AST Gruppe
Angewandte System Technik

Switching Amplifier
LS 1000

Original
Manual

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Contents

1. Safety instructions

This operating manual describes the installation, commissioning and operation of switching amplifier.LS 1000 It is assumed that qualified staff only who have adequate knowledge in the fields of measuring and control engineering take all measures.

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

1.1. Field of application

The switching amplifier LS 1000 is intended to amplify the output signal of sensors with metal foil strain gauges, preferably force transducers, to a standard signal. Any use beyond this is considered improper. The manufacturer is not liable for any resulting damage. The user alone bears the risk.
The LS 1000 may not be used as the sole means of averting dangerous conditions on machines and systems. Machines and systems must be designed in such a way (e.g. through mechanical locks, limit switches) that faulty states cannot lead to a dangerous situation.
It must be ensured that incorrect settings on the device, its malfunction or failure cannot lead to material damage or a danger to the operating personnel or others.

1.2. Installation

The installation and connection must be 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. Only the manufacturer is authorized to repair the devices.

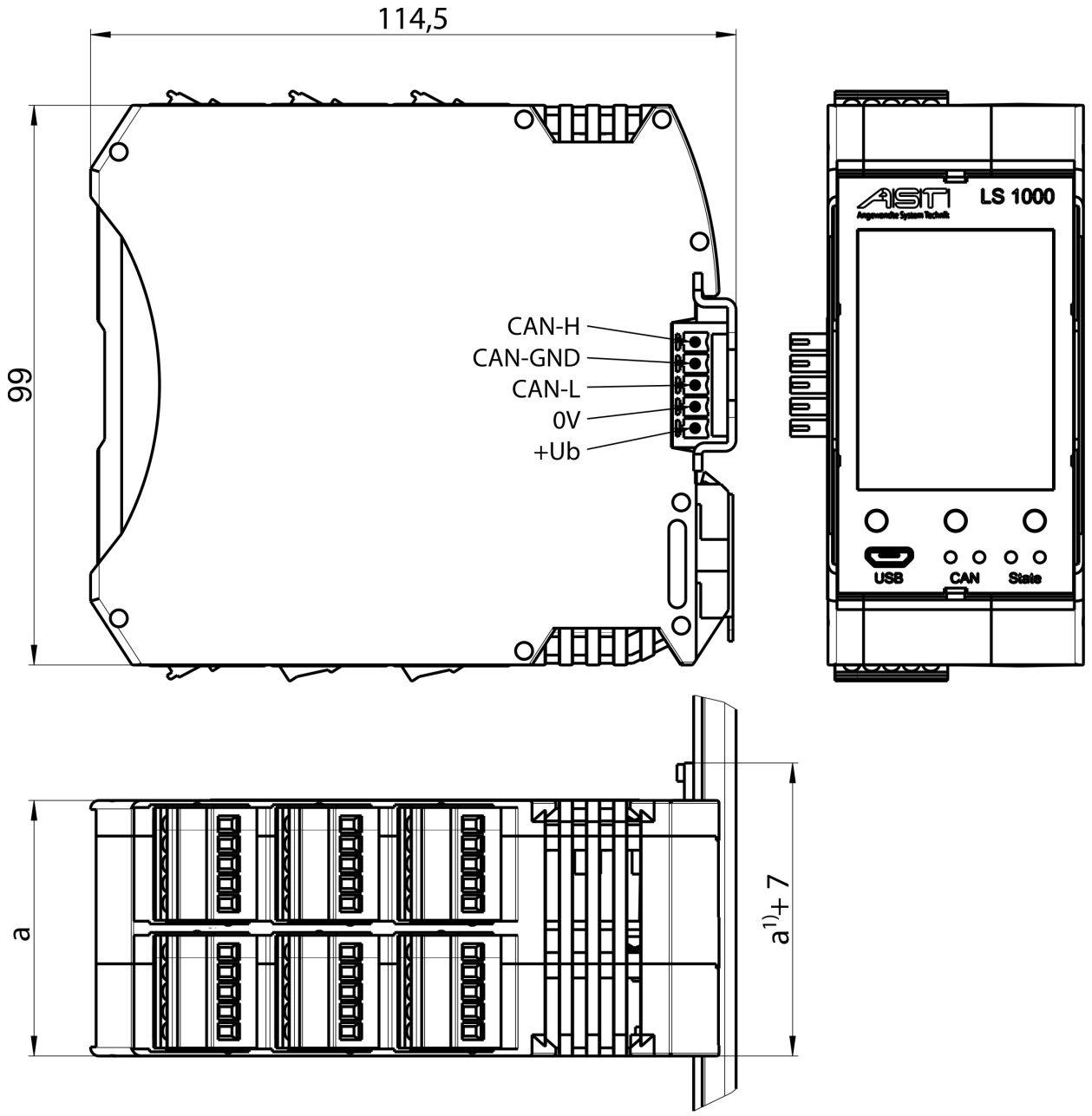
2. Device description

- Universal usable digital strain gauge amplifier with up to 4 measuring channels
- Connecting with different kind of strain gauge sensors
- Complete system solutions through networking of devices via CANopen
- 24 bit resolution
- Up to 3200 Sps conversion rate per measuring channel
- Setting by our software ASTAS®2 or via CANopen
- CANopen and power supply 24V via TBUS for simply linking of devices

NOTE! You can find the software ASTAS®2 on our website ***www.ast.de*** or on the CD-ROM “Product Information”

3. Dimensions

Assembly Rail TS35



1) - see type code

Figure 1 - Dimensions LS 1000

4. Type code

Type code	Description
LS 1101-A100-2/1-2	1x mV/V-Input, Type A, 2 digital Inputs, 1 Analog output, 2 Relay, a=45
LS 1102-B200-5/2-6	2x mV/V- Inputs, Type B, 5 digital Inputs, 2 Analog outputs, 6 Relay, a=45
LS 1104-B400-6/4-8	4x mV/V- Inputs, Type B, 6 digital Inputs, 4 Analog outputs, 8 Relay, a=67,5

Table 1- Type code

5. Specifications

Type		**Type A**	**Type B**
Device profile		CiA 404: Sensors and controllers	
Input strain gauge sensor			
Number of strain gauge input channels		1	2/ 4
Connecting equipment		4- or 6-wire system, configurable	4-wire system
Input signal range (+Si/-Si)	mV/V	0,5/ 1,0/ 2,0[2)]/ 4,0	
Internal resistance of strain gauges bridge	Ω	50 ... 1000	100 … 1000
Power supply for strain gauge bridge (+EX/-EX)	VDC	± 2,5 (5,0)	
EMI- Filter cut-off frequency (-3dB)	Hz	ca. 2700	
Resolution ADU	Bit	24	
Conversion rate ADU	Sps	up to 3200	up to 510
Input temperature sensor PT1000			
Number		1 per channel, maximum 4	none
Temperature measuring range	°C	-40 ... 125	-
Input digital switching signal			
Number of switching inputs		2 per channel, maximum 4	1 per channel, maximum 4
Type of switching inputs		potential free, optically isolated	
Input voltage switching inputs	VDC	low: ≤2,0 - high: ≥ 4,5	
Galvanic isolation	VDC	1000	
Output digital CAN			
Data transfer rate (adjustable)	kBits/ s	125[2)]/ 250/ 500	
Protocol		CANopen CiA 404	
Number of PDO´s - adjustable		4	
Module address - adjustable		1 … 126, 127 reserved	
Status indicator		2 LEDs	
Filter - configurable		Moving average, Repeating average Average over last N values	
Accuracy class digital CAN		regarding strain gauge sensor: 2 mV/V Input signal = 100 % v. E	
Non-linearity	%v. E.	0,0025	
Noise (depending on conversion rate)	%v. E.	<0,001 at 3200 Sps	<0,015 at 220 Sps
Temperature coefficient amplification	%v.E./10K	<0,01	
Temperature coefficient zero point	%v.E./10K	<0,01	
Power supply			
Supply voltage	VDC	18 ... **24** ...36	
Power consumption	W/channel	6	3
Galvanic isolation	VDC	1000	
Environmental conditions			
Working temperature range	°C	-20 ... +60	
Storage temperature range	°C	-30 ... +70	
interference resistance		DIN EN 61000-6-2	
Interference emissions		DIN EN 55011-B	

