SÜTRON

ELECTRONIC GMBH

Technical Manual

TesiMod Operating Terminal

BT5N LCD / BT5N VF

Field Bus Unit

V1.0   19.11.1999   First Edition

TesiMod BT5N

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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 BT5N

The **BT5N** operating terminal is of small size that makes it suitable for installation wherever space is limited while being able to take advantage of all of the functions provided by larger operating terminals.

The unit is fitted with function keys that can be individually labelled with slide-in identification strips.

The communication with a controller and a logging printer is carried out via separate interfaces.

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2.1 Front View
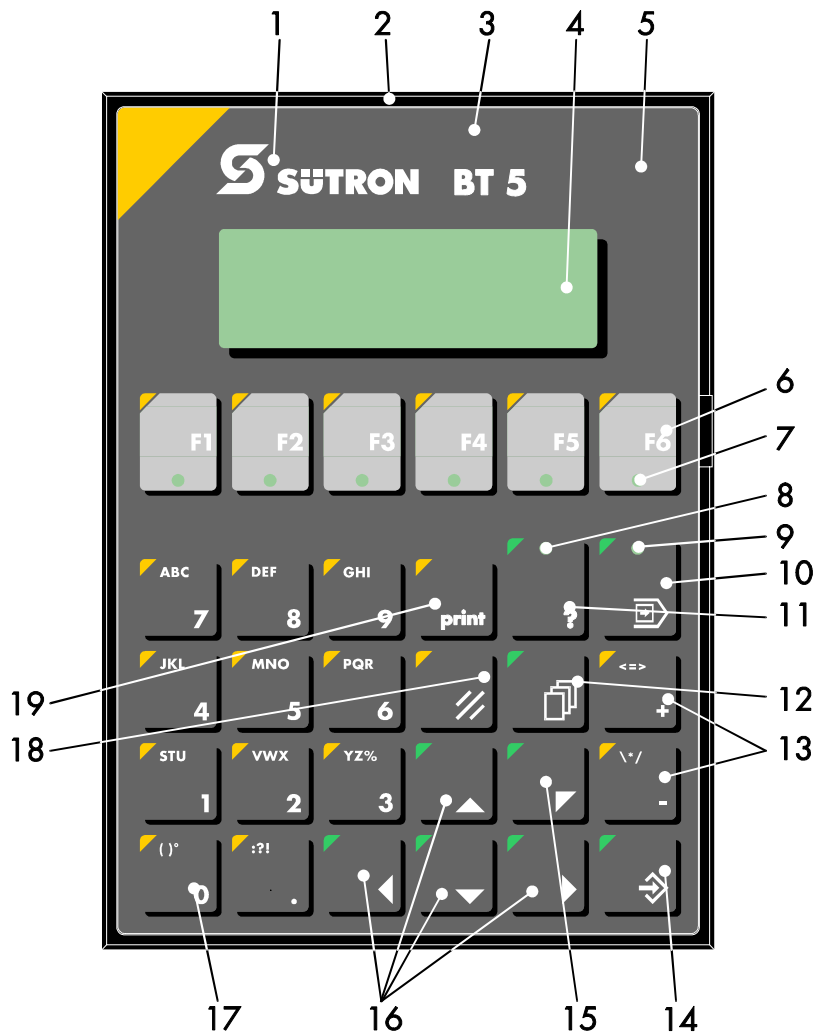
1	Company Logo	
2	Front Panel	
3	Operating Terminal Type Logo	
4	Display	
5	Front Cover	
6	Function Keys F1 to F6	
7	Status-LED Function Keys	
8	Status-LED Help	
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12	Control Key Page	
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14	Special Key Enter	
15	Key Cursor Home	
16	Key Cursor Right, Left, Up, Down	
17	Editing Keys 0 to 9, Alphabet	
18	Special Key Clear	
19	Special Key Print	

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2.2 Keyboard

The **BT5N** supports all important key functions in spite of the small measures. The keyboard consists of membrane keys. The stroke distance is 0.3 mm and the key area is 15 x 15 mm. The key elements are covered by an embossed polyester foil against environmental influences. The Status LEDs are positioned under or above the according key element and they illuminate green. The keyboard has a lifetime of 2 million switching cycles.

In transparent mode, the keys supply a fixed start and stop code. In standard mode, the function of the keys is as defined by the user.

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.

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.

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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** 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. The key **Page** is programmed as function key F8.

2.2.3   Special Keys

Key: **Help** 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** 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. The key **Print** is programmed as function key F7.

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2.2.4 Function Keys
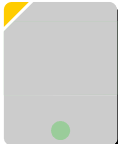
The **function keys F1 to F6** with integrated LEDs for functional feedback. The keys can be freely assigned a soft key functionality; either for menu control or to trigger a function in the controller.

