

# Switching Amplifier LS 1000

Original  
Manual





## Contents

<b>1.</b>	<b>Safety instructions</b> .....	<b>1</b>
1.1.	Field of application .....	1
1.2.	Installation .....	1
1.3.	Maintenance .....	1
<b>2.</b>	<b>Device description</b> .....	<b>1</b>
<b>3.</b>	<b>Dimensions</b> .....	<b>2</b>
<b>4.</b>	<b>Type code</b> .....	<b>2</b>
<b>5.</b>	<b>Specifications</b> .....	<b>3</b>
<b>6.</b>	<b>Electrical connection</b> .....	<b>4</b>
6.1.	Connection description .....	4
6.2.	Schematic diagram .....	5
6.3.	Connections .....	5
6.3.1.	Type A .....	6
6.3.1.1.	Position of the connections LS 1101-A100-2/1-2 .....	6
6.3.2.	Type B .....	7
6.3.2.1.	Position of the connections LS 1102-B200-5/2-6 .....	7
6.3.2.2.	Position of the connections LS 1104-B400-6/4-8 .....	8
<b>7.</b>	<b>Operation and display</b> .....	<b>9</b>
7.1.	Measured Value .....	9
7.2.	Peak Values .....	9
7.3.	Analog Input .....	10
7.4.	Analog Output .....	10
7.5.	Relais Status .....	11
7.6.	Digital Input .....	11
7.7.	Switch Points .....	12
<b>8.</b>	<b>Calibration and adjustment of LS1000</b> .....	<b>13</b>
8.1.	Calibration of channel .....	13
8.2.	Switch Points .....	15
<b>9.</b>	<b>Error messages</b> .....	<b>17</b>
<b>10.</b>	<b>EC Declaration of Conformity</b> .....	<b>18</b>



### 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

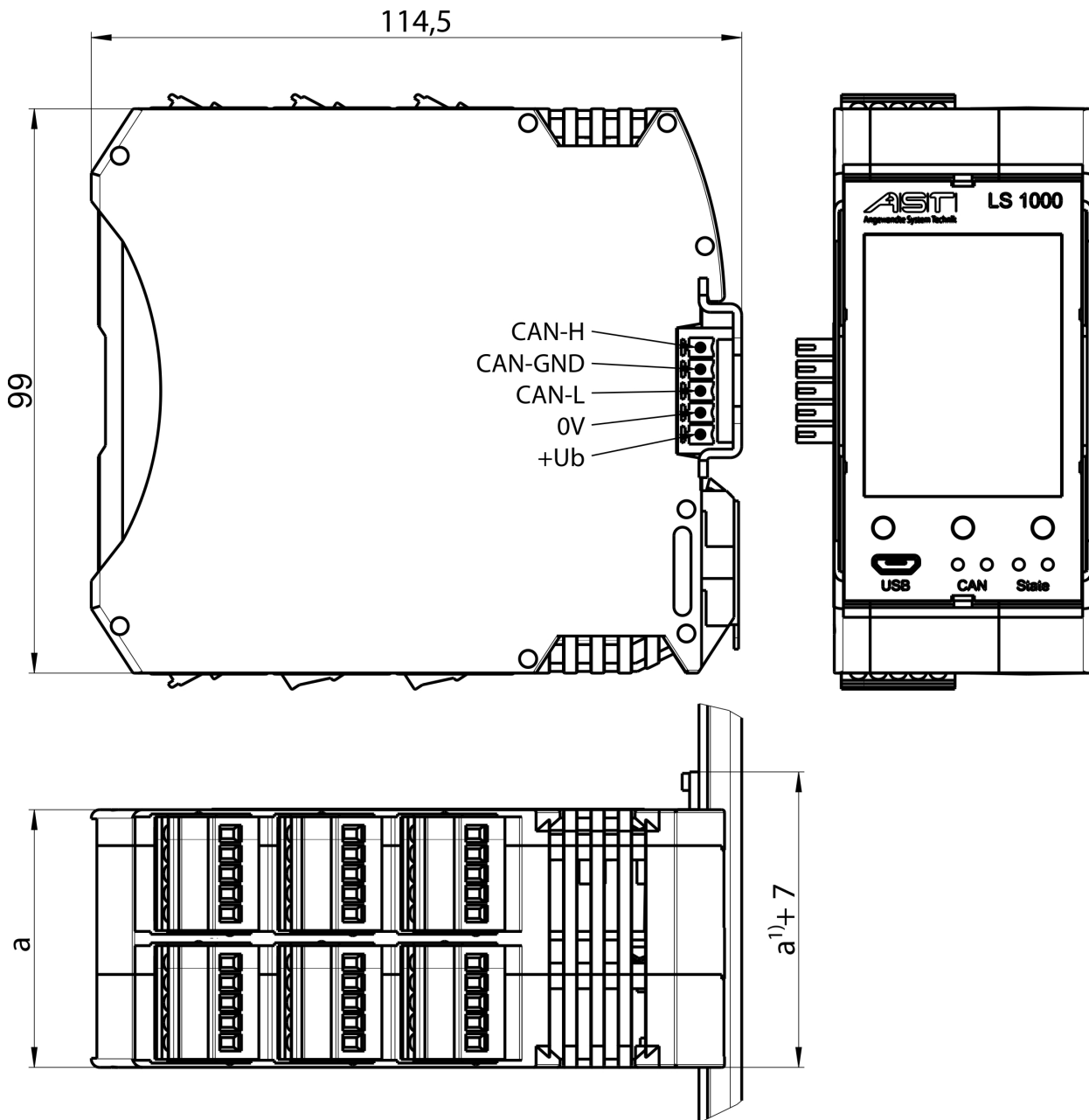
- Universal usable digital strain gauge amplifier with up to 4 measuring channels
- Connecting with different kind of strain gauge sensors
- Complete system solutions through networking of devices via CANopen
- 24 bit resolution
- Up to 3200 Sps conversion rate per measuring channel
- Setting by our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



