User Manual

TesiMod Touch Panel TP52

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Version:	1
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Revision	Date	Modifications
0	27 April 2002	First edition
A	1 August 2002	Chapter „identification" and „touch" new, table „user mode switch" and chapter „contrast- / brightness setting" reprocessed, technical data reprocessed.
B	22 October 2002	Chapter "identification" reprocessed.
C	6 November 2002	Chapter "changing the battery" and technical data of the keyboard and touch reprocessed.

Overall Table of Contents

Table of Contents of Chapter 1

1   Important Notes

1.1   Symbols

The symbols in this manual are used to draw your attention on notes and dangers.

1.1.1   General Symbols

Danger
This symbol is used to refer to instructions which, if ignored or not carefully followed could result in personal injury.

Notes
This symbol indicates application tips or supplementary notes.

Reference to source of information
This symbol refers to detailed sources of information on the current topic.

1.1.2   Specific Symbols

The following symbols indicate specific dangers which could result in damage to equipment or personal injury or even up to the death of the operator.

Danger - Electric Shock

Danger - Corrosive

Danger - Toxic

Danger - Explosive

Danger - Fire

Danger - Infrared Light

Danger - Electrostatic Charge

1.2   Safety Notes

–   Read this manual carefully before using the operating device. Keep this manual in a place where it is always accessible to all users.

–   Proper transportation, handling and storage, placement and installation of this product are prerequisites for its subsequent flawless and safe operation.

–   This user manual contains the most important information for the safe operation of the device.

–   The user manual, in particular the safety notes, must be observed by all personnel working with the device.

–   Observe the accident prevention rules and regulations that apply to the operating site.

–   Installation and operation must only be carried out by qualified and trained personnel.

1.2.1   Intended Use

–   The device is designed for use in the industry.

–   The device is state-of-the art and has been built to the latest standard safety requirements. However, dangerous situations or damage to the machine itself or other property can arise from the use of this device.

–   The device fulfills the requirements of the EMC directives and harmonized European standards. Any modifications to the system can influence the EMC behavior.

This is a class A device. This device may cause radio interference in residential areas. In this case, the user may be required to introduce appropriate countermeasures, and to bear the cost of same.

1.3   Target Group

All configuration, programming, installation, commissioning, operating and maintenance work in connection with the automation system must be performed by trained personnel only (e.g. qualified electricians, electrical engineers, etc.).

The configuration and programming personnel must be familiar with the safety concepts of automation technology.

The operating personnel must have been trained in handling the controller and be familiar with the operating instructions.

The installation, commissioning and maintenance personnel must have an education which entitles them to work on automation systems.

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Table of Contents of Chapter 2

2   Installation and Commissioning

2.1   Unpacking the Device

Unpack all parts carefully and check the contents for any visible damage in transit. Also check whether the shipment matches the specifications on your delivery note.

If you notice damages in transit or discrepancies, please contact our sales department immediately.

2.2   Mounting the Device

When installing the terminal, keep a minimum clearance of 30 mm (1.181") around the terminal to ensure adequate air circulation.

To maintain the specified degree of protection, make sure the seal is evenly seated on the installation surface and the hexagon nuts are tightened uniformly.

The device can be easily and quickly mounted from the rear of the device. This is particularly recommended for mounting in switchboards with a plate thickness of approx. 1 to 8 mm (0.039" to 0.315").

1.   Insert the device from the front through the mounting cutout.
2.   Fasten the device using the hexagon nuts supplied with the accessories.