2.2.4.1 Function Key Arrangement
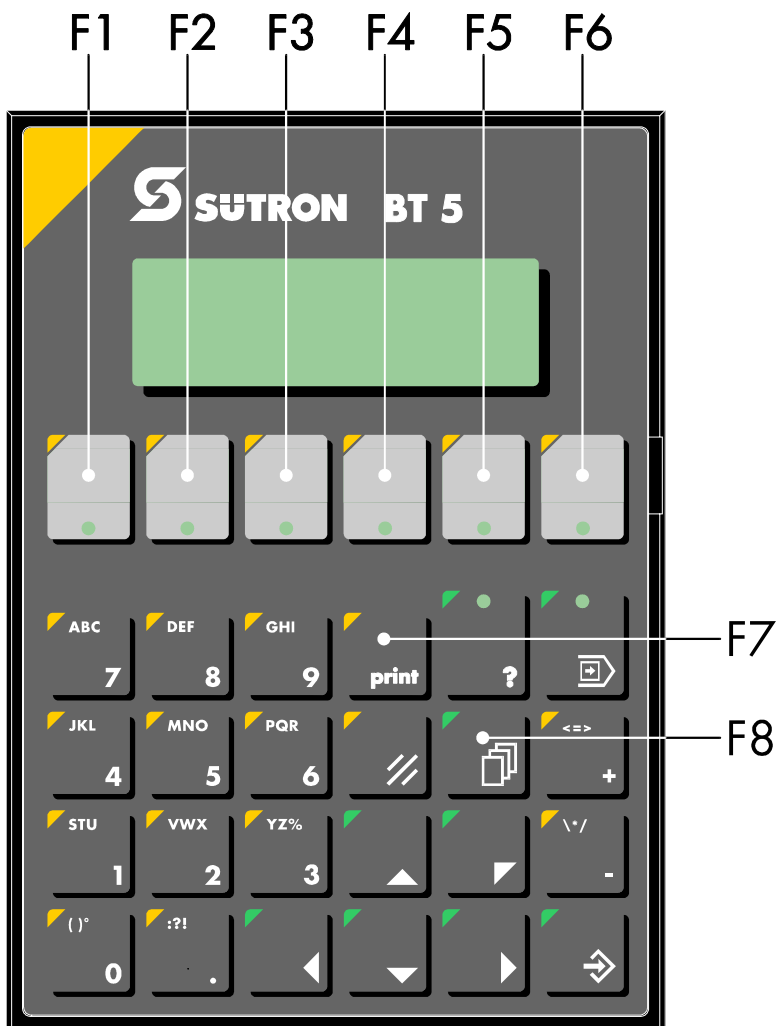
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2.2.4.2 Slide-in Identification Strips for the Function Keys

The slide-in identification strips can be replaced without having to disassemble the terminal. One blank slide-in identification strip and one labelled with F1 through F6 are supplied. Various labelling methods are recommended, depending on the number of terminals involved.

Suitable labelling methods for:

custom-made terminals,
prototypes: labelling with an indelible pen
small number of terminals: transparency with laser printing
large number of terminals: identification strips printed according to customer's needs
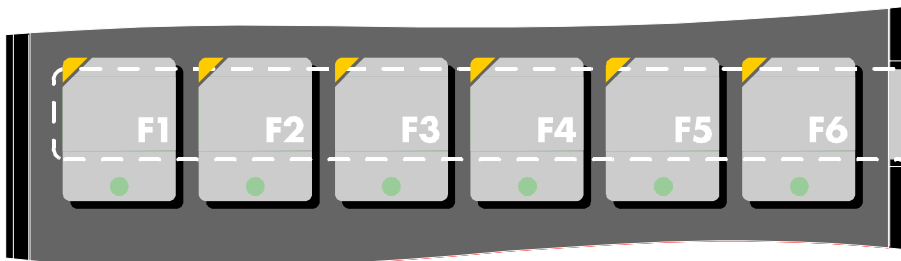
*Position of the slide-in identification strip in the **BT5N***

blank slide-in identification strip

labelled slide-in identification strip, standard

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2.3 Rear View

2.3.1 InterBus
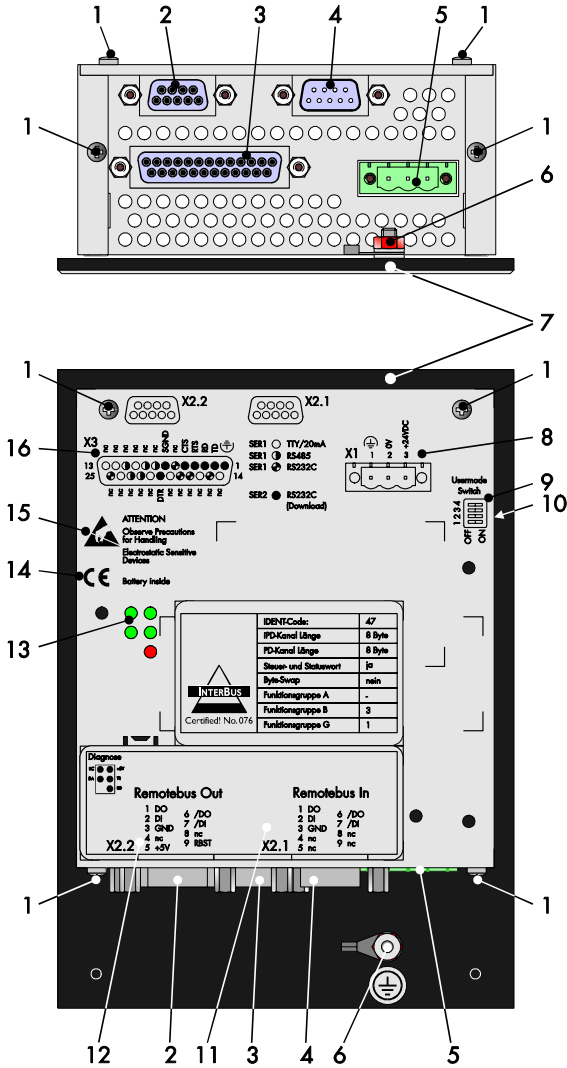
1	Fastening Screw for Enclosure	11	Pin Assignment X2.1 (Remotebus In)
2	Female Connector X2.2 (Remotebus Out)	12	Pin Assignment X2.2 (Remotebus Out)
3	Female Connector X3 (SER2-RS232c)	13	Diagnosis LEDs
4	Male Connector X2.1 (Remotebus In)	14	CE Mark
5	Connector X1 (Power Supply)	15	Warning
6	Threaded Bolt for Protective Ground	16	Pin Assignment X3 (SER2-RS232c)
7	Front Panel		
8	Pin Assignment Connector X1		
9	Switch Positions of User-Mode Switch		
10	User-Mode Switch at the Side of the Unit		