1) See type code
2) Factory settings

6. Electrical connection

6.1. Connection description

Connection	Marking
n.u.	Not used
+EX n	Excitation voltage - plus
- EX n	Excitation voltage - minus
+SE n	with 6-wire technology sense signal - plus
- SE n	with 6-wire technology sense signal – minus
+SI n	Signal - plus
- SI n	Signal - minus
SH n	Shield
+Ub	Power voltage - plus
0V	Power voltage - minus
CAN-H	CAN-Bus - plus
CAN-L	CAN-Bus - minus
CAN-GND	CAN-Bus GND, internal ground potential
+PT n	Temperature sensor PT1000 - plus
- PT n	Temperature sensor PT1000 - minus
IN n	Digital switching input
R n	Digital switching input return l
AN n	Analog output
GND n	Analog output Ground
IN+	Digital Input plus
IN-	Digital Input minus
K n-11	Relay Common
K n-12	Relay open
K n-14	Relay close

n… running index

Table 2 – Connection description

6.2. Connections

6.2.1. Type A

6.2.1.1. Position of the connections LS 1101-A100-2/1-2

Figure 1 – Position of the connections LS 1101-A100-2/1-2

View from the front

X1.1	IN2	IN2R	IN1	+SE1	-SE1
X2.1	+EX1	-EX1	+SI1	-SI1	SH1
X3.1	n.u.	n.u.	+PT1	-PT1	SH2
X4.1	R1	GND1	AN1	+Ub	0V
X5.1	K1-12	K1-11	K1-14	K1-11	
X6.1	K2-12	K2-11	K2-14	K2-11	

Table 3 – Description of connections LS 1101-A100-2/1-2

6.2.2. Type B

6.2.2.1. Position of the connections LS 1102-B200-5/2-6

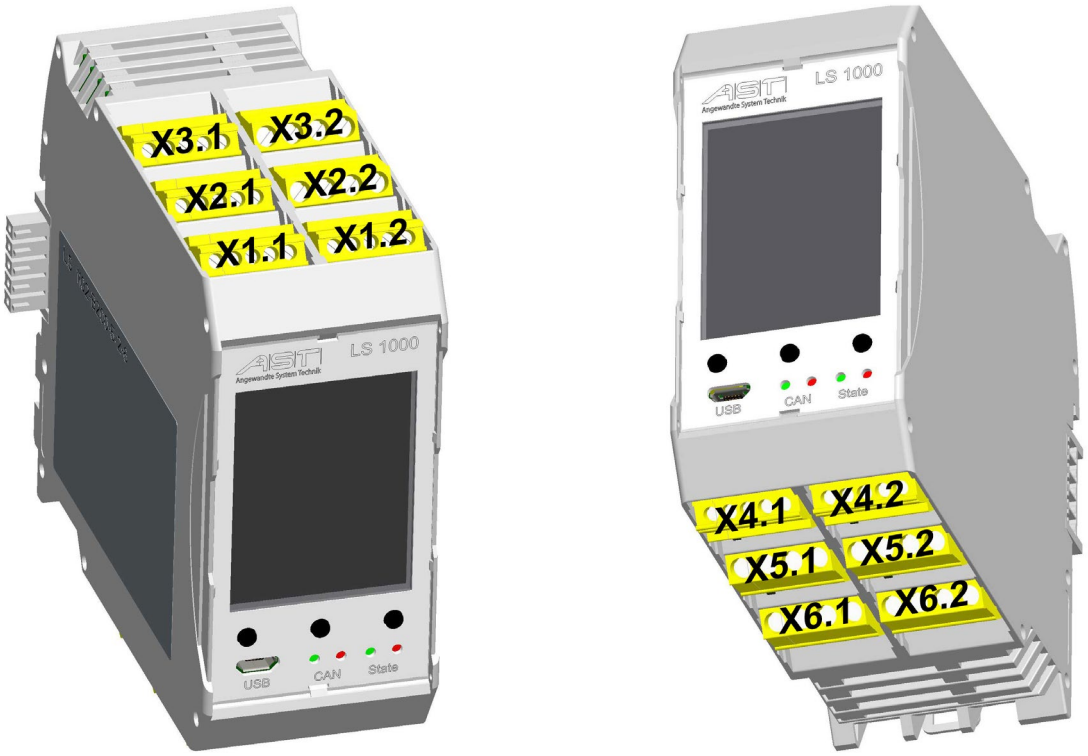


Figure 2 - Position of the connections LS 1102-B200-5/2-6

View from the front

X1.1	AN2	GND2	IN1	n.u.	n.u.
X2.1	+EX1	-EX1	+SI1	-SI1	SH1
X3.1	+EX2	-EX2	+SI2	-SI2	SH2
X4.1	R1	GND1	AN1	+Ub	0V
X5.1	K1-12	K1-11	K1-14	K1-11	
X6.1	K2-12	K2-11	K2-14	K2-11	

X1.2	IN11	IN12	R1112	IN+	IN-
X2.2	K13-12	K13-11	K13-14	K13-11	
X3.2	K14-12	K14-11	K14-14	K14-11	
X4.2	IN13	IN14	R1314	IN+	IN-
X5.2	K11-12	K11-11	K11-14	K11-11	
X6.2	K12-12	K12-11	K12-14	K12-11	