2.2.1 Front Panel Dimensions
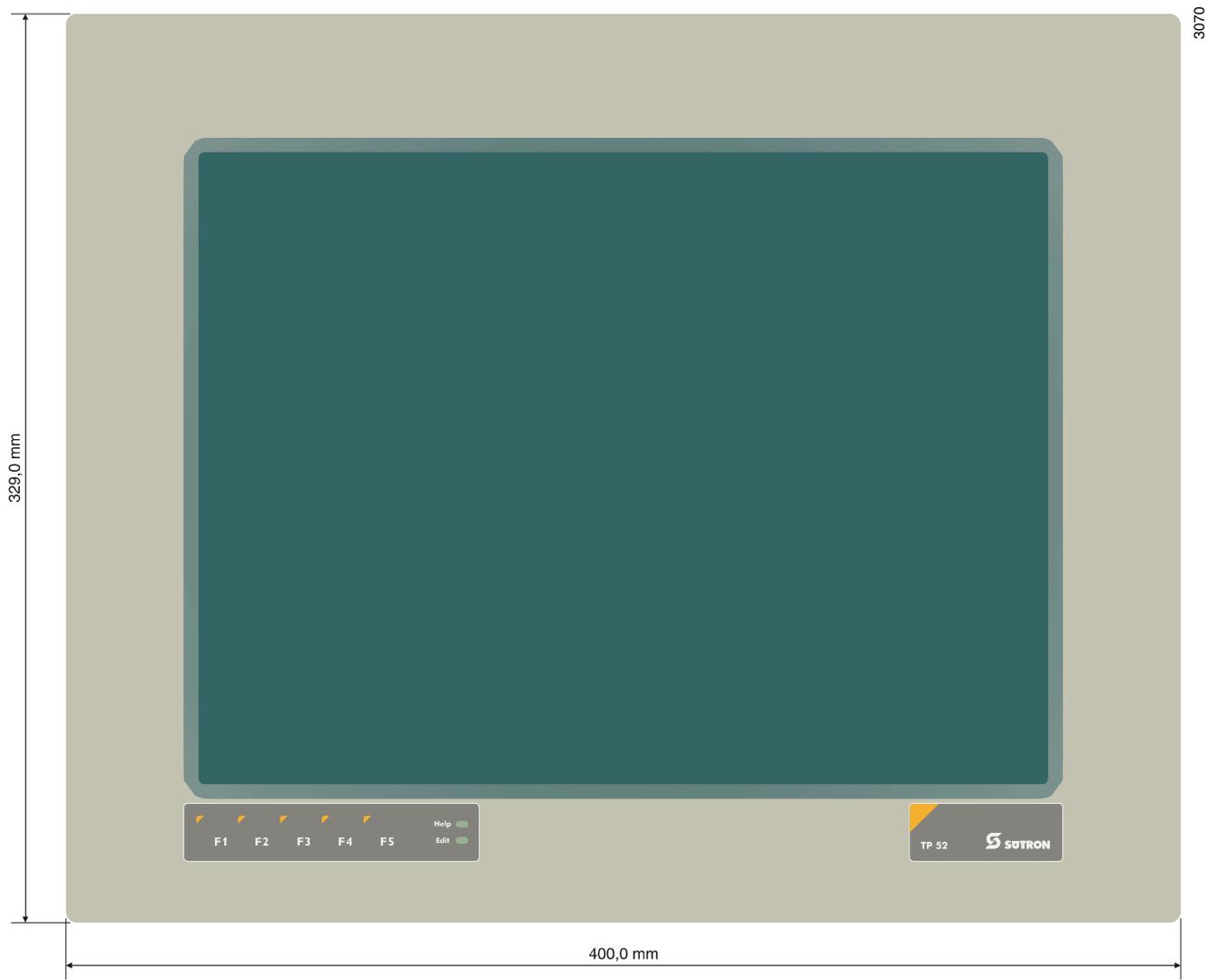
Figure 2-1   Front panel dimensions

2.2.2   Mounting Cutout
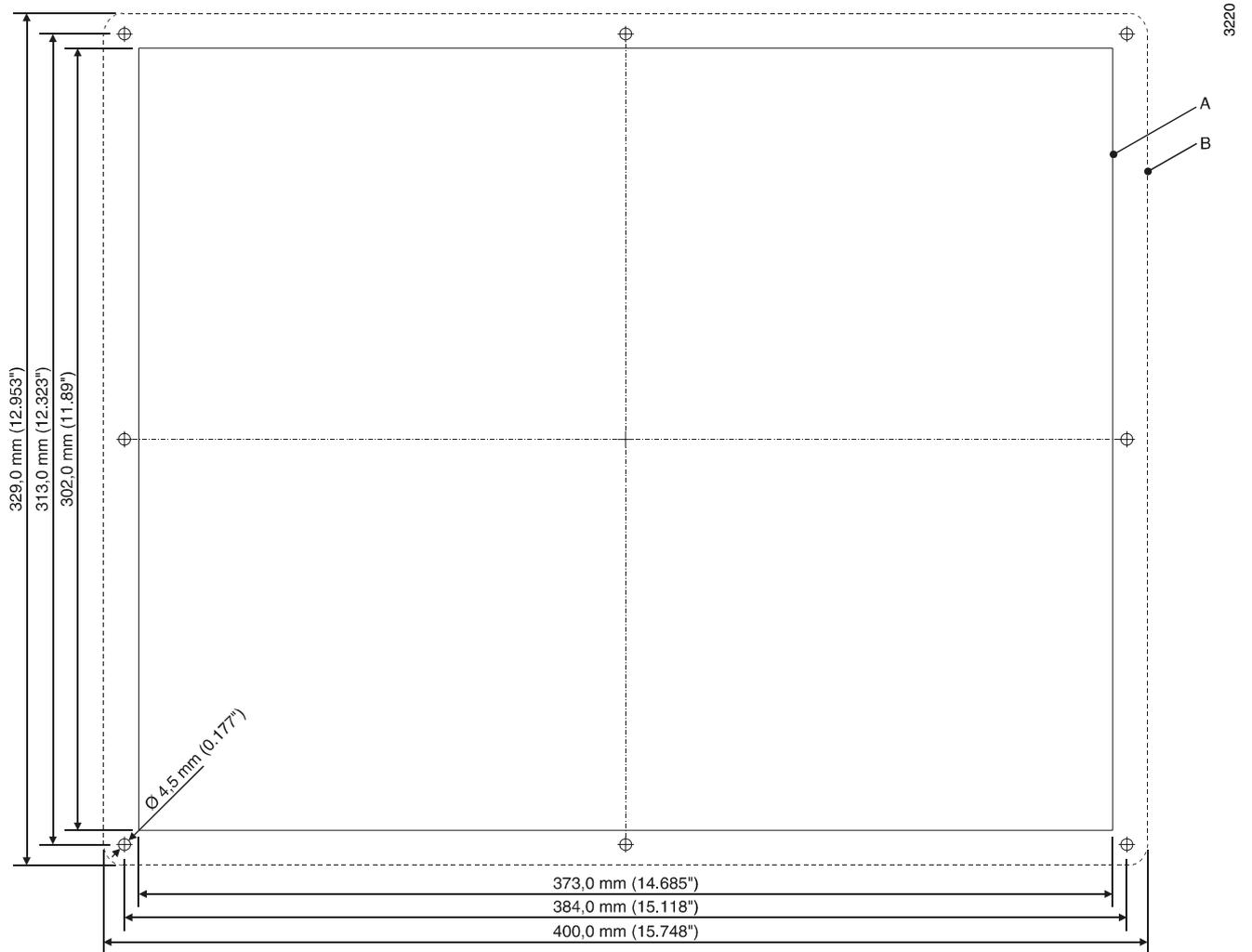
Figure 2-2   Mounting cutout

A. Mounting Cutout
B. Front Panel

2.2.3   Side View, Mounting Depth

2.2.3.1   Standard Device
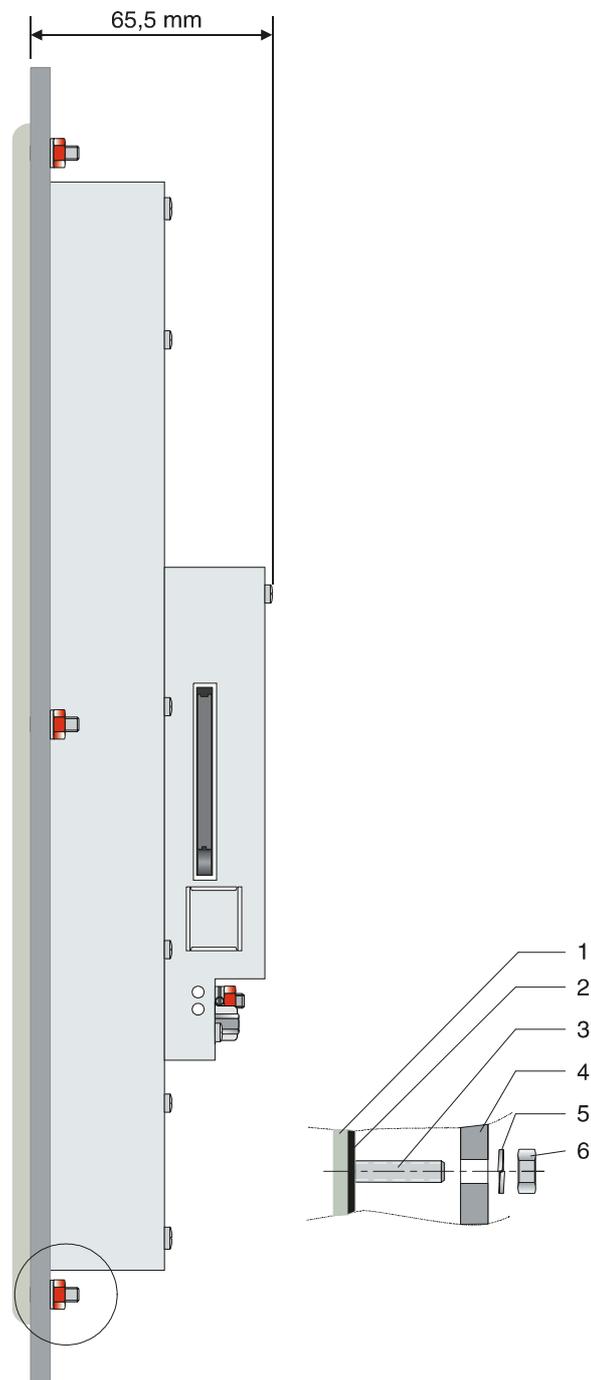
Figure 2-3   Side view and mounting depth for the standard device

1.   Front Panel
2.   Circumferential Seal
3.   Press-in Threaded Bolt M4 x 18 mm (0.709")
4.   Mounting Surface Thickness 1 to 8 m (0.039" to 0.315")
5.   Spring-Lock Washer B4 DIN127 Form B
6.   Nut M4 DIN934

2.2.3.2   Field Bus Device
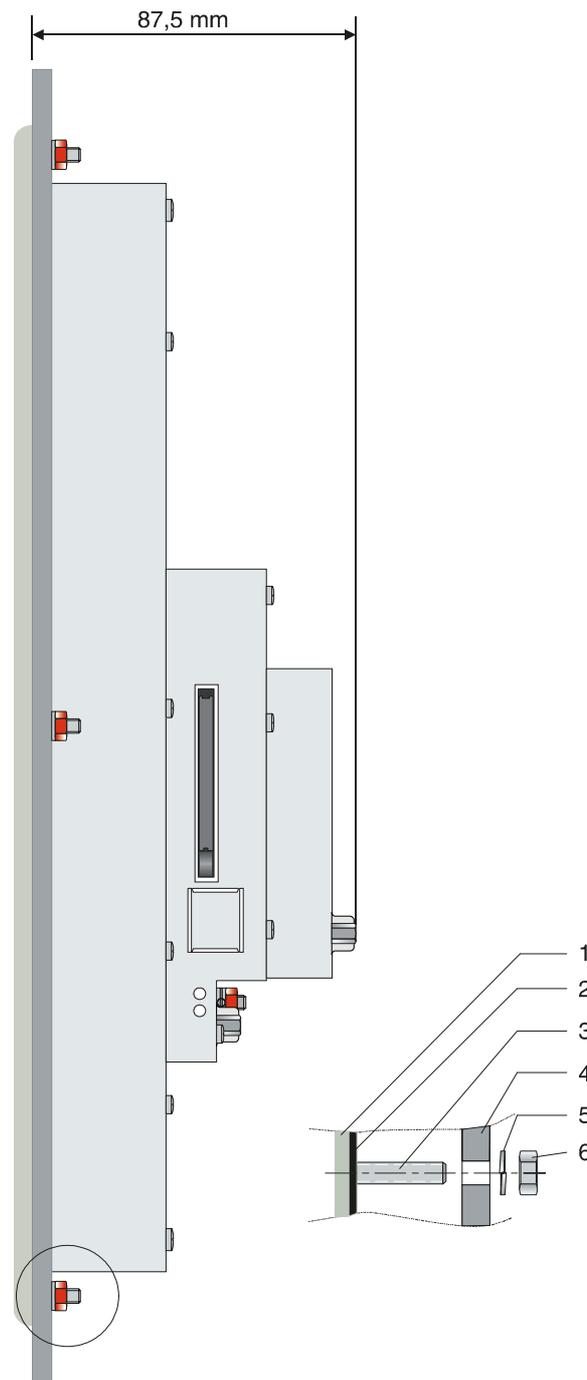
Figure 2-4   Side view and mounting depth for the field bus device

1. Front Panel
2. Circumferential Seal
3. Press-in Threaded Bolt M4 x 18 mm (0.709")
4. Mounting Surface Thickness 1 to 8 mm (0.039" to 0.315")
5. Spring-Lock Washer B4 DIN127 Form B
6. Nut M4 DIN934

2.3   Connecting the Device

2.3.1   Supply Voltage

The supply voltage is supplied via connector X1.A.

The device can optionally be equipped with an additional connector (X1.B). In this case, X1.A is looped through to X1.B and can be used to provide power supply to other components (e.g. bus node). The pin assignment is the same for both connectors.

The maximum continuous current allowed to flow from connector X1.A to X1.B is 5 A. To avoid an overload, an external protection must be installed (e.g. fusible cut-out).

The device has reverse polarity protection. In case of wrong polarity, the device will not operate.

This is a protection class I device. For safe operation, safety extra-low voltage (SELV) in accordance with DIN EN 61131 must be used for the supply voltage.

Connector in the terminal: 3 pin connector Phoenix COMBICON MSTBV 2.5/3-GF

Table 2-1   Pin assignment X1.A / X1.B supply voltage

Pin	Designation	Function
1	⏚	Low-Noise Ground
2	0 V	Supply Voltage 0 V
3	24 VDC	Supply Voltage 24 VDC

A suitable female connector strip of the type Phoenix COMBICON MSTB 2.5/3-STF is supplied.

Cables with finely stranded conductors with a cross-section of up to 2.5 mm² (14 AWG) can be used.

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!**

Use the following procedure to connect the device to the supply voltage:

1. Strip approx. 30 mm (1.181") off the outer cable sheath and approx. 5 mm (0.197") off the wires.
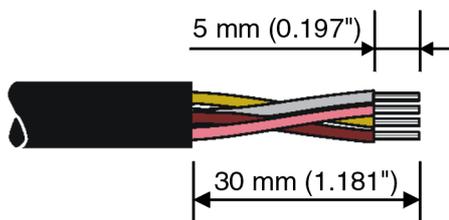
Figure 2-5   Preparing the cable

2. Fit the wires with wire end ferrules and connect the wires to the connector.
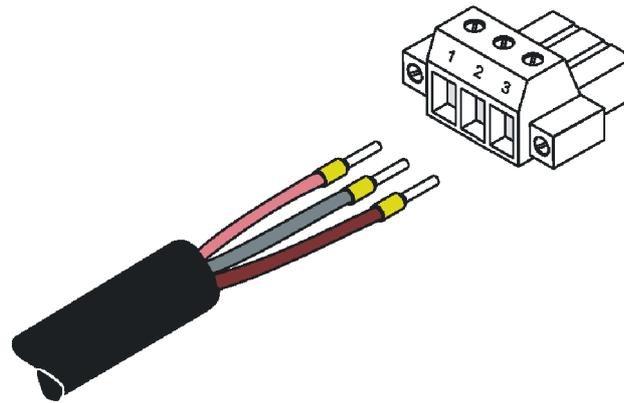
Figure 2-6   Connecting the female connector strip

☞ If shielded connecting cables are used in the supply voltage area, the shield should be connected to pin 1.