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2.3.2   SUKOnet K
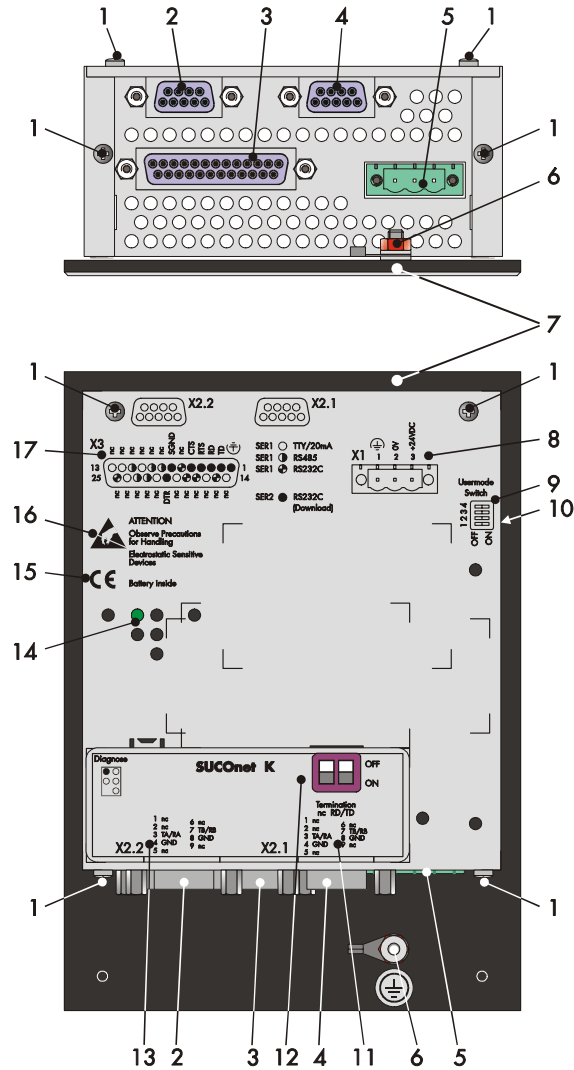
1	Fastening Screw for Enclosure	11	Pin Assignment X2.1 (SUCOnet K)
2	Female Connector X2.1 (SUCOnet K)	12	Terminator Switch (X2.1 - SUCOnet K)
3	Female Connector X3 (SER2-RS232c)	13	Pin Assignment X2.2 (SUCOnet K)
4	Female Connector X2.2 (SUCOnet K)	14	Diagnosis LED
5	Connector X1 (Power Supply)	15	CE Mark
6	Threaded Bolt for Protective Ground	16	Warning
7	Front Panel	17	Pin Assignment X3 (SER2-RS232c)
8	Pin Assignment Connector X1		
9	Switch Positions of User-Mode Switch		
10	User-Mode Switch at the Side of the Unit		

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2.3.3   PROFIBUS-DP

1	Fastening Screw for Enclosure	11	Diagnosis LED
2	Female Connector X2 (PROFIBUS-DP)	12	CE Mark
3	Female Connector X3 (SER2-RS232c)	13	Warning
4	Connector X1 (Power Supply)	14	Pin Assignment X3 (SER2-RS232c)
5	Threaded Bolt for Protective Ground		
6	Front Panel		
7	Pin Assignment Connector X1		
8	Switch Positions of User-Mode Switch		
9	User-Mode Switch at the Side of the Unit		
10	Pin Assignment X2 (PROFIBUS-DP)		

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2.3.4   MPI
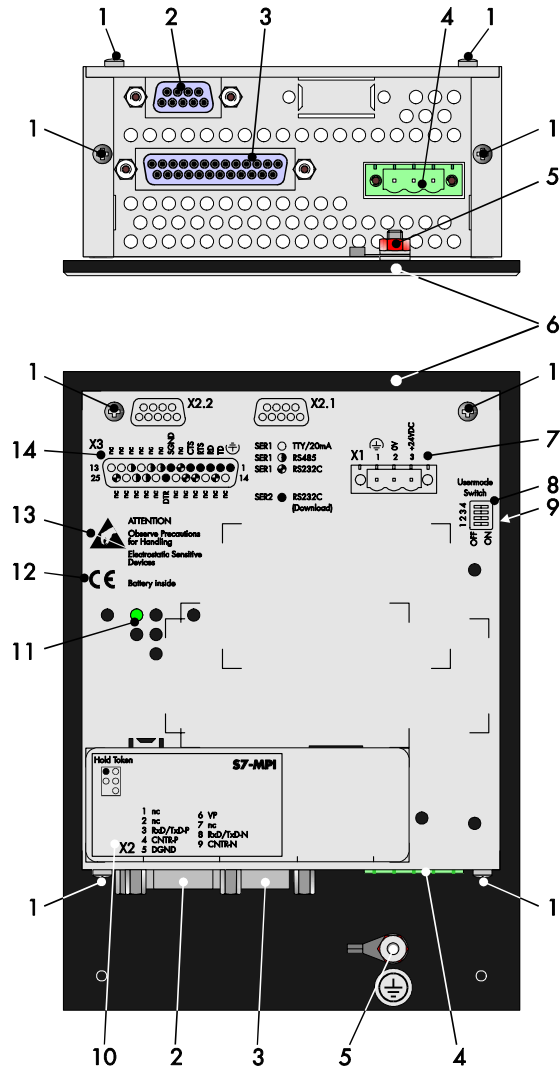
1	Fastening Screw for Enclosure	11 Diagnosis LED
2	Female Connector X2 (MPI)	12 CE Mark
3	Female Connector X3 (SER2-RS232c)	13 Warning
4	Connector X1 (Power Supply)	14 Pin Assignment X3 (SER2-RS232c)
5	Threaded Bolt for Protective Ground	
6	Front Panel	
7	Pin Assignment Connector X1	
8	Switch Positions of User-Mode Switch	
9	User-Mode Switch at the Side of the Unit	
10	Pin Assignment X2 (MPI)	

