- **1-Channel**
- **Control circuit EEx ia IIC Class I, Div 1, Groups A-G**
- **AC 110 V / 230 V supply voltage**
- **Input frequency range 0.001 Hz ... 999 Hz, decade adjustable**
- **Output current 0 mA ... 20 mA or 4 mA ... 20 mA at a 0 Ohm ... 1000 Ohm load**
- **Test connection for analog values**
- **Serial switch output**

Nominal frequency adjustment f_n

Switch S1 (0 ... 9) x 100
Switch S2 (0 ... 9) x 10
Switch S3 (0 ... 9) x 1
Switch S4 x $10^{-(0 \dots 3)}$ see Table

Table:

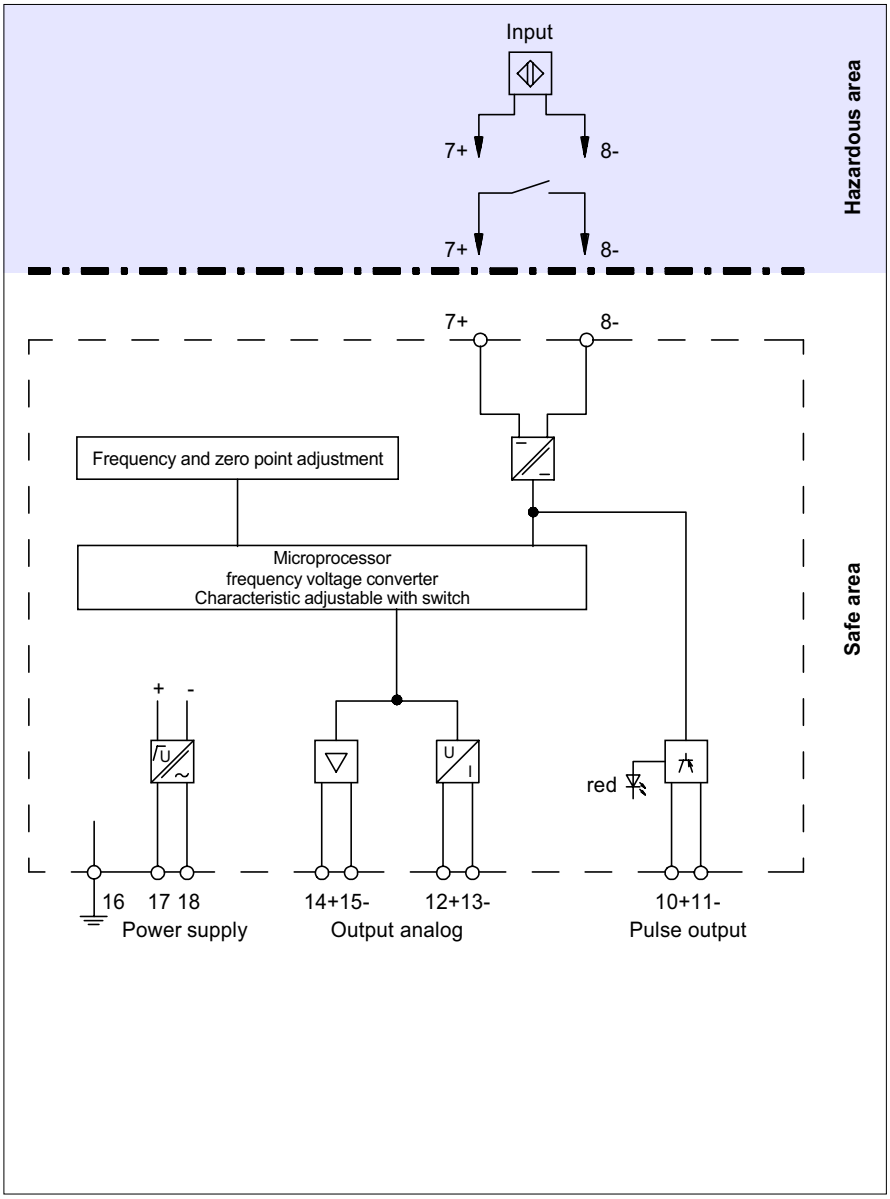
Switch S4 in Pos.	Nominal freq. f_n (S1 + S2 + S3)	0-Point of the Output Characteristic
0	x 10^{-0} Hz	0 mA
1	x 10^{-1} Hz	0 mA
2	x 10^{-2} Hz	0 mA
3	x 10^{-3} Hz	0 mA
4	x 10^{-0} Hz	4 mA
5	x 10^{-1} Hz	4 mA
6	x 10^{-2} Hz	4 mA
7	x 10^{-3} Hz	4 mA