3. Plug the female connector strip onto connector X1.A.
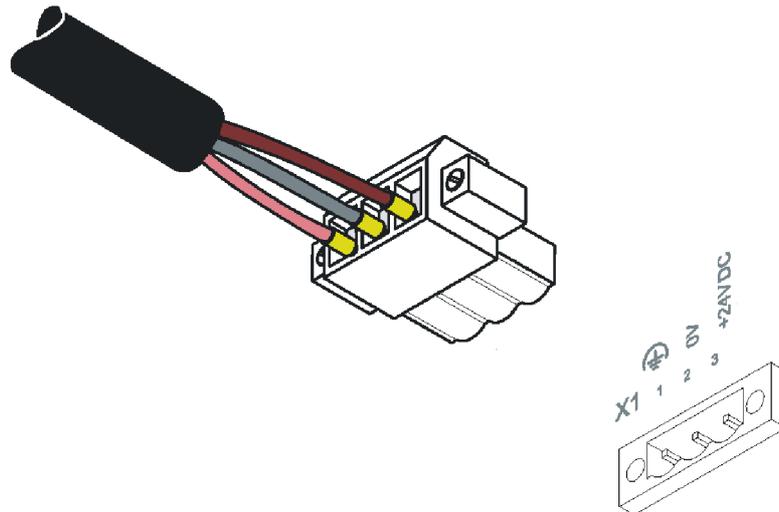
Figure 2-7   Female connector strip is plugged on

4. Secure the female connector strip in place with a screw-type locking to prevent it from slipping out.

⏚ A separate conductor must always be provided for the protective grounding at the threaded bolt. The conductor must have a minimum cross-section of 1.5 mm² (16 AWG) and must be kept as short as possible. Complying with this will increase operating safety.

2.4   Switching the Device on

After you applied the supply voltage, a system test is carried out during which the modules in the operating device are tested and initialized. All status LEDs are activated for a short time. A number of system and error messages can be output by the system test. If the application memory contains a valid project, the first mask, i.e. the Start mask or the mask defined in the TSwin language parameters as the Start-up mask appears on the display. A beep also sounds by the integrated loudspeaker.

This mask is displayed for about 5 seconds. This is a fixed time setting. After this time has elapsed, the Main mask or the mask defined in the language parameters as the Main mask appears on the display. This is the first mask of the operator guidance.

When you touch the display while the Start mask is displayed, the Setup mask appears. In this mask you define the parameters for the interfaces and the operating terminal.

2.5   Identification

You identify the operating device with the nameplate on the rear.
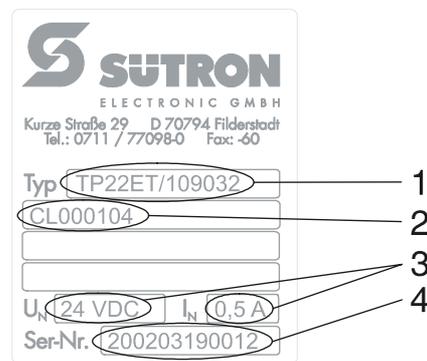
Figure 2-8   Nameplate

1.   Order Number
2.   Firmware version (Version on delivery)
3.   Voltage and Current
4.   Serial number

You can read the following information during the initialization of the operating device: Clock frequency, application memory size, current firmware version, TSwin version, project name, time, date, number of translation runs and a random number.

Because the initialization mask is visible only few seconds there is a possibility to represent the firmware level for a longer time period.

1.   Hold down an arbitrary key at the operating device to generate an error message.
2.   Read the firmware version now.
3.   Release the key to complete the initialization procedure of the operating device.

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3   Control and Display Elements

3.1   Keyboard

The keys are positioned under an environmental-proof polyester foil. You project the operating principle of the keys in TSwin.
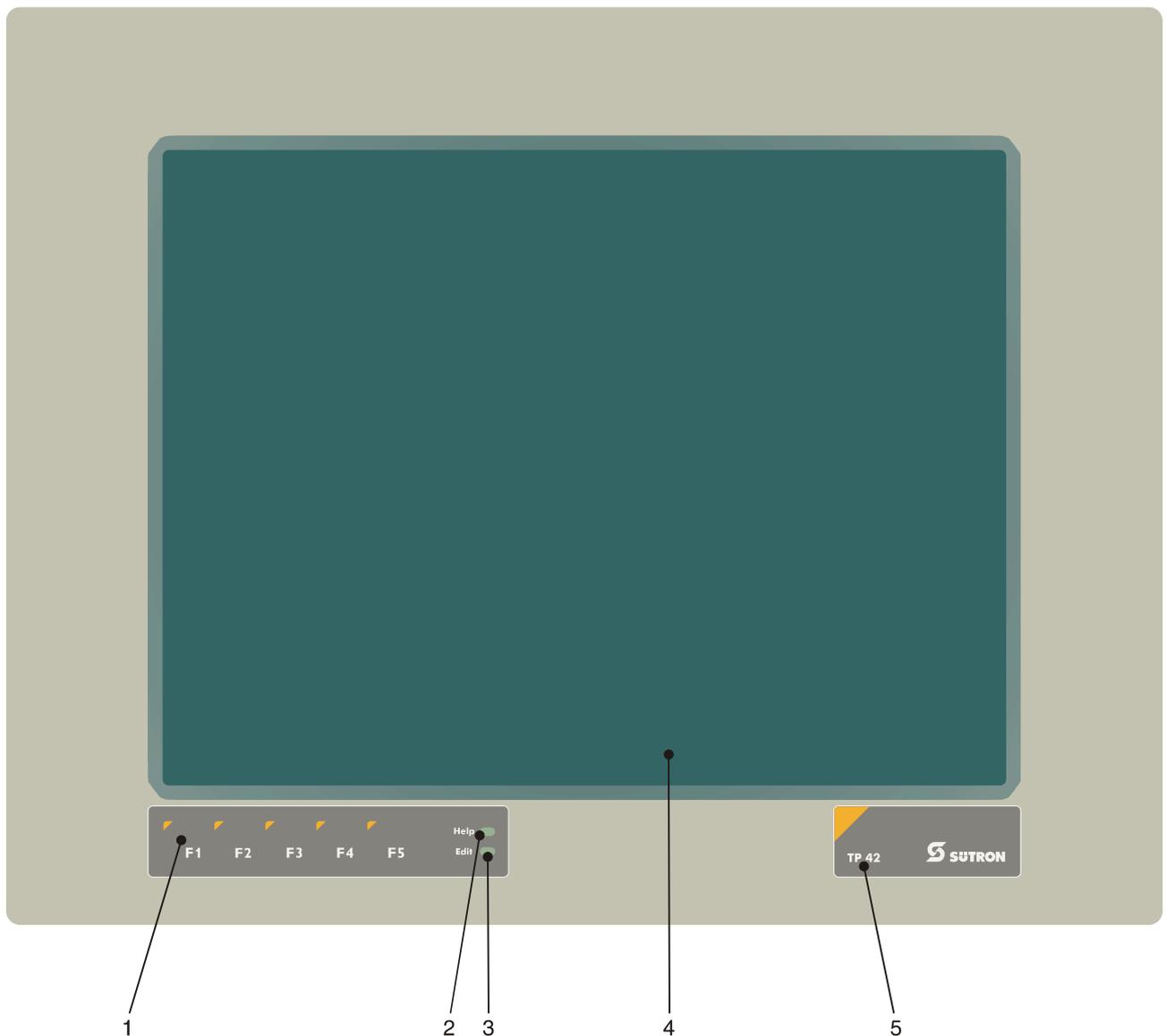
Figure 3-1   Front view

1. Function Keys F1 to F5
2. Status LED, Help
3. Status LED, Edit
4. Display
5. Device Designation

3.1.1 Function Keys

The function of the keys **F1 to F5** is freely assignable (with soft key functions). The function keys can be used either as direct keys for menu control or for triggering a function in the controller.

3.1.2 Status LEDs

The following status LEDs are at the operating device:

Help　　　Indicates an upcoming system message

Edit　　　Indicates the editing mode

3.2 Touch

The device is equipped with a resistive 4 wire touch screen. With this touch screen you operate the device.

To protect the touch screen you can use special protection foils. You receive a corresponding protection foil directly from Sütron electronic (order no. 27291.000).

3.3 User Mode Switch

The user mode switch is installed at the rear of the operating device.

The switch positions for ON or OFF are shown on the user mode switch.

Table 3-1　　　User mode switch

S1	S2	S3	S4	Operating mode
I	X	–	–	Standard mode with PLC (default upon delivery)
I	X	I	–	Standard mode without PLC
I	–	–	I	Activate download (erases the application memory) and default contrast / brightness setting
I	–	I	I	Activate upload
–	–	–	–	Calibration mask is called-up on start-up
–	–	I	–	Calibration mask is called-up on start-up and the calibration process is started immediately

Legend for table:

I = Switch ON

– = Switch OFF

X = Any switch position

3.4   Reset Key

The reset key is located on the rear of the device. You can use this key to restart the device.

3.5   Display

If the display is damaged, avoid touching, swallowing or breathing in the liquids or gases which may leak out. **Danger - Toxic. Danger - Corrosive.**

The device is equipped with a TFT display.

3.5.1   Brightness Setting

To define the brightness setting, set up the system variable **LcdBackLight** in any mask within TSwin.

To do so, follow the instructions listed in the TSwin help topic „How do I specify the contrast / brightness setting for the operating terminal".

In TSwin, enter the following values as lower and upper limits for the representation type.

Table 3-2   Values for representation type

System Variable	Lower Limit	Upper Limit	Default Setting
LcdBackLight	0	+ 15	+ 8

If you do not configure the system variable **LcdBackLight**, the default setting is used when the device is initialized.

