

Switching amplifier BS 805

Original
Manual

Strain gauge switching amplifier BS 805.01 / BS 805.11 / BS 805.21



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1. Safety Instructions



ATTENTION!

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



ATTENTION!

These Operating Instructions explain the installation, bringing into service, and operation of the type BS 805.0x amplifier. It is assumed that every action is taken by qualified staff only who have adequate knowledge in the fields of measuring and control engineering.

The equipment must be installed and attached under adherence to of the current DIN and VDE standards.



ATTENTION!

The type **BS 805.01** Strain-Gauge amplifier has been designed to the purpose of amplifying the output signals of sensors with **metal-foil strain gauges**, preferably force transducers.

The type **BS 805.02** has been designed to the purpose of amplifying the output signals of sensors with **standard signal 4-20mA**, preferably force transducers.

Any other application is regarded contrary to intended usage.

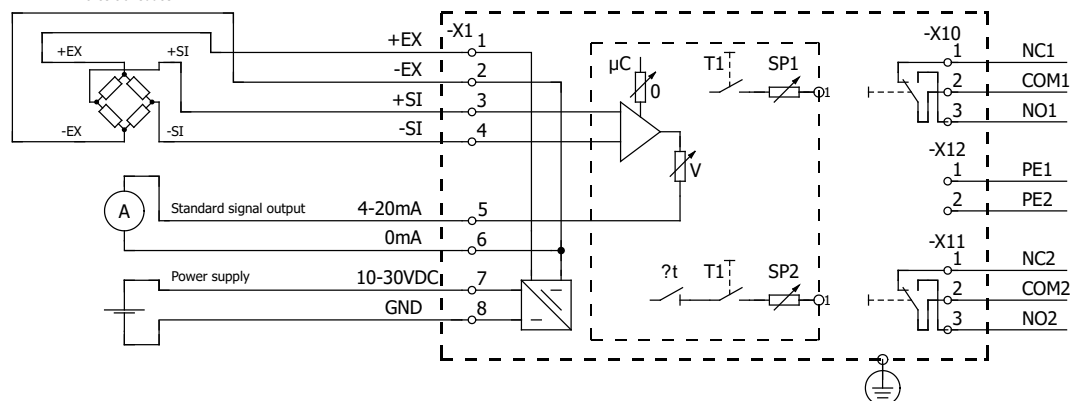
The **BS 805.0x** may not be used as exclusive means for the prevention of dangerous conditions at machines and plants.

Make sure that any erroneous setting or malfunction of the unit or its break-down cannot cause damage or be a risk to the staff or other persons.