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2.3.5 CAN-Bus

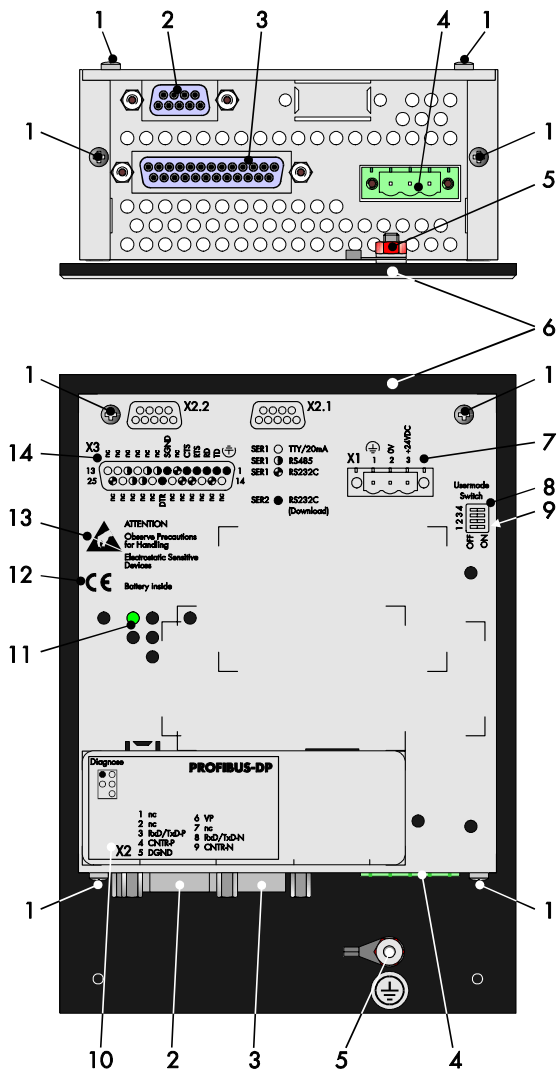|	
1	Fastening Screw for Enclosure
2	Female Connector X2.2 (CAN-Bus)
3	Female Connector X3 (SER2-RS232c)
4	Male Connector X2.1 (CAN-Bus)
5	Connector X1 (Power Supply)
6	Threaded Bolt for Protective Ground
7	Front Panel
8	Pin Assignment Connector X1
9	Switch Positions of User-Mode Switch
10	User-Mode Switch at the Side of the Unit
11	Pin Assignment X2.1 (CAN-Bus)
12	Pin Assignment X2.2 (CAN-Bus)
13	Diagnosis LEDs
14	CE Mark
15	Warning
16	Pin Assignment Interface X3 (SER2-RS232c)

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2.3.6 InterBus Optical Fibre

1	Fastening Screw for Enclosure	11	Fibre Optical Interface DI2 (Remotebus Out)
2	Female Connector X3 (SER2-RS232c)	12	Termintator Switch (InterBus)
3	Connector X1 (Power Supply)	13	Fibre Optical Interface DO2 (Remotebus Out)
4	Threaded Bolt for Protective Ground	14	Diagnosis LEDs
5	Front Panel	15	CE Mark
6	Pin Assignment Connector X1	16	Warning
7	Switch Positions of User-Mode Switch	17	Pin Assignment X3 (SER2-RS232c)
8	User-Mode Switch at the Side of the Unit		
9	Fibre Optical Interface DO1 (Remotebus In)		
10	Fibre Optical Interface DI1 (Remotebus In)		

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2.4   Mounting the Terminal

The rear panel mounting is suitable for easy and sealed installation in places where the rear side of the appliance is accessible. The appliance is particularly suitable for mounting in control cabinets with a mounting wall plate thickness of approximately 1 to 14 mm.
The front panel permits sealed installation of the operating terminal in accordance with the IP65 degree of protection (at the front). At the rear side of the front panel a circumferencial sealing is attached.
All parts for mounting the appliance are given with the spare parts set.

Special care needs to be taken during installation to maintain this high degree of protection. The operating terminal is inserted from the front through the panel cutout and screwed to the mounting wall from the rear. 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.

Mounting and maintenance may only be performed by qualified and authorized personnel!

Front Panel Dimensions   168.0 x 120.0 x 4.0 mm   (H x W x D)
Panel Cutout   160 x 112 mm   (H x W)

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2.4.1 Front Panel Dimensions

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2.4.2   Side View, Mounting Depth

58 mm

1
2
3
4
5
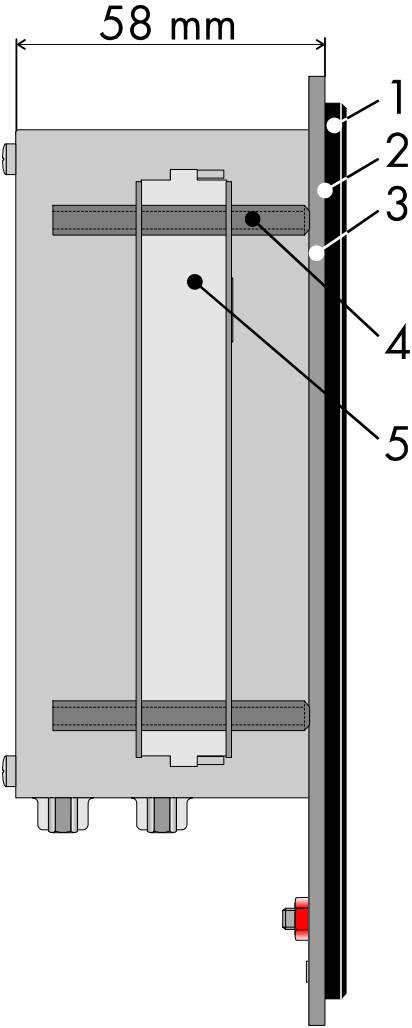
1	Front Panel	4	Threaded Pin DIN 914 M4 x 35
2	Foam Rubber Seal	5	Mounting Clamp
3	Mounting Surface Thickness 1 bis 14 mm		

