



Operating instructions

Series SX302

Alphanumeric large size displays
with Profinet IO IRT interface

1 Contact

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2 Legal note

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3 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 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 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.

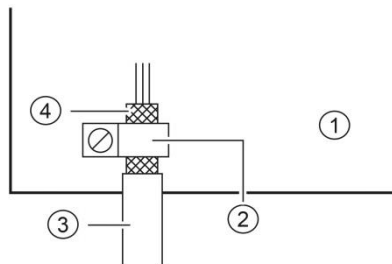
The data and operating voltage cables must be laid separately. They may not be laid together with heavy-current cables or other interference-producing cables.

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

The 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:



- | | |
|------------------|--------------------|
| ① mounting plate | ② conductive clamp |
| ③ data lines | ④ cable shielding |

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.

4 Unit description

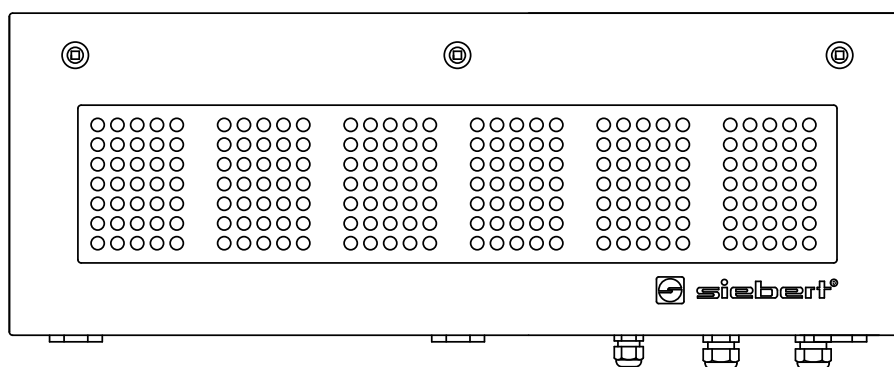
Model designation

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 8):

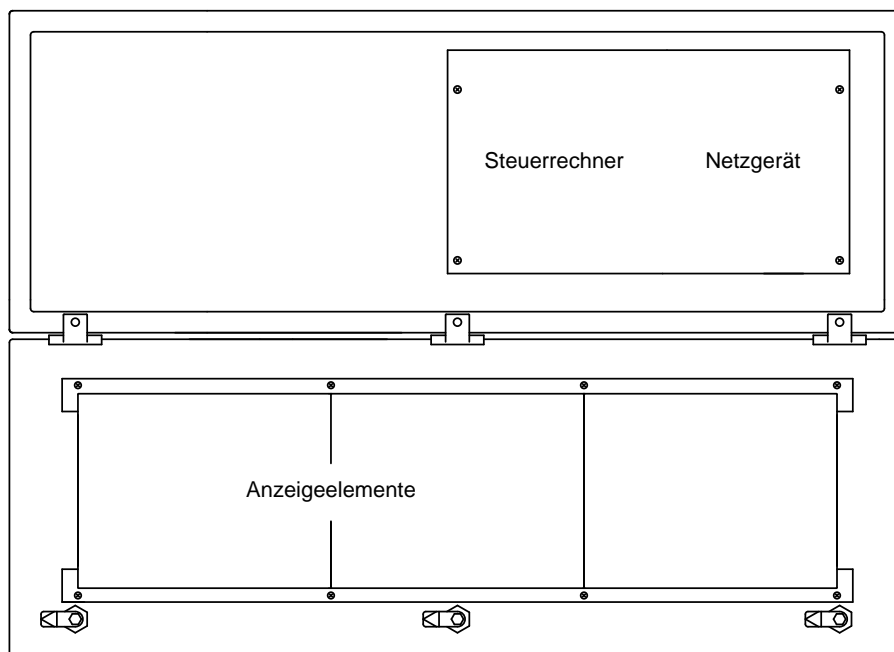
SX302-xx/xx/xx-xxx/xx-YR

Unit construction

The following figure shows model type SX302-05/10/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.



The following figure shows the unit when open.