2. Wiring Diagram

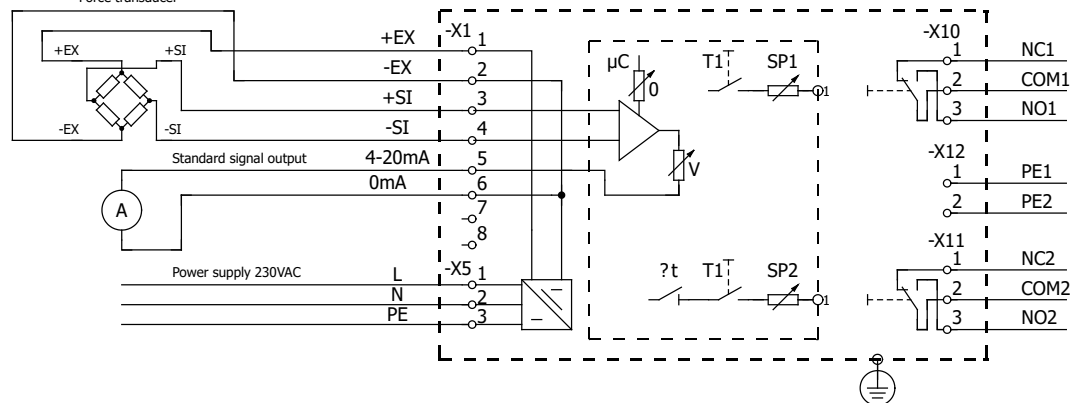
BS 805.01 / BS 805.21

Force transducer



BS 805.11

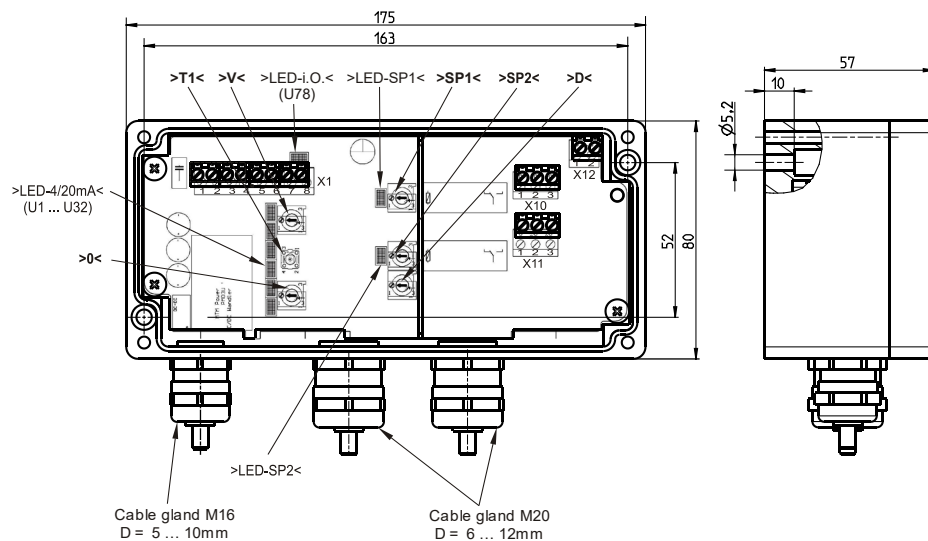
Force transducer



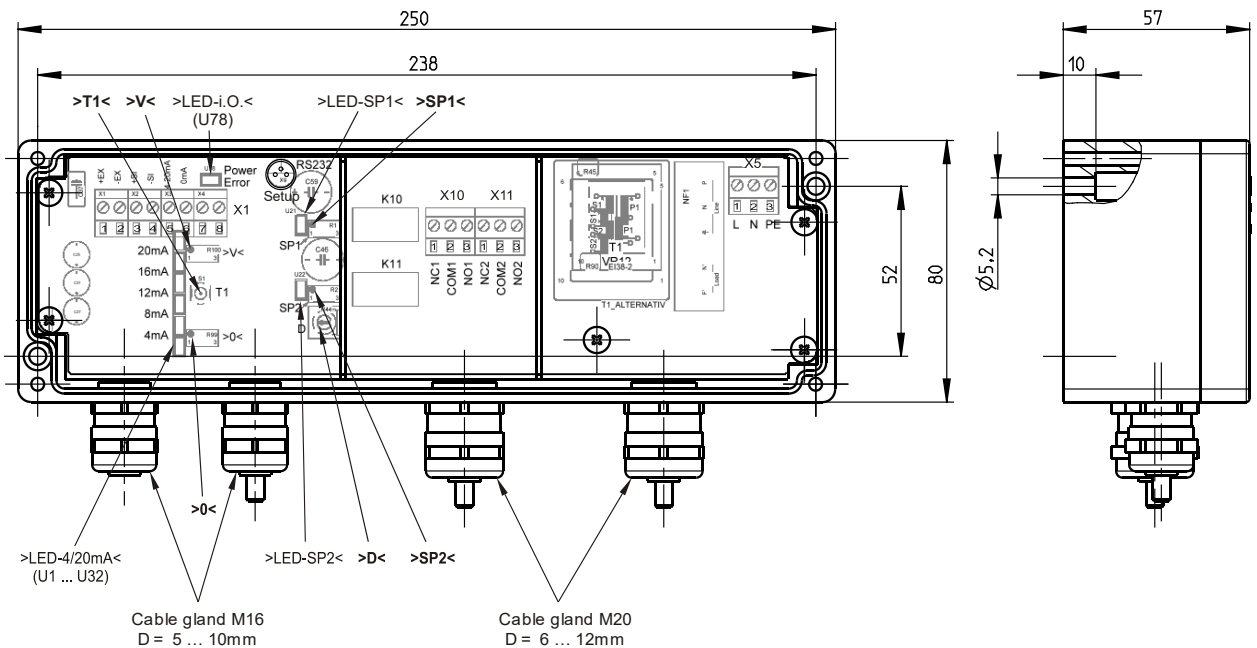
3. Operating elements

BS 805.01

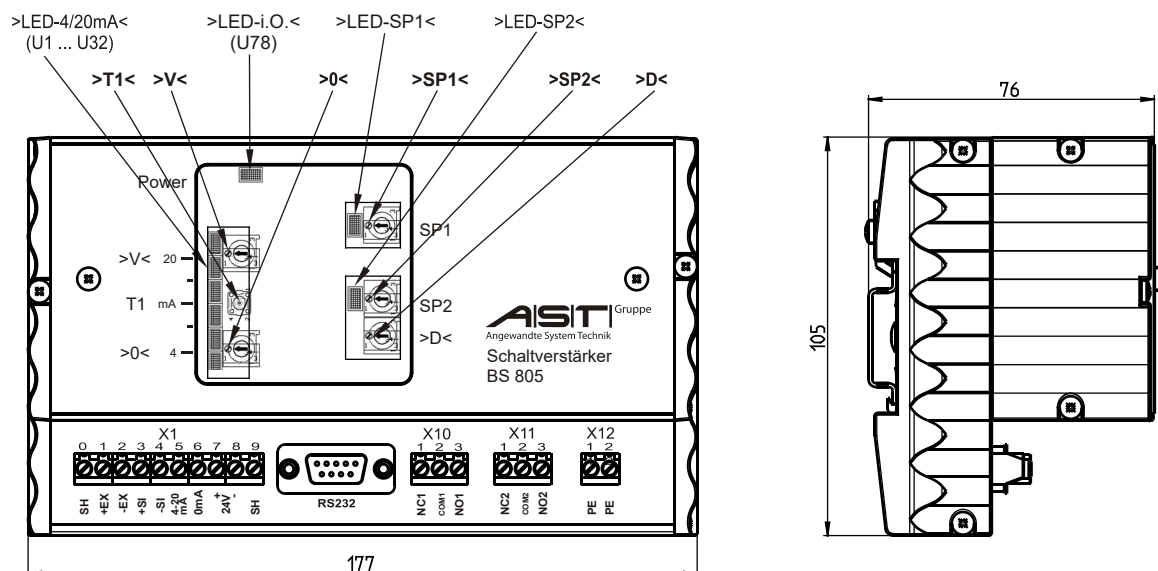
Strain gauge switching amplifier
Supply voltage 10...30VDC / case IP65 – die cast



BS 805.11 Strain gauge switching amplifier Supply voltage 230VAC / case IP65 – die cast



BS 805.21 Strain gauge switching amplifier Supply voltage 10...30VDC / case IP40 – DIN rail



3.1. Adjustments

Switch	Function	Strain gauge switching amplifier BS 805.01 BS 805.11 BS 805.21
>V<	16 mA - characteristic value setting	0,8 ... 2,5mV/V
>0<	4mA - setting to zero point	-0,5 ... +0,5mV/V
SP1	Switching point setting/ switching range	4....20mA
SP2	Switching point setting/ switching range	4....20mA
D	Switching delay for SP2	0 ... 5sec.

