
**Operating instructions**

# Series SX402

## Alphanumeric displays with parallel interface

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## Validity

The model designation of the units is:

| | |
|---|---|
| SX402-220/05/0G-001/0B-P0 | SX402-420/05/0G-001/0B-P0 |
| SX402-240/05/0G-001/0B-P0 | SX402-220/09/0G-001/0B-P0 |

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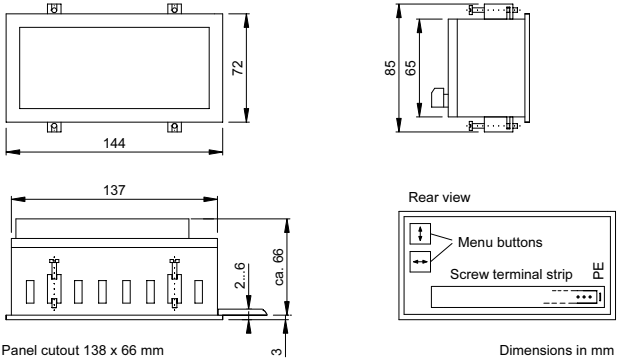
## Chapter 1 | Dimensions

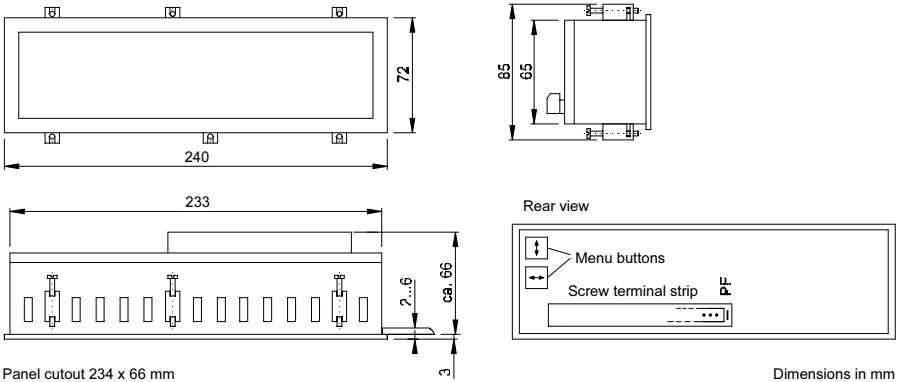
SX402-220/05/0G-001/0B-P0 (2 x 20 caracters, character height 5 mm)
SX402-420/05/0G-001/0B-P0 (4 x 20 caracters, character height 5 mm)




Panel cutout 138 x 66 mm

Dimensions in mm

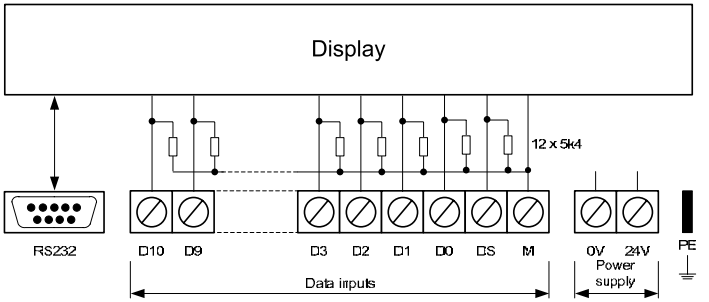
SX402-240/05/0G-001/0B-P0 (2 x 40 caracters, character height 4,7 mm)
SX402-220/09/0G-001/0B-P0 (2 x 20 caracters, character height 9 mm)




Panel cutout 234 x 66 mm

Dimensions in mm

## Principle circuit diagram




**Parameterization** | The parameterization of the unit is done by means of a menu in the display (see chapter 4).

**Parallel interface** | The parallel interface (Data inputs D10…D0, DS) serves for activation of the devices. It is located on the screw terminal strip and is dimensioned for the following signal voltages (PLC-compatible):

Signal L = -3,5...+5 V, Signal H = +18...30 V (active H)
Open input = Signal L, M = reference potential

The data inputs (D10...D0, DS) are debounced for interference suppression. The data are only evaluated when they have been stably active at the data inputs for at least 10 ms.

**Serial Interface** | The serial interface RS 232 serves for programming of the device by means of a PC (see chapter 5) and cannot be used for the activation. It is located on the nine-pin D-Sub connector with the following assignment:

| Pin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Signal | – | RxD | TxD | – | COM | – | RTS | CTS | – |

The PC connection is established using a standard null-modem cable.

