

Strain gauge amplifier for strain and force sensors for applications with occasional zero point adjustments

Variants

X-201-KA07



DIN-rail mounting

X-201-IP07



Aluminum field housing

X-201-IN07



Inline housing

Amplifier with 4 ... 20 mA and 0 ... 10 V analogue output, zero point adjustment by onboard button or by external control signal, maximum 100,000 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
- Teaching zero point with external input or via a button, zero correction is stored permanently (installation tare)
- With integrated amplifier with ± 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 adjustment for these amplifiers is performed by a digital zero point-adjustment mechanism. The zero point setting is stored permanently, the zero point correction is also available after a power-off event. Thus, a constantly available installation tare is available. Therefore, these strain gauge amplifiers are suitable for all static applications. The number of taring operations is limited to 100,000.

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.

| Description | Input sensitivity | Output-signal | Characteristic | Specifications |
|-------------|---|---------------------------|------------------------|----------------|
| X-201-KA07 | 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-IP07 | 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-IN07 | 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-KA07 for DIN-rail mounting

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



Specifications

Performance

| | |
|---|---|
| Sensitivity | 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 |
| Linearity | < 0.5 % from full-scale |
| Zero point temperature coefficient | < 0.01 % / °C |
| Cut-off frequency | 1.3kHz (-3dB) |
| Signal path | Analogue |

Electrical data

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

External zero reset

| | |
|---|---------------|
| Measurement mode | < 3 V or open |
| Zero reset / adjustment | > 10 V |
| Minimal pulse duration | 1000 ms |
| Duration entire adjustment process | 1010 ms |
| Adjustment of zero point | ± 2.2 mV/V |
| Max numbers of tarings | 100.000 |

«Onboard» Zero adjustment by pressing a button

| | |
|--|---------------|
| Setting the output signal to 0, taught-in zero offset is stored captive | «Zero» Button |
|--|---------------|

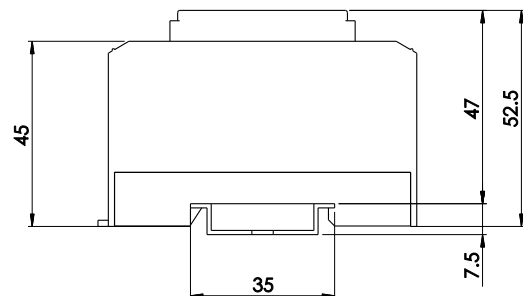
Mechanical data

| | |
|-----------------|--|
| Material | Polycarbonate fiber reinforced, UL 94 V0 |
|-----------------|--|

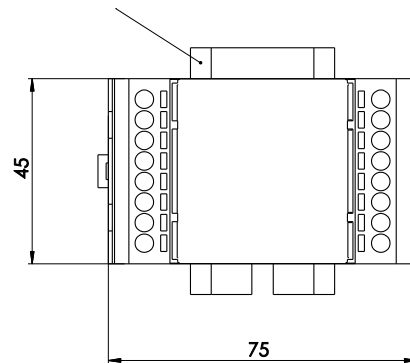
Environmental data

| | |
|----------------------------|----------------|
| Ambient temperature | - 20 ...+60 °C |
| EMV standards | EN 61000-4 |
| Protection rate | IP 52 |

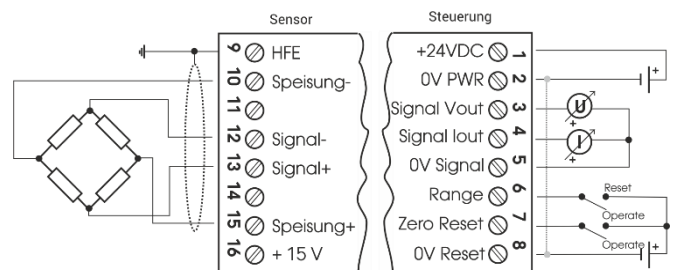
Mechanical dimensions



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-IP07 in aluminum field housing

