

## Strain gauge amplifier for strain and force sensors for cyclic applications with very frequent zero adjustment processes

### Variants

**X-201-KA08**



DIN-rail mounting

**X-201-IP08**



Aluminum field housing

**X-201-IN08**



Inline housing

**Amplifier with 4 ... 20 mA and 0 ... 10 V analogue output, zero point adjustment via external control signal, unlimited taring cycles**

### Features

- Universal connection of strain sensors, force sensors and load cell
- Large input range of 1.0 mV/V to 4.0 mV/V
- For cyclic applications with external input for automatic zero point adjustment, suitable for periodic zero adjustment processes (process tare)
- Analogue signal path with fast reaction time
- With integrated amplifier with  $\pm 10$  V or 4 - 20 mA as robust output signal, can be operated simultaneously

### Application

The amplifiers of X-Sensors are suitable for the universal signal conditioning of strain gauges sensors. They are therefore suitable for amplifying the mV-sensor signal of any force and strain sensors and load cells.

The zero point setting for these amplifiers is made by a digital zero-adjustment mechanism. The zero point adjustment is not saved permanently, it is lost after switching off. A non-volatile, stable zero is available regardless of the cycle times. Therefore, these amplifiers are suitable for all dynamic applications. They can be used in all applications that require a periodic zero reset.

Different types of housing allow a wide range of applications. In addition to the DIN rail version for mounting in control cabinets, there is also a robust field housing and inline housing available.

## Ordering code

Description	Input sensitivity	Output-signal	Characteristic	Specifications
X-201-KA08	0 ... 1.0 mV/V 0 ... 1.25 mV/V 0 ... 1.5 mV/V 0 ... 2.0 mV/V 0 ... 3.0 mV/V 0 ... 4.0 mV/V	0 ... 10 V 4 ... 20 mA	DIN-rail mounting	Page 3
X-201-IP08	0 ... 1.0 mV/V 0 ... 1.25 mV/V 0 ... 1.5 mV/V 0 ... 2.0 mV/V 0 ... 3.0 mV/V 0 ... 4.0 mV/V	0 ... 10 V 4 ... 20 mA	Aluminum field housing	Page 4
X-201-IN08	0 ... 1.0 mV/V 0 ... 1.25 mV/V 0 ... 1.5 mV/V 0 ... 2.0 mV/V 0 ... 3.0 mV/V 0 ... 4.0 mV/V	0 ... 10 V 4 ... 20 mA	Inline housing	Page 5

# X-201-KA08 for DIN-rail mounting

Measuring amplifier with analogue signal path and control  
input for zero point adjustment 0.5 ... 4 mV/V



## Specifications

### Performance

<b>Sensitivity</b>	0 ... 1.0 mV/V 0 ... 1.25 mV/V 0 ... 1.5 mV/V 0 ... 2.0 mV/V 0 ... 3.0 mV/V 0 ... 4.0 mV/V
<b>Linearity</b>	< 0.5 % from full-scale
<b>Zero point temperature coefficient</b>	< 0.01 % / °C
<b>Cut-off frequency</b>	1.3kHz (- 3dB)
<b>Signal path</b>	Analogue

### Electrical data

<b>Power supply</b>	18 ... 28 VDC, <70mA
<b>Output signal related to the final value</b>	
<b>Voltage output</b>	0 ... ± 10 V @ Rload > 2 kΩ
<b>Current output</b>	0/4 ... 20 mA @ Rload 0 ... 800Ω
<b>Output signal at overload</b>	± 11.5 V / 1.5-23 mA
<b>Noise</b>	Max. 20 mVpp (0 ... 5kHz)
<b>Resistance of strain gauge bridge</b>	4.5 V (standard): 200 Ω ... 10 kΩ 10 V (range selection): 330 Ω ... 10 kΩ

### External zero reset

<b>Measurement mode</b>	< 3 V or open
<b>Zero reset / adjustment</b>	> 10 V
<b>Minimal pulse duration</b>	200 ms
<b>Duration entire adjustment process</b>	210 ms
<b>Adjustment of zero point</b>	± 2.2 mV/V
<b>Max numbers of tarings</b>	Unlimited

### «Onboard» Zero adjustment by pressing a button

<b>Setting the output signal to 0, taught-in zero offset is stored captive</b>	«Zero» Button
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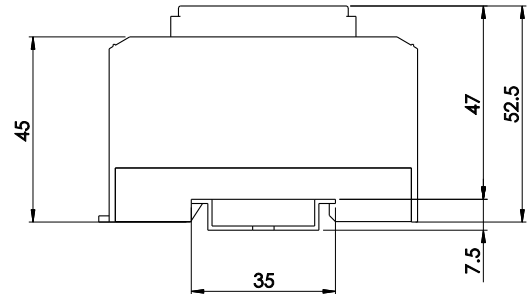
### Mechanical data