If you did set up the system variable, you can set the brightness as follows. Enter the mask where you set up the system variable and:

1. Press the brightness button.
2. Enter a new value for the brightness. To do so, use the keyboard shown on the screen.
3. Confirm with Enter.

The new brightness setting becomes effective immediately after the Enter key is pressed. If necessary, repeat the steps two and three until you are satisfied with the brightness.

3.5.2   Default Brightness Setting

If the contrast / brightness setting is such that it is no longer possible to read the masks, you can use the user mode switch to reset the contrast / brightness to the default value.

For the table with the switch positions of the user mode switch, see chapter „User Mode Switch".

The switch position for the default contrast / brightness is identical with the „Activate download via hardware". The contrast / brightness is reset before a corresponding message is displayed. The warning will be displayed in a legible manner.

To restore the default contrast / brightness:

1. Switch the device off.
2. Set the switches S1 and S4 of the user mode switch to ON.
3. Switch the device on again.
4. When the warning appears, switch the device off again.
5. Set switch S4 to OFF.
6. Then switch the device on again.

The application will not be lost.

3.5.3   Character Attributes

The following character attributes can be displayed on the device:
– Normal
– Underlined
– Foreground / background color

3.5.4   Fonts

You are able to use the Windows character sets. Further you can use the font "Normal" and the font "Zoom" or create and use your own character sets.

Table of Contents of Chapter 4

4 Interfaces of the Device

The device can either be supplied as a standard device or field bus device.

The universal interface X3 combines several interface standards in one connector. The connector is divided into two channels. The communication channel (SER1) is operated separately from the channel for the upload/download/logging printer/scanner (SER2).

For the communication channel (SER1), the protocol-specific use only allows one of the three interface standards to be used.

Depending on the device variant, several interfaces are available to you:

Table 4-1   Device variants

Order number	Available interfaces							
	RS232c (X3-SER2)	TTY / 20mA, RS485, RS232c (X3-SER1)	CAN Bus	DeviceNet	INTERBUS	INTERBUS OPC LWL	MPI	PROFIBUS-DP
TP52Ex/10xxxx	X	X	-	-	-	-	-	-
TP52Ex/09xxxx	X	-	X	-	-	-	-	-
TP52Ex/19xxxx	X	-	-	X	-	-	-	-
TP52Ex/06xxxx	X	-	-	-	X	-	-	-
TP52Ex/20xxxx	X	-	-	-	-	X	-	-
TP52Ex/16xxxx	X	-	-	-	-	-	X	-
TP52Ex/08xxxx	X	-	-	-	-	-	-	X

4.1　Standard Interfaces
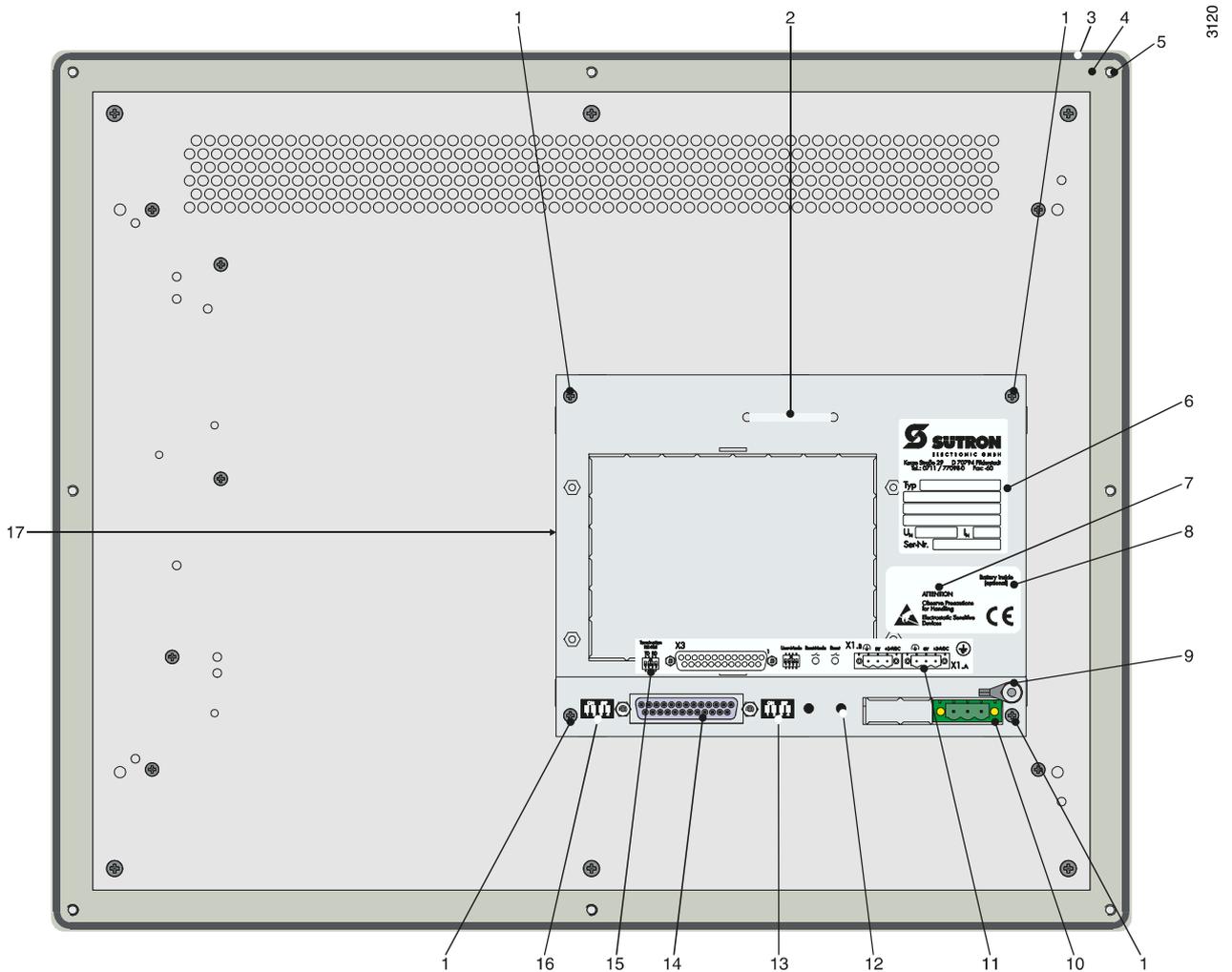
Figure 4-1　　　Rear view standard device

1. Fastening Screw
2. Cable Fastener for Battery
3. Seal
4. Front Panel
5. Mounting Bolt
6. Nameplate
7. Warning
8. Battery Information
9. Threaded Bolt for Protective Grounding
10. Connector X1.A (Supply Voltage)
11. Assignment Connector X1.A
12. Reset Key
13. User Mode Switch
14. Female Connector X3 (TTY/RS485/RS232c)
15. Pin Assignment for Termination Switch (X3-SER1 RS485)
16. Termination Switch (X3-SER1 RS485)
17. Compact Flash, Inserted on the Side (Option)

4.1.1   TTY / 20 mA Current Loop (SER1)

Depending on the wiring, it is possible to connect the interface X3 SER1 TTY / 20 mA either as an active or passive current loop. The transmit line and the receive line are each provided with a separate 20 mA current source. The compliance voltage is approx. 24 VDC.

The 20 mA current should be supplied via the transmitter unit. This decreases crosstalk on the signal lines considerably.

In idle state (signal logic 1), a 20mA current loop can be measured in the cable.

Signal Logic 1   Current Flow 20 mA

Signal Logic 0   Current Flow Interrupted

For the operation of channel SER1 as a current loop, the **termination** for the RS485 must be **deactivated**.

Connector in the terminal: 25 pin D-SUB female connector strip.

Table 4-2   Pin assignment X3 SER1 TTY / 20 mA, passive

Pin	Designation	Function
10	T+	Transmitted Data, Positive Polarity
13	R+	Received Data, Positive Polarity
14	R-	Received Data, Negative Polarity
19	T-	Transmitted Data, Negative Polarity

Table 4-3   Pin assignment X3 SER1 TTY / 20 mA, active

Pin	Designation	Function
10	T+	Transmitted Data, Positive Polarity
12	S1+	Power Source 1, Positive Polarity
13	R+	Received Data, Positive Polarity
14	R-	Received Data, Negative Polarity
16	S2+	Power Source 2, Positive Polarity
19	T-	Transmitted Data, Negative Polarity
21	S1-	Current Sink 1, Negative Polarity
24	S2-	Current Sink 2, Negative Polarity

4.1.2 RS485 (SER1)

The X3 SER1 RS485 interface is suitable for point-to-point and for multiple-point connections.

The wires belonging together are marked with „A" and „B". Some descriptions refer to the pins with „-" and „+", where A = - and B = +.

Signal Logic 1 $U_A - U_B <= -0.3$ V i.e. $(U_A < U_B)$

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

For point-to-point connections, always activate the termination. For multi-point connections, only activate the termination at the cable end.

The switch positions for ON or OFF are shown on the user mode switch. Only the given switch positions are permitted.

Table 4-4   Termination switch

S1	S2	S3	S4	Function
I	I	I	I	Termination is on
–	–	–	–	Termination is off

Legend for table:

I = Switch ON

– = Switch OFF

Connector in the terminal: 25 pin D-SUB female connector strip.

Table 4-5   Pin assignment X3 SER1 RS485

Pin	Designation	Function
8	T(A)	Transmitted Data (-)
9	T(B)	Transmitted Data (+)
11	SGND	Signal Ground
22	R(A)	Received Data (-)
23	R(B)	Received Data (+)

4.1.3   RS232c (SER1)

The interface X3 SER1 RS232c is suitable to establish a point-to-point connection.

Connector in the terminal: 25 pin D-SUB female connector strip.

Table 4-6   Pin assignment X3 SER1 RS232c

Pin	Designation	Function
6	TD	Transmitted Data
15	CTS	Clear to Send
17	RTS	Request to Send
18	RD	Received Data
25	SGND	Signal Ground

4.1.4   RS232c (SER2)

The interface X3 SER2 RS232c is designed to be used for downloads, uploads, a scanner or a logging printer.

