

# Mobile digital amplifier for strain gauge

## Safety warnings



**General:** When mounting, initiating and operating this measuring amplifier the safety precautions and regulations have to be observed. Only staff with a corresponding qualification should work with the measuring amplifier. A non-observance of the safety regulations may cause serious injuries and/or damages. Check before initial operation the suitability of the measuring amplifier for this area of application. The technical data of this manual have to be followed.

## Characteristics

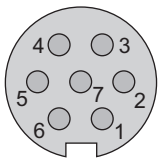


Input: 2 strain gauge full bridges (350 ohms) / Input sensitivity: 0,1...5 mV/V  
 Sensor supply: 5 VDC / Analogue output: 4...20 mA / 0...10 V  
 Digital output: 2 interface RS232 / Voltage supply: Internal accumulator  
 Option: external supply / Resolution: 12 / 14 / 15 / 16 bit  
 Combined error: 0,2% of end scale value / Indication: LCD-display  
 Memory: peak values / Degree of protection: IP 54  
 Adjustment: with RS232 interface and software  
                   with programming keys of display  
 Optionally: adaptor for connection of strain gauge sensor  
 Supplied with: counter plugs and protection kit

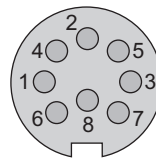
## Connector plugs

Supplied connector plugs:                   2x 7-pole (Binder 423 series) to connect strain gauge  
   1x 8-pole DIN 45326 (Binder 423 series) to connect analogue outputs

Pin assignment: view on soldered connection of pin insert

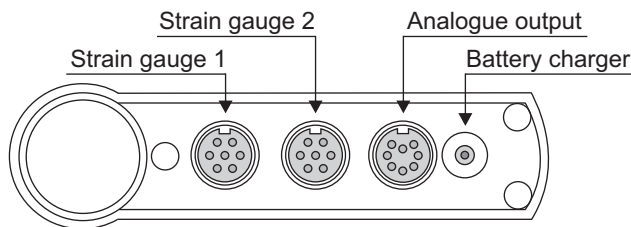


Connection strain gauge bridge  
 Connection cable Ø4...6 mm  
 Wires up to 0,75 mm<sup>2</sup>



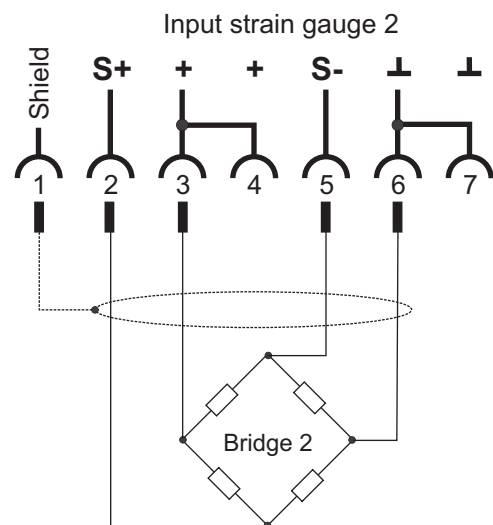
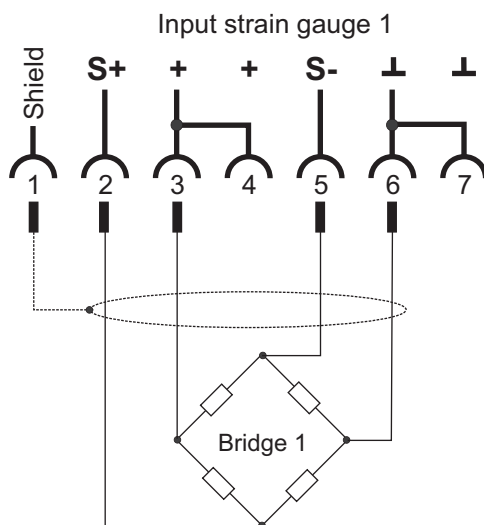
Connection analogue outputs  
 Connection cable Ø4...6 mm  
 Wires up to 0,75 mm<sup>2</sup>

## Connection top side



When using the battery charger (see accessories), it is possible to operate the measuring amplifier with discharged accumulator. The accumulator will be charged at the same time. An empty accumulator has a charging time of approx. 30 hours.