**NOTE!** You can find the software **ASTAS**<sup>®2</sup> on our website **[www.ast.de](http://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
<b>Input</b> strain gauge sensor			
Number of strain gauge input channels		1	2/ 4
Connectin equipment		4-/ 6-wire system, configurable	4-wire system
Input signal range (+Si/-Si)	mV/V	± 7.0	
Internal resistance of strain gauges bridge per channel	Ω	50 ... 1000	100 ... 1000
Power supply for strain gauge gridge (+EX/-EX)	VDC	± 2.5 (5.0)	
Resolution ADU	Bit	24	
Conversion rate ADU	Sps	up to 3200	up to 540
Cut-off frequency (-3dB)	Hz	approx. 2700	
<b>Input</b> temperature sensor PT1000			
Number		1 per channel, maximum	none
Temperature measuring range	°C	4 -40 ... 125	-
<b>Input</b> digital switching signal			
Number of switching inputs		2 ... 6 <sup>1)</sup>	
Type of switching inputs		potential free, optically isolated	
Input voltage switching inputs	VDC	low: ≤2.0 - high: ≥ 4.5	
Galvanic isolation	VDC	1000	
<b>Output</b> standard signal analog			
Current output / burden	mA	0/4...20, 0...24 / ≤ 500 Ω	
Voltage output / burden	VDC	-10/-5 ... 0 ... +5/+10 / ≥10 kΩ ≥ 10	
Datarate DAC max.	1/s	3200	540
<b>Accuracy class</b> standard signal analog			
2 mV/V Input signal = 100 % f. R.			
Linearity	%f. R.	0.1	
Noise Current output, typical	μA <sub>RMS</sub>	≤ 25	
Noise Voltage output, typical	mV <sub>RMS</sub>	≤ 5	
Temperature coefficient amplification	%f. R./10K	0.1	
Temperature coefficient zero point	%f. R./10K	0.1	
<b>Switching Outputs</b>			
Switch contacts	VAC	potential free changeover 230 VAC	
Switching power	VA	1000	
Datarate	1/s	50	
Electrical lifetime	cycles	100.000	
Mechanical lifetime	cycles	> 10 <sup>6</sup>	
<b>interface</b> digital CAN			
Data transfer rate (adjustable)	kBits/ s	125 <sup>2)</sup> / 250/ 500	
Protocol		CANopen CiA 404	
Number of PDO´s - adjustable		4	
Modul adress - adjustable		1 ... 126, 127 reserviert	
Status indicator		2 LEDs	
Filter - configurable		Moving average, Repeating average, Average over last n values	
<b>Accuracy class</b> digital CAN			
2 mV/V Input signal = 100 % f. R.			
Non-linearity	%f. R.	0.0025	
Noise (depending on conversion rate)	%f. R.	<0.001 at 3200 Sps	<0.015 at 220 Sps
Temperature coefficient amplification	%f. R./10K	<0.01	
Temperature coefficient zero point	%f. R./10K	<0.01	
<b>Interface</b> USB			
Type		Micro USB	
<b>Power supply</b>			
Supply voltage	VDC	18 ... 24 ...36	
Power consumption	W/channel	6	3
Galvanic isolation	VDC	1000	
<b>Environmental Conditions</b>			
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	

Construction		
Dimensions (W x H x D)	mm	a <sup>1)</sup> x 114.5 x 99
Environmental protection (EN 60529)		IP20

- 1) See type code  
 2) Factory settings

## 6. Electrical connection

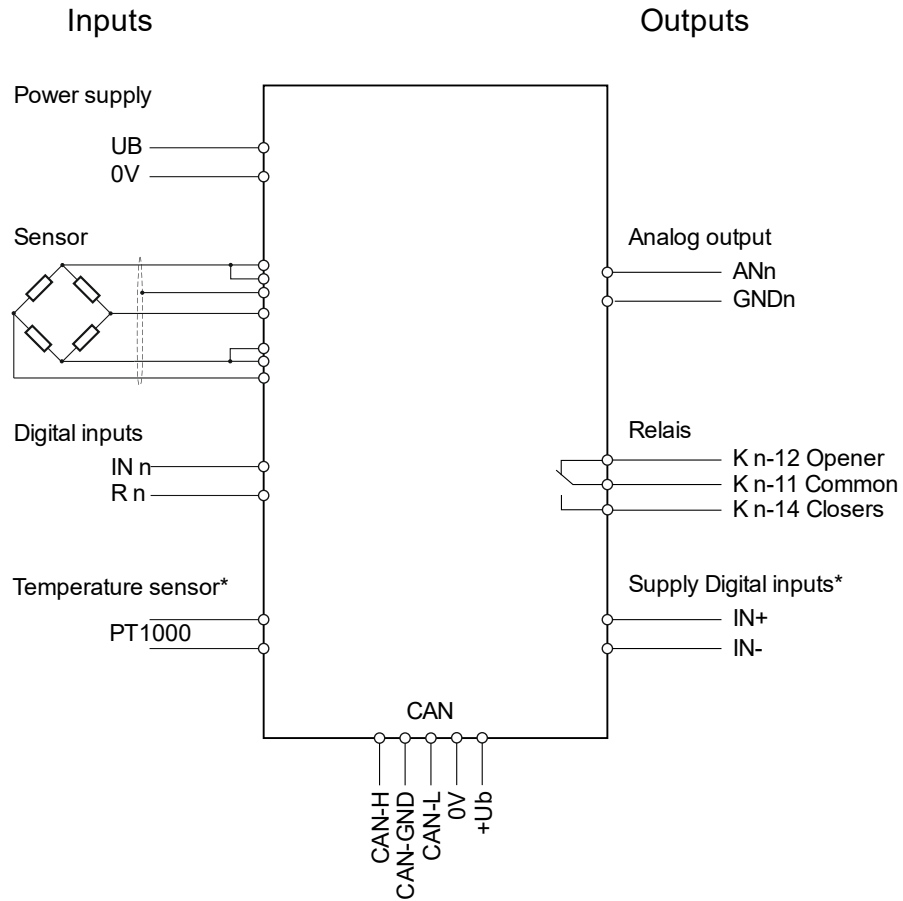
### 6.1. Connection description

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
K n-11	Relay Common
K n-12	Relay open
K n-14	Relay close
AN n	Analog output
GND n	Analog output Ground
IN n	Digital switching input
R n	Digital switching input return I
IN+	Digital Input plus
IN-	Digital Input minus
+PT n	Temperature sensor PT1000 - plus
- PT n	Temperature sensor PT1000 - minus