The interface parameters are set as follows: 9600 bauds, 8 data bits, no parity, 1 stop bit, RTS/CTS handshake.

**Text creation** | The text is compiled using the PC tool 'Text Manager' delivered on data carrier and loaded in the text memory via the serial interface. After that, they can be opened via their text number.

**Function table** | The devices are activated according to the following function table. The figures in [ ] refer to the corresponding explanations in the text.

| **Data inputs** | | **D10** | **D9** | **D8** | **D7** | **D6** | **D5** | **D4** | **D3** | **D2** | **D1** | **D0** | **DS** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Static activation | | | | | | | | | | | | | |
| Text numbers binary coded | [1] | L | X | $2^8$ | $2^7$ | $2^6$ | $2^5$ | $2^4$ | $2^3$ | $2^2$ | $2^1$ | $2^0$ | H |
| Text numbers BCD coded | [2] | L | 200 | 100 | 80 | 40 | 20 | 10 | 8 | 4 | 2 | 1 | H |
| Text numbers 1-from-n coded | [3] | L | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | H |
| Dynamic activation | | | | | | | | | | | | | |
| Text numbers binary coded | [4] | L | X | $2^8$ | $2^7$ | $2^6$ | $2^5$ | $2^4$ | $2^3$ | $2^2$ | $2^1$ | $2^0$ | ↑ |
| Text numbers BCD coded | [5] | L | 200 | 100 | 80 | 40 | 20 | 10 | 8 | 4 | 2 | 1 | ↑ |
| Text numbers 1-from-n coded | [6] | L | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | ↑ |
| Insert variables | | | | | | | | | | | | | |
| Variables ASCII coded | [7] | H | L | L | $2^7$ | $2^6$ | $2^5$ | $2^4$ | $2^3$ | $2^2$ | $2^1$ | $2^0$ | ↑ |
| Variables BCD coded | [8] | H | L | L | X | X | X | X | 8 | 4 | 2 | 1 | ↑ |
| BCD-packed variables coded | [9] | H | L | L | 80 | 40 | 20 | 10 | 8 | 4 | 2 | 1 | ↑ |
| Position of variables | [10] | H | L | H | X | $2^6$ | $2^5$ | $2^4$ | $2^3$ | $2^2$ | $2^1$ | $2^0$ | ↑ |
| Flashing | | | | | | | | | | | | | |
| H = activate, L = deactivate | [11] | H | H | X | X | X | X | X | 4 | 3 | 2 | 1 | ↑ |

L = Signal L, H = Signal H, X = Signal L or H, ↑ = rising edge of the pulse

**Coding of the text numbers** | The text numbers can be binary, BCD or 1-from-n. The coding must be set in the menu item 1 (see chapter 4).
For binary coded text numbers [1, 4], the text numbers 0...511 are possible.

For BCD coded text numbers [2, 5], the text numbers 0...399 are possible. Invalid text numbers (not BCD coded) result in an undefined display.

For 1-from-n coded text numbers [3, 6], the text numbers 1...10 are possible. The lowest data input showing H-signal has priority. With L signal at the data inputs D9...D0, the display is cleared. Should a start text be displayed instead (e.g. unit free from troubles) this text must be stored in the text memory under text number 0 and the display of the start text must be set under menu item A (see chapter 4).

**Static activation** | In case of a static activation a text appears in the display as long as its text number is applied to the data inputs of the parallel interface [1…3].

In the menu item 2, the setting StAt is to be selected (see chapter 4).

An H signal must be applied to input DS. If an L signal is applied, the display shows the text that was last active.

**Dynamic activation** | After a dynamic text call, a text is displayed if the corresponding text number is active at the data inputs of the parallel interface and if a rising edge reaches input DS [4...5].
In the menu item 2, the setting Dyn is to be selected (see chapter 4).

**Insert variables** | During the creation by means of the PC tool 'Display manager', wildcards are automatically entered in the texts in which variables have to be inserted (see chapter 5). Depending on the device, a text can contain up to 40 or 80 variables:

| | |
|---|---|
| SX402-220/05/0G-001/0B-P0, SX402-220/09/0G-001/0B-P0 | 40 Variables |
| SX402-420/05/0G-001/0B-P0, SX402-240/05/0G-001/0B-P0 | 80 Variables |

After calling up the text [1...6], the wildcards are dark. The variables are displayed when they are active at the parallel interface and when a rising edge reaches the input DS [7...9].