## Connection strain gauge

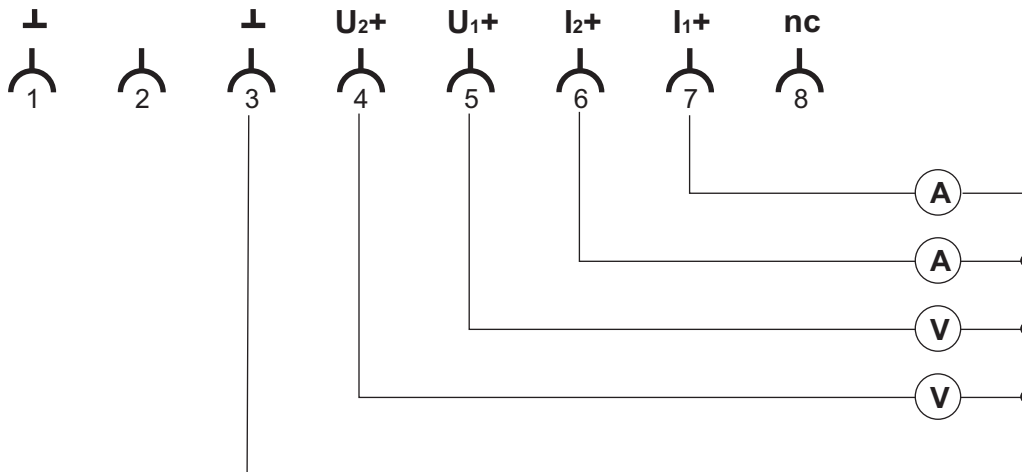


Connection 3/4 and 6/7: + and ⊥ of bridge supply 5 VDC

Connection 2 and 5: output signal of bridge **S+** and **S-**

Connection 1: Shield of connection cable (bridged internally with ⊥)

## Analog outputs



Connection 1/3: common  $\perp$  of analogue outputs

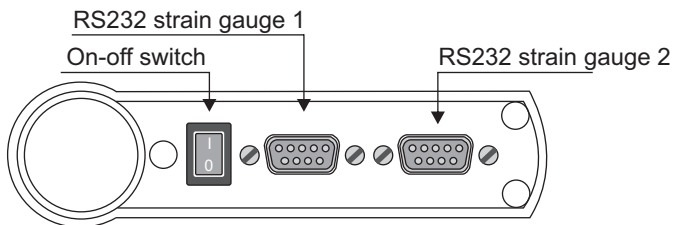
Connection 5: output voltage  $+$  strain gauge 1 (0...10 VDC)

Connection 4: output voltage  $+$  strain gauge 2 (0...10 VDC)

Connection 7: output current  $+$  strain gauge 1 (4...20 mA)

Connection 6: output current  $+$  strain gauge 2 (4...20 mA)

## Connection bottom



**Programming:** When using the software for visualization it is possible to do the settings of each strain gauge amplifier via interface RS232.



**Normal operation:** It is possible to read out the current measured value of the strain gauge amplifier with a terminal program and then process it.

## Setting into operation

Connect the strain gauge sensor(s) to the mobile amplifier, using the adaptor(s) or the 7-pole plug(s). Switch on the device. The backlighting of the display is switched on momentarily, the version of the LCD-software (**LCD v. 1.0x**) and of the software for the amplifier (**CPU v. 10x**) is indicated in succession. After that the device is turning to normal operation (Indication: **totAl 0**).

When switching on the device and no strain gauge sensor is connected, for approx. 30 seconds **HI----** is indicated for the the corresponding channel. This indication appears too, when the connected sensor is used above the adjusted upper limit value. When the sensor is used below the adjusted lower range limit, the indication is **LO----**. If the device is in operation and a strain gauge sensor is connected, the corresponding channel changes into normal operation automatically.

## Notes accumulator

If the power unit is connected, the accumulator is charged. Indication:  and  are switched on one after the other and switched off.

If no power unit is connected, the current state of charging is indicated:

 Full accumulator

  Half-full accumulator

 blinking, accumulator low (should be charged)

If the accumulator is discharged, **Batt Lo / shut off** is indicated (switch off the device to avoid a total discharge or operate the device with a connected battery charger).

