

Industrial Amplifiers



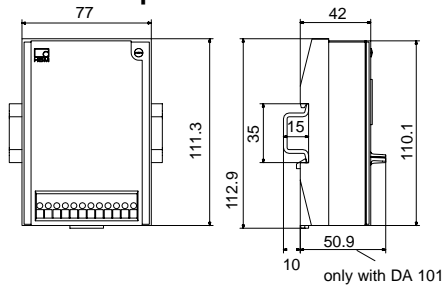
Special features

- Amplifier and additional units for strain gauge full bridges and inductive half and full bridges
- Modules for mounting onto support rails to DIN EN 50022
- Accuracy class 0.1
- Adjustment via DIP switches and potentiometers
- Clip IG industrial amplifier (aluminium-die-cast enclosure) IP65
- Intrinsically safe EEx ib measurement circuit with safety barriers

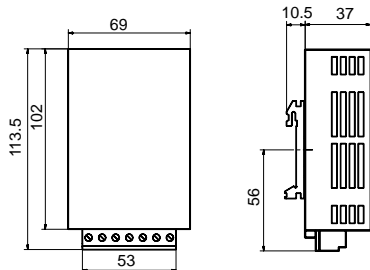
Dimensions (in mm; 1 mm= 0.03937 inches)

Clip Electronics

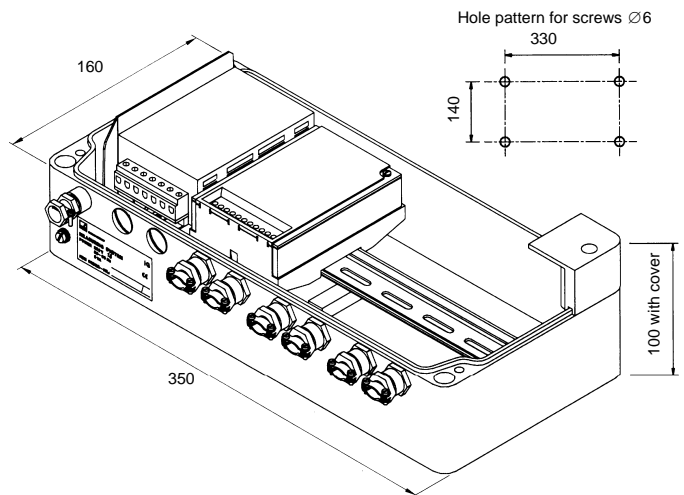
AE101
AE301
AE501/AE511
EM201
EM201K2
GR201
DA101
TS101



NT101A
NT102A



Clip IG Industrial amplifier



Specifications

Clip IG Industrial amplifier in aluminium-die-cast enclosure

| | | |
|--|------------------|--------------------------|
| Degree of protection | | IP65 |
| Weight approx. | kg | 4.3 |
| Weight (empty) | kg | 3.2 |
| Ambient temperature | °C [°F] | -20...+50 [-4...+122] |
| Operating voltage with 101A Power supply unit (Type WG 010) with NT 102A Power supply unit (Type WG 011) | V V | 230 ± 10 % 115 ± 10 % |
| Mechanical stress (test similar to DIN IEC 68) Vibration (30 min each direction) | m/s ² | 50 (5...65 Hz) |
| Impact (3 times each direction, impact duration 6ms) | m/s ² | 350 |