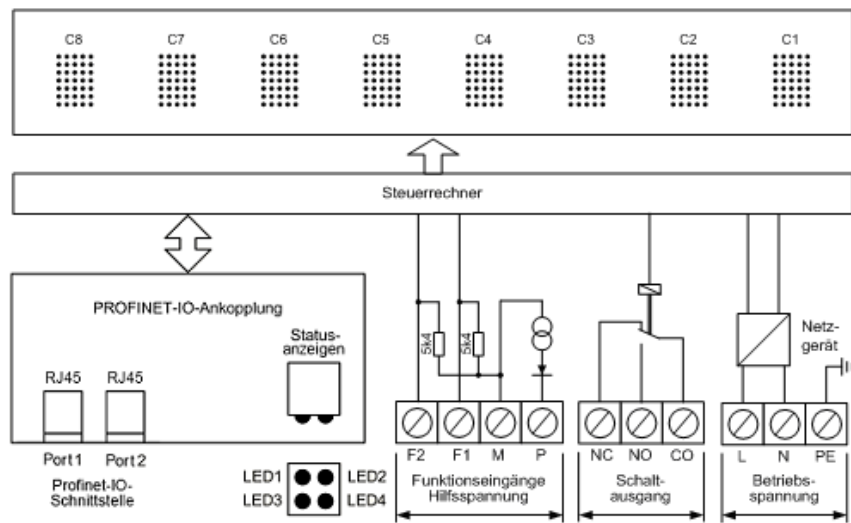
Units with double-sided display show the same information on the front and on the rear side.

Steuerrechner Central processing unit

Netzgerät Power supply unit

Anzeigeelemente Display modules

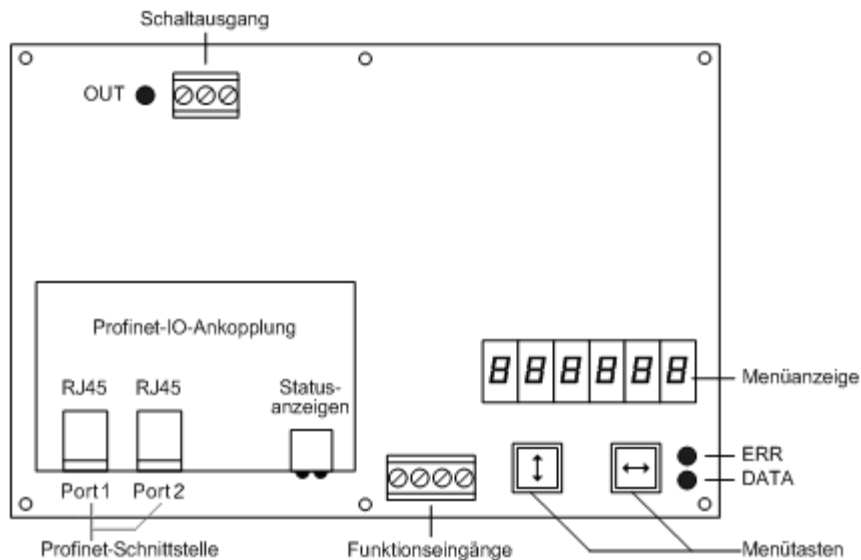
Principle circuit diagram



Steuerrechner	Central processing unit
PROFINET-IO-Ankopplung	Profinet IO couplig
Statusanzeigen	Status indicators
Profinet-IO-Schnittstelle	Profinet IO interface
Funktionseingänge	Function inputs
Hilfsspannung	Auxiliary voltage
Schaltausgang	Switching output
Betriebsspannung	Power supply
Netzgerät	Power supply unit

Central Processing Unit

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



Schaltausgang	Switching output
Profinet-IO-Ankopplung	Profinet IO coupling
Statusanzeigen	Status indicators
Profinet-Schnittstelle	Profinet interface
Funktionseingänge	Function inputs
Menüanzeige	Menu display
Menütasten	Menu buttons

Profinet IO interface

The Profinet IO interface is located on the RJ45 socket of the Profinet IO coupling.

The units have an Ethernet switch with 2 ports. Connection can be made via Port1 or Port2.

The GSDML data file is included on disk in delivery.

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 PROFINET IO interface (see Chapter 6).

Auxiliary voltage

The units supply terminal P with an auxiliary voltage galvanically isolated from the operating voltage ($24\text{ V} \pm 20\%$, max. 50 mA, M = reference potential). It can be used for supplying power to the current loop or as H signal for the function inputs.