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2.4.3   Panel Cutout

160,0mm +1mm -0mm

112,0mm +1mm -0mm

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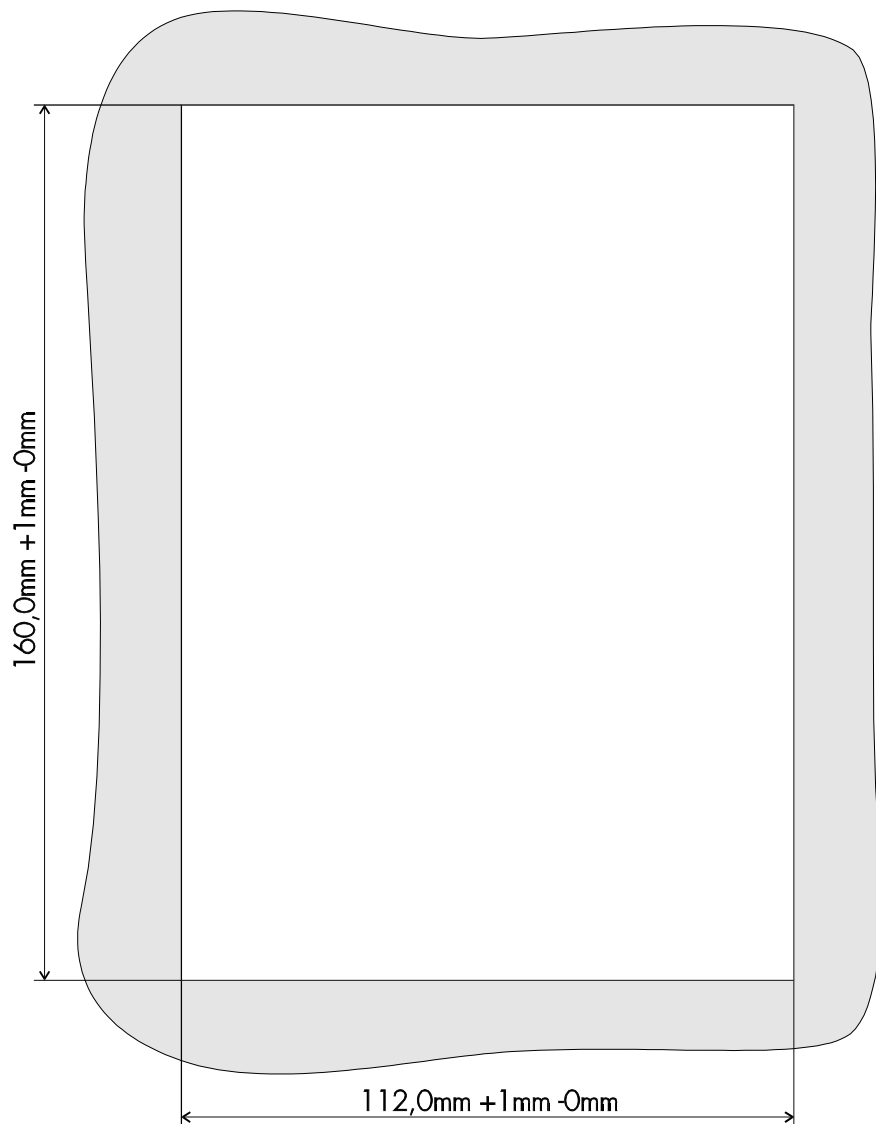
2.5 Pin Assignments

The operating terminal is fitted with the following connectors:

Connector X1	24 VDC	Supply Voltage
Connector X3 / SER2	RS232c	Upload/Download/Logging Printer/Scanner

Optional the unit is fitted with this Connectors:

Connector X2.1 and X2.2	InterBus	Communication
Connector X2.1 and X2.2	SUCOnet K	Communication
Connector X2	PROFIBUS-DP	Communication
Connector X2	MPI	Communication
Connector X2.1 and X2.2	CAN Bus	Communication
Connector DO1/DI1	InterBus	
and DO2/DI2	Optical Fibre	Communication

2.5.1   Pin Assignment X1 Supply Voltage

The supply voltage is connected via the connector X1.

The unit is equipped with a reverse voltage protection. If the poling is wrong, the unit doesn´t operate.

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.

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!**

Please note with respect to pin assignment:
If shielded connecting cables are used for the supply voltage, the shield should be connected to pin 1.

Threaded bolt 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 and the length as short as possible. Compliance with this information increases the operational safety.

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2.5.2 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.

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2.5.3 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 <u>at all times</u>. 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.

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2.5.4 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	RxD/TxD-P	Transmit / Receive Data Plus
4	CNTR-P	Control Signal Repeater Plus
5	DGND	Data Transmission Potential
6	VP	Power Supply of the Matching Resistors Plus
7	nc	not connected
8	RxD/TxD-N	Transmit / Receive Data Minus
9	CNTR-N	Control Signal Repeater Minus

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

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2.5.5   Pin Assignment X2 MPI

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

The Termination of the bus cable is in the connector.

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

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

Termination for spur lines:
For spur lines the **termination** must <u>always</u> be deactivated.

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

Assignment:

Pin	Designation	Function
1	nc	not connected
2	nc	not connected
3	RxD/TxD-P	Transmit / Receive Data Plus
4	CNTR-P	Control Signal Repeater Plus
5	DGND	Data Transmission Potential
6	VP	Power Supply of the Matching Resistors Plus
7	nc	not connected
8	RxD/TxD-N	Transmit / Receive Data Minus
9	CNTR-N	Control Signal Repeater Minus

Principally, all cable with the following parameters can be used:
- Loop resistance   110 Ohm/km
- Effective capacitance 30 nF/km
- Surge impedance   150 Ohm

The maximum length of a segment must be less than 50 meters. In the „Installation Manual S7-400, M7-400, C79000-G7000-C400-01" of Siemens you can gather more information about installation.

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2.5.6 Pin Assignment X2.1 / X2.2 CAN-Bus

To integrate the unit into a network topology of the CAN bus it can be equipped with the special interfaces X2.1 and X2.2 for CAN Bus. The CAN bus is stated as a high-speed-bus according to ISO-DIS 11898.

Connector: 9-pin SubminD male connector strip X2.1

Pin	Designation	Function
1	nc	not connected
2	CANL	CAN_L bus line (dominant LOW)
3	CAN_GND	CAN Ground
4	nc	not connected
5	nc	not connected
6	CAN_GND	CAN Ground
7	CANH	CAN_H bus line (dominant HIGH)
8	nc	not connected
9	nc	not connected.

