Strain Gauge Measuring Amplifier BA 662

Original of the

Manual

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1. Safety precautions

In this operating manual, the installation, putting into operation and the operation itself of the Strain Gauge Bridge Amplifier BA 662 is described. It is assumed that all measures are taken by qualified staff only who have adequate knowledge in the fields of measuring and control engineering.

ATTENTION! Any non-compliance with these safety precautions may result in severe damage to property and health.

1.1. Field of application

The Strain Gauge Bridge Amplifier BA 662 has been designed to the purpose of amplifying the output signals of sensors with metal-foil strain gauges, preferably force transducers and transform them into standard signals. Any other application is regarded contrary to the intended purpose. The manufacturer does not accept any liability for damages resulting from such inappropriate usage. In this case it is the user alone who has to bear the risk.
Type BA 662 must not be used as the sole means to prevent dangerous conditions of machines and plants. All machines and plants must be constructed in such a way (e.g. by using mechanical stops, limit switches) that a condition of failure does not result in a situation of severe danger.
It must be made sure that any erroneous setting or malfunction of the unit or its breakdown cannot cause damage or be a risk to the operating staff or other persons.

1.2. Installation

The unit must be installed and connected in compliance with the current DIN- and VDE-standards. Supply cables and signal lines shall be installed so that interference signals such as electrical interference do not have any adverse effects on the function of the equipment.

1.3. Maintenance

The device does not contain any components that require maintenance. Repairs shall be carried out by the manufacturer only.

2. Function

The Strain Gauge Bridge Amplifier BA 662 is a digital amplifier for the low-drift amplification of the output signals of sensors with metal-foil strain gauges, preferably force transducers to supply a standard signal of (-10/0...10) VDC or (0/4...20) mA.
An internal voltage source provides the stabilized feeding voltage for the sensor. The power is supplied by an unstabilized source of (9...36) VDC. The Strain Gauge Bridge Amplifier is delivered in a case for standard rails in accordance with DIN EN 50022-35.
The BA 662 is delivered with a factory setting for an input signal of 2mV/V and a corresponding output signal of ± 10V or 20mA. The other input signal ranges 0.1mV/V to 7mV/V can be generated internally from the 2mV/V factory adjustments. The different settings of the factory adjustments (zero point and gain) can be changed by the user through keys.
By an optically separated input, the zero-setting can be carried out by means of a superior control and through the trigger input. The overload limit is not affected by such a zeroing, which means that 100 % of the end-value adjustment of the sensor remains as end value. An existing preload by a container can thus be set zero.