3.2. Button

Switch	Function
T1	Additionally function see Point 5

4. LED- display

LED	Normal operations	Error (flashing display)
U1	<4mA	incorrect code enter
U2	4mA < I < 8mA	
U4	8mA < I < 12mA	-
U8	12mA < I < 16mA	-
U16	16mA < I < 20mA	-
U32	20mA < I	-
U78	Ready for operation	break or short in sensor wire
		blinks once Current level exceeded through +EX for BS805.y1 bridge resistance < 300Ω for BS805.y1 sensor current > 40mA
		blinks twice Current level not attained through +EX Only for BS805.y1 bridge resistance > 1000Ω
		blinks 3 times Input signal exceeded for BS805.y1 bridge signal = > +2.5mV
		blinks 4 times Input signal not attained for BS805.y1 bridge signal < -2.5mV/V
		blinks 5 times Bridge median voltage exceeded only for BS805.y1 (-SI zu -EX >2.2V)
		blinks 6 times Bridge median voltage not attained only for BS805.y1(-SI zu -EX <1.2V)
U21	SP1 current on	-
U22	SP2 current on	-

5. Function of key T1

5.1. Code table

Element	Function	Code	Basic setting	SP1: normal / without hysteresis SP2: normal / without hysteresis Strain gauge input positive Zero point -/+ 0,5 mV/V	555			
Relay 1	Normal → from appointed SP1 current less	211*	(only BS 805.01 →)	on	421			
	Inverse → from appointed SP1 current on	212						
	Hysteresis 0,0mA	230*						
	Hysteresis 0,1mA	231						
	Hysteresis 0,5mA	232	Setup-protection	off	425*			
	Hysteresis 1,0mA	233						
	Hysteresis 2,0mA	234						
Relay 2	Normal → from appointed SP2 current less	221*	Strain gauge input	tension and compression: 12mA=0mV/V Negative Positive	411			
	Inverse → from appointed SP2 current on	222				412 415*		
	Hysteresis 0,0mA	240*	Test signal	on off	422 423			
	Hysteresis 0,1mA	241						
	Hysteresis 0,5mA	242	>V< limit stop left	Δ16mA = Δ2,0mV/V Δ16mA = Δ1,5mV/V Δ16mA = Δ1,0mV/V Δ16mA = Δ2,5mV/V	431 432 433 435*			
	Hysteresis 1,0mA	243						
	Hysteresis 2,0mA	244						
Switching attitude SP1, SP2: → normal, adjustment SP1: to 2mA over SP2, fault: SP1 and SP2 current less and output signal 2mA	251							
Mandatory security SP1			>V< limit stop right	Δ16mA = Δ0,5mV/V Δ16mA = Δ1,0mV/V Δ16mA = Δ1,5mV/V Δ16mA = Δ0,83mV/V	441 442 443 445*			
Relay 1 and Relay 2	Reset at normal	255	>0< adjusting range	- 1,00 ... 0,00mV/V - 0,75 ... +0,25mV/V - 0,25 ... +0,75mV/V 0,00 ... +1,00mV/V - 0,50 ... +0,50mV/V	451 452 453 454 455*			
Constant current (mA)	4,0	311						
	12,0	312						
	20,0	313						
	+ 0,2	344						
	+ 0,5	343						
	+ 1,0	331						
	+ 2,0	332						
	+ 3,0	333						
	+ 4,0	334						
	+ 5,0	335						
	- 0,2	341						
	- 0,5	342						
	- 1,0	321						
	- 2,0	322						
	- 3,0	323						
	- 4,0	324						
	- 5,0	325						
	Example	16,8=12,0+5,0-0,2	“312”+“335”+“341”					
	Current to reset	Back to measuring mode	355 or voltage supply 10–30VDC to break					

