SÜTRON

ELECTRONIC GMBH

Technical Manual

TesiMod Operating Terminal

BT15

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1 Explanation of Symbols

This manual uses the following symbols to indicate notes and hazardous situations.



Notes for the User



General Danger



Specific Danger

2 The Operating Terminal BT15

The operating terminal **BT15** makes it easier for the operator to input and visualise process values. A comfortable operation is established by means of the TesiMod operating concept.

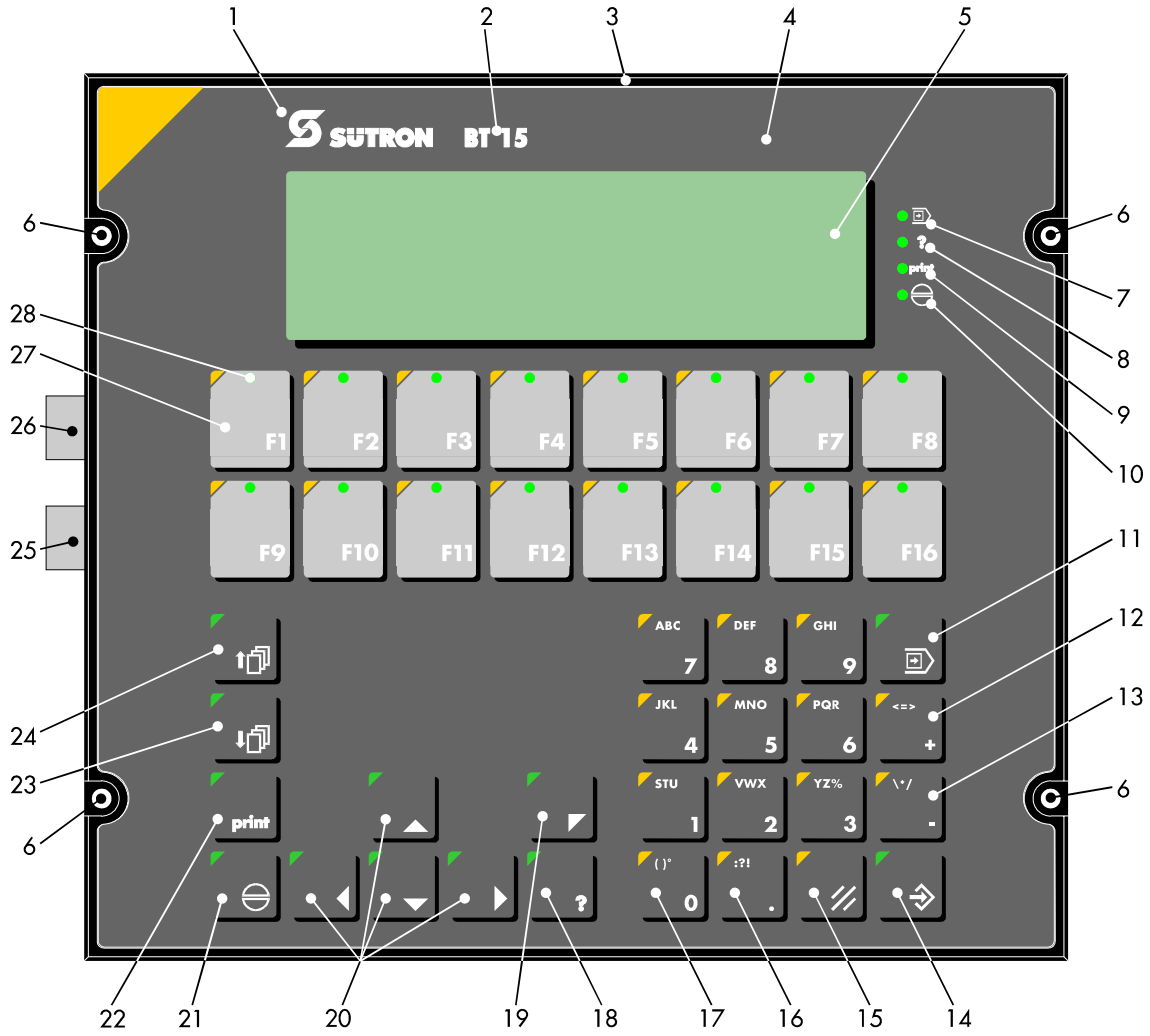
The **BT15** is equipped with an extensive keyboard to input process values and to access several functions. The LED backlit LCD module has a wide contrast and has full graphics capability. It supports character oriented positioning of graphics, text elements and variables.

A built-in lithium battery buffers the data in the RAM and also supplies the real-time clock with power. The discharge state of the battery is monitored constantly by the system.

The communication with the **BT15** is supported by standardized interfaces. The modularity of the software allows a quick adjustment to different protocols.

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2.1 Front View



1	Company Logo	15	Key Clear
2	Operating Terminal Type Logo	16	Key Dot
3	Front Panel	17	Keys 0 to 9, Alphabet
4	Front Cover	18	Key Help
5	Filter Plate, Display Cutout	19	Key Cursor Home
6	Fastening Holes	20	Key Cursor Right, Left, Up, Down
7	Status-LED Data Release	21	Key Acknowledge
8	Status LED Help	22	Key Print
9	Status LED Print	23	Key Page Down
10	Status-LED Acknowledge	24	Key Page Up
11	Key Data Release	25	Slide-In Identification Strip
12	Key Plus	26	Slide-In Identification Strip
13	Key Minus	27	Function Key (F1)
14	Key Enter	28	Status-LED Function Key (F1)

2.2 Keyboard

The **BT15** supports all important key functions in spite of the small measures. The keyboard consists of membrane switches. The stroke distance is 0.3 mm and the key area is 16 x 16 mm. The key elements are covered by an embossed polyester foil against environmental infuences. This combination allows a sensitive use of the keys. The status LEDs illuminate green.
The function of the keys depend on the application. In transparent mode the keys supply a fixed start and stop code. In standard mode, the function of the keys is as defined in the application.

2.2.1 Editing Keys



Key: **0 and ( ) °** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters (and) and ° can be entered.



Key: **1 and STU** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters S and T and U can be entered.



Key: **2 and VWX** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters V and W and X can be entered.



Key: **3 and YZ%** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters Y and Z and % can be entered.



Key: **4 and JKL** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters J and K and L can be entered.



Key: **5 and MNO** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters M and N and O can be entered.



Key: **6 and PQR** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters P and Q and R can be entered.



Key: **7 and ABC** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters A and B and C can be entered.



Key: **8 and DEF** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters D and E and F can be entered.

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Key: **9 and GHI** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters G and H and I can be entered.



Key: **Decimal Point and :?!** is used to edit data within the editor. If the system variable **Shift** or **ShiftCase** is programmed, the characters : and ? and ! can be entered.



Key: **Minus and** */ can be used to enter negative values within the editor. In the increment editor, the variable value is decremented by 1. When the key is held down, the function is repeated at a rate of repetition that is automatically increased. If the system variable **Shift** or **ShiftCase** is programmed, the characters \ and * and / can be entered.



Key: **Plus and <=>** can be used to enter positive values within the editor. In the increment editor, the variable value is incremented by 1. When the key is held down, the function is repeated at a rate of repetition that is automatically increased. If the system variable **Shift** or **ShiftCase** is programmed, the characters < and = and > can be entered.

2.2.2 Control Keys



Key: **Cursor left** can be programmed to directly select I/O masks.
In the editor, it moves the cursor to the left.



Key: **Cursor right** can be programmed to directly select I/O masks.
In the editor, it moves the cursor to the right.



Key: **Cursor up** can be programmed to directly select I/O masks.
In the editor, it moves the cursor upwards.



Key: **Cursor down** can be programmed to directly select I/O masks.
In the editor, it moves the cursor downwards.



Key: **Cursor home** can be programmed to directly select I/O masks.
In the editor, it moves the cursor to the position of the first input variable.



Key: **Page down** is used to page through tables, recipes and messages. The functionality corresponds to the system variable "**TabPgDn**". The key allows data contents towards the bottom of the table to be viewed.



Key: **Page up** is used to page through tables, recipes and messages. The functionality corresponds to the system variable "**TabPgUp**". The key allows data contents towards the top of the table to be viewed.

2.2.3 Special Keys



Key: **Help key** always displays the current help text (online help). When the status-LED help flashes, it signals that an error message is pending. The error or system message is always displayed in plain-text.



Key: **Data Release** key is used to switch from a menu into the editor. The status-LED data release lights up when the editing mode is active. When the Data Release key is pressed within the editor, the editing mode is exited.



Key: **Enter** is used to conclude data entry. When pressed while in the startup mask, the key switches into the setup mask.



Key: **Clear** deletes the character beneath the cursor when it is used in an editor. Deletes the selected messages from the data memory.

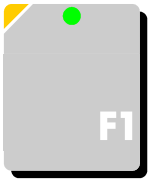


Key: **Acknowledge** is used as an acknowledge key for the message system.



