

## Series S102 – Digital displays for the weighing technology

### Operating instructions

This operating manual applies to the following unit versions:

**S102-W6/14/0R-00x/xB-S0**    Interface RS485 and RS232  
**S102-W6/14/0R-00x/xB-T0**    Interface TTY and RS232

#### Description

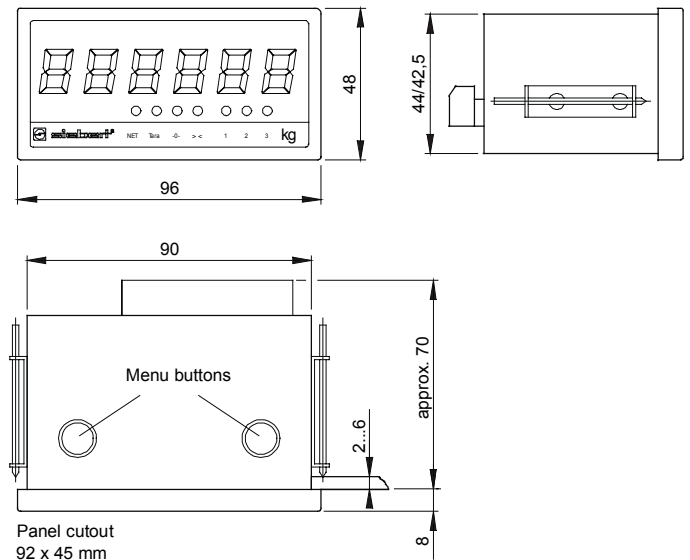
The display has six characters for displaying the weight value and seven LEDs for displaying the following status messages:

Net	Net value
Tara	Tared weight
-0-	Measured value = zero (1/4 d)
><	Scales stationary
1	Weighing range 1
2	Weighing range 2
3	Weighing range 3

The displays are controlled via a serial interface.

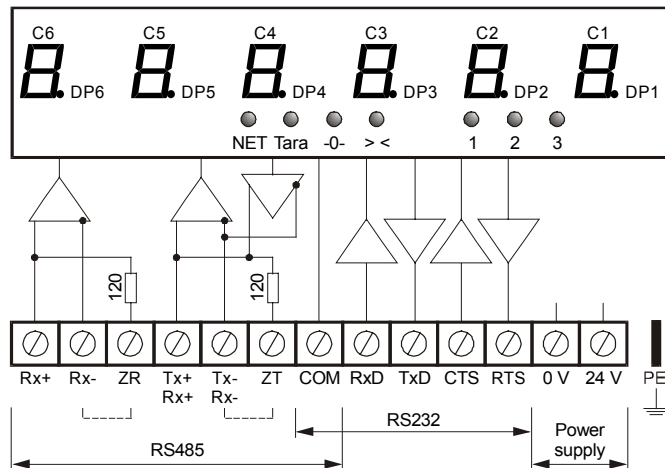
A test certificate from the Physikalisch-Technische Bundesanstalt (PTB), Number D09-04.09, has been issued for the displays.

#### Dimensions

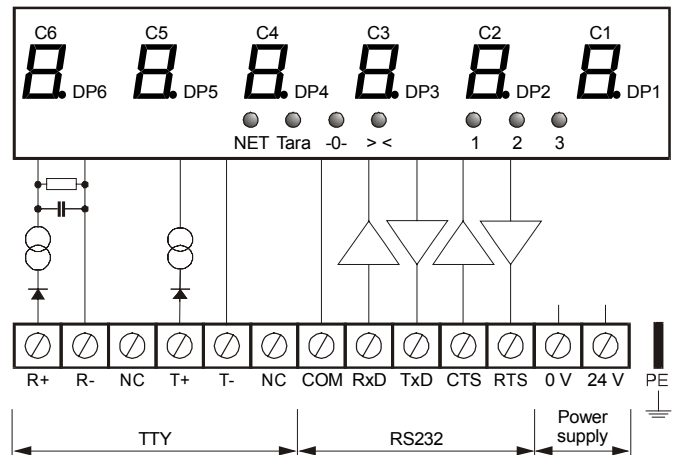


#### Basic circuit diagram

S102-W6/14/0R-00x/0B-SM (Interface RS485 and RS232)



S102-W6/14/0R-00x/0B-TM (Interface TTY and RS232)



#### Technical data

Display	LED red, character height 14 mm	Protection type (front)	S102-W6/14/0R-000/0B-xx: IP40 S102-W6/14/0R-001/0B-xx: IP65
Power supply	18...30 V DC, galvanically isolated, protected against reversed polarity	Operating temperature	0...50 °C
Power consumption	approx. 4 VA	Storage temperature	20...70 °C
Connecting technology	Plug-in terminal strip	Humidity	95 % (non condensing)
		Weight	approx. 170 g

## Setup-menu

The parameterization of the unit is carried out in a menu (see menu table) that is shown in the display and operated by menu buttons.