**!** The device has no automatic switching-off, when accumulator is discharged. To avoid a total discharge, switch off the device with the switch.

## Notes program numbers

PN 43: Tare key (value 0 = not active / value 1 = Tare when pressing a short time / value 2 = Tare when pressing more than 2 seconds)

PN 188: Backlighting (value -1 = always on / value 0 = off / value 1...300 = operating time in seconds after pressing a key). The standard configuration is -1

PN 189: Brightness of backlighting (value 0...100 (in %)) The standard configuration is 3 (uisable for dark surroundings)

**!** The brighter the backlighting the shorter life of the accumulator.

## Notes interfaces

When activating the on-line operation with the software: indication **PCCon CH 1** for RS232 strain gauge 1, **PCCon CH 2** for RS232 strain gauge 2. The respective indication appears also for a short time, when the measuring amplifier is connected with an interface circuit to a PC.

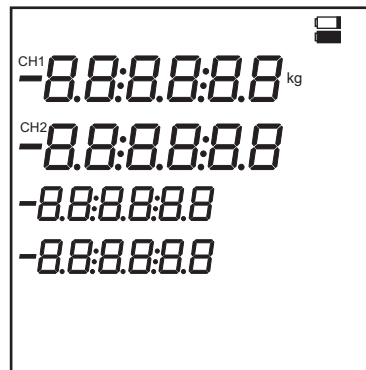
## Display

Line 1 (channel 1 for strain gauge 1)

Line 2 (channel 2 for strain gauge 2)

Line 3

Line 4



Indicates the measured value of strain gauge 1.  
Open input circuit: no indication

Indicates the measured value of strain gauge 2.  
Open input circuit: no indication

Indicates in normal operation **totAl**

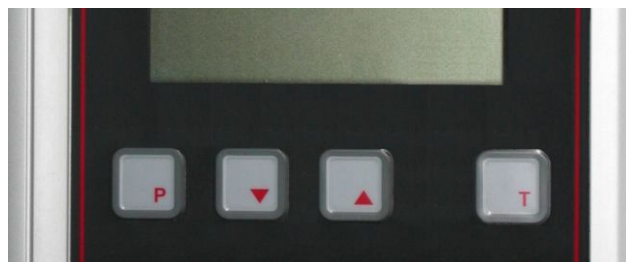
Indicates the sum of line 1 and line 2

**Note:** Line 1 and line 2 are indicating "HI" for a while, when switching on power and no strain gauge is connected

## Programming

Besides programming the ADLM-HD via serial interface it is possible with the keys of the display, too. In this case some program numbers cannot be used.

### Control keys



#### Function of keys

- ▲ increase address or value
- P ESC (leave editing mode / programming mode or reject input)
- ▼ decrease address or value
- T enter (accept address or value)

### 1.0 Programming mode (programming mode not interlocked)

To enter programming mode, press keys ▲ and ▼ simultaneously. Indication: **SELEct L.1**  
 Select the programming level by pressing ▲ or ▼ and confirm 2 times with T. Indication: **Prog** and **SELEct CH.1**.  
 Continue with 2.0

### 1.1 Programming mode (programming mode interlocked)

To enter programming mode, press keys ▲ and ▼ simultaneously. Indication: **SELEct L.1**  
 Select the programming level by pressing ▲ or ▼ and confirm with T. Indication: **CodE:L.x** (x = programming level)  
 Input the pin code (four-digit, standard is 5032) with ▲ or ▼ and confirm with T.  
 Indication: **Prog** and **SELEct CH.1**. Continue with 2.0

### Selecting channel

Select channel with ▲ or ▼ and confirm with T. Indication: **CH1** (small), in line 1 the first available address and in line 2 the value stored under this address (eg in program level 1 and channel 1: line 1: **0** / line 2: **1.03** (version of software))

### Selecting address

Select address with ▲ or ▼. Indication line 1: address / Indication line 2: stored value under this address. Confirm the selected address with T. Indication: **↕** (editing mode, small characters) / line 1: stored value under this address / line 2: changeable value in editing mode, can be stored under the selected address.

### Editing mode

The editing mode is indicated with **↕**. The top line of the display indicates the value which is stored with the selected address. This indication is for support. The value of the lower line can be changed when pressing the ▲ or ▼ key. With key T this value is stored. The display indicates the proper transfer of data with **☑**. If the transfer of data was faulty this is indicated with **☒**. Pressing the T key the editing mode is left and by pressing the ▲ or ▼ key another address can be selected.