Connector in the terminal: 25 pin D-SUB female connector strip.

Table 4-7   Pin assignment X3 SER2 RS232c

Pin	Designation	Function
1	⏚	Low-Noise Ground
2	TD	Transmitted Data
3	RD	Received Data
4	RTS	Request to Send
5	CTS	Clear to Send
7	SGND	Signal Ground
20	DTR	Data Transfer Request

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4.2   Field Bus Interfaces

4.2.1   CAN Bus

The opto-decoupled interfaces X2.1 and X2.2 for CAN bus connections are available
to integrate the device into a CAN structure. The CAN bus is designed as a high
speed bus in accordance with ISO-DIS 11898.
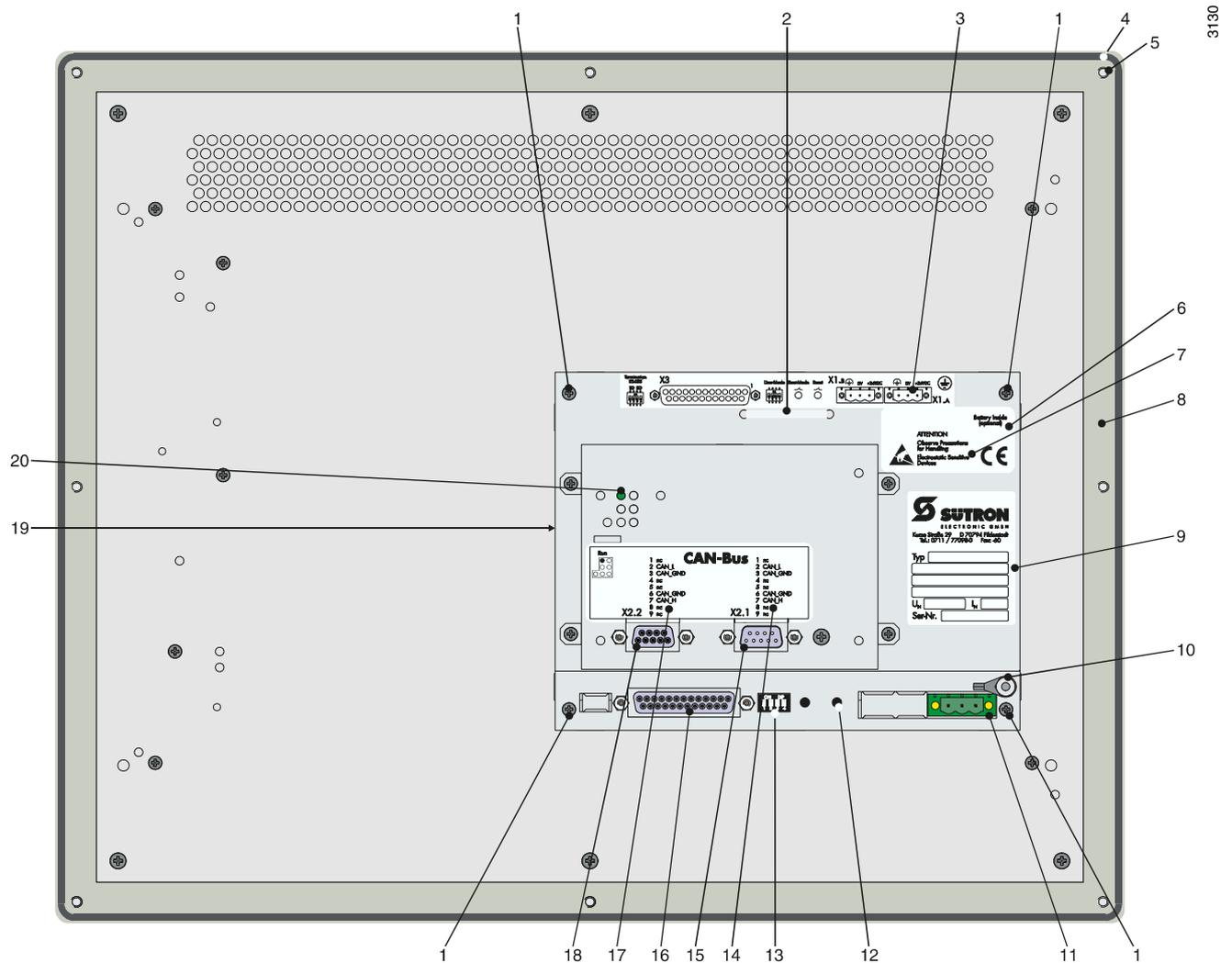
Figure 4-2   Rear view CAN bus

1. Fastening Screw
2. Cable Fastener for Battery
3. Assignment Connector X1.A (Supply Voltage)
4. Seal
5. Mounting Bolt
6. Battery Information
7. Warning
8. Front Panel
9. Nameplate
10. Threaded Bolt for Protective Grounding
11. Connector X1.A (Supply Voltage)
12. Reset Key
13. User Mode Switch
14. Assignment Connector X2.1 (CAN Bus)
15. Connector X2.1 (CAN Bus)
16. Female Connector X3 (SER2 RS232c)
17. Assignment Female Connector X2.2 (CAN Bus)
18. Female Connector X2.2 (CAN Bus)
19. Compact Flash, Inserted on the Side (Option)
20. Diagnostics LED

Terminate the CAN bus at both ends by terminating resistors.

Connector in the terminal: 9 pin D-SUB male and female connector strip (assignment for male and female connector strip is the same.)

Table 4-8   Pin assignment X2.1 / X2.2 CAN bus

Pin	Designation	Function
1	nc	Not Connected
2	CAN_L	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	CAN_H	CAN_H Bus Line (Dominant HIGH)
8	nc	Not Connected
9	nc	Not Connected

All signal lines are looped through from X2.1 to X2.2. The connecting cables should be connected to every pin, including the reserved pins. In this way, the cables can still be used in case of future bus specification extensions.

A shielded twisted-pair cable (cable type LiYCY-TP) must be used.

A diagnostics LED is located at the rear of the operating device. The LED shows the states of the bus system.

Figure 4-3   Arrangement of the CAN diagnostics LED

The diagnostics LED at the operating device has the following functions:

Table 4-9   Function of the CAN diagnostics LED

Color	State	Function
Green	Off	Terminal Disconnected from Bus
Green	On	Communication Active
Green	Flashing	Sporadic Bus Error

4.2.2   DeviceNet

The opto-decoupled interfaces X2.1 and X2.2 are available to integrate the device into a CAN structure. The CAN bus is designed as a high speed bus in accordance with ISO-DIS 11898.
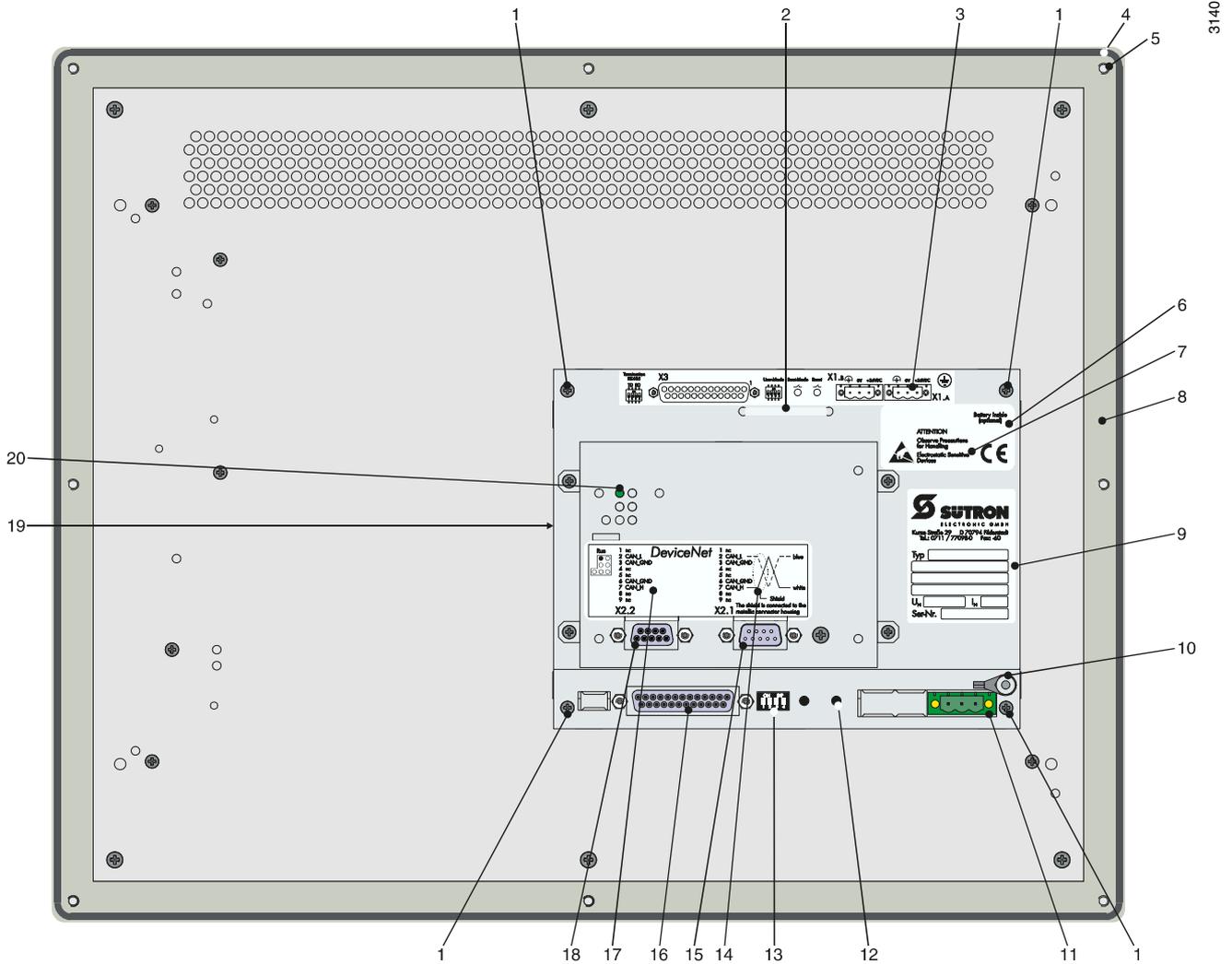
Figure 4-4   Rear view DeviceNet

1. Fastening Screw
2. Cable Fastener for Battery
3. Assignment Connector X1.A (Supply Voltage)
4. Seal
5. Mounting Bolt
6. Battery Information
7. Warning
8. Front Panel
9. Nameplate
10. Threaded Bolt for Protective Grounding
11. Connector X1.A (Supply Voltage)
12. Reset Key
13. User Mode Switch
14. Connector X2.1 (DeviceNet)
15. Assignment Connector X2.1 (DeviceNet)
16. Female Connector X3 (SER2 RS232c)
17. Female Connector X2.2 (DeviceNet)
18. Assignment Female Connector X2.2 (DeviceNet)
19. Compact Flash, Inserted on the Side (Option)
20. Diagnostics LED

Terminate the CAN bus at both ends by terminating resistors.

