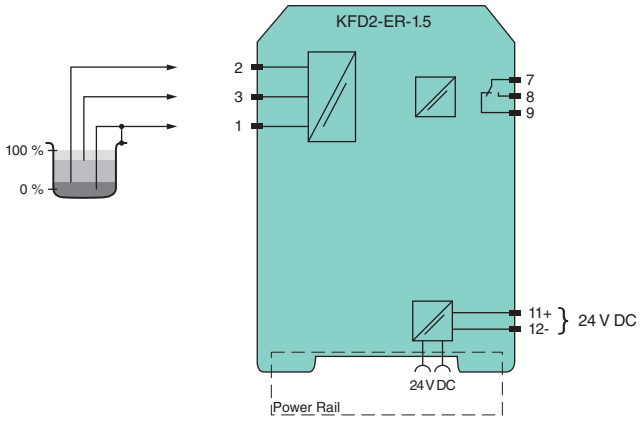
This signal conditioner provides the AC measuring voltage for the level-sensing electrodes.

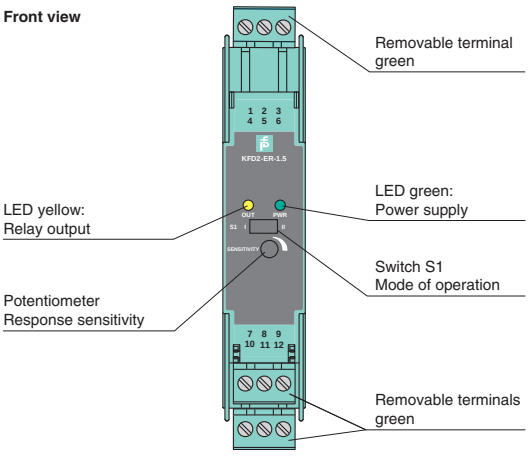
Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

The module is voltage and temperature stabilized and guarantees defined switching characteristics. An electronic holding circuit is used that allows minimum/maximum control. Since the conductance of the media may vary, the relay response sensitivity is adjustable.

The normal output state can be reversed through the mode of operation switch S1.

Diagrams





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Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Level sensing input**
- **Adjustable range 5 kΩ ... 150 kΩ**
- **Latching relay output**
- **Minimum/maximum control**

Function

This signal conditioner provides the AC measuring voltage for the level-sensing electrodes.

Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

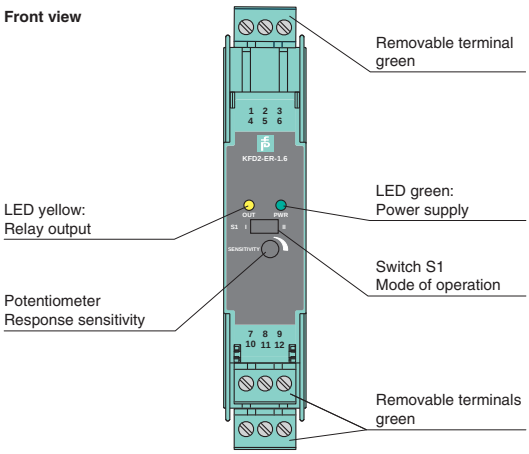
The module is voltage and temperature stabilized and guarantees defined switching characteristics. An electronic holding circuit is used that allows minimum/maximum control. Since the conductance of the media may vary, the relay response sensitivity is adjustable.

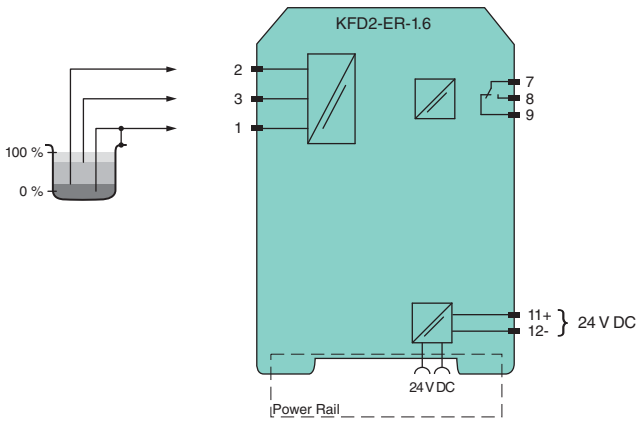
The normal output state can be reversed through the mode of operation switch S1.

Technical data

Supply	
Rated voltage	20 ... 30 V DC
Input	
Open circuit voltage/short-circuit current	approx. 10 V AC (approx. 1 Hz)/approx. 5 mA
Control input	min./max. control system: terminals 1, 2, 3 on/off control system: terminals 1, 3
Response sensitivity	5 ... 150 kΩ, adjustable via potentiometer (20 turns)
Output	
Output	1 changeover contact
Contact loading	253 V AC/2 A/cos Φ> 0.7; 40 V DC/2 A resistive load
Energized/De-energized delay	approx. 1 s/approx. 1 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 110 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Diagrams





Edition 908837 (US) / 208599 (EU) 11/2010

Technical data

Supply	
Rated voltage	103.5 ... 126 V AC, 45 ... 65 Hz
Power consumption	approx. 0.8 W
Input	
Open circuit voltage/short-circuit current	approx. 10 V AC (approx. 1 Hz)/approx. 5 mA
Control input	min./max. control system: terminals 1, 2, 3 on/off control system: terminals 1, 3
Response sensitivity	1 ... 30 kΩ, adjustable via potentiometer (20 turns)
Output	
Output	1 changeover contact
Contact loading	253 V AC/2 A/cos Φ > 0.7; 40 V DC/2 A resistive load
Energized/De-energized delay	approx. 1 s/approx. 1 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 110 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Features

- **1-channel signal conditioner**
- **115 V AC supply**
- **Level sensing input**
- **Adjustable range 1 kΩ ... 30 kΩ**
- **Latching relay output**
- **Minimum/maximum control**

Function

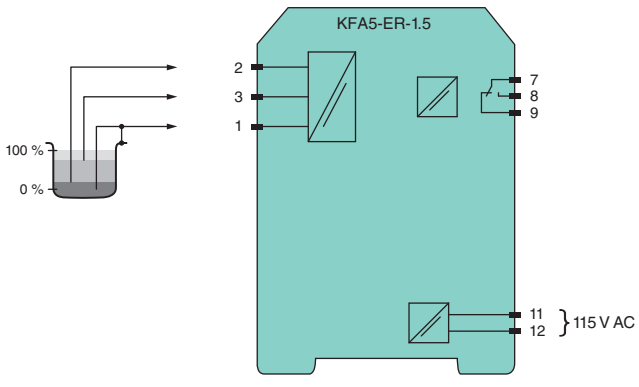
This signal conditioner provides the AC measuring voltage for the level-sensing electrodes.

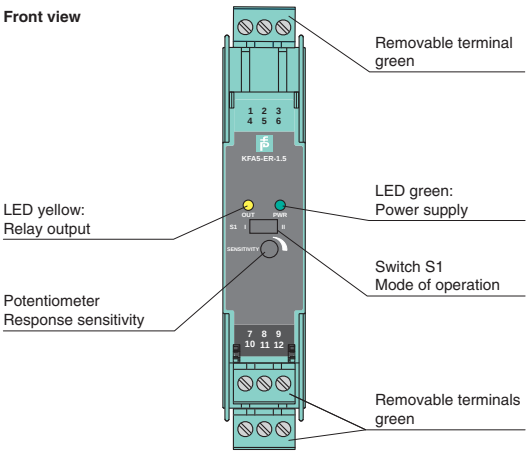
Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

The module is voltage and temperature stabilized and guarantees defined switching characteristics. An electronic holding circuit is used that allows minimum/maximum control. Since the conductance of the media may vary, the relay response sensitivity is adjustable.

The normal output state can be reversed through the mode of operation switch S1.

Diagrams





Edition 908837 (US) / 208599 (EU) 11/2010

Features

- **1-channel signal conditioner**
- **115 V AC supply**
- **Level sensing input**
- **Adjustable range 5 kΩ ... 150 kΩ**
- **Latching relay output**
- **Minimum/maximum control**

Function

This signal conditioner provides the AC measuring voltage for the level-sensing electrodes.

Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

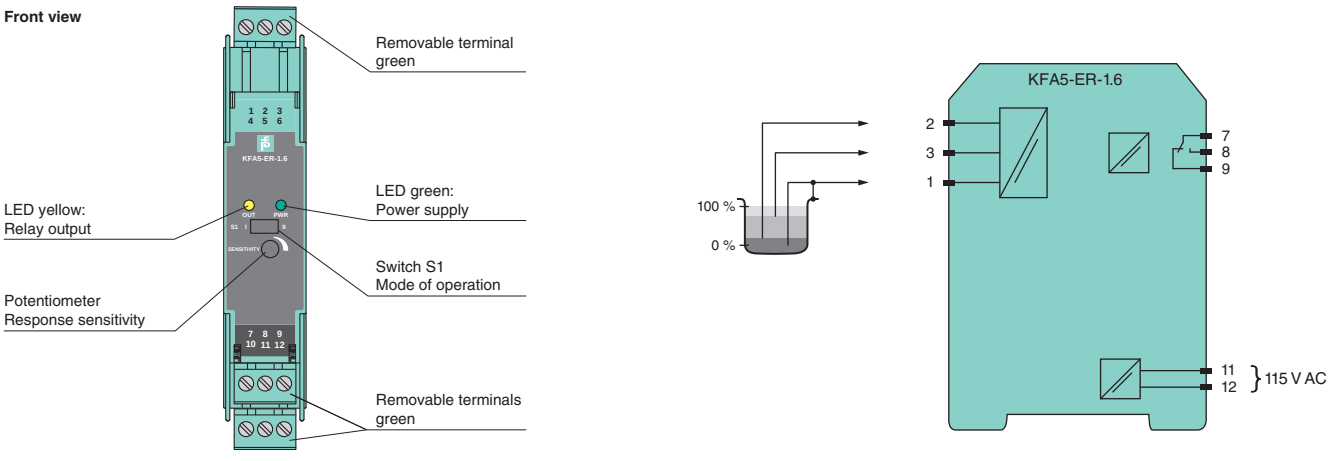
The module is voltage and temperature stabilized and guarantees defined switching characteristics. An electronic holding circuit is used that allows minimum/maximum control. Since the conductance of the media may vary, the relay response sensitivity is adjustable.

The normal output state can be reversed through the mode of operation switch S1.

Technical data

Supply	
Rated voltage	103.5 ... 126 V AC, 45 ... 65 Hz
Power consumption	approx. 0.8 W
Input	
Open circuit voltage/short-circuit current	approx. 10 V AC (approx. 1 Hz)/approx. 5 mA
Control input	min./max. control system: terminals 1, 2, 3 on/off control system: terminals 1, 3
Response sensitivity	5 ... 150 kΩ, adjustable via potentiometer (20 turns)
Output	
Output	1 changeover contact
Contact loading	253 V AC/2 A/cos Φ> 0.7; 40 V DC/2 A resistive load
Energized/De-energized delay	approx. 1 s/approx. 1 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 110 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Diagrams



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Technical data

Supply	
Rated voltage	207 ... 253 V AC, 45 ... 65 Hz
Power consumption	approx. 0.8 W
Input	
Open circuit voltage/short-circuit current	approx. 10 V AC (approx. 1 Hz)/approx. 5 mA
Control input	min./max. control system: terminals 1, 2, 3 on/off control system: terminals 1, 3
Response sensitivity	1 ... 30 kΩ, adjustable via potentiometer (20 turns)
Output	
Output	1 changeover contact
Contact loading	253 V AC/2 A/cos Φ > 0.7; 40 V DC/2 A resistive load
Energized/De-energized delay	approx. 1 s/approx. 1 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 110 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Features

- **1-channel signal conditioner**
- **230 V AC supply**
- **Level sensing input**
- **Adjustable range 1 kΩ ... 30 kΩ**
- **Latching relay output**
- **Minimum/maximum control**

Function

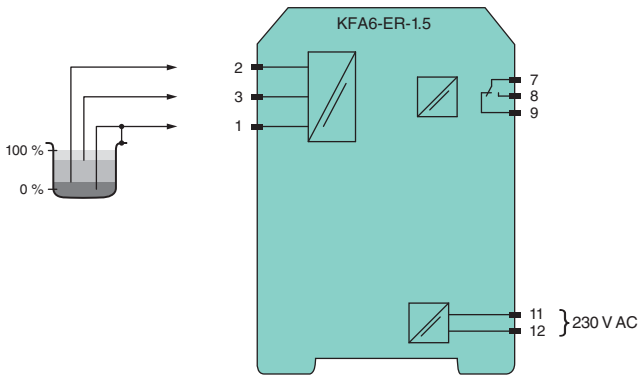
This signal conditioner provides the AC measuring voltage for the level-sensing electrodes.

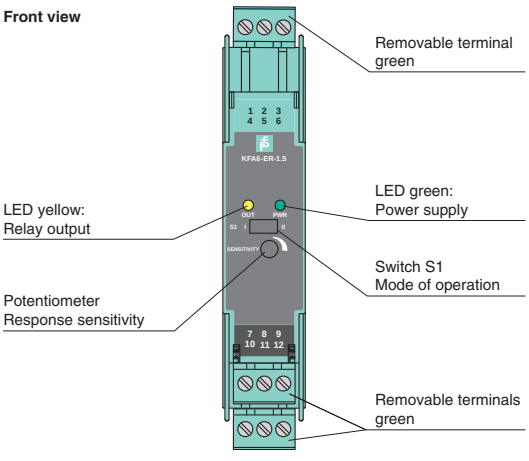
Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

The module is voltage and temperature stabilized and guarantees defined switching characteristics. An electronic holding circuit is used that allows minimum/maximum control. Since the conductance of the media may vary, the relay response sensitivity is adjustable.

The normal output state can be reversed through the mode of operation switch S1.

Diagrams





Edition 908837 (US) / 208599 (EU) 11/2010

Features

- **1-channel signal conditioner**
- **230 V AC supply**
- **Level sensing input**
- **Adjustable range 5 kΩ ... 150 kΩ**
- **Latching relay output**
- **Minimum/maximum control**

Function

This signal conditioner provides the AC measuring voltage for the level-sensing electrodes.

Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

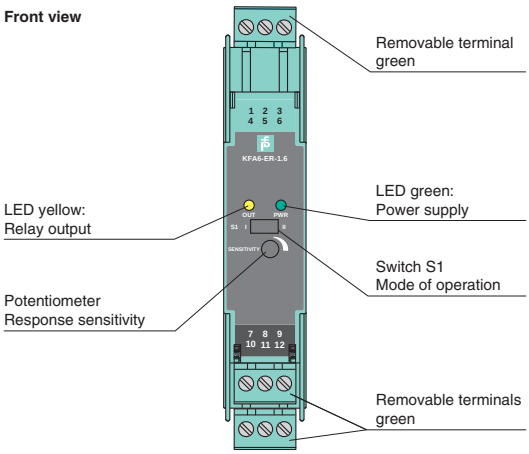
The module is voltage and temperature stabilized and guarantees defined switching characteristics. An electronic holding circuit is used that allows minimum/maximum control. Since the conductance of the media may vary, the relay response sensitivity is adjustable.

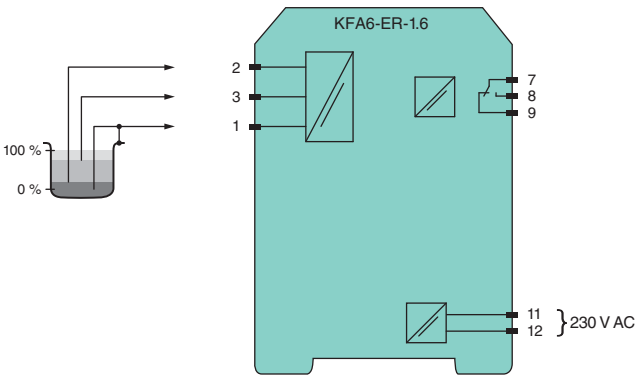
The normal output state can be reversed through the mode of operation switch S1.

Technical data

Supply	
Rated voltage	207 ... 253 V AC, 45 ... 65 Hz
Power consumption	approx. 0.8 W
Input	
Open circuit voltage/short-circuit current	approx. 10 V AC (approx. 1 Hz)/approx. 5 mA
Control input	min./max. control system: terminals 1, 2, 3 on/off control system: terminals 1, 3
Response sensitivity	5 ... 150 kΩ, adjustable via potentiometer (20 turns)
Output	
Output	1 changeover contact
Contact loading	253 V AC/2 A/cos Φ> 0.7; 40 V DC/2 A resistive load
Energized/De-energized delay	approx. 1 s/approx. 1 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 110 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Diagrams





Edition 908837 (US) / 208599 (EU) 11/2010

Technical data

Supply	
Rated voltage	20 ... 30 V DC
Input	
Control input	min./max. control system: terminals 1, 2, 3 on/off control system: terminals 1, 3
Response sensitivity	1 ... 150 kΩ, adjustable via potentiometer
Output	
Switch power	max. 192 W, 2000 VA
Output	relay
Contact loading	253 V AC/2 A/cos Φ> 0.7; 40 V DC/2 A resistive load
Time constant for signal damping	0.5 s, 2 s, 5 s, 10 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Level sensing input**
- **Adjustable range 1 kΩ ... 150 kΩ**
- **Latching relay output**
- **Adjustable time delay up to 10 s**
- **Minimum/maximum control**
- **Line fault detection (LFD)**

Function

This signal conditioner provides the AC measuring voltage for the level sensing electrodes.

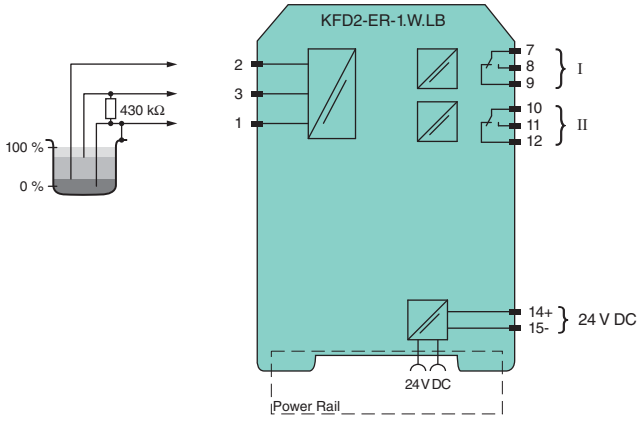
Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

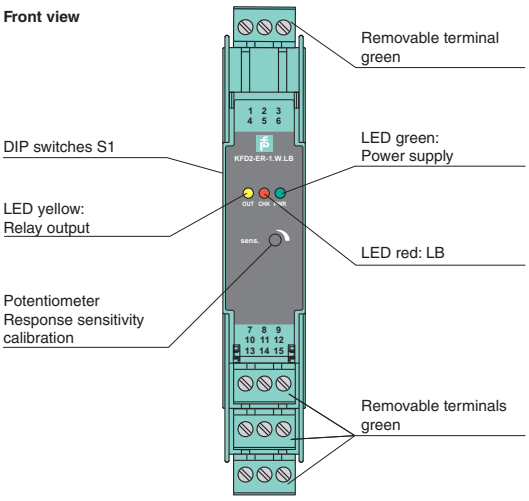
The module is voltage and temperature stabilized and guarantees a defined switching characteristic.

It can be used for on/off control or minimum/maximum control. A signal delay feature is available and is adjustable between 0.5 s and 10 s.

This module can also monitor the field circuit for lead breakage (LB). LB is indicated by a red LED. If LB monitoring is selected, output II serves as the fault signal output; otherwise, it will follow the function of output I.

Diagrams





Edition 908837 (US) / 208599 (EU) 11/2010

KFD2-ER-2.W.LB

Conductivity Switch Amplifier

Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Level sensing input**
- **Adjustable range 1 kΩ ... 150 kΩ**
- **Latching relay output**
- **Adjustable time delay up to 10 s**
- **Minimum/maximum control**
- **Line fault detection (LFD)**

Function

This signal conditioner provides the AC measuring voltage for the level sensing electrodes.

Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

The module is voltage and temperature stabilized and guarantees a defined switching characteristic.

It can be used for on/off control or minimum/maximum control. A signal delay feature is available and is adjustable between 0.5 s and 10 s.

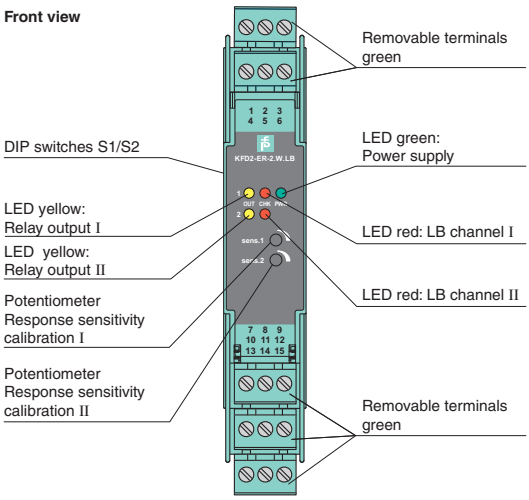
This module can also monitor the field circuit for lead breakage (LB). LB is indicated by a red LED. This function can be deactivated with DIP switches.

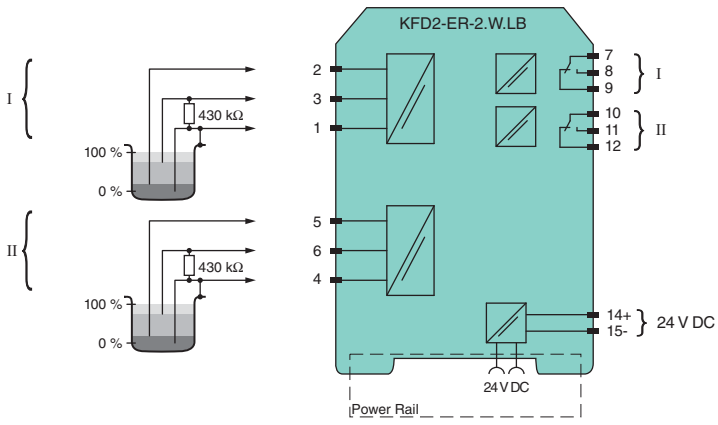
Technical data

Supply	
Rated voltage	20 ... 30 V DC
Input	
Control input	min./max. control system: terminals 1, 2, 3; 4, 5. 6 on/off control system: terminals 1, 3; 4, 6
Response sensitivity	1 ... 150 kΩ, adjustable via potentiometer
Output	
Switch power	max. 192 W, 2000 VA
Output	relay
Contact loading	253 V AC/2 A/cos Φ> 0.7; 40 V DC/2 A resistive load
Time constant for signal damping	0.5 s, 2 s, 5 s, 10 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	103.5 ... 126 V AC, 45 ... 65 Hz
Power consumption	< 1.2 W
Input	
Control input	min./max. control system: terminals 1, 2, 3 on/off control system: terminals 1, 3
Response sensitivity	1 ... 150 kΩ, adjustable via potentiometer
Output	
Switch power	max. 192 W, 2000 VA
Output	relay
Contact loading	253 V AC/2 A/cos Φ> 0.7; 40 V DC/2 A resistive load
Time constant for signal damping	0.5 s, 2 s, 5 s, 10 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **115 V AC supply**
- **Level sensing input**
- **Adjustable range 1 kΩ ... 150 kΩ**
- **Latching relay output**
- **Adjustable time delay up to 10 s**
- **Minimum/maximum control**
- **Line fault detection (LFD)**

Function

This signal conditioner provides the AC measuring voltage for the level sensing electrodes.

