

## Industrial Amplifier



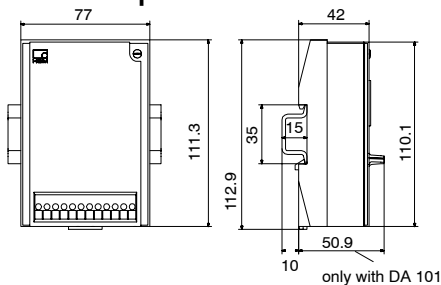
### Special features

- 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 ia] IIC measurement circuit with safety barriers

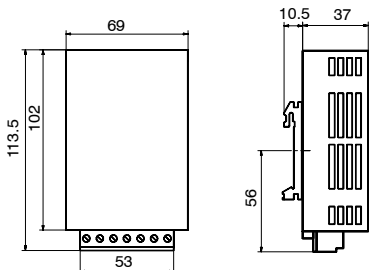
Dimensions (in mm; 1 mm= 0.03937 inches)

### Clip Electronics

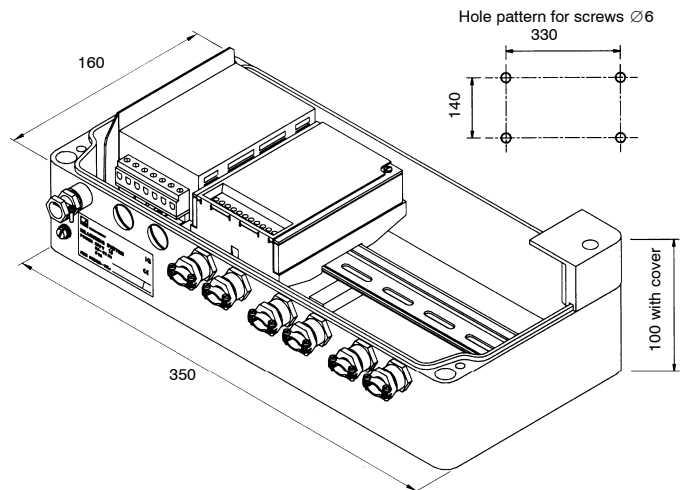
AE101  
AE301  
AE501/AE511  
EM201  
EM201K2  
GR201  
DA101  
TS101



NT101A  
NT102A



### Clip IG Industrial amplifier



## Specifications

### Clip IG Industrial amplifier in aluminium-die-cast enclosure

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

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

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

4) AE301S6 and AE301S7: 0,1

## Specifications

### AE101, AE 301, AE501 Industrial amplifiers

| Type   |                   | AE101                  | AE301                | AE501  |
|--|-------------------|------------------------|----------------------|--------|
| <b>Measuring frequency range</b><br>Bessel 3rd-order low-pass filter.<br>changeover (-1 dB)<br>Bessel 3rd-order low-pass filter (-1 dB)  | Hz                | 0...10                 | -                    | -      |
|  | kHz               | 0...6                  | -                    | -      |
|  | Hz                | -                      | 0...10 <sup>4)</sup> | 0...10 |
| <b>Phase transit time</b><br>with 0...10 Hz filter<br>with 0...6 kHz filter  | ms                | < 18                   | < 17 <sup>5)</sup>   | < 17   |
|  | µs                | < 20                   | -                    | -      |
| <b>Rise time</b> with 0...10 Hz filter   | ms                | 25 <sup>6)</sup>       |                      |        |
| <b>Overshoot in the case of voltage surge</b><br>with 0...10 Hz filter<br>with 0...6 kHz filter  | %                 | 0                      | < 2                  |        |
|  | %                 | < 10                   | -                    |        |
| <b>Noise voltage</b><br>measuring range 0.2 mV/V (10 Hz)<br>measuring range 2 mV/V (10 Hz)<br>measuring range 8 mV/V (10 Hz)<br>measuring range 80 mV/V (10 Hz)<br>measuring range 0.2 mV/V (6 kHz)<br>measuring range 2 mV/V (6 kHz)                | mV <sub>rms</sub> | < 4                    | < 4                  | -      |
|  | mV <sub>rms</sub> | < 4                    | < 4                  | -      |
|  | mV <sub>rms</sub> | -                      | -                    | < 4    |
|  | mV <sub>rms</sub> | -                      | -                    | < 4    |
|  | mV <sub>rms</sub> | < 30                   | -                    | -      |
|  | mV <sub>rms</sub> | < 6                    | -                    | -      |
| <b>Long term drift</b> over 48 hours (after 1 h warm-up time)  | µV/V              | < 0.2                  | < 0.1                | < 0.8  |
| <b>Influence of a 10 K-change in ambient temperature</b><br>on sensitivity<br>on zero point<br>measuring range 0.2 mV/V<br>measuring range 2 mV/V<br>measuring range 8 mV/V (1 mV/V)<br>measuring range 10 mV/V<br>measuring range 80 mV/V (10 mV/V) | % full scale      | < 0.1 typ 0.05         |                      |        |
|  | mV                | < 60                   | < 10                 | -      |
|  | mV                | < 10                   | < 4                  | -      |
|  | mV                | -                      | -                    | < 10   |
|  | mV                | -                      | -                    | < 4    |
|  | mV                | -                      | -                    | -      |
| <b>Influence of a +15...30 V change in operating voltage</b><br>on sensitivity<br>on zero point (350 Ω bridge resistance)  | mV                | < 1                    |                      |        |
|  | mV                | < 1                    |                      |        |
| <b>5V-synchronisation</b> (square wave)  | kHz               | -                      | 76.8                 |        |
| <b>Residual carrier voltage</b>  | mV                | -                      | < 5                  |        |
| <b>Operating voltage</b> (DC)  | V <sub>DC</sub>   | +15...30               |                      |        |
| <b>Power consumption</b>   | mA                | ≤ 125                  |                      | ≤ 100  |
| <b>Nominal temperature range</b>   | °C [°F]           | -20...+60 [-4...+140]  |                      |        |
| <b>Service temperature range</b>   | °C [°F]           | -20...+60 [-4...+140]  |                      |        |
| <b>Storage temperature range</b>   | °C [°F]           | -25...+70 [-13...+158] |                      |        |
| <b>Degree of protection</b>  |                   | IP10                   |                      |        |
| <b>Weight</b>  | g                 | 200                    |                      |        |