Menu display

The parameterization of the units is carried out in a menu of the menu display (see Chapter 7).

In normal operation mode ONLINE is shown in the menu display.

Menu buttons

The menu buttons are used to control the menu (see Chapter 7).

Switching output

The devices dispose of a switching output (relay) with potential-free make contact (NC, NO, CO).

Status indicators

The status indicators (LED) of the control computer and the Profinet coupling have the following meaning:

- LED 1 Data link on port 1 (flickering = data traffic)
- LED 2 Connection to IO-Controller
Blinking: IO-Controller in STOP condition
Lighting: IO-Controller in RUN condition
- LED 3 Data link on port 2 (flickering = data traffic)
- LED4 Green: The unit is parameterized and recognized as Profinet participant.
Red 1 impulse: number and type of IO-Controller projected modules and the configuration of the display do not match.
Red 3 impulse: no ID or IP-address assigned.
- DATA Data receipt
- ERR No meaning
- OUT Switching output is active

Other status information (LED1...LED4) are of no meaning.

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 Configuration

MAC address

The MAC address of the unit is to be found on the Profinet IO coupling of the control computer (see label). It is needed for commissioning and should be written down on this operating manual before the unit is mounted on an inaccessible location.

GSDML data file

After importing the GSDML data file (data carrier included in delivery) into the Engineering-Tool the unit is shown in hardware-catalog under 'PROFINET IO / Further Field Units / General / Anybus-PIR'.

Configuration

The configuration is dependent on the number of digits of the display (see Chapter 6).

6 Control



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.

Input-/Output data bytes

The number of output data bytes is one greater than the number of digits of the display. The number of input data bytes is 0.

Configuration inside IO controller

Starting with slot 1 from file 'RT Exit Modules' as many modules must be plugged in that the sum of the output data bytes corresponds with the number of digits of the display plus 1. Other configurations are not allowed.

Configuration example

If the display range is 6 digits, then the number of output data bytes is 7. The configuration of the IO device is as follows:

Slot 1	RT AUS 001 byte
Slot 2	RT AUS 002 bytes
Slot 3	RT AUS 004 bytes

Data format ASCII

The data is transmitted using a number of bytes depending on the number of digits of the device.

Byte 0 contains the formatting of the display and the control of the switching output. The following bytes contain the indicator value in ASCII format (C8...C1).

Units with 1 digit SX302-x1/xx/xx-xxx/xx-xx	Byte 0 Charact.	Byte 1 C1							
Units with 2 digits SX302-x2/xx/xx-xxx/xx-xx	Byte 0 Charact.	Byte 1 C2	Byte 2 C1						
Units with 3 digits SX302-x3/xx/xx-xxx/xx-xx	Byte 0 Charact.	Byte 1 C3	Byte 2 C2	Byte 3 C1					
Units with 4 digits SX302-x4/xx/xx-xxx/xx-xx	Byte 0 Charact.	Byte 1 C4	Byte 2 C3	Byte 3 C2	Byte 4 C1				
Units with 5 digits SX302-x5/xx/xx-xxx/xx-xx	Byte 0 Charact.	Byte 1 C5	Byte 2 C4	Byte 3 C3	Byte 4 C2	Byte 5 C1			
Units with 6 digits SX302-x6/xx/xx-xxx/xx-xx	Byte 0 Charact.	Byte 1 C6	Byte 2 C5	Byte 3 C4	Byte 4 C3	Byte 5 C2	Byte 6 C1		
Units with 7 digits SX302-x7/xx/xx-xxx/xx-xx	Byte 0 Charact.	Byte 1 C7	Byte 2 C6	Byte 3 C5	Byte 4 C4	Byte 5 C3	Byte 6 C2	Byte 7 C1	
Units with 8 digits SX302-x8/xx/xx-xxx/xx-xx	Byte 0 Charact.	Byte 1 C8	Byte 2 C7	Byte 3 C6	Byte 4 C5	Byte 5 C4	Byte 6 C3	Byte 7 C2	Byte 8 C1

Byte 0							
7	6	5	4	3	2	1	0
:	:	:	:	:	:	:	:
:	:	:	:	:	0	0	0
:	:	:	:	:	:	:	:
:	:	:	:	:	0	:	:
:	:	:	:	:	1	:	:
:	:	:	:	:	:	:	:
:	:	:	:	:	0	:	:
:	:	:	:	:	1	:	:
:	:	:	:	:	:	:	:
:	:	:	:	:	0	:	:
:	:	:	:	:	1	:	:
:	:	:	:	:	:	:	:
0	0	:	:	:	:	:	:
0	1	:	:	:	:	:	:
1	0	:	:	:	:	:	:
1	1	:	:	:	:	:	:

Valid for units with monochrome LED display or LRD[®] display

Flashing

If in byte 0 bit 5 is set, the whole display flashes.

