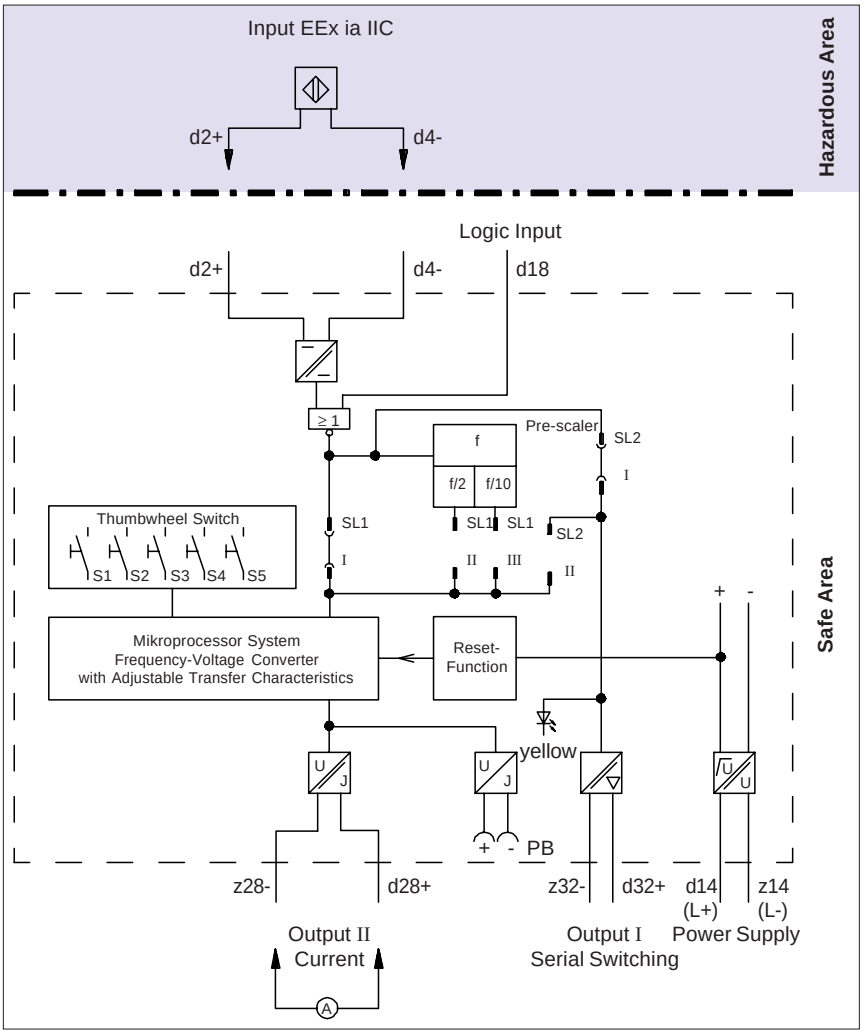
- **1-Channel**
- **Control circuit EEx ia IIC**
- **DC 24 V supply voltage**
- **Max. input frequency 5 kHz**
- **Test jacks for output current on the face plate**
- **1 Logic input**
- **1 passive transistor output, serially switched**
- **1 Current output (0 mA / 4 mA ...20 mA)**
- **Max. load 650 Ohm**
- **Galvanic isolation between input, output and power supply**

Mode of operation auxiliary switch
A dampened sensor or logic input d18 = "0" means output is switched

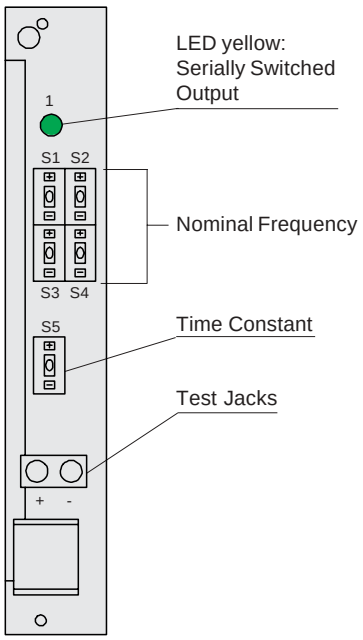
Function
The frequency / current converter transforms the input frequency into an impressed DC current. It is designed for connection with a sensor per DIN 19 234 / NAMUR.
The unit can be controlled with a 24 V DC voltage signal via logic input d18.
A load of 650 Ohm is allowed at the analog output.
The input signal for the control of additional evaluation levels is available at the z32/d32 potential free output.