To activate the menu, press both menu buttons simultaneously (for approx. 1 s) until menu item 1 appears flashing in the display.

The menu items can now be selected by pressing the left button and settings within the individual items by pressing the right button.

Short successive pushes of a button lead to the preceding menu item or parameter within a menu item.

In menu item (U) pressing the left button exits the menu. Depending on the parameters selected in menu item U, the activated parameters are saved (Set), not saved (Escape), or the factory settings are restored (Default).

After exiting the menu the unit behaves as it does when the power has been switched on.

Exiting the menu without saving the selected parameters is possible by pressing both menu buttons simultaneously (approx. 1 s) or is effected automatically if for more than 60 s no menu button is pressed.

## Interface

The interface has the following formats, depending on the display version:

- S102-xx/14/0x-00x/0B-S0: RS485 and RS232
- S102-xx/14/0x-00x/0B-T0: TTY and RS232

A selection is made in menu item 1 between the formats available in the display.

Depending on the setting in menu item 1, the following control types are possible for the interface format RS485:

- Setting 485                      Control of a single device
- Setting 485.4                  Control via a 4-wire bus (Full-duplex mode)
- Setting 485.2                  Control via a 2-wire bus (Half-duplex mode)

The data lines of the RS485 must be terminated at both ends. The resistors required here are already present in the hardware of the interface and can be easily connected with a wire jumper on the terminal strip (see principle circuit diagram, terminals ZR, ZT). The corresponding project planning information can be found under 'RS485 interface'.

## Menu table

In the menu, depending on the unit version or on the setting of another menu item individual menu items or settings can be suppressed. Factory settings are marked with \*

Menüpunkt	Einstellungen	Anzeige	
1	Interface	RS232*	1 232
		RS485 (4-wire point to point)	1 485
		RS485 (4-wire bus)	1 4-4
		RS485 (2-wire bus)	1 4-2
		TTY	1 444
2	Data format	7 bit + even or odd parity	2 7
		8 bit*	2 8
3	Parity	none*	3 0
		odd	3 1
		even	3 2
4	Baud rate	1200*	4 12
		2400	4 24
		4800	4 48
		9600	4 96
		19200	4 192
5	Protocol	CR/LF*	5 crL
		STX/ETX	5 5-E
		3964	5 39
6	Protocol reply	none*	6 0
		XON/XOFF	6 1
		ACK/NAK	6 2
		Echo	6 3
7	Ignore characters	Ignore no character*	7 00
		Ignore first character	7 0 1
		Ignore first 2 characters	7 02
		Ignore first 3 characters	7 03
		etc. up to	etc. up to
8	Address length	Ignore first 99 characters	7 99
		No addressing*	8 0
		1 digit	8 1
		2 digits	8 2
		3 digits	8 3
9	Address	Address 0*	9 000
		Address 1	9 00 1
		etc. up to	etc. up to
		Address 999	9 999
t	Time-out	No time-out*	t 0
		Time-out after 2s	t 2
		Time-out after 4 s	t 4
		Time-out after 8 s	t 8
		Time-out after 16 s	t 16
		Time-out after 32 s	t 32
		Time-out after 64 s	t 64
A	Decimal point	Time-out after 128 s	t 128
		No decimal point*	A 0
		DP1 displayed	A 1
		etc. up to	etc. up to
C	Leading zeros	DP6 displayed	A 6
		Leading zeros not displayed*	C 00
F	Display test	Leading zeros displayed	C 000
		No display test at power-on*	F --
		Display test at power-on	F 888
U	Saving	Demo operation mode	F PL4
		Saving parameters* (Set)	U 5E4
		Not saving parameters (Escape)	U E5C
	Resetting to the default settings (Default)	U dEF	

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### Interface parameter

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Data format, parity, baud rate, protocol and protocol reply are set in menu items 2 to 6.

When the protocol 3964 is set in menu item 5, the 8-bit data format and even parity are set again and menu items 2 and 3 are suppressed.

If the setting "Echo" is selected in menu item 6, the device sends the received data telegrams as an echo via the serial interface.