Flashing of the display can also be activated by application of the H signal to function input F1 (priority over bit 5 in byte 0).

For devices with LRD[®] display flashing is not possible.

Blanking

If in byte 0 bit 6 is set, the display will be blank (priority over flashing; not possible for devices with switchable LED color).

Brightness

If in byte 0 bit 4 is set the brightness of the display will be reduced.

The brightness can be reduced with an H signal on function input F2 (Priority over bit 4 in byte 0).

For units provided with a LRD[®] display brightness reduction is not possible.

Switching output

The units have a switching output (relay) with a potential free changeover contact (NC, NO, CO).

If in menu point r the setting is OFF the switching output can be activated by setting bit 3 in byte 0.

When setting A1, A2 or A4 in menu item r, the switching output automatically gives a wiping pulse with a duration of 1, 2 or 4 seconds with every valid telegram.

The wipe function is suitable p. e. for controlling optical and acoustic signal generators.

When the switching output is active the status indicator OUT of the Central Processing Unit is lightening.

Display test

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

The display test can also be activated by setting bits 7 and 6 in byte 0.

The display test has priority over flashing and blanking.

Demo operation mode

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

Power-on reset

After power-on, minus signs are displayed to signalize that the unit is ready for operation. If a display test has been preselected in menu item F, it will run beforehand.

Character set

	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	{		}	~	Δ
8	€	£	¤	¥	¦	§	¨	©	ª	«	¬	®	¯	°	±	²
9	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿	À	Á	Â
A	Ë	Ì	Í	Î	Ï	Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú
B	Û	Ü	Ý	Þ	ß	à	á	â	ã	ä	å	æ	ç	è	é	Ê
C	À	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	β	γ	π	Σ	σ	μ	τ	ϑ	ε	ρ	δ	ω	φ	ε	η
F	≡	±	¿	≤	≥	÷	×	°	·	-

8 Parametrization

Menu

The parameterization of the devices is carried out in a menu in the menu display. In normal mode, the menu display corresponds to the main display. For devices with more than six positions, *Online* is shown in the menu display in normal operation.

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 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 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.

In the menu mode the character Ξ appears in the main display. 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 *.

Menu item	Settings	Display
r Switching output	No wiping pulse*	r OFF
	Wiping pulse 1 sec.	r R1
	Wiping pulse 2 sec.	r R2
	Wiping pulse 4 sec.	r R4
F Display test	No display test at power-on*	F ----
	Display test at power-on	F BBBB
	Demo operation mode	F PLY
U Save	Save parameters* (Set)	U SET
	Not saving parameters (Escape)	U ESC
	Restore to factory settings (Default)	U DEF

9 Technical data

Unit properties

The model designation is structured as follows:

	SX302	-	<input type="text"/>	<input type="text"/>	/	<input type="text"/>	<input type="text"/>	/	<input type="text"/>	<input type="text"/>	-	<input type="text"/>	<input type="text"/>	/	<input type="text"/>	<input type="text"/>	-	<input type="text"/>	<input type="text"/>
			:	:		:	:		:	:		:	:		:	:		:	:
1 Digit			0	1		:	:		:	:		:	:		:	:		:	:
2 Digits			0	2															
			↓	↓															
8 Digits			0	8		:	:		:	:		:	:		:	:		:	:
						:	:		:	:		:	:		:	:		:	:
Character height 50 mm			0	5		:	:		:	:		:	:		:	:		:	:
Character height 100 mm			1	0		:	:		:	:		:	:		:	:		:	:
						:	:		:	:		:	:		:	:		:	:
LED Standard			0			:	:		:	:		:	:		:	:		:	:
LRD [®]			4			:	:		:	:		:	:		:	:		:	:
						:	:		:	:		:	:		:	:		:	:
Character color red																			
Character color green																			
Character color white																			
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