* Factory settings

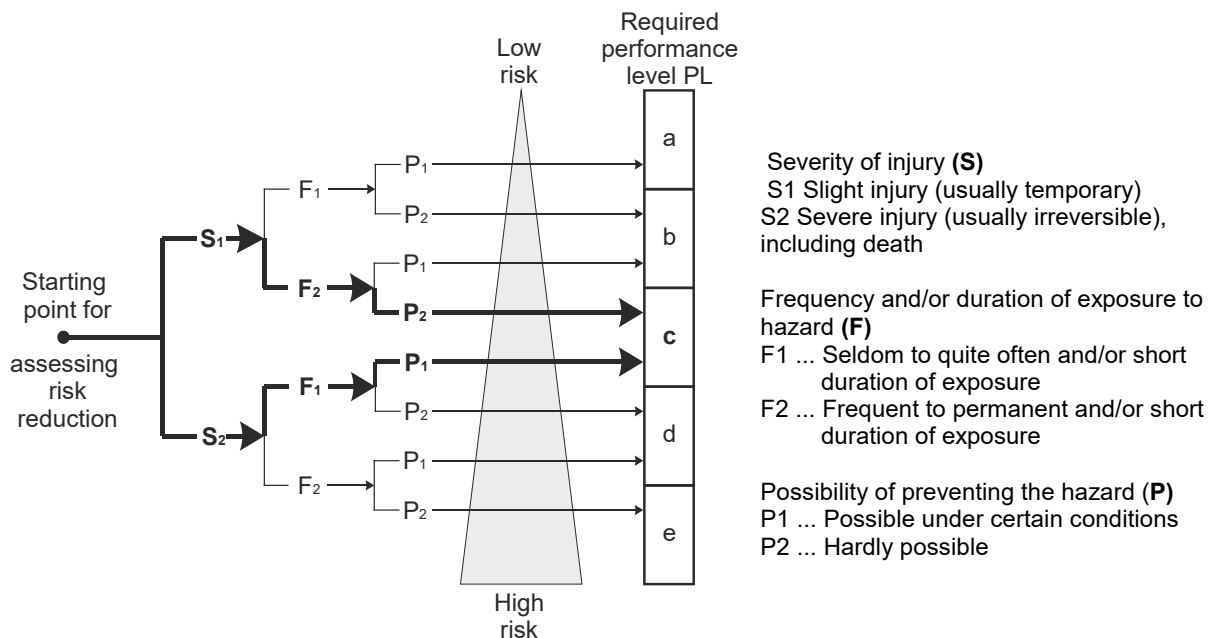
5.2. Example

sequence	Operation for Code 341	LED-display
1.	3-times press >T1<	>U2-U4-U8< light
2.	Wait approx. 2 sec	Light off
3.	4-times press >T1<	>U2-U4-U8-U16< light
4.	Wait approx. 2 sec	Light off
5.	1-times press>T1<	>U2< light
6.	end	LED >U16< flashing approx. 2 sec

6. Information on Performance-Level PLc in accordance with DIN EN 13849-1

6.1. Classification of Type Series “Switching Amplifier BS 805”

The Switching Amplifier BS805 can be classified in the Performance-Level PLc in accordance with the set of standards governing Safety Relevant Control Systems DIN EN 13849-1. This then covers hazards as shown in the hazard graphs below recommended for safety-relevant control systems in conjunction with the Performance-Level PLc and SK1 Category.



6.2. Error detection in operation with a connected sensor

The Switching Amplifier BS805 identifies the following errors:

Sensor monitoring

- Wire breakage, also on single core of sensor cable.
- Short circuit on any number of cores of sensor cable.
- “Unsafe” connection of individual cores.

Internal monitoring

- Failure of operating voltage
- Failure of sensor power supply

The BS 805 is responding to an error with:

- Relay SP1 and SP2 fall (to drop out)
- LED U78 blinking
- Output signal is 2mA

6.3. Other functions

In the event of a software error occurring, the inherent processor watchdog will repeatedly attempt to restart the Switching Amplifier BS805, this involving constant opening/closing of the relays SP1 and SP2.

Zero drifts on the internal amplifier are cyclically corrected.

The function of the Switching Amplifier BS805 is not impaired by errors occurring on downstream devices.

Coercive fusing of relay SP2 can be set by means of key code '251' as follows: SP1 lies 0...2mA above SP2. Accordingly, SP1 monitors SP2 (the latter normally being set with a time lag) and is immediately de-energised whenever a short and high load peak occurs

7. Commissioning

7.1. Mounting

The BS 805.01 and BS 805.11 appliances are intended to be wall-mounted using two M5 screws. The drilling patterns for BS 805.01 (163 x 52) and BS 805.11 (238x52) will be found under 3. Appliances BS 805.21 are designed for mounting on a standard rail.

