Operating instructions

Series SX402

Alphanumeric digital display with Ethernet interface

BAL SX402 ETH EN 1.1

MAC address: | | : | | : | | : | | : | | : | |

Site of the unit: _____

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Validity

The model designation of the units is:

SX402-220/05/0G-001/0B-E0
SX402-420/05/0G-001/0B-E0
SX402-240/05/0G-001/0B-E0
SX402-220/09/0G-001/0B-E0

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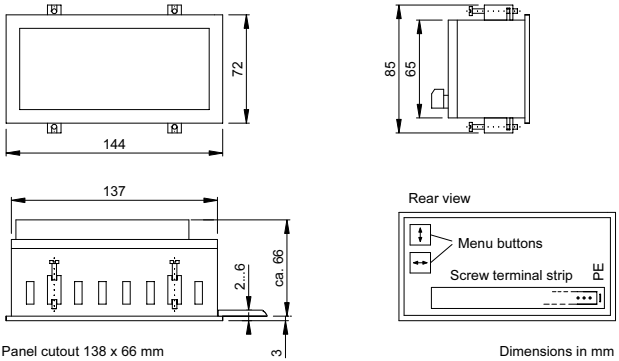
Chapter 1 | Dimensions

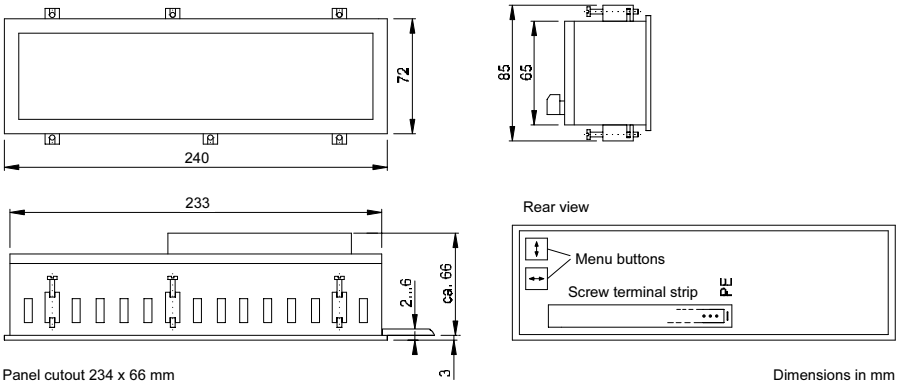
SX402-220/05/0G-001/0B-xx (2 x 20 characters, character height 5 mm)
SX402-420/05/0G-001/0B-xx (4 x 20 characters, character height 5 mm)



Panel cutout 138 x 66 mm

Dimensions in mm

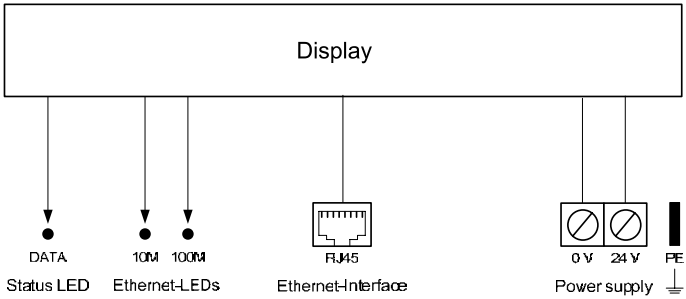
SX402-240/05/0G-001/0B-xx (2 x 40 characters, character height 4,7 mm)
SX402-220/09/0G-001/0B-xx (2 x 20 characters, character height 9 mm)



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 menu display (see chapter 5).

Ethernet interface | The Ethernet interface is located on a standard RJ45 socket on the back side of the display. It has the following specifications:

Data rate	10/100 Mbps, automatic detection
Galvanic isolation	1,5 kV
Protocols	ICMP, ARP, IP, TCP, UDP, DHCP, Telnet, HTTP
Operating modes	TCP Server, TCP Client, UDP
	The units are set-up as TCP server by default. The data is transmitted to port 8000 via a socket connection (factory settings). Other ports between 2000 and 9999 can be set in menu item P (see chapter 5).
Configuration	The basic configuration can be set up without external aids via the menu (see chapter 5). Further settings can be done via Web Browser or Telnet console (see chapter 7).