Connector: 9-pin SubminD female connector strip X2.2

Pin	Bezeichnung	Funktion
1	nc	not connected
2	CANL	CAN_L bus line (dominant LOW)
3	CAN_GND	CAN Ground
4	nc	not connected
5	nc	not connected
6	CAN_GND	CAN Ground
7	CANH	CAN_H bus line (dominant HIGH)
8	nc	not connected
9	nc	not connected

All signals of X2.1 to X2.2 are interconnected. The connecting cable has to be connected to all pins including the reserved ones. The intention is, that there shall be no interruption of any of the wires in the bus cable, assuming a possible future specification of the use of the reserved pins.

A shielded cable with twisted pair wires (cabe type LiYCY-TP) must be used. The CAN bus must be terminated with resistors on both ends of the cable structure.

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2.5.7 Pin Assignment InterBus Optical Fibre

To integrate the unit into a network topology of the InterBus optical fibre device net it can be equipped with the special interfaces for InterBus Optical Fibre.
The optical fibre interface is stated as F-SMA type 905.

The connectors for the optical fibres are
DO1 and DI1 for Remotebus In and
DO2 and DI2 for Remotebus Out.

The connection must conform to „Technical Guideline For Optical Transmission".

For the optical transmission a dielectrical fibre with refractive index profile, likely a polymer fibre with a diameter of 980 μm of the core and 1000 μm of the coating. The connector of the type F-SMA is according to the specifications of IEC 874-2 respectively DIN 47258.
The permitted distance between two subscribers of the optical fibre device bus is 1 through 5 m.

Infrared light can **damage the retina of the eye**! Never look into the open end of the optical fibre! Secure the open ends of the optical fibres and the plugs with caps! Always wear safety glasses!

The transmitter and receiver units may get unusable by dirt. For transportation, storage and when a unit is not in use, place caps on the plug terminals.

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2.5.8 Pin Assignment X3 SER2 RS232c

Interface for download, upload, logging printer and scanner.

Pin	Designation	Channel	Function
1	⏚	SER2	Low-noise Earth
2	TD	SER2	Transmit Data
3	RD	SER2	Receive Data
4	RTS	SER2	Request to Send
5	CTS	SER2	Clear To Send
7	SGND	SER2	Signal Ground
20	DTR	SER2	Data Terminal Ready

A shielded cable with stranding in layers (cable type LiYCY) and with a minimum cross-section of 0.25 mm^2 must be used. The maximum cable length is 15 m.

☞ Connect the cable shield to the metal hoods of the connectors over as large a surface as possible! Please refer to appendix A.

2.6 Shielding

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.

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2.7 Display

The display in the **BT5N** operating terminal is a 4-line LCD Module with a width of 20 characters. The version with the VF Module is fitted with a 4-line display with a width of 20 characters too.
The characters are displayed by a matrix of 5 x 7 dots. The LCD Module has a yellow-green LED backlighting.The VF Module is luminescent. The operating terminal has an optimum viewing angle of approximately 90°. The contrast of the display is kept constant over the entire temperature range. The default contrast can be set online by means of a system variable.

The displayable character set is shown by the display as the standard character set. Depending on type of LCD module the character set Cyrillic or Katakana is available, too. The VF module only supports loading the character set Katakana. Additionally you can use the character attribute *Flashing*.

Displays for the BT5N (LCD/VF) at a glance:

	BT5N (LCD)	**BT5N (VF)**
Type:	LCD Module	VF Module
Resolution:	4 x 20 Dots	4 x 20 Dots
Backlight:	LED backlit	Luminescent
Lifetime LCD/VF:	100000 h	50000 h
Lifetime Backlight:	100000 h	—
Lines:	4	4
Characters/Line:	20	20
Character Matrix:	5 x 7 Dots + Cursor	5 x 7 Dots + Cursor
Character Height:	4.3 mm	4.7 mm
Illumination Color:	—	Blue-green
Background Color:	Yellow-green	—
Visible Front Cutout:	23 mm x 74 mm (H x W)	23 mm x 74 mm (H x W)

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!

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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: -25
Upper level: +70

The values that apply for the VF Module brightness settings are as follows:

Input Value	Brightness Level	Brightness
<1	2	50%
1	1	25%
2	2	50%
3	3	75%
4	4	100%
>4	2	50%

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.
How to setup the default contrast:
-      Switch off the operating terminal
-      Set the DIP-switches to the above decribed switch positions
-      Switch on the operating terminal
-      Upon display of a warning, switch off the operating terminal
-      Set the switch S4 to the OFF-position
-      Switch on the terminal again.
The application description is not lost.

2.7.3   Character Attributes

By preselecting an attribute, all characters can be displayed as follows:
-    normal
-    flashing

2.7.4   Font Normal

2.7.5   Displayable Character Set

0	32	64	96	128	160	192	224
0	32	64 @	96 `	128	160	192	224
1	33 !	65 A	97 a	129 ü	161	193	225 ß
2	34 "	66 B	98 b	130	162	194	226
3	35 #	67 C	99 c	131	163	195	227
4	36 $	68 D	100 d	132 ä	164	196	228
5	37 %	69 E	101 e	133	165	197	229
6	38 &	70 F	102 f	134	166	198	230
7	39 '	71 G	103 g	135	167	199	231
8	40 "	72 H	104 h	136	168	200	232
9	41)	73 I	105 i	137	169	201	233
10	42 *	74 J	106 j	138	170	202	234
11	43 +	75 K	107 k	139	171	203	235
12	44 ,	76 L	108 l	140	172	204	236
13	45 –	77 M	109 ▪	141	173	205	237 ø
14	46 .	78 N	110 n	142 Ä	174	206	238
15	47 /	79 O	111 o	143	175	207	239
16	48 0	80 P	112 p	144	176	208	240
17	49 1	81 Q	113 q	145	177	209	241
18	50 2	82 R	114 r	146	178	210	242
19	51 3	83 S	115 s	147	179	211	243
20	52 4	84 T	116 t	148 ö	180	212	244
21	53 5	85 U	117 u	149	181	213	245
22	54 6	86 V	118 v	150	182	214	246 ÷
23	55 7	87 W	119 w	151	183	215	247
24 ↑	56 8	88 X	120 x	152	184	216	248 °
25 ↓	57 9	89 Y	121 y	153 Ö	185	217	249
26 →	58 :	90 Z	122 z	154 Ü	186	218	250
27 ←	59 ;	91 [	123 {	155	187	219	251
28	60 <	92 \	124		156	188	220	252
29	61 =	93]	125 }	157	189	221	253
30	62 >	94 ^	126	158	190	222	254
31	63 ?	95 _	127	159	191	223	255

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2.7.6 Loadable Font Katakana

A character map table showing loadable Katakana font characters with column headers 032, 048, 064, 080, 096, 112, 160, 176, 192, 208, 224, 240 at the top and 047, 063, 079, 095, 111, 127, 175, 191, 207, 223, 239, 255 at the bottom.

