Series SX502

Alphanumeric large size displays
with Modbus RTU interface

Operating instructions

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2   Legal note

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Table of contents

3 Safety precautions

⚠️ Bus errors may result in personal injury or material damage. Therefore it must be noted that the reset of the display with command $0 (see Chapter 9) and activation of the menu (see Chapter 11) 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 is 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.

The units are to be mounted in such a way that they can be opened up while mounted. Sufficient space for the cables must be available in the unit near the cable entries.

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. The relevant information must be heeded in the case of units ventilated by other means.

⚠️ When the housing fasteners are opened, the front frame of the housing hinges out upward or downward (depending on the unit version) automatically.

Grounding

All devices are equipped with a metal housing. They comply with safety class I and require a protective earth connection. The connecting cable for the operating voltage must contain a protective earth wire of a sufficient cross section (DIN VDE 0106 part 1, DIN VDE 0411 part 1).

EMC measures

The devices comply with the EU Directive 89/336/EEC (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 cable lengths inside the units are to be kept as short as possible to prevent interference. This applies especially to unshielded operating voltage cables. Shielded cables are also to be kept short due to any interference which might be emitted by the shielding.

Neither excessively long cables nor cable loops may be placed inside the units.

The connection of the cable shielding to the functional ground (PE) must be as short and low-impedance as possible. It should be made directly to the mounting plate over a large area with a conductive clip:
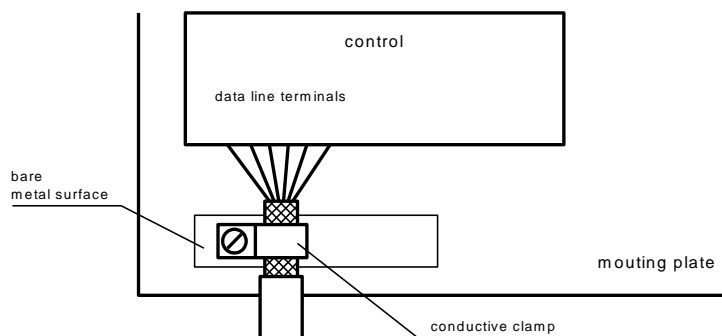
The cable shielding is to be connected at both cable ends. If equipotential bonding currents are expected due to the cable arrangement, electrical isolation is to be performed on one side. In this case, capacitive connection (approx. 0.1µF/600 V AC) of the shielding on the isolated side must occur.

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.

4   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 see Chapter 13):

SX502-xxx/xx/xx-xxx/xx-MO

Unit construction

The following figure shows model type SX502-220/05/xx-xxx/xx-xx as example for the other model types. The front frame of the housing is locked with quick-action releases. When opening the unit the front frame hinges downward (exceptions to this are SX502-640/05/xx-xxx/xx-xx and SX502-840/05/xx-xxx/xx-xx: which open upward supported by gas-pressure springs).
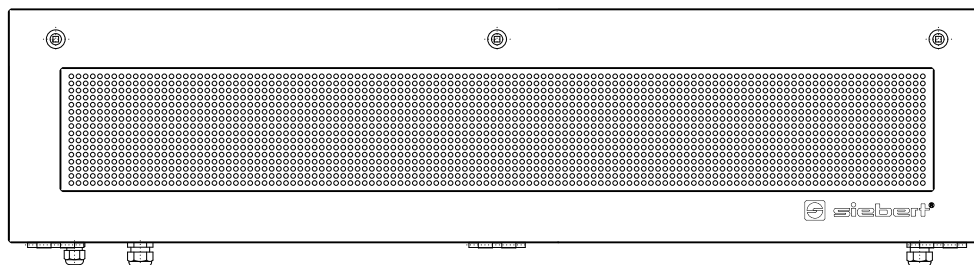
The following figure shows the unit when open.
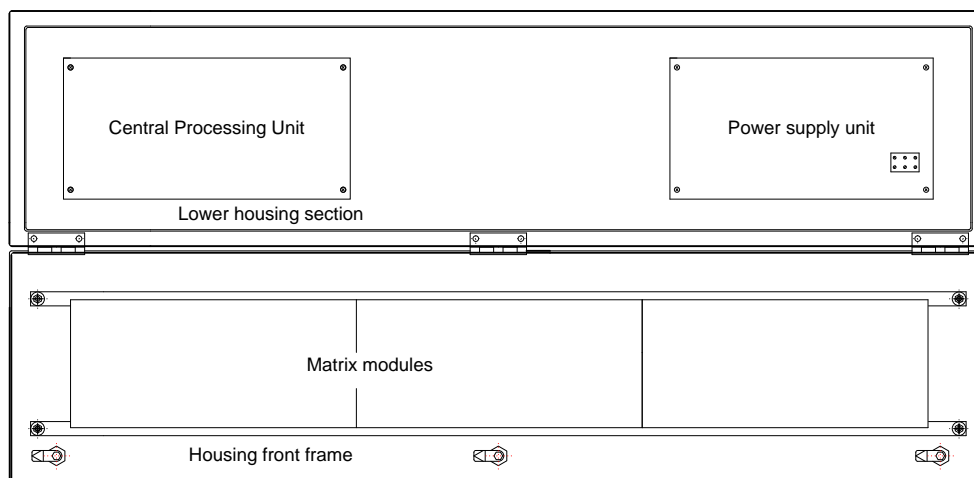
Units with double-sided display show the same information on the front and on the rear side.

Principle circuit diagram
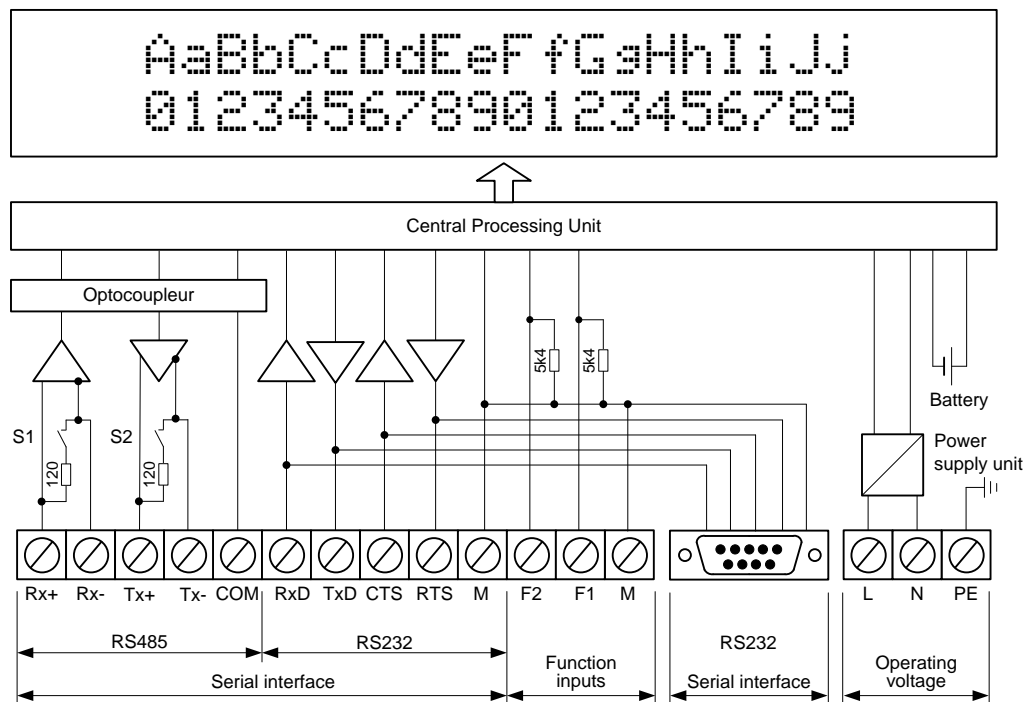
Central Processing Unit

The following figure shows the Central Processing Unit, located in the lower part of the housing.
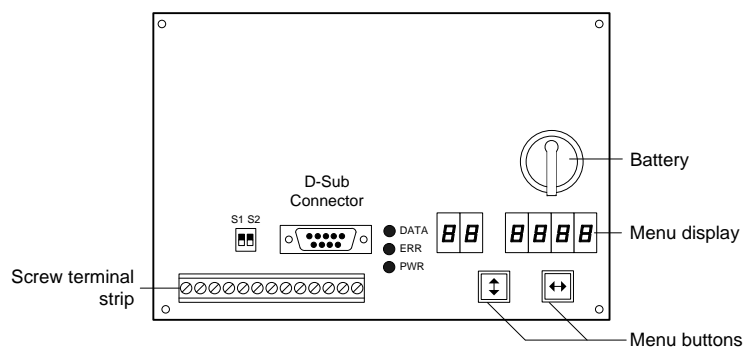
Serial interface

The serial interface is located on the screw-type terminal strip of the control computer. It has the formats RS485 and RS232. The interface format is set in menu item 01 (see Chapter 11).

For Modbus interfacing the RS485 interface is to be used. It is galvanically isolated from all other electric circuits.

The switches S1 and S2 serve for locking the data lines of the RS485 (see Chapter 6).

Do not use interface RS232 for Modbus interfacing. It is determined for programming the device using a computer, p. e. for loading static texts in the text memory or for installing character sets my means of the PC tool 'DisplayManager' provided on data carrier.

The interface RS232 is located, apart from the screw-type terminal strip, also on a nine-pin sub D connector of the control computer 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 programming operation for programming the devices is selected in the menu item 01 (see Chapter 11). Then, the parameter of the interface RS232 is set firmly as follows: 9600 bauds, 8 data bits, no parity, 1 stop bit, RTS/CTS handshake, CR/LF protocol, no addressing.

Function inputs

The function inputs are located on the screw-type terminal strip of the control computer. They allow reduction in brightness and flashing of the display, independently of commands via the Modbus interface (see Chapter 9).

The function inputs are designed for the following signal voltages:

Signal voltage: L = -3.5...+5 V (open input = L)
H = +18...30 V (active H), M = reference potential

Menu display

The parameterization of the units is carried out in a menu of the menu display (see Chapter 11).