Connector in the terminal: 9 pin D-SUB male and female connector strip (assignment for male and female connector strip is the same.)

Table 4-10   Pin assignment X2.1 / X2.2 CAN bus

Pin	Designation	Function
1	nc	Not Connected
2	CAN_L	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	CAN_H	CAN_H Bus Line (Dominant HIGH)
8	nc	Not Connected
9	nc	Not Connected

All signal lines are looped through from X2.1 to X2.2. The connecting cables should be connected to every pin, including the reserved pins. In this way, the cables can still be used in case of future bus specification extensions.

A shielded twisted-pair cable (cable type LiYCY-TP) must be used.

A diagnostics LED is located at the rear of the operating device. The LED shows the states of the bus system.

Figure 4-5   Arrangement of the CAN diagnostics LED

The diagnostics LED at the operating device has the following functions:

Table 4-11   Function of the CAN diagnostics LED

Color	State	Function
Green	Off	Terminal Disconnected from Bus
Green	On	Communication Active
Green	Flashing	Sporadic Bus Error

4.2.3   INTERBUS

The device can be integrated into the INTERBUS using the interfaces X2.1 and X2.2 available for INTERBUS connections.
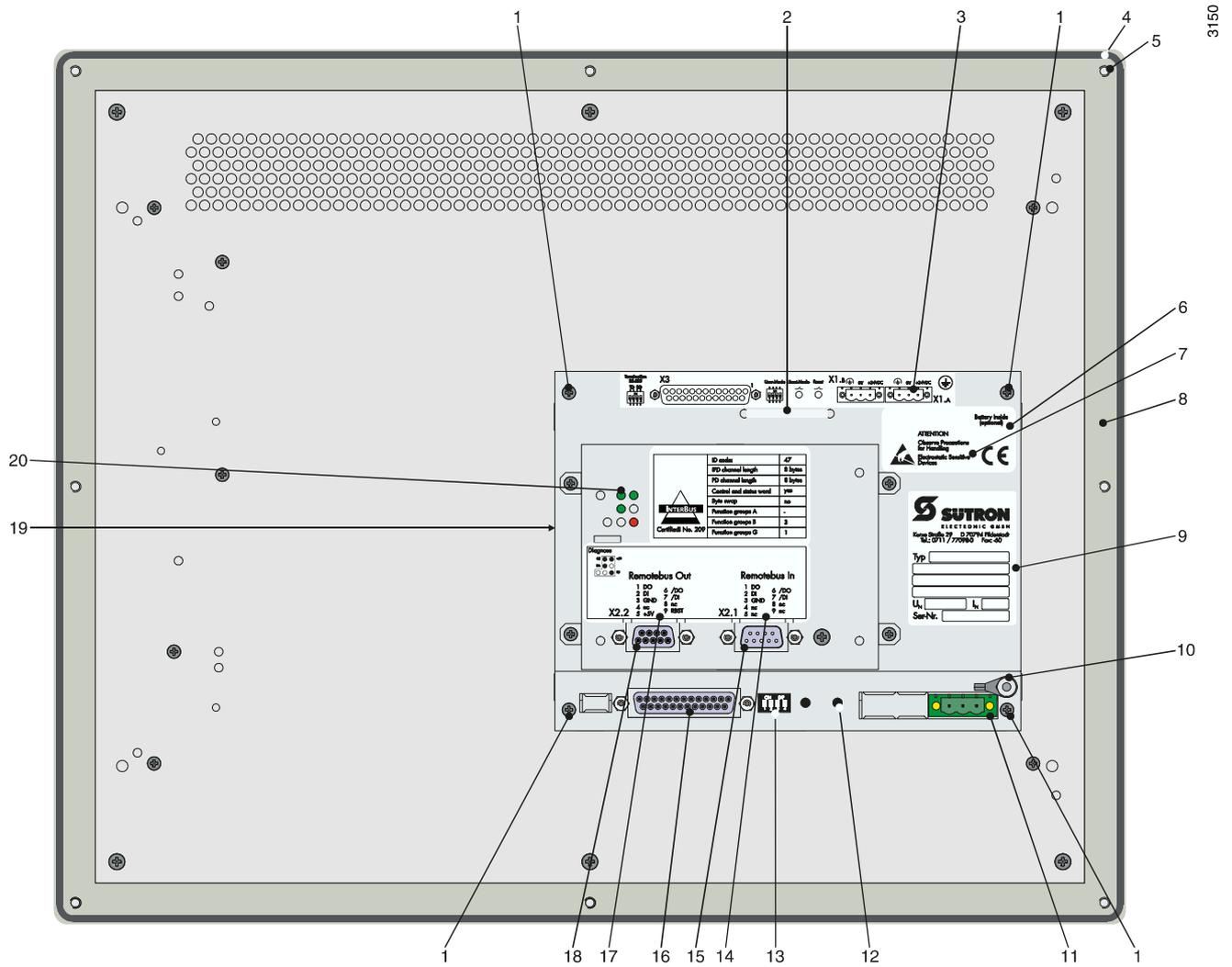
Figure 4-6   Rear view INTERBUS

1. Fastening Screw
2. Cable Fastener for Battery
3. Assignment Connector X1.A (Supply Voltage)
4. Seal
5. Mounting Bolt
6. Battery Information
7. Warning
8. Front Panel
9. Nameplate
10. Threaded Bolt for Protective Grounding
11. Connector X1.A (Supply Voltage)
12. Reset Key
13. User Mode Switch
14. Assignment Connector X2.1 (Remote Bus In)
15. Connector X2.1 (Remote Bus In)
16. Female Connector X3 (SER2 RS232c)
17. Assignment Female Connector X2.2 (Remote Bus Out)
18. Female Connector X2.2 (Remote Bus Out)
19. Compact Flash, Inserted on the Side (Option)
20. Diagnostics LEDs

Connector in the terminal: 9 pin D-SUB male connector strip for **remote bus in**

Table 4-12   Pin assignment X2.1 remote bus in (INTERBUS)

Pin	Designation	Function
1	DO	Data Output
2	DI	Data Input
3	GND	Ground
4	nc	Not Connected
5	nc	Not Connected
6	/DO	Data Output, Inverted
7	/DI	Data Input, Inverted
8	nc	Not Connected
9	nc	Not Connected

Connector in the terminal: 9 pin D-SUB female connector strip for **remote bus out**

Table 4-13   Pin assignment X2.2 remote bus out (INTERBUS)

Pin	Designation	Function
1	DO	Data Output
2	DI	Data Input
3	GND	Ground
4	nc	Not Connected

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Table 4-13   Pin assignment X2.2 remote bus out (INTERBUS)

Pin	Designation	Function
5	+5 V	Power Supply +5 VDC
6	/DO	Data Output, Inverted
7	/DI	Data Input, Inverted
8	nc	Not Connected
9	RBST	Remote Bus Status

A shielded twisted-pair cable (cable type LiYCY-TP) must be used. The maximum cable length depends on its use within the INTERBUS topology.

The diagnostics LEDs are located at the rear of the operating device. The LEDs show the states of the bus system.
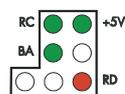
Figure 4-7   Arrangement of the INTERBUS diagnostics LEDs

The diagnostics LEDs at the operating device has the following functions:

Table 4-14   Functions of the INTERBUS diagnostics LEDs

Designation	Color	State	Function
RC	Green	On	Remote Bus Check
+5 V	Green	On	Supply Voltage OK
		Off	No Supply Voltage
BA	Green	On	Bus Active
		Off	Bus Not Active
RD	Red	On	Remote Bus Inactive