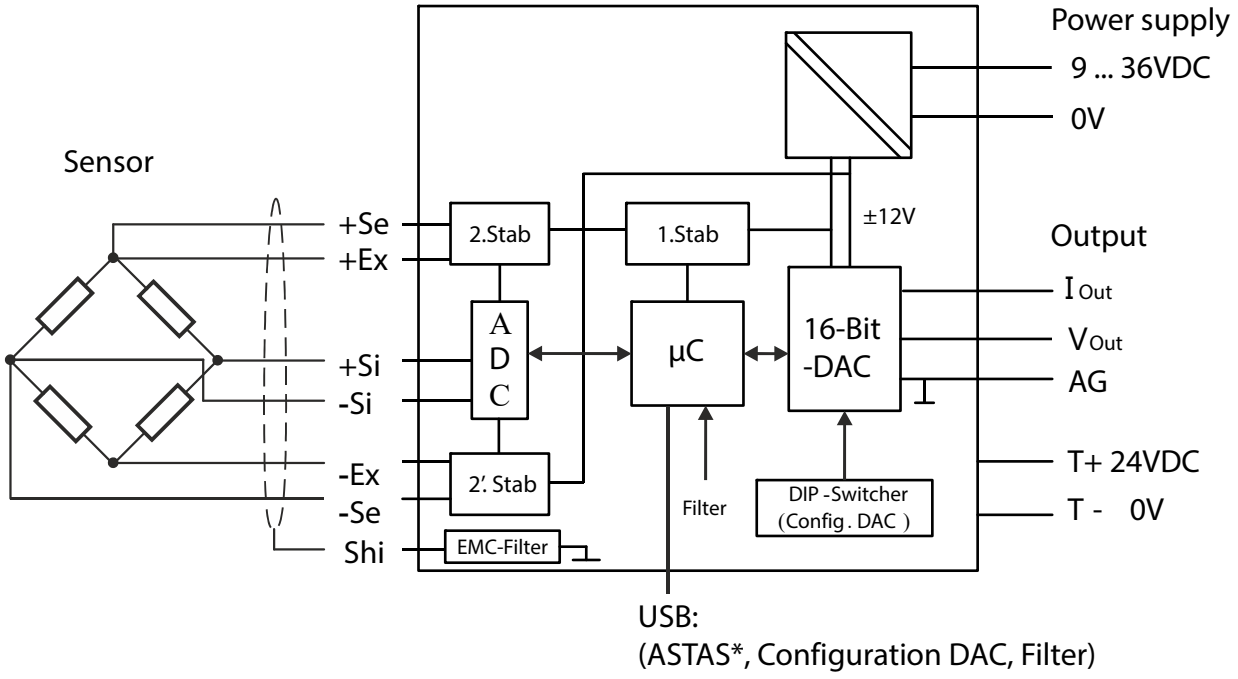
3. Specifications

3.1. General technical data

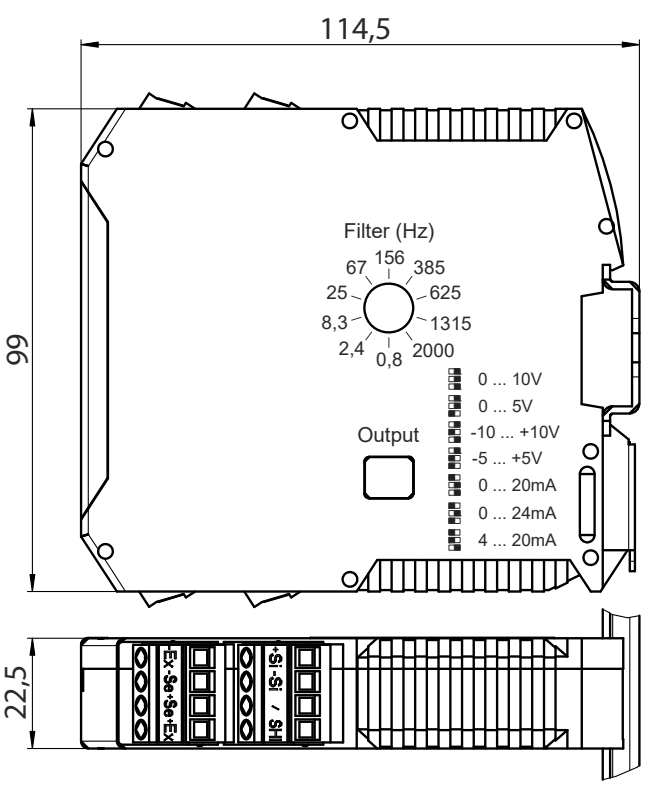
Class of accuracy at input signal 2mV/V	**% FSR**	**< 0.02 (typ.)**	
Connection for strain gauge sensor		4- or 6-wire	
Bridge resistance / range of input impedance	Ω	58...2000 (up to 6 loadcells each 350 Ω)	
Input signal range (+Si/-Si)	mV/V	0.1 / 0.25 / 0.5 / 1.0 / 1.5 / 2.0 / 3.0 / 4.0 / 5.0 / 7.0	
Excitation voltage (+Ex/-Ex)	VDC	±2.5	
Norm Output			
Current Output	mA	0/ 4... +20; 0…24	
Voltage Output	V		-10/-5...0…+5/ +10
Load resistance (burden)	Ω	≤ 350	≥ 1000
Measurement Characteristics			
Conversion rate	Sps	6 …. 3200	
Resolution of the A/D Converter	Bit	24	
Filter	Hz	0.8…2000	
Error at S=2mV/V			
Nonlinearity	%FSR	0.0025	
Noise (at measurement rate)	%FSR	0.002 (0.8Hz) … 0.009 (2000Hz)	
Input sensitivity for 1 LSB	nV	150	
Zero drift	%/ 10K	<0.01	
Power Supply			
Input range	VDC	9 ... 36	
Power consumption (without sensor)	W	3	
Environmental Conditions			
Operating temperature range	°C	- 20...+ 60	
Storage temperature range	°C	- 25...+ 85	
Construction		Plastic housing for DIN-rail mounting	
Weight	kg	0.2	
Dimensions (W x H x D)	mm	22.5 x 114.5 x 99	
Environmental protection (EN 50529)		IP 20	
Terminal block, wire size	mm²	0.14 … 2.5	