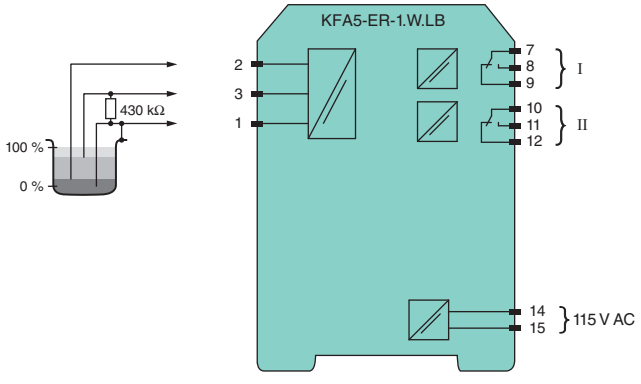
Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

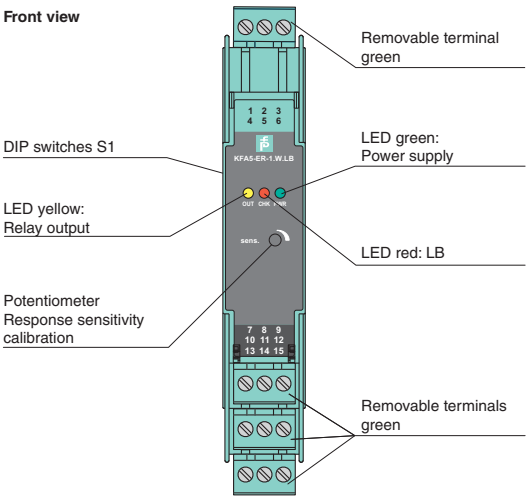
The module is voltage and temperature stabilized and guarantees a defined switching characteristic.

It can be used for on/off control or minimum/maximum control. A signal delay feature is available and is adjustable between 0.5 s and 10 s.

This module can also monitor the field circuit for lead breakage (LB). LB is indicated by a red LED. If LB monitoring is selected, output II serves as the fault signal output; otherwise, it will follow the function of output I.

Diagrams





Edition 908837 (US) / 208599 (EU) 11/2010

KFA5-ER-2.W.LB

Conductivity Switch Amplifier

Features

- **2-channel signal conditioner**
- **115 V AC supply**
- **Level sensing input**
- **Adjustable range 1 kΩ ... 150 kΩ**
- **Latching relay output**
- **Adjustable time delay up to 10 s**
- **Minimum/maximum control**
- **Line fault detection (LFD)**

Function

This signal conditioner provides the AC measuring voltage for the level sensing electrodes.

Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

The module is voltage and temperature stabilized and guarantees a defined switching characteristic.

It can be used for on/off control or minimum/maximum control. A signal delay feature is available and is adjustable between 0.5 s and 10 s.

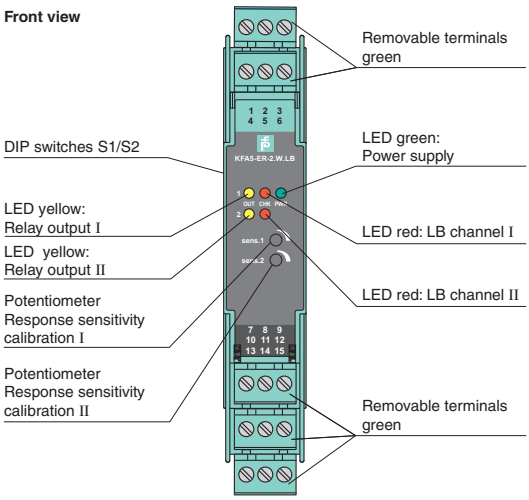
This module can also monitor the field circuit for lead breakage (LB). LB is indicated by a red LED. This function can be deactivated with DIP switches.

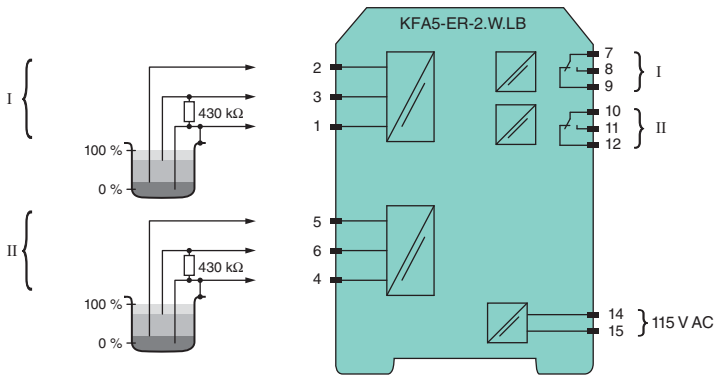
Technical data

Supply	
Rated voltage	103.5 ... 126 V AC, 45 ... 65 Hz
Power consumption	< 1.2 W
Input	
Control input	min./max. control system: terminals 1, 2, 3; 4, 5. 6 on/off control system: terminals 1, 3; 4, 6
Response sensitivity	1 ... 150 kΩ, adjustable via potentiometer
Output	
Switch power	max. 192 W, 2000 VA
Output	relay
Contact loading	253 V AC/2 A/cos Φ> 0.7; 40 V DC/2 A resistive load
Time constant for signal damping	0.5 s, 2 s, 5 s, 10 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	207 ... 253 V AC, 45 ... 65 Hz
Power consumption	< 1.2 W
Input	
Control input	min./max. control system: terminals 1, 2, 3 on/off control system: terminals 1, 3
Response sensitivity	1 ... 150 kΩ, adjustable via potentiometer
Output	
Switch power	max. 192 W, 2000 VA
Output	relay
Contact loading	253 V AC/2 A/cos Φ> 0.7; 40 V DC/2 A resistive load
Time constant for signal damping	0.5 s, 2 s, 5 s, 10 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **230 V AC supply**
- **Level sensing input**
- **Adjustable range 1 kΩ ... 150 kΩ**
- **Latching relay output**
- **Adjustable time delay up to 10 s**
- **Minimum/maximum control**
- **Line fault detection (LFD)**

Function

This signal conditioner provides the AC measuring voltage for the level sensing electrodes.

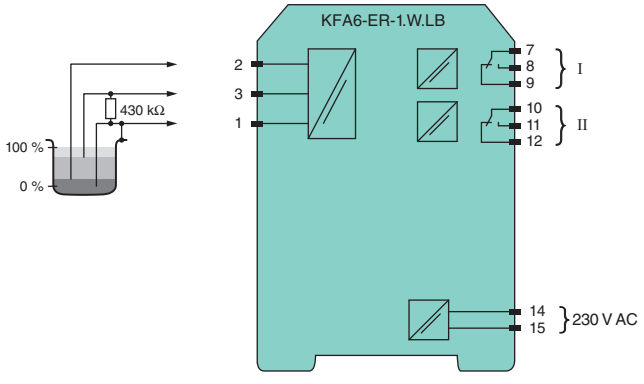
Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

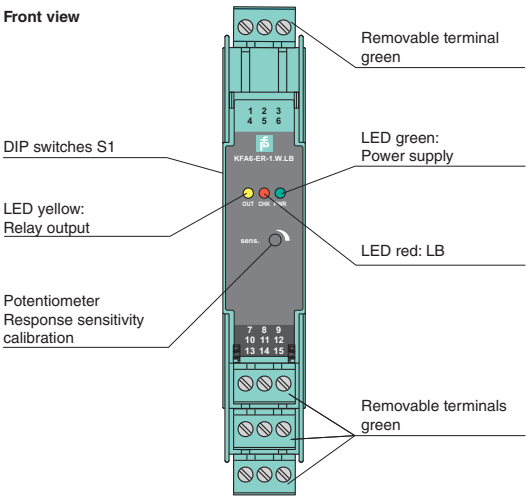
The module is voltage and temperature stabilized and guarantees a defined switching characteristic.

It can be used for on/off control or minimum/maximum control. A signal delay feature is available and is adjustable between 0.5 s and 10 s.

This module can also monitor the field circuit for lead breakage (LB). LB is indicated by a red LED. If LB monitoring is selected, output II serves as the fault signal output; otherwise, it will follow the function of output I.

Diagrams





Edition 908837 (US) / 208599 (EU) 11/2010

Features

- **2-channel signal conditioner**
- **230 V AC supply**
- **Level sensing input**
- **Adjustable range 1 kΩ ... 150 kΩ**
- **Latching relay output**
- **Adjustable time delay up to 10 s**
- **Minimum/maximum control**
- **Line fault detection (LFD)**

Function

This signal conditioner provides the AC measuring voltage for the level sensing electrodes.

Once the measured medium reaches the electrodes, the unit reacts by energizing a form C changeover relay contact.

The module is voltage and temperature stabilized and guarantees a defined switching characteristic.

It can be used for on/off control or minimum/maximum control. A signal delay feature is available and is adjustable between 0.5 s and 10 s.

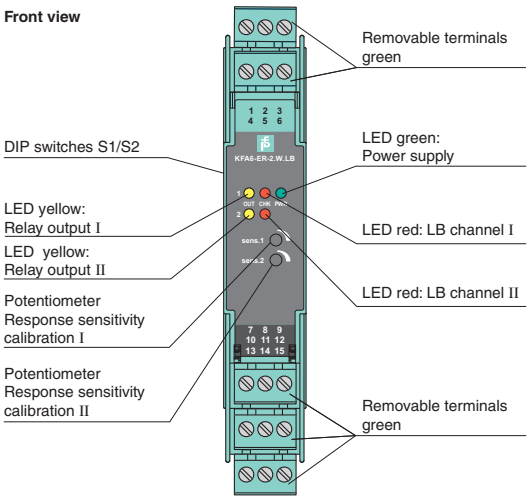
This module can also monitor the field circuit for lead breakage (LB). LB is indicated by a red LED. This function can be deactivated with DIP switches.

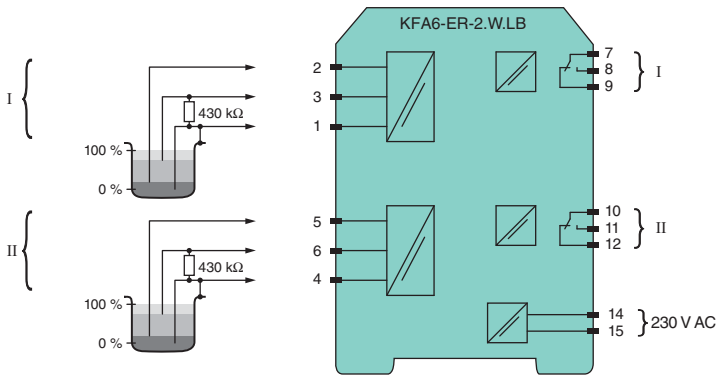
Technical data

Supply	
Rated voltage	207 ... 253 V AC, 45 ... 65 Hz
Power consumption	< 1.2 W
Input	
Control input	min./max. control system: terminals 1, 2, 3; 4, 5. 6 on/off control system: terminals 1, 3; 4, 6
Response sensitivity	1 ... 150 kΩ, adjustable via potentiometer
Output	
Switch power	max. 192 W, 2000 VA
Output	relay
Contact loading	253 V AC/2 A/cos Φ> 0.7; 40 V DC/2 A resistive load
Time constant for signal damping	0.5 s, 2 s, 5 s, 10 s
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams

Front view





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Solenoid Drivers

Model Number	Channels	Input (Control System)		Output (Field)		Supply	SIL	Page
		Loop Powered	Logic Input	Voltage (V)	Max. Current (mA)	Supply 24 V DC		
KFD2-SL-4	4		■	24	600	■	2	604

Relay Outputs

Model Number	Channels	Input (Control System)			Output (Field)				Supply		SIL	Page
		Loop Powered	Logic Input	Immune to DCS Test Pulses	Relay	ETS (Energized to Safe)	DTS (De-energized to Safe)	DPS (Dual Pole Switching)	24 V DC	Loop Powered		
KFD0-RSH-1	1	■	■		1		■			■	3	605
KFD0-RSH-1.4S.PS2	1	■	■	Yokogawa	2	■	■	■		■	3	606
KFD0-RSH-1-Y2	1	■	■	Triconex	1		■			■	3	607

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Features

- **4-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Output 600 mA per channel**
- **Logic inputs**
- **Common disable input**
- **Line fault detection (LFD)**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner is a 4-channel barrier with outputs that switch 600 mA to high-power solenoids. It is also used as power amplifier up to a switching frequency of 1 kHz.

Two channels per module can be paralleled. The output current of a parallel combination is 1.2 A. If the supply voltage falls below 18 V, the outputs will be switched off.

The outputs are sustained short-circuit proofed and overload-proofed.

Lead breakage and short circuit, which is selected via DIP switch, is indicated by a red LED and through the collective error output via Power Rail.

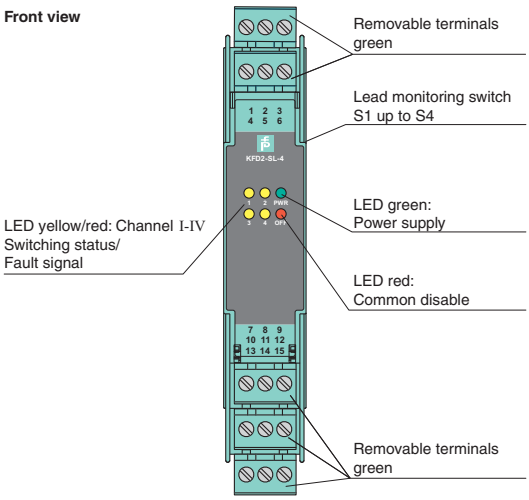
With the common disable input (terminals 11 and 12), the auxiliary power for all 4 channels can be switched off simultaneously. This central switch-off is also indicated by a red LED and reported as an error signal to the Power Rail.

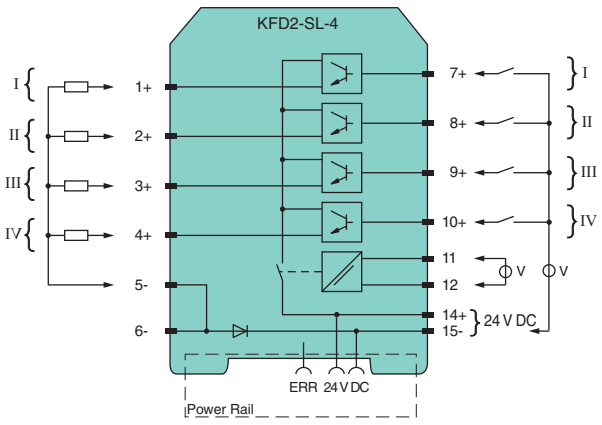
Technical data

Supply	
Rated voltage	20 ... 30 V DC
Input	
Input current	approx. 2 mA at 24 V DC
Signal level	0-signal: 0 ... 5 V DC 1-signal: 16 ... 30 V
Comon disable	
Input current	≤ 50 mA at 24 V, depolarized currentless state: downscale of the outputs
Switch on	≥ 15 V
Switch off	≤ 5 V
Output	
Open loop voltage	24 V DC
Switching frequency f	1 kHz
Output rated operating current	600 mA, sustained short-circuit proof and overload-proof
Off-state current I_r	< 1 mA at 24 V DC
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Power loss	< 1.5 W
Power consumption	< 1.5 W
Input	
Pulse/Pause ratio	≥ 20 ms/≥ 20 ms
Signal level	0-signal: 0 ... 5 V DC 1-signal: 16 ... 30 V
Rated current I_i	approx. 50 mA
Output	
Contact loading	230 V AC/2 A/cos Φ0.7; 40 V DC/2 A resistive load
Minimum switch current	2 mA/24 V DC
Energized/De-energized delay	approx. 10 ms/approx. 5 ms
Mechanical life	5 x 10^6 switching cycles
Transfer characteristics	
Switching frequency	< 10 Hz
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Fail-safe relay contact output**
- **Logic input 16 V DC ... 30 V DC, non-polarized**
- **Up to SIL3 acc. to IEC 61508**

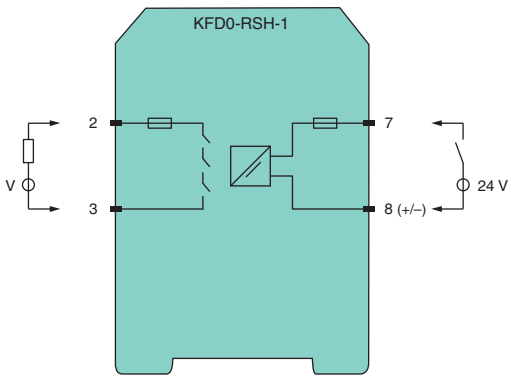
Function

This signal conditioner is a relay module that is suitable for safely switching applications of a load circuit. The device isolates load circuits up to 230 V and the 24 V control interface.

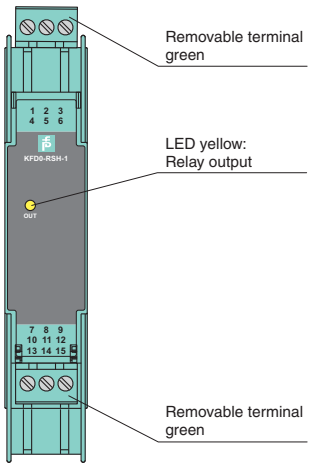
The output is galvanically isolated from the input and is protected against contact welding by a fuse.

The three relays are of diverse design, but have a common effect on the switch output.

Diagrams



Front view



Edition 908837 (US) / 208599 (EU) 11/2010

KFD0-RSH-1.4S.PS2

Relay Module

Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Fail-safe relay contact output for de-energized and energized to safe function**
- **Logic input 20 V DC ... 26.5 V DC, non-polarized**
- **Immune to DCS test pulses (Yokogawa)**
- **Up to SIL3 acc. to IEC 61508**

Function

This signal conditioner is a relay module that is suitable for safely switching applications of a load circuit. The device isolates load circuits up to 230 V and the 24 V control interface.

The energized to safe (ETS) function is permitted for SIL3 applications with output I. The de-energized to safe (DTS) function is permitted for SIL3 applications with output II. Additionally a dual pole switching (DPS) is possible by combination of output I and II.

The relays are of diverse design, but have a common effect on the individual switch output. For checking of these relays, terminals 10, 11 and 12 can be used. The test mode will be indicated by LEDs according to NAMUR NE44.

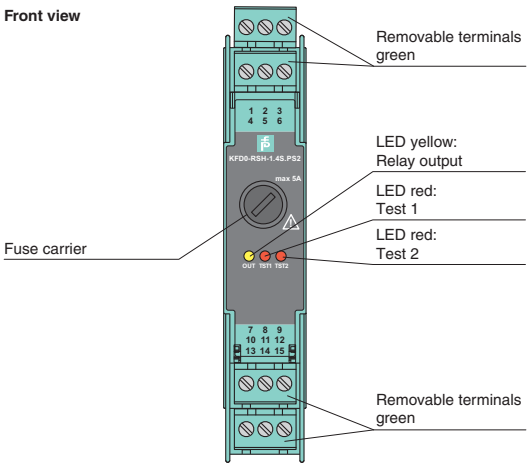
The outputs are galvanically isolated from the input. Output II is protected against contact welding by a fuse depending on the used terminal.

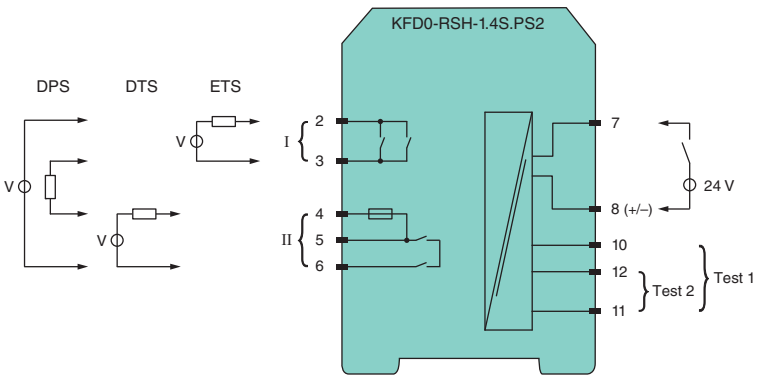
Technical data

Supply	
Power loss	< 1.5 W
Power consumption	< 1.5 W
Input	
Pulse/Pause ratio	≥ 20 ms/≥ 20 ms
Test input	see Safety Manual
Signal level	0-signal: -3 ... 3 V DC 1-signal: 20 ... 26.5 V
Rated current I_i	45 ... 50 mA
Output	
Contact loading	230 V AC/5 A/cos Φ0.7; 24 V DC/5 A resistive load
Minimum switch current	2 mA/24 V DC
Energized/De-energized delay	approx. 10 ms/approx. 5 ms
Mechanical life	5 x 10^6 switching cycles
Electrical life	2.5 x 10^5 switching cycles at 2 A 1 x 10^4 switching cycles at 5 A
Fuse rating	2.5 A (max. 5 A) recommended maximum utilization of the fuse: 80 %
Transfer characteristics	
Switching frequency	< 10 Hz
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Power loss	< 1.5 W
Power consumption	< 1.5 W
Input	
Pulse/Pause ratio	≥ 35 ms/≥ 35 ms
Pulse/Pause ratio test pulse	< 10 %
Test pulse length	max. 2 ms
Signal level	0-signal: 0 ... 5 V DC 1-signal: 20 ... 30 V
Rated current I_i	approx. 58 mA
Output	
Contact loading	230 V AC/2 A/cos Φ0.7; 40 V DC/2 A resistive load
Minimum switch current	2 mA/24 V DC
Energized/De-energized delay	5 ... 15 ms/5 ... 10 ms
Mechanical life	5 x 10^6 switching cycles
Electrical life	2.5 x 10^5 switching cycles, at maximium load
Transfer characteristics	
Switching frequency	< 10 Hz
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Fail-safe relay contact output**
- **Logic input 20 V DC ... 30 V DC, non-polarized**
- **Immune to DCS test pulses (Triconex)**
- **Up to SIL3 acc. to IEC 61508**

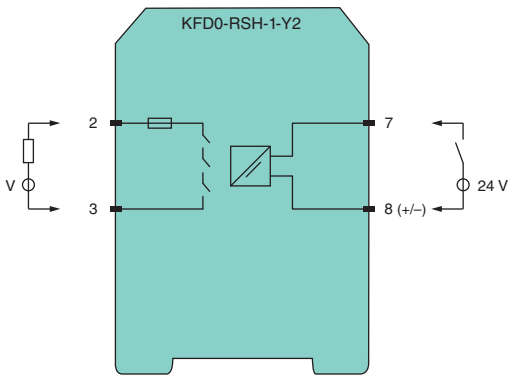
Function

This signal conditioner is a relay module that is suitable for safely switching applications of a load circuit. The device isolates load circuits up to 230 V and the 24 V control interface.