n... running index

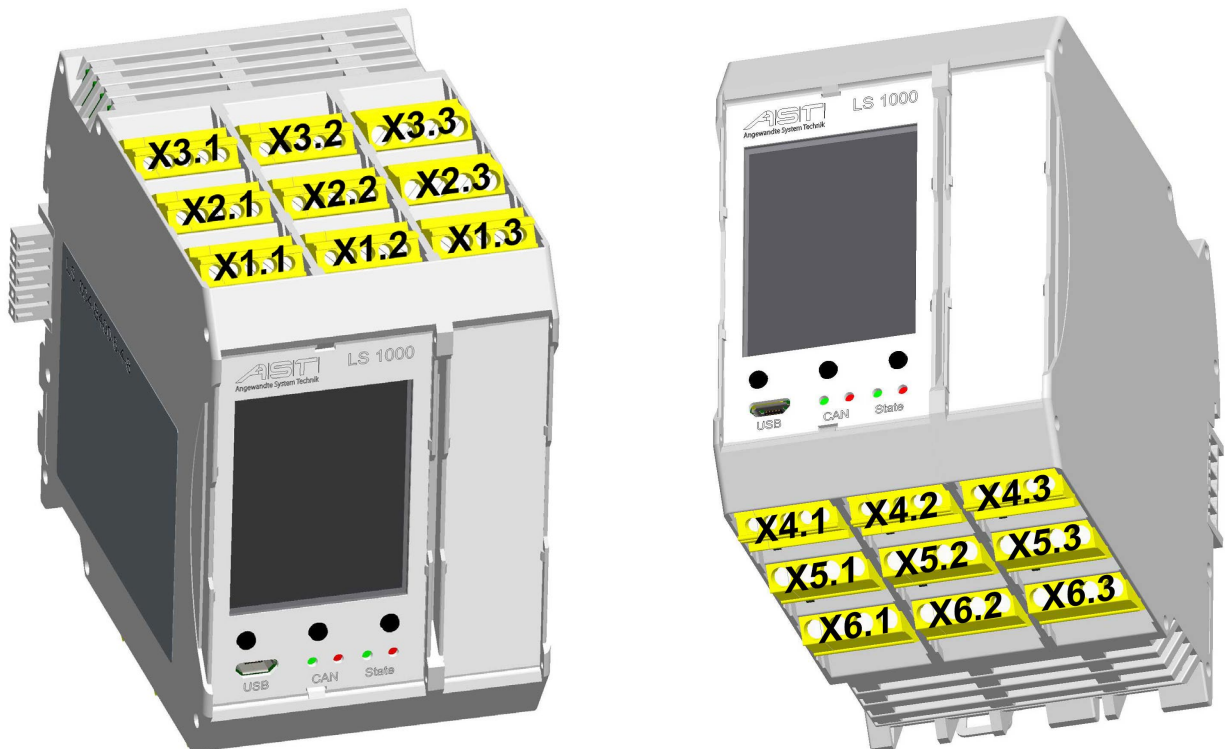
Table 2 – Connection description

## 6.2. Schematic diagram



n ... Running index  
\* ... if available

## 6.3. Connections



6.3.1. Type A

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

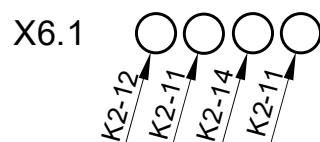
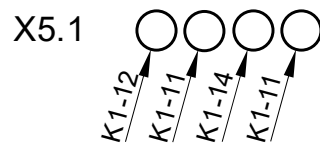
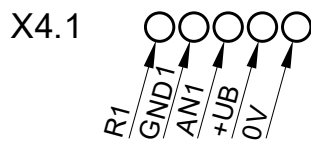
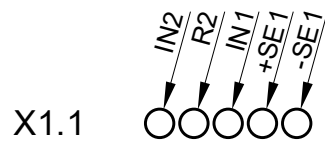
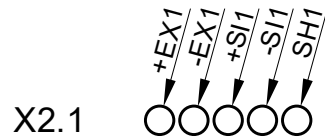
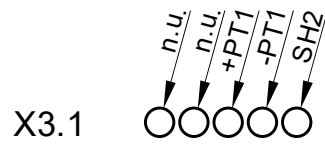