The variables can be ASCII, BCD or BCD-packed coded. The coding must be set in the menu item 3 (see chapter 4).

**Position of variables** | Variables are inserted from left to right starting with the first wildcard. For starting with another wildcard, the position of this wildcard must be active at the data inputs of the parallel interface and a rising edge must reach the input DS [10].

For ASCII and BCD coded variables [7, 8], the (assumed) variable indicator goes automatically to the next position every time a rising edge reaches the input DS. For BCD-packed coded variables [9], the indicator moves forward by 2 positions.

**Flashing** | The flashing of the display can be activated line by line via the data inputs D0...D3. The data inputs D0…D3 correspond to the lines 1…4 of the display (D2…D3 only active for SX402-420/05/0G 001/0B-P0). The flashing of a line is activated (deactivated) by means of an H signal (L signal) at the corresponding data input and by means of a rising edge reaching the input DS [11].

The call of a new text deactivates the flashing in all lines.

**Paging** | If a text contains more characters than can be shown in the display, it is automatically displayed in paging mode. The page change interval can be set between 2, 5 and 10 seconds in menu item P (see chapter 5).

**Initial text** | After switching the operating voltage on, > is displayed to signalize that the device is ready for operation. If an initial text is to appear in the display instead (e.g.'System operational'), this text is to be saved in the text memory with text number 0, and displaying of the initial text is to be set in menu item A (see Chapter 4).

**Character set** | In menu item F, you can set the default character set used to display the texts.

The standard character set is permanently installed in the devices (setting Std). The setting User allows you to activate the user defined character set. If no user defined character set is installed, all the characters are shown in the standard character set.

The PC tool 'DisplayManager' (see chapter 5) is used for installing the character sets, for creating user-defined character sets, for saving character sets on data carriers and for restoring the installed character sets.

**Status of data inputs** | If the setting Test in the menu item 1 is selected, the signals that are active at the data inputs of the parallel interface are displayed.

**Menu operation** | The parameterization of the devices is carried out in a menu of the display. To reach the menu, press both menu buttons simultaneously (approx. 1 sec.) until the first menu item appears in the menu display. Now, you can navigate in the menu as follows:

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

The menu ends in menu item U with the button [↕].The settings made are either saved (set), not saved (escape) or the factory settings, except for menu item 1, are reset, depending on the setting selected in menu item U.

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

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

Control of the display is not possible in menu mode.

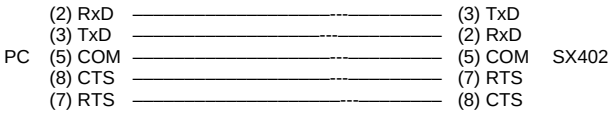
**Menu table** | The menu items are displayed in the following menu table. The factory settings are marked with an *. Individual menu items or settings can be suppressed in another menu item, depending on the unit version or setting.

| Menu item | | Settings | Menu display |
|---|---|---|---|
| 1 | Coding of the text numbers | binary* | 1 Bin |
| | | BCD | 1 BCD |
| | | 1 from n | 1 1ofN |
| | | Test | 1 Test |
| 2 | Text call | Dynamic* | 2 Dyn |
| | | Static | 2 Stat |
| 3 | Coding variables | ASCII* | 3 ASC |
| | | BCD | 3 BCD |
| | | BCD-packed | 3 Pack |
| A | Initial text | Not displaying initial text* | A > |
| | | Displaying initial text | A Txt0 |
| F | Character set | Standard character set* | F Std |
| | | User-defined character set | F User |
| P | Paging interval | 2 seconds* | P 2 |
| | | 5 seconds | P 5 |
| | | 10 seconds | P 10 |
| U | Saving | Saving parameters* (Set) | U Set |
| | | Not saving parameters (Escape) | U Esc |
| | | Resetting to the default settings (Default) | U Def |

## Chapter 5 | Programming of the units

A data carrier with the PC tool 'DisplayManager' is included in the delivery of the devices. It serves for creating texts and user defined character sets. For details please refer to the menu item 'Help' or to the operating manual of the PC tool.

To use the PC tool, the unit is connected to a PC by means of a standard null modem cable:




The parameters of the serial interface are set as follows: 9600 Baud, 8 data bits, no parity, 1 stop bit, RTS/CTS handshake.

In the programming mode, the display is temporarily dark.