<sup>4)</sup> AE301S6: 0...2 (-1 dB)

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

<sup>5)</sup> AE301S6: <80 (filter frequency 2 Hz)

AE301S7: <2.8 (filter frequency 60 Hz)

<sup>6)</sup> Rise time with AE301S7 6 ms

Rise time with AE301S6 200 ms

### TS101 Tare and store unit

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

## Specifications

### TS101 Tare and store unit

|   |                  |  |
|---|------------------|--|
| <b>Permissible load resistance</b>                              | k $\Omega$       | $\geq 5$   |
| <b>Linearity deviation</b>                                      | %                | < 0.04 of full scale   |
| <b>Influence of a 10 K-change of the ambient temperature</b>    | %                | < 0.1 of full scale  |
| <b>Influence of a 15...30 V-change of the operating voltage</b> | %                | < 0.01 of full scale   |
| <b>Long-term drift over 48h (after 1 hour warm-up time)</b>     | %                | < 0.02 of full scale   |
| <b>Noise voltage of the output</b>                              | mV <sub>pp</sub> | < 20   |
| <b>Control inputs</b> (floating)                                |                  |  |
| High signal level   | V                | 11...30 (24 V nominal)   |
| Low signal level  | V                | 0...5  |
| <b>Control output</b>   |                  |  |
| High signal level   | V                | $V_b - 2$  |
| Low signal level  | V                | < 1  |
| <b>Output current</b>   | mA               | < 500  |
| <b>Tare unit</b>  |                  |  |
| <b>Output</b>   | ms               | Net value (alternatively pos. peak val.)   |
| <b>Net-value amplification</b>                                  |                  | 1, 2, 5, 10-fold, selectable in steps, for taring of major initial loads   |
| <b>Tare error</b> (with $v=1$ )                                 | mV               | < 4  |
| <b>Settling time for the output voltage</b> after taring        | ms               | 40 (to 99.9 %)   |
| <b>Low-pass filter</b> (before taring)                          | Hz               | 0.1...12.5; adjustable   |
| <b>Transmission bandwidth</b>                                   | kHz              | > 10   |
| <b>Storage time for tare value</b>                              |                  | Unlimited as long as $V_b$ is present (alternatively, storage in EEPROM)   |
| <b>Control input</b>  |                  | Taring with rising edge  |
| <b>Delay time for taring</b>                                    | ms               | < 1  |
| <b>Control output</b>   |                  | Taring valid   |
| <b>Peak-value store unit</b>                                    |                  |  |
| <b>Output</b>   |                  | 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)) |
| <b>Peak-value store update-rate</b>                             | ms               | < 1.3  |
| <b>Accuracy</b>   | %                | 0.25 (in 6 ms)   |
|   | %                | 0.05 (in 20 ms)  |
| <b>Transmission bandwidth</b>                                   | Hz               | 15 (-1 dB)   |
| <b>Settling time for the output voltage</b>                     | ms               | 40 (to 99.9 %)   |
| <b>Discharge rate for envelope curve</b>                        | mV/s             | 5...1000, adjustable   |
| <b>Control inputs</b>   |                  | Run/Hold;<br>(clear/inst.value)  |
| <b>Delay time for the control signals</b>                       | ms               | < 8  |
| <b>Connection</b>   |                  | 12 series terminals for wire $\varnothing$ 0.13...1.5 mm <sup>2</sup> ; 10 mm end sleeves for strands  |
| <b>Operating voltage <math>V_b</math></b>                       | V <sub>DC</sub>  | 15...30, unstabilized  |
| <b>Power consumption</b>  | mA               | < 90   |
| <b>Nominal temperature range</b>                                | °C [°F]          | -20 to +60 [-4...+140]   |
| <b>Service temperature range</b>                                | °C [°F]          | -20 to +60 [-4...+140]   |
| <b>Storage temperature range</b>                                | °C [°F]          | -25 to +70 [-13...+158]  |
| <b>Weight</b>   | g                | ca. 200  |
| <b>Degree of protection to EN 60529</b>                         |                  | IP10   |
| <b>Mounting</b>   |                  | On support rails to EN 50022   |