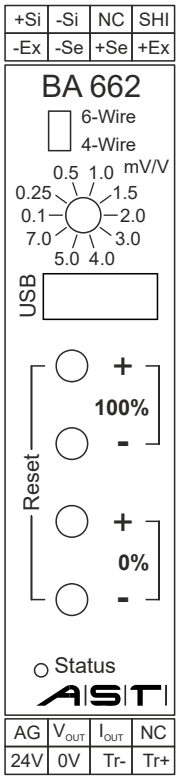
*Software ASTAS - Download over www.ast.de

3.2. Circuit diagram



3.3. Dimensions





3.4. Connections

Terminal connection	Description	
-Ex	neg. Exitation voltage	Sensor with 6-wire
-Se	neg. Sense signal	
+Se	pos. Sense signal	
+Ex	pos. Exitation voltage	
+Si	pos. Signal	
-Si	neg. Signal	
NC	not connected	
SHI	Shield	
AG	Ground for output signal	Outuput signal
V_{out}	Voltage output	
I_{out}	Current output	
NC	not connected	
24V	Supply voltage	Power supply
0V	Supply voltage ground	
Tr+	Trigger 24V	electrically isolated input
Tr-	Trigger 0V	

Installation recommendations

- Use shielded cables.
- Use the largest possible cable cross section (Error due to cable extension).
- Lay the measuring lines separately from the power supply lines.
- At the force transducers and the measuring amplifier, make as short as possible a connection to earth, in particular in strong electromagnetic fields.
- Additionally, lay an equipotential bonding parallel to the measuring line.
- Keep away from stray fields of motors, transformers and contactors.
- Connect force transducers, amplifier, mains unit, and indicator / processor unit with earth in one place only.
- Set the slide switch for the sensing line (6- or 4-wire) according to the sensor connection.

3.5. How to connect signal output

The Bridge Amplifier BA 662 provides different output signals, depending upon the setting of the slide switches. (see 4.6)

NOTE Either the current output or the voltage output can be used, not both at the same time.

TIP: o form the sum, current outputs of several BA662 can be connected in parallel. In this case, 12V should not be exceeded at the standard output and the maximum load (load resistance) be <12V / ΣI_{Out} .Voltage outputs must not be connected in parallel.