Example: S1 : 3
S2 : 5
S3 : 7
S4 : 6

Nominal frequency
f_n = 357 x 10^{-2} Hz = 3.57 Hz
(0-Point of the output characteristic at 4 mA)

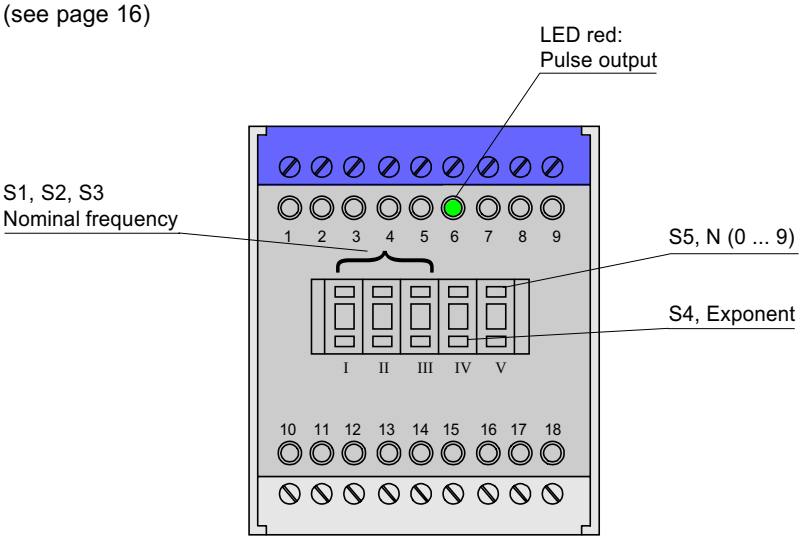
Adjustment range: 0.001 Hz ... 999 Hz
f_n = (S1 + S2+ S3) x S4 in Hz

Application:
Signal produced with a sensor
(see page 226)



Front View

Housing type W2
(see page 16)



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Technical data	
Power supply	Terminals 17, 18
Nominal voltage	AC: 207 V ... 264.5 V; 45 Hz ... 65 Hz / 99 V ... 126.5 V; 45 Hz ... 65 Hz
Power consumption	≈ 3.5 VA
Input (Intrinsically safe)	Terminals 7+, 8-
Nominal data	per DIN 19 234 or NAMUR, ≈ DC 8 V / ≈ 8 mA
Input pulse length / Input pulse interval	≥ 350 µs / ≥ 350 µs
Certificate of Conformity Peak Values	**PTB Nr. Ex-81/2146X** for additional international approvals see page 384
U_0 / I_0 / P_0	DC 12.7 V / 20 mA / 63.5 mW
Allowable circuit values	
Ignition protection method, category	**[EEx ia]** **[EEx ib]**
Explosion group	IIB / IIC IIB / IIC
Max. external capacitance	1.1 µF / 0.415 µF 3.9 µF / 0.8 µF
Max. external inductance	5 mH / 2 mH 290 mH / 76 mH
Entity Parameters	**FM No. 0Q 8A0.AX** Terminals 1+, 3-; 2+, 3-; 4+, 6-; 5+, 6-
Suitable for Div 2 installation/mounting	No
Voltage V_{OC}	13.1 V
Current I_{SC}	19.9 mA
Voltage V_t	-
Current I_t	-
Explosion group	A&B C&E D, F&G
Max. external capacitance (C_a)	1.2 µF 3.6 µF 9.6 µF
Max. external inductance (L_a)	80.0 mH 300.0 mH 680.0 mH
Output (Not intrinsically safe)	
Output:	Current output Terminals 12+, 13-; 14+, 15-
Output current range / Load	0 mA ... 20 mA or 4 mA ... 20 mA / ≤ 1000 Ohm
Max. Current	22 mA
Output: Auxiliary	Transistor output, passive Terminals 10+, 11-
Max. switching voltage	DC 30 V
Nominal current / Max. switching current	10 mA, short circuit protected / 16 mA
Signal level: Logic 1 / Logic 0	(L+) -2.5 V / cut off output (leakage current ≤ 10 µA)
Analog output, test jack	0 mV ... 200 mV
Internal resistance R_i	≈ 10 kOhm
Transfer characteristics	
Input frequency	≤ 1.5 kHz
Working range	0.001 Hz ≤ f_n ≤ 999 Hz
Pulse-duty factor	preferably asymmetric
Linearity fault	≤ 1% of final value
Certificate	
PTB (Germany)	Nr. Ex-81/2146X
FM (USA)	Nr. OQ BAO.AX
ASEV (Switzerland)	Nr. 90.102719X
Weight	≈ 400 g (≈ 14.1 oz)
Ambient temperature	-25 °C ... +60 °C (-13 °F ... 140 °F)