Table 3 – Description of connections LS 1101-A100-2/1-2

6.3.2. Type B

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

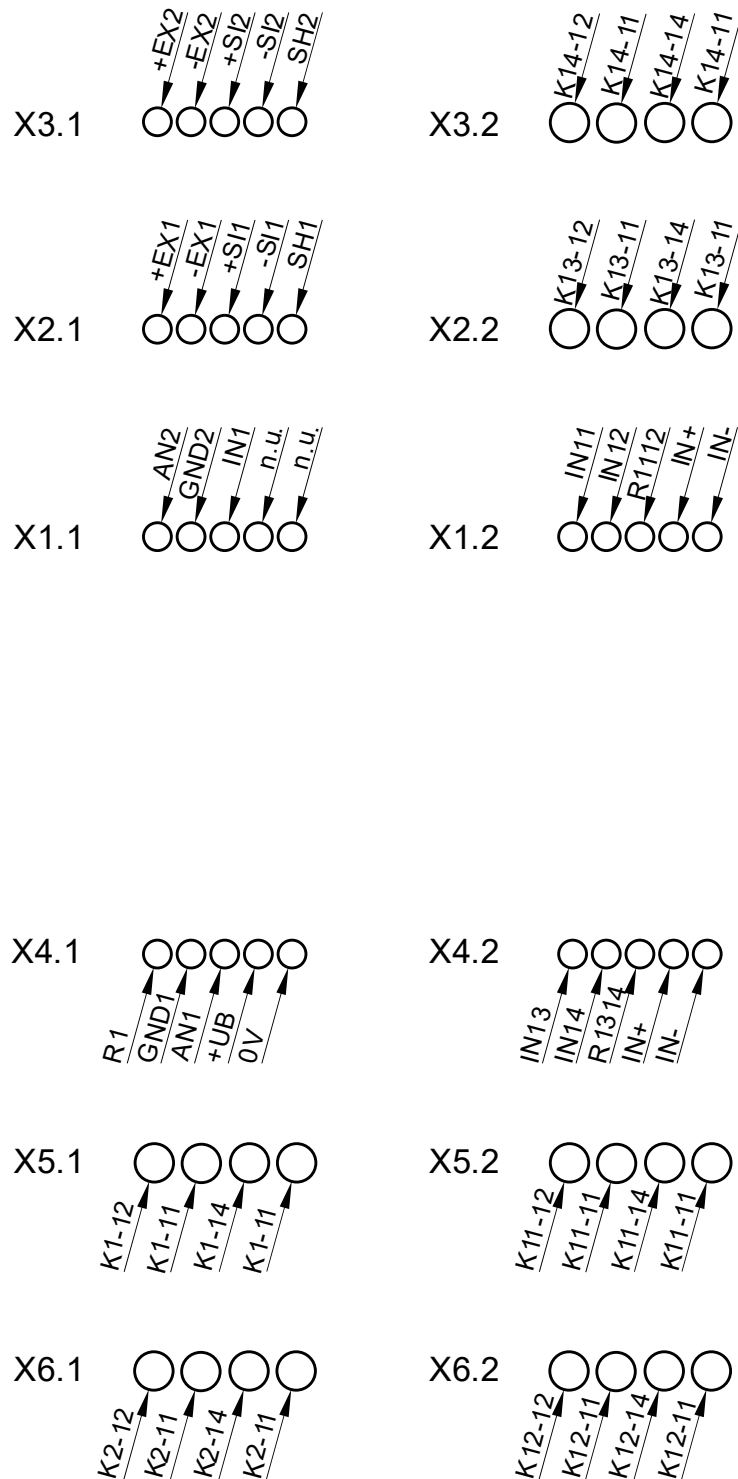


Table 4 – Description of connections LS 1101-A100-2/1-2

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

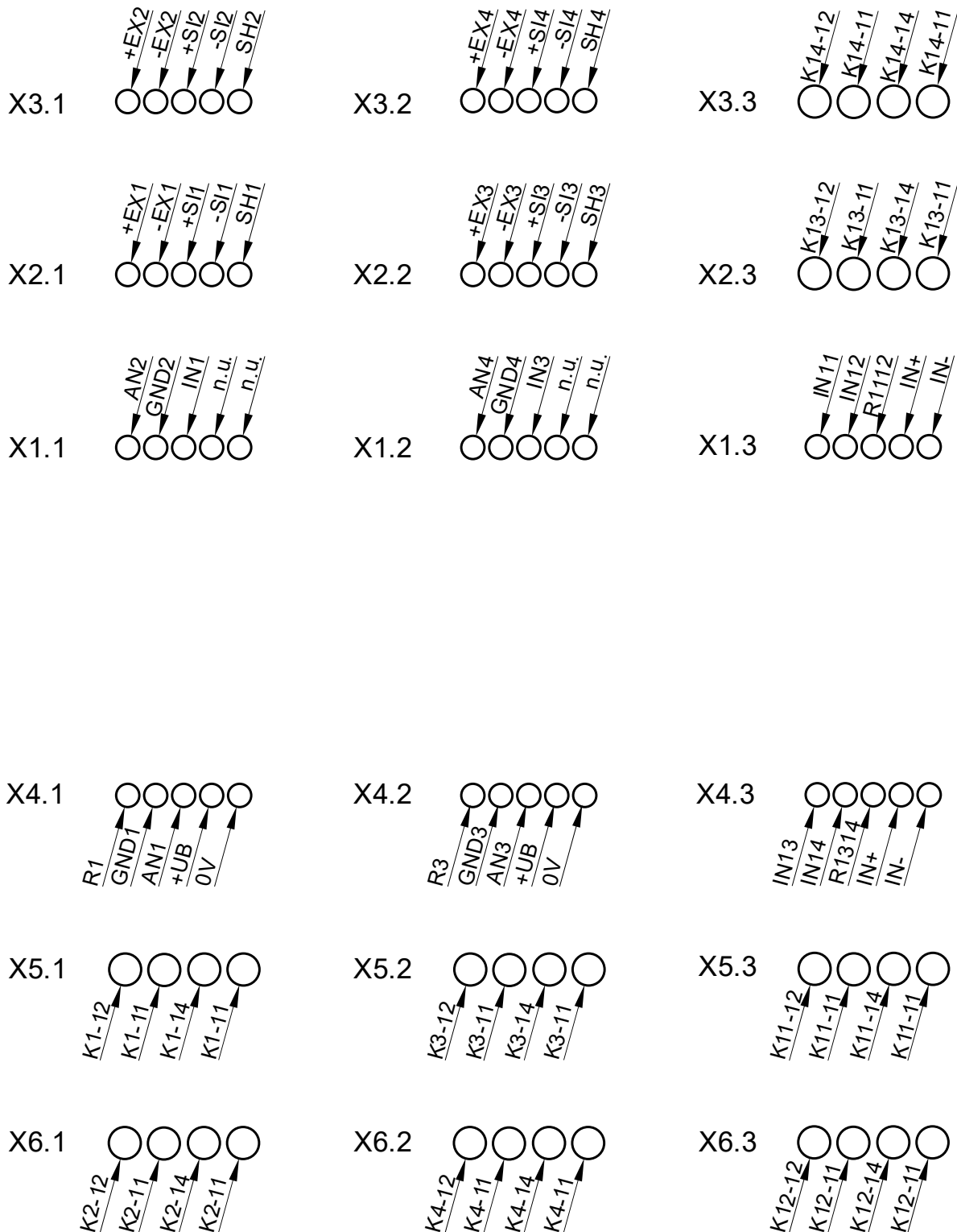


Table 5 – Description of connections LS 1104-B400-6/4-8