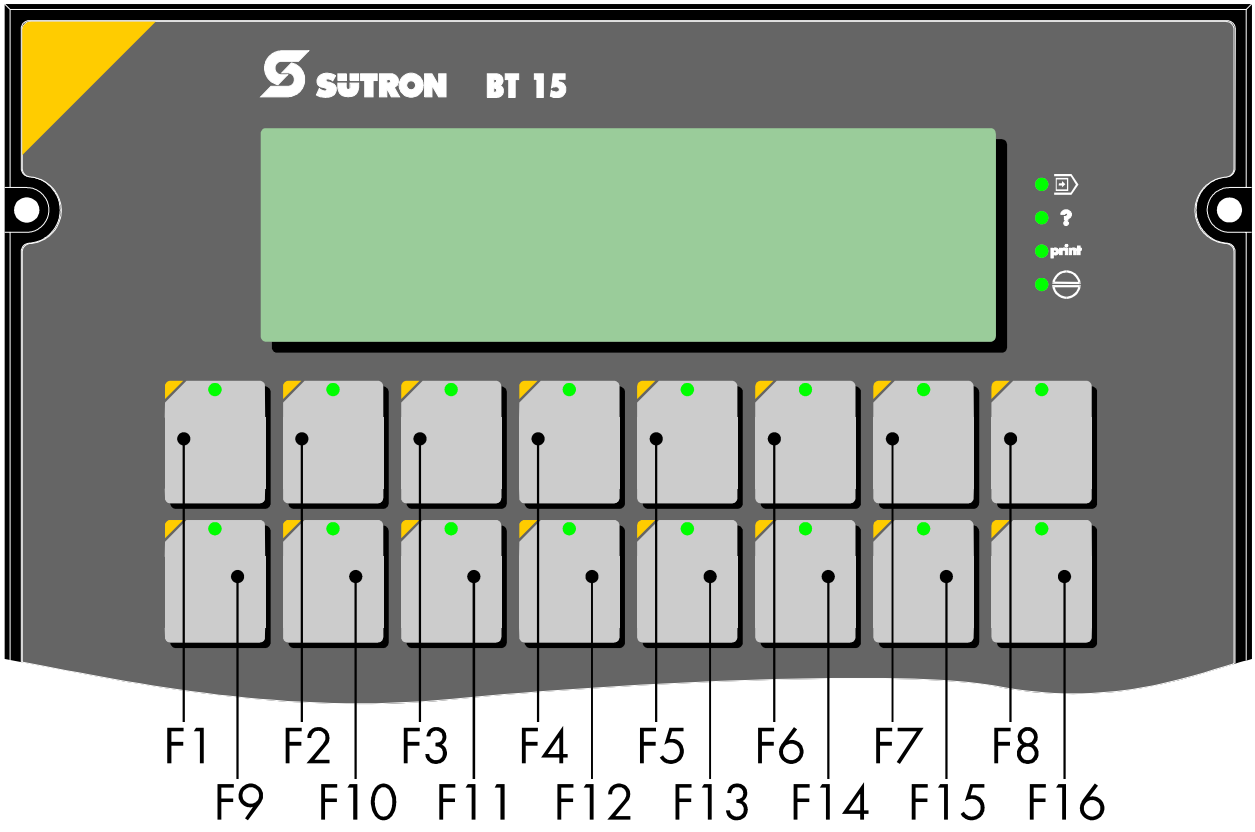
Key: **Print** can be used as a soft key to activate various print processes.

2.2.4 Function Keys



Funktion key F1 to F16 with integrated LEDs for functional feedback. The key functions can be freely assigned to a softkey functionality, either as direct access keys for menu control or to activate a function in the controller.

2.2.4.1 Function Key Arrangement



2.2.4.2 Slide-in Identification Strips for the Function Keys

The identification strips can be replaced after the terminal is dismounted. Inserting the strpis from the rear of the front panel does not affect the tightness specified for the unit.
The unit is delivered with a set of identification strips.
The set consists of:
- two identification strips, labeled with F1 to F16
- two blank identification strips.

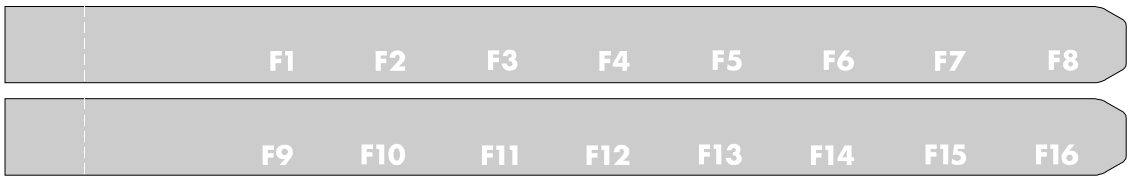
Various labeling methods are recommended, depending on the number of units involved.

Suitable labeling methods for:

Single units, prototypes:	lableling with an indelible pen
Small batch production:	transparency with laser printing
Large batch production:	custom specific printed identification strips