The editing mode can be left when pressing the P key, too. In this case all changings with this address will not be stored and a new address can be selected by pressing the ▲ or ▼ key.

When pressing the ▲ or ▼ key (in editing mode) a longer time the unit position changes first (20 counts), then the tens digit, the hundreds digit and in the end thousands digit (each 20 counts).

### Leaving programming mode

To leave the programming mode, the P key has to be pressed.

## Programming software

### Notes

Before completing the link (online-mode) via the RS232-interface to the measuring amplifier, the display module has to be switched over in programming mode by pressing the ▲ and ▼ key. The display indicates this mode with **Prog**.

If any key of the display module is pressed during online mode, the display is reset every 4 seconds (all symbols flash). The ADLM-HA is in normal mode, as soon as the PC-software has sent the command for offline mode.

If the PC software is switched over into offline mode and no key of the display module was pressed during online mode, the programming mode has to be left by pressing the P key. Then the ADLM-HA is in normal mode.

If the PC software is quitted without switching over into offline mode, the voltage supply of the ADLM-HD has to be disconnected temporarily.

## Addresses

addr.	status	function	bytes	value	WE	E1	E2	E3
0	R	version software (xx.yy / x=MSB, y=LSB)	2			x	x	x
1	R/W	strain gauge voltage (mV)	2					x
2	R/W	sensitivity ( $\mu\text{V/V}$ )	2					x
3	R/W	amplification	2	1 / 2 / 4 / 8		x	x	x
4	R/W	resolution	2	12 / 14 / 15 / 16 bit		x	x	x
5	R/W	measuring cycle (ms)	2			x	x	x
6	R/W	minimum AD-value	2			x	x	x
7	R/W	maximum AD-value	2			x	x	x
8	R/W	tare offset	2		0	x	x	x
9	W	tare trigger		x				
10	R/W	0% calibration current output	2			x	x	x
11	R/W	100% calibration current output	2			x	x	x
12	R/W	measuring period (ms)	2			x	x	x
13	R/W	behaviour on error	2					x
14	R/W	value for error	2					x
20	R/W	0% calibration voltage output	2			x	x	x
21	R/W	100% calibration voltage output	2			x	x	x
22	R/W	measuring period (ms)	2			x	x	x
23	R/W	behaviour on error	2					x
24	R/W	value for error	2					x
30	R/W	baud rate	2					x
31	R/W	start bits	2					x
32	R/W	data bits	2					x
33	R/W	parity	2					x
34	R/W	stop bits	2					x
35	R/W	protocol	2					x
36	R/W	0% value indication	2			x	x	x
37	R/W	100% value indication	2			x	x	x
38	R/W	test load	2					x
39	R/W	decimal-place	2		1	x	x	x
40	R/W	company logo		0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8		x	x	x
41	R/W	unit line 1		0 / 1...22		x	x	x
42	R/W	unit line 2		0 / 1...35		x	x	x
43	R/W	tare key		0 / 1 / 2		x	x	x
44	R/W	mode sum up		0 / 1 / 3		x	x	x
50	R/W	IST 0	2					x
51	R/W	IST 1	2					x
52	R/W	IST 2	2					x
53	R/W	IST 3	2					x
54	R/W	IST 4	2					x
55	R/W	IST 5	2					x
56	R/W	IST 6	2					x
57	R/W	IST 7	2					x
58	R/W	IST 8	2					x
59	R/W	IST 9	2					x
60	R/W	IST 10	2					x
61	R/W	IST 11	2					x
62	R/W	IST 12	2					x
63	R/W	IST 13	2					x
64	R/W	IST 14	2					x
65	R/W	IST 15	2					x
66	R/W	IST 16	2					x
70	R/W	SOLL 0	2					x
71	R/W	SOLL 1	2					x
72	R/W	SOLL 2	2					x
73	R/W	SOLL 3	2					x
74	R/W	SOLL 4	2					x
75	R/W	SOLL 5	2					x
76	R/W	SOLL 6	2					x
77	R/W	SOLL 7	2					x
78	R/W	SOLL 8	2					x
79	R/W	SOLL 9	2					x
80	R/W	SOLL 10	2					x
81	R/W	SOLL 11	2					x
82	R/W	SOLL 12	2					x
83	R/W	SOLL 13	2					x
84	R/W	SOLL 14	2					x
85	R/W	SOLL 15	2					x
86	R/W	SOLL 16	2					x
90	R/W	customized serial number	16					x
100	R/W	AD-Value: G= 1 / Res= 12 / Inp= -20 mV	2					x
101	R/W	AD-Value: G= 1 / Res= 12 / Inp= +20 mV	2					x
102	R/W	AD-Value: G= 1 / Res= 14 / Inp= -20 mV	2					x
103	R/W	AD-Value: G= 1 / Res= 14 / Inp= +20 mV	2					x
104	R/W	AD-Value: G= 1 / Res= 15 / Inp= -20 mV	2					x
105	R/W	AD-Value: G= 1 / Res= 15 / Inp= +20 mV	2					x
106	R/W	AD-Value: G= 1 / Res= 16 / Inp= -20 mV	2					x
107	R/W	AD-Value: G= 1 / Res= 16 / Inp= +20 mV	2					x