4.2.4   INTERBUS OPC LWL

The device can be integrated into an INTERBUS device bus using the interfaces available for INTERBUS OPC LWL connection.
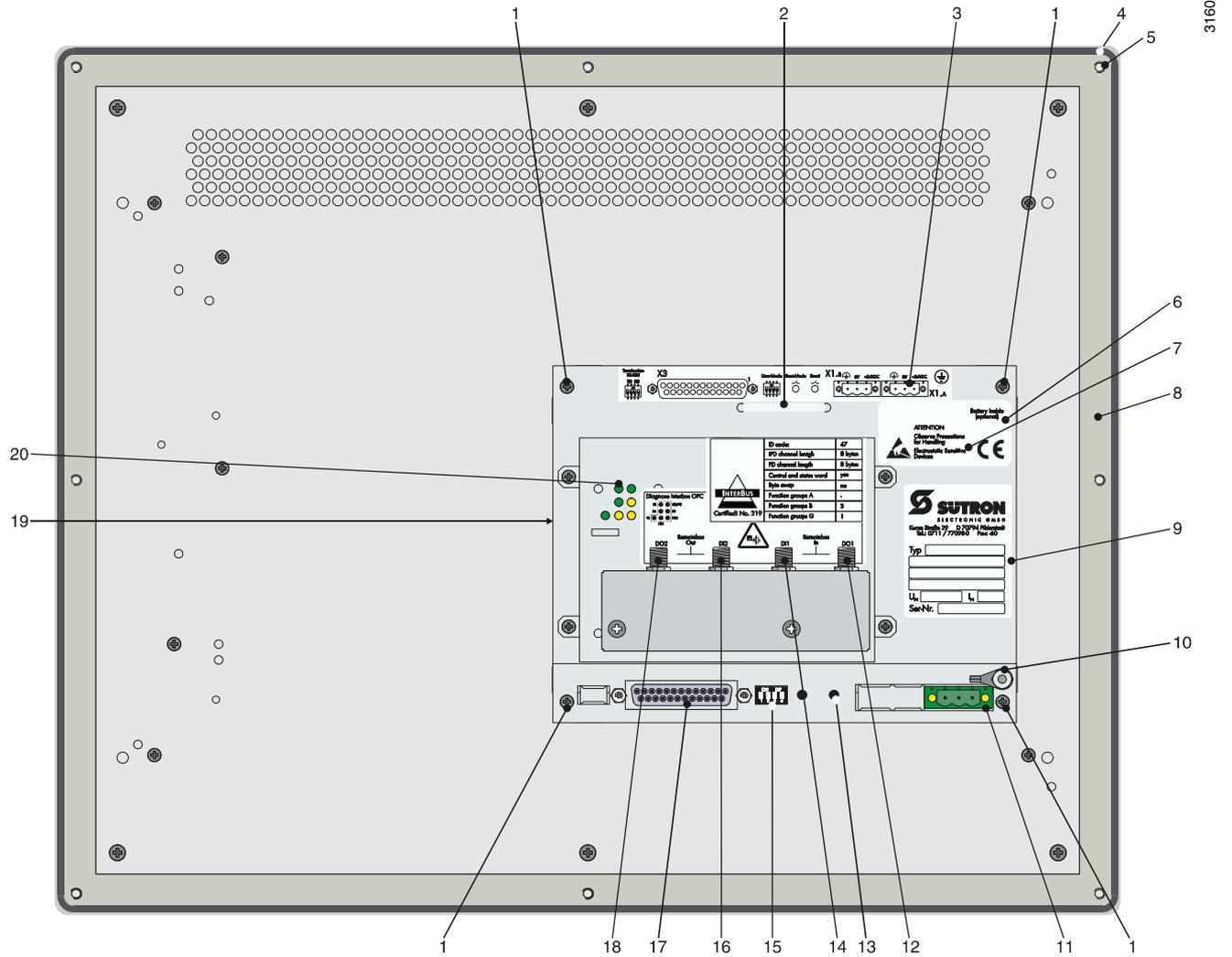
Figure 4-8   Rear view INTERBUS OPC LWL

1. Fastening Screw

2. Cable Fastener for Battery

3. Assignment Connector X1.A (Supply Voltage)

4. Seal

5. Mounting Bolt

6. Battery Information

7. Warning

8. Front Panel

9. Nameplate

10. Threaded Bolt for Protective Grounding

11. Connector X1.A (Supply Voltage)

12. Optical Fiber Interface DO1 (Remote Bus In)

13. Reset Key

14. Optical Fiber Interface DI1 (Remote Bus In)

15. User Mode Switch

16. Optical Fiber Interface DI2 (Remote Bus Out)

17. Female Connector X3 (SER2 RS232c)

18. Optical Fiber Interface DO2 (Remote Bus Out)

19. Compact Flash, Inserted on the Side (Option)

20. Diagnostics LEDs

Never look directly into the open end of an optical fiber cable. **Infrared light can cause damage to the retina of the eye.** Fit the open ends of an optical fiber cable and the connections with protective caps. Wear protective goggles.

The sending and receiving units can be rendered unusable by dirt accumulation. For this reason, place protective caps onto the connections when the units are not used or are transported! Wear protective goggles.

The optical fiber interface is designed as a FSMA type 905.

Table 4-15   Assignment DO1, DI1, DO2, DI2 (INTERBUS OPC LWL)

Designation	Function
DO1	Remote Bus In
DI1	Remote Bus In
DO2	Remote Bus Out
DI2	Remote Bus Out

The cables are connected in accordance with the "INTERBUS Fiber Optic Installation Guidelines".

Suitable for optical transmission is a dielectric waveguide with step index refractive index profile - a polymer fiber with a core diameter of 980 µm and a cladding diameter of 1000 µm. The F-SMA connector is specified in IEC 874-2 or in DIN 47258, respectively.

The maximum distance between two remote bus users is 50 m (164.042 ft.).

The diagnostics LEDs are located at the rear of the operating device. The LEDs show the states of the bus system.
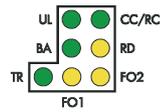
2220

Arrangement of the INTERBUS OPC LWL diagnostics LEDs

The diagnostics LEDs at the operating device has the following functions:

Table 4-16   Functions of the INTERBUS OPC LWL diagnostics LEDs

Designation	Color	State	Function
UL	Green	On	Supply Voltage OK
		Off	No Supply Voltage
CC/RC	Green	On	Remote Bus Cable Check
BA	Green	On	Bus Active
		Off	Bus Not Active
RD	Yellow	On	Remote Bus Inactive
TR	Green	On	PCP Active
		Off	PCP Not Active
FO1	Yellow	On	Incoming Optical Fiber Path Not OK
		Off	Incoming Optical Fiber Path OK
FO2	Yellow	On	Outgoing Optical Fiber Path Not OK
		Off	Outgoing Optical Fiber Path OK

4.2.5   MPI

The device can be integrated into a Siemens MPI bus structure using the interface X2 available for Siemens MPI connections.
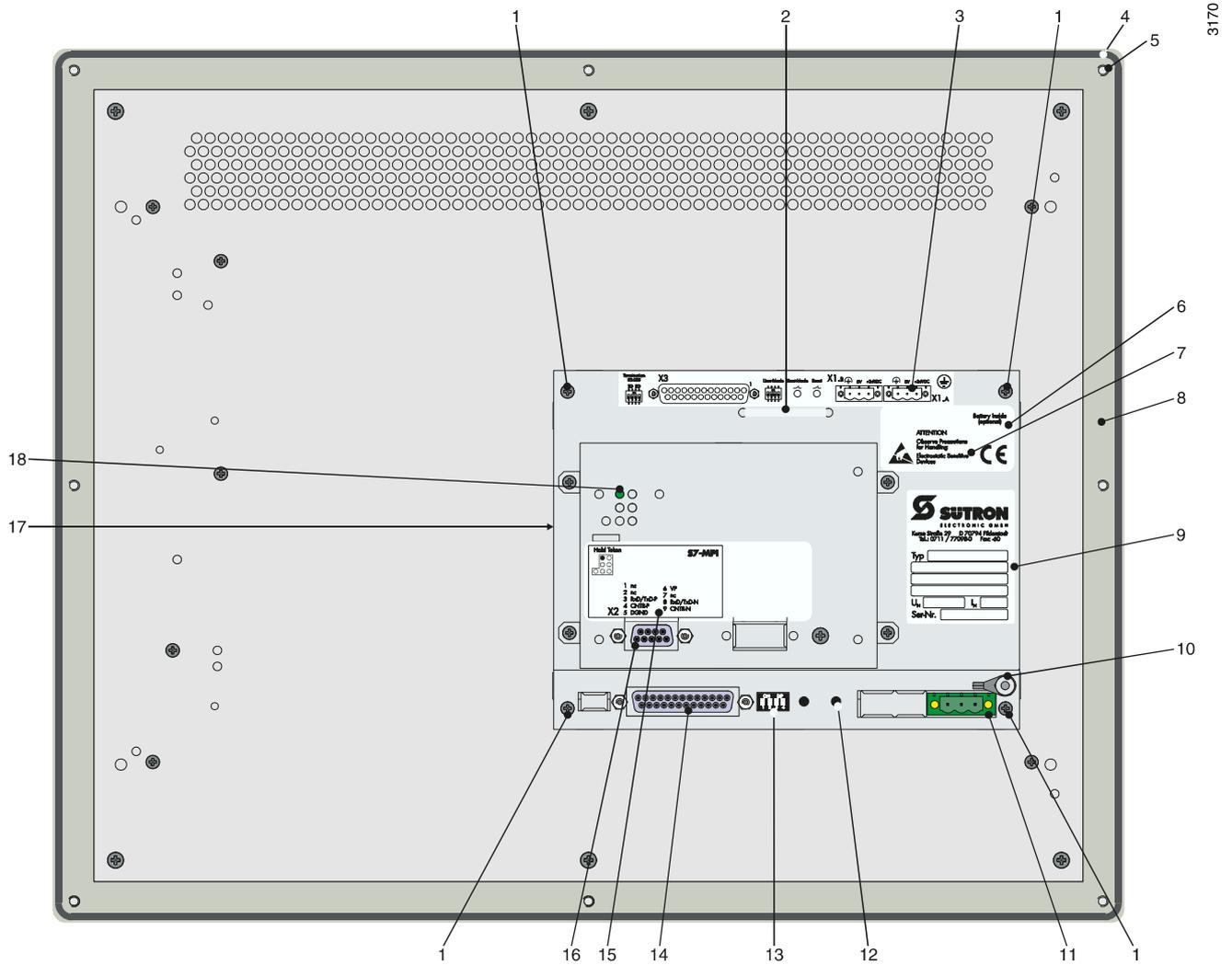
Figure 4-9   Rear view MPI

1. Fastening Screw

2. Cable Fastener for Battery

3. Assignment Connector X1.A (Supply Voltage)

4. Seal

5. Mounting Bolt

6. Battery Information

7. Warning

8. Front Panel

9. Nameplate

10. Threaded Bolt for Protective Grounding

11. Connector X1.A (Supply Voltage)

12. Reset Key

13. User Mode Switch

14. Female Connector X3 (SER2 RS232c)

15. Assignment Female Connector X2 (MPI)

16. Female Connector X2 (MPI)

17. Compact Flash, Inserted on the Side (Option)

18. Diagnostics LED

The bus line is terminated at the connector.
For point-to-point connections, always activate the termination. For multi-point connections, only activate the termination at the cable end. For spur lines, always deactivate the termination.