Table 4 – Description of connections LS 1101-A100-2/1-2

6.2.2.2. Position of the connections LS 1104-B400-6/4-8

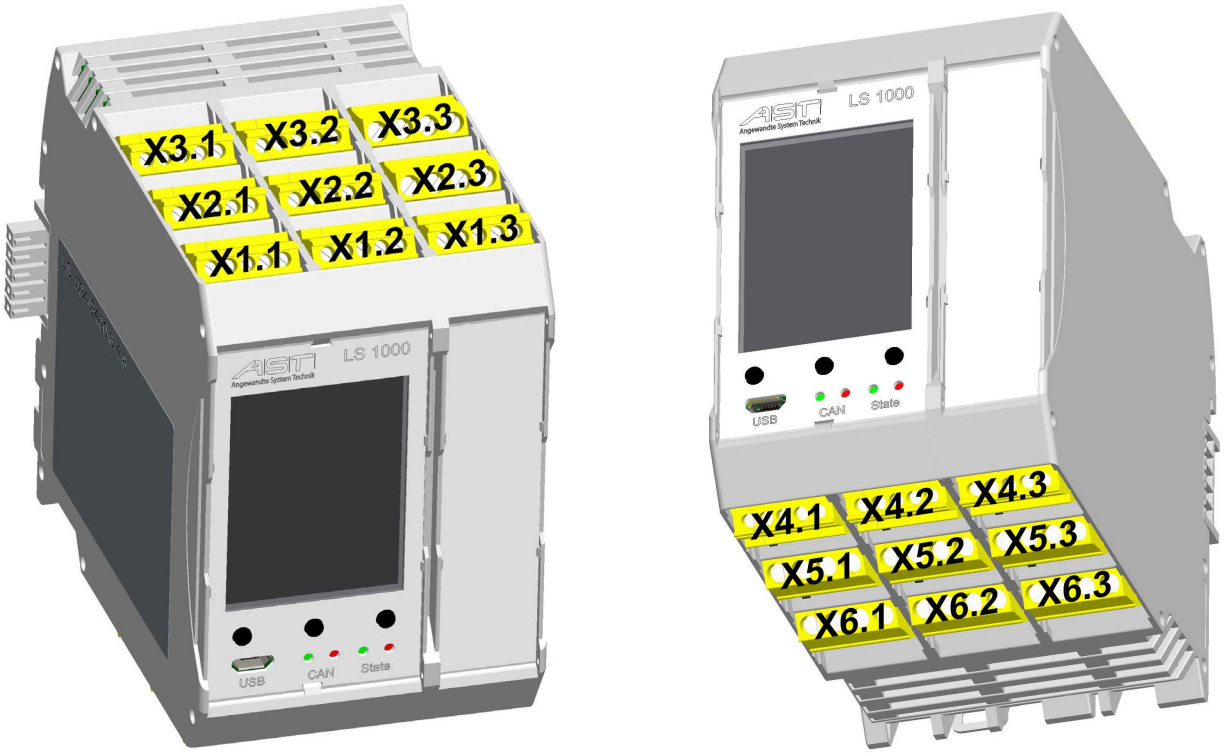


Figure 3 - Position of the connections LS 1104-B400-6/4-8

View from the front

X1.1	AN2	GND2	IN1	n.u.	n.u.
X2.1	+EX1	-EX1	+SI1	-SI1	SH1
X3.1	+EX2	-EX2	+SI2	-SI2	SH2
X4.1	R1	GND1	AN1	+Ub	0V
X5.1	K1-12	K1-11	K1-14	K1-11	
X6.1	K2-12	K2-11	K2-14	K2-11	

X1.2	AN4	GND4	IN3	n.u.	n.u.
X2.2	+EX3	-EX3	+SI3	-SI3	SH3
X3.2	+EX4	-EX4	+SI4	-SI4	SH4
X4.2	R3	GND3	AN3	+Ub	0V
X5.2	K3-12	K3-11	K3-14	K3-11	
X6.2	K4-12	K4-11	K4-14	K4-11	

X1.3	IN11	IN12	R1112	IN+	IN-
X2.3	K13-12	K13-11	K13-14	K13-11	
X3.3	K14-12	K14-11	K14-14	K14-11	
X4.3	IN13	IN14	R1314	IN+	IN-
X5.3	K11-12	K11-11	K11-14	K11-11	
X6.3	K12-12	K12-11	K12-14	K12-11	

Table 5 – Description of connections LS 1104-B400-6/4-8

7. Operation and display

Different displays and settings are possible on the device. The measuring range and switching points can be set on the device.

Additional settings with the software ASTAS®2.

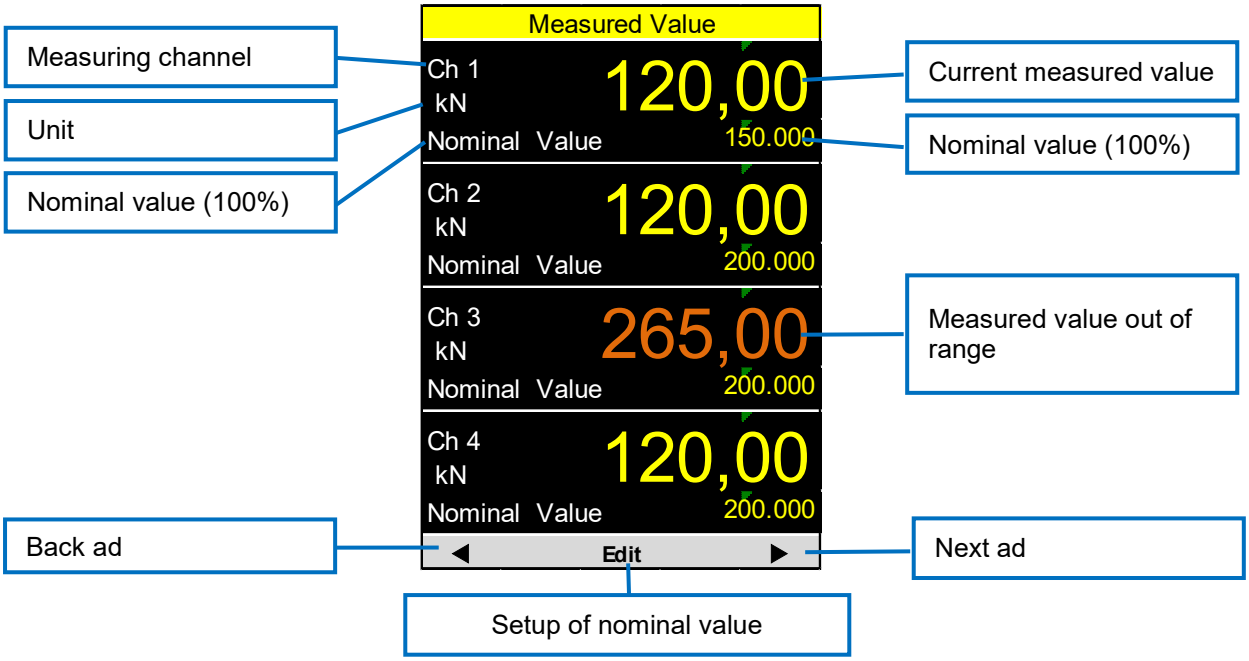
NOTE ! Meaning of colours

Yellow: Values are in the set range.