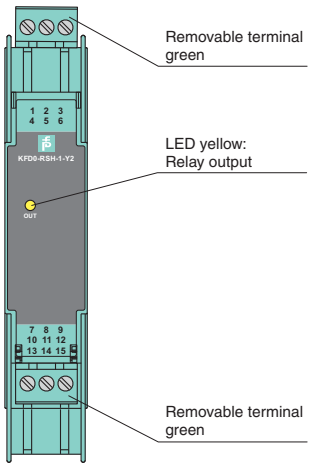
The output is galvanically isolated from the input and is protected against contact welding by a fuse.

The three relays are of diverse design, but have a common effect on the switch output.

Diagrams



Front view



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Transmitter Power Supplies

Model Number	Channels	Input (Field)				Output (Control System)				Specials		Supply		SIL	Page
		2-wire Transmitter	3-wire Transmitter	Current Source	0/2 V ... 10 V	0/4 mA ... 20 mA (Source)	0/4 mA ... 20 mA (Sink)	1 V ... 5 V	0/2 V ... 10 V	SMART	Signal Splitting (1 Input – 2 Outputs)	24 V DC	115 V AC/ 230 V AC		
KCD2-STC-1	1	■		■		■	■	1		■		■		2	612
KFD2-STC4-1	1	■	■	■		1				■		■		2	613
KFD2-STC4-1-3	1	■	■	■			1			■		■		2	614
KFD2-STV4-1-1	1	■	■	■				1		■		■		2	615
KFD2-CR4-1	1	■	■	■		1						■		2	616
KFD2-STC4-1.2O	1	■	■	■		2				■	■	■		3	617
KFD2-STC4-1.2O-3	1	■	■	■			2			■	■	■		3	618
KFD2-CR4-1.2O	1	■	■	■		2					■	■		3	619
KFU8-VCR-1	1	■	■	■	■	■	■		■			■	■		620
KFD2-STC4-2	2	■				2				■		■		2	621
KFD2-STC4-2-3	2	■					2			■		■		2	622
KFD2-STV4-2-1	2	■						2		■		■		2	623
KFD2-CR4-2	2	■				2						■		2	624

Transmitter Power Supplies with Trip Values

Model Number	Channels	Input (Field)			Output (Control System)			Supply		SIL	Page
		2-wire Transmitter	3-wire Transmitter	Current Source	0/4 mA ... 20 mA (Source)	Relay	SMART	24 V DC	115 V AC/ 230 V AC		
KFD2-CRG2-1.D	1	■	■	■	1	2		■		2	625
KFU8-CRG2-1.D	1	■	■	■	1	2		■	■	2	626

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Current Repeaters

Model Number	Channels	Input (Field)				Output (Control System)			Supply Loop Powered	SIL	Page
		0 mA ... 40 mA	1 mA ... 20 mA	4 mA ... 20 mA	Fire Alarm	0 mA ... 40 mA	4 mA ... 20 mA	SMART			
KFD0-SCS-1.55	1			■			1	■	■	2	627
KFD0-CS-1.50	1			■	■		1		■	2	628
KFD0-CS-2.50	2			■	■		2		■	2	629
KFD0-CS-2.51P	2	■			■	2			■	2	630

Current and Voltage Converters

Model Number	Channels	Input (Field)					Output (Control System)			Supply			SIL	Page
		mV	-10 V ... 10 V	0/2 V ... 10 V	0/4 mA ... 20 mA	Strain Gauge	0/4 mA ... 20 mA	0/1 V ... 5 V 0/2 V ... 10 V	Relay	Loop Powered	24 V DC	115 V AC/ 230 V AC		
KFD0-CC-1	1			■	■		1			■				631
KFD2-USC-1.D	1	■		■	■		■	■	1		■			632
KFU8-USC-1.D	1	■		■	■		■	■	1		■	■		633
KFD2-GS-1.2W	1			■	■				2		■			634
KFD2-WAC2-1.D	1	■				■	1		2		■			635
KFD0-VC-1.10	1		■				1			■				636

Temperature Converters and Repeaters

Model Number	Channels	Input (Field)				Output (Control System)			Supply		SIL	Page
		RTD	TC	Potentiometer	V	0/4 mA ... 20 mA	0/1 V ... 5 V	Resistance	24 V DC	Loop Powered		
KFD2-UT2-1	1	■	■	■	■	1			■		2	637
KFD2-UT2-1-1	1	■	■	■	■		1		■		2	638
KFD2-UT2-2	2	■	■	■	■	2			■		2	639
KFD2-UT2-2-1	2	■	■	■	■		2		■		2	640
KFD0-TR-1	1	■				1				■		641
KFD0-TT-1	1		■			1				■		642

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Temperature Converters with Trip Values

Model Number	Channels	Input (Field)					Output (Control System)		Supply		SIL	Page
		RTD	TC	Potentiometer	V	mA	4 mA ... 20 mA	Relay	24 V DC	115 V AC/ 230 V AC		
KFD2-GU-1	1	■	■		■	■		2	■			643
KFD2-GUT-1.D	1	■	■	■	■		1	2	■		2	644
KFU8-GUT-1.D	1	■	■	■	■		1	2	■	■	2	645

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Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire SMART transmitters and 2-wire SMART current sources**
- **Output 4 mA ... 20 mA or 1 V ... 5 V**
- **Sink or source mode**
- **Housing width 12.5 mm**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire SMART transmitters, and can also be used with 2-wire SMART current sources.

It transfers the analog input signal as an isolated current value.

Digital signals may be superimposed on the input signal and are transferred bi-directionally.

Selectable output of current source, sink mode, or voltage output is available via DIP switches.

If the HART communication resistance in the loop is too low, the internal resistance of 250 Ω between terminals 6 and 8 can be used.

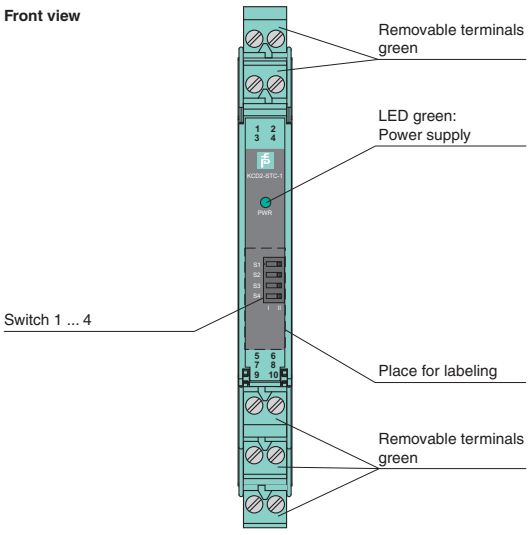
Test sockets for the connection of HART communicators are integrated into the terminals of the device.

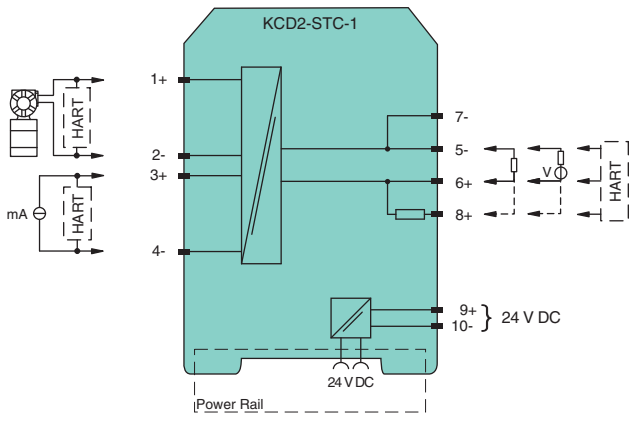
Technical data

Supply	
Rated voltage	19 ... 30 V DC
Power consumption	≤ 1.1 W
Input	
Input signal	4 ... 20 mA limited to approx. 30 mA
Voltage drop U_d	approx. 5 V on terminals 3+, 4-
Available voltage	≥ 15 V at 20 mA terminals 1+, 2-
Output	
Load	0 ... 300 Ω (source mode)
Output signal	4 ... 20 mA or 1 ... 5 V (on 250 Ω, 0.1 % internal shunt) 4 ... 20 mA (sink mode), operating voltage 15.5 ... 26 V
Ripple	20 mV_{rms}
Transfer characteristics	
Deviation	at 20 °C (68 °F) ≤ ± 0.1 % incl. non-linearity and hysteresis (source mode 4 ... 20 mA) ≤ ± 0.2 % incl. non-linearity and hysteresis (sink mode 4 ... 20 mA) ≤ ± 0.2 % incl. non-linearity and hysteresis (source mode 1 ... 5 V)
Influence of ambient temperature	< 2 µA/K (0 ... 60 °C (32 ... 140 °F)); < 4 µA/K (-20 ... 0 °C (-4 ... 32 °F)) (source mode and sink mode 4 ... 20 mA) < 0.5 mV/K (0 ... +60 °C (32 ... 140 °F)); < 1 mV/K (-20 ... 0 °C (-4 ... 32 °F)) (source mode 1 ... 5 V)
Frequency range	bandwidth at 0.5 V_{pp} signal 0 ... 3 kHz (-3 dB)
Rise time	10 to 90 % ≤ 20 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	12.5 x 114 x 124 mm (0.5 x 4.5 x 4.9 in), housing type A2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	1.9 W
Input	
Input signal	0/4 ... 20 mA
Voltage drop U_d	≤2.4 V at 20 mA (terminals 5, 6)
Input resistance	≤ 64 Ω terminals 2-, 3; ≤500 Ω terminals 1+, 3 (250 Ω load)
Available voltage	≥ 16 V at 20 mA, terminals 1+, 3
Output	
Load	0 ... 800 Ω
Output signal	4 ... 20 mA (overload > 25 mA)
Ripple	≤50 μA_{rms}
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤10 µA incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	≤20 ppm/K
Frequency range	input to output: bandwidth with 0.5 V_{pp} signal 0 ... 7.5 kHz (-3 dB) output to input: bandwidth with 0.5 V_{pp} signal 0.3 ... 7.5 kHz (-3 dB)
Start-up time	200 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 200 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire and 3-wire SMART transmitters and 2-wire SMART current sources**
- **Output 0/4 mA ... 20 mA**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire and 3-wire SMART transmitters, and can also be used with 2-wire SMART current sources.

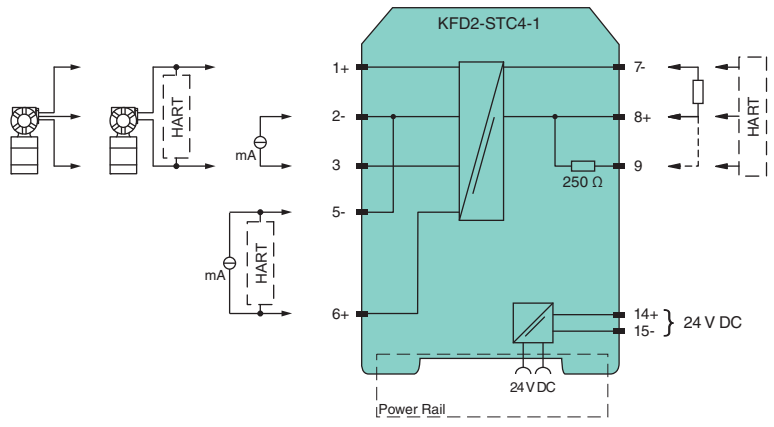
It transfers the analog input signal as an isolated current value.

Digital signals may be superimposed on the input signal and are transferred bi-directionally.

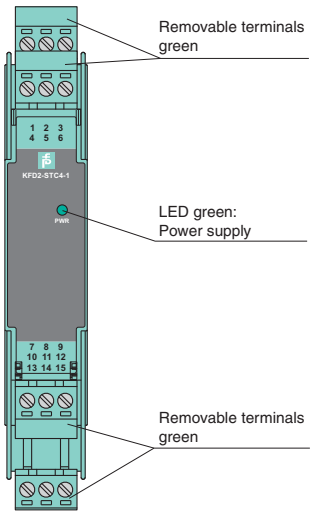
If the HART communication resistance in the loop is too low, the internal resistance of 250 Ω between terminals 8 and 9 can be used.

Test sockets for the connection of HART communicators are integrated into the terminals of the device.

Diagrams



Front view



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Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire and 3-wire SMART transmitters and 2-wire SMART current sources**
- **0/4 mA ... 20 mA current sink output**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire and 3-wire SMART transmitters, and can also be used with 2-wire SMART current sources.

It transfers the analog input signal as an isolated current value.

Digital signals may be superimposed on the input or output signal and are transferred bi-directionally.

It is designed to provide a sink mode output.

If the HART communication resistance in the loop is too low, the internal resistance of 250 Ω between terminals 8 and 9 can be used.

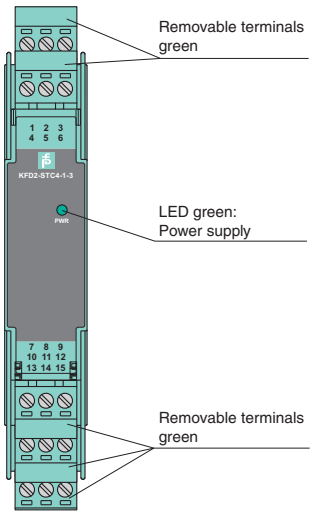
Test sockets for the connection of HART communicators are integrated into the terminals of the device.

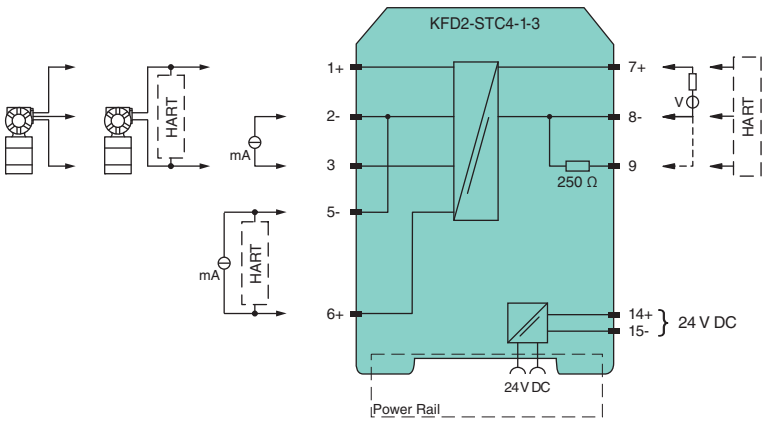
Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	2.5 W
Input	
Input signal	0/4 ... 20 mA
Voltage drop U_d	≤ 2.4 V at 20 mA (terminals 5, 6)
Input resistance	≤ 64 Ω terminals 2-, 3; ≤ 500 Ω terminals 1+, 3 (250 Ω load)
Available voltage	≥ 16 V at 20 mA terminals 1+, 3
Output	
Output signal	0/4 ... 20 mA (overload > 25 mA)
Ripple	≤ 50 μA_{rms}
External supply (loop)	11 ... 30 V DC
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤ 10 µA incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	0.25 µA/K
Frequency range	input to output: bandwidth with 0.5 V_{pp} signal 0 ... 7.5 kHz (-3 dB) output to input: bandwidth with 0.5 V_{pp} signal 0.3 ... 7.5 kHz (-3 dB)
Rise time	20 µs
Start-up time	200 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 200 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	1.9 W
Input	
Input signal	0/4 ... 20 mA
Voltage drop U_d	≤2.4 V at 20 mA (terminals 5, 6)
Input resistance	≤ 64 Ω terminals 2-, 3; ≤500 Ω terminals 1+, 3 (250 Ω load)
Available voltage	≥ 16 V at 20 mA terminals 1+, 3
Output	
Load	output resistance: 250 Ω
Output signal	0/1 ... 5 V
Ripple	≤12.5 mV
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/1 ... 5 V ≤5 mV incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	≤20 ppm/K
Frequency range	hazardous area into the safe area: bandwidth with 0.5 V_{pp} 0 ... 7.5 kHz (-3 dB) safe area into the hazardous area: bandwidth with 0.5 V_{pp} 0.3 ... 7.5 kHz (-3 dB)
Rise time	20 µs
Start-up time	200 µs
De-energized delay	20 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 200 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire and 3-wire SMART transmitters and 2-wire SMART current sources**
- **Output 0/1 V ... 5 V**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire and 3-wire SMART transmitters, and can also be used with 2-wire SMART current sources.

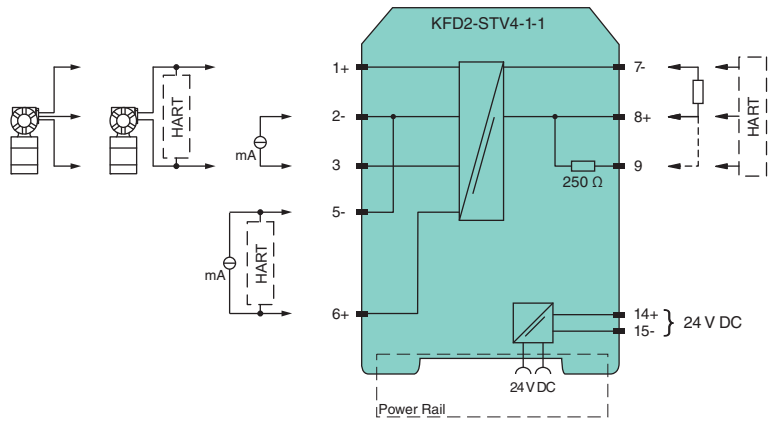
It transfers the analog input signal as an isolated voltage value.

Digital signals may be superimposed on the input signal and are transferred bi-directionally.

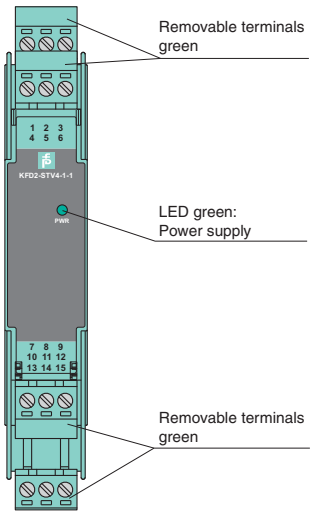
If the HART communication resistance in the loop is too low, the internal resistance of 250 Ω between terminals 8 and 9 can be used.

Test sockets for the connection of HART communicators are integrated into the terminals of the device.

Diagrams



Front view



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Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire and 3-wire transmitters and 2-wire current sources**
- **Output 0/4 mA ... 20 mA**
- **Accuracy 0.1 %**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire and 3-wire transmitters, and can also be used with 2-wire current sources.

It transfers the analog input signal as an isolated current value.

The output provides a 0/4 mA ... 20 mA current corresponding to the input signal. The minimum available field voltage is 16 V at 20 mA.

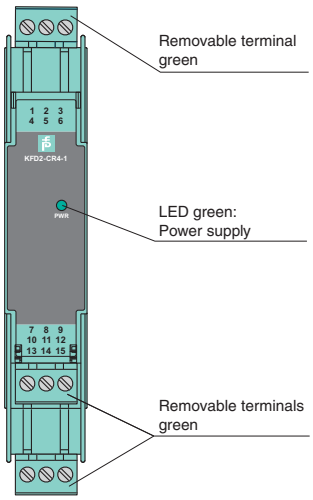
If necessary, the internal resistance of 250 Ω between terminals 8, 9 can be used for conversion into a 0 V ... 5 V voltage signal.

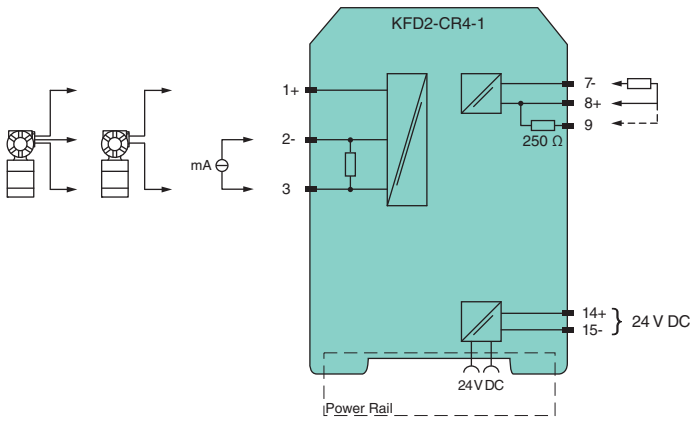
Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	1.6 W
Input	
Input signal	0/4 ... 20 mA
Input resistance	≤ 64 Ω terminals 2-, 3; ≤ 500 Ω terminals 1+, 3 (250 Ω load)
Available voltage	≥ 15.7 V at 20 mA terminals 1+, 3
Ripple	50 mV_{pp} at 20 mA
Output	
Load	0 ... 800 Ω
Output signal	0/4 ... 20 mA
Ripple	≤ 50 μA_{rms}
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤ 10 µA incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	0.25 µA/K
Rise time	20 µs
Start-up time	200 µs
De-energized delay	20 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	2.5 W
Input	
Input signal	0/4 ... 20 mA
Voltage drop U_d	≤2.4 V at 20 mA (terminals 5, 6)
Input resistance	≤ 76 Ω terminals 2-, 3; ≤500 Ω terminals 1+, 3 (250 Ω load)
Available voltage	≥ 16 V at 20 mA, terminals 1+, 3
Ripple	0
Output	
Load	0 ... 550 Ω
Output signal	0/4 ... 20 mA (overload > 25 mA)
Ripple	≤50 μA_{rms}
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤ ± 10 µA incl. calibration, linearity, hysteresis, loads and supply voltage fluctuations
Influence of ambient temperature	≤20 ppm/K
Frequency range	Input in output: bandwidth with 1 mA_{pp} signal 0 ... 7.5 kHz (-3 dB) output in input: band width with 1 V_{pp} signal 0.3 ... 7.5 kHz (-3 dB)
Rise time	20 µs
Start-up time	200 µs
De-energized delay	20 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 200 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire and 3-wire SMART transmitters and 2-wire SMART current sources**
- **Dual output 0/4 mA ... 20 mA**
- **Terminals with test points**
- **Up to SIL3 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire and 3-wire SMART transmitters, and can also be used with 2-wire SMART current sources.