In normal operation, the following status messages can appear in the menu display:

on l inE	Data are received at the interface
dAtA	The device detects a telegram ending
-- ----	No data are received at the interface

In programming mode, the following status messages can appear in the menu display:

ProG	The device is in programming operation
LoAd	Static texts are loaded in the text memory
rEAd	Static texts are read from the text memory

Menu buttons

The menu buttons are used to control the menu (see Chapter 11).

Status indicators

The status indicators (LEDs) of the control computer have the following meaning:

DATA	Data reception
ERR	Communication error
PWR	No meaning

Battery

The lithium battery (type CR2032) provides a power reserve for the real-time clock. It is located in a battery holder. The battery is to be replaced after three years.

Power supply

The screw-type terminals for the power supply are located on the power supply unit in the bottom section of the housing. They have the following designations:

Devices for a power supply 115 V AC or 230 V AC	L, N and PE
Devices for a power supply 24 V DC	+, – and PE

5   Character display

LED-matrix

The characters are displayed on an LED matrix. A matrix module is 16 LED dots (pixels) high and, depending on the unit version, the following number of pixels wide:

Unit versions SX502-x20/xx/xx-xxx/xx-xx: 120 pixels
Unit versions SX502-x40/xx/xx-xxx/xx-xx: 240 pixels

Character display

The units feature several different character sets, which will be elaborated on later. The following explanation is based on the Acala 7 character set.

With this character set, the character width is five pixels and the space between characters is one pixel. Units with a 120 pixel-wide matrix can therefore display 20 characters on a line and units with a 240 pixel-wide matrix can display 40 characters on a line.

The character height is seven pixels. Thus two lines of seven pixel-high characters with a space between lines of two pixels can be displayed on a 16 pixel-high matrix module.
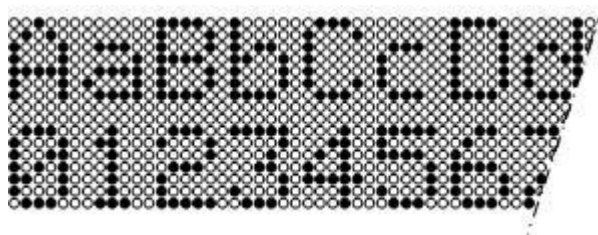
This means that two lines of 20 characters each can be displayed on a 120 x 16 pixel matrix and two lines of 40 characters each can be displayed on a 240 x 16 pixel matrix.

If the entire height of the matrix is used, characters with twice the character height, i.e. 14 pixels, can be displayed. The Acala 14 condensed character set, for example, is available for this. It uses a height of 14 pixels out of the 16 pixels available in the matrix.

With this character set, the character width is eight pixels and the space between characters is two pixels. Ten pixels are thus required for the width of each character. According to this, units with a 120 pixel-wide matrix can therefore display one line with 12 characters and units with a 240 pixel-wide matrix can display one line with 24 characters.
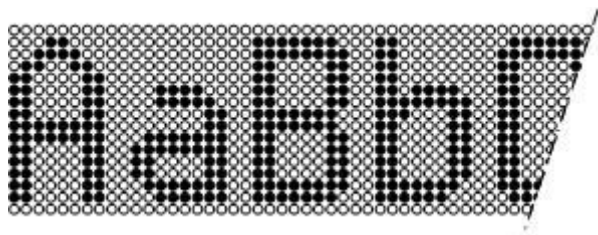
Character sets

The following pictured character sets are available. They differ in character height (seven, 14 or 16 pixels) and in character width (normal, extended or condensed).

The number of characters (number of lines x number of characters per line) which can be displayed on a 120 x 16 and 240 x 16 pixel matrix for each character set is noted in the table.

Character set	Character display	120 x 16 pixels	240 x 16 pixels
Acala 7*	AaBbCcDdEeFfGgHhIiJj AaBbCcDdEeFfGgHhIiJj	2 x 20	2 x 40
Acala 7 extended*	AaBbCcDdEe AaBbCcDdEe	2 x 10	2 x 20
Acala 14 condensed*	AaBbCdDdEeFf	1 x 12	1 x 24
Acala 14	AaBbCcDdEe	1 x 10	1 x 20
Acala 14 extended*	AaBcDd	1 x 6	1 x 12
Acala 16 condensed	AaBbCcDdEeFf	1 x 12	1 x 24
Acala 16	AaBbCcDdEe	1 x 10	1 x 20
Acala 16 extended	AaBbCc	1 x 6	1 x 12

The character sets marked with * in the table are permanently installed in the units. The remaining character sets are included on a data carrier.

The PC tool 'DisplayManager' that can also be found on the included data carrier is used for installing character sets, for creating user-defined character sets, for saving character sets on data carriers and for restoring the installed character sets.

Multi-line units

To display texts containing more characters than can be displayed with a 120 x 16 or 240 x 16 pixel matrix we offer unit versions with a suitable number of matrix modules arranged vertically.

The following figure shows unit version SX502-420/05/xx-xxx/xx-xx with two vertically arranged 120 x 16 pixel matrix modules as an example. Character set Acala 7 allows 4 x 20 characters to be displayed, and 2 x 12 characters can be displayed with the character set Acala 14 condensed.
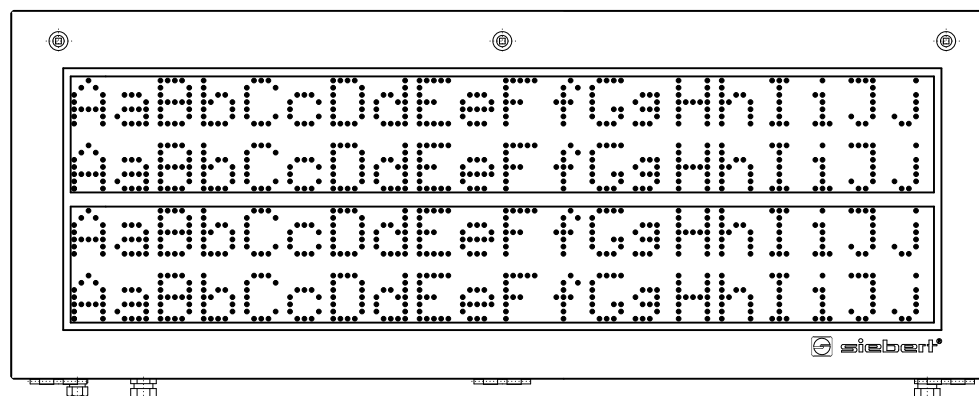
The physical distance between the matrix modules corresponds to a height of two pixels. Thus the distance between the first and second lines is the same as between the second and third lines.

The SX502 series also includes units with three or four vertically arranged matrix modules. They can display six or eight lines with the Acala 7 character set and three or four lines with the Acala 14 condensed character set.

Character height

The actual character height depends on the height of a character in pixels and the size of the pixel diameter and spacing.

The SX502-xxx/03/xx-xxx/xx-xx unit versions have a pixel diameter of approx. 3 mm and a pixel spacing of approx. 4.7 mm.

The SX502-xxx/05/xx-xxx/xx-xx unit versions have a pixel diameter of approx. 5 mm and a pixel spacing of approx. 7.6 mm.

This results in the following actual character heights for the character sets, depending on the unit version:

Character set	SX502-xxx/03/xx-xxx/xx-xx	SX502-xxx/05/xx-xxx/xx-xx
Acala 7	approx. 33 mm	approx. 50 mm
Acala 7 extended	approx. 33 mm	approx. 50 mm
Acala 14 condensed	approx. 66 mm	approx. 100 mm
Acala 14	approx. 66 mm	approx. 100 mm
Acala 14 extended	approx. 66 mm	approx. 100 mm
Acala 16 condensed	approx. 75 mm	approx. 120 mm
Acala 16	approx. 75 mm	approx. 120 mm
Acala 16 extended	approx. 75 mm	approx. 120 mm

Proportional lettering

The previously described character sets display the characters in non-proportional lettering (monospace font). The same number of pixels is available for the width of each character.

Character sets Acala 7 P and Acala 14 P, which display the characters in proportional lettering, are included on data carrier. Each character uses the width it requires visually.
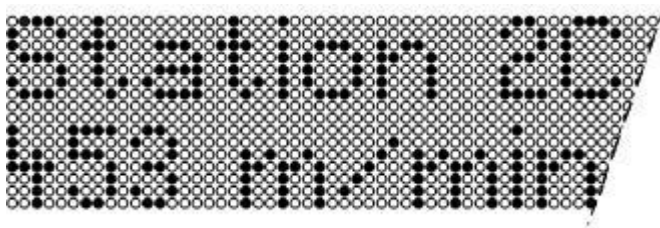
LED color

The unit versions SX502-xxx/xx/xR-xxx/xx-xx have a display with red LED color. The LED color cannot be changed (monochrome display).

The unit versions SX502-xxx/xx/xM-xxx/xx-xx have a display whose LED color can be switched between red, green and orange.

Character table

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
20		!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	
80	€	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
90	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü		£			ƒ
A0	á	í	ó	ú	Ñ	ñ				⌐	¬	½	¼	¡	«	»
B0	▒	▒	▒								ĥ	≡	¢	¥	Ë
C0	А	Б	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
D0	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
E0	α	Þ	Γ	π	Σ	σ	μ	τ	Φ	θ	Ω	δ	∞	φ	ε	∩
F0	≡	±	≥	≤			÷	≈	°	∙	·			²		

6   Control

Function code

The devices are Modbus RTU slaves (remote terminal unit) according to the *Modbus over serial line specification and implementation guide*. They support function code 16 (0x10) Write Multiple registers according to the *Modbus Application Protocol Specification.*

The indications in the above mentioned documentation are to be observed. Both documentations are available under 'www.modbus.org' and on the delivered data carrier.

Interface

For Modbus control interface RS485 is to be used.