Position of identification strips



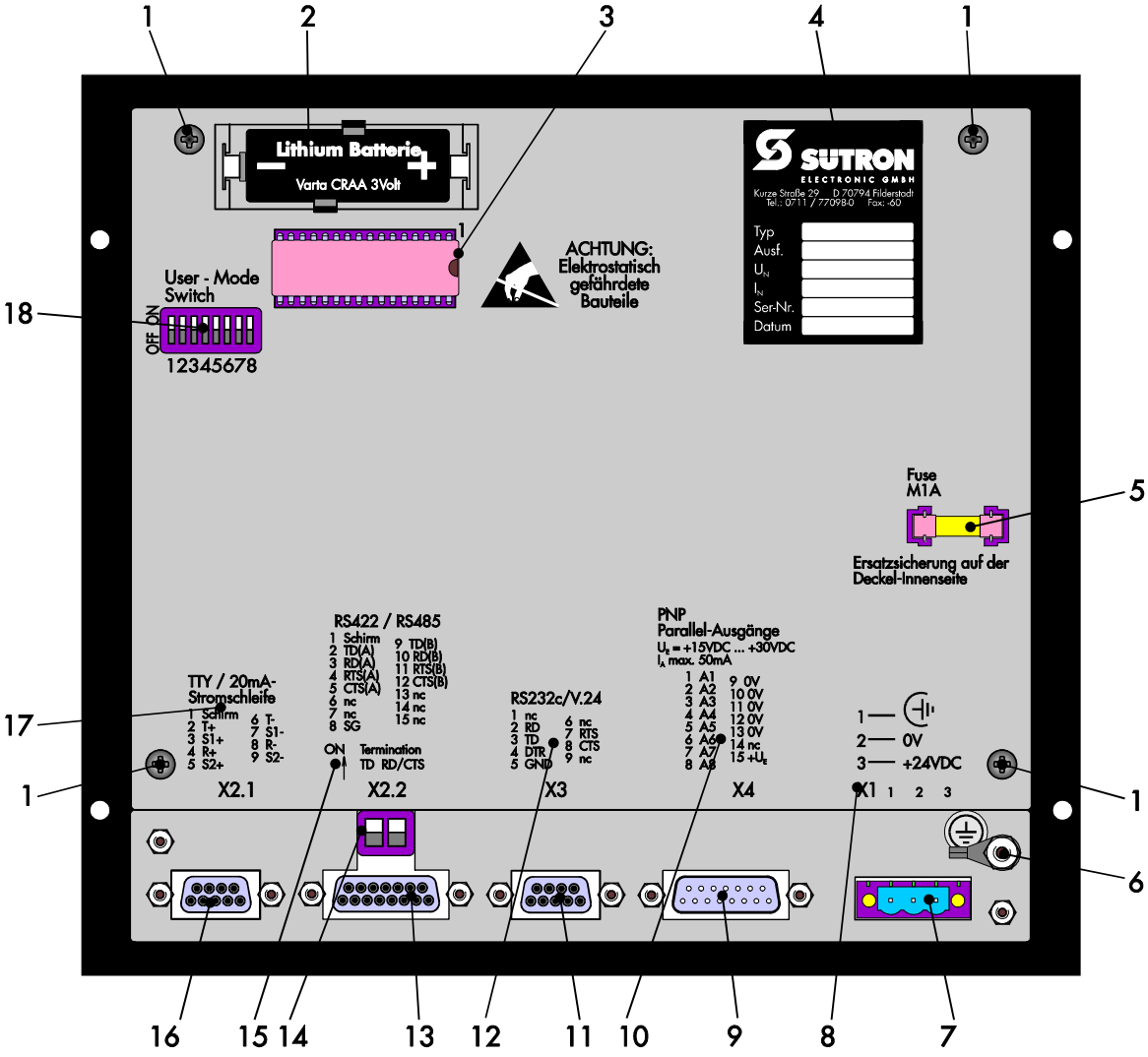
Labeled identification strips, standard



Blank identification strips

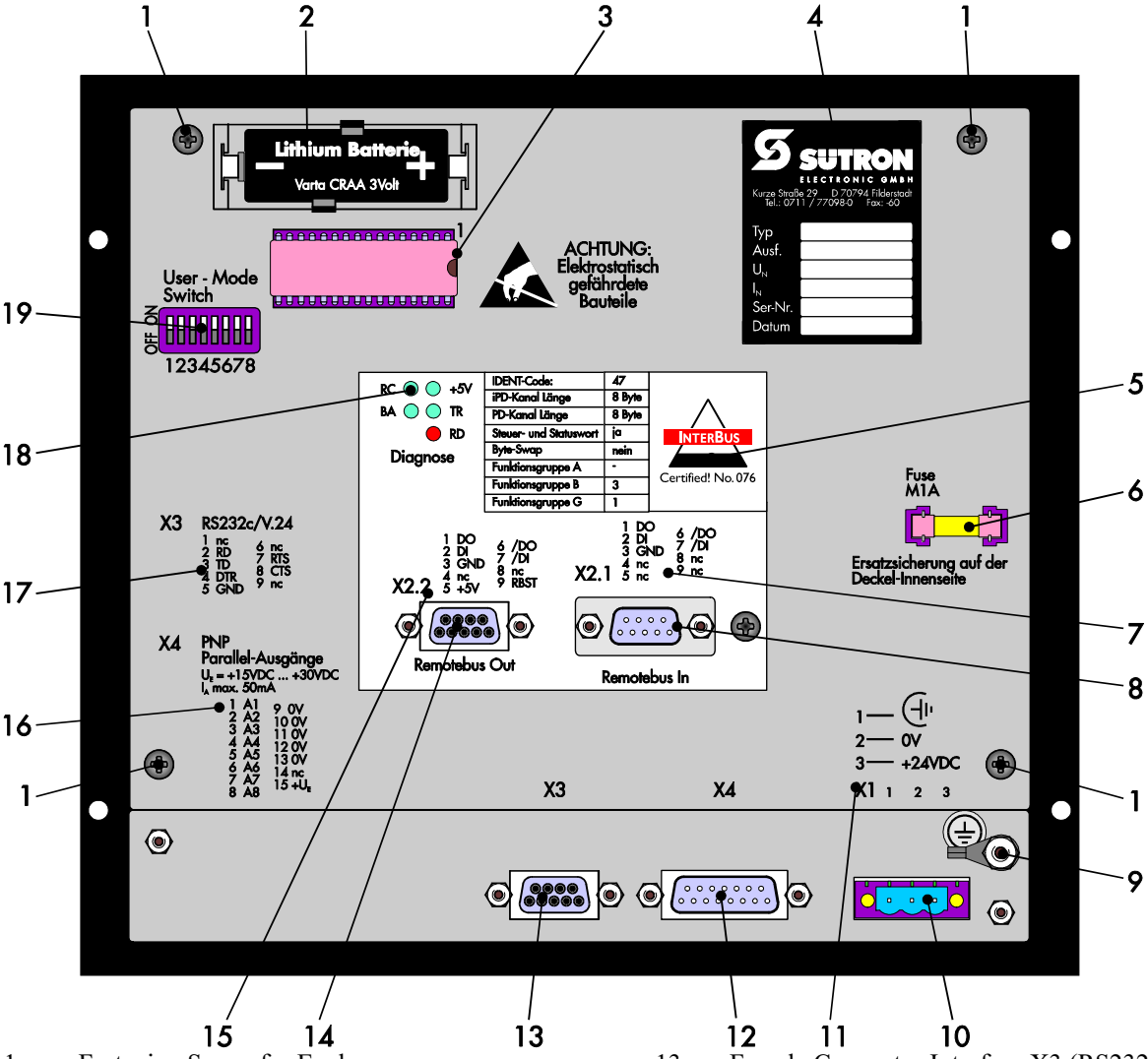
2.3 Rear View

2.3.1 Standard



1	Fastening Screw for Enclosure	11	Female Connector Interface X3 (RS232c)
2	Position of Battery (inside unit)	12	Pin Assignment Interface X3 (RS232c)
3	Position of Application Memory (inside unit)	13	Female Connector Interface X2.2 (RS485)
4	Name Plate	14	Terminator Switch (RS485)
5	Position of Fuse (inside unit)	15	Pin Assignment Interface X2.2 (RS485)
6	Ground Screw	16	Female Connector Interface X2.1 (TTY/20mA)
7	Connector X1 (Power Supply)	17	Pin Assignment Interface X2.2 (TTY/20mA)
8	Pin Assignment Connector X1	18	Position of User-Mode Switch (inside unit)
9	Connector X4 (Parallel Outputs)		
10	Pin Assignment Connector X4 (Parallel Outputs)		

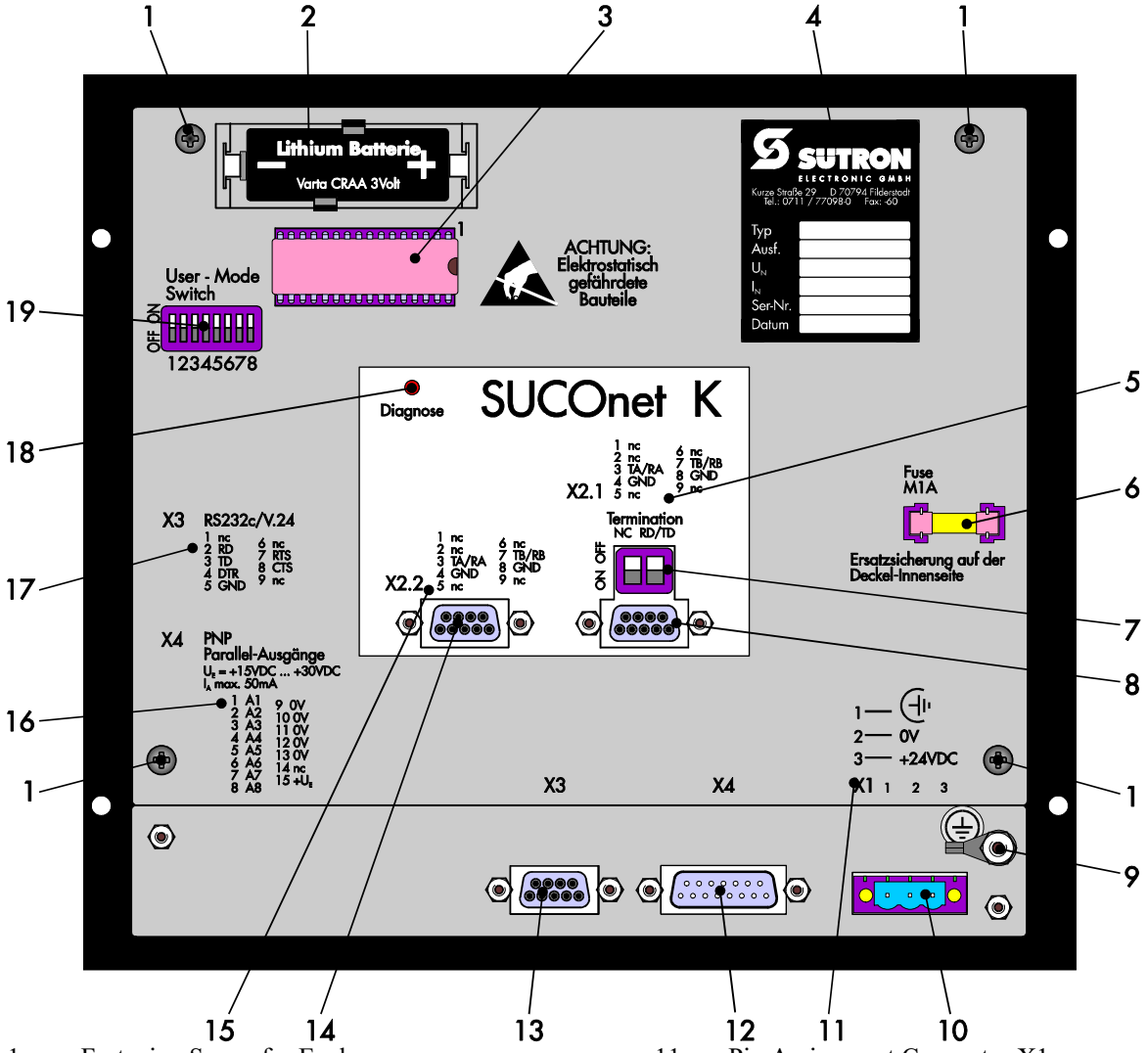
2.3.2 InterBus



1	Fastening Screw for Enclosure	13	Female Connector Interface X3 (RS232c)
2	Position of Battery (inside unit)	14	Female Connector Interface X2.2 (Remotebus Out)
3	Position of Application Memory (inside unit)	15	Pin Assignment Interface X2.2 (Remotebus Out)
4	Name Plate	16	Pin Assignment Connector X4 (Parallel Outputs)
5	Sign of Certification INTERBUS	17	Pin Assignment Interface X3 (RS232c)
6	Position of Fuse (inside unit)	18	Diagnosis LEDs Interfaces X2.1 / X2.2 (INTERBUS)
7	Pin Assignment Interface X2.1 (Remotebus In)	19	Position of User-Mode Switch (inside unit)
8	Male Connector Interface X2.1 (Remotebus In)		
9	Ground Screw		
10	Connector X1 (Power Supply)		
11	Pin Assignment Connector X1		
12	Connector X4 (Parallel Outputs)		

