- 1-channel
- Input EEx ia IIC
- Input for 4-wire and 6-wire bridges
- Analogue output 0/4 mA ... 20 mA or 4 mA ... -12 mA
- Full bridge load cells and strain gauges
- Power circuit for resistance bridges up to 17 Ω
- Bridge voltage 1 V DC ... 10 V DC
- Measuring span 1.2 mV ... 40 mV
- Tare range: 0 % ... 500 %

24 V DC

KFD2-WAC-Ex1

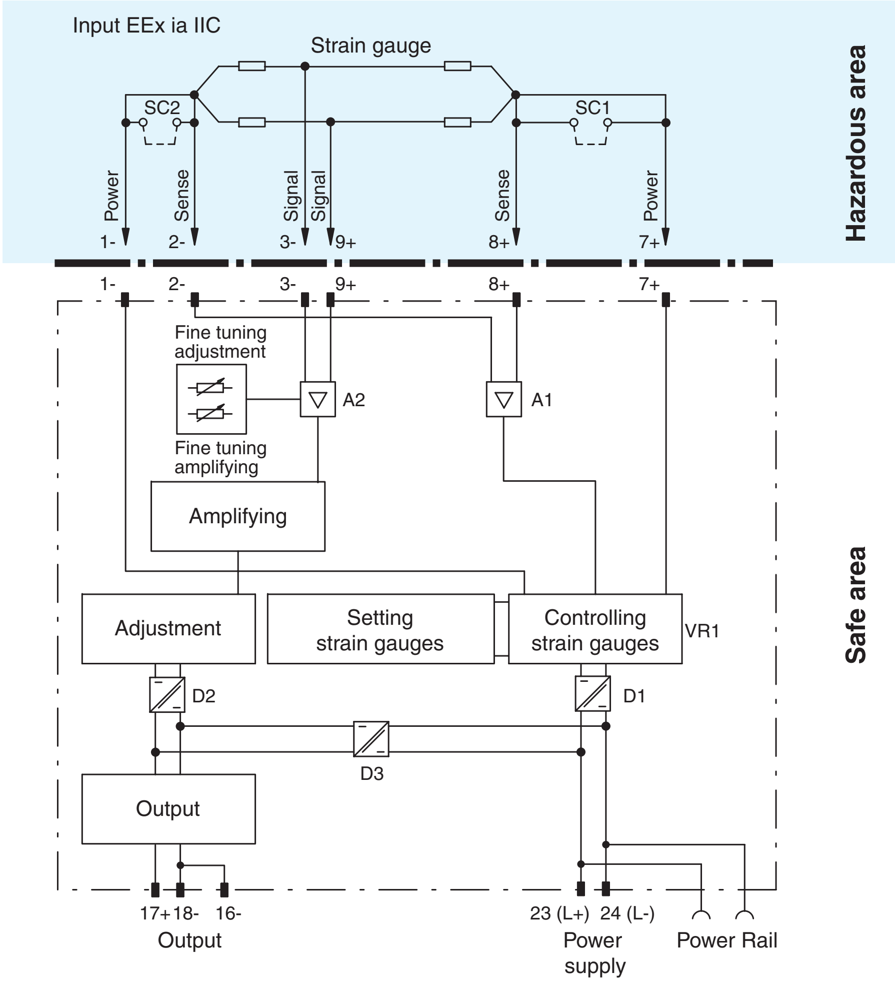
Function

The KFD2-WAC-Ex1 is used as a transmitter for all element resistance bridges from 17 Ω, making it suitable for interfacing with load cells, pressure transducers, torque shafts, individual resistance bridges and similar resistive elements.

Up to three test bridges with up to 50 Ω each can be switched in parallel.

A current signal is the standard output signal with voltage outputs available upon request.

Connection

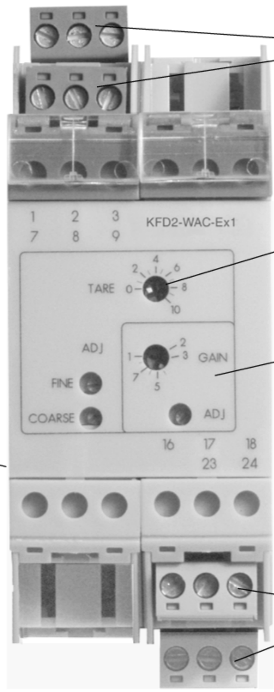


Composition

Front View

Housing type B4
(see system description)