<b>Material</b>	Polycarbonate fiber reinforced, UL 94 V0
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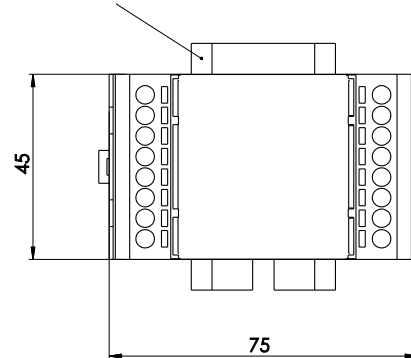
## Environmental data

<b>Ambient temperature</b>	- 20 ... +60 ° C
<b>EMV standards</b>	EN 61000-4
<b>Protection rate</b>	IP 52

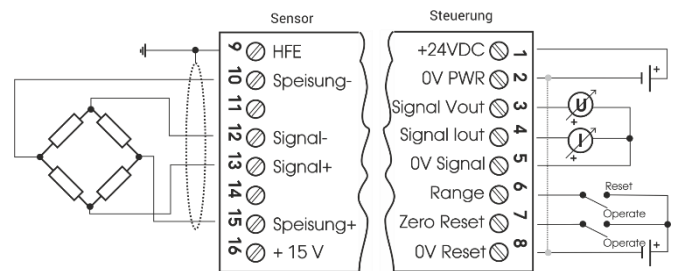
## Mechanical dimensions



Tragschiene, DIN EN 60715



## Pin assignment



## Ordering code

See page 2 for detailed order information.

Options:

- Pre-configured setting (specific sensitivity)
- Calibrated measuring chain (amplifier and sensor)

## X-201-IP08 in aluminum field housing

Measuring amplifier with analogue signal path and control input for zero point adjustment 0.5 ... 4 mV/V



### Specifications

#### Performance

<b>Sensitivity</b>	0 ... 1.0 mV/V 0 ... 1.25 mV/V 0 ... 1.5 mV/V 0 ... 2.0 mV/V 0 ... 3.0 mV/V 0 ... 4.0 mV/V
<b>Linearity</b>	< 0.5 % from full-scale
<b>Zero point temperature coefficient</b>	< 0.01 % / °C
<b>Cut-off frequency</b>	1.3kHz (- 3dB)
<b>Signal path</b>	Analogue

#### Electrical data

<b>Power supply</b>	18 ... 28 VDC, <70mA
<b>Output signal related to the final value</b>	
<b>Voltage output</b>	0 ... ± 10 V @ Rload > 2 kΩ
<b>Current output</b>	0/4 ... 20 mA @ Rload 0 ... 800Ω
<b>Output signal at overload</b>	± 11.5 V / 1.5-23 mA
<b>Noise</b>	Max. 20 mVpp (0 ... 5kHz)
<b>Resistance of strain gauge bridge</b>	4.5 V (standard): 200 Ω ... 10 kΩ 10 V (range selection): 330 Ω ... 10 kΩ

#### External zero reset

<b>Measurement mode</b>	< 3 V or open
<b>Zero reset / adjustment</b>	> 10 V
<b>Minimal pulse duration</b>	200 ms
<b>Duration entire adjustment process</b>	210 ms
<b>Adjustment of zero point</b>	± 2.2 mV/V
<b>Max numbers of tarings</b>	Unlimited

#### «Onboard» Zero adjustment by pressing a button

<b>Setting the output signal to 0, taught-in zero offset is stored captive</b>	«Zero» Button
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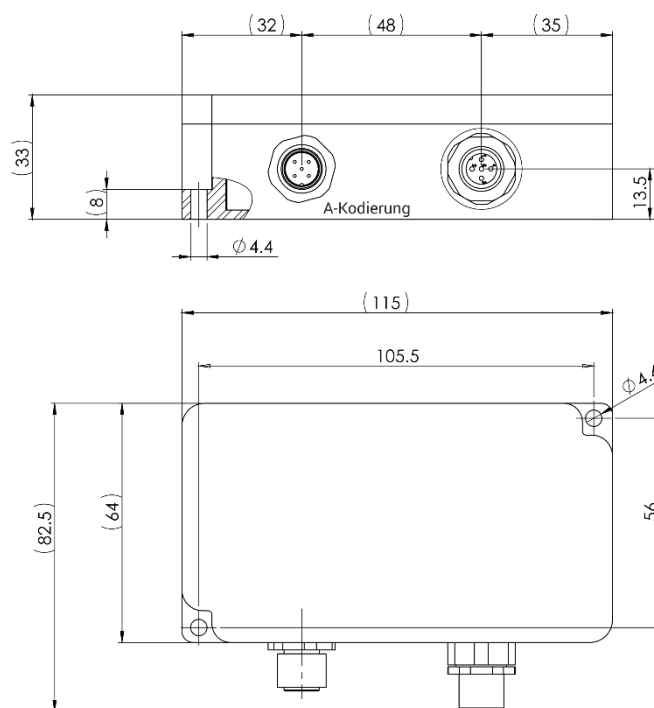
#### Mechanical data