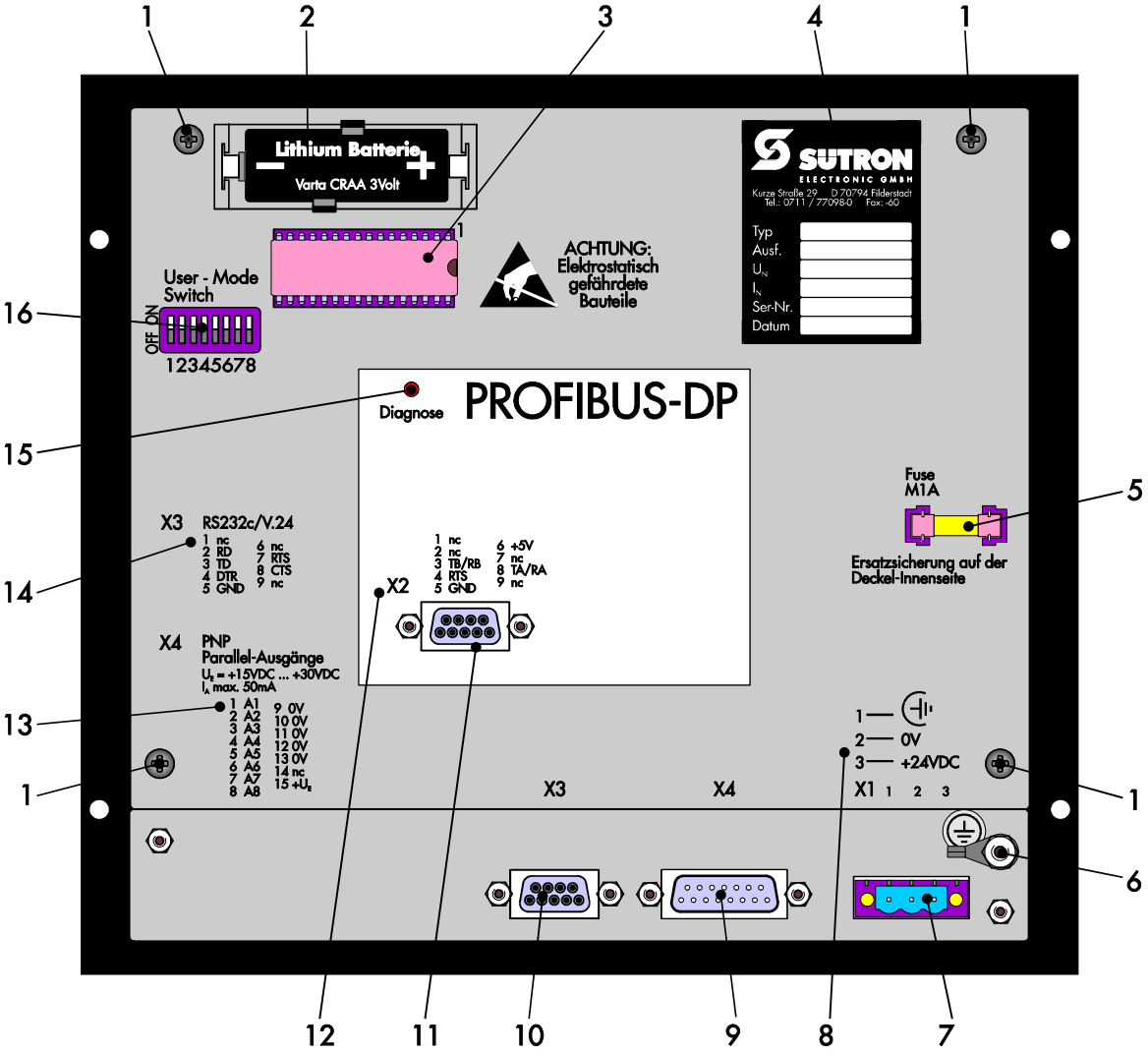
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2.3.3 SUCOnet K



1	Fastening Screw for Enclosure	11	Pin Assignment Connector X1
2	Position of Battery (inside unit)	12	Connector X4 (Parallel Outputs)
3	Position of Application Memory (inside unit)	13	Female Connector Interface X3 (RS232c)
4	Name Plate	14	Female Connector Interface X2.2 (SUCOnet K)
5	Pin Assignment Interface X2.1 (SUCOnet K)	15	Pin Assignment Interface X2.2 (SUCOnet K)
6	Position of Fuse (inside unit)	16	Pin Assignment Connector X4 (Parallel Outputs)
7	Terminator Switch Interface X2.1 (SUCOnet K)	17	Pin Assignment Interface X3 (RS232c)
8	Female Connector Interface X2.1 (SUCOnet K)	18	Diagnosis LED Interface X2.1 / X2.2 (SUCOnet K)
9	Ground Screw	19	Position of User-Mode Switch (inside unit)
10	Connector X1 (Power Supply)		

2.3.4 PROFIBUS-DP



1	Fastening Screw for Enclosure	11	Female Connector Interface X2 (PROFIBUS-DP)
2	Position of Battery (inside unit)		
3	Position of Application Memory (inside unit)	12	Pin Assignment Interface X2 (PROFIBUS-DP)
4	Name Plate	13	Pin Assignment Connector X4 (Parallel Outputs)
5	Position of Fuse (inside unit)		
6	Ground Screw	14	Pin Assignment Interface X3 (RS232c)
7	Connector X1 (Power Supply)	15	Diagnosis LED Interface X2 (PROFIBUS-DP)
8	Pin Assignment Connector X1	16	Position of User-Mode Switch (inside unit)
9	Connector X4 (Parallel Outputs)		
10	Female Connector Interface X3 (RS232c)		

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2.4 Mounting the Terminal

The front panel mounting is suitable for easy and sealed installation in places where the rear side of the unit is not accessible. The unit is particularly suitable for mounting in enclosures.

The front panel permits sealed installation of the unit in accordance with the IP65 degree of protection (at the front). At the rear side of the front panel a circumferential sealing is attached.
All parts for mounting the unit are given with the spare parts set.

Special care needs to be taken during installation to maintain this high degree of protection. The unit is inserted from the front through the panel cutout and screwed to the mounting wall from the front. The seal must be positioned evenly and the fastening elements tightened uniformly.

When installing the terminal, keep a minimum space of 30 mm around the terminal for adequate air circulation.

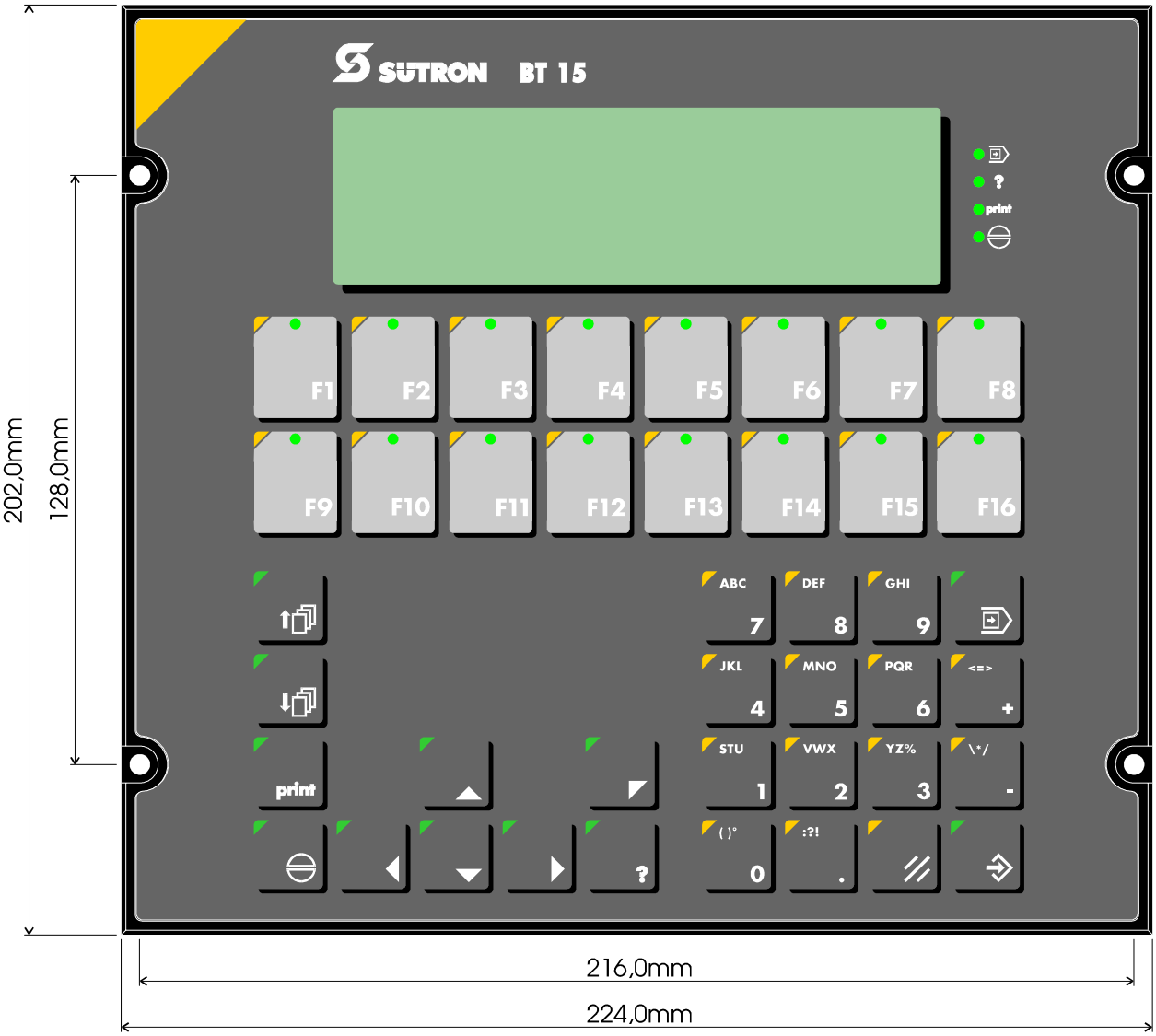
The tightness between the front panel and the mounting surface depends on the care during installation.