Max. power consumption

Units with one-sided display	[VA]
1 digit	
SX302-01/10/0x-1xx/xx-xx	approx. 12
2 digits	
SX302-02/05/0x-1xx/xx-xx	approx. 12
SX302-02/10/0x-1xx/xx-xx	approx. 15
3 digits	
SX302-03/05/0x-1xx/xx-xx	approx. 13
SX302-03/10/0x-1xx/xx-xx	approx. 17
4 digits	
SX302-04/05/0x-1xx/xx-xx	approx. 14
SX302-04/10/0x-1xx/xx-xx	approx. 21
5 digits	
SX302-05/05/0x-1xx/xx-xx	approx. 15
SX302-05/10/0x-1xx/xx-xx	approx. 23
6 digits	
SX302-06/03/0x-1xx/xx-xx	approx. 16
SX302-06/05/0x-1xx/xx-xx	approx. 26
7 digits	
SX302-07/05/0x-1xx/xx-xx	approx. 17
SX302-07/10/0x-1xx/xx-xx	approx. 30
8 digits	
SX302-08/05/0x-1xx/xx-xx	approx. 18
SX302-08/10/0x-1xx/xx-xx	approx. 32

Units with double-sided display	[VA]
1 digit	
SX302-01/10/0x-2xx/xx-xx	approx. 16
2 digits	
SX302-02/05/0x-2xx/xx-xx	approx. 15
SX302-02/10/0x-2xx/xx-xx	approx. 21
3 digits	
SX302-03/05/0x-2xx/xx-xx	approx. 17
SX302-03/10/0x-2xx/xx-xx	approx. 26
4 digits	
SX302-04/05/0x-2xx/xx-xx	approx. 19
SX302-04/10/0x-2xx/xx-xx	approx. 33
5 digits	
SX302-05/05/0x-2xx/xx-xx	approx. 21
SX302-05/10/0x-2xx/xx-xx	approx. 38
6 digits	
SX302-06/05/0x-2xx/xx-xx	approx. 23
SX302-06/10/0x-2xx/xx-xx	approx. 43
7 digits	
SX302-07/05/0x-2xx/xx-xx	approx. 25
SX302-07/10/0x-2xx/xx-xx	approx. 51
8 digits	
SX302-08/05/0x-2xx/xx-xx	approx. 27
SX302-08/10/0x-2xx/xx-xx	approx. 55

For units with built-in heating, the values for power consumption specified in the table increase by approx. 10 – 100 VA (exact values on request), depending on the unit size.

Switching output

Maximum switching voltage 30 V AC/DC
Maximum switching current 500 mA (ohmic load)

Screw-type terminals

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

Housing colors

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

Front frame

SX302-xx/xx/xR-xxx/xx-xx Plastic, tinted red, non-reflective
SX302-xx/xx/xG-xxx/xx-xx Plastic, tinted green, non-reflective

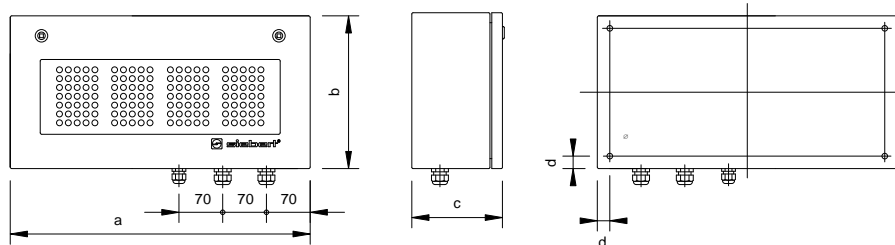
Ambient conditions

Operating temperature 0...55 °C
Storage temperature -30...85 °C
Relative humidity max. 95 % (non-condensing)