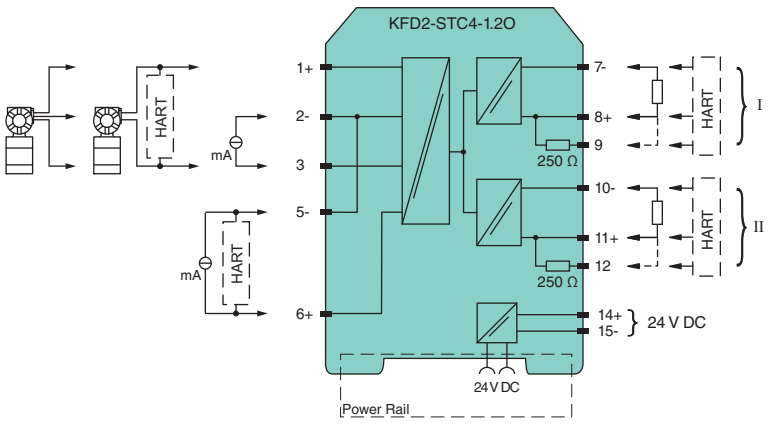
It transfers the analog input signal to the safe area as two isolated current values.

Digital signals may be superimposed on the input signal and are transferred bi-directionally.

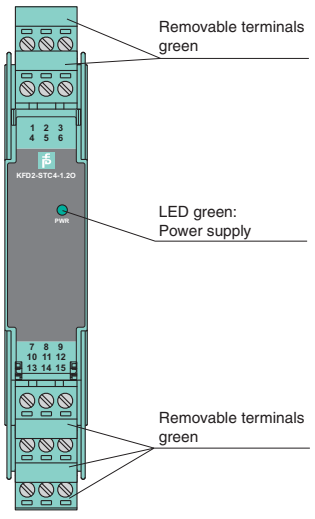
If the HART communication resistance in the loop is too low, the internal resistance of 250 Ω between terminals 8, 9 and 11, 12 can be used.

Test sockets for the connection of HART communicators are integrated into the terminals of the device.

Diagrams



Front view



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KFD2-STC4-1.2O-3 SMART Transmitter Power Supply, Output Current Sink

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire and 3-wire SMART transmitters and 2-wire SMART current sources**
- **Dual output 0/4 mA ... 20 mA**
- **Terminals with test points**
- **Up to SIL3 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire and 3-wire SMART transmitters, and can also be used with 2-wire SMART current sources.

It transfers the analog input signal as two isolated current values.

Digital signals may be superimposed on the input or the output signals and are transferred bi-directionally.

It is designed to provide sink mode outputs.

If the HART communication resistance in the loop is too low, the internal resistance of 250 Ω between terminals 8, 9 and 11, 12 can be used.

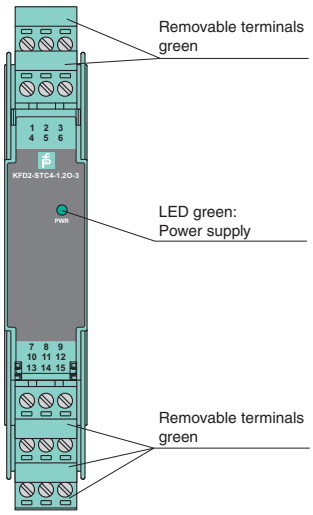
Test sockets for the connection of HART communicators are integrated into the terminals of the device.

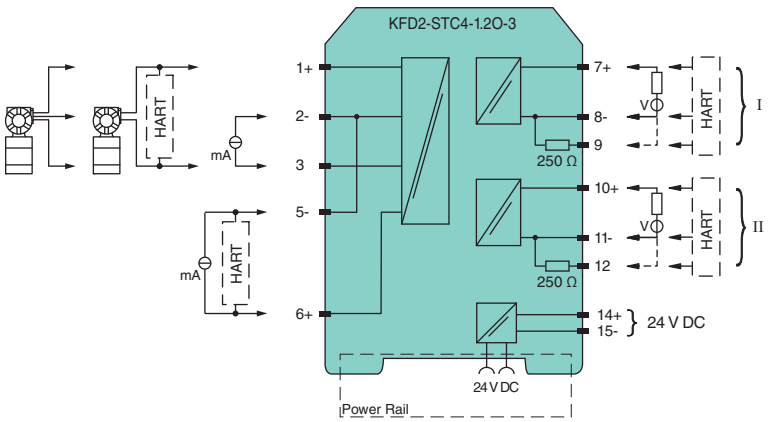
Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	2.5 W
Input	
Input signal	0/4 ... 20 mA
Voltage drop U_d	≤ 2.4 V at 20 mA (terminals 5, 6)
Input resistance	≤ 76 Ω terminals 2-, 3; ≤ 500 Ω terminals 1+, 3 (250 Ω load)
Available voltage	≥ 16 V at 20 mA terminals 1+, 3
Output	
Output signal	0/4 ... 20 mA (overload > 25 mA)
Ripple	≤ 50 μA_{rms}
External supply (loop)	11 ... 30 V DC
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤ 10 µA incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	0.25 µA/K
Frequency range	input to output: bandwidth with 0.5 V_{pp} signal 0 ... 7.5 kHz (-3 dB) output to input: bandwidth with 0.5 V_{pp} signal 0.3 ... 7.5 kHz (-3 dB)
Rise time	20 µs
Start-up time	200 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 200 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 32 V DC
Power consumption	approx. 2.5 W
Input	
Input signal	0/4 ... 20 mA
Input resistance	≤ 85 Ω terminals 2-, 3
Available voltage	≥ 16 V at 20 mA terminals 1+, 3
Ripple	50 mV_{pp} at 20 mA
Output	
Load	0 ... 550 Ω
Output signal	0/4 ... 20 mA
Ripple	≤ 50 μA_{rms}
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤ 10 µA incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	0.25 µA/K
Rise time	20 µs
Start-up time	200 µs
De-energized delay	20 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire and 3-wire transmitters and 2-wire current sources**
- **Dual output 0/4 mA ... 20 mA**
- **Accuracy 0.1 %**
- **Up to SIL3 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

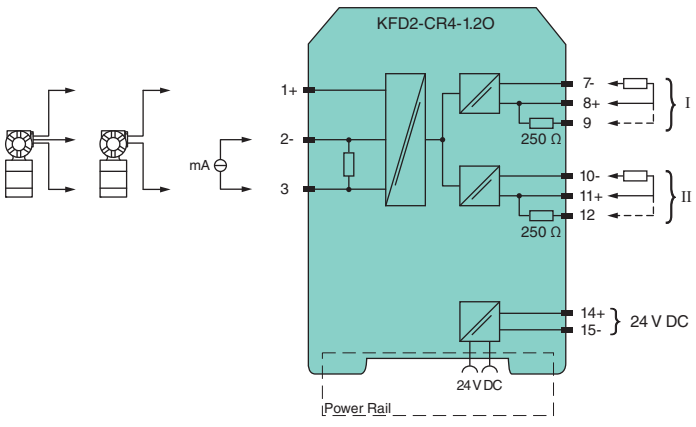
The device supplies 2-wire and 3-wire transmitters, and can also be used with 2-wire current sources.

It transfers the analog input signal as two isolated current values.

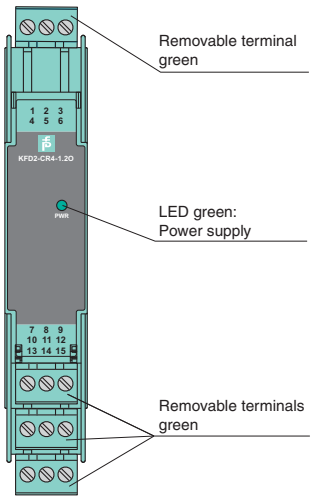
Both outputs provide a 0/4 mA ... 20 mA current corresponding to the input signal. The minimum available field voltage is 16 V at 20 mA.

If necessary, the internal resistance of 250 Ω between terminals 8, 9 and 11, 12 can be used for conversion into a 0 V ... 5 V voltage signal.

Diagrams



Front view



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Features

- **1-channel signal conditioner**
- **AC/DC wide range supply**
- **Current and voltage inputs**
- **Current or voltage output**
- **Switch selectable ranges**

Function

This isolated signal conditioner is a signal converter that is suitable for the connection of current and voltage signals and provides isolation for non-intrinsically safe applications.

The input ranges include 0/4 mA ... 20 mA or 0/2 V ... 10 V.

The output measuring signals are 0/4 mA ... 20 mA or 0/2 V ... 10 V.

The measuring range is easily selected by switches located on the front of device.

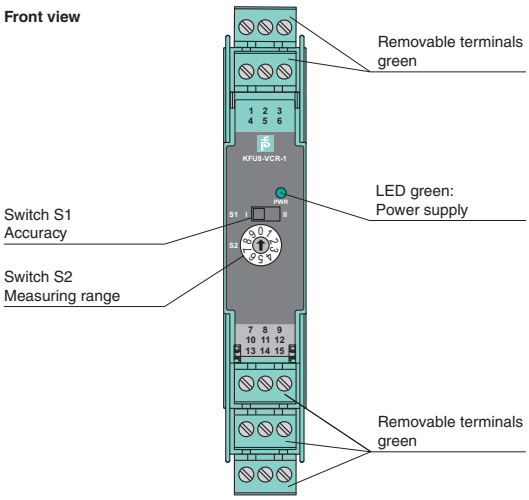
For additional information, refer to the manual and www.pepperl-fuchs.com.

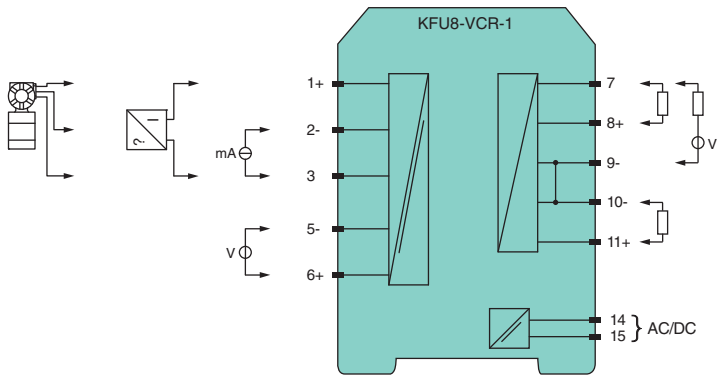
Technical data

Supply	
Rated voltage	20 ... 90 V DC/48 ... 253 V AC
Power consumption	≤ 2.1 W/≤ 4 VA
Input	
Input I	
Input signal	0/4 ... 20 mA
Available voltage	> 15 V at 20 mA terminals 1+, 3-
Open circuit voltage/short-circuit current	21 V/26 mA
Input resistance	< 55 Ω terminals 2-, 3+
Input II	
Input signal	0/2 ... 10 V
Input resistance	> 1 MΩ
Output	
Output I	analog current output
Output signal	0/4 ... 20 mA
Source	load 0 ... 750 Ω open circuit voltage > 21 V
Sink	voltage across terminals 5 ... 30 V. If the current is supplied from a source > 16.5 V, series resistance of ≥ (V - 16.5)/0.0215 Ω is needed, where V is the source voltage.
Output II	analog voltage output
Output signal	0/2 ... 10 V
Load	≥ 2 kΩ
Transfer characteristics	
Deviation	0.1 % of output signal range
Resolution/accuracy	current: 7 µA/20 µA voltage: 3.5 mV/10 mV
Influence of ambient temperature	0.01 %/K of output signal range
Reaction time	150 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	≤ 2.8 W
Input	
Input signal	0/4 ... 20 mA
Available voltage	≥ 16 V at 20 mA, terminals 1+, 3
Output	
Load	0 ... 550 Ω
Output signal	4 ... 20 mA (overload > 25 mA)
Ripple	≤ 50 μA_{rms}
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤ 10 µA incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	0.25 µA/K
Frequency range	input to output: bandwidth with 1 V_{pp} signal 0 ... 7.5 kHz (-3 dB) output to input: bandwidth with 1 V_{pp} signal 0.3 ... 7.5 kHz (-3 dB)
Rise time	20 µs
Start-up time	200 µs
De-energized delay	20 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire SMART transmitters**
- **Output 0/4 mA ... 20 mA**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire SMART transmitters.

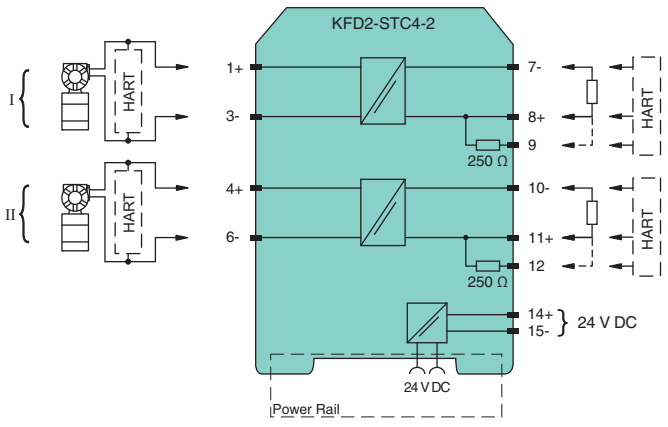
It transfers the analog input signal as an isolated current value.

Digital signals may be superimposed on the input signal and are transferred bi-directionally.

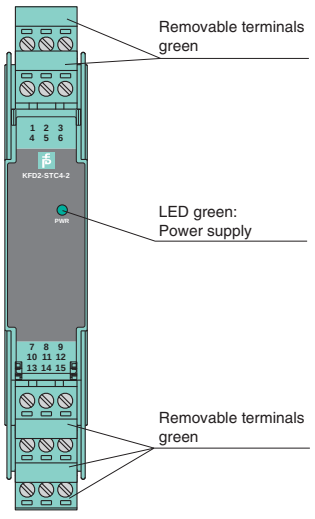
If the HART communication resistance in the loop is too low, the internal resistance of 250 Ω between terminals 8, 9 and 11, 12 can be used.

Test sockets for the connection of HART communicators are integrated into the terminals of the device.

Diagrams



Front view



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Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire SMART transmitters**
- **0/4 mA ... 20 mA current sink output**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire SMART transmitters.

It transfers the analog input signal as an isolated current value.

Digital signals may be superimposed on the input or output signals and transferred bi-directionally.

It is designed to provide sink mode outputs.

If the HART communication resistance in the loop is too low, the internal resistance of 250 Ω between terminals 8, 9 and 11, 12 can be used.

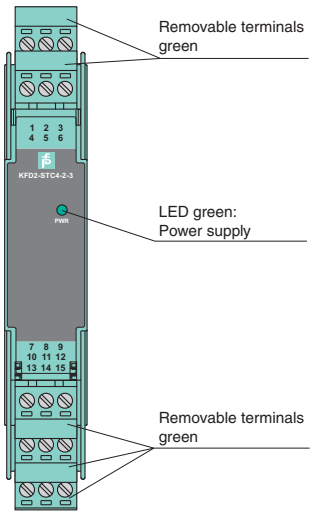
Test sockets for the connection of HART communicators are integrated into the terminals of the device.

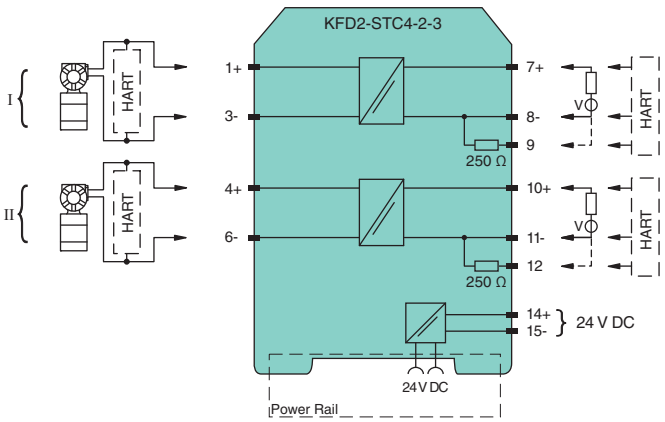
Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	≤ 2.8 W
Input	
Input signal	0/4 ... 20 mA
Available voltage	≥ 16 V at 20 mA, terminals 1+, 3
Output	
Output signal	0/4 ... 20 mA (overload > 25 mA)
Ripple	≤ 50 μA_{rms}
External supply (loop)	11 ... 30 V DC
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤ 10 µA incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	0.25 µA/K
Frequency range	input to output: bandwidth with 0.5 V_{pp} signal 0 ... 7.5 kHz (-3 dB) output to input: bandwidth with 0.5 V_{pp} signal 0.3 ... 7.5 kHz (-3 dB)
Rise time	20 µs
Start-up time	200 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 200 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	≤ 2.5 W
Input	
Input signal	0/4 ... 20 mA
Available voltage	≥ 16 V at 20 mA
Output	
Load	output resistance: 250 Ω
Output signal	0/1 ... 5 V
Ripple	≤ 12.5 mV
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/1 ... 5 V ≤ 5 mV incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	≤ 20 ppm/K
Frequency range	hazardous area into the safe area: bandwidth with 0.5 V_{pp} 0 ... 7.5 kHz (-3 dB) safe area into the hazardous area: bandwidth with 0.5 V_{pp} 0.3 ... 7.5 kHz (-3 dB)
Rise time	20 µs
Start-up time	200 µs
De-energized delay	20 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire SMART transmitters**
- **Output 0/1 V ... 5 V**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire SMART transmitters.

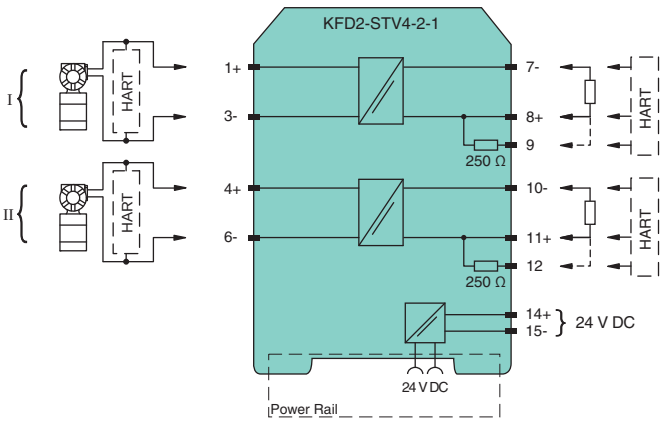
It transfers the analog input signal as an isolated voltage value.

Digital signals may be superimposed on the input signal and are transferred bi-directionally.

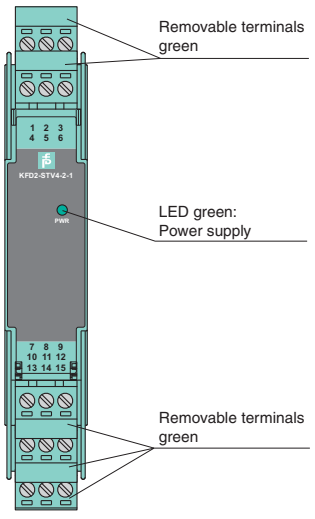
If the HART communication resistance in the loop is too low, the internal resistance of 250 Ω between terminals 8, 9 and 11, 12 can be used.

Test sockets for the connection of HART communicators are integrated into the terminals of the device.

Diagrams



Front view



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Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire transmitters**
- **Output 0/4 mA ... 20 mA**
- **Accuracy 0.1 %**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire transmitters.

It transfers the analog input signal as an isolated current value.

The output provides a 0/4 mA ... 20 mA current corresponding to the input signal. The minimum available field voltage is 16 V at 20 mA.

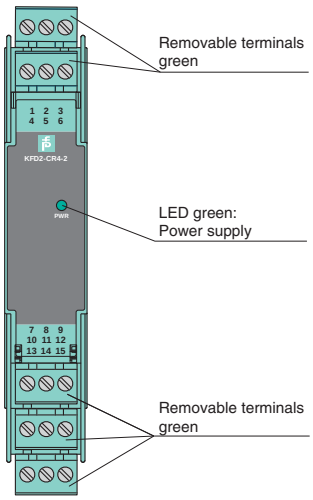
If necessary, the internal resistance of 250 Ω between terminals 8, 9 and 11, 12 can be used for conversion into a 0 V ... 5 V voltage signal.

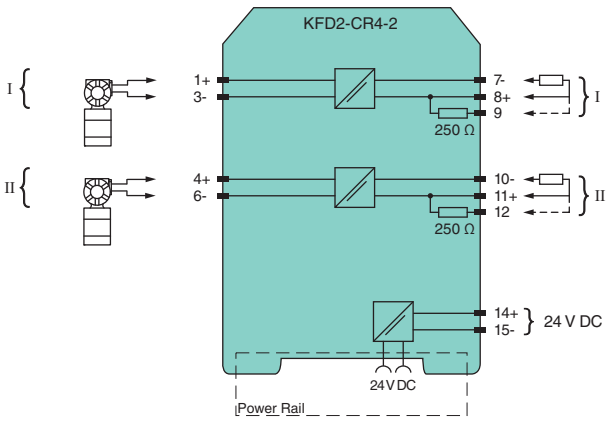
Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	≤ 2.8 W
Input	
Input signal	0/4 ... 20 mA
Input resistance	≤ 500 Ω terminals 1+, 3- (250 Ω load)
Available voltage	≥ 15.7 V at 20 mA terminals 1+, 3
Ripple	50 mV_{pp} at 20 mA
Output	
Load	0 ... 550 Ω
Output signal	0/4 ... 20 mA
Ripple	≤ 50 μA_{rms}
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤ 10 µA incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	0.25 µA/K
Rise time	20 µs
Start-up time	200 µs
De-energized delay	20 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power consumption	2.5 W
Input	
Input I	
Input signal	0/4 ... 20 mA
Available voltage	≥ 15 V at 20 mA
Open circuit voltage/short-circuit current	24 V/33 mA
Input resistance	45 Ω (terminals 2, 3)
Lead monitoring	breakage I < 0.2 mA; short-circuit I > 22 mA acc. to NAMUR NE43
Output	
Output signal	0 ... 20 mA or 4 ... 20 mA
Output I, II	signal, relay
Contact loading	250 V AC/2 A/cos Φ≥ 0.7; 40 V DC/2 A
Mechanical life	5 x 10^7 switching cycles
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Output III	signal, analog
Current range	0 ... 20 mA or 4 ... 20 mA
Open loop voltage	≤24 V DC
Load	≤650 Ω
Fault signal	downscale I ≤ 3.6 mA, upscale I ≥ 21.5 mA (acc. NAMUR NE43)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	300 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Input 2-wire and 3-wire transmitters and 2-wire current sources**
- **Output 0/4 mA ... 20 mA**
- **2 relay contact outputs**
- **Programmable high/low alarm**
- **Linearization function (max 20 points)**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire and 3-wire transmitters, and can also be used with active current sources.