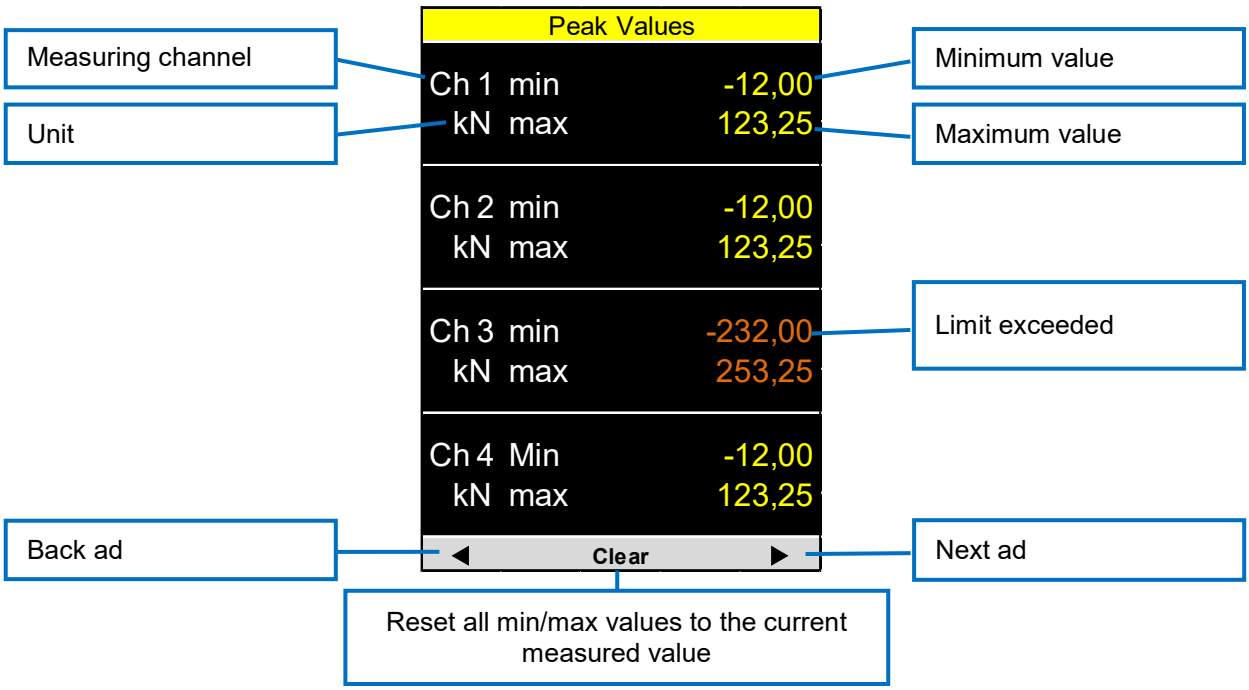
Orange: Values are outside the set measuring range. The device works still right.

Red: Values are outside the technical parameters - inputs or outputs do not work correctly - **error**!