DIP-switches:
setting output range/
setting strain gauge
nominal voltage



Removable terminals blue

Tare setting

Setting input amplification

Removable terminals green

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Supply	
Connection	Power Rail or terminals 23+, 24-
Rated voltage	20 ... 35 V DC
Ripple	within the supply tolerance
Field circuit	
Connection	terminals 1-, 2-, 3-, 7+, 8+, 9+
Lead resistance	≤ 25 Ω per lead
Input	
Connection	terminals 3-, 9+
Sensor supply	1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 V
Connection	terminals 1-, 2-, 7+, 8+
Short-circuit current	85 mA
Load	≥ 85 Ω up to 5 V
Input	
Connection	terminals 3-, 9+
Input signal	-40 ... 40 mV
Input resistance	> 1 MΩ for voltage measurement
Programmable Tare	0 ... 500 % of span
Output	
Connection	terminals 16-, 17+, 18-
Load	max. 500 Ω
Current output	-20 ... 20 mA
Transfer characteristics	
Deviation	
Resolution/accuracy	≤ ± 0.05 % incl. non-linearity and hysteresis
Temperature effect	≤ ± 0.004 %/K
Response time	100 ms
Electrical isolation	
Input/output	safe electrical isolation acc. to EN 50020, voltage peak value 375 V
Input/power supply	safe electrical isolation acc. to EN 50020, voltage peak value 375 V
Output/power supply	function insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff}
Directive conformity	
Electromagnetic compatibility	
Directive 89/336/EC	on request
Standard conformity	
Insulation coordination	acc. to DIN EN 50178
Electrical isolation	acc. to DIN EN 50178
Electromagnetic compatibility	acc. to EN 50081-2 / EN 50082-2, NAMUR NE 21
Climatic conditions	acc. to DIN IEC 721
Ambient conditions	
Ambient temperature	-20 ... 60 °C (253 ... 333 K)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 215 g
Data for application in conjunction with hazardous areas	
EC-Type Examination Certificate	BASEEFA 03 ATEX 0031 , for additional certificates see www.pepperl-fuchs.com
Group, category, type of protection	Ex II (1)GD [EEx ia] IIC (-20 °C ≤ T_{amb} ≤ 60 °C)
Input	[EEx ia] IIC
Voltage U_o	17.6 V
Current I_o	314 mA
Power P_o	1.23 W
Safety parameter	
Input I	
Explosion group	[EEx ia] IIC

Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. For information see www.pepperl-fuchs.com.

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Function

The device has a voltage supply of 24 V DC. The supply occurs via the terminals 23+ and 24- or via Power Rail. The field circuits, the output current and the power supply are galvanically isolated from each other

The strain gauge bridge is supplied from the internal power regulation VR1 via the terminals 7+ and 1-. The height of the bridge supply is given by the user via the DIP-switches (located on the side of the device).

A sense line, connected to the terminal 8+ and 2-, ensures via the amplifier A1, that the supply voltage at the strain gauge bridges without influence of the lead resistance corresponds to the programmed voltage.

For simplification (with slightly reduced accuracy) this compensation can be deactivated by suitable positioning of the jumpers LK1 and LK2. This allows the connection of the strain gauge bridge in 4-wire technology instead of the more precise 6-wire technology, shown in the block diagram.

The measurement signals from the strain gauge bridge are connected to the terminals 9+ and 3-. The amplification factor of the input amplifier A2 can be adjusted roughly by means of the switch GAIN; the fine adjustment can be made by means of the potentiometer ADJ at the front of the device.

Tare-adjustment option: The values for tare can be adjusted in a range of 0 % ... 500 %. By the switch TARE at the front it can be adjusted to the desired value in 10 steps of 50 % each (coarse adjustment) and by the potentiometer TARE/ADJ/FINE and COARSE the desired value (fine adjustment) can be adjusted.

At the output (terminal 17+, terminals 16 and 18-) the signal is given as a current from 4 mA ... 20 mA or 0 mA ... 20 mA (selection likewise with DIP-switches at the side of the device).

Setting instructions

Delivery settings for the unit

- designed for connecting of a strain gauge full bridge
- bridge connection in 6-wire

Setting of the strain gauge bridge power supply

Power supply [V]	1	2	3	4	5	6	7	8	9	10
max. current [mA]	60	60	60	60	60	60	60	60	60	57
min. load resistance [Ω]	17	33	50	67	83	100	116	133	150	175
max. cable resistance at min. load resistance [Ω]	161	138	123	107	89	73	56	39	23	10

Calculation of cable resistance

$R_{LM} = R_L \times (14 - U_{Exc})/U_{Exc} - 60\ \Omega$

this means:

R_L load resistance of strain gauge bridge
U_{Exc} power supply of strain gauge bridge
R_{LM} max. total resistance of the cable between strain gauge bridge and connectors d2 and d8

Strain gauge bridge connection in 4-wire technique

If the compensation is not required, i. e. strain gauge power connector in 4 wire, the LK1 jumper between terminals 7 and 8 and the LK2 jumper between terminals 1 and 2 must be in place.