Do not use interface RS232 for Modbus control. It is intended for the programming of the device using a PC, p. e. for loading static texts in the text memory and for installing character sets by means of the PC tool 'DisplayManager' provided on data carrier.

Interface parameters

Parity and baud rate are set in menu items 03 and 04 (see Chapter 11).

Control

Control via RS485 2-wire bus (two-wire Modbus defination) as described in the following is recommended by *Modbus over serial line specification and implementation guide*.

Setting in menu item 01: RS485.2
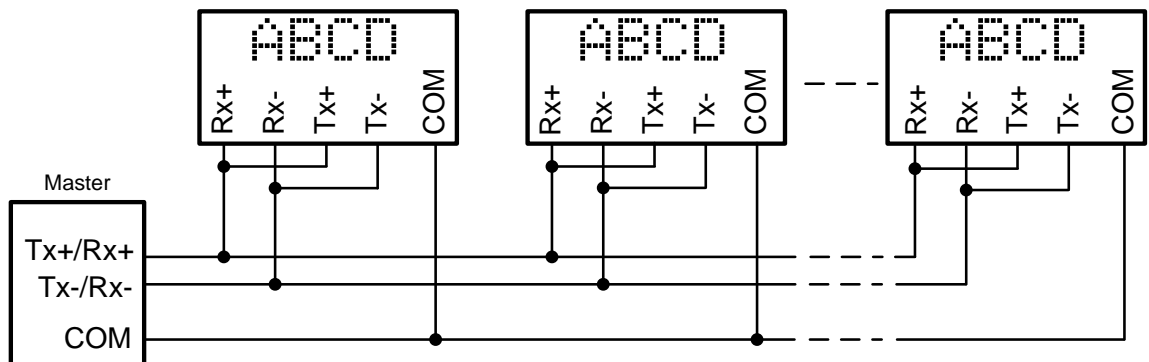
Below shown control via RS485 4-wire bus (optional four-wire Modbus definition) is optionally possible.

Setting in menu item 01: RS485.4
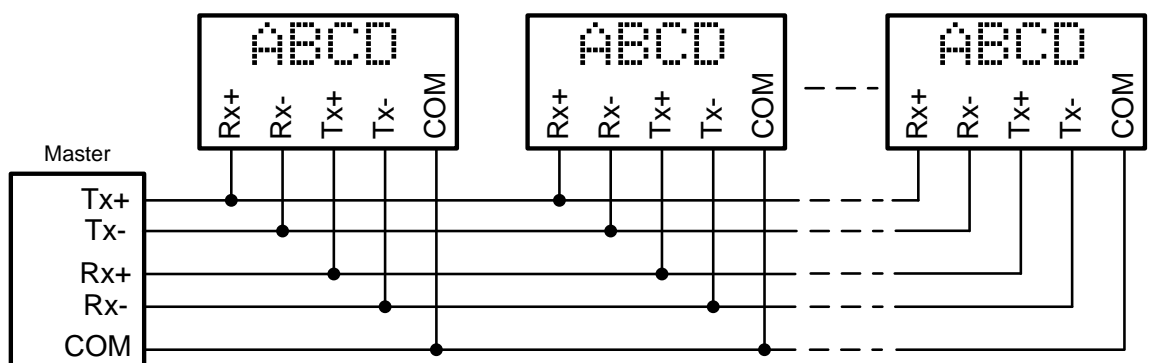
If the Modbus, as shown below, consists only of one master and one display (point-tp-point) it is possible to choose setting RS485 in menu item 01.
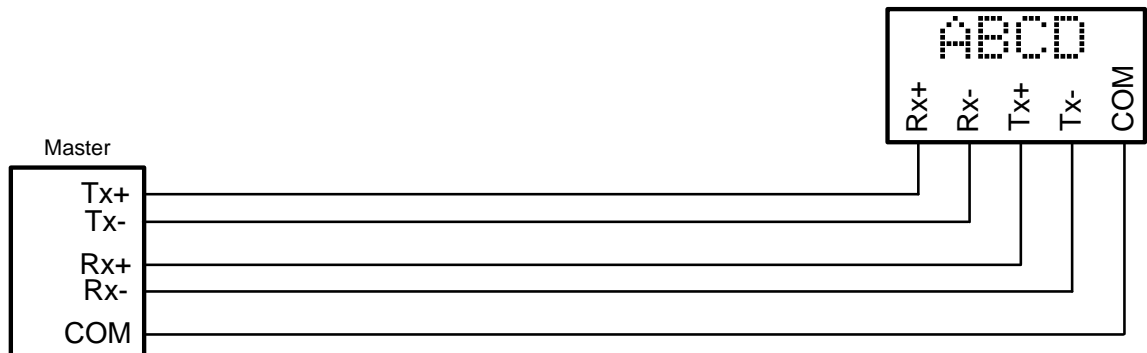
Data lines RS485

To achieve the highest possible interference immunity, the data lines of the RS485 have to be terminated on both ends. The required resistors are provided in the control computer and can be connected on the screw terminal strip with the switches S1 (Rx) and S2 (Tx) (see Chapter 4, Principle Circuit Diagram).

The polarization of the data lines must be ensured by means of the master.

For the data lines, you always have to ensure that:

Shielded twisted-pair cables of sufficiently large cross-section are used

The shielding is connected on both line ends

For the signal ground (GND) use a wire pair short-circuited on both ends in the data cable. The shielding may not be used as the signal ground.

A twisted pair of conductors is used each for Tx+ and Tx- and for Rx+ and Rx-. Non-observance of this instruction causes the protective function of the twisted-pair cable to be lost.

Improperly terminated data lines cause faults during data transfer.

7   Text types

⚠️ Bus errors may result in personal injury or material damage. Therefore it must be noted that resetting the unit with the command $0 (see Chapter 7) and activating the menu (see Chapter 9) can cause a bus error.

The units can display dynamic and static texts.

Dynamic texts can be changed while the unit is running. They are generated from within the process and have modifiable contents.

Static texts cannot be changed while the unit is running. They are compiled using the PC tool 'Display Manager' included on data carrier and are loaded in the text memory. After that, they can be opened via their text number.

The starting address determines whether the Modbus data is interpreted as dynamic text or call of a static text. Both operating modes can be combined.

8   Operating mode 'Quick call of static texts

If the units are used exclusively for the display of static texts (e.g. static fault message texts) and if no variables must be shown in the texts, the static texts can be called up directly.

Data format

To call a static text 2 bytes are sent to the display which receive the text number as 12-bit integer value and four formatting bits (brightness, blinking, blanking, display test).

Byte 0 (MSB)								Byte 1 (LSB)							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

				2^{11} 2^{10} 2^9 2^8	2^7 2^6 2^5 2^4	2^3 2^2 2^1 2^0	

———————— Fixed text number 0…4095 ————————

			0	Normal brightness
			1	Reduced brightness
		0		Flashing off
		1		Flashing on
	0			Blanking off
	1			Blanking on (priority over flashing)
0				Display test off
1				Display test on (priority over flashing and blanking)

9   Operating mode 'Dynamic and static texts'"

Starting address

Use the register address 0x0000 as starting address.

Data transmission

The transmission is carried out with up to 246 bytes per frame. The number of bytes must be an even number. When having an uneven number a dummy byte having the value 0x00 must be inserted in the data telegram.

If the data quantity is larger than 246 bytes, the data telegram can be distributed over several Modbus frames. The end of a telegram must be marked with a telegram ending.

Telegram ending

To end a telegram insert character <CR>, <LF> or <CR/LF>. Here two operating modes are possible which have to be chosen in menu item 05 (see Chapter 11).

In operating mode $CrLF$ you must send the telegram ending. A maximum of one data telegram can be transmitted in one Modbus frame. Characters following within a Modbus frame on a telegram ending will be ignored.

In operating mode $Auto$ the telegram ending is attached at the end of a Modbus frame automatically. Multiple data telegrams that are separated from each other by a telegram ending can be transmitted in one Modbus frame. A data telegram then can not be distributed via multiple Modbus frames.

Commands

The data are evaluated according to the command table shown below. In the following description, the numbers in [ ] refer to the corresponding lines in the command table.

In operation mode $CrLF$ commands with (↵) require a telegram ending.

In lines [1] and [3] `cc...` stands for a character chain of any desired content.

Commands for text manipulations

Display dynamic text	`cc...↵`	Send any desired characters	[1]
Display static text	`$Tn↵`	Calling up fixed text (n = text number, one to four digits)	[2]
Insert variables	`$VEcc...↵`	Entering variables from the current insertion position	[3]
	`$VPn↵`	Selecting insertion position of variables (n = wildcard number for the variable, 0...255)	[4]
Delete text	`$E↵`	Delete text in the display	[5]

Commands for text formatting

Line break	`$C`	Forced line break	[6]
Flashing	`$F1`	Flashing of following characters on	[7]
	`$F0`	Flashing of following characters off	[8]
Marquee text	`$Y`	Marquee text from current position until end of text or $C	[9]
Charcter set	`$M1`	Acala 7	[10]
	`$M2`	Acala 7 extended	[11]

	$M3	Acala 14 condensed	[12]
	$M4	Acala 14 extended	[13]
	$M5	Acala 7 P / user-defined character set 7 pixel	[14]
	$M6	Acala 14 / user-defined character set 14/16 pixel	[15]
LED color	$A0	Red	[16]
	$A1	Green	[17]
	$A2	Orange	[18]
Place holders for variables	$VS	Inserting place holders for variables	[19]
Inserting time	$HA	Current time (HH:MM:SS)	[20]
	$HH	Hour of current time (HH)	[21]
	$HM	Minute of current time (MM)	[22]
	$HS	Second of current time (SS)	[23]
Inserting date	$DA	Current date, four-digit year (TT.MM.JJJJ)	[24]
	$DB	Current date, two-digit year (TT.MM.JJ)	[25]
	$DD	Current day (TT)	[26]
	$DM	Current month (MM)	[27]
	$DY	Current year, four-digit (JJJJ)	[28]
	$DZ	Current year, two-digit (JJ)	[29]
	$DW	Weekday in selected dialog language	[30]
Bar graph	$Gnnnn	Bar graph display (nnn = number of columns, always enter in four numeric digits, e.g. $G0040)	[31]
Character $		Display of the character '$' in the text	[32]

Commands for display options

Flashing	$F1↵	Flashing of the whole display on	[33]
	$F0↵	Flashing of the whole display off	[34]
Brightness	$B0↵	Normal brightness	[35]
	$B1↵	Reduced brightness	[36]
Reset	$0↵	Restart of the display (see safety precautions)	[37]

Commands for time and date

Set time/date	$SHhhmmss↵	Set time	[38]
	$SDddmmyy↵	Set date	[39]
Reading out time/date	$RH↵	Read out time via serial interface	[40]
	$RD↵	Read out weekday and date via serial interface	[41]

Display dynamic text

To display a dynamic text, its characters (cc…) are sent to the display as a data telegram [1]. Any text in the display is cleared when a new text is called up.