Two relays and an active 0/4 mA ... 20 mA current source are available as outputs. The relay contacts and the current output can be integrated in security-relevant circuits. The current output is easily scaled.

On the display the measured value can be indicated in various physical units.

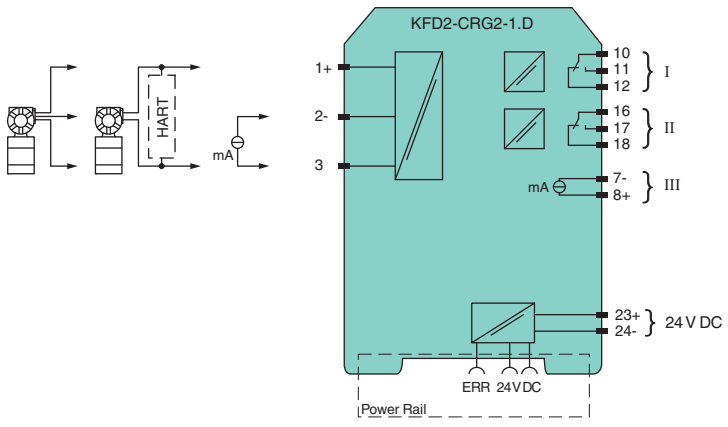
The unit is easily programmed by the use of a keypad located on the front of the unit or with the **PACT***ware*™ configuration software.

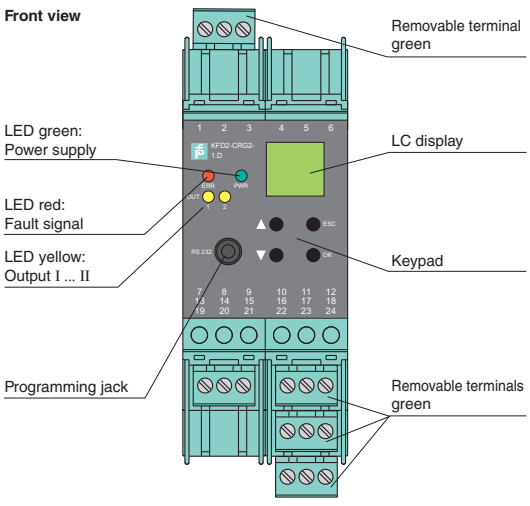
The input has a line fault detection.

A unique collective error messaging feature is available when used with the Power Rail system.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Diagrams





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Features

- **1-channel signal conditioner**
- **AC/DC wide range supply**
- **Input 2-wire and 3-wire transmitters and 2-wire current sources**
- **Output 0/4 mA ... 20 mA**
- **2 relay contact outputs**
- **Programmable high/low alarm**
- **Linearization function (max 20 points)**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner provides the isolation for non-intrinsically safe applications.

The device supplies 2-wire and 3-wire transmitters, and can also be used with active current sources.

Two relays and an active 0/4 mA ... 20 mA current source are available as outputs.

The relay contacts and the current output can be integrated in security-relevant circuits. The current output is easily scaled.

On the display the measured value can be indicated in various physical units.

The unit is easily programmed by the use of a keypad located on the front of the unit or with the **PACT***ware*™ configuration software.

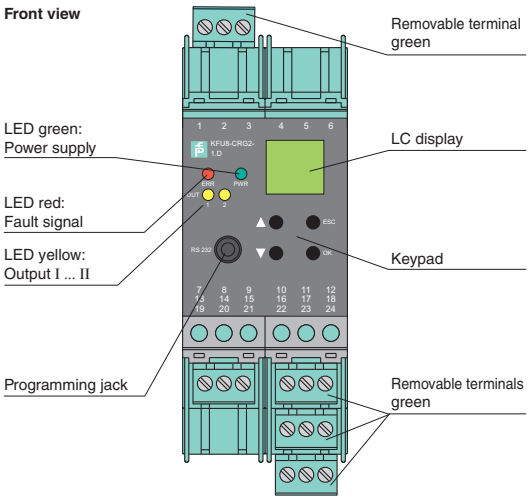
The input has a line fault detection.

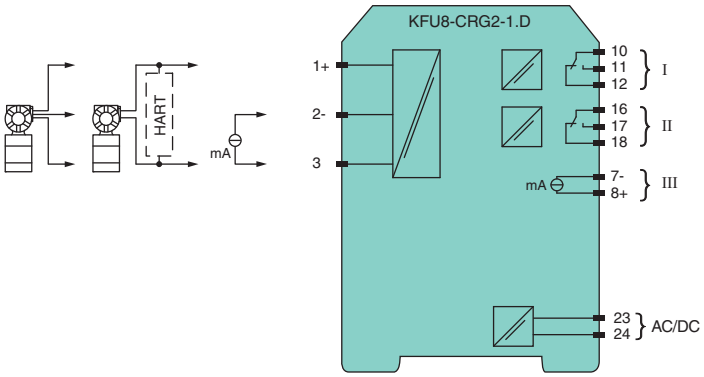
For additional information, refer to the manual and www.pepperl-fuchs.com.

Technical data

Supply	
Rated voltage	20 ... 90 V DC or 48 ... 253 V AC
Power consumption	2.2 W/4 VA
Input	
Input I	
Input signal	0/4 ... 20 mA
Available voltage	> 15 V at 20 mA
Open circuit voltage/short-circuit current	24 V/33 mA
Input resistance	45 Ω (terminals 2, 3)
Lead monitoring	breakage I < 0.2 mA; short-circuit I > 22 mA acc. to NAMUR NE43
Output	
Output signal	0 ... 20 mA or 4 ... 20 mA
Output I, II	signal, relay
Contact loading	250 V AC/2 A/cos Φ≥ 0.7; 40 V DC/2 A
Mechanical life	5 x 10^7 switching cycles
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Output III	Signal, analog
Current range	0 ... 20 mA or 4 ... 20 mA
Open loop voltage	≤24 V DC
Load	≤650 Ω
Fault signal	downscale I ≤ 3.6 mA, upscale I ≥ 21.5 mA (acc. NAMUR NE43)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	300 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3

Diagrams





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Technical data

Supply	
Rated voltage	loop powered
Field circuit	
Available voltage	≥ 16 V for supply voltage > 21 V
Current	4 ... 20 mA (linear transmission 1 ... 22 mA)
Load	≤ 800 Ω (at 20 mA)
Supply circuit	
Voltage	max. 30 V DC
Current	4 ... 20 mA (quiescent current < 0.5 mA)
Power loss	150 mW at 20 mA and U_E < 24 V
Transfer characteristics	
Deviation	
After calibration	≤ ± 80 µA linearity, load and voltage dependence at 20 °C (68 °F)
Influence of ambient temperature	< 0.5 µA/K
Damping	approx. 3 dB
Rise time	≤ 20 µs at 0 Ω, ≤ 600 µs with 800 Ω load
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 120 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Current input/output 4 mA ... 20 mA**
- **HART I/P or transmitter power supply**
- **Low voltage drop**
- **Line fault detection (LFD)**
- **Up to SIL2 acc. to IEC 61508**

Function

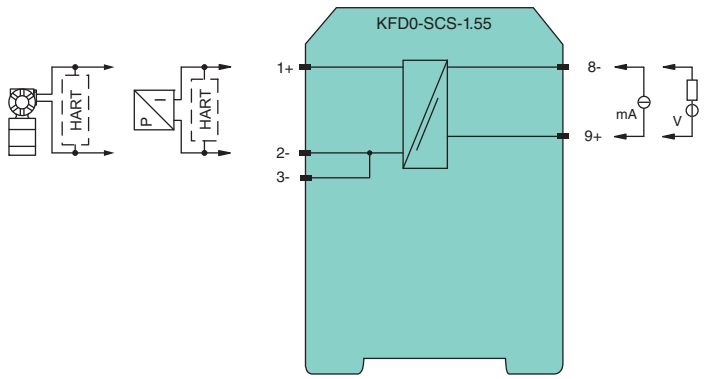
This signal conditioner is loop powered and isolates a 4 mA ... 20 mA signal for transmitters and positioners and is HART compatible.

The low voltage drop of 5 V in comparison to active signal conditioners also allows transmitter applications with unstable power sources between 20 V DC ... 30 V DC.

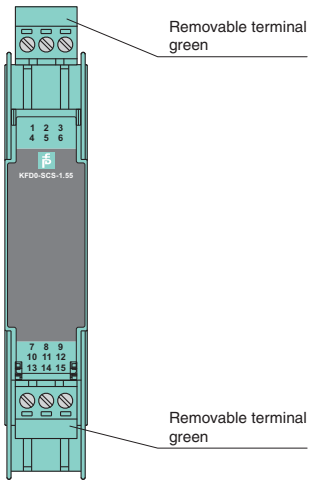
Line fault detection of the field circuit is possible if the control loop in the safe area is monitored for overscale or underscale conditions of the 4 mA ... 20 mA range.

The module can also be used for controlling solenoid valves and discrete outputs, such as LEDs. In this case, terminals 8- and 9+ are driven with a 24 V signal.

Diagrams



Front view



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Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Current input/output 4 mA ... 20 mA**
- **I/P or transmitter power supply**
- **Accuracy 0.1 %**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner transfers DC signals from fire alarms, smoke alarms, and temperature sensors and provides isolation for non-intrinsically safe applications. It can also be used to control I/P converters, power solenoids, LEDs, and audible alarms.

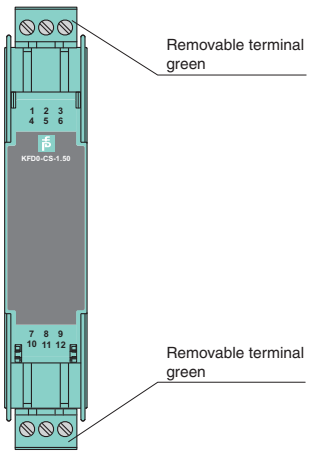
Since this isolator is loop powered, use the technical data to verify that proper voltage is available to the field devices.

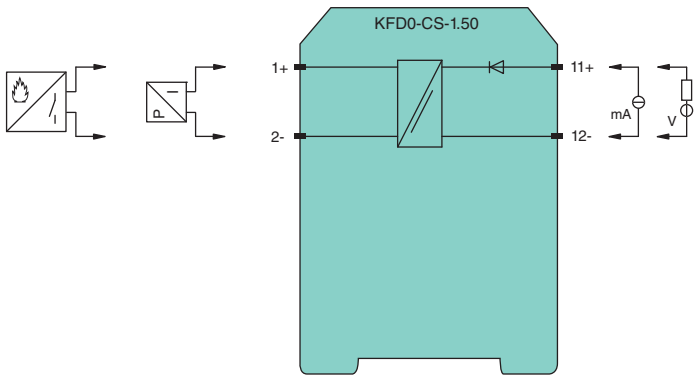
Technical data

Supply	
Rated voltage	loop powered
Input	
Rated voltage U_i	10 ... 35 V
Rated current I_i	4 ... 20 mA
Power loss	< 150 mW per channel at 25 mA and U < 26.1 V < 400 mW per channel at 25 mA and U > 26.1 V
Output	
Voltage	≥ 0.9 x U_{in} - (0.23 x current in mA) - 0.7 for 10 V < U_{in} < 26.1 V ≥ 23 V - (0.23 x current in mA) for U_{in} > 26.1 V
Short-circuit current	≤ 100 mA
Transfer current	≤ 25 mA
Transfer characteristics	
Deviation	
After calibration	U_{in} ≥ 5 V ± 20 µA/U_{in} ≤ 5 V ± 50 µA incl. calibration, linearity, hysteresis and output load fluctuations at 20 °C (68 °F)
Influence of ambient temperature	≤ 2 µA/K (0 ... 50 °C (32 ... 122 °F)); ≤ 5 µA/K (-20 ... 60 °C (-4 ... 140 °F))
Rise time	≤ 5 ms at 4 ... 20 mA and U_{in} = input voltage < 26 V
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Diagrams

Front view





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Technical data

Supply	
Rated voltage	loop powered
Input	
Rated voltage U_i	10 ... 35 V
Rated current I_i	4 ... 20 mA
Power loss	< 150 mW per channel at 25 mA and U < 26.1 V < 400 mW per channel at 25 mA and U > 26.1 V
Output	
Voltage	≥ 0.9 x U_{in} - (0.23 x current in mA) - 0.7 for 10 V < U_{in} < 26.1 V ≥ 23 V - (0.23 x current in mA) for U_{in} > 26.1 V
Short-circuit current	≤ 100 mA
Transfer current	≤ 25 mA
Transfer characteristics	
Deviation	
After calibration	U_{in} ≥ 5 V ± 20 µA/U_{in} ≤ 5 V ± 50 µA incl. calibration, linearity, hysteresis and output load fluctuations at 20 °C (68 °F)
Influence of ambient temperature	≤ 2 µA/K (0 ... 50 °C (32 ... 122 °F)); ≤ 5 µA/K (-20 ... 60 °C (-4 ... 140 °F))
Rise time	≤ 5 ms at 4 ... 20 mA and U_{in} = input voltage < 26 V
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Features

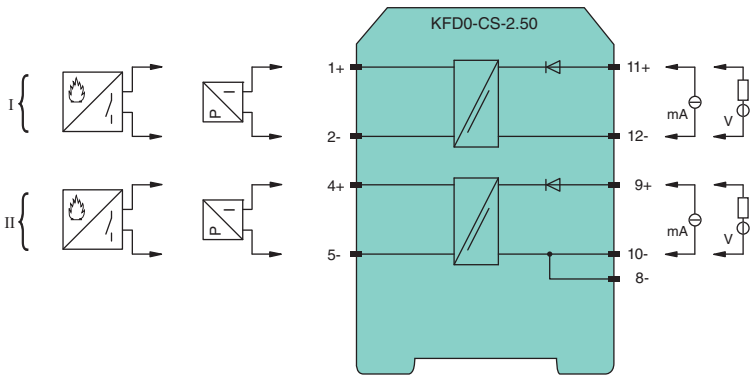
- **2-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Current input/output 4 mA ... 20 mA**
- **I/P or transmitter power supply**
- **Accuracy 0.1 %**
- **Up to SIL2 acc. to IEC 61508**

Function

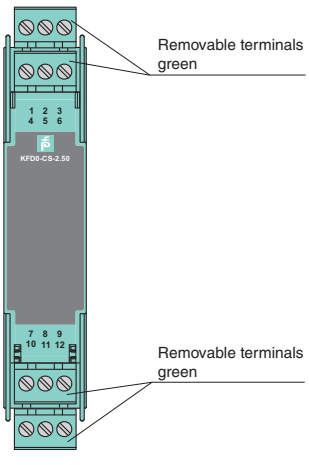
This signal conditioner transfers DC signals from fire alarms, smoke alarms, and temperature sensors and provides isolation for non-intrinsically safe applications. It can also be used to control I/P converters, power solenoids, LEDs, and audible alarms.

Since this isolator is loop powered, use the technical data to verify that proper voltage is available to the field devices.

Diagrams



Front view



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Features

- **2-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Current input/output 0 mA ... 40 mA**
- **I/P or transmitter power supply**
- **Accuracy 1 %**
- **Reverse polarity protection**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner transfers DC signals from fire alarms, smoke alarms, and temperature sensors to the control and provides isolation for non-intrinsically safe applications. It can also be used to control I/P converters, power solenoids, LEDs, and audible alarms.

Reverse polarity protection prevents damage to the isolator caused by faulty wiring.

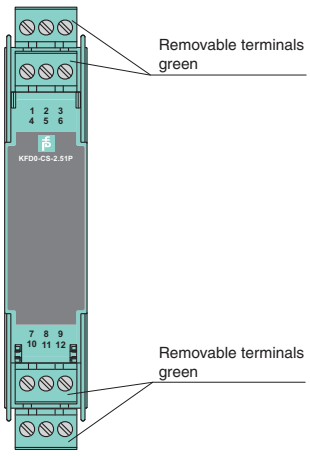
Since this isolator is loop powered, use the technical data to verify that proper voltage is available to the field devices.

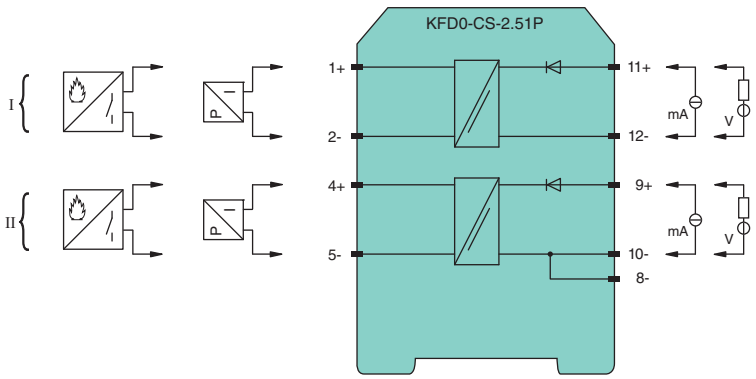
Technical data

Supply	
Rated voltage	loop powered
Input	
Rated voltage U_i	4 ... 35 V
Rated current I_i	0 ... 40 mA
Power loss	at 40 mA and U_{in} < 22 V: 700 mW per channel at 40 mA and U_{in} > 22 V: 1.2 W per channel
Output	
Voltage	for 4 V < U_{in} < 24 V: ≥ 0.9 x U_{in} - (0.37 x current in mA) - 1.0 for U_{in} > 24 V: ≥ 21 V - (0.36 x current in mA)
Short-circuit current	at U_{in} > 24 V: ≤ 65 mA
Transfer current	≤ 40 mA
Transfer characteristics	
Deviation	
After calibration	≤ ± 200 µA; incl. calibration, linearity, hysteresis and load fluctuations at the output up to a load of 1 kΩ and current ≤ 20 mA at 20 °C (68 °F)
Influence of ambient temperature	≤ ± 2 µA/K at U_{in} ≤ 20 V; ≤ ± 5 µA/K at U_{in} > 20 V
Rise time	≤ 5 ms at 4 ... 20 mA step and U_{in} < 24 V
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Diagrams

Front view





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Technical data

Supply	
Rated voltage	12 ... 35 V DC loop powered
Input	
Current range	0 ... 20 mA, load ≤ 50 Ω
Voltage range	0 ... 10 V, load ≥ 100 kΩ
Output	
Load	(U -12 V)/0.02 A
Current output	4 ... 20 mA, limited to ≤ 35 mA
Fault signal	downscaling ≤ 3 mA
Transfer characteristics	
Deviation	
After calibration	0.1 % of full-scale value
Temperature effect	span: 0.050 % of span/K; zero point: 0.060 % of span/K
Linearization	≤ 0.04 % of full-scale value
Influence of supply voltage	6.5 ppm/V
Rise time	250 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Current or voltage input**
- **Output: 4 ... 20 mA**
- **Potentiometer or DIP switch selectable ranges**
- **Line fault detection (LFD)**

Function

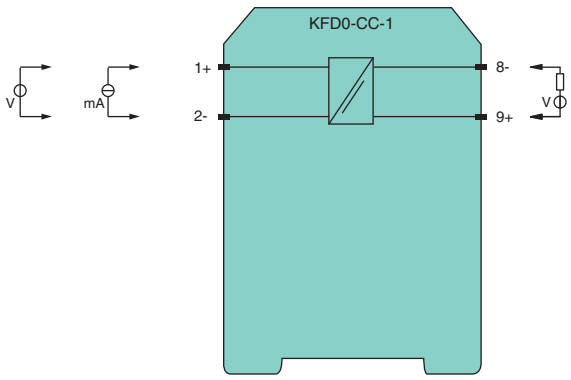
This signal conditioner converts a 2-wire voltage or current to a 4 mA ... 20 mA signal and provides isolation for non-intrinsically safe applications.

The device can be used to double signals in 20 mA measurement circuits due to the limited current signal input load of 50 Ω.

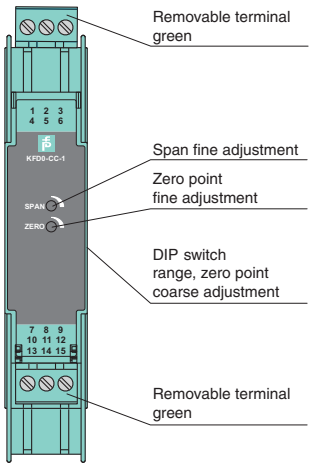
DIP switches and potentiometers make field calibration easy.

Since this isolator is loop-powered, use the technical data to verify that the proper voltage is available to the field devices.

Diagrams



Front view



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KFD2-USC-1.D

Signal Converter with Trip Value

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Scaleable current or voltage input**
- **Current or voltage output**
- **Relay contact output**
- **Configurable by keypad**
- **Line fault detection (LFD)**

Function

This signal conditioner is suitable for the connection of current and voltage signals and provides isolation for non-intrinsically safe applications.

The input ranges include 0 mA ... 20 mA, 0 V ... 10 V or 0 mV ... 60 mV. Subranges from the input ranges are selectable.

The output measuring signals are 0/4 mA ... 20 mA, 0/2 V ... 10 V or 0/1 V ... 5 V.

The output relay serves as trip value contact.

On the display the measured value can be indicated in various physical units.

The unit is easily programmed by the use of a keypad located on the front of the unit.

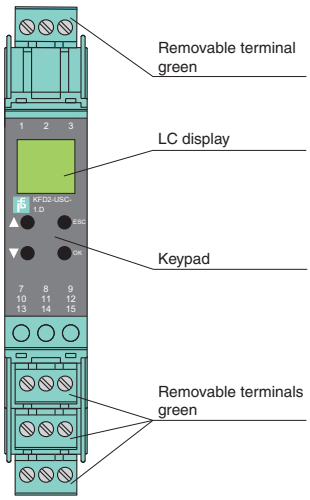
For additional information, refer to the manual and www.pepperl-fuchs.com.