Application
- Measurement of: rotation rates, velocity, flow rates
- As a control device with sequential indicators
- Digital / analog converter in an automatic control system



Front View

Type A
(dimensions see page 16)



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Technical data	
Power supply	Connections d14 (L+), z14 (L-)
Nominal voltage	DC 20.4 V ... 27.6 V
Ripple	≤10 %
Nominal current	max. 150 mA (with J = 20 mA at current output)
Input (intrinsically safe)	Connections d2+, d4-
Nominal data	per DIN 19 234 or NAMUR
Open circuit voltage / short circuit current	about DC 8 V / about 8 mA
Switch point / switch hysteresis	1.2 mA ... 2.1 mA / about 0.2 mA
Input pulse length / pulse interval	≥ 1 ms / ≥ 1 ms
Certificate of Conformity Peak Values	**PTB Nr. Ex-81/2065X** other certifications see www.pepperl-fuchs.com
Max. voltage U_0	13.2 V
Max. current I_0	18.8 mA
Max. power P_0	62 mW
Allowable circuit values	
Ignition protection method, category	**[EEx ia]** **[EEx ib]**
Explosion group	IIB / IIC IIB / IIC
Max. external capacitance	1.31 µF / 0.415 µF 3.0 µF / 0.66 µF
Max. external inductance	5 mH / 2 mH 320 mH / 85 mH
Input (not intrinsically safe)	Logic input Connections d18
Signal level Logic-1	DC 16 V ... 30 V
Signal level Logic-0	DC 0 V ... 5 V or B-circuit input
Input pulse length / pulse interval	≥ 0.1 ms / ≥ 0.1 ms
Outputs (not intrinsically safe)	
Output I :	Transistor output, passive Connections d32+, z32-
Nominal voltage	≤DC 30 V
Nominal current	100 mA, short circuit protected, pulsating
Voltage drop	25 V with 100 mA (leakage current J ≤10 µA)
Output II :	Current output Connections d28+, z28-
Current range	0 mA / 4 mA ... 20 mA
Load	650 Ohm
Open circuit voltage	about 30 V
Output PB : Test jack	Current output Connections +, - (facing)
Current range	0 mA / 4 mA ... 20 mA
Load	≤250 Ohm
Open circuit voltage	about 7.5 V
Transfer characteristics	
Switch frequency	≤5 kHz
Operating range	0.001 Hz ≤f_n ≤999 Hz
Duty ratio	1 : 1
Combined faults	≤ 1%
Galvanic isolation	
Input / Output	available
Input / Power supply	available
Output / Power supply	available
Conformity to standard	
Input	per DIN 19234 (NAMUR)
Climatic conditions	per DIN IEC 721
Ambient temperature	0 °C ... +70 °C (273 K ... 343 K)
Connection method	32-pin plug connector per DIN 41 612, Series 2, Type F; z and d provided
Coding	a3 / c13
Weight	about 200 g

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Function

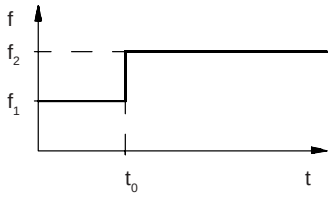
The frequency / current converter transforms the input frequency into an impressed DC current. It is designed for connection with a sensor per DIN 19 234 / NAMUR.
The unit can be controlled with a 24 V DC voltage signal via logic input d18.
The input frequency at which 20 mA flow in the output, is adjustable in the range of 0.001Hz ... 999Hz. Higher frequencies must be reduced by the pre-scaler to a level at which a maximum of 1kHz can be applied to the microprocessor system (see adjustment instructions).
A load of 0 Ohm ... 1 Ohm is permitted accross the analog output.
The time response of the analog output at a step change in input frequency can be adjusted with a thumbwheel switch on the front panel.