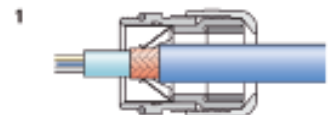
7.2. Connection

		BS 805.01	BS 805.11	BS 805.21
Excitation voltage +	+ EX		X1/1	
Excitation voltage -	-EX		X1/2	
Signal +	+ SI		X1/3	
Signal -	- SI		X1/4	
Analogue Output	4...20mA		X1/5	
Analogue Output	0 mA		X1/6	
Shield	SHI	cable gland	cable gland	X1/0 X1/9
Power supply	10-30VDC	X1/7	-	X1/7
Power supply	GND	X1/8	-	X1/8
230VAC	L	-	X5/1	-
	N	-	X5/2	-
	PE	-	X5/3	-
	PE		X12/1	
	PE		X12/2	
Rel. 1	NC		X10/1	
	Com		X10/2	
	NO		X10/3	
Rel. 2	NC		X11/1	
	Com		X11/2	
	NO		X11/3	

The cables for the sensor, the supply voltage and the signal output are to the strip_X1: to attach. Protective conductors of the discharges for the switching signals are to be attached absolutely to the strip_X12: PE

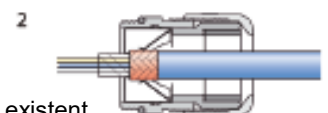
Standard contacting of cable shield to contact clip

- cable jacket and shield dismantle
- cut around the cable jacket 15mm behind the end, do not remove however yet
- pass through the cable
- cable jacket removal
- draw back the cable until the connection between cable shield and contact clip is existent
- tighten



Contacting of cable shield with thin cables without cable sheath:

- cable jacket dismantle
- roll up the shield over the cable jacket approx. 15 - 20 mm
- pass through the cable until the connection between cable shield and contact clip is existent
- tighten



7.3. Signal settings

With the aid of an ammeter and/or LED corresponding to Section 4, the zero point is set by means of the >0< adjuster, the load value for sensor loading being set using the >V< adjuster.

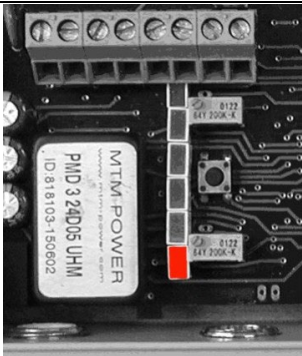
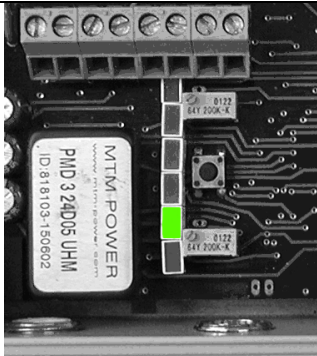
Setting the zero point with the >0< adjuster

Subject to technical change. 04/2024

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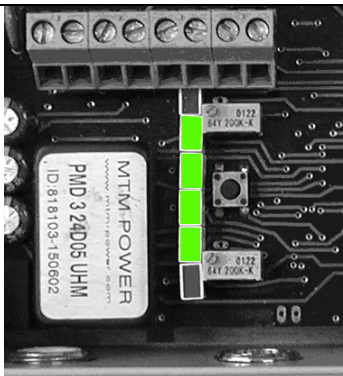
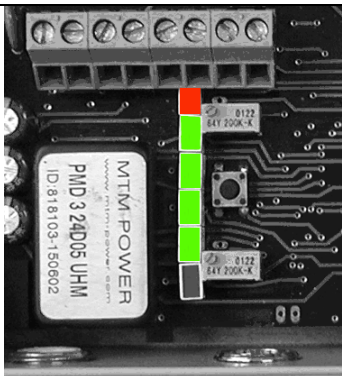
Manual switching amplifier BS 805

- De-charge the sensor.
- The zero point 4mA is correctly set at the very point where the red LED just about lights up.