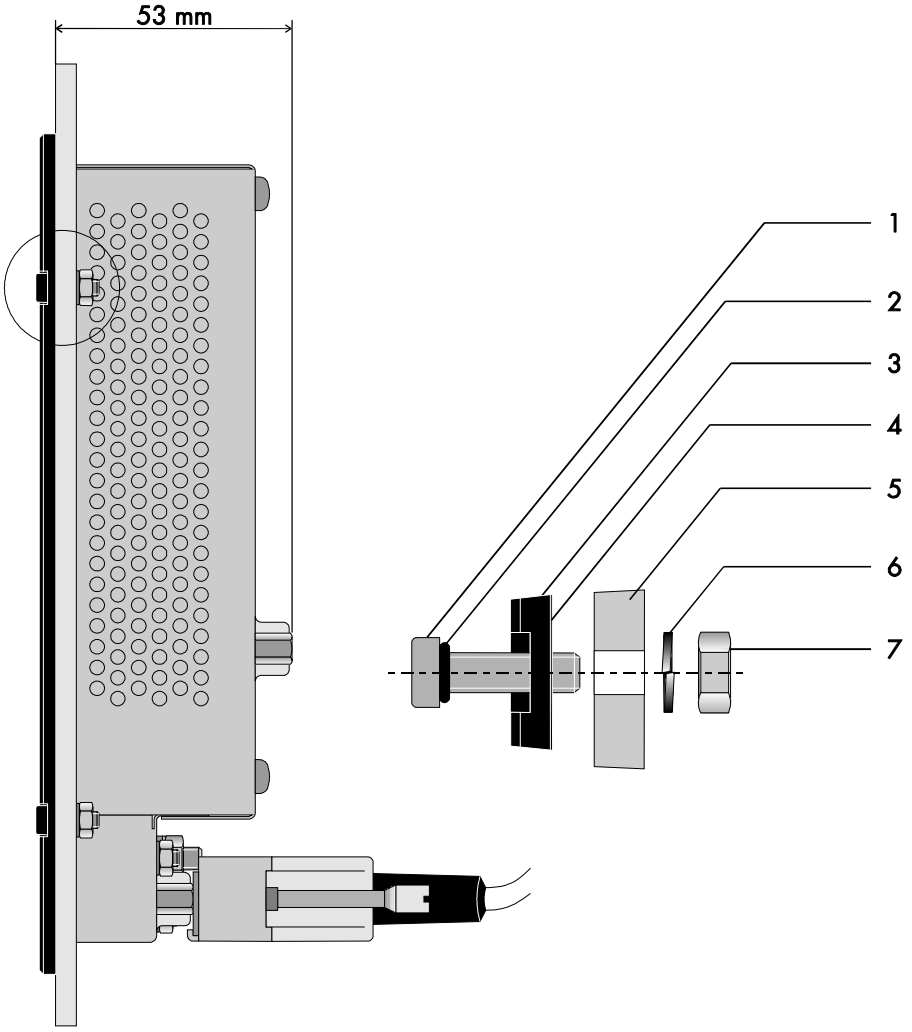
When mounting the device, observe the safety information in the mounting instructions!

Front Panel Dimensions:	202.0 x 224.0 x 4.0 mm	(H x W x D)
Panel Cutout:	188 x 204 mm	(H x W)

2.4.1 Front Panel Dimensions

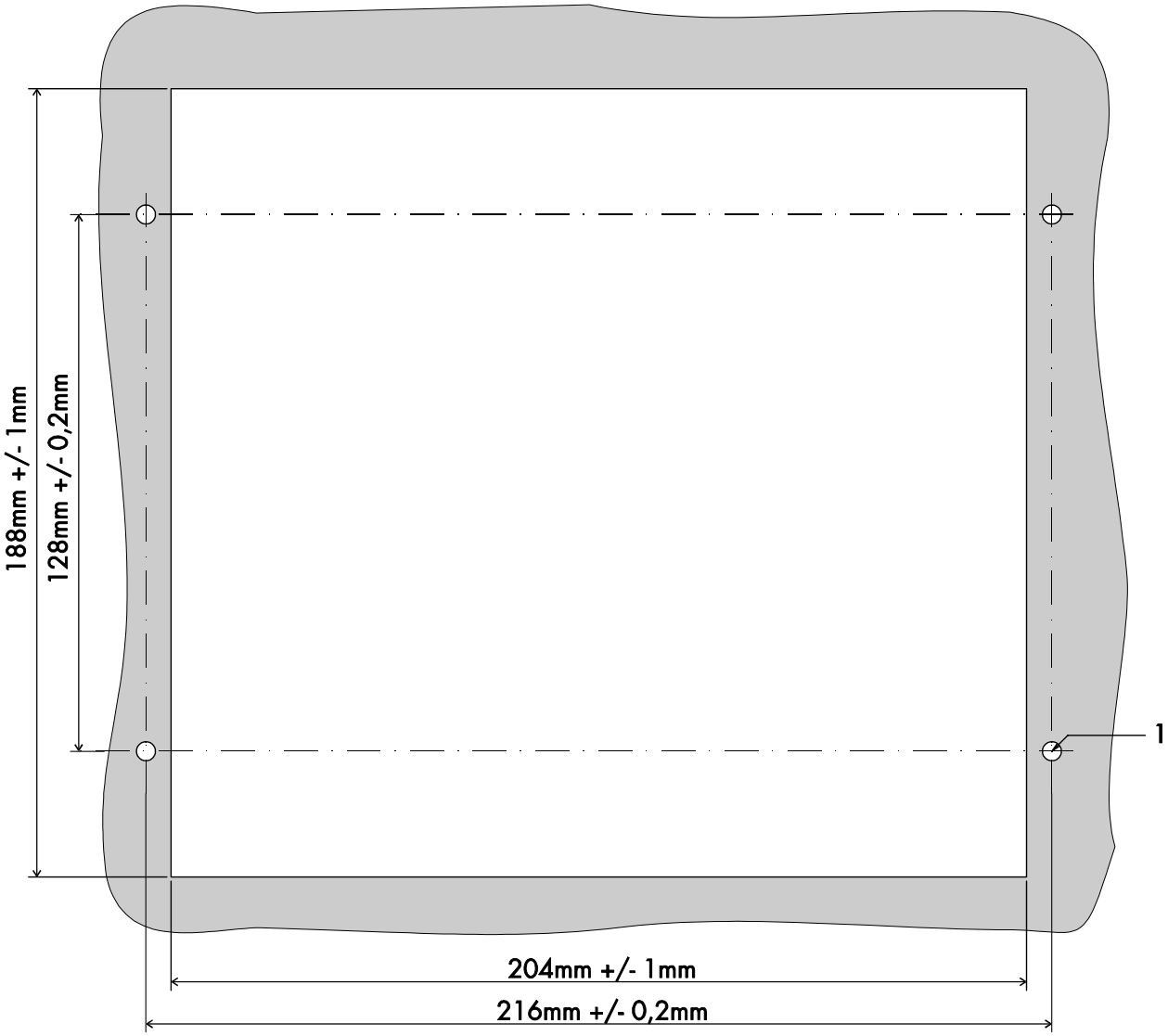


2.4.2 Side View, Mounting Depth



1	Cheese Head Screw M4 x 12 DIN7984	5	Mounting Surface Thickness 1 to 10 mm
2	O-Ring 4.00 x 0.6 N70B	6	Spring Lock Washer B4 DIN127 Form B
3	Front Panel	7	Nut M4 DIN934
4	Circumferencial Sealing		

2.4.3 Panel Cutout



1 4 Holes with a Diameter of 4.5 mm, alternatively Threads M4

2.5 Pin Assignments

The operating terminal is fitted with the following interfaces:

Connector X1	24 VDC	Supply Voltage
Connector X2.1	TTY/20 mA	Communication
Connector X2.2	RS485/RS422	Communication
Connector X3	RS232c	Upload/Download/Logging Printer/Scanner
Connector X4	Parallel Outputs	Influencing Inputs of PLC

Optional the operating panel can be equipped with the interfaces shown below:

Connector X2.1 / X2.2	InterBus	Communication
Connector X2.1 / X2.2	SUCOnet K	Communication
Connector X2	Profibus	Communication

The interfaces are galvanical isolated against the electonic circuitry inside.

The interfaces at the connectors X2, X2.1 / X2.2 are used to connect a PLC or a host computer. The interface at connector X3 is used to connect a printer and is also responsible for logging functions and connection of a PC for downloading purposes.

2.5.1 Pin Assignment X1 Supply Voltage

The supply voltage is connected via the connector X1.
This unit confirms to the safety class I. For safe operation it is necessary to use safety extra-low voltage (SELV) in accordance with DIN EN 61131 for the supply voltage.

Connector in the terminal: 3-pin male connector strip Phoenix COMBICON MSTBV 2,5/3-GF

Pin	Designation	Function
1	⏚	Signal Ground
2	0 V	Supply Voltage 0 V
3	24 VDC	Supply Voltage 24 VDC

The supply voltage is connected via a plug-in 3-pin female connector strip. The cable is secured in the female connector strip by means of screw terminals. Cables with fine wires with a cross-section of up to 2.5mm^2 can be used. The female connector strip is secured in position by means of a screw-type locking.
The female connector strip of the type **Phoenix COMBICON MSTB 2.5/3-STF** is supplied.



When connecting the device, observe the safety information in the mounting instructions!