## Addresses continued

addr.	status	function	bytes	valueert	WE	E1	E2	E3
110	R/W	AD-value: G= 2 / res= 12 / inp= -10 mV	2					x
111	R/W	AD-value: G= 2 / res= 12 / inp= +10 mV	2					x
112	R/W	AD-value: G= 2 / res= 14 / inp= -10 mV	2					x
113	R/W	AD-value: G= 2 / res= 14 / inp= +10 mV	2					x
114	R/W	AD-value: G= 2 / res= 15 / inp= -10 mV	2					x
115	R/W	AD-value: G= 2 / res= 15 / inp= +10 mV	2					x
116	R/W	AD-value: G= 2 / res= 16 / inp= -10 mV	2					x
117	R/W	AD-value: G= 2 / res= 16 / inp= +10 mV	2					x
120	R/W	AD-value: G= 4 / res= 12 / inp= -5 mV	2					x
121	R/W	AD-value: G= 4 / res= 12 / inp= +5 mV	2					x
122	R/W	AD-value: G= 4 / res= 14 / inp= -5 mV	2					x
123	R/W	AD-value: G= 4 / res= 14 / inp= +5 mV	2					x
124	R/W	AD-value: G= 4 / res= 15 / inp= -5 mV	2					x
125	R/W	AD-value: G= 4 / res= 15 / inp= +5 mV	2					x
126	R/W	AD-value: G= 4 / res= 16 / inp= -5 mV	2					x
127	R/W	AD-value: G= 4 / res= 16 / inp= +5 mV	2					x
130	R/W	AD-value: G= 8 / res= 12 / inp= -2,5 mV	2					x
131	R/W	AD-value: G= 8 / res= 12 / inp= +2,5 mV	2					x
132	R/W	AD-value: G= 8 / res= 14 / inp= -2,5 mV	2					x
133	R/W	AD-value: G= 8 / res= 14 / inp= +2,5 mV	2					x
134	R/W	AD-value: G= 8 / res= 15 / inp= -2,5 mV	2					x
135	R/W	AD-value: G= 8 / res= 15 / inp= +2,5 mV	2					x
136	R/W	AD-value: G= 8 / res= 16 / inp= -2,5 mV	2					x
137	R/W	AD-value: G= 8 / res= 16 / inp= +2,5 mV	2					x
140	R/W	DA-value 4 mA	2					x
141	R/W	DA-value 12 mA	2					x
142	R/W	DA-value 20 mA	2					x
143	R/W	DA-value 0 V	2					x
144	R/W	DA-value 5 V	2					x
145	R/W	DA-value 10 V	2					x
150	R/W	GW1 switch off value	2		20	x	x	x
151	R/W	GW1 switch on value	2		10	x	x	x
152	R/W	GW1 switch off delay (ms)	2		0	x	x	x
153	R/W	GW1 switch on delay (ms)	2		0	x	x	x
160	R/W	GW2 switch off value	2		30	x	x	x
161	R/W	GW2 switch on value	2		40	x	x	x
162	R/W	GW2 switch off delay (ms)	2		0	x	x	x
163	R/W	GW2 switch on delay (ms)	2		0	x	x	x
180	R/W	memory value minimum	2				x	x
181	R/W	memory value maximum	2				x	x
182	R/W	working hour meter s	2				x	x
183	R/W	working hour meter h	2				x	x
188	R/W	working time backlighting		-1 / 0 / 1...300 (s)	-1	x	x	x
189	R/W	brightness backlighting		0...100 (%)	3	x	x	x
190	R/W	serial number Müller	16				x	x
191	R/W	date (week= LSB / year= MSB)	2				x	x
192	W	pin code level 1			5032	x		
193	W	pin code level 2			5032	x	x	
194	W	pin code level 3			5032	x	x	x
195	W	pin code level 4		(factory-set only)	5032	x	x	x
196	R/W	pin code preset			5032			x
200	R	current measuring value	2			x	x	x
201	R	current AD-value	2			x	x	x
203	R/W	AD-value accumulator voltage				x	x	x
210	W	test current output	2				x	x
211	W	test voltage output	2				x	x
240	R/W	dummy-int 0	2					x
241	R/W	dummy-int 1	2					x
242	R/W	dummy-int 2	2					x
243	R/W	dummy-int 3	2					x
244	R/W	dummy-int 4	2					x
245	R/W	dummy-int 5	2					x
246	R/W	dummy-int 6	2					x
247	R/W	dummy-int 7	2					x
248	R/W	dummy-string 0	16					x
249	R/W	dummy-string 1	16					x
250	R/W	check sum addresses 1 - 199	2					x
254	R/W	mode	2	0=normal 1=linearisation			x	x
255	R	version software (xx.yy / x=MSB, y=LSB)				x	x	x