	
- Output current below 4mA: Turn >0< adjuster clockwise, - Red LED remains on: Extend zeroing range in minus direction applying functions 452 or 451	- Output current exceeds 4mA: Turn >0< adjuster counter-clockwise, - Green LED remains on: Extend zeroing range in plus direction applying functions 453 or 454

Setting the load value using the >V< adjuster

- Charge the sensor.
- The load value, e.g. 20mA is correctly at the point where the red LED does not yet light up.

	
- Output current below 20mA: Turn >0< adjuster clockwise, - Red LED remains off: Extend zeroing range with functions 44x	- Output current exceeds 20mA: Turn >V< adjuster counter-clockwise, - Red LED remains on: Extend zeroing range with functions 43x

Whenever the appliance detects an error (refer to point 4 LED display, LED U78) an output current of 2mA is always generated and the red LED >U1< lights up.

A note can be made of the test signal (Code No.: Switch-on 422, Switch-off 423) for documentation purposes later on.

For this purpose de-charge the sensor, measure the output signal and connect the test signal by means of function 422. Now measure the output signal and switch the test signal back off again by means of function 423. A note is made of the difference between the output signals which can then be reviewed when checks are carried out at a later point.

Setting the switching points >SP1< and >SP2<

Setting of the switching points with the aid of the rotary potentiometers SP1 and SP2 governing the relays takes place applying the corresponding test loads or, if proceeding from a computed current signal, by means of the constant-current settings (Code No. 311 to 355).

The switching action of the relays needs to be set as required using key >T1< (Code No. 211 to 255).

After being connected, the sensor is charged with a test load. If the test load cannot be attained or no constant setting is possible, an alternative in lieu of this is to set a constant current applying the functions 31x

Example

- Cut-off point 1 14mA is intended to switch >SP1<:
- Call function 312 and function 332 (output current now 12mA + 2mA = 14mA)
- Turn >SP1< adjuster clockwise up to the very point where relay 1 just about switches over.

- Cut-off point 2 8mA is intended to switch >SP2<:
- Call function 334 (output current now 14mA + 4mA = 18mA)
- Turn >SP2< adjuster clockwise up to the very point where relay 2 just about switches over.
- Switch to measuring mode applying function 355.

When geared to the standard setting, the relay de-energises as soon as the switching point is attained. The function 2x2 reverses the switching action and allows the relay to energise when the switching point is attained.

7.4. Control of settings

The signal and switching attitude of the BS 805,01 are to be proven at the latest for the delivery of the plant to the operator at material load cycles.

Protect the setup adjustments with key >T1< (Code-Nr. locking-421 and unlocking-425).

8. Specification

		BS 805.01 BS 805.11 BS 805.21
Input		
Input signal range		-2.5 ... +2.4mV/V
Resistance of strain-gauge bridge	Ω	350 ... 1000
Excitation voltage for sensor	V	ca. 4
Conversion rate	Hz	20
Output		
Output signal	mA	4 - 20
Display		6 LED – display on 4mA-Steps
Zero point range $>0<$ 4mA	mV/V	+/- 0.5 ¹⁾
Full load range $>V<$ 20mA	mV/V	0.8 ... 2.5 ²⁾
Constant current adjustable	mA	2 ... 22
Load resistance (burden)	Ω	300
Output Relays $>SP1<$ / Relays $>SP2<$		LED-display for Switching status
Switching point adjustable	mA	4 ... 22
Switching hysteresis adjustable with $>T1<$	mA	0.05 – 0.1 – 0.5 – 1 – 2
Switching delay $>D<$ during overstepping	Sec	0 ... 5
Switching voltage / switching current		250V / 6A
Normal / Invers with. $>T1<$		- adjustable -
Accuracy		
Reproducibility the settings	%v. E.	0.5
Linear error plus hysteresis	%v. E.	0.2
Temperature effect full load 20mA	%v.E./10K	0.2
Temperature effect zero 4mA	%v.E./10K	0.2
Power supply		
- - Nominal voltage	VDC	LED-display for stand by (10 ... 30) for BS805.01 and BS805.21/ 230 for BS805.11
- - Current consumption	VAC A	max. 0,3
Environmental conditions		
Operating temperature range	°C	-25 ... +60
storage temperature range	°C	-40 ... +70
Noise immunity		DIN EN 61000-6-2
Emitted interference		DIN EN 55011-B
Oscillating resistance		DIN EN 60068-2-6
Shock resistance		DIN EN 60068-2-27/-29
Construction		
Dimensions (B x H x T)	mm	Aluminum-die cast see measurements in drawings
Environmental protection	EN 60529	IP65 for BS805.01 and BS805.11/ IP40 for BS805.21
admissible conductor cross-section	mm ²	0.14 ... 1.5
protective earthing		Protection class 1