## 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<sup>®2</sup>**.



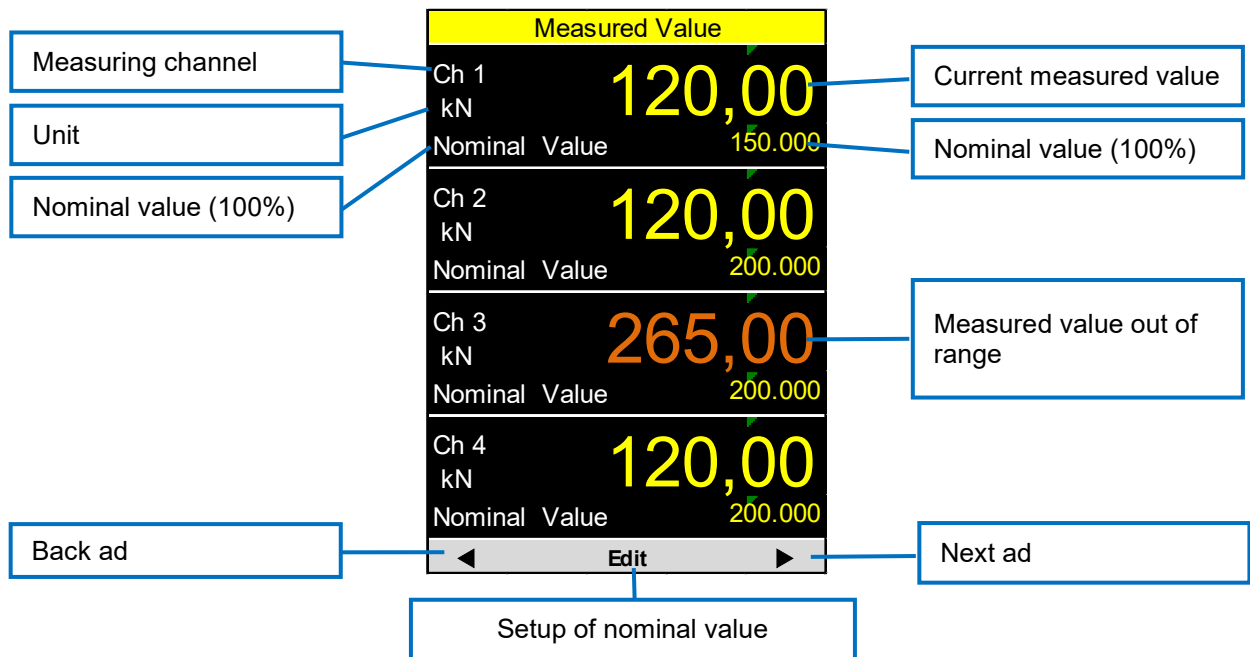
### NOTE ! Meaning of colours

**Yellow:** Values are in the set range.

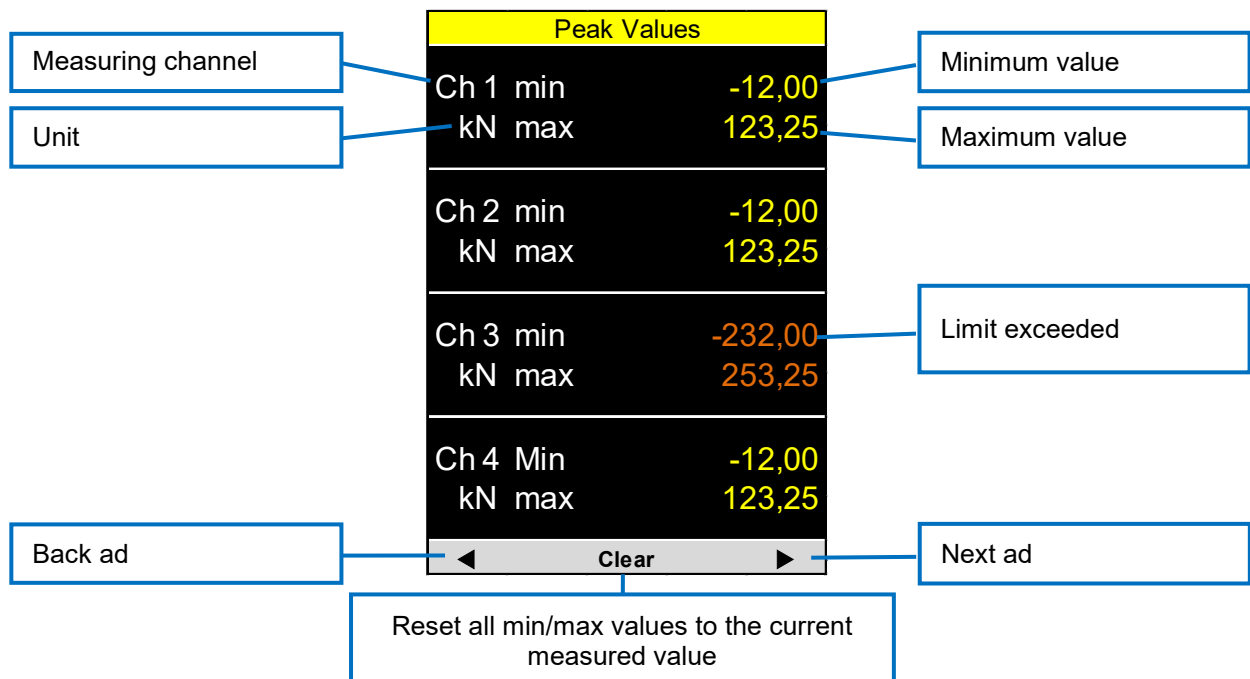
**Orange:** Values are outside the set measuring range. The device works still right. *Setting via ASTAS2 software "Overload, underload"*