Please note with respect to pin assignment:
If shielded connecting cables are used for the supply voltage, the shield should be connected to the ground screw.
Any protective conductors in the cable must be connected with pin 1.



Separate ground screw for protective grounding

A separate ground conductor must be provided for the ground screw in each case. The minimum cross-section of the ground conductor must be 1.5 mm^2. Compliance with this information increases the operational safety.

2.5.2 Pin Assignment X2.1 TTY / 20 mA Current Loop

The interface can be connected as either an active or passive current loop depending on the wiring. The transmit line and the receive line are provided with separate 20mA power sources. The compliance voltage is approximately 24 VDC.
The maximum baud rate is 19200Bd. The maximum cable length depends on the baud rate and rate of transmission errors.
For longer cable lengths, the 20mA power supply should be fed by the transmitting unit. This can decrease crosstalk on the signal lines considerably.
In idle state (signal logical 1) a current loop of 20mA can be measured on the cable.

Termination :
For proper operation of the TTY/20 mA current loop the **termination** of the RS422/RS485 interface must always be **OFF**.

Connector in the terminal: 9-pin subminD female connector

TTY / 20 mA current loop, passive

Pin	Designation	Function
1	Shield	Shield
2	T+	Transmit Data, Positive Polarity
4	R+	Receive Data, Positive Polarity
6	T-	Transmit Data, Negative Polarity
8	R-	Receive Data, Negative Polarity

TTY / 20 mA current loop, active

Pin	Designation	Function
1	Shield	Shield
2	T+	Transmit Data, Positive Polarity
3	S1+	Power Source 2, Positive Polarity
4	R+	Receive Data, Positive Polarity
5	R-	Receive Data, Negative Polarity
6	S2+	Power Source 1, Positive Polarity
7	T-	Transmit Data, Negative Polarity
8	S1-	Power Sink 1, Negative Polarity
9	S2-	Power Sink 2, Negative Polarity

A shielded cable with twisted pair wires (cable type LiYCY-TP) and a minimum cross section of 0.08 mm^2 must be used. The maximum cable length is 100 m.



Connect the cable shield to the metal hoods of the connectors over as large a surface as possible!

2.5.3 Pin Assignment X2.2 RS422 / RS485

The interfaces RS422 and RS485 are suitable for point-to-point connections and multipoint connections.

Termination for point-to-point connection:
For operation with point-to-point connection the **termination** must always be activated.

Termination for multipoint connection:
For operation with multipoint connections only the **termination** at the cable end must be activated.

The signals of the interface are electrically isolated.
The configuration of the hardware can be adapted to different systems. The associated wires are marked with „A“ and „B“. Some descriptions refer to the pins with „+“ and „-“, where the following applies: A = + and B = -. The voltage levels comply with the standards and are defined as follows:

Signal logical 1 - $U_A - U_B <= -0.3$ V i.e. ($U_A < U_B$)
Signal logical 0 - $U_A - U_B >= +0.3$ V i.e. ($U_A > U_B$)

Connector in the terminal: 15-pin SubminD female connector

Pin	Designation	Function
1	Shield	Shield
2	T(A)	Transmit Data Channel A
3	R(A)	Receive Data Channel A
4	RTS(A)	Request to Send Channel A
5	CTS(A)	Clear to Send Channel A
6	*TXCK(B)*	*Transmitter Clock Channel B*
7	*RXCK(B)*	*Receiver Clock Channel B*
8	SG	Signal Ground
9	T(B)	Transmit Data Channel B
10	R(B)	Receive Data Channel B
11	RTS(B)	Request to Send Channel B
12	CTS(B)	Clear to Send Channel B
13	*TXCK(A)*	*Transmitter Clock Channel A*
14	*RXCK(A)*	*Receiver Clock Channel* A
15	nc	not connected

Italic printed pins are not available.

A shielded cable with twisted pair wires (cable type LiYCY-TP) and a minimum cross section of 0.34 mm² (for 400 m) must be used. The maximum cable length is 400 m.



Connect the cable shield to the metal hoods of the connectors over as large a surface as possible!

2.5.4 Pin Assignment X3 RS232c / V.24

The interface X3 is used to perform downloads to the unit or uploads to the PC while evaluation. During normal operation the interface X3 is used to connect a logging printer or a scanner.

Connector in the terminal: 9-pin SubminD female connector

The assignment is PC-AT compatible!

Pin	Designation	Function
1	*DCD*	*Data Carrier Detect*
2	RD	Receive Data
3	TD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	*DSR*	*Data Set Ready*
7	RTS	Request to Send
8	CTS	Clear to Send
9	*RI*	*Ring Indicator*

Italic printed pins are not available.

A shielded cable with stranding in layers (cable type LiYCY) and with a minimum cross-section of



Connect the cable shield to the metal hoods of the connectors over as large a surface as possible!

2.5.5 Pin Assignment X4 Parallel Outputs

Open-collector-outputs, which switch the positive potential, are used as parallel outputs. These outputs are suitable for direct control of PLC inputs. The outputs can be activated by means of function keys or the controller. The assignment of these functions is carried out in the programming software. The parallel outputs are designed for use in standard mode only.

Technical Data:

Input voltage	15 through 30 VDC
Output Current	max. 50 mA
Delay	30 to 50 ms

The outputs are not short-circuit-proof!
The voltage supply must be provided externally. Pins 9 through 13 for the negative potential are connected internally.

Connector in the operating terminal: 15-pin SubminD male connector strip

Pin	Designation	Function
1	A1	Output 1
2	A2	Output 2
3	A3	Output 3
4	A4	Output 4
5	A5	Output 5
6	A6	Output 6
7	A7	Output 7
8	A8	Output 8
9	0V	Negative Potential
10	0V	Negative Potential
11	0V	Negative Potential
12	0V	Negative Potential
13	0V	Negative Potential
14	nc	Not Connected
15	+24 V	Positive Potential



Connect the cable shield to the metal hoods of the connectors over as large a surface as possible!

2.5.6 Pin Assignment X2.1 / X2.2 InterBus

The unit can be fitted with the bus interfaces X2.1 and X2.2 for connection to the InterBus instead of the standard interfaces TTY / 20 mA and RS422 / RS485. The InterBus connection is certified under the number 076. The connectors are of the 9-pin Submin D female and male connector strip type.

Connector in the terminal: 9-pin SubminD male connector strip for **Remotebus In**

Assignment:

Pin	Designation	Function
1	DO	Data Out
2	DI	Data In
3	GND	Signal Ground
4	nc	not connected
5	nc	not connected
6	/DO	Data Out Reverse
7	/DI	Data In Reverse
8	nc	not connected
9	nc	not connected

Connector in the terminal: 9-pin SubminD female connector strip for **Remotebus Out**

Assignment:

Pin	Designation	Function
1	DO	Data Out
2	DI	Data In
3	GND	Signal Ground
4	nc	not connected
5	+5 V	Power Supply +5 VDC
6	/DO	Data Out Reverse
7	/DI	Data In Reverse
8	nc	not connected
9	RBST	Remote Bus Status

A shielded cable with twisted pairs (Cable type LiYCY-TP) is used. The maximum cable length depends on the usage within the InterBus topology.



Connect the cable shield to the metal hoods of the connectors over as large a surface as possible!

2.5.7 Pin Assignment X2.1 / X2.2 SUCOnet K

To integrate the unit into a network topology of the SUCOnet K it can be equipped with the special interfaces for SUCOnet K instead of the standard interfaces TTY / 20 mA and RS422 / RS485. The connectors are 9-pin SubminD female and male connectors. The pinning of either connectors is identical.

Termination:
Activate the **termination** of the physically first (master) and last station in the network at all times. The termination of the stations located in between remains inactivated. To activate the termination, the termination switch RD/TD must be set to **ON**.

Connector in the operating terminal: 9-pin SubminD female/male connector strip

Pin	Designation	Function
1	nc	not connected
2	nc	not connected
3	TA/RA	Transmit- / Receive Channel A
4	GND	Signal Ground
5	nc	not connected
6	nc	not connected
7	TB/RB	Transmit- / Receive Channel B
8	GND	Signal Ground
9	nc	not connected

A shielded cable with twisted pair wires (cable type LiYCY-TP) must be used.
The maximum cable length depends on the data transmission rate that is used.
For a transmission rate of 187.5 kbps the maximum cable length is 600 m, for a transmission rate of 375 kbps a cable length of 300 m should not be exceeded. If longer cable length are required, repeaters must be used for signal conditioning. Self-controlled repeaters may be used for this process.



Connect the cable shield to the metal hoods of the connectors over as large a surface as possible!

2.5.8 Pin Assignment X2 PROFIBUS-DP

To integrate the unit into a network of the PROFIBUS-DP it can be equipped with the special interface for PROFIBUS-DP connection instead of the standard interfaces TTY / 20 mA and RS422 / RS485. A 9-pin SubminD female connector strip is used as a connector.

Connector on the operating terminal: 9-pin SubminD female connector strip

Assignment:

Pin	Designation	Function
1	nc	not connected
2	nc	not connected
3	TB/RB	Transmit / Receive Data Plus
4	RTS	Request to Send
5	GND	Signal Ground
6	+5 V	Power Supply +5 VDC
7	nc	not connected
8	TA/RA	Transmit / Receive Data Minus
9	nc	not connected

Principally, all cable types specified in EN 50170 as cable type A can be used.
This allows the following cable lengths (depending on the baud rate):

Baud Rate (bps)	Cable Length (m)
9 600	1200
19 200	1200
93 750	1200
187 500	1000
500 000	400
1 500 000	200
12 000 000	100

2.6 Shield

The shield must be connected to the metal hoods of the connector housings at both ends and over as large a surface as possible. It should be noted that a potential equalization line with a minimum cross-section equal to 10 times that of the shield may be necessary as a result of the grounding on both sides.