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

|  |                 |                                 |
|--|-----------------|---------------------------------|
| <b>Accuracy class</b>  |                 | 0.1                             |
| <b>Input</b><br>Voltage<br>Impedance                         | V<br>kΩ         | $\pm 10$ (0...+ 10 V)<br>> 11.5 |
| <b>Operating voltage</b>                                     | V <sub>DC</sub> | +15...30                        |
| <b>Power consumption</b><br>(fully assembled with 2 x EM002) | mA              | < 180                           |
| <b>Nominal temperature range</b>                             | °C [°F]         | - 20...+ 60 [-4...+140]         |
| <b>Service temperature range</b>                             | °C [°F]         | - 20...+ 60 [-4...+140]         |
| <b>Storage temperature range</b>                             | °C [°F]         | - 25...+ 75 [-13...+158]        |
| <b>Weight</b>  | g               | 200                             |

|  |          |                               |                             |
|--|----------|-------------------------------|-----------------------------|
| <b>EM002</b>   |          |                               |                             |
| <b>Output signal selectable</b>  | mA       | $\pm 20$                      | 4...20                      |
| <b>Output current</b><br>with V <sub>E</sub> = 10 V<br>with V <sub>E</sub> = 0 V | mA<br>mA | 20 $\pm$ 0.02<br>< $\pm$ 0.04 | 20 $\pm$ 0.5<br>4 $\pm$ 0.2 |
| <b>Output current limit</b>  | -        | -                             | > 3 (switchable)            |
| <b>Permissible load resistance</b>   | Ω        | < 500                         |                             |
| <b>Linearity deviation</b>   | %        | < 0.05 full scale             |                             |
| <b>Internal resistance</b>   | kΩ       | > 100                         |                             |
| <b>Measuring frequency range</b>   | kHz      | 3 (-1 dB)                     |                             |
| <b>Degree of protection</b>  |          | IP10                          |                             |

**GR201 Limit value switch**

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

## Specifications

### GR201 Limit value switch

|  |               |                 |                          |
|--|---------------|-----------------|--------------------------|
| <b>Switching times</b> (Factory setting) | Response time | ms              | < 5                      |
|  | Decay time    | ms              | < 25                     |
| <b>Operating voltage</b>                 |               | V <sub>DC</sub> | +15...26                 |
| <b>Power consumption</b>                 |               | mA              | < 100                    |
| <b>Nominal temperature range</b>         |               | °C [°F]         | - 20...+ 60 [-4...+140]  |
| <b>Service temperature range</b>         |               | °C [°F]         | - 20...+ 60 [-4...+140]  |
| <b>Storage temperature range</b>         |               | °C [°F]         | - 25...+ 70 [-13...+158] |
| <b>Degree of protection</b>              |               |                 | IP10                     |
| <b>Weight</b>                            |               | g               | 200                      |

### NT 101A, NT 102A\*) Power supply

| Type   |                   | NT101A                                      | NT102A     |
|--|-------------------|---|------------|
| <b>Input voltage</b>   | V                 | 230 ± 10 %                                  | 115 ± 10 % |
| <b>Permissible frequency range</b>                                 | Hz                | 47...63                                     |            |
| <b>Output voltage</b>  | V <sub>DC</sub>   | 15.3  |            |
| <b>Output current I<sub>n</sub> at &gt;25°...+60°</b>              | A <sub>DC</sub>   | 0.45  |            |
| <b>Output power</b>  | W                 | 9.75  |            |
| <b>Efficiency approx.</b>  | %                 | 60  |            |
| <b>Current limiter</b> (protected against sustained short circuit) |                   | 1.2 x I <sub>n</sub> (permanently adjusted) |            |
| <b>Residual ripple</b>   | mV <sub>pp</sub>  | ≤ 10  |            |
| <b>Ambient temperature</b>   | °C [°F]           | - 20...+ 60 [-4...+140]                     |            |
| <b>Excess-temperature protection</b>                               | °C [°F]           | typ.105 [221] (trafo temperature)           |            |
| <b>Test voltage</b>  | kV <sub>eff</sub> | 3.75 (prim/sec and prim/housing)            |            |
| <b>Degree of protection</b>  |                   | IP10  |            |
| <b>Weight</b>  | g                 | 420   |            |

\*) Version to DIN -VDE0551, EN60742 Protection class 1  
The maximum permissible continuous current is 450 mA.

#### 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 mm<sup>2</sup>, 10 mm long).

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#### Hottinger Baldwin Messtechnik GmbH

Im Tiefen See 45 · 64293 Darmstadt · Germany  
Tel. +49 6151 803-0 · Fax: +49 6151 803-9100  
Email: info@hbm.com · www.hbm.com



measure and predict with confidence