Static texts

Static texts are called up with the **$Tn⏎** command and appear in the display. [2] **n** is the text number; it can be from one to four digits . Any text in the display is cleared when a static text is called up.

Inserting variables

This operating mode is used when the units are to display so-called text masks in which only certain characters are changed, e.g. for the updating of numerical values as in the following:

```
Temperature: 172 °C
Expansion  : 243 mm
```

The text components *temperature, expansion, °C* and *mm* are fixed and do not change. The numerical values, on the other hand, are continually updated variable text components.

In principle, updating could occur with dynamic texts containing both the fixed and the variable text components. However, the data transfer required here is considerable.

The SX502 series offers the advantageous alternative of a one-time transmission of the fixed text components to the display and subsequent insertion of just the appropriate characters (variables) to update the variable text components. In the example shown above, the fixed text components of *temperature, expansion, °C* and *mm* are shown in the display with the following data telegram:

$M1temperature: VSVS$VS °C$Cexpansion: VSVS$VS mm⏎

The place holders for variables to be inserted later are marked with the command **$VS** [19]. They appear blank in the display. A variable corresponds to a character to be displayed. Up to 256 variables can be inserted into a text.

The place holder from which the variables are to be inserted in the text (insertion position) is marked with the command **$VPn⏎** [4]. n is the running number of the place holders for variables; it can be from one to three digits (0 – 255). In the example, the first insertion position is marked with the command **$VP0⏎**.

Insertion of the variables in the place holders occurs with the command **$VEcc...⏎** [3]. **cc...** stands for any character. In the example the variables are inserted with the data telegram **$VE172243⏎** . They can also be inserted in two steps with the data telegram **$VE172⏎** followed by **$VE243⏎**.

In the example, the fixed text components were shown in the display as dynamic text. Alternatively, they can be prepared as a fixed text called up from the text memory. The place holders for the variables are also to be marked with **$VS** in the fixed text.

Deleting text

Any text in the display is cleared with the **$E⏎** command [5]. An LED dot then illuminates in the upper left-hand corner of the display.

Forced line break

If the text contains more characters than can be displayed in one line, a line break is inserted automatically at the end of the line, and the text is continued in the next line.

A line break can also be forced at a certain place in the text, for example for correct hyphenation [6] using the command **$C.**

Flashing

The **$F1** command in the data telegram causes the following characters to flash [7]. The **$F0** command in the data telegram deactivates the flashing of the following characters [8].

The command **$F1⏎** activates the flashing of the entire display [33]. The command **$F0⏎** deactivates the flashing of the entire display [34].

Flashing of the entire display can also be activated with an H-signal at function input F2 (priority over commands).

Marquee text

Marquee text display is activated from the current position in the text with the **$Y** command [9]. It remains active up to the end of the text or a forced line break (**$C**).

If a seven pixel-high font is currently selected, e.g. Acala 7, marquee text activation only affects the current line.

Character set

The texts are displayed with the character set specified in menu item 22 as standard (see Chapter 11). To call up another character set, one of the **$M1** to **$M6** commands must be contained in the text [10 – 15].

Using commands **$M1** to **$M4** the permanently installed character sets of Acala 7 [10], Acala 7 extended [11], Acala 14 condensed [12] and Acala 7 extended [13] are called up.

A user-defined character set with a character height of seven pixels can be called up with the **$M5** commands [14]. The Acala 7 P character set is preinstalled here. It can be replaced by a character set created by the user, for example.

A user-defined character set with a character height of 14 or 16 pixels can be called up with the **$M6** command [15]. The Acala 14 P character set is preinstalled here. The Acala 14 character set is preinstalled here. It can be replaced by a character set created by the user or an optional character set (Acala 14 P, Acala 16 condensed, Acala 16 or Acala 16 extended).

The optional character sets and the PC-Tool 'DisplayManager' for generating user-defined character sets are included on data carrier. The tool is also used to install the character sets, to save character sets on data carrier and to readout installed character sets.

LED color

Units with switchable LED color (see Chapter 5) display the texts in red by default. For a color change, the command **$A0** (red), **$A1** (green) or **$A2** (orange) must be contained in the text [16...18].

Inserting time/date

The units have a real-time clock with a date and weekday display. The current time, date or parts of them can be inserted into the text with the **$H...** and **$D...** commands [20 – 30]. The year can be displayed with four [24, 28] or two [25, 29] digits].

The day of the week is displayed abbreviated to two letters in the language set in menu item 23 (see Chapter 11).

Bar graph

The **$Gnnnn** command in the data telegram is used for activating the bar graph. [31]. **nnnn** stands for the number luminous columns, i.e. the length of the bar graph and must always be four digits, p. e. $G0040.

Units with switchable LED color (see Chapter 5) can only show the Bar graph in red or green. In bar graph mode they ignore command **$A2** for the color orange. [18].

Character $

The command for displaying the character '$' is **$$** [32].

Brightness

The brightness of the display can be reduced with the $B1↵ command [36] and reset to normal brightness with the command $B0↵ [35].

The brightness of the display can also be reduced with an H-signal on function input F1 (priority over commands).

Reset

To restart the unit use command $0↵ [37].

Setting time/date

Setting of the time is done with the command $SHhhmmss↵ [38] hh stands for hours, mm for minutes and ss for seconds (p. e $SH204515↵ 20:45:15 o'clock).

Setting of the date is done with the command $SDddmmyy↵ [39]. dd stands for the day, mm for the month and yy for the year (p. e. $SD200804↵ = 20.08.2004).

The time can also be set in menu items 90...92 und 94...95 (see Chapter 11).

Reading out time/date

The current time can be read out via the serial interface with the command RH↵ [40] and the current date, including the weekday, with the command $RD↵ [41].

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 3 and 30 seconds in menu item 21 (see Chapter 11).

Initial text

Once the operating voltage has been applied, an LED dot in the upper left-hand corner of the display illuminates to indicate that the unit is ready for operation. If an initial text is to appear in the display instead (e .g. 'System trouble-free'), 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 20 (see Chapter 11).

10 Individual line selection

Application

The activation of the devices as described in chapter "Control" is optimized for applications in which individual texts are shown in the display. Longer texts are written in several lines of the display due to the automatic line break. When the text contains more characters than can be displayed, it will be automatically displayed in paging mode.

The individual line selection is optimized for applications in which several texts independent of one another should be shown in different lines and each line should be considered as an individual display. The lines can be selected individually. The control commands only refer to the activated line. The automatic line break and paging functions are not active.

Commands

The individual line selection is carried out by means of commands according to the following command table. In the description of the commands, the numbers in [ ] refer to the corresponding lines in the command table.

The commands beginning with **$Lxx** select an individual line. **xx** is the line number (01, 02, 03, …).

Commands with ↵ require a telegram ending (<CR>, <LF> or <CR/LF>).

In line [42] **cc...** stands for a character chain of any desired content.
In line [44] **c** stands for any desired character.

Commands for text manipulation

Display dynamic text	$Lxxcc...↵	Send any desired characters to the line xx	[42]
Display static text	LxxTn↵	Load static text in the line xx (n = text number, 1 to 4 digits)	[43]
Inserting variables	$VInnnc↵	Insert the character c in a wildcard for a variable (nnn = wildcard number for the variable, 0...255)	[44]
	$VC	Delete all variables	[45]
Delete text	LxxE↵	Delete the text in the line xx	[46]

Commands for text formatting

Place holders for variables	$VNnnn↵	Insert wildcard for variables (nnn = wildcard number for the variable, 0...255)	[47]

Commands for display options

Flashing	LxxF1↵	Flashing of the whole line xx on	[48]
	LxxF0↵	Flashing of the whole line xx off	[49]

For all other device functions the commands described in Chapter 9 shall apply.

Display dynamic text

To display a dynamic text, its characters (**cc**…) are transmitted to the selected line as a data telegram [42]. Any text in the display is deleted when a new text is called up.

Display static text

A static text in the selected line can be loaded using the `$Lxx$Tn↵` command [43]. `n` is the text number, it can be from one to four digits. Any text in the display is deleted when a new text is called up.

Insert variables

The `$VNnnn` command is used for selecting wildcards for the variables [47]. They appear blank in the display. A variable corresponds to a character to be displayed. Up to 256 variables can be inserted in a text. `nnn` stands for the a wildcard number for variables (0...255).

Insertion of the variables in the place holders occurs with the `$VInnnc` command [44]. `c` stands for any desired character. Any number of insert commands can be transmitted via a data telegram.

Deleting text

The `$Lxx$E↵` command is used for deleting a text located in line `xx` [46]. Then a LED point flashes in the top left line.

Flashing

The `$LxxF1↵` command activates the flashing of the whole line [48]. The command `$LxxF0↵` deactivates the flashing of the whole line. [49].

Line numbers

The lines are counted as shown in the following example for the unit version SX502-420/05/......

For the character height 50 (e.g. Acala 7) 2 lines are counted per LED matrix.
For the character height 100 mm (e.g. Acala 14) 1 line is counted per LED matrix.
This is also valid if both character heights are used.