2.7.7   Loadable Font Cyrillic

032	048	064	080	096	112	160	176	192	208	224	240

047	063	079	095	111	127	175	191	207	223	239	255

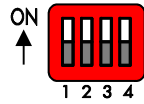# TesiMod BT5N

2.8   User-Mode Switch

The user-mode switch is placed at the side of the unit.

User-Mode Switch   4 Switch Positions

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

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

TesiMod BT5N

2.9   Battery

A built-in lithium battery buffers the data in the CMOS-RAM and also supplies the real-time clock with power. 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.

We recommend to replace the battery every 4 years while performing the regular maintenance.

A new battery is supported by Sütron electronic or the sales representative of your country.

If the system message „change battery" would not be recognized in due, eg the real time clock is interrupted or displays a wrong time, a loss of data in the CMOS-RAM can be expected. In this case you must check all alterable data like passwords, parameters in the system variables, data sets of recipes and the entries of the message system after replacing the battery.

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 connectors
- Remove the fastening screws of the enclosure and remove the enclosure
- Replace the cable fastener, which is used to hold the battery
- Plug off the connector of the battery cable and replace the battery
- Plug on the connector of the new battery
- Place the new battery onto the plastic carrier on the printed circuit board and fasten it with a new cable fastener
- Place the enclosure on the rear side of the unit
- At first fasten the bolts of the interface connectors 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!

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2.10   Fuse

A semiconductor fuse is used to prevent damage to the operating terminal. Once the fuse has been activated, the device must be disconnected from the supply voltage to allow the semiconductor fuse to regenerate. With an ambient temperature of 20 °C, the regeneration takes about 20 seconds. The higher the ambient temperature, the longer the regeneration period.
The semiconductor fuse is not designed to be replaced.

2.11   Application Memory

The unit is equipped with a 256 KByte flash memory an application memory.
After switching on the unit the size of the application memory is displayed. This memory area is available to store the user application, the loadable protocol driver, the fonts and the recipe data.

3   Technical Data

Keyboard   a Total of 30 Keys, Membrane with Tactile Feedback, 2 Million Switch
                        Cycles
                        Divided into
                                6 Control Keys
                                6 Function Keys with LEDs and Slide-in Identification Strips
                                2 Special Keys with LED
                                3 Special Keys without LED
                                13 Editing Keys

LCD Display   Backlit LCD Module / Luminescent VF Module, 4 Lines with 20 Charac-
                        ters Each,
                        Display Area 23 x 74 mm (H x W)
                        with Glare Suppression for Increased Contrast
                        Lifetime LCD: 100000 h
                        Lifetime Backlight: 100000 h
                        Lifetime VF: 50000 h

Interface X3   Variable Baud Rates and Data Formats
                        SER2 RS232c   Download/Upload/Scanner/
                                                                 Logging Printer

Interface X2   X2.1/X2.2 InterBus   Communication
                        X2.1/X2.2 SUCOnet K   Communication
                        X2   PROFIBUS-DP   Communication
                        X2   MPI   Communication
                        X2.1/X2.2 CAN-Bus   Communication
                        DO1/DI1
                        DO2/DI2   InterBus Optical Fibre   Communication

TesiMod BT5N

Protocols Standard	none
Protocols Field Bus	CAN/CANopen InterBus Moeller SUCOnet K PROFIBUS-DP Siemens S7 MPI
Central Unit	Z84-CPU, 10 MHz, Watchdog Timer, Real-Time Clock, Programmable Interface Parameters, Temperature Compensation of the Display, Adjustment of Brightness/Contrast, Battery Monitoring, User Mode Switch
Memory	256 KByte Flash Memory, Application Memory 256 KByte Flash Memory, Firmware 128 KByte stat. CMOS-RAM, Battery-Backed
Connection System	Plug-in Type, via SubminD Connector Strips
Supply Voltage	24 V Direct Voltage, Residual Ripple Max. 10%, SELV in accordance to DIN EN 61131 Minimum Voltage 19.2 V Maximum Voltage 30.2 V Typ. Power Consumption <0.3 A Peak Current (10 ms) <0.5 A
Connected Load	~10 W
Fuse	Semiconductor Fuse
Reverse Voltage Protection	Protection Diode
Noise Immunity	EC Electromagnetic Compatibility Directive 89/336/EEC EN 50082-2 EN 55011 Limit Class B EN 55022 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 EN 61000-4-6

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Environmental Test	Operating Temperature	0°C to 50°C
	Storage Temperature	-20°C to 70°C
	Relative Humidity for:	
	Operation	max. 75% annual average
	Storage	max. 75% annual average
	Non-condensing	
Degrees of Protection	EN 60529 Mechanical Degrees of Protection	
	Front: IP65	
	Rear: IP20	
Front Panel	Aluminum, black anodized with affixed polyester cover, polyäthylen foam seal around rear of front panel	
	168.0 x 120.0 x 4.0 mm (H x W x D)	
Panel Cutout	160 x 112 mm (H x W)	
Mounting Depth	58 mm without Connector	
Enclosure	Zinc-Coated Steel Plate	
Total Weight	approx. 500 g	