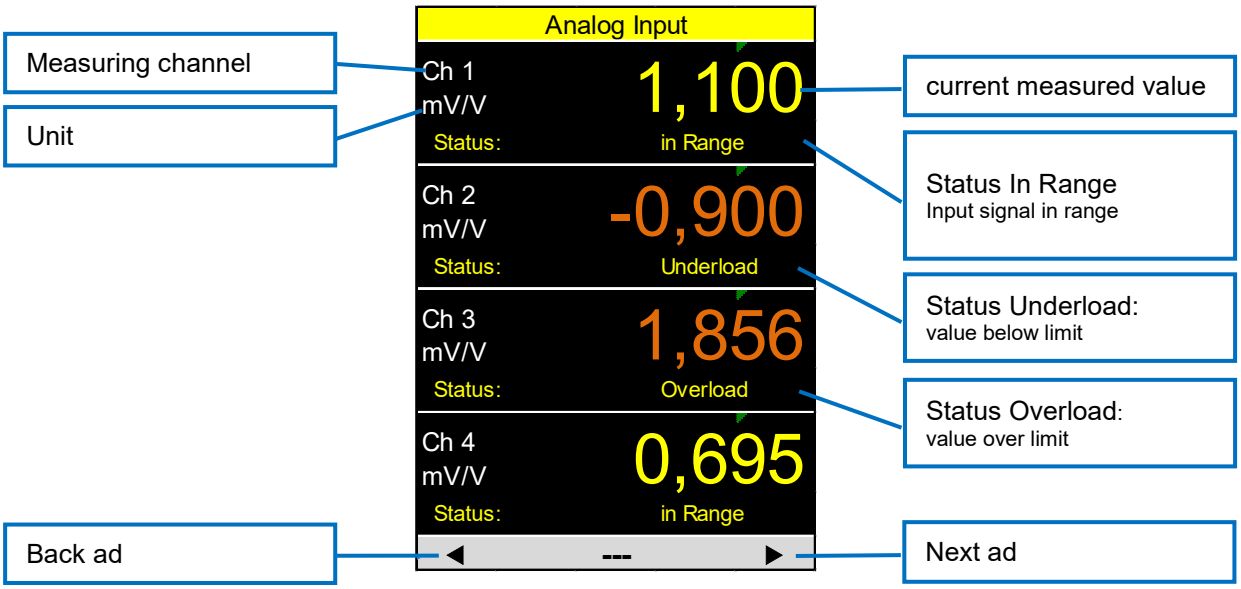
7.1. Measured Value



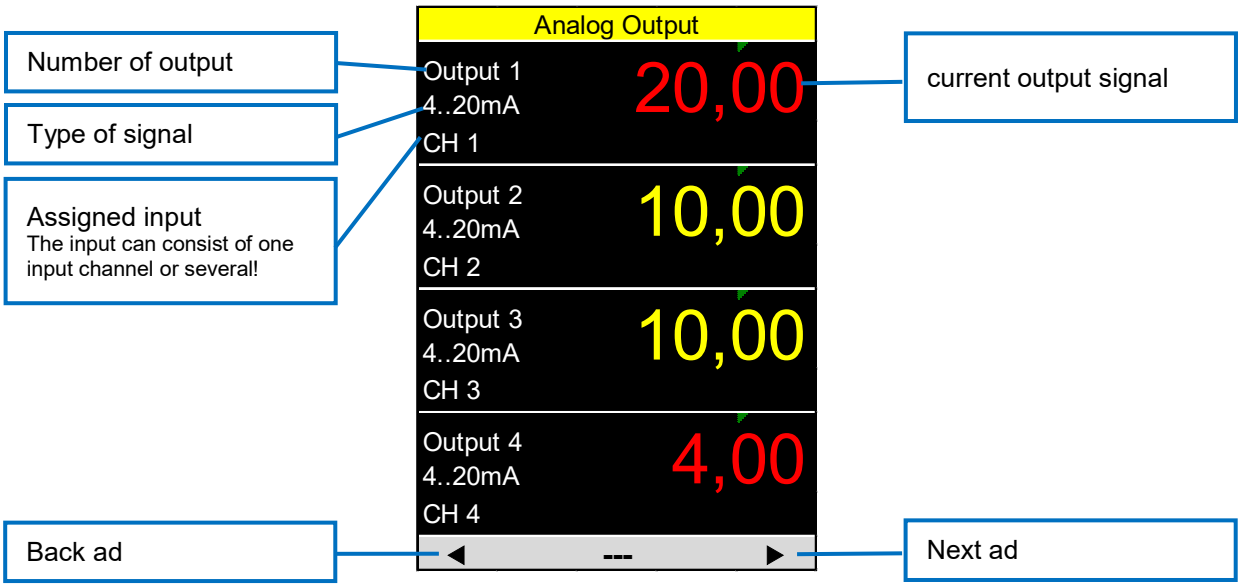
7.2. Peak Values



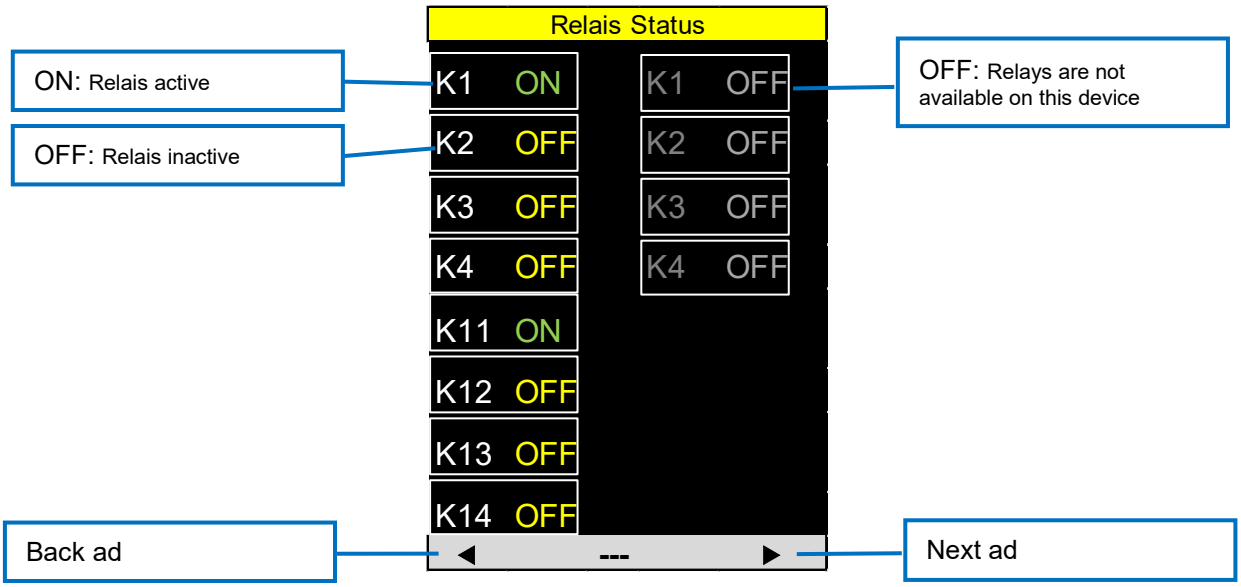
7.3. Analog Input



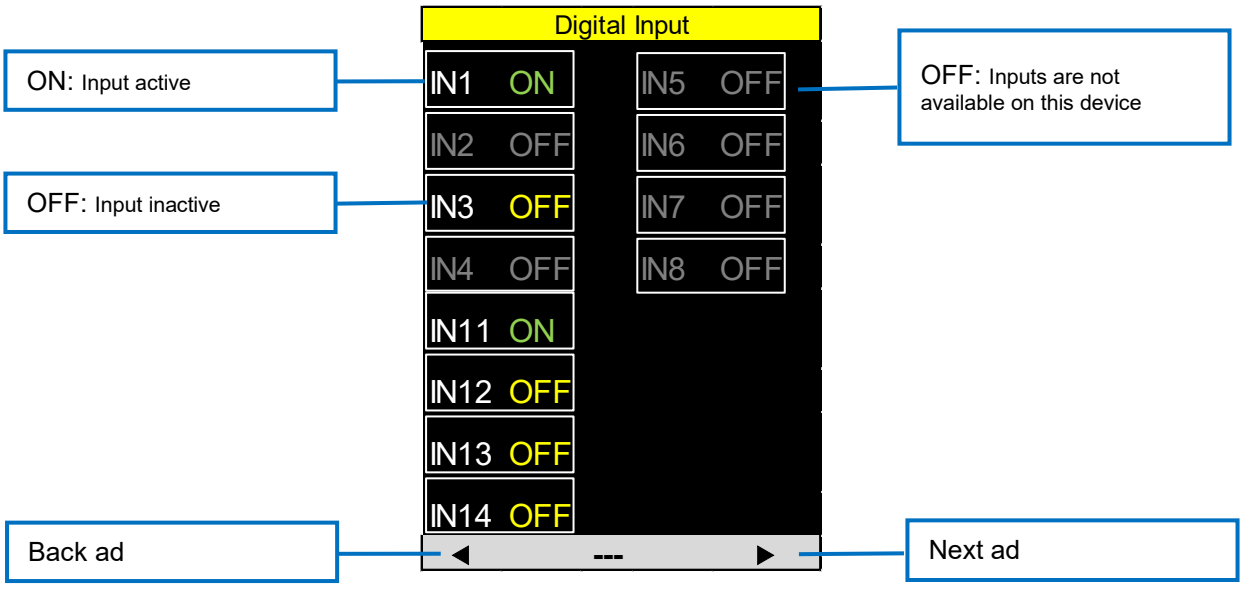
7.4. Analog Output



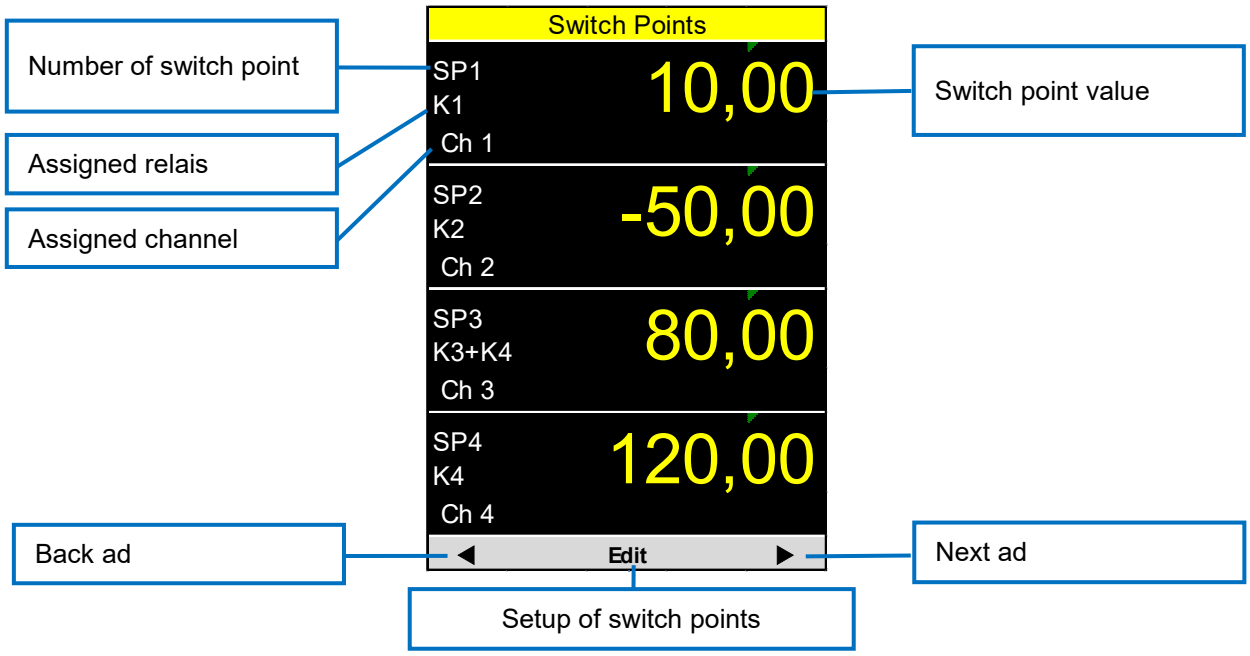
7.5. Relais Status



7.6. Digital Input



7.7. Switch Points