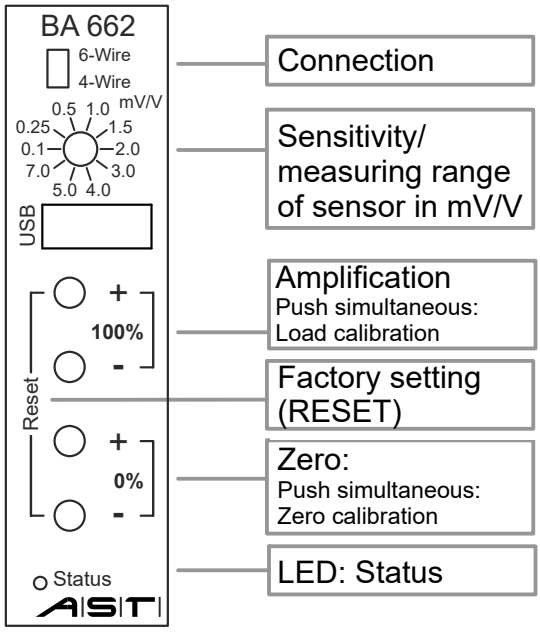
3.6. Trigger input

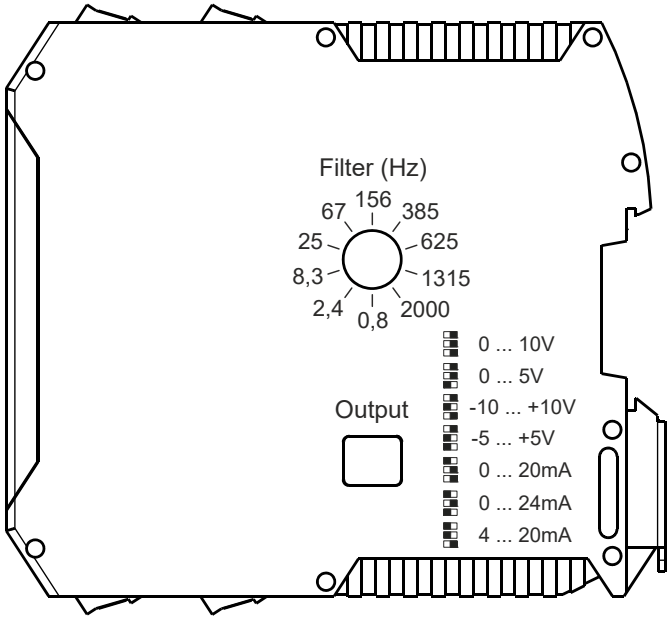
The BA662 has an optically separate trigger input so that the zero-setting can be carried out by means of a superior control. The overload limit is not affected by such a zeroing.
The function is started by a 24 VDC trigger impulse.

Note! The measuring amplifier is protected against reverse polarity.

4. Operation

4.1. Overview operating elements BA662/IP20





4.2. How to operate the keys

Keys individually / short: Setting of the signal output
Keys individually / long (2s): Fast setting of the signal output

4.3. Amplification

Switch position	0	1	2	3	4	5	6	7	8	9
Measuring range (mV/V)	0,1	0,25	0,5	1,0	1,5	2,0	3,0	4,0	5,0	7,0

>100% +< and >100% -< simultaneously (2s):
Adjustment of the present input signal (currently applied force) to100% of the output signal (end-value adjustment).

By individually pushing the keys >100% +< or >100% -< respectively, an individual fine adjustment of the output signal / the end value is possible.

NOTE In case of changing the amplifier output by means of keys > 100 % +< or > 100% -< there should always be a zero-alignment check.

NOTE Amplification-values are saved permanently 7 seconds after last push button action. During saving LED blinks for a short time.

4.4. Zero alingment

>0% + < and >0% - < simultaneously (2s):
Setting of the present input signal at the output to zero point (zero-adjustment/ zero-alignment)

By individually pressing the keys >0% +< or >0% -< respectively, an individual fine adjustment of the output signal / the zero point is possible.

NOTE! Zero-values are saved permanently 7 seconds after last push button action. During saving LED blinks red for a short time.

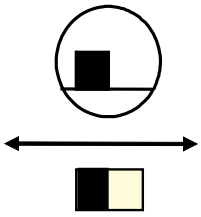
4.5. Filter

Through a low-pass filter, the output signal can be set in 10 stages, from 0.8 to 2000Hz.

Filter (Hz)	0,8	2,4	8,3	25	67	156	385	625	1315	2000
Internal Sample rate (Hz)	6	12	25	50	100	200	400	800	1600	3200

4.6. Signal output

DIP-switch explanation:



DIP-switch function:

0 … 10V

0 … 5V

-10 … +10V

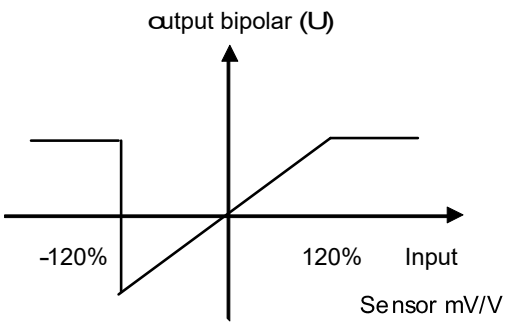
-5 … +5V

0 … 20mA

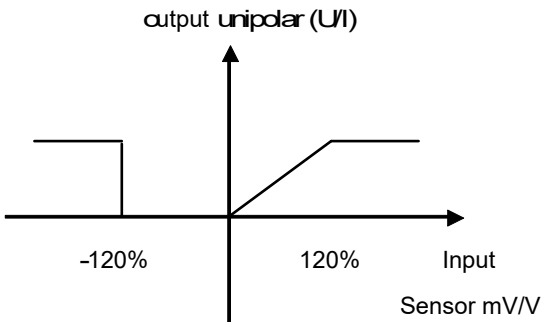
0 … 24mA

4 … 20mA

ATTENTION! In case of exceedance of the input signal of >-120%, the analogue output is set to the maximum positive initial value.
In case the input signal lies in the range between -120% and 0%, the minimum analogue signal is released at the unipolar voltage output and the current output respectively (see graphs).



