

# LED-Line

## Analogue Display

### General Description

The LED-Line range of displays are highly versatile and economic analogue bargraph indicators. The bright LEDs allow rapid reading of displayed values and trends at a glance.

### Advantages

- Rapid reading of displayed values and trends
- Low energy consumption
- Minimal heat dissipation
- Slim design
- Easy installation in front panels
- Minimal wiring
- Standard and customised scales available

### Applications

LED Line displays are ideally suited wherever the consumption, the flow, or the dosage of media such as water, gas, electricity or granules must be monitored and values read very rapidly.

- Pressure
- Temperature
- Speed
- Revolutions
- Viscosity
- Tolerance
- Flow
- Fluid levels

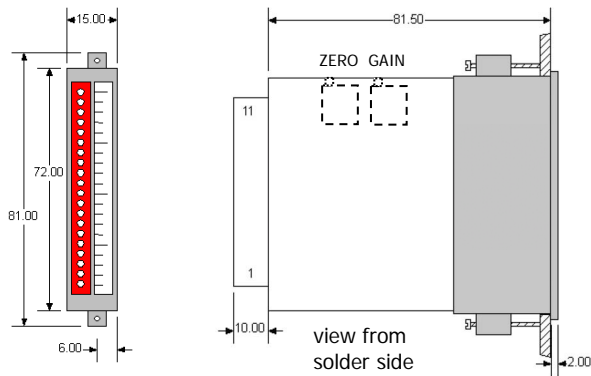


### Technical Data

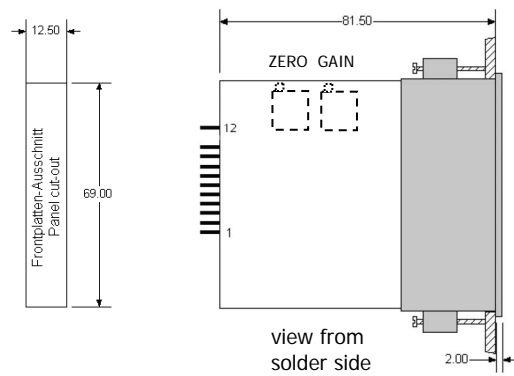
<b>Display</b>	21 dots, incl. zero dots or bar	<b>Power input</b>	Full scale nominal 20 mADC
Type of display	0 - 100% or $\pm 50\%$	Maximum current	$\pm 60$ mADC
Mode of display	last three dots flash	Input resistance	25.5 Ohm
Overflow	fixed or external setting	<b>Power supply</b>	10 - 30 VDC / 8 - 100 mA
Display brightness	fixed or external setting	<b>Connectors</b>	screw terminal or pin connector
Display colors	red or green	<b>Mounting</b>	front panel
Increment per dot	5 %	<b>Housing colors</b>	grey or black
Zero point	adjustable (e.g. for 4-20 mA)	<b>CE-Conformity</b>	EN 61326-1
Scale length	adjustable		- EMV-Emission: Class B, residential envir.
Scales	self-adhesive, various scales available		- EMV-Immunity t: industrial environment
<b>Voltage input</b>			RoHS-compliant
Number of inputs	4		
Nominal final values	1, 5, 10 und 50 VDC		
Maximum voltage	$\pm 60$ VDC		
Input resistance	>100 kOhm		

Subject to technical changes

**Dimensions Types L-2x40xxxC**  
with screw terminal



**Dimensions Types L-2x40xxxB**  
with pin connector



**Type Code**

<b>LED-Line</b>		<b>L</b>	<b>-</b>	<b>2</b>	<b>X</b>	<b>4</b>	<b>0</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Build size</b>	72 mm			<b>2</b>							
<b>Housing color</b>	grey black				<b>A</b> <b>B</b>						
<b>Type</b>						<b>4</b>	<b>0</b>				
								<b>1</b>	<b>0</b>		
								<b>1</b>	<b>4</b>		
								<b>2</b>	<b>7</b>		
<b>Functions</b>								<b>3</b>	<b>1</b>		
• Type of display	Bar Dots	X -	X -	- X	- X						
• Scale	0...100% -50...+50%	X -	- X	X -	- X						
• Overflow	last three dots flash	X	X	X	X						
• Zero point	LED permanently lit LED switches off	X -	X -	- X	- X						
• Current meas.	25 Ohm shunt	X	X	X	X						
<b>Display color</b>	green red									<b>1</b> <b>3</b>	
<b>Connector</b>	Pin connector Screw terminal										<b>B</b> <b>C</b>