Dimensions and weights

Units with one-sided display

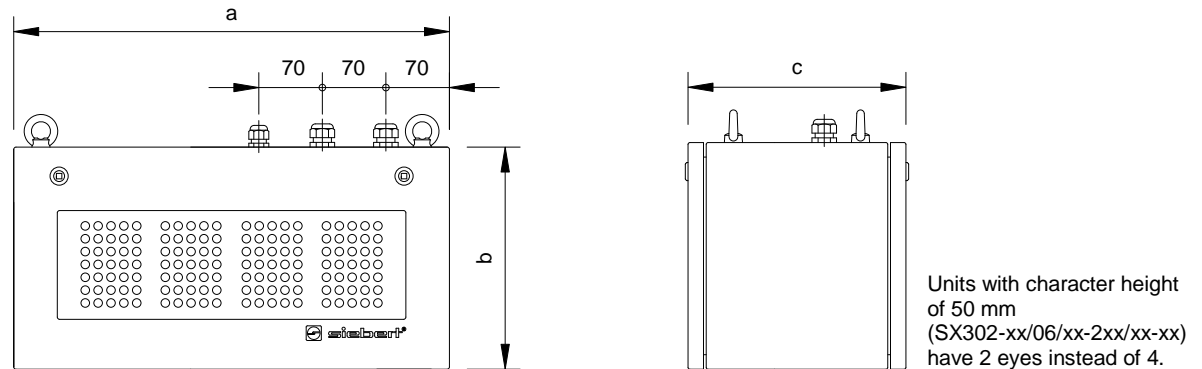
The following figure shows unit version SX302-04/10/xx-1xx/xx-xx representing the other unit versions listed in the following table.



	a [mm]	b [mm]	c [mm]	d [mm]	Ø [mm]	Weight [kg]
1 digit						
SX302-01/10/xx-1xx/xx-xx	330	245	145	16	7	approx. 7
2 digits						
SX302-02/05/xx-1xx/xx-xx	300	185	110	16	7	approx. 5
SX302-02/10/xx-1xx/xx-xx	330	245	145	16	7	approx. 7
3 digits						
SX302-03/05/xx-1xx/xx-xx	300	185	110	16	7	approx. 5
SX302-03/10/xx-1xx/xx-xx	480	245	145	16	7	approx. 9
4 digits						
SX302-04/05/xx-1xx/xx-xx	300	185	110	16	7	approx. 5
SX302-04/10/xx-1xx/xx-xx	480	245	145	16	7	approx. 9
5 digits						
SX302-05/05/xx-1xx/xx-xx	400	185	110	16	7	approx. 6
SX302-05/10/xx-1xx/xx-xx	680	245	145	16	7	approx. 12
6 digits						
SX302-06/05/xx-1xx/xx-xx	400	185	110	16	7	approx. 6
SX302-06/10/xx-1xx/xx-xx	680	245	145	16	7	approx. 12
7 digits						
SX302-07/05/xx-1xx/xx-xx	510	185	110	16	7	approx. 7
SX302-07/10/xx-1xx/xx-xx	870	245	145	16	7	approx. 14
8 digits						
SX302-08/05/xx-1xx/xx-xx	510	185	110	16	7	approx. 7
SX302-08/10/xx-1xx/xx-xx	870	245	145	16	7	approx. 14

Units with double-sided display

The following figure shows unit version SX302-04/10/xx-2xx/xx-xx representing the other unit versions listed in the following table.



	a [mm]	b [mm]	c [mm]	Weight [kg]
1 digit				
SX302-01/10/xx-2xx/xx-xx	330	245	240	approx. 11
2 digits				
SX302-02/05/xx-2xx/xx-xx	300	185	150	approx. 9
SX302-02/10/xx-2xx/xx-xx	330	245	240	approx. 11
3 digits				
SX302-03/05/xx-2x/xx-xx	300	185	150	approx. 9
SX302-03/10/xx-2xx/xx-xx	480	245	240	approx. 15
4 digits				
SX302-04/05/xx-2xx/xx-xx	300	185	150	approx. 9
SX302-04/10/xx-2xx/xx-xx	480	245	240	approx. 15
5 digits				
SX302-05/05/xx-2xx/xx-xx	400	185	150	approx. 9
SX302-05/10/xx-2xx/xx-xx	680	245	240	approx. 19
6 digits				
SX302-06/05/xx-2xx/xx-xx	400	185	150	approx. 9
SX302-06/10/xx-2xx/xx-xx	680	245	240	approx. 19
7 digits				
SX302-07/05/xx-2xx/xx-xx	510	185	150	approx. 11
SX302-07/10/xx-2xx/xx-xx	870	245	240	approx. 23
8 digits				
SX302-08/05/xx-2xx/xx-xx	510	185	150	approx. 11
SX302-08/10/xx-2xx/xx-xx	870	245	240	approx. 23