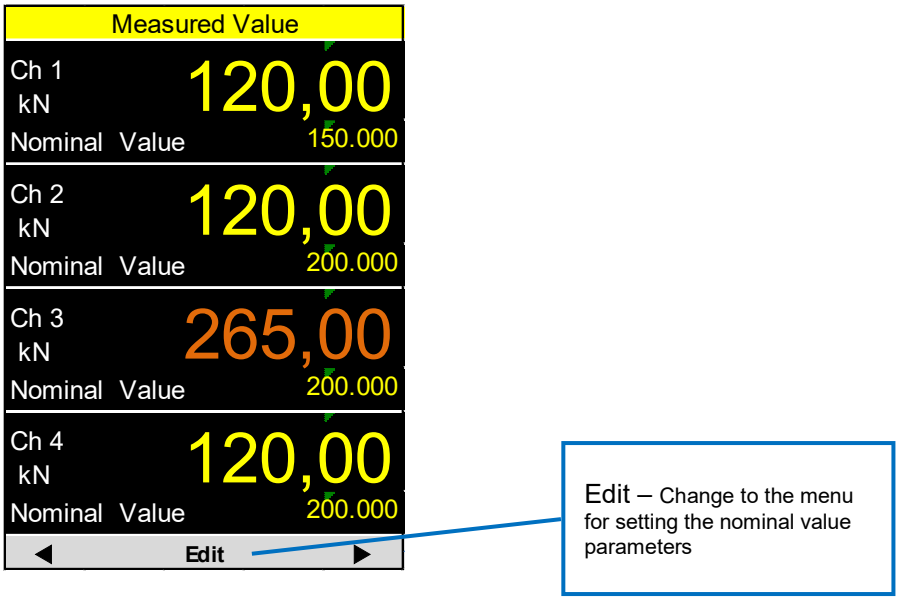
8. Calibration and adjustment of LS1000

8.1. Calibration of channel

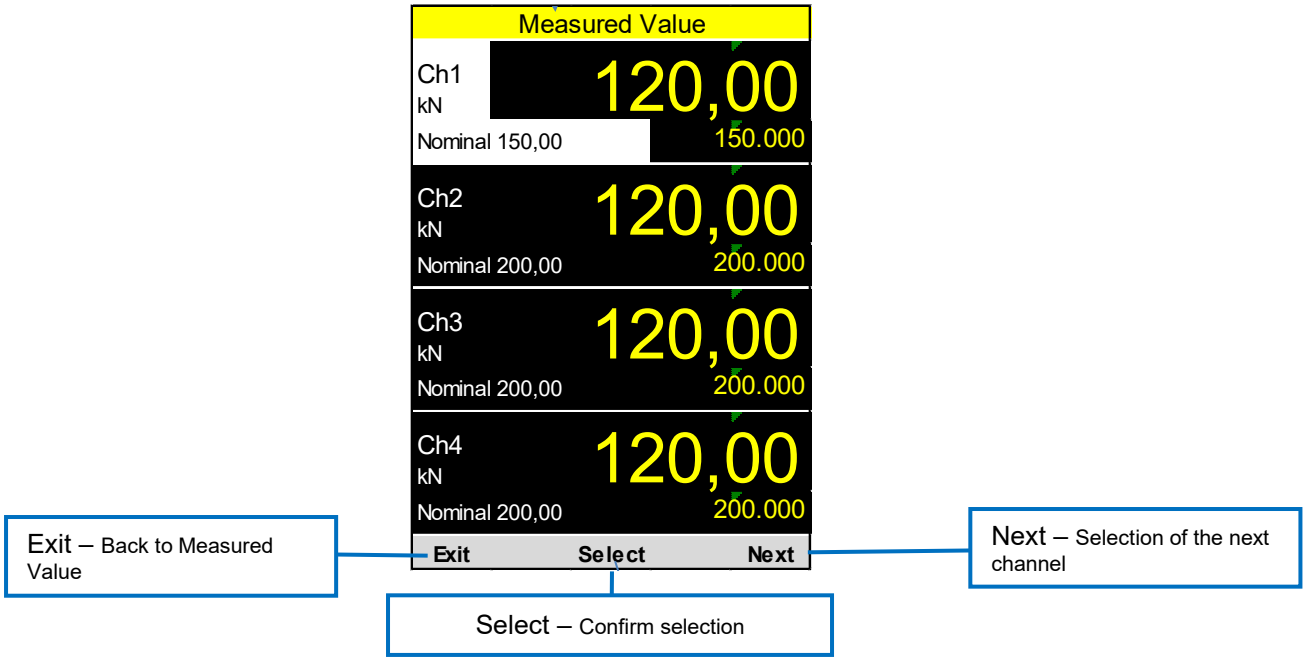
Each measuring channel can be readjusted with two points.

NOTE! The nominal values can only be set with the software ASTAS®2 !

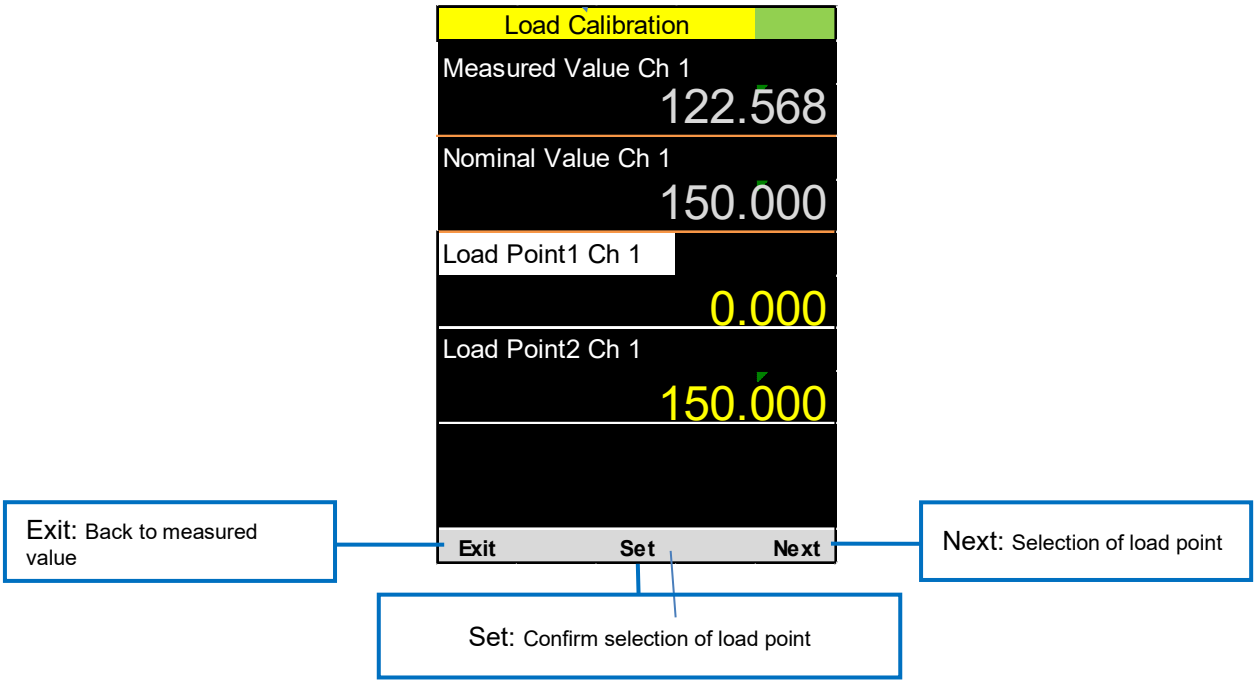
1. Select the menu "Measured Value"