+ + + + Character height 50 mm + + + +	Line 01 (Command `$M1$L01`…)
+ + + + Character height 50 mm + + + +	Line 02 (Command `$M1$L02`…)
+ + + + Character height 50 mm + + + +	Line 03 (Command `$M1$L03`…)
+ + + + Character height 50 mm + + + +	Line 04 (Command `$M1$L04`…)

Character height 100 mm	Line 01 (Command `$M3$L01`…)
Character height 100 mm	Line 02 (Command `$M3$L02`…)

Character height 100 mm	Line 01 (Command `$M3$L01`…)
+ + + + Character height 50 mm + + + +	Line 03 (Command `$M1$L03`…)
+ + + + Character height 50 mm + + + +	Line 04 (Command `$M1$L04`…)

+ + + + Character height 50 mm + + + +	Line 01 (Command `$M1$L01`…)
+ + + + Character height 50 mm + + + +	Line 02 (Command `$M1$L02`…)
Character height 100 mm	Line 02 (Command `$M3$L02`…)

11 Parameterization

⚠️ Bus errors may result in personal injury or material damage. Therefore it must be noted that resetting the unit with the command $0 and activating the menu during the operation of devices on the bus can cause a bus error.

Menu

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

In normal operation, status messages appear in the menu display (see Chapter 4).

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 99. Depending on the setting in menu item 99 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.

An LED dot illuminates in the upper left-hand corner of the display in menu mode. Control of the display is not possible in menu mode.

Menu item		Settings	Menu display
01	Serial interface	RS232	01 232
		RS485	01 485
		RS485 (4-wire bus)	01 4854
		RS485 (2-wire bus) *	01 4852
		RS232 programming mode	01 ProG
03	Parity	No parity	03 nonE
		Odd parity	03 odd
		Even parity*	03 EuEn
04	Baud rate	1200	04 1200
		2400	04 2400
		4800	04 4800
		9600	04 9600
		19200*	04 192
05	Telegram ending	Send telegram ending*	05 CrLF
		Attach telegram ending automatically	05 5-E
09	Slave-address	Address 1	09 001

		Address 2	09	002
		↓	↓	
		Address 247	09	247
10	Time-out	No time-out*	10	0
		Time-out after 2 s	10	2
		Time-out after 4 s	10	4
		Time-out after 8 s	10	8
		Time-out after 16 s	10	16
		Time-out after 32 s	10	32
		Time-out after 64 s	10	64
		Time-out after 128 s	10	128
20	Initial text	No display of initial text*	20	0
		Display initial text	20	1
21	Paging	3 Seconds*	21	3
		↓	↓	
		30 Seconds	21	30
22	Character set	Acala 7*	22	7
		Acala 7 extended	22	7E
		Acala 14 condensed	22	14C
		Acala 14 extended	22	14E
		Acala 7 P / user-defined character set 7 pixel	22	U1
		Acala 14 / user-defined character set 14/16 pixel	22	U2
23	Language	German*	23	G
		French	23	F
		English	23	E
24	Display test	No display test at power-on	24	0
		Display test at power-on	24	1
90	Setting date (year)	05	90	05
		↓	↓	
		99	90	99
91	Setting date (month)	1	91	1
		↓	↓	
		12	91	12
92	Setting date (day)	1	92	1
		↓	↓	
		31	92	31
94	Setting time (hours)	1	94	0
		↓	↓	
		23	94	23
95	Setting time (minutes)	0	95	0
		↓	↓	
		59	95	59
99	Save	Save parameters* (Set)	99	SEt
		Not saving paramerts (Escape)	99	ESC
		Restore to factory settings (Default)	99	dEF

Serial interface

The desired interface format (RS485 und RS232) is set in menu item 01.

Interface RS485 is used for Modbus control (see Chapter 6).

Do not use interface RS232 for Modbus control. It is intended for the programming of the device using a PC, p. e. for loading static texts in the text memory and for installing character sets.

The RTS/CTS handshake is always active with interface format RS232.

Parity and baud rate are set in menu items 03 and 04.

Programming operation

If the interface RS232 is connected to a PC for programming the device, for example, for loading static texts or for installing character sets, in menu item 01, the setting $Pr\,oG$ has to be selected.

Then, the parameter of the interface RS232 is set firmly as follows: 9600 bauds, 8 data bits, no parity, 1 stop bit, RTS/CTS handshake, CR/LF protocol, no addressing.

After finishing the programming operation, the interface parameters selected in the menu items 03 and 04 are automatically reset.

Telegram ending

In menu item 05 you set whether the telegram ending is send (CR/LF) or is attached automatically at the end of a Modbus frame (Auto).

Slave-address

The individual slave-address 1 to 247 is set in menu item 09.

Time-out

In menu item 10, it is possible to set whether a time-out occurs, and if so, after what time. Time-out means that the display is cleared if it has not received a data telegram after a defined time period. An LED dot then illuminates in the upper left-hand corner of the display.

Initial text

Once the operating voltage has been applied, an LED dot in the upper left-hand corner of the display illuminates to indicate that the unit 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 20.

If a display test is preselected in menu item 24, it appears in the display before the initial text.

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 3 and 30 seconds in menu item 21.

Character set

In menu item 22, you can set the default character set used to display the texts. Character sets Acala 7, Acala 7 extended, Acala 14 condensed and Acala 7 extended are permanently installed in the units.

The character set Acala 7 can be loaded with the setting $U\,l$. It can be replaced by a user-defined character set with a character height of up to 7 pixels.

The character set Acala 14P can be loaded with the setting $U2$. It can be replaced by a user-defined character set with a character height of up to 16 pixels or by an optional character set (Acala 14 P, Acala 16 condensed, Acala 16 or Acala 16 extended).

The optional character sets and the PC tool 'DisplayManager' for creating user-defined character sets are delivered on a data carrier. The tool is also used to install character sets, to save character sets to data media and to read back installed character sets.

Language

In menu item 23, you can set the language in which the weekday is displayed (abbreviated to two letters).

Display test

In menu item 24, you can set whether a display test is to be performed after the operating voltage is applied.

Set time/date

The year, month, and day of the real-time clock are set in menu items 90 – 92. The time at which the clock is to be started is set in menu items 94 – 95. Then select menu item 99 and select the setting 5EE there. When the set time is reached, briefly press the left menu button [↕]. The clock is now set to the current time.

If the settings in menu items 90 – 92 (date) and 94 – 95 (time) are not changed when the menu is run through, the current settings for the time, date and weekday are retained when the menu is exited. Therefore, the clock only needs to be set when running through the menu if this is intended.

Time and date can be set independently from one another.

Setting the clock can also occur with control commands via the serial interface (see Chapter 9).

Attention: Setting unrealistic date values, e.g. 31/02/06 can lead to unpredictable date displays and is therefore impermissible.

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12 Status messages

Fault messages

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

Fault message	Cause	Rectification
No Text	The called up text is not available in the text memory.	The text is to be loaded into the text memory.
Syntax Error	An incorrect command was sent to the display.	The command has to be corrected (see command table Chapter 9).

13 Technical data

Unit properties

The model designation is structured as follows:

```
SX502  –  [ ][ ][ ]  /  [ ][ ]  /  [ ][ ]  –  [ ][ ][ ]  /  [ ][ ]  –  [ ][ ]
```

2 lines	2
4 lines	4
6 lines	6
8 lines	8
20 characters/line*	2 0
40 characters/line*	4 0
Character height 33/66/75 mm	0 3
Character height 50/100/120 mm	0 5
LED Standard	0
LED for outdoor use	2
LED color red	R
LED color red/green/orange switchable	M
Display readable on one side	1
Display readable on both sides	2
Steel sheet housing, coated	0
Steel sheet housing, bilayer painting	1
Stainless steel housing V2A, coated	2
Stainless steel housing V2A, brushed	3
Stainless steel housing V4A, brushed	5
Protection type IP54	0
Protection type IP65	1
Protection type IP54 with climate adjustment	2
Protection type IP54 with climate adjustment and heating	4
Wall mounting, cable entry point from the bottom	0
Wall mounting, cable entry point from the top	1
Hanging installation, cable entry point from the bottom	2
Hanging installation, cable entry point from the top	3
Wall mounting and hanging installation, cable entry point from the bottom	4
Wall mounting and hanging installation, cable entry point from the top	5
Power supply 230 V AC ±15 %, 50 Hz	A
Power supply 24 V DC ±15 %	B
Power supply 115 V AC ±15 %, 60 Hz	C
Interface	x x

* applies for Acala 7 character set

Housing colors

Case front	RAL 5002 ultramarine
Case rear part	RAL 7035 light grey

Front frame

SX502-xxx/xx/xR-xxx/xx-xx	plastic, tinted red, non-reflective
SX502-xxx/xx/xM-xxx/xx-xx	plastic, clear, non-reflective

Ambient conditions

Operating temperature	0…40 °C
Storage temperature	-30…85 °C
Relative humidity	max. 95 % (non-condensing)