AE101, AE 301, AE501 Measuring amplifiers for support rail mounting

| Type | | AE101 | AE301 | AE501 |
|--|-----------------|-----------------|-----------------------------|---------------|
| Accuracy class | | 0.1 | 0.1 | 0.1 |
| Transducers that may be connected | | | | |
| Strain gauge full bridge | | | | |
| $V_E = 10\text{ V}$ | Ω | 340...5000 | – | – |
| $V_E = 5\text{ V}$ | Ω | 170...5000 | 170...5000 | – |
| $V_E = 2.5\text{ V}$ | Ω | 85...5000 | 85...5000 | – |
| Inductive half/full bridge | | | | |
| $V_E = 2.5\text{ V}$ | mH | – | – | 2.5...20 |
| $V_E = 1\text{ V}$ | mH | – | – | 6...19 |
| Bridge excitation voltage V_E (symmetrical to earth) | V | 10 | 5 | 2.5 |
| | V | 5 | 2.5 | 1 |
| | V | 2.5 | – | – |
| Permissible cable length between transducer and amplifier | m | | 500 | |
| Carrier frequency (crystal-stabilised) | Hz | – DC | 600 | 4800 |
| Bridge zero balance coarse approx. fine approx. | mV/V mV/V | ± 2 ± 0.08 | ± 2 ¹⁾ ± 0.09 | ± 80 ± 3.2 |
| Measuring ranges | | | | |
| $V_E = 10\text{ V}$ | mV/V | 0.1...2 | – | – |
| $V_E = 5\text{ V}$ | mV/V | 0.2...4 | 0.2...4 ²⁾ | – |
| $V_E = 2.5\text{ V}$ | mV/V | 0.4...8 | 0.4...8 ³⁾ | 8...160 |
| $V_E = 1\text{ V}$ | mV/V | – | – | 20...400 |
| Calibration signal, in addition to the meas. signal | mV/V | + 0.2 ± 1 % | | + 8 ± 1 % |
| Input impedance | MΩ | >10 / 2 nF | > 1 / 3 nF | > 1 / 2nF |
| Common mode voltage, max. perm. | V _{pp} | ± 10 V | | |
| Common mode rejection 0... 300 Hz > 300 Hz | dB dB | > 100 > 85 | > 100 – | |
| Linearity deviation | % full scale | < 0.05 typ 0.03 | | |
| Output voltage Rise rate, max. | V V/μs | ± 10 0.4 | ± 10 – | |
| Load resistance | kΩ | ≥ 4 | | |
| Internal resistance | Ω | < 2 | | |

¹⁾ AE301S6 and AE301S7: ±1 coarse, ±0.05 fine

²⁾ AE301S6 and AE301S7: 0.1...2

³⁾ AE301S6 and AE301S7: 0.2...4

Specifications

AE101, AE 301, AE501 Industrial amplifiers

| Type | | AE101 | AE301 | AE501 |
|--|--|-------------------------------------|--|--------------------------------|
| Measuring frequency range Bessel 3rd-order low-pass filter. changeover (-1 dB) Bessel 3rd-order low-pass filter (-1 dB) | Hz kHz Hz | 0...10 0...6 - | - - 0...10 ⁴⁾ | - - 0...10 |
| Phase transit time with 0...10 Hz filter with 0...6 kHz filter | ms µs | < 18 < 20 | < 17 ⁵⁾ - | < 17 - |
| Rise time with 0...10 Hz filter | ms | 25 | | |
| Overshoot in the case of voltage surge with 0...10 Hz filter with 0...6 kHz filter | % % | 0 < 10 | < 2 - | |
| Noise voltage measuring range 0.2 mV/V (10 Hz) measuring range 2 mV/V (10 Hz) measuring range 8 mV/V (10 Hz) measuring range 80 mV/V (10 Hz) measuring range 0.2 mV/V (6 kHz) measuring range 2 mV/V (6 kHz) | mV _{rms} mV _{rms} mV _{rms} mV _{rms} mV _{rms} mV _{rms} | < 4 < 4 - - < 30 < 6 | < 4 < 4 - - - - | - - < 4 < 4 - - |
| Long term drift over 48 hours (after 1 h warm-up time) | µV/V | < 0.2 | < 0.1 | < 0.8 |
| Influence of a 10 K-change in ambient temperature on sensitivity on zero point measuring range 0.2 mV/V measuring range 2 mV/V measuring range 8 mV/V (1 mV/V) measuring range 10 mV/V measuring range 80 mV/V (10 mV/V) | % full scale mV mV mV mV mV | < 60 < 10 - - - | < 0.1 typ 0.05 < 10 < 4 - - - | |
| Influence of a +15...26 V change in operating voltage on sensitivity on zero point (350 Ω bridge resistance) | mV mV | < 1 < 1 | | |
| 5V-synchronisation (square wave) | kHz | - | 76.8 | |
| Residual carrier voltage | mV | - | < 5 | |
| Operating voltage (DC) | V _{DC} | +15...26 | | |
| Power consumption | mA | ≤ 125 | | ≤ 100 |
| Nominal temperature range | °C [°F] | -20...+60 [-4...+140] | | |
| Service temperature range | °C [°F] | -20...+60 [-4...+140] | | |
| Storage temperature range | °C [°F] | -25...+70 [-13...+158] | | |
| Degree of protection | | IP20 | | |
| Weight | g | 200 | | |