The Telnet and HTTP protocols are used exclusively for configuration, not for data transmission.

Status display | The status display DATA (LED), which is located on the back of the device, lights up when receiving data. Constant blinking with 2 Hz means:

DHCP addressing	The addressing has not occurred yet or there is not a connection to the DHCP Server.
Static addressing	There is an address conflict.

Ethernet-LEDs | The data transmission rate is detected automatically and displayed via the 100M and 10M Ethernet LEDs. A permanently lit LED signals a connection having the indicated speed. Flickering means additional data exchange.

Chapter 3 | Control

Text types | The displays can display either dynamic or static texts.

Dynamic texts can be changed while the unit is running. They are generated from within the process and sent to the display as data telegram.

Static texts cannot be changed while the unit is running. They are compiled using the PC tool 'Text Manager' delivered on data carrier and loaded in the text memory via the Ethernet interface. Then, they can be opened via their text number.

Commands | The control of the devices is done using commands according to the following command table. In the description, the numbers in [ ] refer to the corresponding lines in the command table.

Some of the commands require a telegram ending (↵). It can be inserted by means of a single CR ($0D_h$) or LF ($0A_h$) character or a CR/LF character combination.

Commands for text manipulation

Online-Text	**cc . . .↵**	Send any character (**cc…** = characterband with any content)	[1]
Display static text	**$Tn↵**	Select static text (n = number, 1 to 3 digits)	[2]
Deleting text	**$E↵**	Clearing text in the display	[3]

Commands for text formatting

Line break	**$C**	Forced line break	[4]
Flashing	**$F1**	Flashing of following characters on	[5]
	$F0	Flashing of following characters off	[6]
Character set	**$M1**	Standard character set	[7]
	$M2	User-defined character set	[8]
Bar graph	**$Gnnn**	Bar graph display (nnn = number of columns, always enter in three numeric digits, e. g. $G040)	[9]
$ character	**$$**	Display of the '$' character in the text	[10]

Commands for display options

Flashing	**$F1↵**	Flashing of the entire display on	[11]
	$↵F0	Flashing of the entire display off	[12]
Reset	**$0↵**	Restarting the display	[13]

Display online texts | 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 fixed text is called up.

Display static text | A static text is called up using the command **$Tn↵** [2]. **n** is the text number; it can be from one to three digits . Any text in the display is cleared when a fixed text is called up.

Deleting text | Any text in the display is cleared with the **$E↵** command [3]. Afterwards the following will appear on the display: .

Line break | A line break occurs automatically if a text has more characters than can be displayed in one line. The rest of the text will then be displayed in the next line.

A line break can also be forced at a certain place in the text, for example for correct hyphenation [4] using the command **$**C.

Flashing | Including **$F1** in the data string causes the following characters to flash [5]. **$F0** command in the data telegram deactivates the flashing of the following characters [6].

The **$F1↵** command activates the flashing of the entire display [11]. The **$F0↵** command deactivates the flashing of the entire display [12].

Character set | The character set for all characters can be chosen in the text. The command **$M1** in the data telegram causes all following characters to be displayed in standard character sets [7]. The command **$M2** in the data telegram causes all following characters to be displayed in user defined character sets [8]. Characters will be displayed in the standard character set if no user defined character sets has been installed.

Bar graph | The **$Gnnn** command in the data telegram is used for activating the bar graph display [9]. **nnn** stands for the number of illuminating columns, i.e. the length of the bar graph and must always be three digits, e. g. $G040.

Character $** | The command for displaying the '$' character is **$$ [10].

Reset | The **$0↵** command restarts the unit [13].

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 or 10 seconds in menu item PI (see chapter 5).

Initial text | After power-on, ⁘ is displayed to signalize 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 A (see Chapter 5).

Chapter 4 | Individual line selection

Application | The activation of the devices as described in chapter 3 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 activation of the individual lines is carried out according to the following command table.

The commands beginning with **$Lx** select an individual line. **x** is the line number (1…4).

