



Series S 102

Digital displays with programmable counter functions

Operating instructions

1 Contact

www.siebert-group.com

GERMANY

Siebert Industrieelektronik GmbH
Siebertstrasse, D-66571 Eppelborn
P.O. Box 11 30, D-66565 Eppelborn
Phone +49 (0)6806 980-0, Fax +49 (0)6806 980-999
email: info.de@siebert-group.com

AUSTRIA

Siebert Österreich GmbH
Mooslackengasse 17. A-1190 Wien
Phone +43 (0)1 890 63 86-0, Fax +43 (0)14 890 63 86-99
email: info.at@siebert-group.com

FRANCE

Siebert France Sarl
4 rue de l'Abbé Louis Verdet, F-57200 Sarreguemines
P.O. Box 90 334, F-57203 Sarreguemines Cédex
Phone +33 (0)3 87 98 63 68, Fax +33 (0)3 87 98 63 94
email: info.fr@siebert-group.com

ITALY

Siebert Italia Srl
Via Galileo Galilei 2A, I-39100 Bolzano (BZ)
Phone +39 (0)471 053753 Fax +39 (0)471 053754
email info.it@siebert-group.com

THE NETHERLANDS

Siebert Nederland B.V.
Jadedreef 26, NL-7828 BH Emmen
Phone +31 (0)591-633444, Fax +31 (0)591-633125
email: info.nl@siebert-group.com

SWITZERLAND

Siebert AG
Bützbergstrasse 2, P.O. Box 91, CH-4912 Aarwangen
Phone +41 (0)62 922 18 70, Fax +41 (0)62 922 33 37
email: info.ch@siebert-group.com

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2 Safety precautions



Bus errors may result in personal injury or material damage. Therefore it must be noted that the activation of the menu may cause a bus error.

Important information

Read these operating instructions before starting the unit. They provide you with important information on the use, safety and maintenance of the units. This helps you to protect yourself and prevent damage to the unit.



Information intended to help you to avoid death, bodily harm or considerable damage to property is highlighted by the warning triangle shown here; it is imperative that this information be properly heeded.

The operating instructions are intended for trained professional electricians familiar with the safety standards of electrical technology and industrial electronics.

Store these operating instructions in an appropriate place.

The manufacturer is not liable if the information in these operating instructions are not complied with.

Safety



Components inside the units are energized with electricity during operation. For this reason, mounting and maintenance work may only be performed by professionally-trained personnel while observing the corresponding safety regulations.

The repair and replacement of components and modules may only be carried out by the manufacturer for safety reasons and due to the required compliance with the documented unit properties.

The units do not have a power switch. They are operative as soon as the operating voltage is applied.

Intended use

The units are intended for use in industrial environments. They may only be operated within the limit values stipulated by the technical data.

When configuring, installing, maintaining and testing the units, the safety and accident-prevention regulations relevant to use in each individual case must be complied with.

Trouble-free, safe operation of the units requires proper transport, storage, installation, mounting and careful operation and maintenance of the units.

Mounting and installation

The attachment options for the units were conceived in such a way as to ensure safe, reliable mounting.



The user must ensure that the attachment hardware, the unit carrier and the anchoring at the unit carrier are sufficient to securely support the unit under the given surrounding conditions.

Sufficient space is to be kept clear around the units to ensure air circulation and to prevent the build-up of heat resulting from use.

Grounding

The devices are equipped with a ground connection for connection of the cable shielding to the functional ground (PE).

EMC measures

The devices comply with the EU Directive 2004/108/EC (EMC Directive) and provide the required interference immunity. Observe the following when connecting the operating voltage and data cables:

Use shielded data cables.

The data and operating voltage cables must be laid separately. They may not be laid together with heavy-current cables or other interference-producing cables.

The cable thickness must be properly assessed (DIN VDE 0100 Part 540).

The connection of the cable shielding to the functional ground (PE) must be as short and low-impedance as possible.

The cable shielding is to be connected at both cable ends. If equipotential bonding currents are expected due to the cable arrangement, electrical isolation is to be performed on one side. In this case, capacitive connection (approx. $0.1\mu\text{F}/600\text{ V AC}$) of the shielding on the isolated side must occur.

Disposal

Units or unit parts which are no longer needed are to be disposed of in accordance with the regulations in effect in your country.