Graph 1
Output signal in case of error (bipolar)
Output signal -5…5V, -10…10V



Graph 2
Output signal in case of error (unipolar)
Output signal 0…5/10V, 0/4…20/24mA

4.7. LED Status

LED display	Explanation	Error description
Green	Ready for operation	• No error
Red 1 x flashing	ADC-Overload	• Error at connections of sensor lines • Cable break in sensor line • Switch for 6- and 4-wire not accordingly connected
Red 2x flashing	Indicates overload or underload	• Exceed of maximum load of 120% of nominal sensitivity, or exceed minimum load (*see too 4.6*)
Red 3x flashing	TEDS error	• Error in the memory of the automatic sensor recognition • (only option with TEDS)
Red 4 x flashing	Output > 100%	• The amplification at the output is set too high.
Red 5 x flashing	Current output open or overheating DAC	• Output side not closed • Cable break at output • Thermal overheating - cooling necessary
Red 6 x flashing	Hardware error	• General error – restart necessary

4.8. Restart

100% - and >0% +< simultaneously: A restart is carried out. All settings are saved.

4.9. Factory setting (RESET)

For all ten sensitivity settings / measuring ranges (see 4.1 – sensitivity in mV/V of the sensor) factory settings are stored in the amplifier.

Individual adjustments of the amplification (see 4.3.) or of the zero point (see 4.4) carried out later by the user, do only influence the active measuring range that has just been set.

When simultaneously pushing the two keys >100% +< and >0% -< for 2s, all zero-point adjustments and end-value adjustments of all ten measuring ranges are deleted and reset to the factory settings of 0mV/V ≙ initial value of the selected signal output (-5/-10/0V or 0/4mA) and 2mV/V ≙ end value of the selected signal output (5/10V or 20/24mA).

NOTE! After reset to factory settings, the amplifier has to be newly adjusted to the sensor!

5. Using the Software ASTAS (USB)

Load the software ASTAS from our website www.ast.de

TIP: Linearization: If the measured values between zero and rated load should deviate from the real load, up to four additional points can be set to increase the measurement accuracy. These measuring points can be made in any order, similar to the input of the zero point and end point. After entering all of the calibration points, the result must be stored.

6. EC Declaration of Conformity

A.S.T. - Angewandte System Technik GmbH
Mess- und Regeltechnik

AST Gruppe
Angewandte System Technik

EG-Konformitätserklärung
EC Declaration of Conformity

No. 29/16

Hersteller: Manufacturer:	A.S.T. - Angewandte System Technik GmbH Mess- und Regeltechnik
Anschrift: Adress:	Marschnerstraße 26, 01307 Dresden Bundesrepublik Deutschland
Produkt- bezeichnung: Product description:	DMS - Messverstärker BA 661, BA 662 Strain gauge measuring amplifier BA 661, BA 662

Das bezeichnete Produkt stimmt in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinien überein:
The product described above in the form as delivered is in conformity with the provisions of the following European Directives:

2014/30/EU Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten über die elektromagnetische Verträglichkeit.
Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility.

Die Konformität mit der Richtlinie 2014/30/EU wird nachgewiesen durch die Einhaltung folgender harmonisierter Normen:
Conformity to the Directive 2014/30/EU is assured through the application of the following harmonised standards:

Störfestigkeit: Interference resistance:	DIN EN 61000-6-2:2006-03
Störaussendung: Emitted interference:	DIN EN 61000-6-3:2011-09

Dresden, den 14.10.2016

i. A. Heinrich

gez. Dr.-Ing. Gerd Heinrich
Qualitätssicherung / Quality assurance

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