Ordering example: L-2A40103C

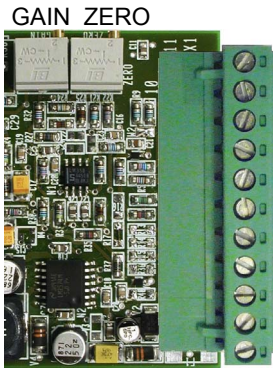
Build size **2** = 72mm; Housing color: **A** = grey, Function: **10** = Bardisplay, 0...100%, with overrange indication; Display color: **3** = red; Connector type: **C** = Screw terminal

**LED-Line Scales**

Display range Font	Bestell-Nr.			
	Horizontal mounting		Vertikal mounting	
	Black on Silver	Silver on Black	Black on Silver	Silver on Black
0...0,5...1,0	CU309002C	CU309002D	--	--
0...1,0	--	--	CU309003A	CU309003B
-50...0...+50	CU309008C	CU309008D	--	--
0...10...20	--	--	CU309012A	CU309012B
0...5...10	CU309013C	CU309013D	CU309014A	CU309014B
0...50...100	CU309030C	CU309030D	CU309031A	CU309031B
0...10...20.....100	--	--	CU309182A	CU309182B
0...5...10...15	--	--	CU309202A	CU309202B
0...25...50.....125 %	--	--	CU309207A	CU309207B
0...10...20.....100 %	--	--	CU309217A	CU309217B

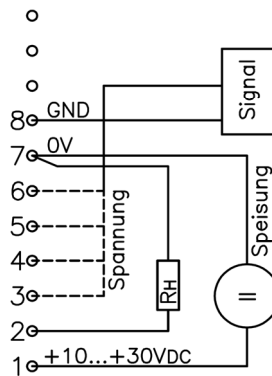
Customised scales are available on request

## Connectors Types L-2x40xxxC with screw terminal

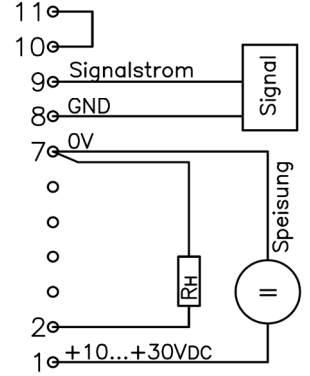


Number	Function
11	Bridge for current meas.
10	Bridge for current meas.
9	20 mADC
8	Signal GND
7	Supply 0 V
6	50 VDC
5	10 VDC
4	5 VDC
3	1 VDC
2	LED-Brightness
1	Supply +10 ... +30 VDC

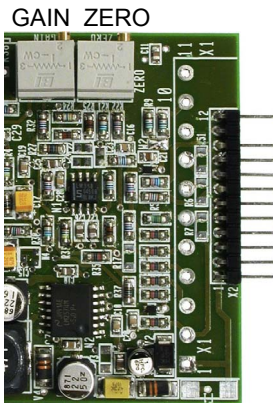
### Voltage measurement



### Current measurement

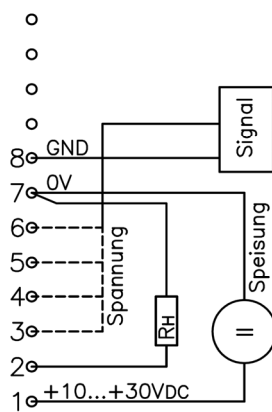


## Connectors Types L-2x40xxxB with pin connector

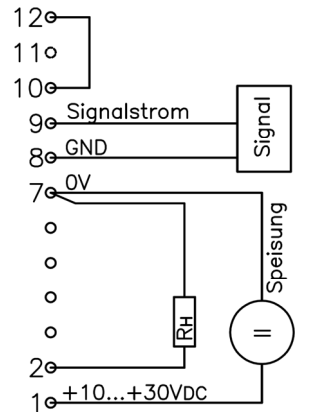


Number	Function
12	Bridge for current meas.
11	Connector-Coding
10	Bridge for current meas.
9	20 mADC
8	Signal GND
7	Supply 0V
6	50 VDC
5	10 VDC
4	5 VDC
3	1 VDC
2	LED-Brightness
1	Supply +10 ... +30 VDC

### Voltage Measurement



### Current Measurement



### Inputs

For each function, a dedicated connection port is provided. Only one port may be connected at a time.