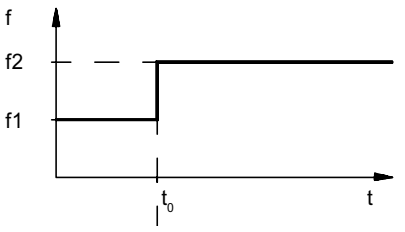
See page 12 for additional information on mechanical and electrical standards of the K-System.

Adjustment of the time constant

The frequency current converter has an input / output time ratio which means that the time can be set with the S5 thumbwheel switch after the output current rises preceded by a jump in the input frequency. The time constant τ can be calculated using the following formula:

$$\tau = \frac{2^{N+1}}{f_E}$$

The value N is adjustable with thumbwheel switch S5 from 0 ... 9.

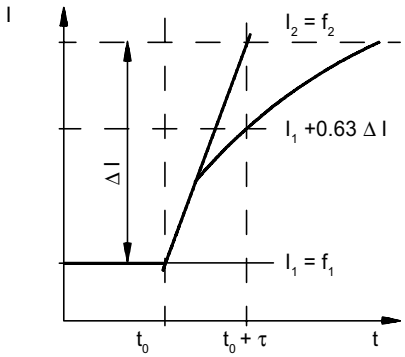


$$I(t) = I_2 + (I_1 - I_2) \times e^{-\frac{t}{\tau}}$$

$$= I_2 + \Delta I_1 - I_2) \times e^{-\frac{t}{\tau}}$$

I (t): Output current
J_1 : Output current at frequency f_1
J_2 : Output current at frequency f_2
Δ I: Output current difference $I_1 - I_2$
τ: Time constant

Output Ratio



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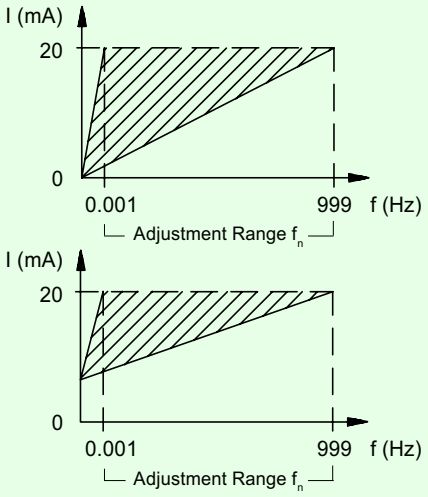
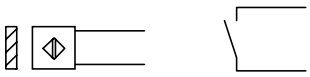
Operating Range for I (f_n)

The slope of the characteristic curve can be changed with switches S1, S2 and S3 without changing the linearity or the measurement accuracy. If the input frequency exceeds the set frequency, the output current will continue to rise up to 1.1 times its normal value.



Mode of operation

Input	Serial Switch Ouput	LED
	Logic 1	ON
	Logic 0	OFF

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