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

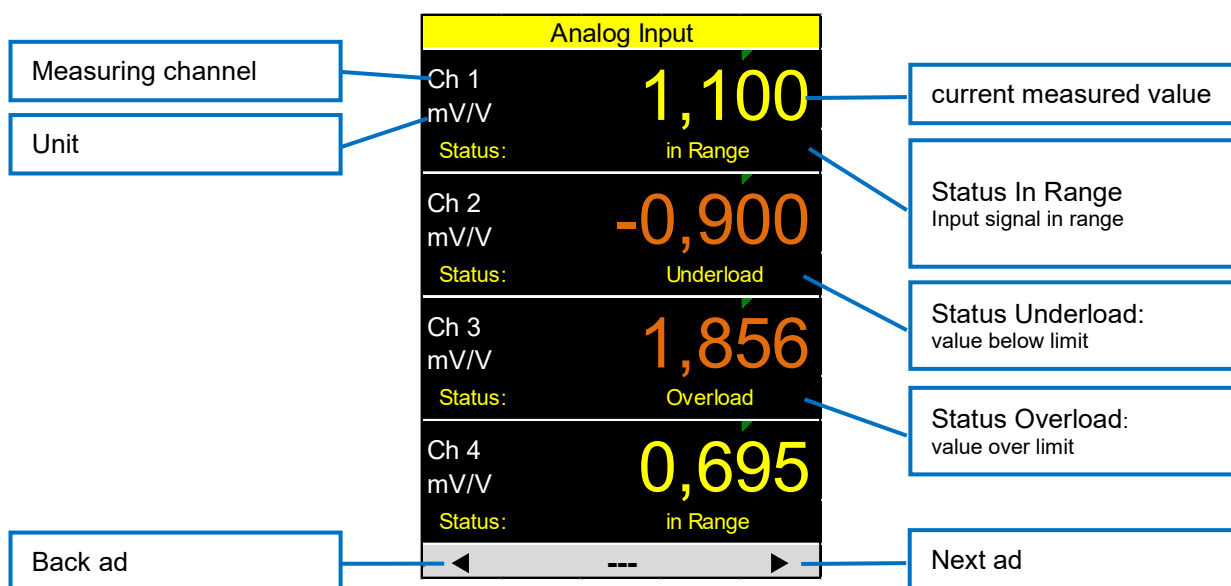
### 7.1. Measured Value



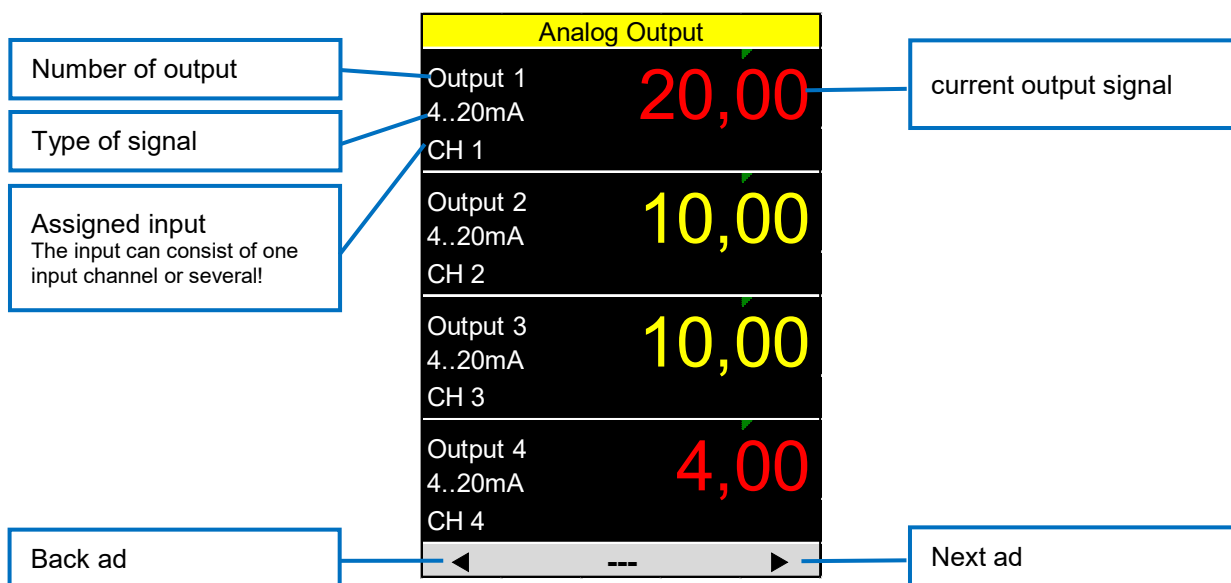
### 7.2. Peak Values



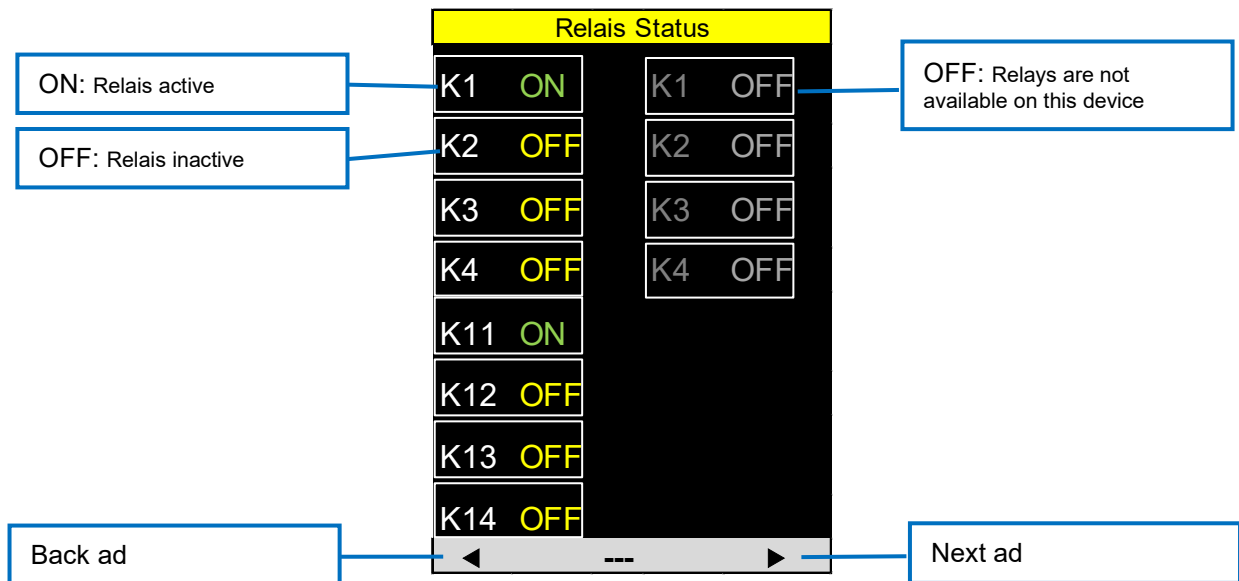
### 7.3. Analog Input



### 7.4. Analog Output



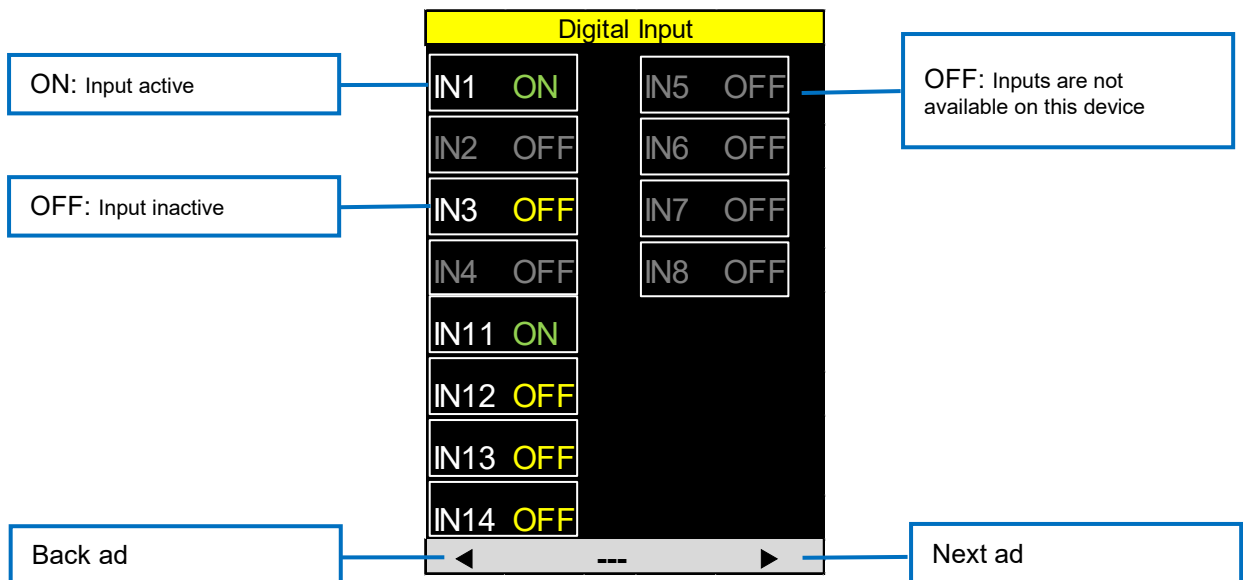
### 7.5. Relais Status



**NOTE!** ON - the relays are active

- Overload (**Ovl**)- The relays switch off when the switch points (SP x) is reached
- Underload (**Unl**) The relays switch off when the switch points (SP x) to go below the limit

### 7.6. Digital Input

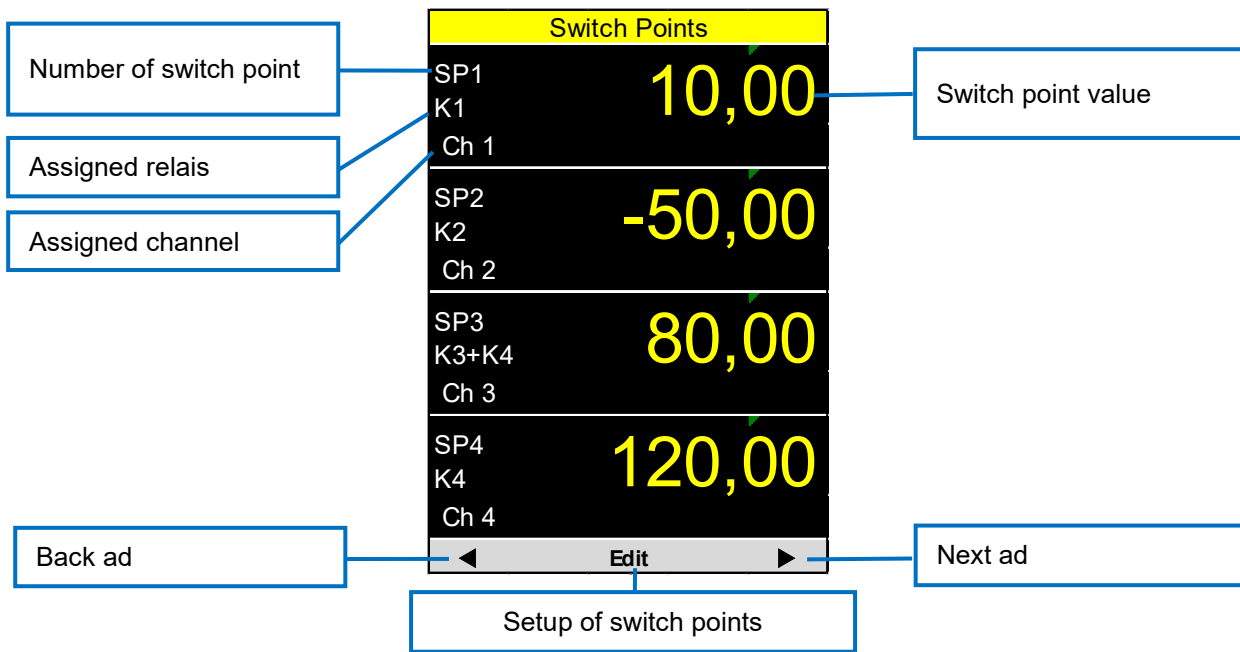


**Function**      Function selection for digital input: Tare / Clear Min/Max / Load collective counter (LKZ)



**NOTE!** ON - The digital inputs are switched with an input voltage signal  $\geq 4.5$  to 24 VDC (connection "IN n" and "R n")!