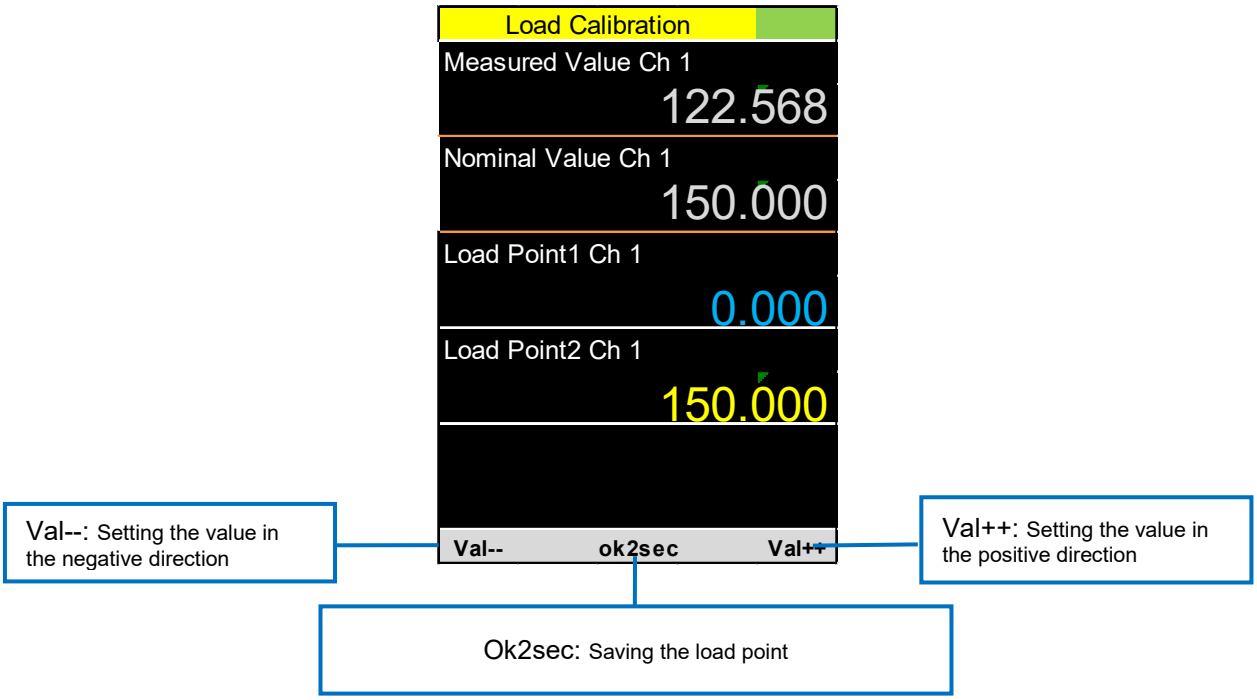
2. Select the channel Ch



3. Select the Load Point



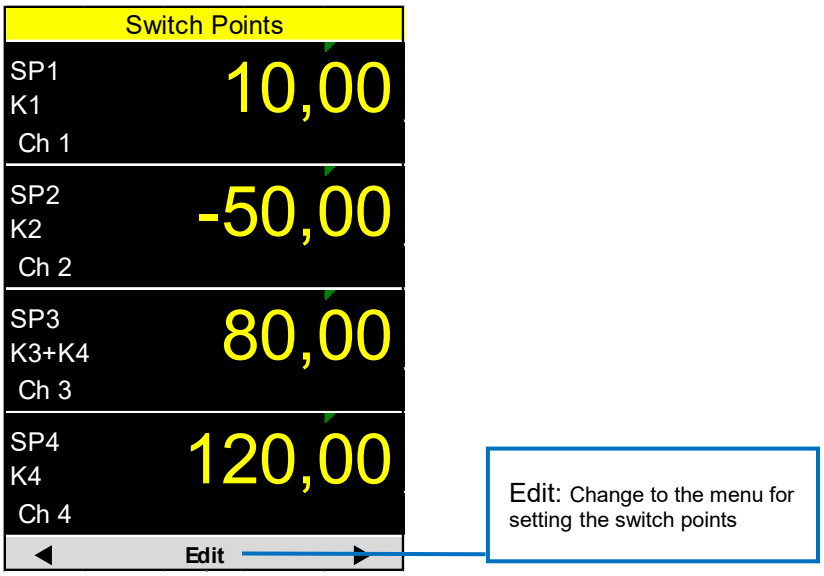
4. Apply load and save the value



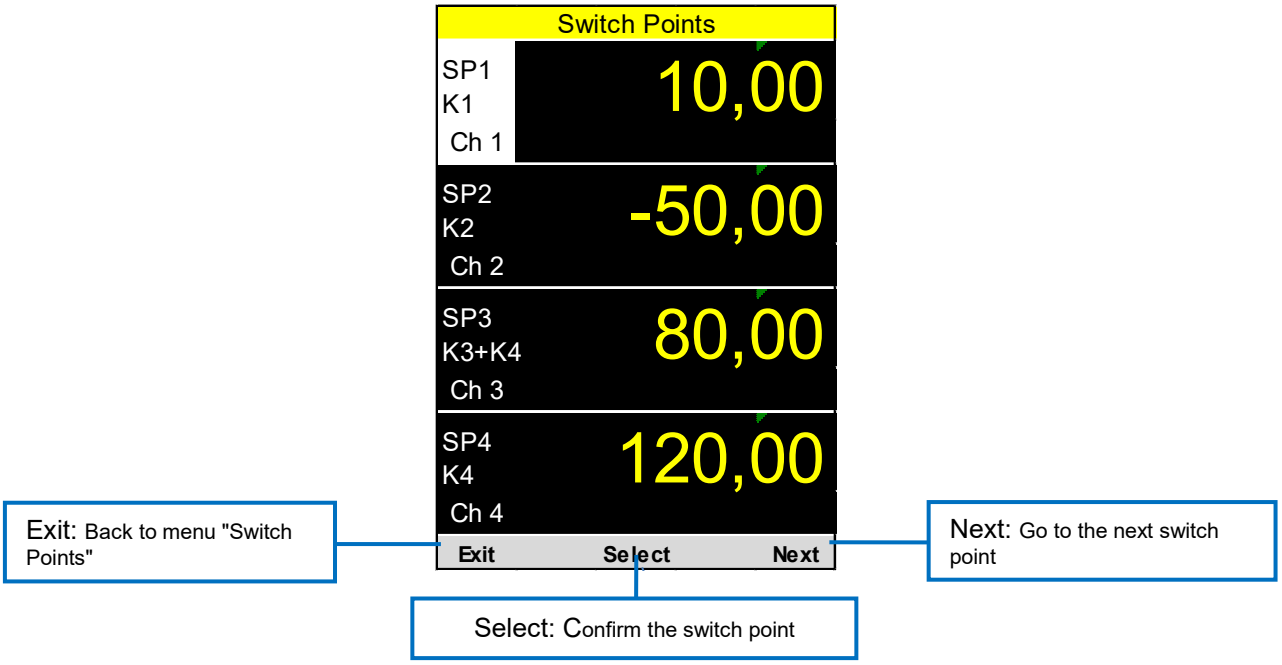
8.2. Switch Points

NOTE! The assignment of the relays and channels to a switching point can only be done with the software ASTAS®2!