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### Ignore characters

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If the characters to be shown in the display do not start at the first position in the data string, it is possible to set in menu item 7 how many preceding characters are to be ignored.

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### Addressing

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Several displays can be operated on one control interface. Each display is assigned an individual address for this purpose in menu item 9. In menu item 8, it is determined how many spaces the address covers. If there is to be no addressing, select the setting 0 in menu item 8.

If the display should accept every address, set the address 0 in menu item 9. In this case, the display sends no telegram reply.

If several individually addressed displays are to be addressed simultaneously, send the address 0 (broadcast address). In this case, the displays send no telegram reply.

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### Time-out

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In the menu item t, it is possible to set whether and after what time a time-out occurs. Time-out means that a minus sign appears in all decades if the display has not received a data telegram after a defined time.

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### Decimal point

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In menu item A it is possible to set whether and in which digit position a decimal point is to be displayed.

The decimal point can also be controlled with the characters 2Ch and 2Eh via the serial interface. To do this, the setting 0 (no decimal point) is selected in menu item A.

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### Leading zero suppression

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In menu item C can be set whether leading zeros are to be displayed or suppressed.

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### Display test

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In menu item F can be set whether a display test is automatically carried out after power-on.

In ongoing operation, the display test can be activated via the serial interface with an ESC or \$ sequence:

Display test on: <ESC>T1 or \$T1

Display test off: <ESC>T0 or \$T0

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### Demo mode

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If in menu item F the setting *PLY* (Play) is selected, random numbers are displayed one after another. Control of the display is not possible.

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### Switch-on reset

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After the operating voltage is applied, a minus sign appears in all decades in order to signal operational readiness of the unit.

If a display test is preselected in the menu, this runs first.

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### Flashing

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The flashing function is selected with an ESC or \$ sequence:

Flashing on: <ESC>F1 oder \$F1

Flashing off: <ESC>F0 oder \$F0

If <ESC>F1 is sent in the data string, the following characters flash up to the end of the data string or until <ESC>F0 is sent in the data string.

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### Brightness reduction

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The brightness of the display can be reduced with an ESC or \$ sequence:

Normal brightness: <ESC>L0 or \$L0

Reduced brightness: <ESC>L1 or \$L1

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### Status messages

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The LEDs for the status messages and the weighing range are activated with ESC or \$ sequences:

Net Net value: <ESC>S4 oder \$\$S4

Tara Tared weight: <ESC>S5 oder \$\$S5

-0- Measured value = 0 (¼ d): <ESC>S6 oder \$\$S6

>< Scales stationary: <ESC>S7 oder \$\$S7

1 Weighing range 1: <ESC>S1 oder \$\$S1

2 Weighing range 2: <ESC>S2 oder \$\$S2

3 Weighing range 3: <ESC>S3 oder \$\$S3

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### Character set

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In addition to the numbers 0...9, the character set also contains the other characters that can be displayed with a 7-segment matrix. They are reproduced in the table below with the corresponding hex code.

20/2B	2D	30	31	32	33	34	35	36
	-	□	l	2	3	4	5	6
37	38	39	2C/2E	41/61	42/62	43	44/64	45/65
7	8	9	.	A	b	C	d	E
46/66	47/67	48	4A/6A	4C/6C	50/70	55	59/79	5F
F	G	H	J	L	P	U	Y	-
63	68	4E/6E	4F/6F	52/72	54/74	75	58/78	others
c	h	n	o	r	t	u	□	≡

## RS485 interface

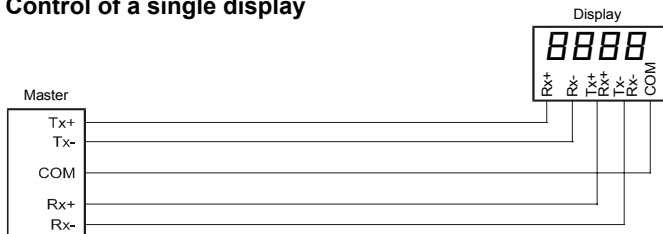
The universally-compatible interface design concept offers all of the requirements for reliable and safe operation of the devices in industrial use. Comply with the following project planning information to prevent external influences from lessening this advantage.

The RS485 interface allows point-to-point control of the displays and control via 2-wire or 4-wire bus systems. The following is an explanation of the various control types in project planning examples, including the required terminations of the data lines.