Max. power consumption

Units with character height of 33/66/75 mm

One-sided display		Double-sided display	
SX502-220/03/0R-1xx/xx-xx	approx. 40 VA	SX502-220/03/0R-2xx/xx-xx	approx. 75 VA
SX502-220/03/0M-1xx/xx-xx	approx. 65 VA	SX502-220/03/0M-2xx/xx-xx	approx. 130 VA
SX502-420/03/0R-1xx/xx-xx	approx. 75 VA	SX502-420/03/0R-2xx/xx-xx	approx. 140 VA
SX502-420/03/0M-1xx/xx-xx	approx. 130 VA	SX502-420/03/0M-2xx/xx-xx	approx. 265 VA
SX502-620/03/0R-1xx/xx-xx	approx. 105 VA	SX502-620/03/0R-2xx/xx-xx	approx. 220 VA
SX502-620/03/0M-1xx/xx-xx	approx. 205 VA	SX502-620/03/0M-2xx/xx-xx	approx. 390 VA
SX502-820/03/0R-1xx/xx-xx	approx. 140 VA	SX502-820/03/0R-2xx/xx-xx	approx. 290 VA
SX502-820/03/0M-1xx/xx-xx	approx. 265 VA	SX502-820/03/0M-2xx/xx-xx	approx. 525 VA
SX502-240/03/0R-1xx/xx-xx	approx. 75 VA	SX502-240/03/0R-2xx/xx-xx	approx. 150 VA
SX502-240/03/0M-1xx/xx-xx	approx. 130 VA	SX502-240/03/0M-2xx/xx-xx	approx. 265 VA
SX502-440/03/0R-1xx/xx-xx	approx. 140 VA	SX502-440/03/0R-2xx/xx-xx	approx. 290 VA
SX502-440/03/0M-1xx/xx-xx	approx. 265 VA	SX502-440/03/0M-2xx/xx-xx	approx. 525 VA
SX502-640/03/0R-1xx/xx-xx	approx. 210 VA	SX502-640/03/0R-2xx/xx-xx	approx. 425 VA
SX502-640/03/0M-1xx/xx-xx	approx. 390 VA	SX502-640/03/0M-2xx/xx-xx	approx. 775 VA
SX502-840/03/0R-1xx/xx-xx	approx. 280 VA	SX502-840/03/0R-2xx/xx-xx	approx. 560 VA
SX502-840/03/0M-1xx/xx-xx	approx. 515 VA	SX502-840/03/0M-2xx/xx-xx	approx. 1010 VA

Units with character height 50/100/120 mm

One-sided display		Double-sided display	
SX502-220/05/0R-1xx/xx-xx	approx. 45 VA	SX502-220/05/0R-2xx/xx-xx	approx. 85 VA
SX502-220/05/0M-1xx/xx-xx	approx. 85 VA	SX502-220/05/0M-2xx/xx-xx	approx. 165 VA
SX502-420/05/0R-1xx/xx-xx	approx. 85 VA	SX502-420/05/0R-2xx/xx-xx	approx. 170 VA
SX502-420/05/0M-1xx/xx-xx	approx. 165 VA	SX502-420/05/0M-2xx/xx-xx	approx. 335 VA
SX502-620/05/0R-1xx/xx-xx	approx. 130 VA	SX502-620/05/0R-2xx/xx-xx	approx. 250 VA
SX502-620/05/0M-1xx/xx-xx	approx. 245 VA	SX502-620/05/0M-2xx/xx-xx	approx. 490 VA
SX502-820/05/0R-1xx/xx-xx	approx. 170 VA	SX502-820/05/0R-2xx/xx-xx	approx. 335 VA
SX502-820/05/0M-1xx/xx-xx	approx. 335 VA	SX502-820/05/0M-2xx/xx-xx	approx. 660 VA
SX502-240/05/0R-1xx/xx-xx	approx. 85 VA	SX502-240/05/0R-2xx/xx-xx	approx. 170 VA
SX502-240/05/0M-1xx/xx-xx	approx. 165 VA	SX502-240/05/0M-2xx/xx-xx	approx. 320 VA
SX502-440/05/0R-1xx/xx-xx	approx. 170 VA	SX502-440/05/0R-2xx/xx-xx	approx. 335 VA
SX502-440/05/0M-1xx/xx-xx	approx. 320 VA	SX502-440/05/0M-2xx/xx-xx	approx. 650 VA
SX502-640/05/0R-1xx/xx-xx	approx. 250 VA	SX502-640/05/0R-2xx/xx-xx	approx. 500 VA
SX502-640/05/0M-1xx/xx-xx	approx. 490 VA	SX502-640/05/0M-2xx/xx-xx	approx. 980 VA
SX502-840/05/0R-1xx/xx-xx	approx. 335 VA	SX502-840/05/0R-2xx/xx-xx	approx. 685 VA
SX502-840/05/0M-1xx/xx-xx	approx. 650 VA	SX502-840/05/0M-2xx/xx-xx	approx. 1295 VA

The power consumption for the type SX502-xx/xx/0x-xxx/xx-xx is also valid for the type SX502-xx/xx/2x-xxx/xx-xx (LEDs for external use).

For units with built-in heating, the values for power consumption specified in the table increase by approx. 10 – 200 VA (exact values on request), depending on the unit size.

Screw-type terminals

Control computer	Capacity of terminals 0,14…1,5 mm²
Power supply	Capacity of terminals 0,2…4 mm²

Fixed text memory

Capacity	128 KBytes
Number of texts	max. 10.000
Text length	max. 2048 characters (for individual line selection, the number is divided by the number of lines).

Marquee

|	
Text length	max. 4000 display columns (pixel)

Real-time clock

Precision	20 ppm

Dimensions and weights

Units with character height of 33/66/75 mm and one-sided display

The following figure shows unit version SX502-640/03/0x-1xx/xx-xx, representing the other unit versions listed in the following table. All dimensions are in mm.

LG1, LG2 and LG3 are ventilation grates on units ventilated by other means. The ventilation grates and their arrangement are not pictured to scale. The following table specifies the ventilation grates of the individual unit versions.
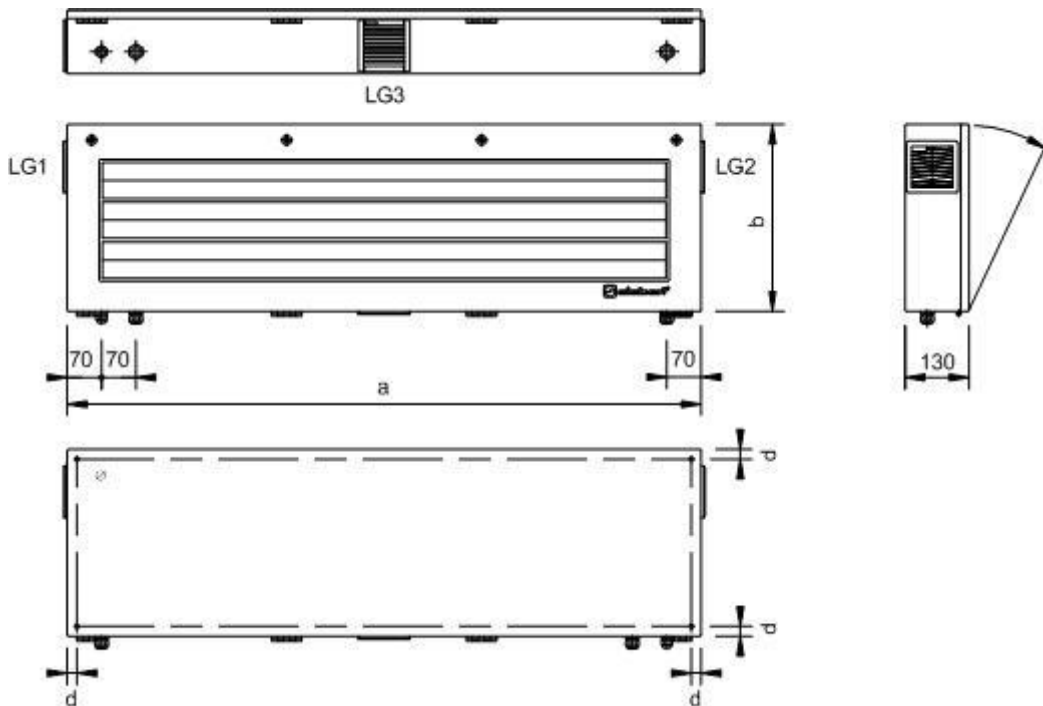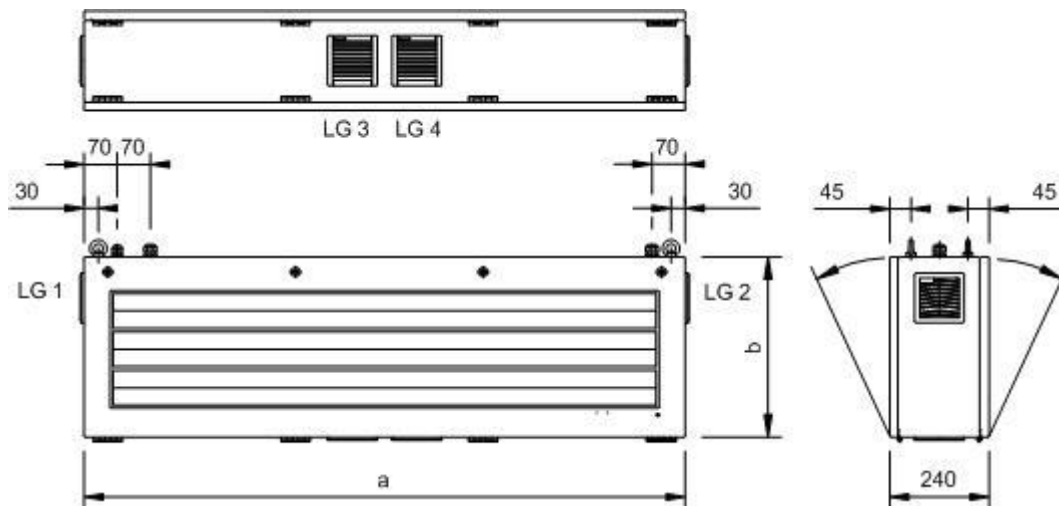

Unit version	a	b	d	Ø	LG1	LG2	LG3	Weight
SX502-220/03/0R-1xx/xx-xx	700	210	16	7	–	–	–	approx. 12 kg
SX502-220/03/0M-1xx/xx-xx	700	210	16	7	–	–	–	approx. 12 kg
SX502-420/03/0R-1xx/xx-xx	700	300	16	7	–	–	–	approx. 14 kg
SX502-420/03/0M-1xx/xx-xx	700	300	16	7	–	–	–	approx. 14 kg
SX502-620/03/0R-1xx/xx-xx	700	380	20	9	–	–	–	approx. 18 kg
SX502-620/03/0M-1xx/xx-xx	700	380	20	9	■	■	–	approx. 18 kg
SX502-820/03/0R-1xx/xx-xx	720	490	20	9	–	–	–	approx. 21 kg
SX502-820/03/0M-1xx/xx-xx	720	490	20	9	■	■	–	approx. 21 kg
SX502-240/03/0R-1xx/xx-xx	1270	210	20	9	–	–	–	approx. 18 kg
SX502-240/03/0M-1xx/xx-xx	1270	210	20	9	–	–	–	approx. 18 kg
SX502-440/03/0R-1xx/xx-xx	1270	300	20	9	–	–	–	approx. 22 kg
SX502-440/03/0M-1xx/xx-xx	1270	300	20	9	■	■	■	approx. 22 kg
SX502-640/03/0R-1xx/xx-xx	1270	380	20	9	–	–	–	approx. 28 kg
SX502-640/03/0M-1xx/xx-xx	1270	380	20	9	■	■	■	approx. 28 kg
SX502-840/03/0R-1xx/xx-xx	1290	490	20	9	–	–	–	approx. 34 kg
SX502-840/03/0M-1xx/xx-xx	1290	490	20	9	■	■	■	approx. 34 kg

Units with character height of 33/66/75 mm and double-sided display

The following figure shows unit version SX502-640/03/0x-2xx/xx-xx, representing the other unit versions listed in the following table. All dimensions are in mm.