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



Specifications

Performance

| | |
|---|---|
| Sensitivity | 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 |
| Linearity | < 0.5 % from full-scale |
| Zero point temperature coefficient | < 0.01 % / °C |
| Cut-off frequency | 1.3kHz (-3dB) |
| Signal path | Analogue |

Electrical data

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

External zero reset

| | |
|---|---------------|
| Measurement mode | < 3 V or open |
| Zero reset / adjustment | > 10 V |
| Minimal pulse duration | 1000 ms |
| Duration entire adjustment process | 1010 ms |
| Adjustment of zero point | ± 2.2 mV/V |
| Max numbers of tarings | 100.000 |

«Onboard» Zero adjustment by pressing a button

| | |
|--|---------------|
| Setting the output signal to 0, taught-in zero offset is stored captive | «Zero» Button |
|--|---------------|

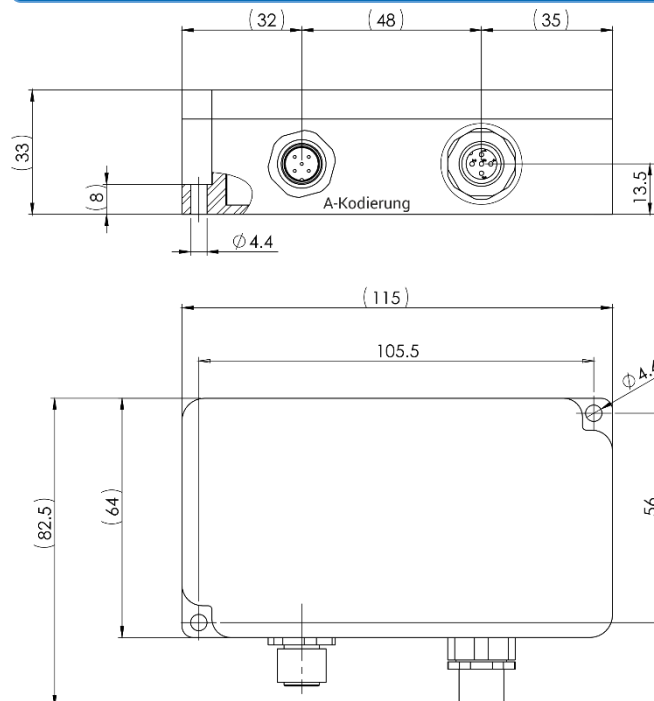
Mechanical data

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

Environmental data

| | |
|----------------------------|-----------------|
| Ambient temperature | - 20 ...+60 ° C |
| EMV standards | EN 61000-4 |
| Protection rate | 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 output 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-IN07 in Inline-housing

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



Specifications

Performance

| | |
|---|---|
| Sensitivity | 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 |
| Linearity | < 0.1 % from full-scale |
| Zero point temperature coefficient | < 0.5 % / °C |
| Cut-off frequency | 700 Hz (-3dB) |
| Signal path | Analogue |

Electrical data

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

External zero reset

| | |
|---|---------------|
| Measurement mode | < 3 V or open |
| Zero reset / adjustment | > 10 V |
| Minimal pulse duration | 1000 ms |
| Duration entire adjustment process | 1010 ms |
| Adjustable sensitivity | ± 2.2 mV/V |
| Maximum number of zero point adjustment cycles | 100.000 |

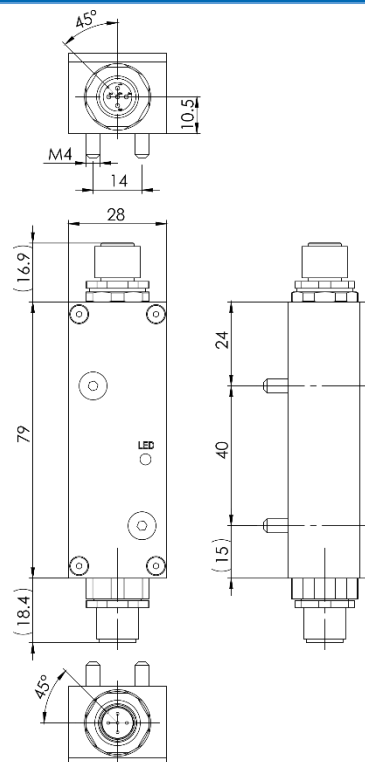
Mechanical data

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

Environmental data

| | |
|----------------------------|----------------|
| Ambient temperature | 0 ... +70 °C |
| Storage temperature | -40 ... +85 °C |
| EMV standards | EN 61000-4 |
| Protection rate | 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 output 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