**Input**

Amplifier 1 / 2: 1 strain gauge full bridge (350 ohms)  
 Sensitivity: 0,1...5 mV/V (programmable)  
 Interface: RS232 (for programming)

**Output**

Analogue: each amplifier 2 outputs (programmable)  
 0...10 V and 4...20 mA (standard)  
 optionally 2...10 V or 0...20 mA  
 Current: working resistance <500 Ohm  
 Voltage: load resistor > 600 Ohm  
 Interface: 1x RS232 (each amplifier)  
 data format: ASCII (can be read out with any  
 terminal program)  
 Sensor supply: 5 VDC 30 mA maximum (each amplifier)

**Indication**

Display: microprocessor based multifunntion indicator  
 with bachlighting (to switch on)  
 Function: 4 keys for programming  
 Indication: current values / minimum/maximum values  
 / diagnostic values

**Adjustment**

Interface: RS232 with programming software  
 Keys: 4 keys of display module  
 Tare: key on display PCB  
 Measuring rate: 10 ms...5 s (programmable)  
 Filter: 10 ms...5 s (programmable)

**Accuracy**

Resolution: 12 /14 /15 /16 bit  
 at measuring rate: 128 / 32 / 16 / 8 per second  
 Combined error: +/- 0,2% of end scale value  
 Temperature coeff.: <50 ppm/K

**Power supply**

Voltage: accumulator pack 6 round cells R6 (NiMH)  
 Capacity: 7,2 V 2 Ah  
 Power consumption: with options approx. 1 W  
 Battery charger: input: 230 VAC  
 output: 9 V / 1 A

**Ambient conditions**

Operating temperature: -10...+60°C  
 Storing temperature: -20...+70°C

**Mechanics**

Enclosure: mobilCase 181 x 138 x 32/38 mm  
 Material: extruded aluminium profile  
 Colour: silver anodised  
 Degree of protection: IP 54  
 Weight: approx.900 g (with accumulator)  
 Connection: 2x strain gauge: Binder 723 series, 7-pole  
 panel jack, 09 0128 99 07)  
 analog output: 1x Binder 723 series, 8-pole  
 panel jack (09 174 90 08)  
 RS232 output: 2x SUB-D jack 9-pole  
 charging jack: jack socket 3,5 mm

**Accessories**

Protection kit: 2 TPE covering caps with adjustable and  
 sturdy shoulder strap (supplied with device)  
 Counter plugs: 2 Binder 723 series 7-pole  
 1 Binder 723 series 8-pole  
 (supplied with device)  
 Battery charger for internal accumulator  
 Adaptor for connection of load cells  
 V24 programming cable with software