LG1, LG2, LG3 and LG4 are ventilation grates on units ventilated by other means. The ventilation grates and their arrangement are not pictured to scale. The following table specifies the ventilation grates of the individual unit versions.
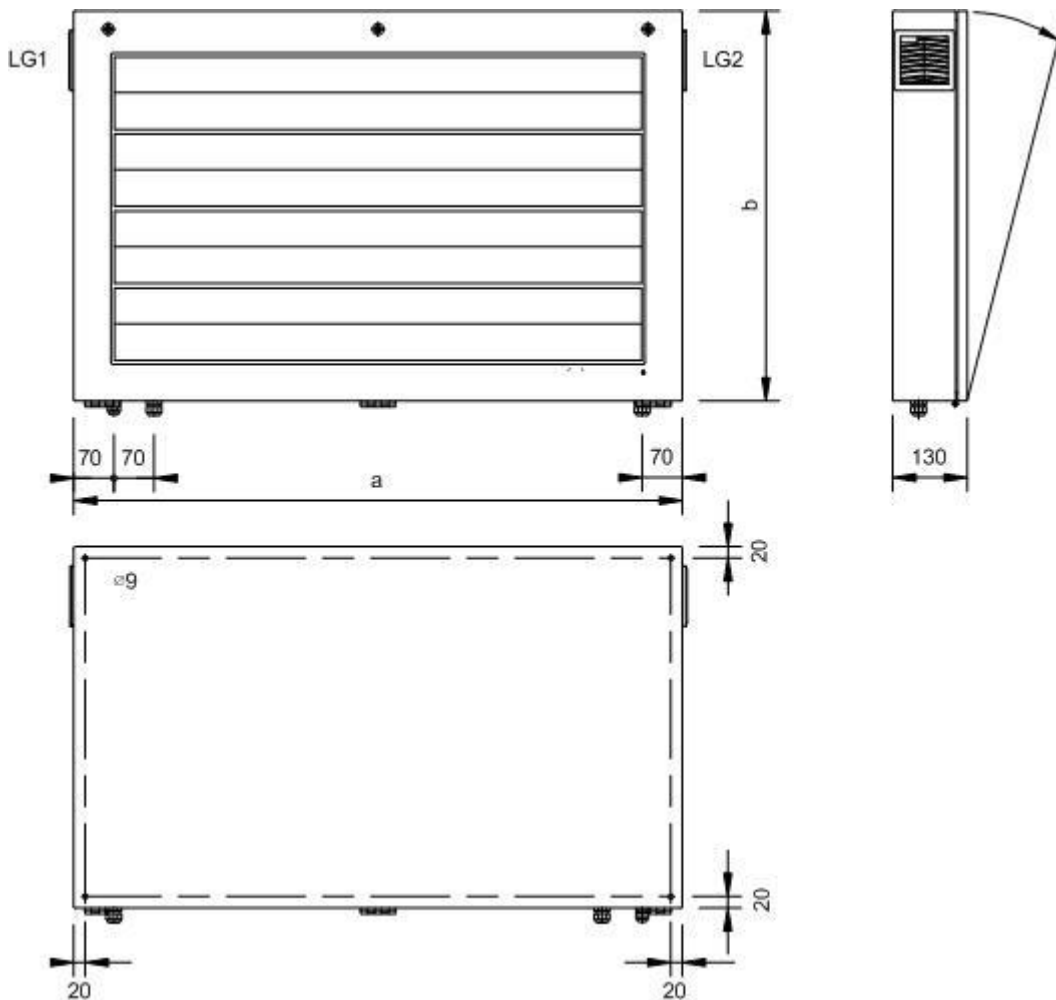

Unit version	a	b	LG1	LG2	LG3	LG4	Weight
SX502-220/03/0R-2xx/xx-xx	700	210	–	–	–	–	approx. 17 kg
SX502-220/03/0M-2xx/xx-xx	700	210	–	–	–	–	approx. 17 kg
SX502-420/03/0R-2xx/xx-xx	700	300	–	–	–	–	approx. 22 kg
SX502-420/03/0M-2xx/xx-xx	700	300	■	–	–	■	approx. 22 kg
SX502-620/03/0R-2xx/xx-xx	700	380	■	–	–	■	approx. 28 kg
SX502-620/03/0M-2xx/xx-xx	700	380	■	–	–	■	approx. 28 kg
SX502-820/03/0R-2xx/xx-xx	720	490	■	–	–	■	approx. 32 kg
SX502-820/03/0M-2xx/xx-xx	720	490	■	■	■	■	approx. 32 kg
SX502-240/03/0R-2xx/xx-xx	1270	210	–	–	–	–	approx. 26 kg
SX502-240/03/0M-2xx/xx-xx	1270	210	■	■	–	–	approx. 26 kg
SX502-440/03/0R-2xx/xx-xx	1270	300	■	–	–	■	approx. 34 kg
SX502-440/03/0M-2xx/xx-xx	1270	300	■	■	■	■	approx. 34 kg
SX502-640/03/0R-2xx/xx-xx	1270	380	■	–	–	■	approx. 42 kg
SX502-640/03/0M-2xx/xx-xx	1270	380	■	■	■	■	approx. 42 kg
SX502-840/03/0R-2xx/xx-xx	1290	490	■	■	■	–	approx. 50 kg
SX502-840/03/0M-2xx/xx-xx	1290	490	■	■	■	■	approx. 50 kg

Units with character height of 50/100/120 mm and one-sided display

The following figure shows unit version SX502-820/05/0x-1xx/xx-xx, representing the other unit versions listed in the following table. All dimensions are in mm.

LG1 and LG2 are ventilation grates on units ventilated by other means. The ventilation grates and their arrangement are not pictured to scale. The following table specifies the ventilation grates of the individual unit versions.

Unit version	a	b	LG1	LG2	Weight
SX502-220/05/0R-1xx/xx-xx	1040	250	–	–	approx. 16 kg
SX502-220/05/0M-1xx/xx-xx	1040	250	–	–	approx. 16 kg
SX502-420/05/0R-1xx/xx-xx	1040	390	–	–	approx. 22 kg
SX502-420/05/0M-1xx/xx-xx	1040	390	–	–	approx. 22 kg
SX502-620/05/0R-1xx/xx-xx	1040	530	–	–	approx. 28 kg
SX502-620/05/0M-1xx/xx-xx	1040	530	–	–	approx. 28 kg
SX502-820/05/0R-1xx/xx-xx	1060	680	–	–	approx. 35 kg
SX502-820/05/0M-1xx/xx-xx	1060	680	■	■	approx. 35 kg
SX502-240/05/0R-1xx/xx-xx	1960	250	–	–	approx. 27 kg
SX502-240/05/0M-1xx/xx-xx	1960	250	–	–	approx. 27 kg
SX502-440/05/0R-1xx/xx-xx	1960	390	–	–	approx. 40 kg
SX502-440/05/0M-1xx/xx-xx	1960	390	–	–	approx. 40 kg

The following figure shows unit version SX502-640/05/0x-1xx/xx-xx, representing the other unit versions listed in the following table. All dimensions are in mm.