TesiMod BT5N

4   Declaration of Conformity

<u>EG - Konformitätserklärung</u>

Seriennummer : BT5N/081100

Dokument - Nr./
Monat. Jahr :   CE-BT5N.081_98/06.1999

Der Unterzeichner, der den nachstehenden Hersteller vertritt

Hersteller :	**S SÜTRON** ELECTRONIC GMBH
Anschrift :	SÜTRON ELECTRONIC GMBH Telefon 0711/77098-0 Kurze Straße 29 Telefax 0711/77098-60 D-70794 Filderstadt (Bonlanden)

oder der den vom Hersteller nachstehend benannten Bevollmächtigten vertritt, der innerhalb der Gemeinschaft (oder des EWR) niedergelassen ist (falls zutreffend)

Bevollmächtigter:	Siegfried Buck
Anschrift:	Kurze Straße 29 D-70794 Filderstadt

erklärt hiermit, daß das Produkt

Produktkennzeichnung :	Tesimod Bedienterminal BT5N/081100

in Übereinstimmung mit den Bestimmungen der nachstehenden EG-Richtlinie(n) (einschließlich aller zutreffenden Änderungen)
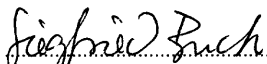
Referenz-Nr.	89 / 336 / EWG
Titel	Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten über die elektromagnetische Verträglichkeit

und daß die Normen und/oder technischen Spezifikationen, die auf der Umseite in Bezug genommen sind, zur Anwendung gelangt sind.

Die letzten beiden Ziffern des Jahres in dem die CE-Kennzeichnung angebracht wurde: .... (nur einzutragen, wenn die Übereinstimmung mit den Bestimmungen der Niederspannungsrichtlinie 73/23/EWG erklärt wird)

Aussteller :   **S SÜTRON**
ELECTRONIC GMBH

Ort , Datum :   Filderstadt , 01.06.99

Unterschrift: *[Unterschrift]*
Siegfried Buck , Geschäftsführer
(Name und Funktion der vom Hersteller oder von seinem Bevollmächtigten zur Unterschrift berechtigten Person)

Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten .

Seite 1

S SÜTRON
ELECTRONIC GMBH

EG-Konformitätserklärung

Seriennummer : BT5N/081100

Dokument - Nr./
Monat. Jahr :   CE-BT5N.081_98/06.1999

Bezugnahme auf Normen und/oder technische Spezifikationen oder Teile von diesen die für diese Konformitätserklärung zur Anwendung gelangt sind :

- harmonisierte Normen :

Referenznummer	Ausgabedatum	Titel	Teile (1)
DIN EN 55011	12.98	Funkstörungen bei ISM-Geräten	
DIN EN 50082-2	02.96	EMV-Störfestigkeit Industriebereich	2
DIN EN 61000-4-2	1996	EMV-Störfestigkeit ESD	2
DIN EN 61000-4-3	08.97	EMV-Störf. Hf-elektromagn. Felder	3
DIN EN 61000-4-4	1996	EMV-Störfestigkeit Burst	4
DIN EN 61000-4-5	1996	EMV-Störfestigkeit Surge	5
DIN EN 61000-4-6	04.97	EMV-Störf. leitungsgef. Störgr.	6
DIN EN 55022	05.99	Funkstörungen bei ITE-Geräte	

- oder andere Normen und/oder technische Spezifikationen:

Referenznummer	Ausgabedatum	Titel	Teile (1)

- andere Technische Lösungen, deren Details in den technischen Unterlagen oder in der technischen Dokumentation enthalten sind :

- Andere in Bezug genommene Dokumente oder Informationen, die von den anzuwendenden EG-Richtlinien gefordert werden :

Prüfbericht :   86137-1-BCD, PNR52

(1)   Wo zutreffend, müssen die angewandten Teile oder Abschnitte der Norm oder der technischen Spezifikation in Bezug genommen werden.

SÜTRON ELECTRONIC GMBH	Telefon 0711/77098-0	Geschäftsführer:	Amtsgericht Nürtingen
Kurze Straße 29	Telefax 0711/77098-60	Siegfried Buck	HRB - Nr. 981
D-70794 Filderstadt (Bonlanden)		Frank Mohn	

Seite 2

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TesiMod BT5N

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Appendix A

A   Appendix A

A.1   Shielding of SubminD - Interconnections
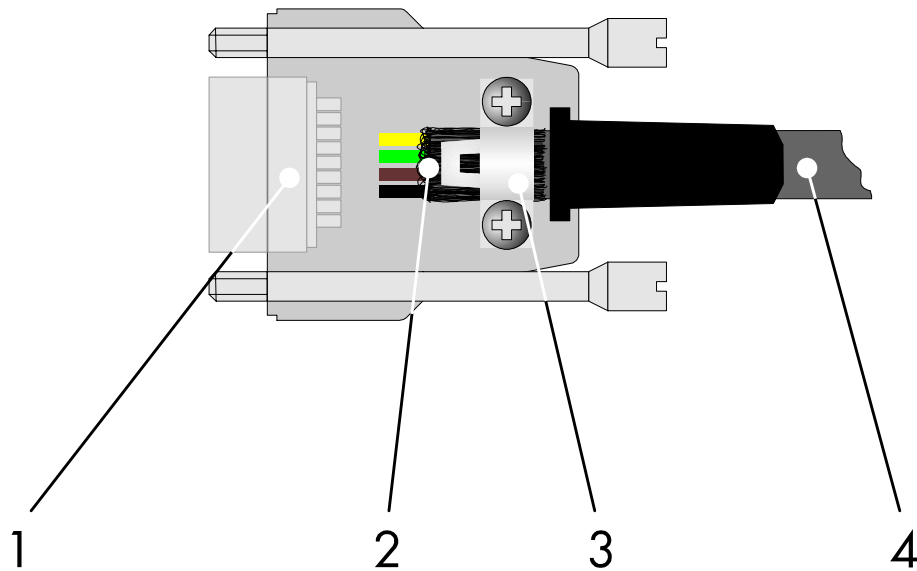
1   SubminD Connector
2   Shield
3   Cord Grip
4   Cable

The shield must be pushed back tubularly.
By fastening the cable with the cord grip you have to ensure an electrical contact of the shield to the housing over an area as wide as possible and an appropriate strain relief.