### 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<sup>®2!</sup>**

1. Select the menu "Measured Value"

Measured Value	
Ch 1 kN	120,00
Nominal Value	150.000
Ch 2 kN	120,00
Nominal Value	200.000
Ch 3 kN	265,00
Nominal Value	200.000
Ch 4 kN	120,00
Nominal Value	200.000
◀ Edit ▶	

Edit – Change to the menu for setting the nominal value parameters

2. Select the channel Ch

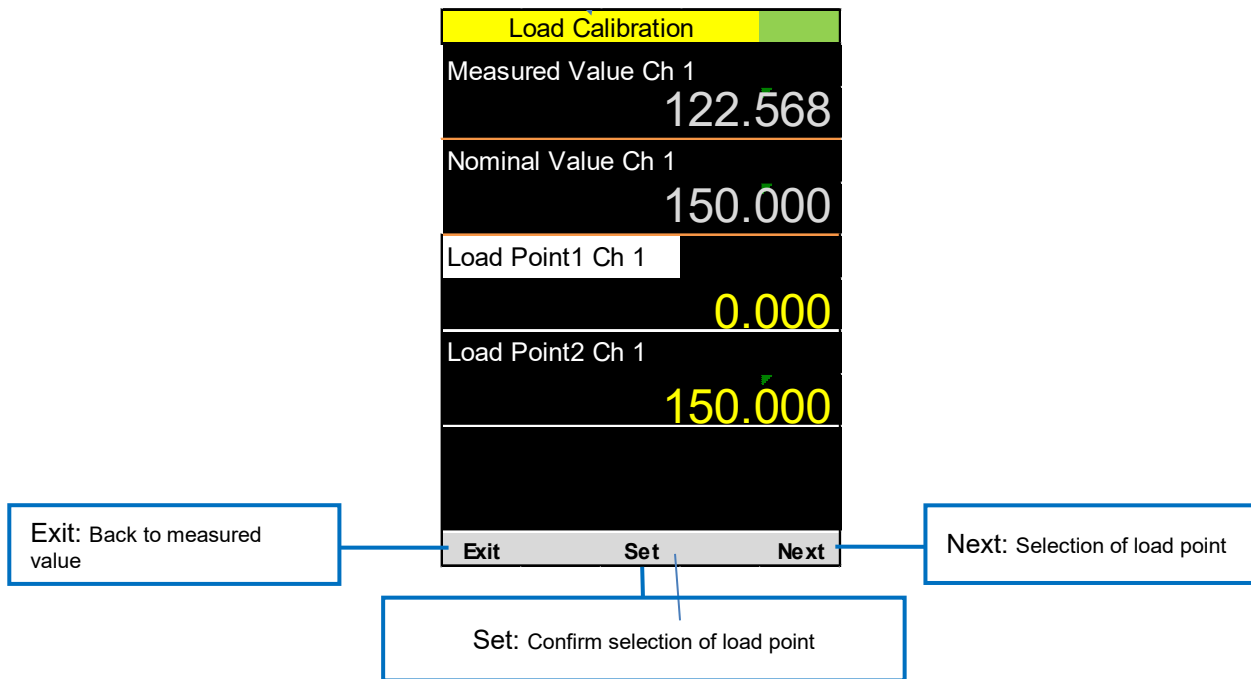
Measured Value	
Ch1 kN	120,00
Nominal 150,00	150.000
Ch2 kN	120,00
Nominal 200,00	200.000
Ch3 kN	120,00
Nominal 200,00	200.000
Ch4 kN	120,00
Nominal 200,00	200.000
Exit Select Next	

Exit – Back to Measured Value

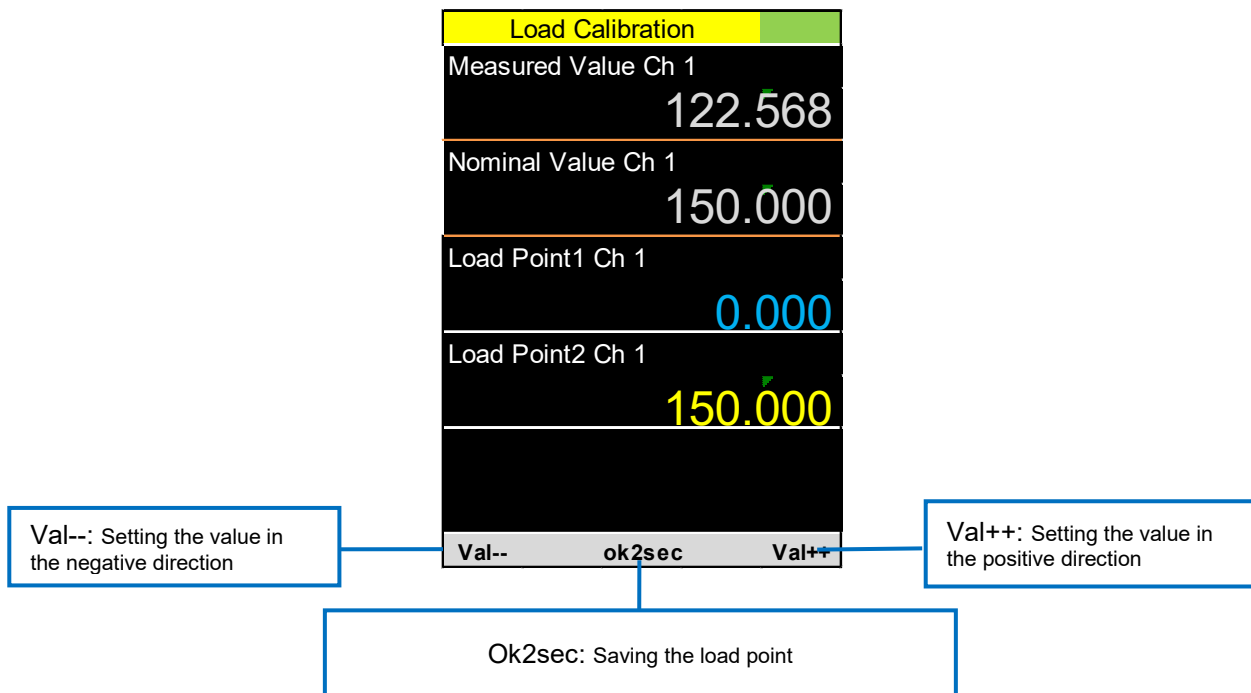
Select – Confirm selection

Next – Selection of the next channel

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"

Switch Points	
SP1 K1 Ch 1	10,00
SP2 K2 Ch 2	-50,00
SP3 K3+K4 Ch 3	80,00
SP4 K4 Ch 4	120,00
◀ Edit ▶	

