

## Industrial Amplifier



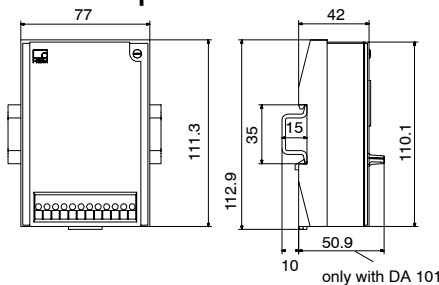
### Special features

- 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

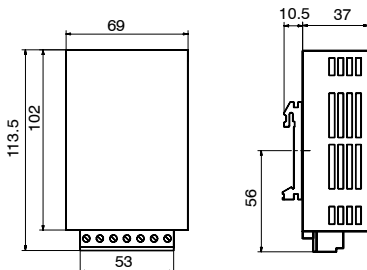
Dimensions (in mm; 1 mm= 0.03937 inches)

### Clip Electronics

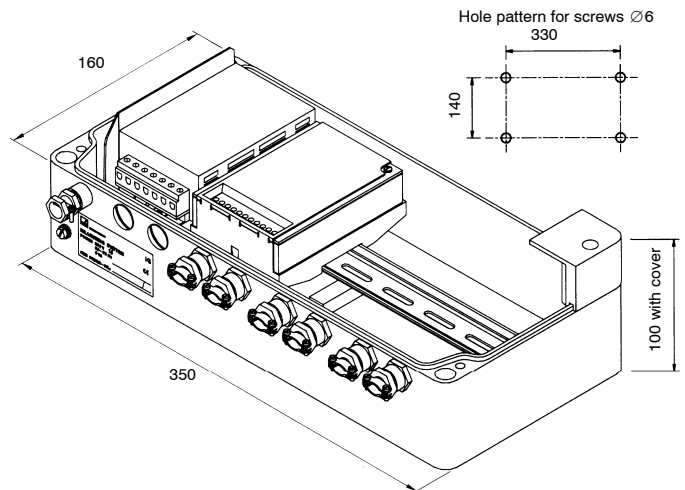
AE101  
AE301  
AE501/AE511  
EM201  
EM201K2  
GR201  
DA101  
TS101



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> with 101A Power supply unit (Type WG 010) with NT 102A Power supply unit (Type WG 011)	V V	230 ± 10 % 115 ± 10 %
<b>Mechanical stress</b> (test similar to DIN IEC 68) 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 V V	10 5 2.5	5 2.5 -	2.5 1 -
<b>Permissible cable length</b> between transducer and amplifier	m	500		
<b>Carrier frequency</b> (crystal-stabilised)	Hz	- DC	600	4800
<b>Bridge zero balance</b> coarse approx. fine approx.	mV/V mV/V	± 2 ± 0.08	± 2 <sup>1)</sup> ± 0.09	± 80 ± 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> 0... 300 Hz > 300 Hz	dB dB	> 100 > 85	> 100 -	
<b>Linearity deviation</b>	% full scale	< 0.05 typ 0.03		
<b>Output voltage</b> Rise rate, max.	V V/μs	± 10 0.4	± 10 -	
<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> 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 <sup>4)</sup>	- - 0...10
<b>Phase transit time</b> with 0...10 Hz filter with 0...6 kHz filter	ms µs	< 18 < 20	< 17 <sup>5)</sup> -	< 17 -
<b>Rise time</b> with 0...10 Hz filter	ms	25 <sup>6)</sup>		
<b>Overshoot in the case of voltage surge</b> with 0...10 Hz filter with 0...6 kHz filter	% %	0 < 10	< 2 -	
<b>Noise voltage</b> 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 <sub>rms</sub> mV <sub>rms</sub> mV <sub>rms</sub> mV <sub>rms</sub> mV <sub>rms</sub> mV <sub>rms</sub>	< 4 < 4 - - < 30 < 6	< 4 < 4 - - - -	- - < 4 < 4 - -
<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> 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 - - -	
<b>Influence of a +15...30 V change in operating voltage</b> on sensitivity on zero point (350 Ω bridge resistance)	mV mV		< 1 < 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; (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> Voltage Impedance	V kΩ	$\pm 10$ (0...+ 10 V) > 11.5
<b>Operating voltage</b>	V <sub>DC</sub>	+15...30
<b>Power consumption</b> (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> with V <sub>E</sub> = 10 V with V <sub>E</sub> = 0 V	mA mA	20 $\pm$ 0.02 < $\pm$ 0.04	20 $\pm$ 0.5 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> Voltage Impedance	V kΩ	$\pm 10$ > 50
<b>Reference voltage</b> coarse approx. fine approx.	V V	$\pm 10$ $\pm 0.5$
<b>Switching hysteresis</b> Factory setting: R43, R48 to be changed by R43 and R48	mV kΩ kΩ	220 3.01 670 mV / V <sub>Hyst.</sub>
<b>Influence of a 10K-change in ambient temperature</b> on the switching point	%	< 0.05 full scale
<b>Switching-point error</b>	%	< 0.05 full scale
<b>Relay capacity</b> max. voltage max. current max. power	V A W	45 (separated extra low voltage) 1 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).