Adjustment of the time constant

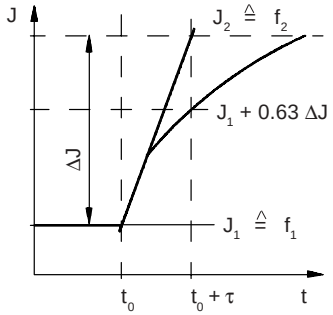
The frequency / current converter has an input / output time response, which means the time can be adjusted with the S5 thumbwheel switch after which the output current rises with a marked increase in the input frequency. The value of the time constant τ is obtained through the following formula:

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

Frequency adjustments at the input



Output characteristics



$J(t) = J_1 + (J_2 - J_1) \times (1 - e^{-\frac{t}{\tau}})$
$= J_1 + \Delta J \times (1 - e^{-\frac{t}{\tau}})$

J(t): Output current
J_1: Output current at frequency f_1
J_2: Output current at frequency f_2
ΔJ: Output current difference $J_2 - J_1$
τ: Time constant

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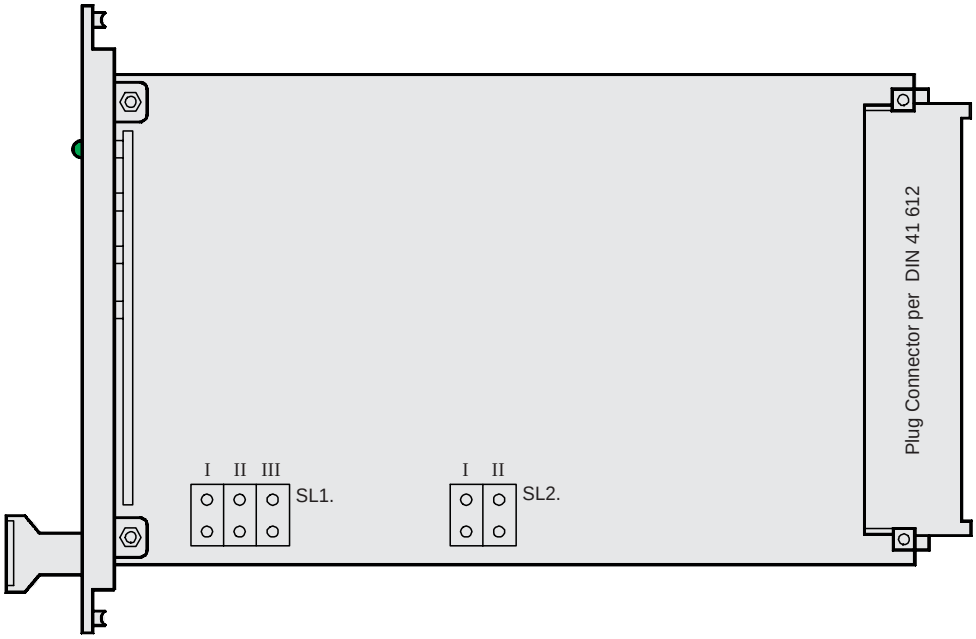
Side View



Adjustment instructions
Pre-scaler

The input frequency f_E is reduced by the pre-scaler depending on the position of the plug in jumper SL1, since the frequency / current converter processes at a maximum 1 kHz.

	Pre-scaler	max. f_E
SL1 in Pos. I:	1:1	1 kHz
SL1 in Pos. II:	2:1	2 kHz
SL1 in Pos. III:	10:1	5 kHz

The position of link SL2 determines whether the serially switched output operates dependently or independently of the pre-scaler setting.

SL2 in Pos. I: The serially switched output is **independent** of the pre-scaler
SL2 in Pos. II: The serially switched output is **dependent** upon the pre-scaler

Frequency adjustment

The frequency at which a maximum current of 20 mA flows, may be adjusted with thumbwheel switches S1 to S4 (see front view). The position of the pre-scaler must however, also be taken into account.

Table:
Thumbwheel switch adjustments

Switch S4 Switch Position	Nominal Frequency 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

A current of 0 mA ... 20 mA is desired with an input frequency of 0 Hz ... 5 kHz.

1. Adjustment of pre-scaler with link SL1 in Pos. III; this supplies the frequency / current converter with a frequency of 500 Hz.
2. Adjustment of the thumbwheel switches S1 to S4:
   S1 = 5,
   S2 = 0,
   S3 = 0,
   S4 = 0 according to table

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