In this case the cable resistance between the test circuit and the power connection should be as small as possible in order to obtain optimum test accuracy.

Setting strain gauge bridge nominal voltage

The network voltage of the strain gauge bridge can be set in a range of 1 V ... 10 V in 1 V steps by using the lower 4 DIP switches on the side of the unit (see figure operting elements).

Nominal voltage [V]		0	1	2	3	4	5	6	7	8	9	10
Switch setting [V]	**1 V**	0	1	0	1	0	1	0	1	0	1	X
	2 V	0	0	1	1	0	0	1	1	0	0	1
	3 V	0	0	0	0	1	1	1	1	0	0	X
	4 V	0	0	0	0	0	0	0	0	1	1	1

0 OFF
1 ON
X no meaning

Other switch positions may lead to faults and are not permitted.

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Setting output range

The output can be programmed by the DIP switches on the side of the housing.

current output: 0 mA ... 20 mA or 4 mA ... 20 mA

Setting input amplification

Amplification can be adjusted for each input range between 1.2 mV and 40 mV with the gain switch (GAIN) and the potentiometer (ADJ) on the front of the unit.

Input range [mV]	27 ... 40	16.4 ... 27	11 ... 16.4	6.6 ... 11	4 ... 6.6	3.1 ... 4	1.7 ... 3.1	1.2 ... 1.7
Switch setting	1	2	3	4	5	6	7	8

Setting tare

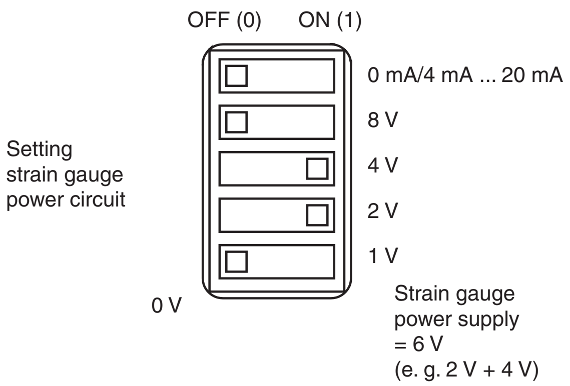
A permanent tare of 50 % ... 500 % of the programmed range can be programmed in 50 % steps with the switch (TARE) on the front. Fine tuning is done through the FINE and COARSE adjustment potentiometers.

Programmed tare [% of the programmed range]	0	50	100	150	200	250	300	350	400	450	500
Switch setting	0	1	2	3	4	5	6	7	8	9	10

Other switch positions may lead to faults and do not lead to additional tare-adjustment options.

Operating elements

DIP switches on the side of the housing



Application example

A 500 kg capacity scale is used for weighing material with a max weight of 100 kg in a container weighing 300 kg. The scale delivers a 1 mV/V output. At a 10 V power supply the output value equals 10 mV (at full load 500 kg).

The range is:

100 kg x 10 mV/500 kg = 2 mV

Based on this, the range being programmed is 1.7 mV ... 3.1 mV (GAIN switch on the front of the unit in switch setting 7). Set the tare setting on 0 % and adjust the output current to 0 mA for a 0 mV input voltage by using the TARE potentiometer. Adjust the output to 20 mA for a 2 mV (=100 kg) input by using the potentiometer for load adjustments.

The tare in % equals:

300 kg x 100 %/100 kg = 300 %

Thus, the programmed tare is 300 %. Adjust the output to 0 mA for a 6 mV input (= 300 kg) by using the TARE potentiometer. Also check to see if there is a 20 mA output for a 8 mV input(= 300 kg + 100 kg) and adjust as needed.

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Accessories

Power Rail PR-03
Power Rail UPR-03
Power feed module KFD2-EB2...

Using Power Rail PR-03 or UPR-03 the devices are supplied with 24 V DC by means of the power feed modules. If no Power Rails are used, power supply of the individual devices is possible directly via their device terminals.

Each power feed module is used for fusing and monitoring groups with up to 100 individual devices. The Power Rail PR-03 is an inset component for the DIN rail. The Power Rail UPR-03 is a complete unit consisting of the electrical inset and an aluminium profile rail 35 mm x 15 mm x 2000 mm. To make electrical contact, the devices are simply engaged.

The Power Rail must not be fed via the device terminals of the individual devices!

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