Always ensure the following regarding the data lines:

- Shielded twisted-pair cables are to be used.
- The shielding is to be connected at both line ends.
- For the COM line, use a wire pair short-circuited at both ends in the data cable. Under no circumstances may the shielding be used as the COM line!
- Separate wire pairs are to be used for Tx+ and Tx- and for Rx+ and Rx-, respectively. If this is not heeded, the protective function of the twisted-pair cable is lost!
- Improperly terminated data lines can cause faults during data transfer.

### Control of a single display

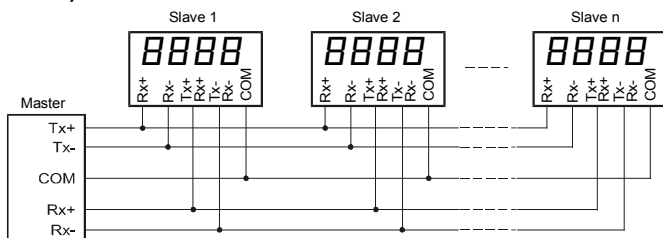


The transmit interface Tx of the master is connected to the receive interface Rx of the display. If the display is to return data to the master (e.g. protocol reply), the receive interface Rx of the master is connected to the transmit interface Tx of the display.

Select the setting RS485 in menu item 1.

The data lines must be terminated at both their physical ends. To do this, ZT and ZR are jumpered with Tx-/Rx- and Rx- respectively on the terminal strip (see principle circuit diagram). The corresponding information in the accompanying operating instructions is to be observed for the master.

### Control of several displays via a 4-wire bus (full-duplex mode)



With a 4-wire bus, a master controls several slaves (displays). The transmit interface Tx of the master is connected to the receive interfaces Rx of the displays and can transmit data at any time. The transmit interfaces Tx of the slaves are connected to the receive interface Rx of the master. This operating mode requires addressing of the individual slaves in order for targeted communication to be possible.

Select the setting RS485.4 in menu item 1.

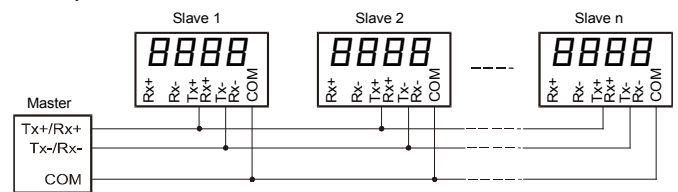
In menu item 6, setting 2 (ACK/NAK) is to be selected for all slaves so that a selective telegram reply from the respective addressed slave can be obtained. Selecting the protocol reply ACK/NAK ensures that only a single slave can transmit while all others remain passive at any one time (high-ohm transmitter outputs).

A faulty byte which is received is acknowledged negatively by the slave with NAK. Any telegram containing one or more faulty bytes is also acknowledged negatively with NAK. Telegrams received properly are acknowledged positively with ACK when the end of the telegram is detected. The display transmits the telegram reply with a time delay of approx. 4 ms.

The settings 1 (no protocol reply), 3 (XON/XOFF) and 4 (echo) in menu item 6 are not useful with the 4-wire bus.

The data lines must be terminated at both their physical ends, which in the project planning example means at the master and at the slave n. To do this, ZT and ZR are jumpered with Tx-/Rx- and Rx- respectively on the terminal strip (see principle circuit diagram). The corresponding information in the accompanying operating instructions is to be observed for the master.

### Control of several displays via a 2-wire bus (half-duplex mode)



With a 2-wire bus, a master controls several slaves (displays). The transmit and receive interface Tx/Rx of the master is connected to the transmit and receive interfaces Tx/Rx of the slaves. As the master and slaves share the same data line for transmitting and receiving, you must ensure that only the master or a single slave can access the bus.

Select the setting RS485.2 in menu item 1.

For the master, you must select an operating mode in which the bus is released after the transfer of a telegram to a slave so that the slave can transmit its telegram reply. The required settings can be found in the operating instructions for the master.

In menu item 6, setting 2 (ACK/NAK) is to be selected as the protocol reply for all slaves.

A telegram containing one or more faulty bytes is acknowledged negatively with NAK. Telegrams received properly are acknowledged positively with ACK when the end of the telegram is detected. The display transmits the telegram reply with a time delay of approx. 4 ms.

The data line must be terminated at both its physical ends, which in the project planning example means at the master and at the slave n. To do this, ZT is jumpered with Tx-/Rx- on the terminal strip (see principle circuit diagram). The corresponding information in the accompanying operating instructions must be observed for the master.