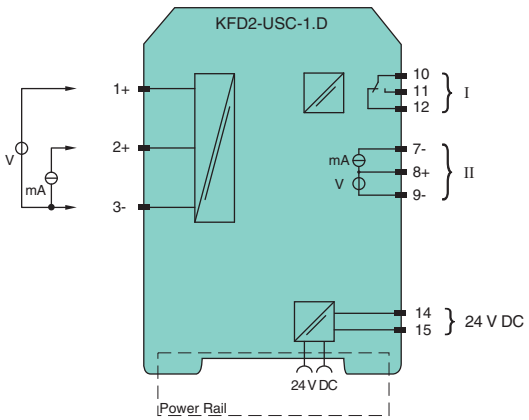
Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power consumption	≤ 1.6 W
Input	
Input resistance	voltage: 1 MΩ, current: ≤ 100 Ω
Limit	30 V
Current	0 ... 20 mA
Voltage	0 ... 10 V/0 ... 60 mV
Resolution	15 Bit
Output	
Output I	signal, relay
Contact loading	250 V AC/2 A/cos Φ 0.7; 40 V DC/2 A
Mechanical life	2 x 10^7 switching cycles
Energized/De-energized delay	approx. 10 ms/approx. 10 ms
Output II	analog
Load	current: ≤ 550 Ω, voltage: ≥ 1 kΩ
Analog voltage output	0/1 ... 5 V, 0/2 ... 10 V
Analog current output	0/4 ... 20 mA
Transfer characteristics	
Deviation	0.1 % of full-scale value
Resolution/accuracy	current: 1 µA/20 µA voltage: 0.5 mV/10 mV mV: 3 µV/60 µV
Influence of ambient temperature	0.003 %/K (30 ppm)
Reaction time	≥ 150 ms/≤ 300 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B3

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 90 V DC/48 ... 253 V AC
Power consumption	≤ 1.6 W/≤ 2.6 VA
Input	
Input resistance	voltage: 1 MΩ, current: ≤ 100 Ω
Limit	30 V
Current	0 ... 20 mA
Voltage	0 ... 10 V/0 ... 60 mV
Resolution	15 Bit
Output	
Output I	signal, relay
Contact loading	250 V AC/2 A/cos Φ 0.7; 40 V DC/2 A
Mechanical life	2 x 10^7 switching cycles
Energized/De-energized delay	approx. 10 ms/approx. 10 ms
Output II	analog
Load	current: ≤ 550 Ω, voltage: ≥ 1 kΩ
Analog voltage output	0/1 ... 5 V, 0/2 ... 10 V
Analog current output	0/4 ... 20 mA
Transfer characteristics	
Deviation	0.1 % of full-scale value
Resolution/accuracy	current: 1 µA/20 µA voltage: 0.5 mV/10 mV mV: 3 µV/60 µV
Influence of ambient temperature	0.003 %/K (30 ppm)
Reaction time	≥ 150 ms/≤ 300 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B3

Features

- **1-channel signal conditioner**
- **AC/DC wide range supply**
- **Scaleable current or voltage input**
- **Current or voltage output**
- **Relay contact output**
- **Configurable by keypad**
- **Line fault detection (LFD)**

Function

This signal conditioner is suitable for the connection of current and voltage signals and provides isolation for non-intrinsically safe applications.

The input ranges include 0 mA ... 20 mA, 0 V ... 10 V or 0 mV ... 60 mV. Subranges from the input ranges are selectable.

The output measuring signals are 0/4 mA ... 20 mA, 0/2 V ... 10 V or 0/1 V ... 5 V.

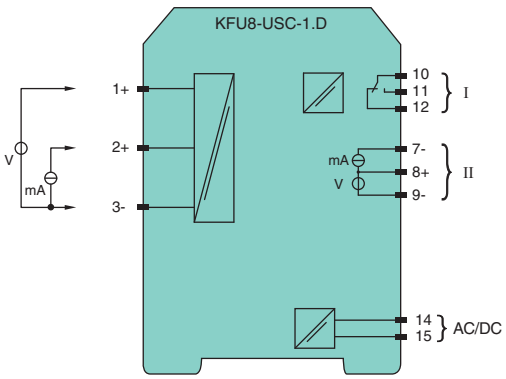
The output relay serves as trip value contact.

On the display the measured value can be indicated in various physical units.

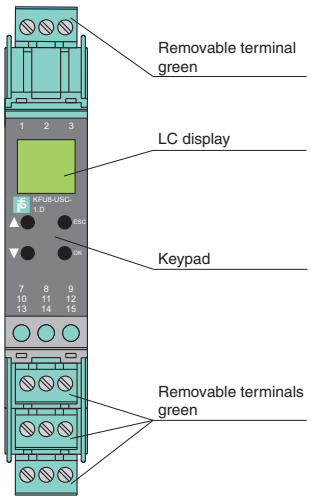
The unit is easily programmed by the use of a keypad located on the front of the unit.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Diagrams



Front view



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Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Current and voltage inputs**
- **2 relay contact outputs**
- **Programmable high/low alarm**
- **DIP switch programmable**
- **Terminals with test points**

Function

This signal conditioner is a trip alarm with two independently adjustable trip points that provides isolation for non-intrinsically safe applications.

The unit actuates a relay output when it reaches a user-programmed input level.

DIP switches are used to program voltage input low alarms and high alarms.

The hysteresis, the operating mode of the relay outputs, and the type of alarm are selectable for each trip point.

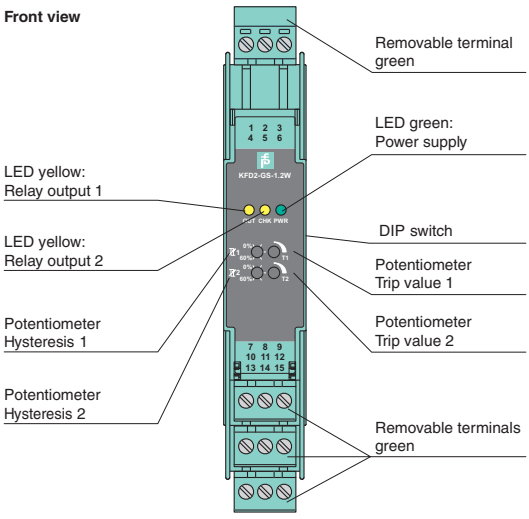
For addtional information, refer to www.pepperl-fuchs.com.

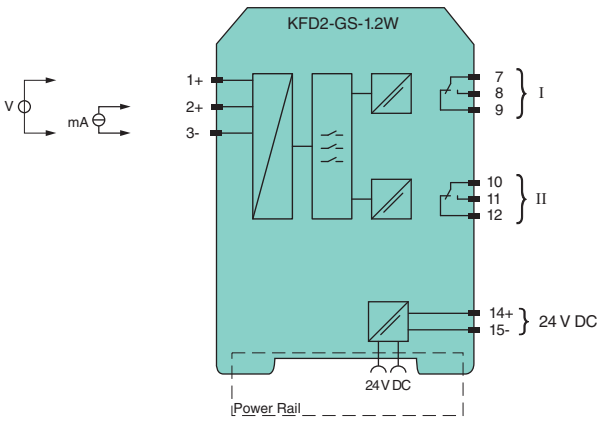
Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power consumption	2.25 W (typ. 1.68 W)
Input	
Measurement range	terminals 1+, 3-; voltage: 0/1 ... 5 V; 50 kΩ or 0/2 ... 10 V; 100 kΩ terminals 2+, 3-; current: 0/4 ... 20 mA; 50 Ω
Output	
Output I	trip value: terminals 7, 8, 9
Output II	trip value: terminals 10, 11, 12
Contact loading	250 V AC/5 A/1250 VA; 125 V DC/5 A/150 W
Transfer characteristics	
Deviation	≤ 0.5 %
Influence of ambient temperature	0.01 %/K of adjusted trip value
Input delay	100 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 120 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power consumption	≤ 3 W
Interface	
Connection	Power Rail or terminals 19+, 20 GND, 21-
Type	RS 485
Programming interface	RS 232 programming jack
Field circuit	
Lead resistance	≤ 25 Ω per lead
Input I	
Connection	terminals 1+, 2-
Sensor supply	1 ... 5 V
Connection	terminals 3+, 4-, 5+, 6-
Short-circuit current	50 mA
Load	≥ 116 Ω up to 5V, ≥ 85 Ω up to 4V
Input	
Programmable Tare	0 ... 500 % of span
Input I	signal, analog
Input signal	-100 ... 100 mV
Input resistance	> 1 MΩ for voltage measurement
Input II, III	tare adjustment, calibration and zero
Active/Passive	I > 4 mA/I < 1.5 mA
Output	
Output I, II	relay output
Mechanical life	2 x 10^7 switching cycles
Output III	Analog output
Current range	-20 ... 20 mA
Load	≤ 550 Ω
Line fault detection	downscale -21.5 mA (-10.75 V) or 2 mA (1 V), upscale 21.5 mA (10.75 V)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 250 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Strain gauge input**
- **Output 0 mA ... ± 20 mA or 0 V ... ± 10 V**
- **Relay contact output**
- **Programmable high/low alarm**
- **RS 485 interface**
- **Line fault detection (LFD)**

Function

This signal conditioner is used with strain gauges, load cells and resistance measuring bridges and provides isolation for non-intrinsically safe applications.

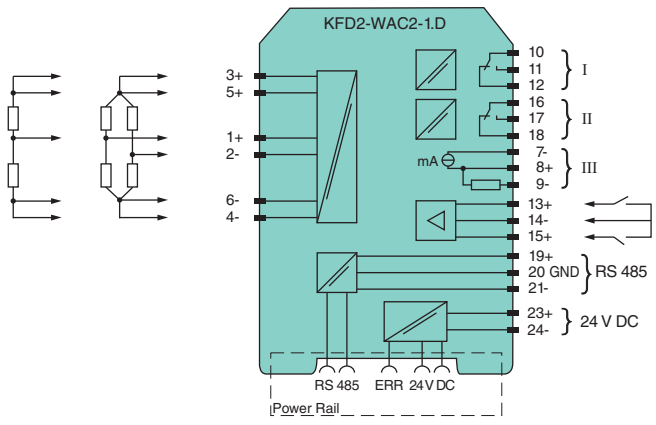
Designed to provide 5 V excitation voltage, this barrier's high quality A/D converter allows it to be used with those devices requiring 10 V.

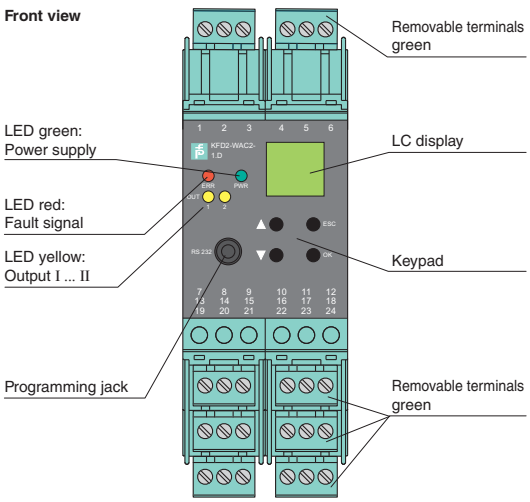
The unit is easily programmed by the use of a keypad located on the front of the unit or with the **PACT***ware*™ configuration software. The actual measurement for tare, zero point, and final value can be entered in this manner.

A unique collective error messaging feature is available when used with the Power Rail system.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Diagrams





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Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Voltage input -10 V ... 10 V**
- **Output 4 mA ... 20 mA**
- **Span and zero point adjustment**

Function

This signal conditioner receives a -10 V ... 10 V voltage input, produces a 4 mA ... 20 mA signal output. It also provides isolation for non-intrinsically safe applications.

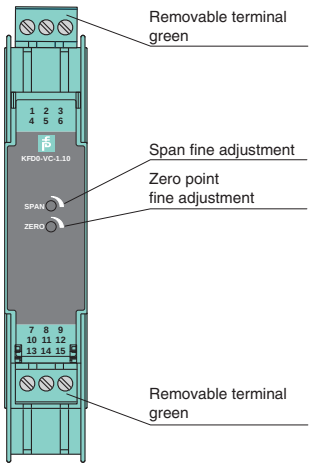
Fine adjustment for zero and span are performed with the potentiometers on top of the unit.

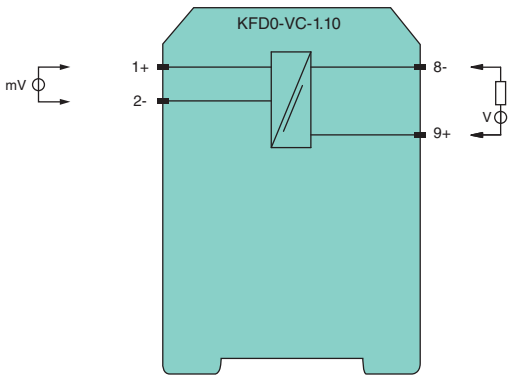
Technical data

Supply	
Rated voltage	12 ... 35 V DC loop powered
Input	
Voltage range	-10 ... 10 V (factory adjustment)
Output	
Load	≤ (supply voltage -12 V)/0.02 A
Current output	4 ... 20 mA, limited to ≤ 35 mA
Transfer characteristics	
Measurement range f_n	-10 ... +10 V, zero point ± 1 % of full-scale value, span ± 1.5 % of full-scale value
Deviation	
After calibration	0.1 % of full-scale value
Temperature effect	span: 0.050 % of span/K zero point: 0.060 % of span/K
Linearization	≤ 0.04 % of full-scale value
Influence of supply voltage	6.5 ppm/V
Rise time	250 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power loss/power consumption	≤ 0.95 W/0.95 W
Input	
RTD	type Pt10, Pt50, Pt100, Pt500, Pt1000 (EN 60751: 1995) type Pt10GOST, Pt50GOST, Pt100GOST, Pt500GOST, Pt1000GOST (6651-94) type Cu10, Cu50, Cu100 (P50353-92) type Ni100 (DIN 43760)
Measuring current	approx. 200 µA with RTD
Types of measuring	2-, 3-, 4-wire connection
Lead resistance	≤ 50 Ω per lead
Measuring circuit monitoring	sensor burnout, sensor short-circuit
Thermocouples	type B, E, J, K, N, R, S, T (IEC 584-1: 1995) type L (DIN 43710: 1985) type TXK, TXKH, TXA (P8.585-2001)
Cold junction compensation	external and internal
Measuring circuit monitoring	sensor burnout
Voltage	selectable within the range -100 ... 100 mV
Potentiometer	0 ... 20 kΩ (2-wire connection), 0.8 ... 20 kΩ (3-wire connection)
Input resistance	≥ 1 MΩ (-100 ... 100 mV)
Output	
Output	analog current output
Current range	0 ... 20 mA or 4 ... 20 mA
Fault signal	downscale 0 or 2 mA, upscale 21.5 mA (acc. NAMUR NE43)
Source	load 0 ... 550 Ω open-circuit voltage ≤ 18 V
Sink	voltage across terminals 5 ... 30 V. If the current is supplied from a source > 16.5 V, series resistance of ≥ (V - 16.5)/0.0215 Ω is needed, where V is the source voltage. The maximum value of the resistance is (V - 5)/0.0215 Ω.
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 130 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **TC, RTD, potentiometer or voltage input**
- **Current output 0/4 mA ... 20 mA**
- **Sink or source mode**
- **Line fault (LFD) and sensor burnout detection**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner is designed to connect RTDs, thermocouples, or potentiometers, and provide a proportional 0/4 mA ... 20 mA signal.

The barrier offers 3-port isolation between input, output, and power supply.

A removable terminal block K-CJC-** is available for thermocouples when internal cold junction compensation is desired.

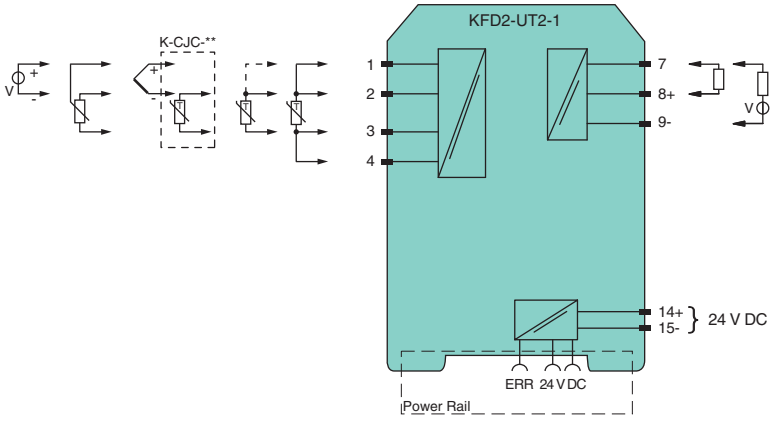
A fault is indicated by a red flashing LED per NAMUR NE44 and user-configured fault outputs.

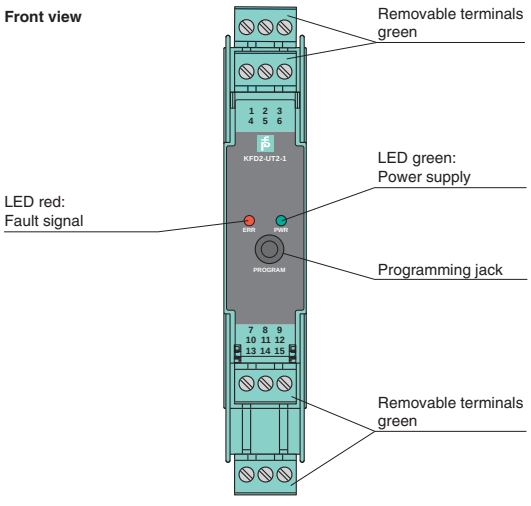
The unit is easily programmed with the **PACT***ware*™ configuration software.

A unique collective error messaging feature is available when used with the Power Rail system.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Diagrams





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Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **TC, RTD, potentiometer or voltage input**
- **Voltage output 0/1 V ... 5 V**
- **Line fault (LFD) and sensor burnout detection**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner is designed to connect RTDs, thermocouples, or potentiometers, and provide a proportional 0/1 V ... 5 V signal.

The barrier offers 3-port isolation between input, output, and power supply.

A removable terminal block K-CJC-** is available for thermocouples when internal cold junction compensation is desired.

A fault is indicated by a red flashing LED per NAMUR NE44 and user-configured fault outputs.

The unit is easily programmed with the **PACT***ware*™ configuration software.

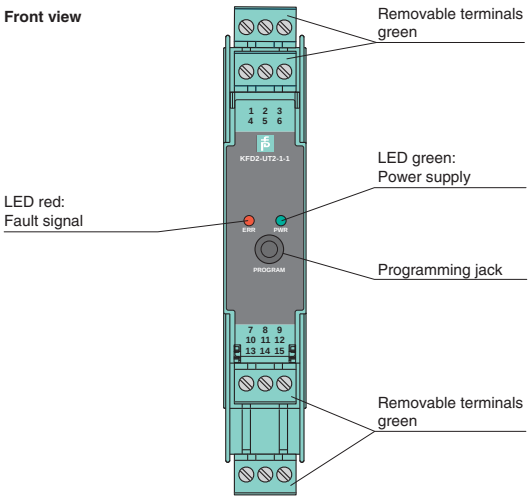
A unique collective error messaging feature is available when used with the Power Rail system.

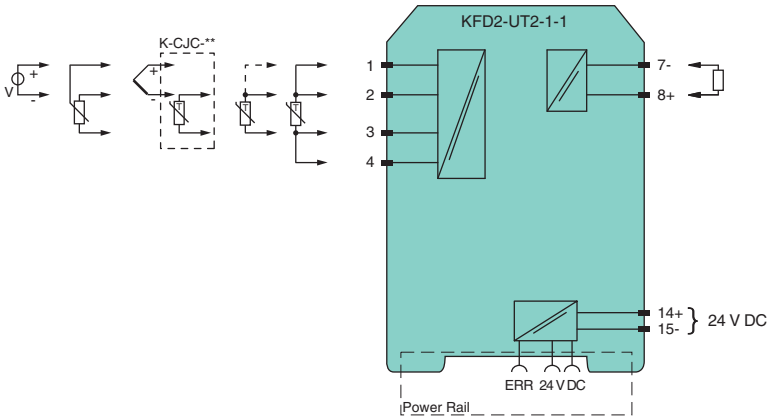
For additional information, refer to the manual and www.pepperl-fuchs.com.

Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power loss/power consumption	≤ 0.64 W/0.64 W
Input	
RTD	type Pt10, Pt50, Pt100, Pt500, Pt1000 (EN 60751: 1995) type Pt10GOST, Pt50GOST, Pt100GOST, Pt500GOST, Pt1000GOST (6651-94) type Cu10, Cu50, Cu100 (P50353-92) type Ni100 (DIN 43760)
Measuring current	approx. 200 µA with RTD
Types of measuring	2-, 3-, 4-wire connection
Lead resistance	≤ 50 Ω per lead
Measuring circuit monitoring	sensor burnout, sensor short-circuit
Thermocouples	type B, E, J, K, N, R, S, T (IEC 584-1: 1995) type L (DIN 43710: 1985) type TXK, TXKH, TXA (P8.585-2001)
Cold junction compensation	external and internal
Measuring circuit monitoring	sensor burnout
Voltage	selectable within the range -100 ... 100 mV
Potentiometer	0 ... 20 kΩ (2-wire connection), 0.8 ... 20 kΩ (3-wire connection)
Input resistance	≥ 1 MΩ (-100 ... 100 mV)
Output	
Voltage output	0 ... 5 V or 1 ... 5 V; output resistance: ≤ 5 Ω; load: ≥ 10 kΩ
Fault signal	downscale 0 V or 0.5 V, upscale 5.375 V
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 130 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams





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Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power loss/power consumption	≤ 1.5 W/1.5 W
Input	
RTD	type Cu10, Cu50, Cu100, Pt10, Pt50, Pt100, Pt500, Pt1000, Ni100 (EN 60751: 1995) type Pt10GOST, Pt50GOST, Pt100GOST, Pt500GOST, Pt1000GOST (P50353-92)
Measuring current	approx. 200 µA with RTD
Types of measuring	2-, 3-wire connection
Lead resistance	≤ 50 Ω per lead
Measuring circuit monitoring	sensor burnout, sensor short-circuit
Thermocouples	type B, E, J, K, N, R, S, T (IEC 584-1: 1995) type L (DIN 43710: 1985) type TXK, TXKH, TXA (P8.585-2001)
Cold junction compensation	external and internal
Measuring circuit monitoring	sensor burnout
Voltage	selectable within the range -100 ... 100 mV
Potentiometer	0 ... 20 kΩ (2-wire connection), 0.8 ... 20 kΩ (3-wire connection)
Input resistance	≥ 1 MΩ (-100 ... 100 mV)
Output	
Output I, II	analog current output
Current range	0 ... 20 mA or 4 ... 20 mA
Fault signal	downscale 0 or 2 mA, upscale 21.5 mA (acc. NAMUR NE43)
Source	load 0 ... 550 Ω open-circuit voltage ≤ 18 V
Sink	voltage across terminals 5 ... 30 V. If the current is supplied from a source > 16.5 V, series resistance of ≥ (V - 16.5)/0.0215 Ω is needed, where V is the source voltage. The maximum value of the resistance is (V - 5)/0.0215 Ω.
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 130 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **TC, RTD, potentiometer or voltage input**
- **Current output 0/4 mA ... 20 mA**
- **Sink or source mode**
- **Line fault (LFD) and sensor burnout detection**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner is designed to connect RTDs, thermocouples, or potentiometers, and provide a proportional 0/4 mA ... 20 mA signal.