3 Unit description

Model designation

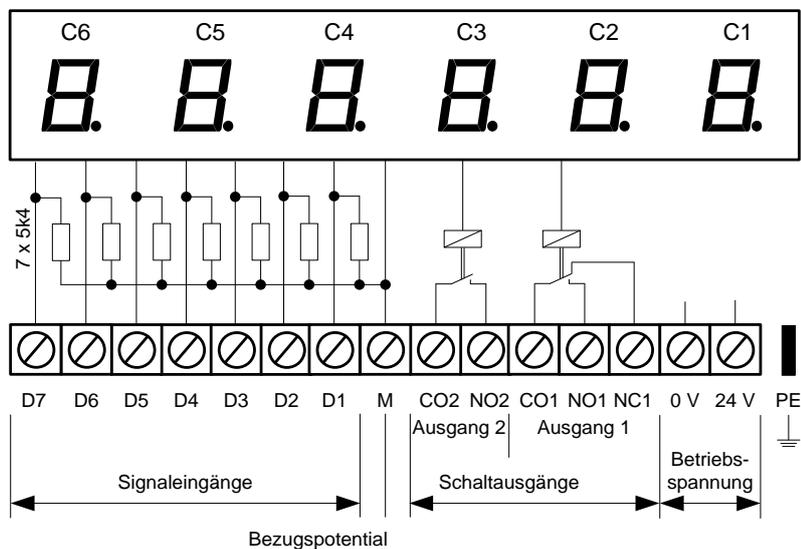
This manual applies to units with the following model designation (x = the 'x's in the model designation indicate the size and design of the units).

S102-x6/14/0x-00x/0B-Z0 Character height 14 mm, 6 digits

S102-x5/25/0x-00x/0B-Z0 Character height 25 mm, 5 digits

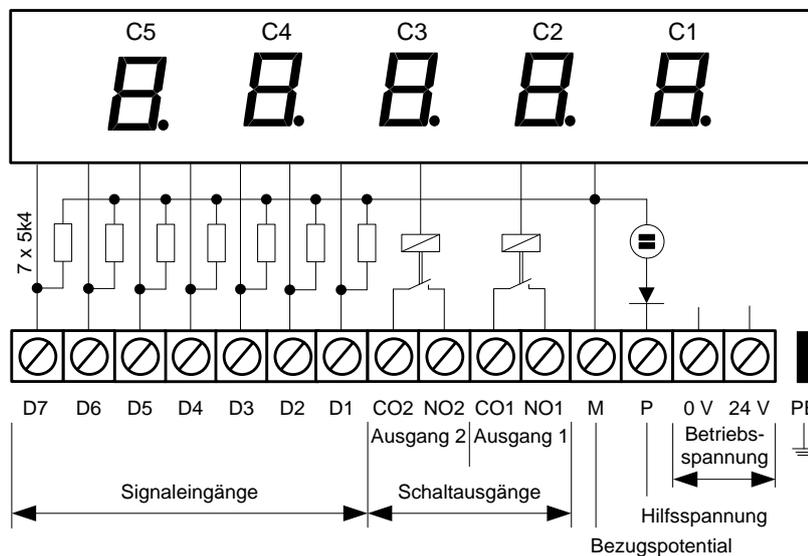
Principle circuit diagram

Units with 14 mm character height



Signaleingänge switching inputs
 Schaltausgänge switching outputs
 Betriebsspannung power supply
 Ausgang output

Units with 25 mm character height



Signaleingänge	switching inputs
Schaltausgänge	switching outputs
Betriebsspannung	power supply
Ausgang	output
Hilfsspannung	auxiliary voltage
Bezugspotential	reference potential

Function inputs

The function inputs D7 ... D1 are dimensioned for the following signal voltages:

L-signal = -3.5...+5 V, H-signal = +18...30 V (active H)

Open input = L signal, M = reference potential

Features

Brilliant LED display

Two potential free switching outputs

User defined scaling

No voltage protected

Parameterization via menu

Plug in screw terminal strip

4 Control

The units must be parameterized before they can be controlled.

Counting functions

The signal inputs D2 and D1 are counting inputs.

If in menu item 1 setting 1 is selected, the impulses arriving at input D1 will be counted. With L signal at input D2 impulses will be counted upward and downward with H signal [1].

If in menu item 1 setting 2 is selected, the impulses arriving at inputs D1 and D2 will be counted upwardly independently one from the other [2].

If in menu item 1 setting 3 is selected, the impulses arriving at input D1 will be counted upwardly and the impulses arriving at input D2 will be counted downwardly independently one from the other [3].

If in menu item 1 setting 4 is selected, the impulses arriving at inputs D1 and D2 will be counted downwardly independently one from the other [4].

Impulse edge

Whether the counting inputs D2 and D1 analyze the rising or falling edge of the counting impulses can be set in menu item 2. With setting *rISE* the rising edge is analyzed and with setting *FALL* the falling edge is analyzed.