<b>Material</b>	Aluminum
<b>Electrical connection sensor</b>	M12 socket (4 pin, a-coded, female)
<b>Electrical connection control</b>	M12 plug (8 pin, a-coded, male)

### Environmental data

<b>Ambient temperature</b>	- 20 ... +60 ° C
<b>EMV standards</b>	EN 61000-4
<b>Protection rate</b>	IP 65

### Mechanical dimensions



### Pin assignment field housing

M12 socket for sensor connection, 4 pin, female

Pin code	Function
1	Excitation +
2	Signal +
3	Signal -
4	Excitation -

M12 plug for PLC connection, 8-pole, male

Pin code	Function
1	Power +
2	n.c.
3	Reset-zero point 0V
4	Reset-zero point +
5	Signal output Vout+ (± 10 V)
6	Power 0V (GND)
7	Signal 0V
8	Signal output Iout+ (4-20 mA)

### Ordering code

See page 2 for detailed order information.

Options:

- Pre-configured setting (specific sensitivity)
- Calibrated measuring chain (amplifier and sensor)

## X-201-IN08 in inline housing

Measuring amplifier with analogue signal path and control input for zero point adjustment 0.5 ... 4 mV/V



### Specifications

#### Performance

<b>Sensitivity</b>	0 ... 1.0 mV/V
	0 ... 1.25 mV/V
	0 ... 1.5 mV/V
	0 ... 2.0 mV/V
	0 ... 3.0 mV/V
	0 ... 4.0 mV/V
<b>Linearity</b>	< 0.5 % from full-scale
<b>Zero point temperature coefficient</b>	< 0.01 % / °C
<b>Cut-off frequency</b>	700 Hz (-3dB)
<b>Signal path</b>	Analogue

#### Electrical data

<b>Power supply</b>	18 ... 30 VDC, <80mA
<b>Output signal at full scale</b>	± 10 V / 4-20 mA
<b>Output signal at overload</b>	± 11.5 V / 1.5-23 mA
<b>Resistance of strain gauge bridge</b>	9 V: 700 Ω ... 2 kΩ

#### External zero reset

<b>Measurement mode</b>	< 3 V or open
<b>Zero reset / adjustment</b>	> 10 V
<b>Minimal pulse duration</b>	200 ms
<b>Duration entire adjustment process</b>	210 ms
<b>Adjustable sensitivity</b>	± 2.2 mV/V
<b>Maximum number of zero point adjustment cycles</b>	Unlimited

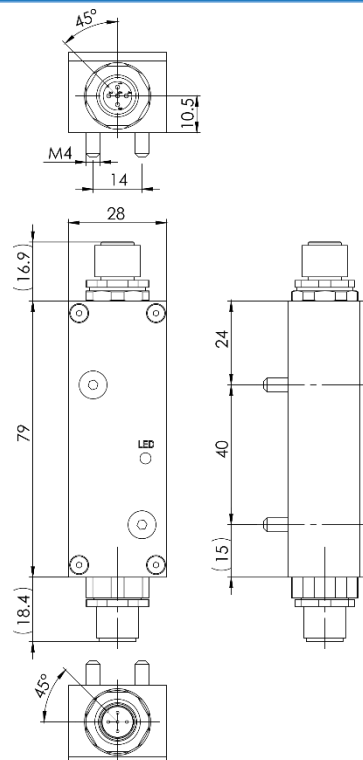
#### Mechanical data

<b>Material</b>	Aluminum
<b>Electrical connection sensor</b>	M12 socket (4 pin, a-coded, female)
<b>Electrical connection control</b>	M12 plug (8 pin, a-coded, male)
<b>Assembly</b>	2x M4-countersunk screws

#### Environmental data

<b>Ambient temperature</b>	0 ... +70 °C
<b>Storage temperature</b>	-40 ... +85 °C
<b>EMV standards</b>	EN 61000-4
<b>Protection rate</b>	IP 65

### Mechanical dimensions



### Pin assignment field housing

M12 socket for sensor connection, 4 pin, female

Pin code	Function
1	Excitation +
2	Signal +
3	Signal -
4	Excitation -

M12 plug for PLC connection, 8-pole, male

Pin code	Function
1	Power +
2	n.c.
3	Reset-zero point 0V
4	Reset-zero point +
5	Signal output Vout+ (± 10 V)
6	Power 0V (GND)
7	Signal 0V
8	Signal output Iout+ (4-20 mA)

### Ordering code

See page 2 for detailed order information.