The barrier offers 3-port isolation between input, output, and power supply.

A removable terminal block K-CJC-** is available for thermocouples when internal cold junction compensation is desired.

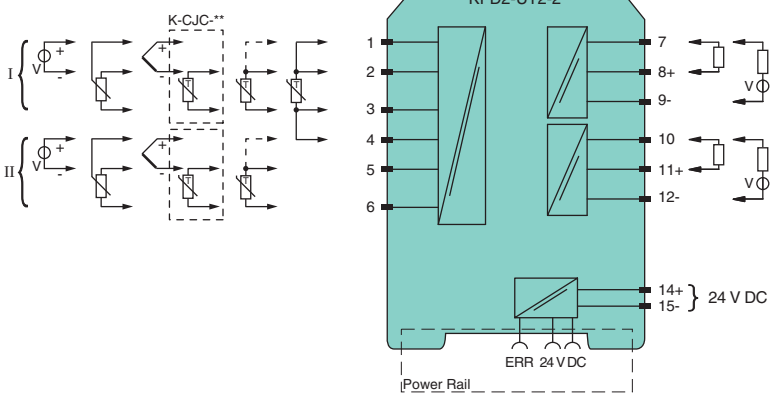
A fault is indicated by a red flashing LED per NAMUR NE44 and user-configured fault outputs.

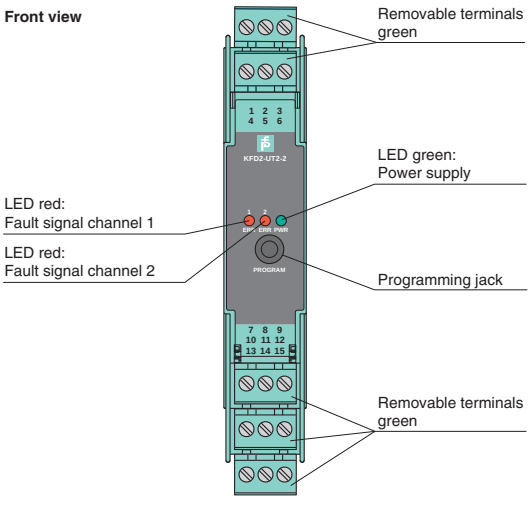
The unit is easily programmed with the **PACT***ware*™ configuration software.

A unique collective error messaging feature is available when used with the Power Rail system.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Diagrams





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Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **TC, RTD, potentiometer or voltage input**
- **Voltage output 0/1 V ... 5 V**
- **Line fault (LFD) and sensor burnout detection**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner is designed to connect RTDs, thermocouples, or potentiometers, and provide a proportional 0/1 V ... 5 V signal.

The barrier offers 3-port isolation between input, output, and power supply.

A removable terminal block K-CJC-** is available for thermocouples when internal cold junction compensation is desired.

A fault is indicated by a red flashing LED per NAMUR NE44 and user-configured fault outputs.

The unit is easily programmed with the **PACT***ware*™ configuration software.

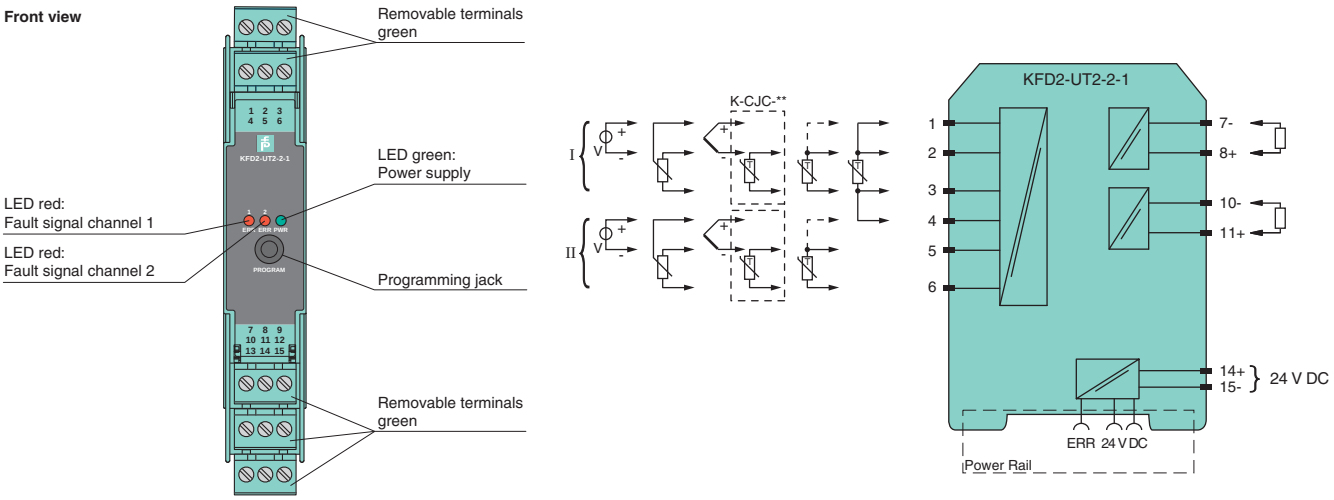
A unique collective error messaging feature is available when used with the Power Rail system.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power loss/power consumption	≤ 0.8 W/0.8 W
Input	
RTD	type Pt10, Pt50, Pt100, Pt500, Pt1000 (EN 60751: 1995) type Pt10GOST, Pt50GOST, Pt100GOST, Pt500GOST, Pt1000GOST (6651-94) type Cu10, Cu50, Cu100 (P50353-92) type Ni100 (DIN 43760)
Measuring current	approx. 200 µA with RTD
Types of measuring	2-, 3-wire connection
Lead resistance	≤ 50 Ω per lead
Measuring circuit monitoring	sensor burnout, sensor short-circuit
Thermocouples	type B, E, J, K, N, R, S, T (IEC 584-1: 1995) type L (DIN 43710: 1985) type TXK, TXKH, TXA (P8.585-2001)
Cold junction compensation	external and internal
Measuring circuit monitoring	sensor burnout
Voltage	selectable within the range -100 ... 100 mV
Potentiometer	0 ... 20 kΩ (2-wire connection), 0.8 ... 20 kΩ (3-wire connection)
Input resistance	≥ 1 MΩ (-100 ... 100 mV)
Output	
Voltage output	0 ... 5 V or 1 ... 5 V; output resistance: ≤ 5 Ω; load: ≥ 10 kΩ
Fault signal	downscale 0 V or 0.5 V, upscale 5.375 V
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 130 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams



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Technical data

Supply	
Rated voltage	12 ... 35 V DC loop powered
Input	
Lead resistance	≤ 100 Ω per lead
Measuring current	approx. 1 mA
Output	
Load	(U -12 V)/0.02 A
Current output	4 ... 20 mA, limited to ≤ 35 mA
Fault signal	Sensor burnout: upscaling ≥ 22 mA, limited to ≤ 35 mA
Transfer characteristics	
Measurement range f_n	span without linearization 25 ... 800 °C (77 ... 1472 °F)/ with linearisation 25 ... 375 °C (77 ... 707 °F) zero point without linearization -200 ... 400 °C (-328 ... 752 °F)/ with linearisation -30 ... 375 °C (-22 ... 707 °F) span and zero point adjustable
Deviation	
After calibration	0.1 % of full-scale value
Influence of ambient temperature	span and zero point 0.015 %/K or ± 10 mΩ/K
Influence of supply voltage	6.5 ppm/V
Rise time	250 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **2- or 3-wire Pt100 RTD input**
- **Output 4 mA ... 20 mA, temperature linearization selectable**
- **DIP switch selectable ranges**
- **Sensor breakage detection**

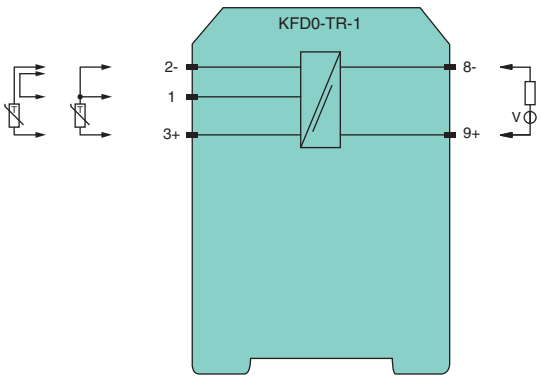
Function

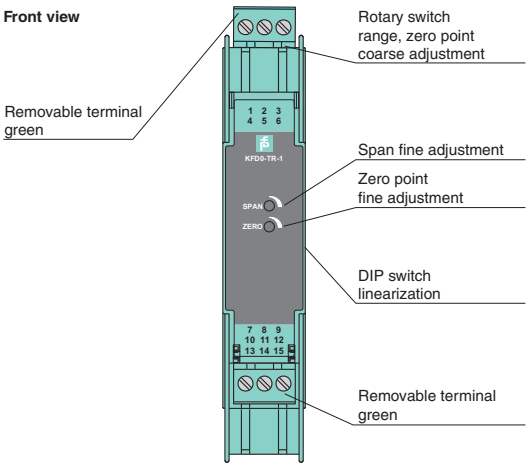
This isolated signal conditioner is a loop-powered isolator that converts the resistance from a 3-wire RTD to a 4 mA ... 20 mA signal and provides isolation for non-intrinsically safe applications.

A selectable analog linearization ensures a temperature linear 4 mA ... 20 mA output between 25 °C ... 375 °C.

It also features conveniently located DIP switches and potentiometers to make field calibration easy.

Diagrams





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Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Thermocouple input**
- **Output 4 mA ... 20 mA**
- **Internal cold junction compensation**
- **Sensor breakage detection**
- **DIP switch selectable ranges**

Function

This isolated signal conditioner is a loop-powered isolator that converts thermocouple inputs to a 4 mA ... 20 mA signal and provides isolation for non-intrinsically safe applications.

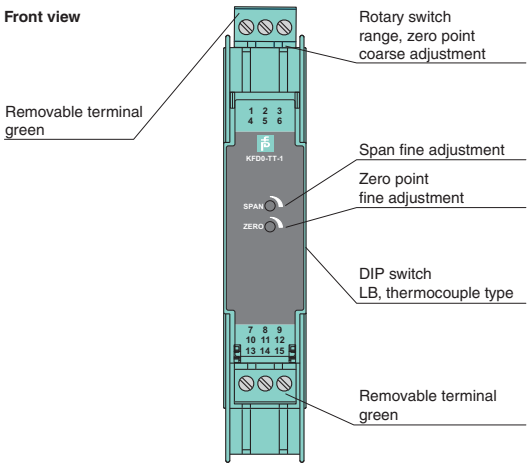
The internal cold junction compensation can be bypassed by using terminals 1 and 3.

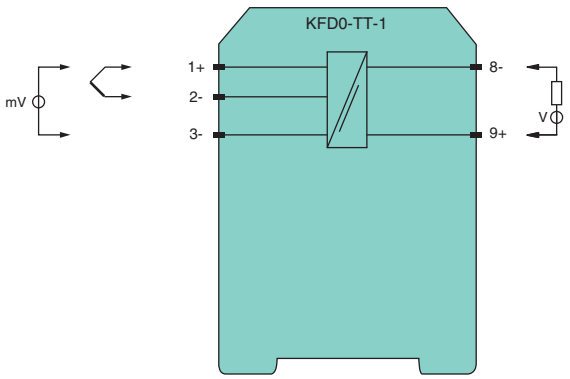
The output current is linear to input voltage, not proportional to temperature. Zero, span, and burnout detection are field-configurable.

Technical data

Supply	
Rated voltage	12 ... 35 V DC loop powered
Input	
Lead resistance	≤ 100 Ω per lead
Current	lead monitoring ON: ≤ 15 nA; OFF: ≤ 1 nA
Output	
Load	(U -12 V)/0.02 A
Current output	4 ... 20 mA, limited to ≤ 35 mA
Fault signal	downscaling ≤ 3 mA, upscaling ≥ 22 mA
Transfer characteristics	
Measurement range f_n	span 4 ... 100 mV, zero point -12 ... 60 mV, both adjustable
Deviation	
After calibration	0.1 % of full-scale value ± 1 K for the cold junction
Temperature effect	temperature deviation 0.015 % of the span/K or 1.5 µV/K cold junction ± 2 K (calibrated at T_{amb} = 20 °C (68 °F))
Influence of supply voltage	6.5 ppm/V
Characteristic curve	the output voltage is linearly proportionate to the input voltage (not to temperature)
Rise time	250 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Diagrams





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Technical data

Supply	
Rated voltage	19 ... 35 V DC
Power consumption	0.8 W
Input	
RTD or resistance	type Pt100 (EN 60751: 1995) type Ni100 (DIN 43760) 0 ... 500 Ω (including lead resistance)
Measuring current	approx. 400 µA with RTD
Lead resistance	≤ 50 Ω per lead
Thermocouples	type B, E, J, K, N, R, S, T (IEC 584-1: 1995) type L (DIN 43710: 1985)
Load	20 Ω for 20 mA; 200 kΩ for 10 V
Output	
Output I, II	
Contact loading	253 V AC/2 A/500 VA/cos Φ min. 0.7; 40 V DC/2 A resistive load
Mechanical life	2 x 10^7 switching cycles
Transfer characteristics	
Deviation	
Voltage input	± 0.02 % of 10 V measuring range
Resistance input	± 0.025 % of measuring range (4-wire connection)
Current input	± 0.02 % of 20 mA measuring range
Pt100	± 0.01 % of abs. temperature value of switching point in K + 0.2 K (4-wire connection)
Thermocouple	± 0.05 % of abs. temperature value of switching point in K + 1.1 K (1.2 K for thermocouple types R and S) this includes ± 0.8 K error of the cold junction compensation (+0.9 K for thermocouple types R and S).
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Thermocouple, RTD, voltage or current input**
- **2 relay contact outputs**
- **Programmable high/low alarm**
- **Sensor breakage detection**

Function

This signal conditioner accepts a variety of inputs including RTDs or thermocouples and provides a relay trip whenever it reaches a user-programmed set point. It also provides isolation for non-intrinsically safe applications.

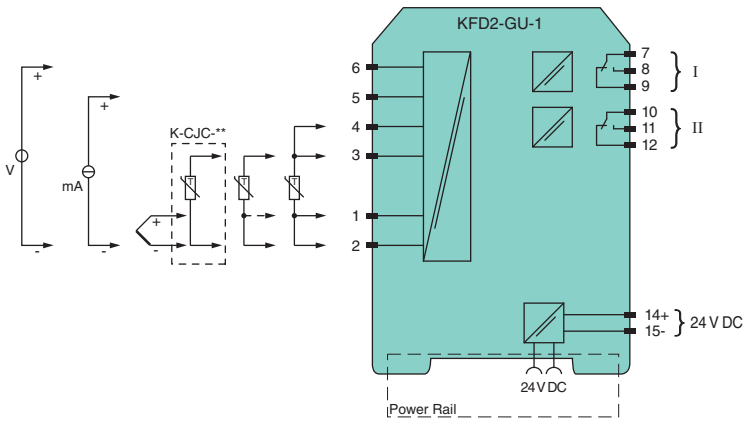
A removable terminal block K-CJC-** is available for thermocouples when internal cold junction compensation is desired.

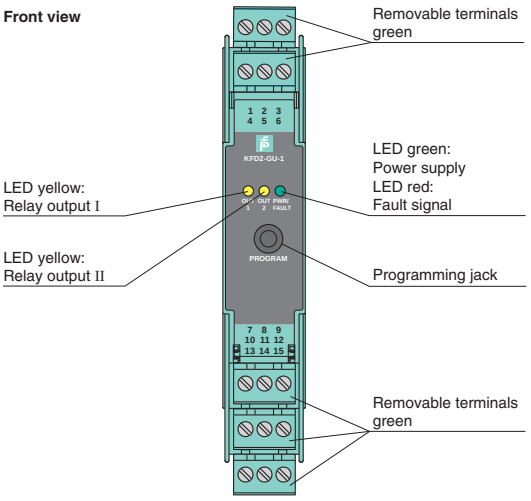
A fault is indicated by a red flashing LED per NAMUR NE44 and user-configured fault outputs.

The unit is easily programmed with the **PACT***ware*™ configuration software.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Diagrams





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KFD2-GUT-1.D

Temperature Converter with Trip Values

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **TC, RTD, potentiometer or voltage input**
- **Redundant TC input**
- **Current output 0/4 mA ... 20 mA**
- **2 relay contact outputs**
- **Line fault (LFD) and sensor burnout detection**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner is a universal input trip alarm that converts the signal of an RTD, thermocouple, potentiometer, or voltage source to a proportional output current. It also provides a relay trip value and isolation for non-intrinsically safe applications.

A removable terminal block K-CJC-** is available for thermocouples when internal cold junction compensation is desired.

The unit is easily programmed by the use of a keypad located on the front of the unit or with the **PACT***ware*™ configuration software.

A unique collective error messaging feature is available when used with the Power Rail system.

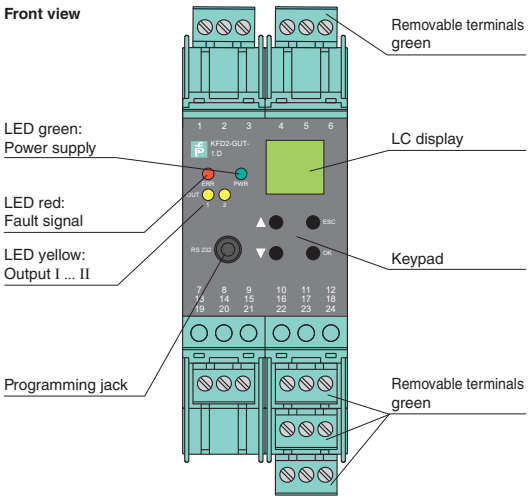
For additional information, refer to the manual and www.pepperl-fuchs.com.

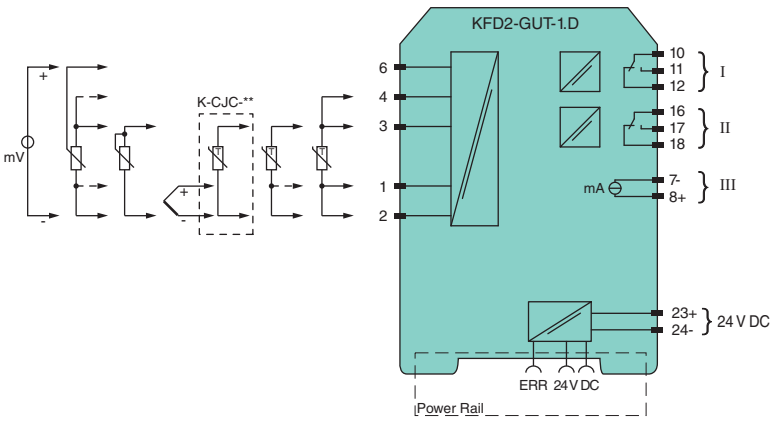
Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power loss/power consumption	≤ 2 W/2.2 W
Input	
RTD	Pt100, Pt500, Pt1000, Ni100, Ni1000
Types of measuring	2-, 3-, 4-wire technology
Lead resistance	≤ 50 Ω
Measuring circuit monitoring	sensor burnout, sensor short-circuit
Thermocouples	type B, E, J, K, L, N, R, S, T
Cold junction compensation	external and internal
Measuring circuit monitoring	sensor burnout
Voltage	0 ... 10 V, 2 ... 10 V, 0 ... 1 V, -100 ... 100 mV
Potentiometer	0.8 ... 20 kΩ
Types of measuring	2-, 3-, 5-wire technology
Input resistance	≥ 250 kΩ (0 ... 10 V) ≥ 1 MΩ (0 ... 1 V, -100 ... 100 mV)
Measuring current	approx. 400 µA with resistance measuring sensor
Output	
Output I, II	relay
Contact loading	250 V AC/2 A/cos Φ≥ 0.7; 40 DC/2 A
Mechanical life	5 x 10^7 switching cycles
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Output III	analog current output
Current range	0 ... 20 mA or 4 ... 20 mA
Open loop voltage	≤ 24 V DC
Load	≤ 650 Ω
Fault signal	downscale I ≤ 3.6 mA, upscale I ≥ 21 mA (acc. NAMUR NE43)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	300 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3

Diagrams

Front view





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Technical data

Supply	
Rated voltage	20 ... 90 V DC/48 ... 253 V AC
Power loss/power consumption	≤ 2 W; 2.5 VA/2.2 W; 3 VA
Input	
RTD	Pt100, Pt500, Pt1000, Ni100, Ni1000
Types of measuring	2-, 3-, 4-wire technology
Lead resistance	≤ 50 Ω
Measuring circuit monitoring	sensor burnout, sensor short-circuit
Thermocouples	type B, E, J, K, L, N, R, S, T
Cold junction compensation	external and internal
Measuring circuit monitoring	sensor burnout
Voltage	0 ... 10 V, 2 ... 10 V, 0 ... 1 V, -100 ... 100 mV
Potentiometer	0.8 ... 20 kΩ
Types of measuring	2-, 3-, 5-wire technology
Input resistance	≥ 250 kΩ (0 ... 10 V) ≥ 1 MΩ (0 ... 1 V, -100 ... 100 mV)
Measuring current	approx. 400 µA with resistance measuring sensor
Output	
Output I, II	relay
Contact loading	250 V AC/2 A/cos Φ≥ 0.7; 40 DC/2 A
Mechanical life	5 x 10^7 switching cycles
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Output III	analog current output
Current range	0 ... 20 mA or 4 ... 20 mA
Open loop voltage	≤ 24 V DC
Load	≤ 650 Ω
Fault signal	downscale I ≤ 3.6 mA, upscale I ≥ 21 mA (acc. NAMUR NE43)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	300 g
Dimensions	40 x 119 x 115 mm (1.6 x 4.7 x 4.5 in), housing type C3

Features

- **1-channel signal conditioner**
- **AC/DC wide range supply**
- **TC, RTD, potentiometer or voltage input**
- **Redundant TC input**
- **Current output 0/4 mA ... 20 mA**
- **2 relay contact outputs**
- **Line fault (LFD) and sensor burnout detection**
- **Up to SIL2 acc. to IEC 61508**

Function

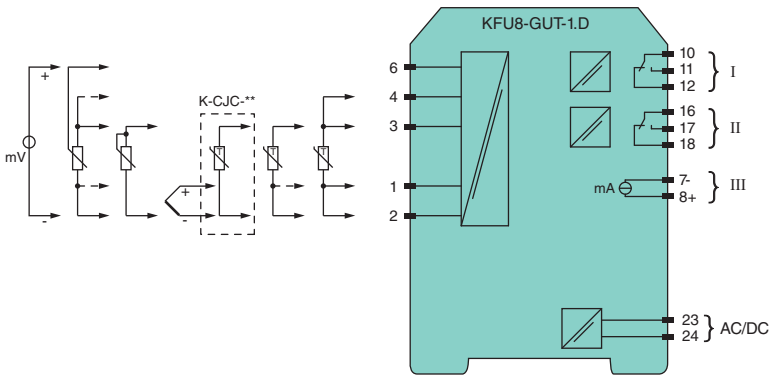
This signal conditioner is a universal input trip alarm that converts the signal of an RTD, thermocouple, potentiometer, or voltage source to a proportional output current. It also provides a relay trip value and isolation for non-intrinsically safe applications.