The inputs D6 and D5 react to the rising edge of the signals. The inputs D7, D4 and D3 are static.

Debouncing time

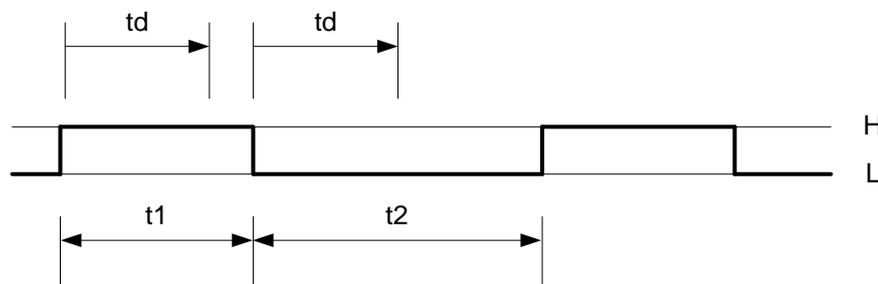
The signal inputs D7...D3 are debounced for interference suppression. They have a fixed debouncing time. A signal must be applied for at least 10 msec. to allow a reliable identification.

The counting inputs D2 and D1 have a variable debouncing time which can be set in menu item 3 between 1 and 25 msec.. This may be necessary if interfacing is affected via contacts.

The debouncing time of the counting inputs influences the maximum counting frequency (see "Maximum counting frequency").

Maximum counting frequency

The H-phase (t_1) and the L phase (t_2) of the counting impulses must be equal to or larger than the debouncing time (t_d) set in menu item 3. Otherwise the counting impulses are not identified and counting will not be effected.



The maximum counting frequency is achieved when $t_1 = t_2 = t_d$.

If in menu item 3 the shortest debouncing time of 1 ms is set, the maximum counting frequency is at 500 Hz. On default setting of 5 ms the maximum counting frequency is at 100 Hz.

Multiplier/Divisor

In menu item 4 you can set a multiplier and in menu item 5 a divisor between 1 and 1000 each.

The display corresponds to the number of impulses counted, multiplied by the multiplier and divided by the divisor.

If a scaling is provided, let's say with the factor 2.91, as a multiplier 291 and as a divisor 100 are to be set.

Control functions

The signal inputs D7...D3 allow the following control functions:

Signal inputs	D7	D6	D5	D4	D3
Stopping the counter	[5] X	L	L	L	H
Stopping the display	[6] X	L	L	H	L
Resetting the counter to zero	[7] X	L	↑	L	L
Setting the counter to preset value	[8] X	↑	L	L	L
Display test, blinking, brightness control,	[9] H	X	X	X	X

↑ = rising edge of an impulse, L = L signal, H = H signal, X = L- or H-signal

Stopping the counter

With L signal on input D3 the impulses are counted according to the setting in menu item 1. With H signal the counting inputs are deactivated [5].

Stopping the display

With L signal at input D4 the display corresponds to the actual count of the counter. With H-signal the display stops (hold function), while the counter continues counting internally [6].

Resetting the counter to zero

The rising edge of an impulse at input D5 sets the counter to zero [7].

Setting the counter to preset value

The rising edge of an impulse at input D6 sets the counter to the preselected value [8] set in menu item 6.

In menu item 6 the number of the menu item and the actual setting alternately appear in the monitor display. Also the decimal points flash one after the other. The digit with the decimal point flashing can be set to the value requested by means of the menu key [↔]. The minus sign can be set in the left digit. It appears between 9 and 0.

Switching outputs

The units have two switching outputs (relays) with potential-free make-contacts (output 1: CO1, NO1; Exit 2: CO2, NO2). The switching points are set in the menu items 7 and 8.

Units with 14 mm character height: output 1 = changeover contact (CO1, NO1, NC1).

In menu item 7 (output 1) and 8 (output 2) the number of the menu item and the current setting appear in turns. Also the decimal points flash one after the other. The digit with the decimal point flashing can be set to the value requested by means of the menu key. The minus sign can be set in the left digit. It appears between 9 and 0.

The switching outputs are activated with a display value equal to or higher than the switching point set in the menu.

The actual display value is compared. A decimal point set in menu item A is not considered.

The switching functions are not defined in the menu mode.

Data backup

In case of a failure of the operating voltage the count is saved. Once the operating voltage is restored the saved count will appear in the display. If a display test has been preselected in menu item F, it runs beforehand.

Decimal point

A fixed decimal point can be set in menu item A.