Caution: There is no galvanic separation between the supply voltage and the measuring circuit. Analog-GND and supply - 0V are hard wired.

The LED Line may only be connected to circuits of measurement category I (EN 61010-1). These circuits must not be connected directly to the power mains.

Caution: voltages over 70 VDC, or in humid environment over 35 VDC, can be harmful if touched by humans!



### LED-Brightness

Resistance R <sub>H</sub> (at ports 2 und 7)	Brightness of LEDs
open / >50 kOhm	Works setting (perm.)
0 kOhm	Minimum
approx. 10 kOhm	≈ approx. Works set.
50 kOhm	Maximum

Port «LED-Brightness» must never be connected to external voltage.

### Note for Installation

Should the LED-Line Display be connected to power- or signal wires of more than 3 m length, measures to protect from overvoltage and EMC-emissions may be necessary.

## Calibration of LED Line Displays

The scale and the zero point of LED Line displays can be calibrated according to requirements of the application. Factory pre settings of Led Line displays correspond to the mode "0 to +5" VDC.

Adjustment of settings to the scale endpoints, follows procedures referred to in sections a) to c).

Adjustment of settings by utilising switching thresholds is described in example d) below "display 0 - 100%". Adjustment of settings in display modes "± 50 %" and „shifted zero point“ basically follow the same procedure.

### a) Calibration of LED Line to „scale endpoints 0 und 100 %“ (types L-2x4010xxxx und L-2x4027xxxx)

1. Set 0 V at the input, or connect to GND. Adjust with potentiometer ZERO display so, that only the first LED remains lit.
2. Adjust voltage at the input to the final display value, e.g. +10 VDC. Adjust GAIN display with potentiometer so, that the last LED lights, but does not yet flash.
3. Check: 0V at the input, if necessary readjust ZERO with potentiometer.

### b) Calibration of LED Line with „shifted zero point“ (e.g. 4 to 20 mA)

1. Set 0 mA at the input, or connect to GND. Adjust ZERO indication with potentiometer so, that the first LED only remains lit.
2. Adjust current at the input to a value within the scale e.g. 16 mA. Adjust GAIN display with potentiometer so, that the last LED lights, but does not yet flash.
3. Adjust current for display value 0 %, e.g. 4 mA. Adjust ZERO indication with potentiometer so, that the first LED only lights up.
4. Adjust current at the input to the final display value, e.g. 20 mA, readjust GAIN if necessary with potentiometer.
5. Check: Adjust current at the input for display 0 %, readjust ZERO if necessary with potentiometer, see step 3.

### c) Calibration of LED Line to „scale endpoints 50 %“ (types L-2x4014xxxx und L-2x4031xxxx)

1. Set 0 V at the input, or connect to GND. Adjust with potentiometer ZERO display so, that only the middle (11<sup>th</sup>) LED is lit.
2. Adjust voltage at the input to the final display value, e.g. +0.5 VDC. Adjust GAIN display with potentiometer so, that the last LED lights, but does not yet flash.
3. Check: 0 V at the input, with ZERO display at 0, readjust ZERO if necessary.

### d) Calibration of LED Line utilising switching thresholds (illustrated in display mode 0 to 100 %)

1. Set 2.5% of the full scale value at the input, for example, +0.25 V for +10 VDC full scale. Adjust ZERO indication with potentiometer so, that the first LED only is lit.  
Check: If more than the first LED is lit: turn potentiometer ZERO left until only the first LED is lit.
2. Set 97.5% of the full scale value at the input, for example, +9.75 V at +10 VDC full scale. Adjust GAIN indication with potentiometer so, that all but the highest LEDs are lit.  
Check: If all LEDs are lit, turn potentiometer GAIN left until the highest LED goes out and all others are lit.