⁴⁾ AE301S6: 0...2 (-1 dB)

AE301S7: 0...60 (-1 dB)

⁵⁾ AE301S6: <80 (filter frequency 2 Hz)

AE301S7: <2.8 (filter frequency 60 Hz)

TS101 Tare and store unit

| Type | | TS101 |
|------------------------|----|-------|
| Accuracy class | | 0.1 |
| Input voltage | V | ± 10 |
| Input impedance | kΩ | 100 |
| Output voltage | V | ± 10 |

Specifications

TS101 Tare and store unit

| | | |
|--|------------------|--|
| Permissible load resistance | k Ω | ≥ 5 |
| Linearity deviation | % | < 0.04 of full scale |
| Influence of a 10 K-change of the ambient temperature | % | < 0.1 of full scale |
| Influence of a 15...26 V-change of the operating voltage | % | < 0.01 of full scale |
| Long-term drift over 48h (after 1 hour warm-up time) | % | < 0.02 of full scale |
| Noise voltage of the output | mV _{pp} | < 20 |
| Control inputs (floating) | | |
| High signal level | V | 11...30 (24 V nominal) |
| Low signal level | V | 0...5 |
| Control output | | |
| High signal level | V | V _b -2 |
| Low signal level | V | <1 |
| Output current | mA | <500 |
| Tare unit | | |
| Output | ms | Net value (alternatively pos. peak val.) |
| Net-value amplification | | 1, 2, 5, 10-fold, selectable in steps, for taring of major initial loads |
| Tare error (with $v=1$) | mV | <4 |
| Settling time for the output voltage after taring | ms | 40 (to 99.9 %) |
| Low-pass filter (before taring) | Hz | 0.1...12.5; adjustable |
| Transmission bandwidth | kHz | >10 |
| Storage time for tare value | | Unlimited as long as V _b is present (alternatively, storage in EEPROM) |
| Control input | | Taring with rising edge |
| Delay time for taring | ms | <1 |
| Control output | | Taring valid |
| Peak-value store unit | | |
| Output | | Peak value (alternatively, pos./neg. peak, peak/peak 0.5 x peak/peak or instantaneous value or envelope-curve value, tared and amplified (1, 2, 5, 10-fold)) |
| Peak-value store update-rate | ms | <1.3 |
| Accuracy | % | 0.25 (in 6 ms) |
| | % | 0.05 (in 20 ms) |
| Transmission bandwidth | Hz | 15 (-1 dB) |
| Settling time for the output voltage | ms | 40 (to 99.9 %) |
| Discharge rate for envelope curve | mV/s | 5...1000, adjustable |
| Control inputs | | Run/Hold; (clear/inst.value) |
| Delay time for the control signals | ms | <8 |
| Connection | | 12 series terminals for wire \varnothing 0.13...1.5 mm ² ; 10 mm end sleeves for strands |
| Operating voltage V _b | V _{DC} | 15...26, unstabilized |
| Power consumption | mA | <90 |
| Nominal temperature range | °C [°F] | -20 to +60 [-4...+140] |
| Service temperature range | °C [°F] | -20 to +60 [-4...+140] |
| Storage temperature range | °C [°F] | -25 to +70 [-13...+158] |
| Weight | g | ca. 200 |
| Degree of protection to EN60529 | | IP20 |
| Mounting | | On support rails to EN 50022 |