1) Setting adjustable – 1mV/V to +1mV/V – via key functions 45x.

2) Setting adjustable – 0.5mV/V to 2.5mV/V – via key functions 43x und 44x.

9. EC Declaration of Conformity

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



EG-Konformitätserklärung EC Declaration of Conformity

No. 21/16

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

Anschrift: Marschnerstraße 26, 01307 Dresden
Adress: Bundesrepublik Deutschland

Produktbezeichnung DMS-Schaltverstärker BS 805.01 / BS 805.11 / BS 805.21
Strom-Schaltverstärker BS 805.02 / BS 805.12 / BS 805.22
Spannungs-Schaltverstärker BS 805.04
Product description: Strain Gauge Switching Amplifier BS 805.01 / BS 805.11 / BS 805.21
Current Switching Amplifier BS 805.02 / BS 805.12 / BS 805.22
Voltage Switching Amplifier BS 805.04

Artikel - Nr.: 3574810.001, 3574810.002, 3574810.004, 3574810.011, 3574810.012, 3575447.001, 3575447.001

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. |
| 2014/31/EU | Richtlinie des Rates betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen.
Council Directive relating to electrical equipment to use within particular limits of voltage. |

Dresden, den 14.10.2016


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

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Anhang zur EG-Konformitätserklärung Annex A to the EC Declaration of Conformity

No. 21/16

Produktbezeichnung DMS-Schaltverstärker BS 805.01 / BS 805.11 / BS 805.21
Strom-Schaltverstärker BS 805.02 / BS 805.12 / BS 805.22
Spannungs-Schaltverstärker BS 805.04
Product description: Strain Gauge Switching Amplifier BS 805.01 / BS 805.11 / BS 805.21
Current Switching Amplifier BS 805.02 / BS 805.12 / BS 805.22
Voltage Switching Amplifier BS 805.04

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
DIN EN 55011: 2011-04 Emitted interference:	Grenzwertkurve Klasse A limit value curve class A

Die Konformität mit der Richtlinie 2014/31/EU wird nachgewiesen durch die Einhaltung folgender harmonisierter Normen:

Conformity to the Directive 2014/31/EU is assured through the application of the following harmonised standards:

DIN EN 51010-1:2002-08
DIN EN 50204-1:2007-06

Die Konformität mit der Richtlinie 2014/31/EU wird nachgewiesen durch die Einhaltung folgender nationaler Normen:

Conformity to the Directive 2014/31/EU is assured through the application of the following national standards:

DIN VDE 0701 T.200:2008-06
BGV A3:2006 „Elektrische Anlagen und Betriebsmittel“

Sicherheitshinweis: Die Schaltverstärker BS 805.xx dürfen nicht als alleiniges Mittel zur Abwendung gefährlicher Zustände an Maschinen und Anlagen eingesetzt werden.

Safety instruction: The above described switching amplifiers BS 805.xx must not be used as the exclusive instrument for prevention of dangerous conditions in the plant and the machinery.

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