The commands require a telegram ending (↵). This can be done with the character CR ($0D_h$) or LF ($0A_h$) or with the character combination CR/LF.

Commands

Online-Text	**$Lxcc...↵**	Send any character to line x (**cc...** = characterband with any content)	[14]
Display static text	**LxTn↵**	Load static text in the line x (n = text number, 1 to 3 digits)	[15]
Deleting text	**LxE↵**	Delete the text in the line x	[16]
Flashing	**LxF1↵**	Flashing of the whole line x on	[17]
	LxF0↵	Flashing of the whole line x off	[18]

Chapter 5 | Parameterization

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 an audible signal is heard and menu item 01 appears in the 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.

Cancelling 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 displays 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	Display
1	IP-Address	Static	1 STAT
		DHCP*	1 DHCP

Menu item		Settings		Display
I1	IP-Address Byte 1 (xxx.- - -.- - -.- - -) 192.168.127.254*	0		I1 000
		↓	192*	↓
		255		I1 255
I2	IP-Address Byte 2 (- - -.xxx.- - -.- - -) 192.168.127.254*	0		I2 000
		↓	168*	↓
		255		I2 255
I3	IP-Address Byte 3 (- - -.- - -.xxx.- - -) 192.168.127.254*	0		I3 000
		↓	127*	↓
		255		I3 255
I4	IP-Address Byte 4 (- - -.- - -.- - -.xxx) 192.168.127.254*	0		I4 000
		↓	254*	↓
		254		I4 254
S1	Subnet Mask Byte 1 (xxx.- - -.- - -.- - -) 255.255.255.000*	0		S1 000
		↓	255*	↓
		255		S1 255
S2	Subnet Mask Byte 2 (- - -.xxx.- - -.- - -) 255.255.255.000*	0		S2 000
		↓	255*	↓
		255		S2 255
S3	Subnet Mask Byte 3 (- - -.- - -.xxx.- - -) 255.255.255.000*	0		S3 000
		↓	255*	↓
		255		S3 255
S4	Subnet Mask Byte 4 (- - -.- - -.- - -.xxx) 255.255.255.000*	0		S4 000
		↓	000*	↓
		254		S4 254
G1	Standard gateway Byte 1 (xxx.- - -.- - -.- - -) 192.168.127.001*	0		G1 000
		↓	192*	↓
		255		G1 255

Menu item		Settings		Display
G2	Standard-Gateway Byte 2 (- - -.xxx.- - -.- - -) 192.168.127.001*	0		G2 000
		↓	168*	↓
		255		G2 255
G3	Standard-Gateway Byte 3 (- - -.- - -.xxx.- - -) 192.168.127.001*	0		G3 000
		↓	127*	↓
		255		G3 255
G4	Standard-Gateway Byte 4 (- - -.- - -.- - -.xxx) 192.168.127.001*	0		G4 000
		↓	001*	↓
		254		G4 254
P	Port	2000…8000*…9999		P nnnn
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
PI	Paging interval	2 seconds *		PI 2
		5 seconds *		PI 5
		10 seconds *		PI 10
T	Time-out	No time-out *		T 0
		Time-out after 2 s		T 2
		Time-out after 4 s		T 4
		Time-out after 8 s		T 8
		Time-out after 16 s		T 16
		Time-out after 32 s		T 32
		Time-out after 64 s		T 64
		Time-out after 128 s		T 128
U	Saving	Saving parameters* (Set)		U SET
		Not saving parameters (Escape)		U ESC
		Reset to default settings (Default)		U DEF

Network parameters | The network parameters can be set in the menu without requiring external aids. Once this has been done, the device can be accessed via the network. Further settings can then be made via the network (see chapter 7).

In menu item 1, static address assignment or DHCP must be selected.

In the I1...I4 menu items, the four bytes of the IP address are set, if static address assignment has been selected.

In the S1...S4 menu items, the four address bytes of the Subnet Mask are set, if static address assignment has been selected.

In the G1...G4 menu items, the four bytes of the standard gateway address are set, if static address assignment has been selected.

Upon resetting the factory settings (Default) in menu item U, DHCP will be activated.