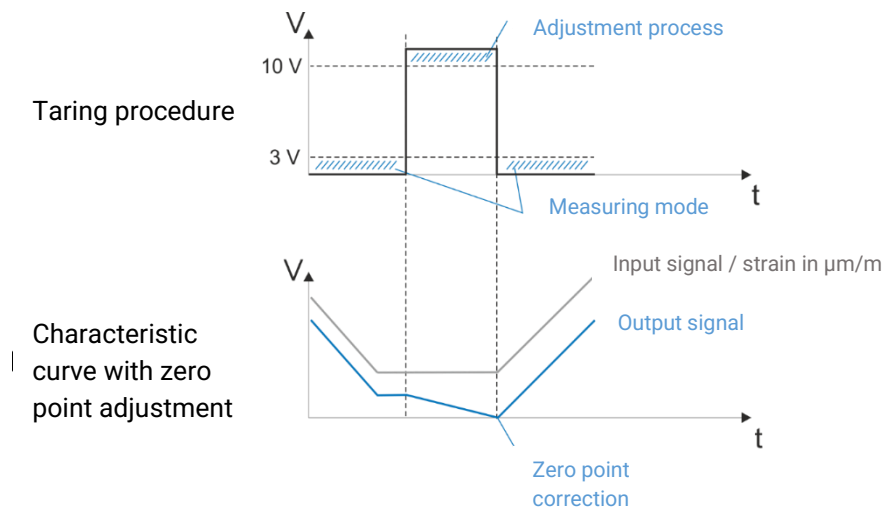
The zero point adjustment for these amplifiers is performed by a digital zero point-adjustment mechanism. The zero point setting is stored permanently, the zero point correction is also available after a power-off event. Thus, a constantly available installation tare is available. Therefore, these amplifiers are suitable for all static applications. The number of taring operations is limited to 100,000.

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 | 1000 ms | 1000 ms |

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

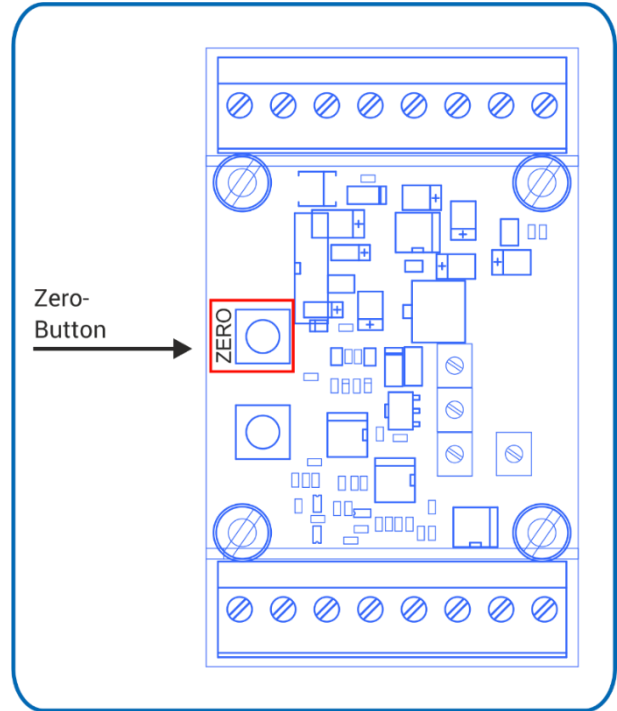


Zero point adjustment "Onboard"

With the DIN-Rail version (X-201-KA07) and aluminum field housing version (X-201-IP07), the zero point can be taught-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.

Zero 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%.

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