Leading zero suppression

In menu item C it is set if leading zeros are to be displayed or suppressed.

Display test

In menu item F, you can set whether a display test is to be performed after the operating voltage is applied.

For a static display test use input D7.

Demo operation mode

If the setting *PLAY* is selected in menu item F, random characters are displayed. In this case, it is impossible to control the unit.

Static display test

If setting *BBB* is selected in menu item G, an H signal on input F causes a static display test, regardless of the data on the inputs D6...D1 [9].

Flashing

If setting *FL* in menu item G, an H signal on input F causes a flashing of the display, regardless of the data on the input D6...D1 [9].

Brightness control

If setting *bri* is selected in menu item G, an H signal on input F causes a reduction of the display brightness, regardless of the data on the inputs D6...D1 [9].

5 Parameterization

Menu

The parameterization of the devices is carried out in a menu in the menu display.

In the following, the numbers in [] refer to the corresponding line in the function table.

Menu operation

To start the menu, press both menu buttons simultaneously (approx. 1 sec.) until the first menu item appears in the menu display. It is now possible to navigate in the menu as follows:

Next menu items forward	Press key [↕] long
Page menu items forward	Shortly press key [↕]
Previous menu item	Double-click on key [↕]
Page menu items backward	Double-click on key [↕] and keep it pressed
Next setting	Shortly press key [↔]
Page settings forward	Press key [↔] long
Previous setting	Double-click on key [↔]
Page setting backward	Double-click on key [↔] and keep it pressed

To exit the menu shortly press the key [↕] in menu item U. Depending on the setting in menu item U the settings made are either saved (set) or not saved (escape) or the factory settings are reset (default).

Canceling the menu without saving the settings made is possible by pressing both menu buttons simultaneously (approx. 1 sec.). It will occur automatically if 60 seconds pass without a menu button being pressed.

Once the menu is closed, the device behaves in the same manner as when the operating voltage was applied.

Control of the display is not possible in menu mode.

The menu is shown in the following menu table. The default settings are marked with *. Individual menu items or settings can be suppressed depending on unit version or setting in another menu item.

Menu item	Settings	Display
1 Counting mode	D2 = Counting direction, D1 = Counter input*	1 d i P
	D2 = upward, D1 = upward	1 u u
	D2 = downward, D1 = upward	1 d u
	D2 = downward, D1 = downward	1 d d
2 Edge	Counting with rising edge*	2 r iSE
	Counting with falling edge	2 F ALL
3 Debounce time counter inputs D2, D1	1 ms (Factory setting: 5 ms*)	3 0 1
	↓	
	25 ms	3 25
4 Multiplier	1*	4 000 1
	↓	
	1000	4 1000
5 Divisor	1*	5 000 1
	↓	
	1000	5 1000
6 Counter	-99999...000000*...999999 ¹⁾	6 L o R d + 000000

	preselection	-9999...00000*...99999 ²⁾	<i>E L0Rd</i> →000000
7	Switching point	-99999...000000*...999999 ¹⁾	<i>7 rEL</i> ↔000000
	Relay 1	-9999...00000*...99999 ²⁾	<i>7 rEL</i> ↔000000
8	Switching point	-99999...000000...999999 ^{1) 3)}	<i>8 rEL2</i> →000000
	Relay 2	-9999...00000...99999 ^{2) 4)}	<i>8 rEL2</i> →000000
A	Decimal point	No decimal point*	<i>A 0</i>
		Decimal point digit C1	<i>A 1</i>
		Decimal point digit C2	<i>A 2</i>
		Decimal point digit C3	<i>A 3</i>
		Decimal point digit C4	<i>A 4</i>
		Decimal point digit C5	<i>A 5</i>
		Decimal point digit C6	<i>A 6</i>
C	Leading zeros	Leading zeros not displayed*	<i>C 00</i>
		Leading zeros displayed	<i>C 000</i>
F	Display test	No display test at power-on*	<i>F ---</i>
		Display test at power-on	<i>F BBB</i>
		Demo operation mode	<i>F PLY</i>
G		Display test if H-signal on input D7*	<i>G BBB</i>
		Flashing if H-signal on input D7	<i>G FL</i>
		Brightness reduction if H-signal on input D7	<i>G brt</i>
U	Saving	Saving parameters* (Set)	<i>U SEt</i>
		Not saving parameters (Escape)	<i>U ESC</i>
		Resetting to the default settings (Default)	<i>U dEF</i>

¹⁾ Applies for units with 6 digits (S102-x6/14/0x-00x/0B-Z0)

²⁾ Applies for units with 5 digits (S102-x5/25/0x-00x/0B-Z0)