## Chapter 6 | Status messages

Serious faults due to improper operation or faulty operating conditions are indicated in the display. The following messages are possible:

| Fault message | Cause | Elimination |
|---|---|---|
| NO_TEXT | The text called up is not saved in the fixed text memory. | The text is to be loaded into the fixed text memory. |
| SYNTAX_ERROR | A faulty command was sent to the display. | The command must be corrected. |
| TIME-OUT | An error occurred when loading static texts or user defined character sets. | The connection and the interface parameters of the PC tool must be corrected. |
| OVER_FLOW | Too many characters have been sent to the display via the serial interface or the interface parameters are incorrect. | The data telegram has to be corrected or the interface parameters of the communication partners must be adapted. |
| VAR_OVER_FLOW | The position of the variable is inadmissibly high. | An admissible variable position must be selected. |

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | ! | " | # | $ | % | & | ' | ( | ) | * | + | , | - | . | / |
| 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > | ? |
| 4 | @ | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 5 | P | Q | R | S | T | U | V | W | X | Y | Z | [ | \ | ] | ^ | _ |
| 6 | ` | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
| 7 | p | q | r | s | t | u | v | w | x | y | z | { | ¦ | } | ~ | ⌂ |
| 8 | € | ü | é | â | ä | à | å | ç | ê | ë | è | ï | í | ì | Ä | Å |
| 9 | É | æ | Æ | ô | ö | ò | û | ù | ÿ | Ö | Ü | ø | £ | Ø | × | ƒ |
| A | á | í | ó | ú | ñ | Ñ | ª | º | ▒ | ⌐ | ¬ | ½ | ¼ | ¡ | « | » |
| B | ⁞ | ▒ | ▒ | ¦ | ¦ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ₧ | ≡ | ¢ | ¥ | ε |
| C | А | Б | В | Г | Д | Е | Ж | З | И | Й | К | Л | М | Н | О | П |
| D | Р | С | Т | У | ф | Х | Ц | Ч | Ш | Щ | Ъ | Ы | Ь | Э | Ю | Я |
| E | α | ß | Γ | π | Σ | σ | µ | τ | Φ | Θ | Ω | δ | ∞ | φ | ∈ | ∩ |
| F | ≡ | ± | ≥ | ≤ | ▒ | ▒ | ÷ | ≈ | ° | ∙ | · | √ | ⁿ | ² | ▪ | ᴾ |

The characters $00_h$ to $1F_h$ are replaced by blanks.

| | | |
|---|---|---|
| Display range | SX402-220/xx/0G-001/0B-P0 | 2 x 20 caracters |
| | SX402-420/xx/0G-001/0B-P0 | 4 x 20 caracters |
| | SX402-240/xx/0G-001/0B-P0 | 2 x 40 caracters |
| Character height | SX402-220/05/0G-001/0B-P0 | approx. 5 mm |
| | SX402-420/05/0G-001/0B-P0 | approx. 5 mm |
| | SX402-240/05/0G-001/0B-P0 | approx. 4,7 mm |
| | SX402-220/09/0G-001/0B-P0 | approx. 9 mm |
| Display color | green | |
| Protection type (front) | IP65 | |
| Operating temperature | 24 V DC ±15 %, galvanically isolated, protected against reversed polarity | |
| Power consumption | 7 VA | |
| Connection | Pluggable screw-type terminal strip<br>Data (D10…D0, DS, M): clamping range 0,08…1 mm²<br>Operating voltage: clamping range 0,08…2,5 mm² | |
| Operating temperature | 0...50 °C | |
| Storage temperature | -20...70 °C | |
| Humiditiy | max. 95 % (non-condensing) | |
| Weight | SX402-220/05/0G-001/0B-P0 | approx. 450 g |
| | SX402-420/05/0G-001/0B-P0 | approx. 450 g |
| | SX402-240/05/0G-001/0B-P0 | approx. 600 g |
| | SX402-220/09/0G-001/0B-P0 | approx. 600 g |
| Fixed text memory | Capacity | 16 KBytes |
| | Number of texts | max. 512 |
| Text length | The text length is not limited but must not exceed the capacity of the text memory. | |
| Number of variables | SX402-220/05/0G-001/0B-P0 | max. 40 variables |
| | SX402-420/05/0G-001/0B-P0 | max. 80 variables |
| | SX402-240/05/0G-001/0B-P0 | max. 80 variables |
| | SX402-220/09/0G-001/0B-P0 | max. 40 variables |