EM201 Output stage module (with one EM002 module)
EM201K2 Output stage module (with two EM002 modules)

| | | |
|--|-----------------|---------------------------------|
| Accuracy class | | 0.1 |
| Input Voltage Impedance | V kΩ | ± 10 (0...+ 10 V) > 11.5 |
| Operating voltage | V _{DC} | +15...26 |
| Power consumption (fully assembled with 2 x EM002) | mA | < 180 |
| Nominal temperature range | °C [°F] | - 20...+ 60 [-4...+140] |
| Service temperature range | °C [°F] | - 20...+ 60 [-4...+140] |
| Storage temperature range | °C [°F] | - 25...+ 75 [-13...+158] |
| Weight | g | 200 |

| | | | |
|---|----------|-------------------------------|-----------------------------|
| EM002 | | | |
| Output signal selectable | mA | ± 20 | 4...20 |
| Output current with V _E =10 V with V _E = 0 V | mA mA | 20 \pm 0.02 < \pm 0.04 | 20 \pm 0.5 4 \pm 0.2 |
| Output current limit | - | - | > 3 (switchable) |
| Permissible load resistance | Ω | < 500 | |
| Linearity deviation | % | < 0.05 full scale | |
| Internal resistance | kΩ | > 100 | |
| Measuring frequency range | kHz | 3 (-1 dB) | |
| Degree of protection | | IP20 | |

GR201 Limit value switch

| | | |
|--|----------------|---|
| Accuracy class | | 0.1 |
| Differential input Voltage Impedance | V kΩ | ± 10 > 50 |
| Reference voltage coarse approx. fine approx. | V V | ± 10 ± 0.5 |
| Switching hysteresis Factory setting: R43, R48 to be changed by R43 and R48 | mV kΩ kΩ | 220 3.01 670 mV / V _{Hyst.} |
| Influence of a 10K-change in ambient temperature on the switching point | % | < 0.05 full scale |
| Switching-point error | % | < 0.05 full scale |
| Relay capacity max. voltage max. current max. power | V A W | 45 (separated extra low voltage) 1 30 (25 VA) |

Specifications

GR201 Limit value switch

| | | | |
|--|---------------|-----------------|--------------------------|
| Switching times (Factory setting) | Response time | ms | < 5 |
| | Decay time | ms | < 25 |
| Operating voltage | | V _{DC} | +15...26 |
| Power consumption | | mA | < 100 |
| Nominal temperature range | | °C [°F] | - 20...+ 60 [-4...+140] |
| Service temperature range | | °C [°F] | - 20...+ 60 [-4...+140] |
| Storage temperature range | | °C [°F] | - 25...+ 70 [-13...+158] |
| Degree of protection | | | IP20 |
| Weight | | g | 200 |

NT 101A, NT 102A*) Power supply

| Type | | NT101A | NT102A |
|--|-------------------|---|------------|
| Input voltage | V | 230 ± 10 % | 115 ± 10 % |
| Permissible frequency range | Hz | 47...63 | |
| Output voltage | V _{DC} | 15.3 | |
| Output current I_n at >25°...+60° | A _{DC} | 0.45 | |
| Output power | W | 9.75 | |
| Efficiency approx. | % | 60 | |
| Current limiter (protected against sustained short circuit) | | 1.2 x I _n (permanently adjusted) | |
| Residual ripple | mV _{pp} | ≤ 10 | |
| Ambient temperature | °C [°F] | - 20...+ 60 [-4...+140] | |
| Excess-temperature protection | °C [°F] | typ.105 [221] (trafo temperature) | |
| Test voltage | kV _{eff} | 3.75 (prim/sec and prim/housing) | |
| Degree of protection | | IP20 | |
| Weight | g | 420 | |

*) Version to DIN –VDE0551, EN60742 Protection class 1

Clip accessories:

Covering angle 3-6450.0001

Clip IG accessories:

Bag with accessories 2-9278.0339 anti-buckling sockets, earth sleeves and end sleeves for strands for connection of one cable. End sleeves for strands (0,5 mm², 10 mm long).

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Hottinger Baldwin Messtechnik GmbH

Postfach 10 01 51, D-64201 Darmstadt
Im Tiefen See 45, D-64293 Darmstadt
Tel.: +49/61 51/ 8 03-0; Fax: +49/61 51/ 8039100
E-mail: support@hbm.com www.hbm.com



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