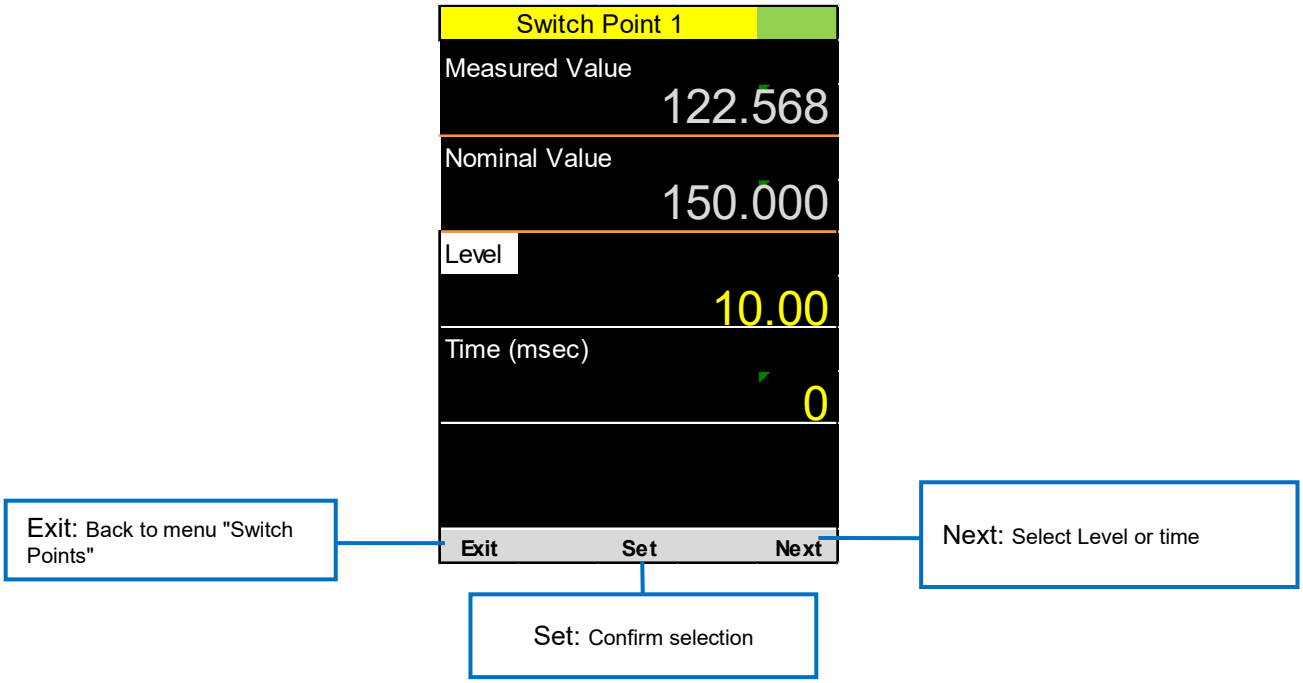
1. Select menu "Switch Points"



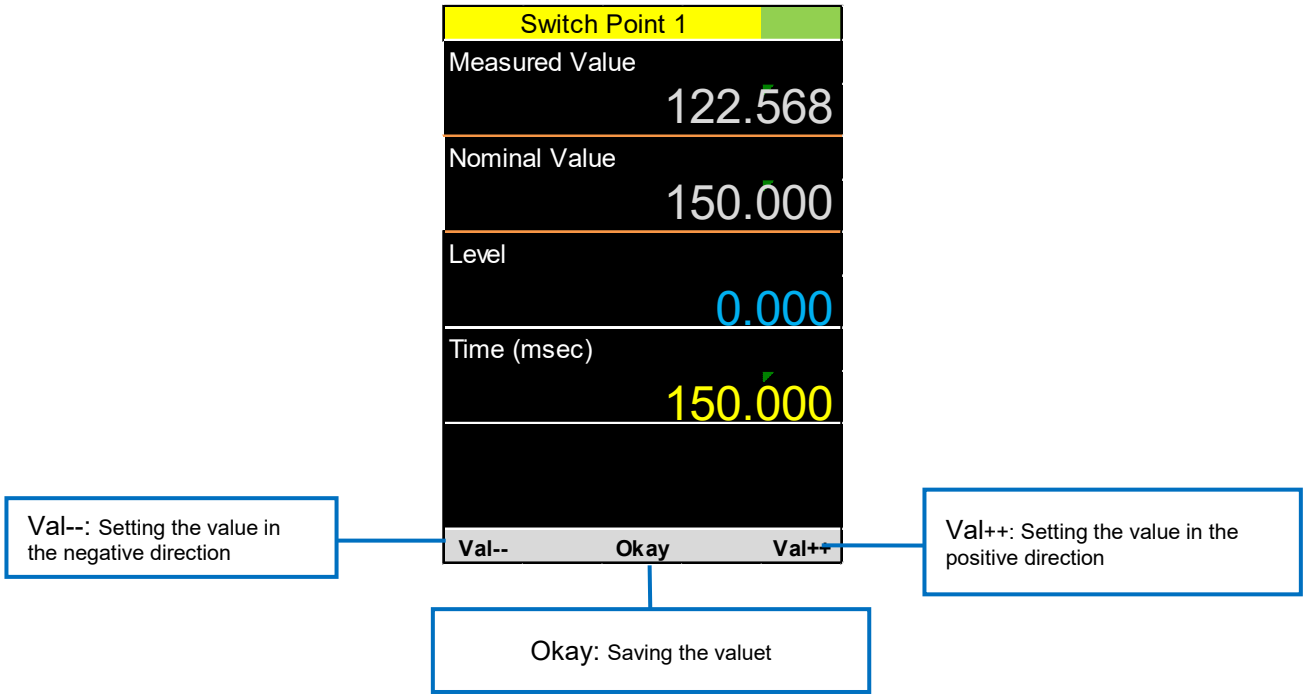
2. Select the switch point



3. Adjustment of the switching point (Level) and time delay (Time)



4. Set value



9. Error messages

Error messages	Reason	Helps
ADC-Error	Das Eingangssignal überschreitet den zulässigen Bereich - Sensor nicht angeschlossen - Kabelunterbrechung -Extreme Sensorüberlastung	Check sensor cable and sensor connection - Sensor connected correctly - Check the cables for faults

10. EC Declaration of Conformity

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

AST Gruppe
Angewandte System Technik

EU-Konformitätserklärung
EC Declaration of Conformity
No. 02/23

Hersteller: Manufacturer:	A.S.T. - Angewandte System Technik GmbH Mess- und Regeltechnik
Anschrift: Adress:	Marschnerstraße 26, 01307 Dresden Bundesrepublik Deutschland
Produktbezeichnung	LS 1000 Schaltverstärker für Normschiene
Product description:	LS 1000 Switching amplifier for DIN rail

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.
2014/35/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 13.07.2023

i. A. D. Steinert

gez. Dipl.-Ing. (FH) Dirk Steinert
CE-Beauftragter

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AST Gruppe
Angewandte System Technik

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

No. 02/23

Produktbezeichnung	LS 1000 Schaltverstärker für Normschiene
Product description:	LS 1000 Switching amplifier for DIN rail

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 IEC 61000-6-2 : 2019-11
Störaussendung: Emitted interference:	DIN EN IEC 61000-6-3: 2022-06
DIN EN 55011 - 2022-05 Emitted interference:	Grenzwertkurve Klasse A limit value curve class A

Die Konformität mit der Richtlinie 2014/35/EU wird nachgewiesen durch die Einhaltung folgender harmonisierter Normen:
Conformity to the Directive 2014/35/EU is assured through the application of the following harmonised standards:

DIN EN 61010-1:2011-07
DIN EN 60204-1:2018

Die Konformität mit der Richtlinie 2014/35/EU wird nachgewiesen durch die Einhaltung folgender nationaler Normen:
Conformity to the Directive 2014/35/EU is assured through the application of the following national standards:

BGV A3:2006 „Elektrische Anlagen und Betriebsmittel“

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