LG1, LG2 and LG3 are ventilation grates on units ventilated by other means. The ventilation grates and their arrangement are not pictured to scale. The following table specifies the ventilation grates of the individual unit versions.
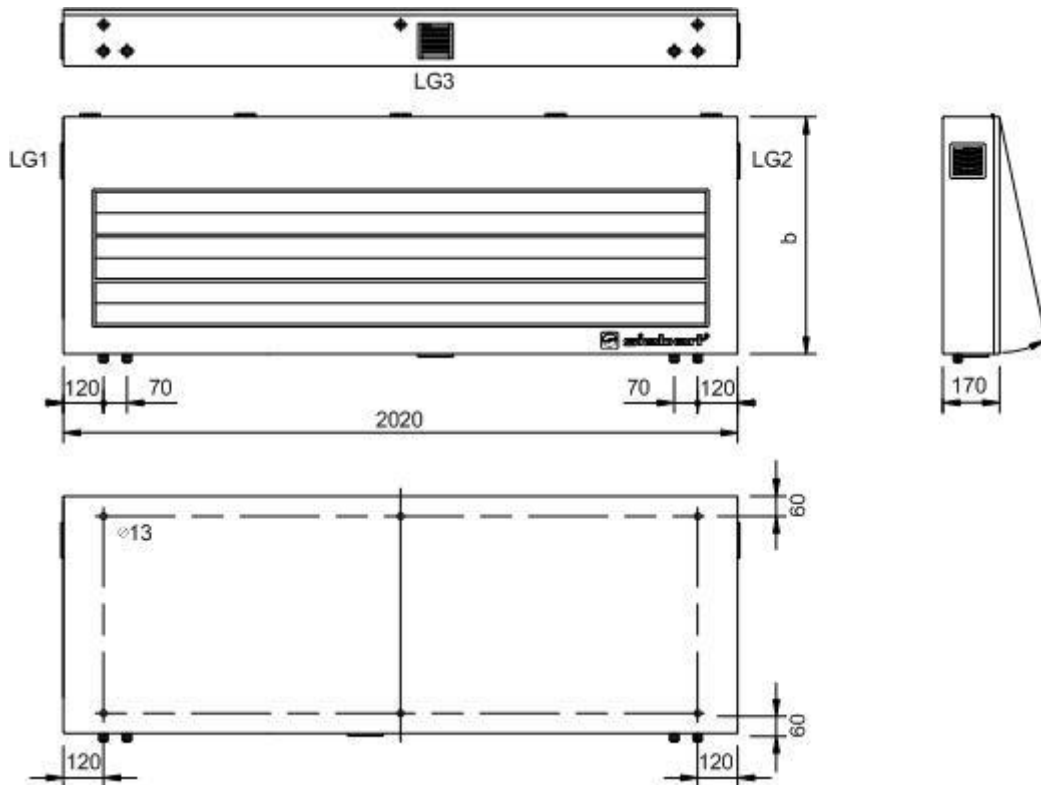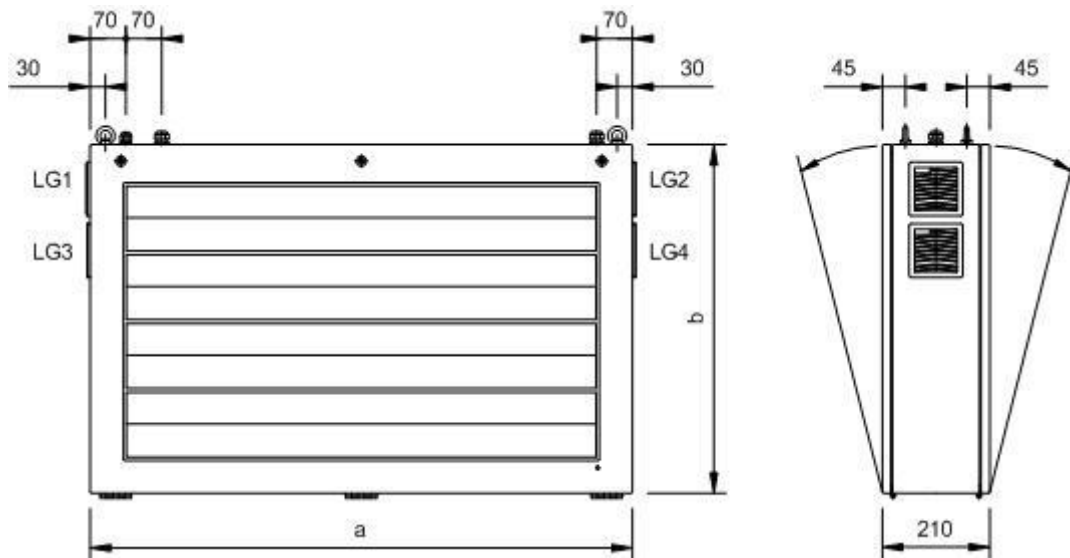

Unit version	b	LG1	LG2	LG3	Weight
SX502-640/05/0R-1xx/xx-xx	710	–	–	–	approx. 82 kg
SX502-640/05/0M-1xx/xx-xx	710	■	■	■	approx. 82 kg
SX502-840/05/0R-1xx/xx-xx	850	–	–	–	approx. 96 kg
SX502-840/05/0M-1xx/xx-xx	850	■	■	■	approx. 96 kg

Units with character height of 50/100/120 mm and double-sided display

The following figure shows unit version SX502-820/05/0x-2xx/xx-xx, representing the other unit versions listed in the following table. All dimensions are in mm.
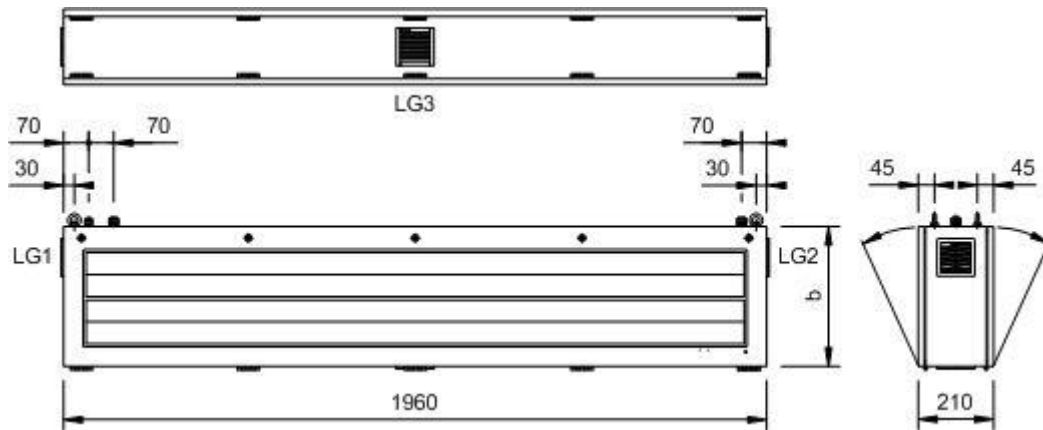
LG1, LG2, LG3 and LG4 are ventilation grates on units ventilated by other means. The ventilation grates and their arrangement are not pictured to scale. The following table specifies the ventilation grates of the individual unit versions.

Unit version	a	b	LG1	LG2	LG3	LG4	Weight
SX502-220/05/0R-2xx/xx-xx	1040	250	–	–	–	–	approx. 24 kg
SX502-220/05/0M-2xx/xx-xx	1040	250	–	–	–	–	approx. 24 kg
SX502-420/05/0R-2xx/xx-xx	1040	390	–	–	–	–	approx. 38 kg
SX502-420/05/0M-2xx/xx-xx	1040	390	■	■	–	–	approx. 38 kg
SX502-620/05/0R-2xx/xx-xx	1040	530	–	–	–	–	approx. 47 kg
SX502-620/05/0M-2xx/xx-xx	1040	530	■	■	–	–	approx. 47 kg
SX502-820/05/0R-2xx/xx-xx	1060	680	–	–	–	–	approx. 65 kg
SX502-820/05/0M-2xx/xx-xx	1060	680	■	■	■	■	approx. 65 kg

The following figure shows unit version SX502-440/05/0x-2xx/xx-xx, representing the other unit versions listed in the following table. All dimensions are in mm.

LG1, LG2 and LG3 are ventilation grates on units ventilated by other means. The ventilation grates and their arrangement are not pictured to scale. The following table specifies the ventilation grates of the individual unit versions.

Unit version	b	LG1	LG2	LG3	Weight
SX502-240/05/0R-2xx/xx-xx	250	–	–	–	approx. 45 kg
SX502-240/05/0M-2xx/xx-xx	250	–	–	–	approx. 45 kg
SX502-440/05/0R-2xx/xx-xx	390	–	–	–	approx. 66 kg
SX502-440/05/0M-2xx/xx-xx	390	■	■	■	approx. 66 kg

The following figure shows unit version SX502-840/05/0x-2xx/xx-xx, representing the other unit versions listed in the following table. All dimensions are in mm.

LG1, LG2, LG3 and LG4 are ventilation grates on units ventilated by other means. The ventilation grates and their arrangement are not pictured to scale. The following table specifies the ventilation grates of the individual unit versions.
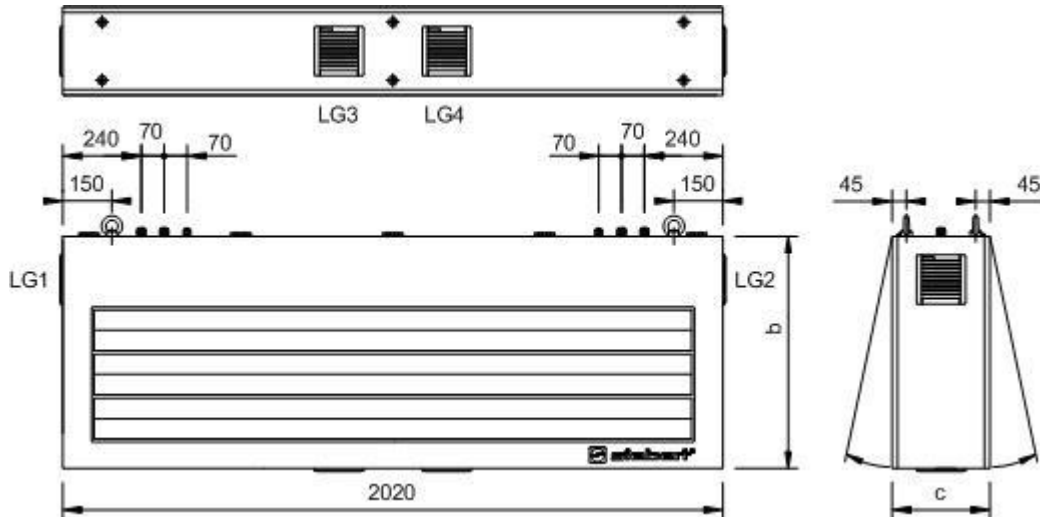
Unit version	b	c	LG1	LG2	LG3	LG4	Weight
SX502-640/05/0R-2xx/xx-xx	710	270	–	–	–	–	approx. 136 kg
SX502-640/05/0M-2xx/xx-xx	710	270	■	■	■	■	approx. 136 kg
SX502-840/05/0R-2xx/xx-xx	850	300	■	■	–	■	approx. 160 kg
SX502-840/05/0M-2xx/xx-xx	850	300	■	■	■	■	approx. 160 kg