2.7 Display

The display in the **BT15** consists of a backlit LCD module with full graphics capability.
The display is capable of simultaneously displaying up to 320 characters of the normal font. The characters of the normal font are displayed by a matrix of 5 x 7 dots and with a height of 3.5 mm. The format allows 8 lines with 40 characters each to be displayed. The drift of contrast of the display is compensated over the full temperature range. The operating terminal has an optimum viewing angle of approximately 90°.
In the operating mode standard mode the default contrast can be adjusted at operating time by means of a system variable.
The display is capable of displaying either the extended ASCII character set (semi graphics) with the font normal and zoom, and of displaying full graphics.

Overview of the Display of the **BT15**:

Type:	LCD Module
Resolution:	240 x 64 Dots
Backlight:	LED
Graphics Capability:	Full Graphics Capability
Lines (Font Normal):	8
Characters/Line (Font Normal):	40
Dot Size:	0.49 mm x 0.49 mm
Gap Size:	0.04 mm
Character of Font Normal:	6 x 8 Dots
Character of Font Zoom:	12 x 16 Dots
Background Colour:	Yellow-Green
Visible Front Cutout (H x W):	40.4 mm x 134.0 mm



If the display is damaged, do not swallow or breathe in the liquids or gases being emitted and avoid direct contact with skin.
Danger of Poisoning! Could Result in Burns!

2.7.1 Display Contrast Setting

The contrast for the display can be adjusted by means of the software. This requires the system variable **LCDContrast** to be set up in an I/O mask of the application. The value can then be modified using any editor that can handle integer numbers.
The limit values for the brightness must be set to

Lower level: -40
Upper level: +75

If this variable is not defined in the menus or the value is out of the range of values, the default setting (value 25) will be loaded when the system is initialized.
The system variable can be stated in any I/O-mask of the application!

2.7.2 Default Contrast Setting

If the contrast of the display should be such that the masks are no longer legible, the default contrast setting can be restored using the user mode switch.

Position of the switch to restore the contrast:

S1 ON
S2 OFF
S3 OFF
S4 ON

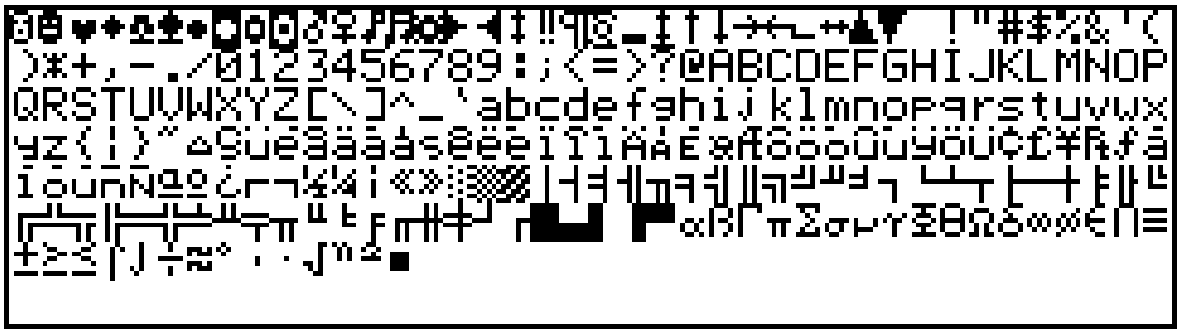
This switch position coincides with “activating download by hardware”. The contrast will be reset before the warning is displayed. The warning will be displayed in a legible manner. Upon display of this warning, switch off the terminal, set the switch 4 to the OFF-position and switch the terminal on again. The application description is not lost.

2.7.3 Character Attributes

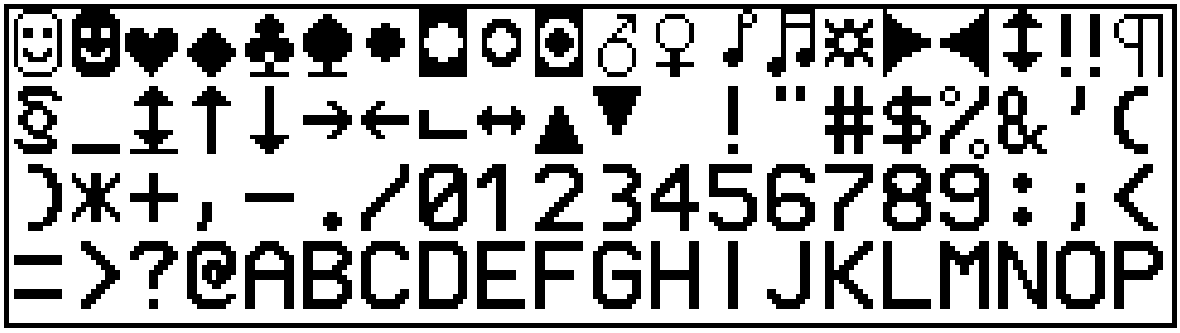
By preselecting an attribute, any characters can be displayed as follows:
- normal
- flashing
- underlined
- inverse

and in any combination.

2.7.3.1 Font Normal



2.7.3.2 Font Zoom

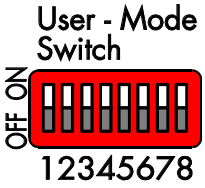


2.7.4 ASCII Character Set Table

000		032		064	@	096	`	128	Ç	160	á	192	└	224	α
001	☺	033	!	065	A	097	a	129	ü	161	í	193	┴	225	ß
002	☻	034	"	066	B	098	b	130	é	162	ó	194	┬	226	Γ
003	♥	035	#	067	C	099	c	131	â	163	ú	195	├	227	π
004	♦	036	$	068	D	100	d	132	ä	164	ñ	196	─	228	Σ
005	♣	037	%	069	E	101	e	133	à	165	Ñ	197	┼	229	σ
006	♠	038	&	070	F	102	f	134	å	166	ª	198	╞	230	µ
007	•	039	'	071	G	103	g	135	ç	167	º	199	╟	231	τ
008	◘	040	(	072	H	104	h	136	ê	168	¿	200	╚	232	Φ
009	○	041	)	073	I	105	i	137	ë	169	⌐	201	╔	233	Θ
010	◙	042	*	074	J	106	j	138	è	170	¬	202	╩	234	Ω
011	♂	043	+	075	K	107	k	139	ï	171	½	203	╦	235	δ
012	♀	044	,	076	L	108	l	140	î	172	¼	204	╠	236	∞
013	♪	045	-	077	M	109	m	141	ì	173	¡	205	═	237	ø
014	♫	046	.	078	N	110	n	142	Ä	174	«	206	╬	238	∈
015	☼	047	/	079	O	111	o	143	Å	175	»	207	╧	239	∩
016	►	048	0	080	P	112	p	144	É	176	░	208	╨	240	≡
017	◄	049	1	081	Q	113	q	145	æ	177	▒	209	╤	241	±
018	↕	050	2	082	R	114	r	146	Æ	178	▓	210	╥	242	≥
019	‼	051	3	083	S	115	s	147	ô	179	│	211	╙	243	≤
020	¶	052	4	084	T	116	t	148	ö	180	┤	212	╘	244	⌠
021	§	053	5	085	U	117	u	149	ò	181	╡	213	╒	245	⌡
022	▬	054	6	086	V	118	v	150	û	182	╢	214	╓	246	÷
023	↨	055	7	087	W	119	w	151	ù	183	╖	215	╫	247	≈
024	↑	056	8	088	X	120	x	152	ÿ	184	╕	216	╪	248	°
025	↓	057	9	089	Y	121	y	153	Ö	185	╣	217	┘	249	∙
026	→	058	:	090	Z	122	z	154	Ü	186	║	218	┌	250	·
027	←	059	;	091	[	123	{	155	¢	187	╗	219	█	251	√
028	∟	060	<	092	\	124	¦	156	£	188	╝	220	▄	252	ⁿ
029	↔	061	=	093	]	125	}	157	¥	189	╜	221	▌	253	²
030	▲	062	>	094	^	126	~	158	₧	190	╛	222	▐	254	
031	▼	063	?	095	_	127	⌂	159	ƒ	191	┐	223	▀	255	

2.8 User-Mode Switch

The user-mode switch is placed under the enclosure at the rear side of the unit. The switch levers can be accessed by using a pen or a small screwdriver.



The switches S5 to S8 can be used by the user as needed. The switch positions are stored at initialization time and afterwards they can be overtaken to the controller.

S1	S2	S3	S4	S5	S6	S7	S8	Function
I	X	-	-	X	X	X	X	Standard-Mode with PLC (delivery state)
I	X	I	-	X	X	X	X	Standard-Mode without PLC
-	I	-	-	X	X	X	X	Transparent-Mode with start and stop code of the keys
-	-	-	I	X	X	X	X	Transparent-Mode without stop code of the keys
I	-	-	I	X	X	X	X	Activate download (deletes application memory) and default contrast setting

Legend of above table:
I = Switch position ON
\- = Switch position OFF
X = Switch position irrelevant

2.9 Battery

A built-in lithium battery buffers the data in the RAM memory and also supplies the real-time clock with power. The discharge degree of the battery is monitored constantly to prevent any loss of data.
The battery provides a minimum life of 5 years, even under unfavourable operating conditions.
If the battery is drained the system message „change battery“ is generated.
A new battery is supported by Sütron electronic or the sales representative of your country.