Edit: Change to the menu for setting the switch points

2. Select the switch point

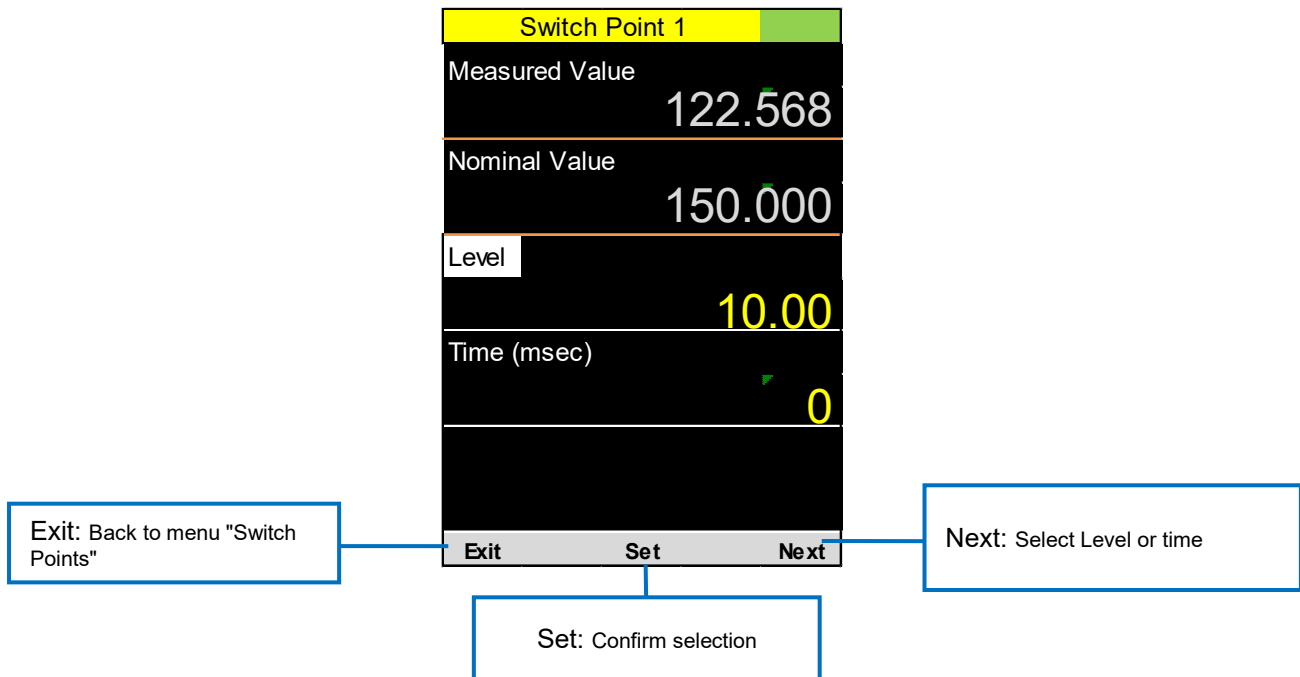
Switch Points	
SP1 K1 Ch 1	10,00
SP2 K2 Ch 2	-50,00
SP3 K3+K4 Ch 3	80,00
SP4 K4 Ch 4	120,00
Exit    Select    Next	

Exit: Back to menu "Switch Points"

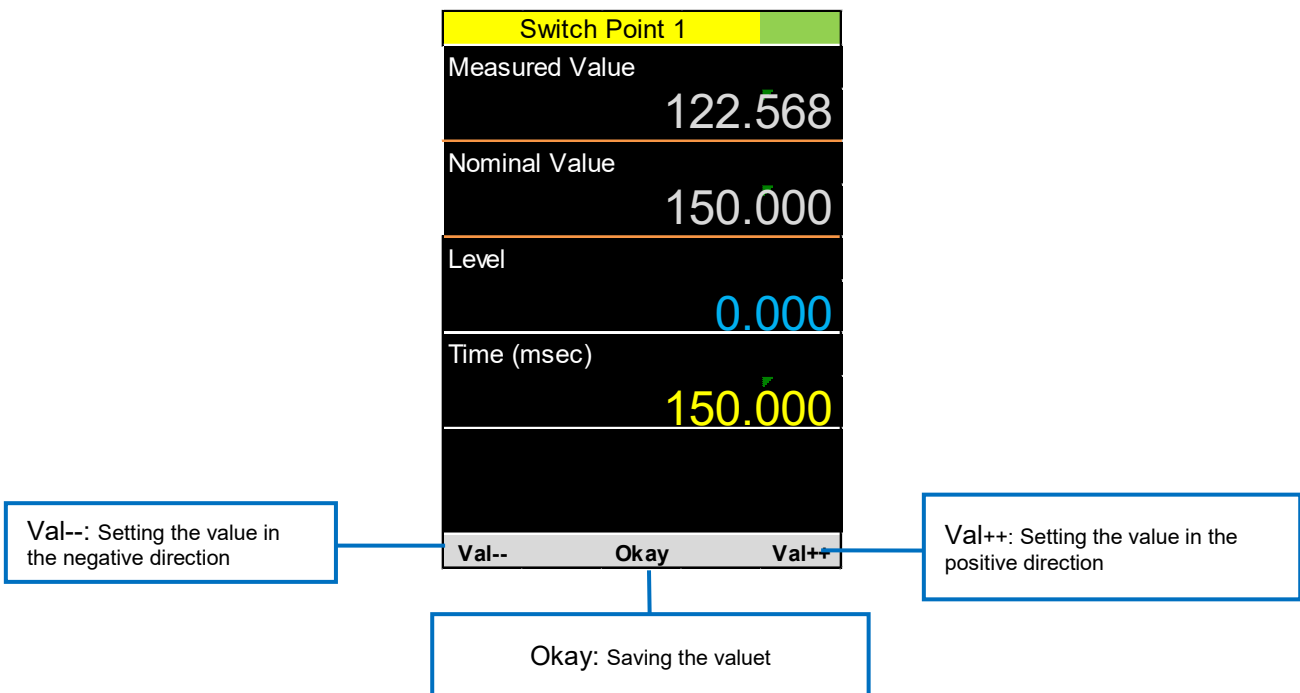
Select: Confirm the switch point

Next: Go to the next 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	The input signal exceeds the permissible range. - Sensor not connected - Cable interruption - Extreme sensor overload	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



### EU-Konformitätserklärung EC Declaration of Conformity

No. 02/23

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

Anschrift: Marschnerstraße 26, 01307 Dresden  
Adress: Bundesrepublik Deutschland

Produktbezeichnung: LS 1000  
Schaltverstärker für Normschiene

Product description: LS 1000  
Switching amplifier for DIN rail

Weitergabe sowie Vervielfältigung dieser Unterlage, Verwertung und Mitteilung ihres Inhaltes ist nicht gestattet, soweit nicht ausdrücklich zugestanden. Zuwiderhandlungen verpflichten zu Schadensersatz. Alle Rechte für den Fall der Patentierung oder Gebrauchsmuster-Eintragung werden vorbehalten.

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.<br>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.<br>Council Directive relating to electrical equipment to use within particular limits of voltage.                                  |

Dresden, den 13.07.2023

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

A.S.T. - Angewandte System Technik GmbH  
Mess- und Regeltechnik  
Marschnerstraße 26, D-01307 Dresden

<http://www.ast.de>  
Tel (0351) 44 55 30  
Fax (0351) 4455-451

Geschäftsführer:  
Matthias Boeck  
HRB-Nr.: 5910  
Kreisgericht  
Dresden

Bankverbindung:  
Ostsächsische  
Sparkasse Dresden  
BLZ 850 503 00  
Konto 3120 1040 93

## **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“

Weitergabe sowie Vervielfältigung dieser Unterlage, Verwertung und Mitteilung ihres Inhaltes ist nicht gestattet, soweit nicht ausdrücklich zugestanden. Zuwiderhandlungen verpflichten zu Schadensersatz. Alle Rechte für den Fall der Patenterteilung oder Gebrauchsmuster-Eintragung werden vorbehalten.

Seite - 2 -

A.S.T. - Angewandte System Technik GmbH  
Mess- und Regeltechnik  
Marschnerstraße 26, D-01307 Dresden

<http://www.ast.de>  
Tel (0351) 44 55 30  
Fax (0351) 4455-451

Geschäftsführer:  
Matthias Boeck  
HRB-Nr.: 5910  
Kreisgericht  
Dresden

Bankverbindung:  
Ostsächsische  
Sparkasse Dresden  
BLZ 850 503 00  
Konto 3120 1040 93