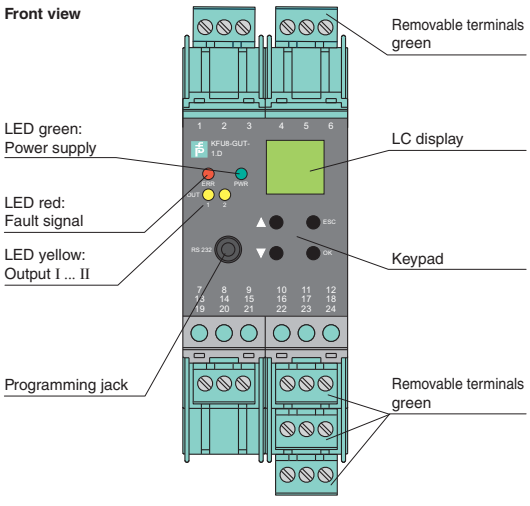
A removable terminal block K-CJC-** is available for thermocouples when internal cold junction compensation is desired.

The unit is easily programmed by the use of a keypad located on the front of the unit or with the **PACT***ware*™ configuration software.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Diagrams





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Current Drivers

Model Number	Channels	Input (Control System)		Output (Field)				Supply		SIL	Page
		0 mA ... 40 mA	4 mA ... 20 mA	mA	Fire Alarm	Line Fault Detection	SMART	24 V DC	Loop Powered		
KCD2-SCD-1	1		■	■			■	■		2	648
KFD2-SCD2-1.LK	1		■	■		■	■	■		2	649
KFD2-SCD2-2.LK	2		■	■		■	■	■		2	650
KFD0-SCS-1.55	1		■	■		■	■		■	2	651
KFD0-CS-1.50	1		■	■	■				■	2	652
KFD0-CS-2.50	2		■	■	■				■	2	653
KFD0-CS-2.51P	2	■		■	■				■	2	654

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Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Current output up to 650 Ω load**
- **HART I/P and valve positioner**
- **Lead breakage monitoring**
- **Accuracy 0.1 %**
- **Housing width 12.5 mm**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner drives SMART I/P converters, electrical valves, and positioners and provides isolation for non-intrinsically safe applications.

Digital signals are superimposed on the analog values at the field or control side and are transferred bi-directionally.

Current transferred across the DC/DC converter is repeated at terminals 1 and 2.

An open field circuit presents a high input impedance to the control side to allow lead breakage monitoring by control system.

If the loop resistance for the digital communication is too low, an internal resistor of 250 Ω between terminals 6 and 8 is available, which may be used as the HART communication resistor.

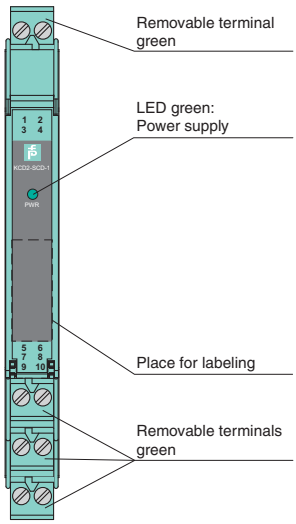
Sockets for the connection of a HART communicator are integrated into the terminals of the device.

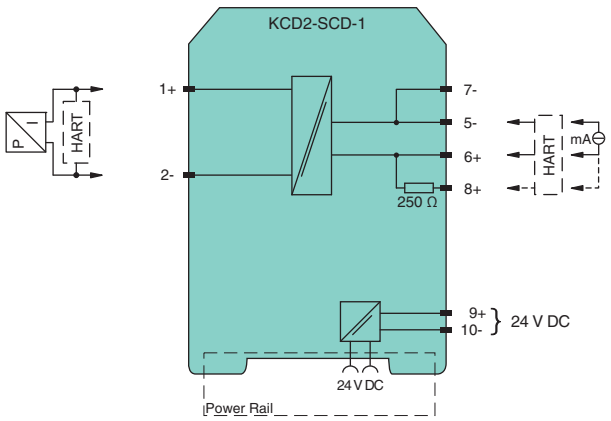
Technical data

Supply	
Rated voltage	19 ... 30 V DC
Power consumption	≤ 700 mW
Input	
Input signal	4 ... 20 mA limited to approx. 30 mA
Voltage drop U_d	approx. 6 V or internal resistance 300 Ω at 20 mA
Input resistance	> 100 kΩ at max. 23 V, with field wiring open
Output	
Current	4 ... 20 mA
Load	0 ... 650 Ω
Voltage	≥ 13 V at 20 mA
Ripple	20 mV_{rms}
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤ ± 0.1 % incl. non-linearity and hysteresis
Influence of ambient temperature	< 2 µA/K (0 ... 60 °C (32 ... 140 °F)); < 4 µA/K (-20 ... 0 °C (-4 ... 32 °F))
Frequency range	bandwidth at 0.5 V_{pp} signal 0 ... 3 kHz (-3 dB)
Rise time	10 to 90 % ≤ 100 ms
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	12.5 x 114 x 124 mm (0.5 x 4.5 x 4.9 in), housing type A2

Diagrams

Front view





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Technical data

Supply	
Rated voltage	10 ... 35 V DC
Power consumption	1 W at 20 mA
Input	
Voltage drop U_d	approx. 4 V or internal resistance 200 Ω at 20 mA
Input resistance	> 100 kΩ, when wiring resistance in the field > 16 V (equivalent to 800 Ω at 20 mA)
Current	4 ... 20 mA limited to approx. 25 mA
Output	
Current	4 ... 20 mA
Load	100 ... 700 Ω
Voltage	≥ 14 V at 20 mA
Transfer characteristics	
Deviation	
After calibration	at 20 °C (68 °F): 10 µA incl. non-linearity, calibration, hysteresis, supply and load changes
Influence of ambient temperature	1 µA/K
Rise time	< 100 µs (bounce from 10 ... 90 %)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Current output up to 700 Ω load**
- **HART I/P and valve positioner**
- **Line fault detection (LFD)**
- **Accuracy 0.05 %**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner drives SMART I/P converters, electrical valves, and positioners and provides isolation for non-intrinsically safe applications.

Digital signals are superimposed on the analog values at the field or control side and are transferred bi-directionally.

Current transferred across the DC/DC converter is repeated at terminals 1 and 2.

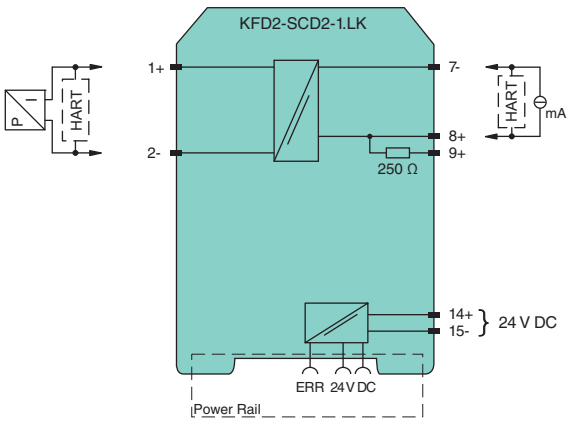
An open and shorted field circuit presents a high input impedance to the control side to allow line fault detection by control system.

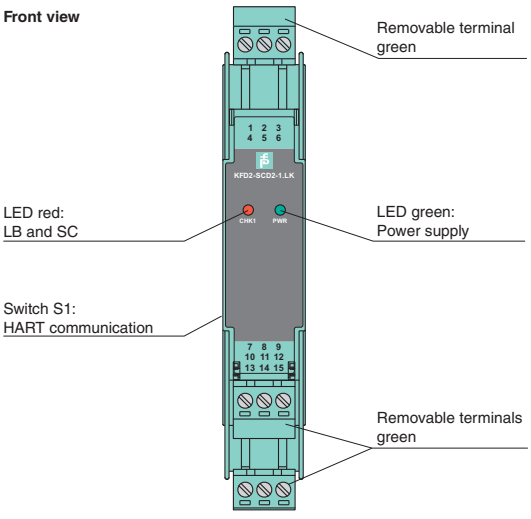
If the loop resistance for digital communication is too low, an internal resistor of 250 Ω between terminals 8 and 9 is available, which may be used as the HART communication resistor.

Sockets for the connection of a HART communicator are integrated into the terminals of the device.

A unique collective error messaging feature is available when used with the Power Rail system.

Diagrams





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Features

- **2-channel signal conditioner**
- **24 V DC supply (Power Rail)**
- **Current output up to 700 Ω load**
- **HART I/P and valve positioner**
- **Line fault detection (LFD)**
- **Accuracy 0.05 %**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner drives SMART I/P converters, electrical valves, and positioners and provides isolation for non-intrinsically safe applications.

Digital signals are superimposed on the analog values at the field or control side and are transferred bi-directionally.

Current transferred across the DC/DC converter is repeated at terminals 1, 2 and 4, 5.

An open and shorted field circuit presents a high input impedance to the control side to allow line fault detection by control system.

If the loop resistance for digital communication is too low, an internal resistor of 250 Ω between terminals 8, 9 and 11, 12 is available, which may be used as the HART communication resistor.

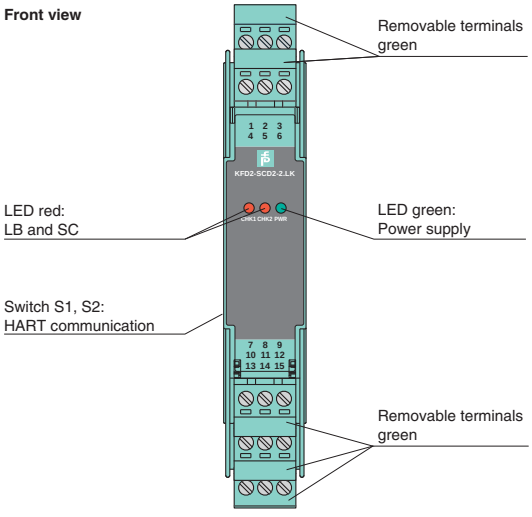
Sockets for the connection of a HART communicator are integrated into the terminals of the device.

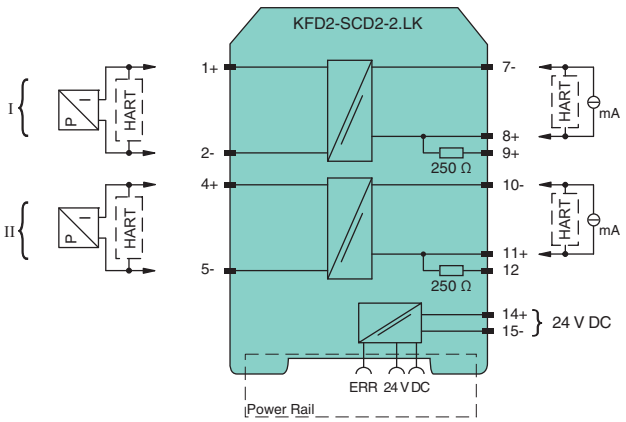
A unique collective error messaging feature is available when used with the Power Rail system.

Technical data

Supply	
Rated voltage	10 ... 35 V DC
Power consumption	1.8 W at 20 mA
Input	
Voltage drop U_d	approx. 4 V or internal resistance 200 Ω at 20 mA
Input resistance	> 100 kΩ, when wiring resistance in the field > 16 V (equivalent to 800 Ω at 20 mA)
Current	4 ... 20 mA limited to approx. 25 mA
Output	
Current	4 ... 20 mA
Load	100 ... 700 Ω
Voltage	≥ 14 V at 20 mA
Transfer characteristics	
Deviation	
After calibration	at 20 °C (68 °F): 10 µA incl. non-linearity, calibration, hysteresis, supply and load changes
Influence of ambient temperature	1 µA/K
Rise time	< 100 µs (bounce from 10 ... 90 %)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Diagrams





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Technical data

Supply	
Rated voltage	loop powered
Field circuit	
Available voltage	≥ 16 V for supply voltage > 21 V
Current	4 ... 20 mA (linear transmission 1 ... 22 mA)
Load	≤ 800 Ω (at 20 mA)
Supply circuit	
Voltage	max. 30 V DC
Current	4 ... 20 mA (quiescent current < 0.5 mA)
Power loss	150 mW at 20 mA and U_E < 24 V
Transfer characteristics	
Deviation	
After calibration	≤ ± 80 µA linearity, load and voltage dependence at 20 °C (68 °F)
Influence of ambient temperature	< 0.5 µA/K
Damping	approx. 3 dB
Rise time	≤ 20 µs at 0 Ω, ≤ 600 µs with 800 Ω load
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 120 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2

Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Current input/output 4 mA ... 20 mA**
- **HART I/P or transmitter power supply**
- **Low voltage drop**
- **Line fault detection (LFD)**
- **Up to SIL2 acc. to IEC 61508**

Function

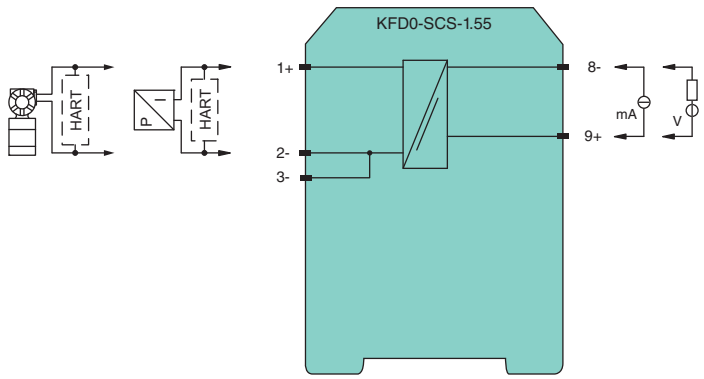
This signal conditioner is loop powered and isolates a 4 mA ... 20 mA signal for transmitters and positioners and is HART compatible.

The low voltage drop of 5 V in comparison to active signal conditioners also allows transmitter applications with unstable power sources between 20 V DC ... 30 V DC.

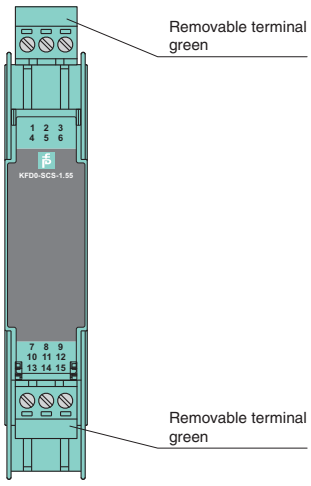
Line fault detection of the field circuit is possible if the control loop in the safe area is monitored for overscale or underscale conditions of the 4 mA ... 20 mA range.

The module can also be used for controlling solenoid valves and discrete outputs, such as LEDs. In this case, terminals 8- and 9+ are driven with a 24 V signal.

Diagrams



Front view



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Features

- **1-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Current input/output 4 mA ... 20 mA**
- **I/P or transmitter power supply**
- **Accuracy 0.1 %**
- **Up to SIL2 acc. to IEC 61508**

Function

This signal conditioner transfers DC signals from fire alarms, smoke alarms, and temperature sensors and provides isolation for non-intrinsically safe applications. It can also be used to control I/P converters, power solenoids, LEDs, and audible alarms.

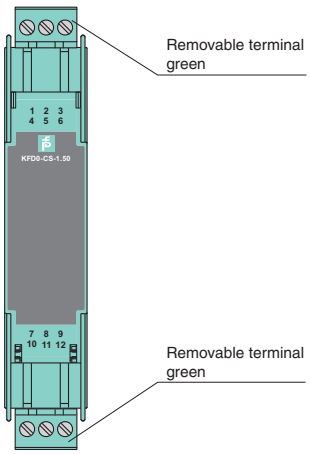
Since this isolator is loop powered, use the technical data to verify that proper voltage is available to the field devices.

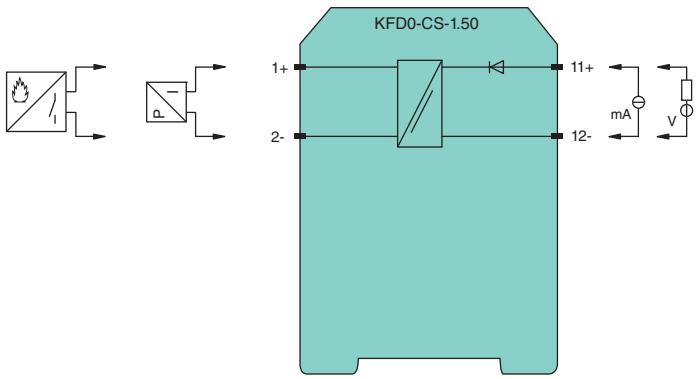
Technical data

Supply	
Rated voltage	loop powered
Input	
Rated voltage U_i	10 ... 35 V
Rated current I_i	4 ... 20 mA
Power loss	< 150 mW per channel at 25 mA and U < 26.1 V < 400 mW per channel at 25 mA and U > 26.1 V
Output	
Voltage	≥ 0.9 x U_{in} - (0.23 x current in mA) - 0.7 for 10 V < U_{in} < 26.1 V ≥ 23 V - (0.23 x current in mA) for U_{in} > 26.1 V
Short-circuit current	≤ 100 mA
Transfer current	≤ 25 mA
Transfer characteristics	
Deviation	
After calibration	U_{in} ≥ 5 V ± 20 µA/U_{in} ≤ 5 V ± 50 µA incl. calibration, linearity, hysteresis and output load fluctuations at 20 °C (68 °F)
Influence of ambient temperature	≤ 2 µA/K (0 ... 50 °C (32 ... 122 °F)); ≤ 5 µA/K (-20 ... 60 °C (-4 ... 140 °F))
Rise time	≤ 5 ms at 4 ... 20 mA and U_{in} = input voltage < 26 V
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Diagrams

Front view





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Technical data

Supply	
Rated voltage	loop powered
Input	
Rated voltage U_i	10 ... 35 V
Rated current I_i	4 ... 20 mA
Power loss	< 150 mW per channel at 25 mA and U < 26.1 V < 400 mW per channel at 25 mA and U > 26.1 V
Output	
Voltage	≥ 0.9 x U_{in} - (0.23 x current in mA) - 0.7 for 10 V < U_{in} < 26.1 V ≥ 23 V - (0.23 x current in mA) for U_{in} > 26.1 V
Short-circuit current	≤ 100 mA
Transfer current	≤ 25 mA
Transfer characteristics	
Deviation	
After calibration	U_{in} ≥ 5 V ± 20 µA/U_{in} ≤ 5 V ± 50 µA incl. calibration, linearity, hysteresis and output load fluctuations at 20 °C (68 °F)
Influence of ambient temperature	≤ 2 µA/K (0 ... 50 °C (32 ... 122 °F)); ≤ 5 µA/K (-20 ... 60 °C (-4 ... 140 °F))
Rise time	≤ 5 ms at 4 ... 20 mA and U_{in} = input voltage < 26 V
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 100 g
Dimensions	20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1

Features

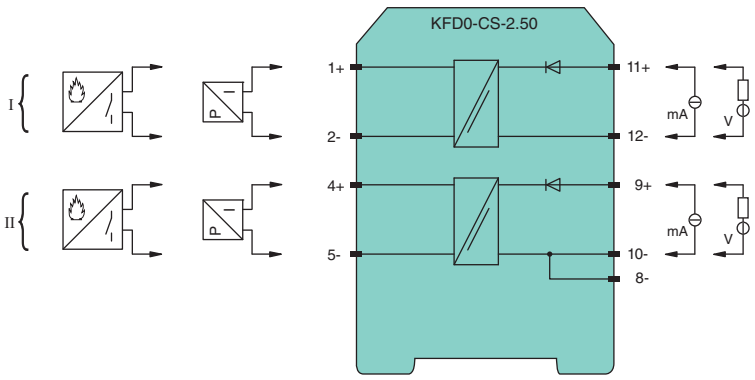
- **2-channel signal conditioner**
- **24 V DC supply (loop powered)**
- **Current input/output 4 mA ... 20 mA**
- **I/P or transmitter power supply**
- **Accuracy 0.1 %**
- **Up to SIL2 acc. to IEC 61508**

Function

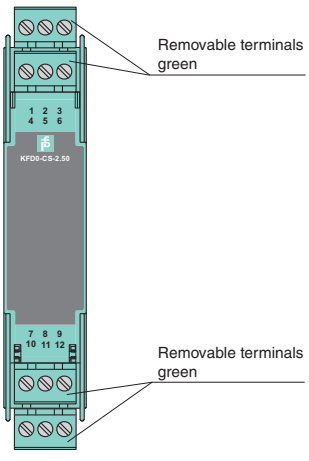
This signal conditioner transfers DC signals from fire alarms, smoke alarms, and temperature sensors and provides isolation for non-intrinsically safe applications. It can also be used to control I/P converters, power solenoids, LEDs, and audible alarms.

Since this isolator is loop powered, use the technical data to verify that proper voltage is available to the field devices.

Diagrams



Front view



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