Replacing the battery:
The battery can be replaced while the operating voltage is connected to ensure that the message data and time setting are not lost. Mind the safety instructions!

- Remove the mounting bolts of the field bus connectors (if available)
- Remove the fastening screws of the enclosure and remove the enclosure
- Replace the cable fastener, which is used only for transportation
- Replace the battery out of the battery holder
- Place a new battery into the battery holder
  OBSERVE THE CORRECT POLARITY OF (-) AND (+)
- A new cable fastener is not necessary
- Place the enclosure on the rear side of the unit
- At first fasten the bolts of the field bus connectors (if available) and at last fasten the screws of the enclosure properly

Changing the battery may only be performed by qualified and authorized personnel!

Sewage and refuse displosal:
Dispose only drained batteries into the collection box of the community or of the local dealer. The battery is stated as drained when the message „change battery“ appears on the display of the appliance.

To prevent short circuitry in the collection boxes insulate the poles of each battery with insulation tape or put each single battery into a plastic bag.



Do not put lithium batteries in fire or heat them above 100° C and do not recharge them. **Danger of Explosion!**



Do not open lithium batteries. **Danger of Poisoning!**



Hazardous voltages can exist inside electrical installations that can pose a danger to humans. Coming in contact with live parts may result in **electric shock!**



Electrostatic discharges can damage electronic components! ESD protective measures must be observed!

2.10 Fuse

A miniature fuse 1 AmT is used to prevent damage to the operating terminal. A spare fuse is placed on the inside of the housing.

Changing the battery may only performed by qualified and authorized personnel!



Hazardous voltages can exist inside electrical installations that can pose a danger to humans. Coming in contact with live parts may result in **electric shock!**



Electrostatic discharges can damage electronic components! ESD protective measures must be observed!

2.11 Application Memory

A 128 kByte flash memory is used as an application memory. In the operating mode standard mode this memory area is available to store the user application. The advantage of the flash memory is that programming and deleting processes can be carried out directly in the unit.
Alternative a normal EPROM can be fitted. The EPROM needs to be written and deleted outside of the unit.
The application memory is fitted in a precision socket that can be accessed after removing the enclosure on the rear side of the unit. For replacing the enclosure see the chapter *2.9 Battery*.
The memory can be replaced using an extracting and inserting tool that is supplied with the spare parts set.

Changing the application memory may only be performed by qualified and authorized personnel!



Hazardous voltages can exist inside electrical installations that can pose a danger to humans. Coming in contact with live parts may result in **electric shock!**



Electrostatic discharges can damage electronic components! ESD protective measures must be observed!

3 Technical Data

Keyboard	a Total of 42 Keys, Mechanical with Tactile Feedback Divided into 7 Control Keys 16 Function Keys with LEDs and Slide-in Identification Strips 2 Special Key without LED 4 Special Keys with LEDs 13 Editing Keys

Display	Backlit LCD Module, 8 Lines with 40 Characters Each, Display Area 40.4 x 134.0 mm (H x W) with Glare Suppression for Increased Contrast
Interfaces	Variable Baud Rates and Data Formats 600 to 500000 Bd X2.1 TTY / 20 mA, Passive, Electrically Isolated or TTY / 20 mA, Active, Non Isolated X2.2 RS422 / RS485, Electrically Isolated X3 RS232c
Options	InterBus instead of X2.1 and X2.2 Profibus DP instead of X2.1 and X2.2 SUCOnet K instead of X2.1 and X2.2
Protocoll Possibilities	ABB CS31 ABB T200 AEG KS-Functions AEG Modbus Allen Bradley Bosch BUEP19 Bosch BUEP19E DIN-Meßbus Slave, DIN-Meßbus Gateway GE Fanuc SNP IDEC Micro3 Jetter PASE/PCOM5 Klöckner Moeller SUCOM 1 (PS306/316) Klöckner Moeller SUCOM 1 (PS4-201) Klöckner Moeller SUCOM 1 (PS416) Mitsubishi A-Series Mitsubishi FX-Series OMRON Host-Link OMRON NT-Link Siemens Sinec L1 Master Link Siemens 3964R/RK512 Siemens S5 PG (AS511) Siemens S7 PPI Siemens S7 MPI (HMI-Adaptor)
Central Unit	Z80-CPU, 10 MHz, Watchdog Timer, Real-Time Clock, Programmable Interface Parameters, Temperature Compensation of the Display, Adjustment of Contrast, Battery Monitoring, User Mode Switch
Memory	128 kByte Flash Memory, Application Memory 256 kByte Flash Memory, Firmware 128 kByte stat. CMOS-RAM, Battery-Backed
Fuse	Miniature Fuse 1 AmT
Connection System	Plug-in Type, via SubminD Female Connector Strip

Supply Voltage	24 V Direct Voltage, Residual Ripple Max. 10%	
	Minimum Voltage	19.2 V
	Maximum Voltage	30.2 V
	Typ. Power Consumption	<0.4 A
	Peak Current (10 ms)	<0.6 A
Connected Load	~10 W	
Noise Immunity	EC Electromagnetic Compatibility Directive 89/336/EEC EN 55011 Limit Class B EN 50081-1 Table A1 EN 50082-2 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 DIN VDE 0843-6	
Environmental Test	Operating Temperature	0°C to 50°C
	Storage Temperature	-25°C to 70°C
	Relative Humidity for:	
	Operation	max. 75% annual average
	Storage	max. 75% annual average
	Non-condensing	
Degrees of Protection	EN 60259 Mechanical Degrees of Protection Front: IP65 Rear: IP20	
Front Panel	Aluminum, Black Anodized with Affixed Polyester Cover, Circumferetial Rubber Sealing at Rear Side of Front Panel. 202.0 x 224.0 x 4.0 mm (H x W x D)	
Panel Cutout	188 x 204 mm (H x W)	
Mounting Depth	53 mm without Connector (approx. 90 mm with connector)	
Enclosure	Zinc-Coated Steel Plate	
Total Weight	Approx. 1500 g	

/000-9181/
BT15_grau_eng_V10.30000000QK0

4 Declaration of Conformity

EG - Konformitätserklärung

Dokument - Nr./
Monat. Jahr : CE-BT15.000_1.2/05.1997

Hersteller : SÜTRON ELECTRONIC GMBH

Anschrift : SÜTRON ELECTRONIC GMBH
Kurze Straße 29
D-70794 Filderstadt (Bonlanden)

Telefon 0711/77098-0
Telefax 0711/77098-60

Teilenummer : 81059.000
Produktbezeichnung : Tesimod - Bedienterminal BT15 F01 S

Hiermit wird bestätigt , daß das bezeichnete Produkt den wesentlichen Schutzanforderungen folgender Europäischen Richtlinie entspricht :

Nummer 89 / 336 / EWG

Text Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten über die elektromagnetische Verträglichkeit , geändert durch RL 91 / 31 / EWG , geändert durch RL 93 / 68 / EWG , geändert durch Neufassung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten vom 30.08.1995.
Weitere Angaben über die Einhaltung dieser Richtlinien enthält der Anhang .

Anbringung der CE - Kennzeichnung[1] :-

Aussteller : SÜTRON ELECTRONIC GMBH

Ort , Datum : Filderstadt , 07.05.1997

Rechtsverbindliche Unterschrift : Siegfried Buck
Angaben zum Unterzeichner : Siegfried Buck , Geschäftsführer

Die Anhänge sind Bestandteil dieser Erklärung .
Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien , beinhaltet jedoch keine Zusicherung von Eigenschaften .
Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten .

[1] Nur nach der Niederspannungsrichtlinie

Seite 1

Anhang
zur EG - Konformitätserklärung
oder EG - Herstellererklärung

Dokument - Nr./
Monat. Jahr : CE-BT15.000_1.2/05.1997

Teilenummer : 81059.000
Produktbezeichnung : Tesimod - Bedienterminal BT15 F01 S

Zur Beurteilung des Erzeugnisses wurden folgende Normen herangezogen .

Harmonisierte Europäische Normen :

Referenznummer	Ausgabedatum	Referenznummer	Ausgabedatum
EN 55011	03.1991	EN 50081-1 Tabelle A.1	01.1992
EN 50082-2	03.1995	EN 61000-4-2	1995
EN 61000-4-4	1995	EN 61000-4-5	1995
EN 61000-4-3	08.1996	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

Nationale Normen (nach NSR oder nach MSR Art. 5 Abs. 1 Satz 2) :

Referenznummer	Ausgabedatum	Referenznummer	Ausgabedatum
.....	.....	E DIN VDE 0843-6	12.1993
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

IEC - Standards (nur NSR) :

Referenznummer	Ausgabedatum	Referenznummer	Ausgabedatum
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

Prüfbericht : 56220-1-BCD , 66290-1-BCD

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D-70794 Filderstadt (Bonlanden)

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Geschäftsführer:
Siegfried Buck Karl Mohn
Manfred Süssmilch

Amtsgericht Nürtingen
HRB - Nr. 981

/000-9181/
BT15_grau_eng_V10.30000000QK0

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