After switching to static address assignment, the following addresses are set in-factory by default:

192.168.127.254	IP-Address
255.255.255.000	Subnet Mask
192.168.127.001	Standard-Gateway

Port number | A port number between 2000 and 9999 can be set in menu item P which transfers the data via a socket connection. The factory setting for the port number is 8000.

The four digits of the port number will blink one after the other. The blinking digit can then be programmed via the menu button [↔].

Initial text | After power-on, > is displayed to signalize 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 A see Chapter .

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“ is included in the delivery of the displays. It serves for creating user defined characters. The tool is also used to install

character sets, to save character sets to data media and to read back installed character sets.

Paging | If the 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 or 10 seconds in menu item PI.

Time-out | In menu item T, 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. The following symbol with then appear on the display: >.

Chapter 6 | Character table

	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	ä	à	à	å	ç	ê	ë	è	ï	î	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	▒	▒	▒	¦	¦	▒	▒	▒	▒	▒	▒	▒	Ą	ą	Ę	ę
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	▪	ƒ

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

MAC address | The MAC address of the device is located on the back of the display (see label). It is possibly needed for commissioning and should be written down on page 2 of this operating manual before the unit is mounted on a hardly accessible location.

Basic configuration | The basic configuration can be set up without external aids via the menu (see chapter 4). To integrate the unit in the network, either DHCP must be activated, or the static IP address, the relevant Subnet Mask and, if necessary, the IP address of the standard gateway must be set. These values are assigned by the system administrator and should be known before putting the unit into operation.

Configuration via network | As soon as the units can accessed via TCP/IP, additional configuration can take place via Telnet and HTTP. Access can be password-protected or can be deactivated, to prevent unauthorized operations. As-delivered and after setting the default in menu item U, access is enabled.

Additional information | The configuration dialogs are self-explanatory. For detailed information, please refer to the documentation of the Ethernet coupling (Moxa NE4100T type). For further information and PC tools, please go to *www.moxa.com*.

Basic setting | Via Telnet and HTTP the gateway can inadvertently be parameterized so that it is no longer accessible via the network. In this case the gateway can be rest in a defined status via menu and selection of default in menu item U (see chapter 5) and after resetting of the network parameters it can be accessed via network again.

Chapter 8 | 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. In the programming mode, the display will be temporarily dark.

Chapter 9 | 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 (see command table in chapter 7).
Time-out	An error occured 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 or the interface parameters are incorrect.	The data telegram has to be corrected or the interface parameters of the communication partners must be adapted.

Display range	SX402-220/xx/0G-001/0B-xx	2 x 20 characters
	SX402-420/xx/0G-001/0B-xx	4 x 20 characters
	SX402-240/xx/0G-001/0B-xx	2 x 40 characters
Character height	SX402-220/05/0G-001/0B-xx	ca. 5 mm
	SX402-420/05/0G-001/0B-xx	approx. 5 mm
	SX402-240/05/0G-001/0B-xx	approx. 4,7 mm
	SX402-220/09/0G-001/0B-xx	approx. 9 mm
Display color	green	
Protection type	IP65 (front)	
Operating voltage	24 V DC ±15 %, galvanically isolated, protected against reversed polarity	
Power consumption	approx. 9 VA	
Connection	Pluggable screw-type terminal strip clamping range 0,08…2,5 mm²	
	Ethernet on a standard RJ45 socket, galvanically isolated	
Operating temperature	0...50 °C	
Storage temperature	-20...70 °C	
Relative humidity max. 95 % (non-condensing)		
Weight	SX402-220/05/0G-001/0B-xx	approx. 450 g
	SX402-420/05/0G-001/0B-xx	approx. 450 g
	SX402-240/05/0G-001/0B-xx	approx. 600 g
	SX402-220/09/0G-001/0B-xx	approx. 600 g
Fixed text memory	Capacity	16 KBytes
	Number of texts	max. 128 (static texts)
Text length	The text length of static texts is not limited but must not exceed the capacity of the text memory. Dynamic texts can have a length of 180 characters at the most; formatting is included in the 180 characters.	