³⁾ Factory setting: 100000

⁴⁾ Factory setting: 10000

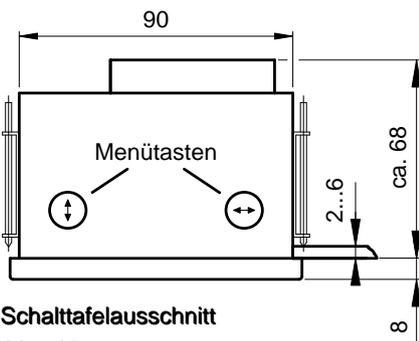
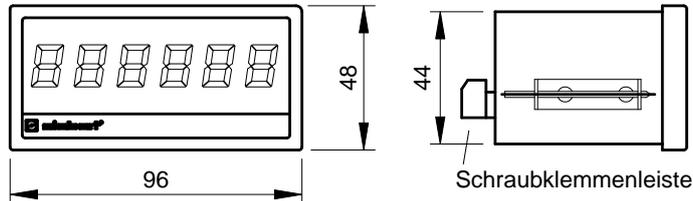
6 Technical data

Unit properties

LED display	S102-xx/xx/0R-00x/0B-Z0	red
	S102-xx/xx/0G-00x/0B-Z0	green
Character height	S102-06/14/0x-00x/0B-Z0	14 mm
	S102-05/25/0x-00x/0B-Z0	25 mm
Number of digits	S102-06/14/0x-00x/0B-Z0	6 digits
	S102-05/25/0x-00x/0B-Z0	5 digits
Dimension symbol	S102-0x/xx/0R-00x/0B-Z0	without dimension symbol
	S102-Fx/xx/0R-00x/0B-Z0	with dimension symbol
Power supply	24 V DC $\pm 15\%$, galvanically isolated, protected against reversed polarity	
Power consumption	S102-06/14/0x-00x/0B-Z0	approx. 4,5 VA
	S102-05/25/0x-00x/0B-Z0	approx. 5,5 VA
Connection	plug-in screw terminal strip	
Switching outputs	maximum switching voltage	30 V AC/DC
	maximum switching current	500 mA (ohmic load)
Protection type (front)	S102-xx/xx/0x-000/0B-Z0	IP40
	S102-xx/xx/0x-001/0B-Z0	IP65
Operating temperature	0...50 °C	
Storage temperature	-20...70 °C	
Humidity	max. 95 % (non condensing)	
Weight	S102-xx/14/0x-00x/0B-Z0	approx. 170 g
	S102-xx/25/0x-00x/0B-Z0	approx. 300 g

Dimensions

Units with 14 mm character height



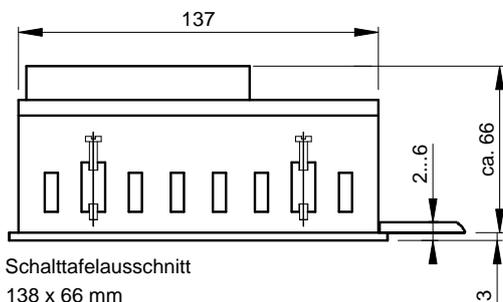
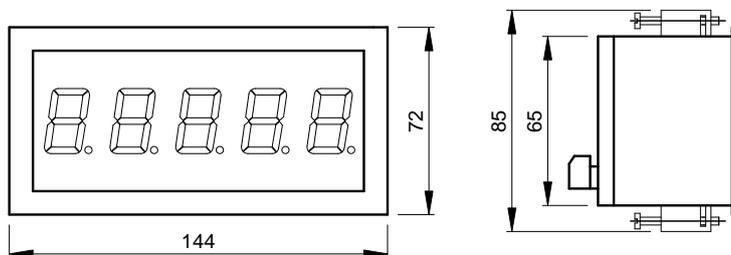
Schalttafelausschnitt
92 x 45 mm

Masse in mm

Schraubklemmleiste
Menütasten
Schalttafelausschnitt
Masse in mm

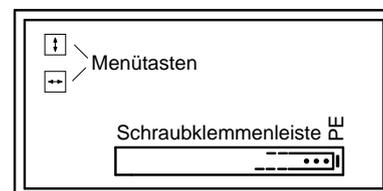
screw terminal strip
menu buttons
panel outcut
dimensions in mm

Units with 25 mm character height



Schalttafelausschnitt
138 x 66 mm

Rückansicht



Masse in mm

Schraubklemmleiste
Rückansicht
Menütasten
Schalttafelausschnitt
Masse in mm

screw terminal strip
rear view
menu buttons
panel outcut
dimensions in mm