Options:

- Pre-configured setting (specific sensitivity)
- Calibrated measuring chain (amplifier and sensor)

## External zero point adjustment

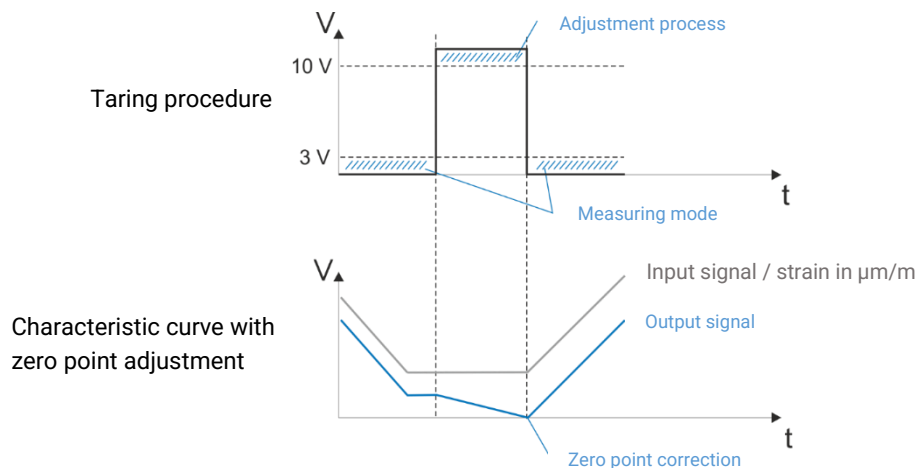
The zero point setting for these amplifiers is made by a digital zero-adjustment mechanism. The zero point adjustment is not saved permanently, it is lost after switching off. A non-volatile, stable zero is available regardless of the cycle times. Therefore, these amplifiers are suitable for all dynamic applications. They can be used in all applications that require a periodic zero reset.

The zero point adjustment is triggered by an external control input (reset input). It is available with Active Low and Active High logic.

The following characteristic values are to be considered for the external zero point adjustment.

External zero point adjustment	Active low	Active High
Measurement mode	> 10 V or open	< 3 V or open
Zero reset / adjustment	< 3 V	> 10 V
Minimal pulse duration	10 ms	10 ms

The following diagram describes the behavior of the amplifier in reference to the zero adjustment control input:

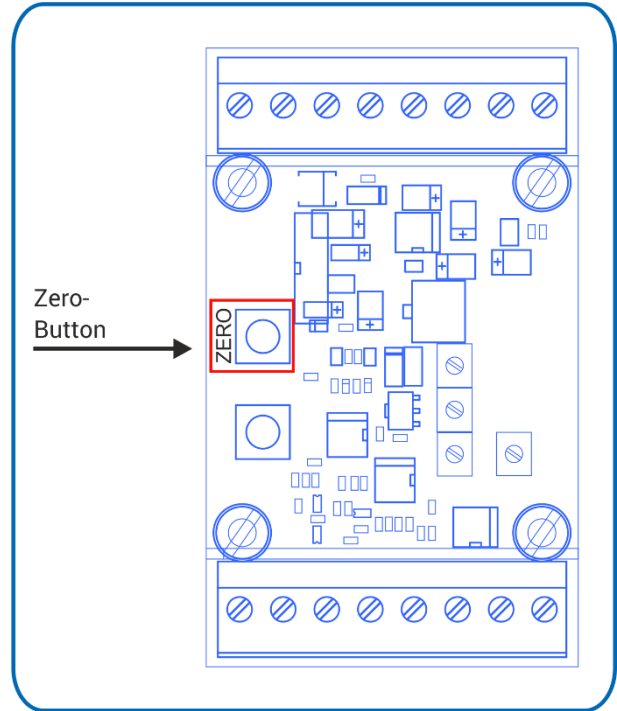


## Zero point adjustment "Onboard"

With the DIN-rail version (X-201-KA08) and aluminum field housing (X-201-IP08), the zero point can be teached-in by pressing a button.

The zero point correction taught with the "Zero" button is always saved as an installation tare. This means that the zero point correction is still present even after a power-off.

The zero point adjustment is performed as long as the zero-button is pressed. The output signal is set to zero at this moment.



## Output

The X-201 offers two calibrated outputs at once, a voltage output and a current output. The relation between these two outputs is strictly proportional, in other words, if the voltage output is forced to 100%, the current output will also go to 100%.

$U_{out} 0 \dots 10 \text{ V} = I_{out} 0 \dots 20 \text{ mA (or } 4 \dots 20 \text{ mA)}$