Connector in the terminal: 9 pin D-SUB female connector strip

Table 4-17   Pin assignment X2 MPI

Pin	Designation	Function
1	nc	Not Connected
2	nc	Not Connected
3	RxD/TxD-P	Received Data / Transmitted Data Plus
4	CNTR-P	Repeater Control Signal Plus
5	DGND	Data Transmission Potential
6	VP	Supply Voltage of Terminators Plus
7	nc	Not Connected
8	RxD/TxD-N	Received Data / Transmitted Data Minus
9	CNTR-N	Repeater Control Signal Minus

Any cable that conforms with the following parameters can be used:

– Loop resistance 110 Ohm/km

– Working capacitance 30 nF/km

– Surge impedance 150 Ohm

The maximum length of one segment is 50 m which cannot be exceeded. This 50 m applies from the first node to the last node in the segment. For further information on the installation, please refer to the Siemens manual "SIMATIC S7-400 and M7-400 Programmable Controllers Hardware and Installation, 6ES7498-8AA03-8BA0".

A diagnostics LED is located at the rear of the operating device. The LED shows a state of the bus system.

Figure 4-10   Arrangement of the MPI diagnostics LED

The diagnostics LED at the operating device has the following function:

Table 4-18   Function of the MPI diagnostics LED

Color	State	Function
Green	Flashing	Operating Device has the Token

4.2.6   PROFIBUS-DP

The interface X2 for PROFIBUS-DP connections is available to integrate the device into a PROFIBUS-DP structure.
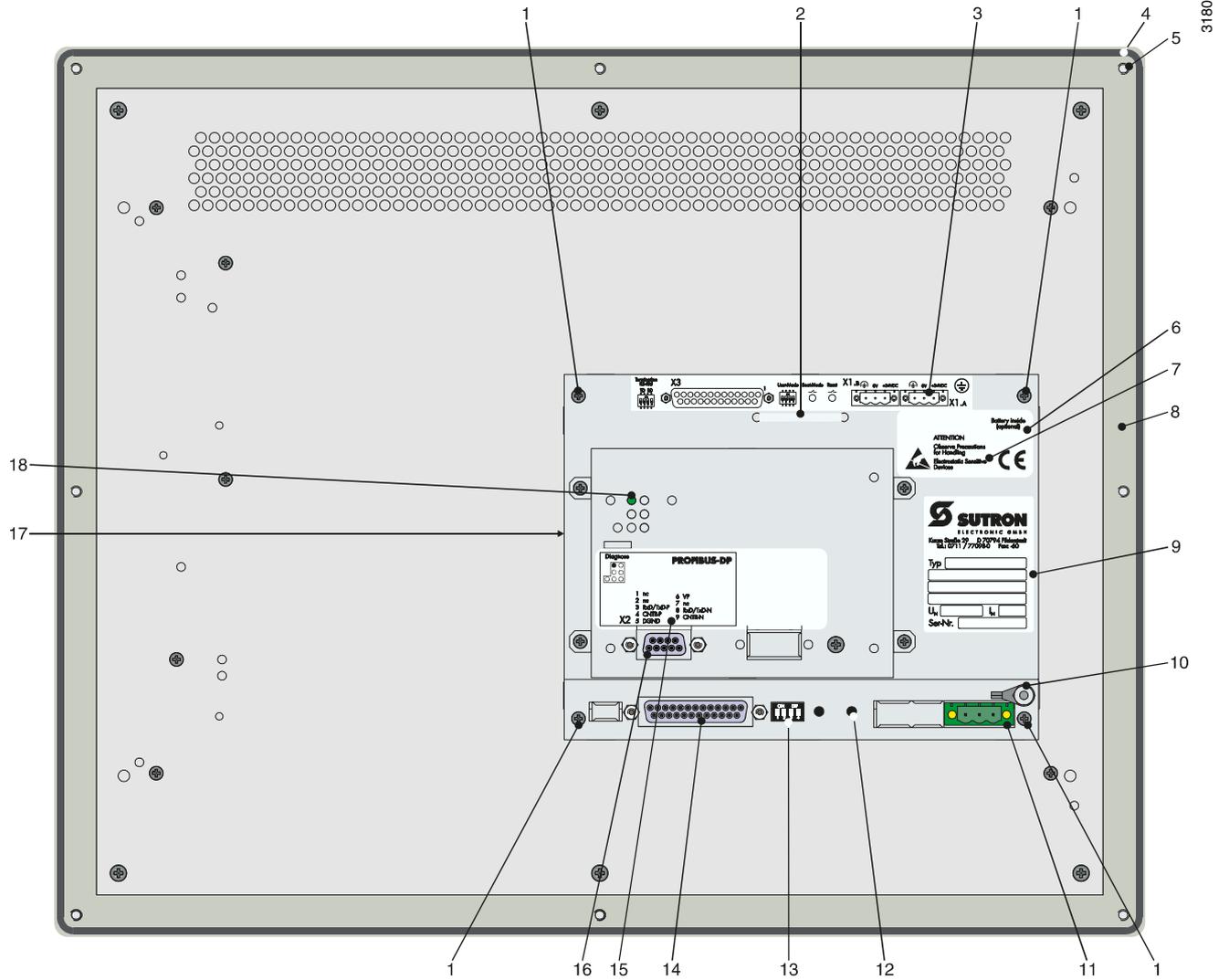
Figure 4-11   Rear view PROFIBUS-DP

1. Fastening Screw
2. Cable Fastener for Battery
3. Assignment Connector X1.A (Supply Voltage)
4. Seal
5. Mounting Bolt
6. Battery Information
7. Warning
8. Front Panel
9. Nameplate
10. Threaded Bolt for Protective Grounding
11. Connector X1.A (Supply Voltage)
12. Reset Key
13. User Mode Switch
14. Female Connector X3 (SER2 RS232c)
15. Assignment Female Connector X2 (PROFIBUS-DP)
16. Female Connector X2 (PROFIBUS-DP)
17. Compact Flash, Inserted on the Side (Option)
18. Diagnostics LED

Connector in the terminal: 9 pin D-SUB female connector

Table 4-19   Pin assignment X2 PROFIBUS-DP

Pin	Designation	Function
1	nc	Not Connected
2	nc	Not Connected
3	RxD/TxD-P	Received Data / Transmitted Data Plus
4	CNTR-P	Repeater Control Signal Plus
5	DGND	Data Transmission Potential
6	VP	Supply Voltage of Terminators Plus
7	nc	Not Connected
8	RxD/TxD-N	Received Data / Transmitted Data Minus
9	CNTR-N	Repeater Control Signal Minus

Basically, any cables specified in the EN 50170 as cable type A can be used.

This allows the following cable lengths depending on the baud rate:

Table 4-20   Cable length PROFIBUS-DP

Baud rate	Cable length (m)
9.6 to 187.5 kBaud	1000
500 kBaud	400
1.5 MBaud	200
3 to 12 MBaud	100

A diagnostics LED is located at the rear of the operating device. The LED shows a state of the bus system.

Figure 4-12   Arrangement of the PROFIBUS-DP diagnostics LED

The diagnostics LED at the operating device has the following function:

Table 4-21   Function of the PROFIBUS-DP diagnostics LED

Color	State	Function
Green	On	Communication Active

4.3   Memory Card (Option)

You can insert a Compact Flash card on the side of your device. The Compact Flash card allows you to exchange projects between the PC and the operating device.

You can recognize the rear side of a Compact Flash card by the notches on each side of the card.


540
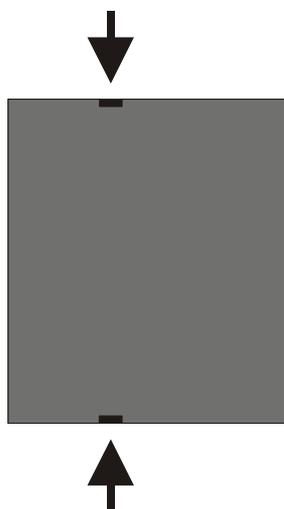
Figure 4-13   Rear view of the memory card

4.3.1   Inserting the Memory Card

When you insert the card from the rear side of the device, make sure the front side of the card is facing up. Insert the card until it snaps into place.


550
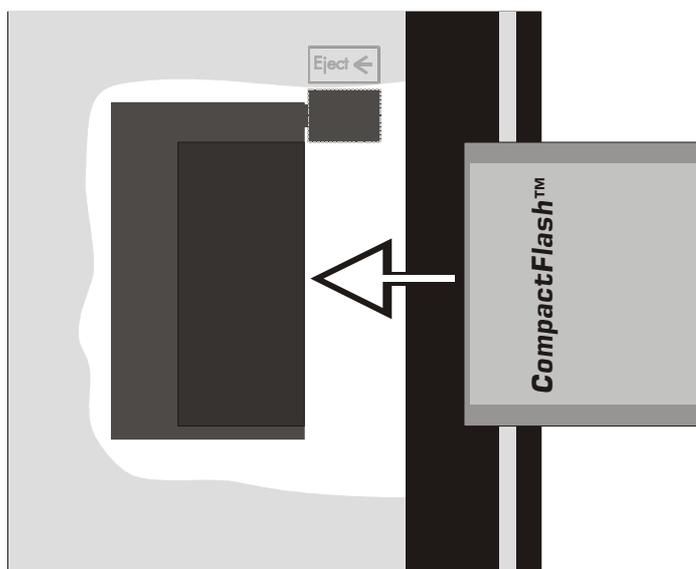
Figure 4-14   Inserting the memory card

4.3.2   Ejecting the Memory Card

To remove the card, press the ejection button.
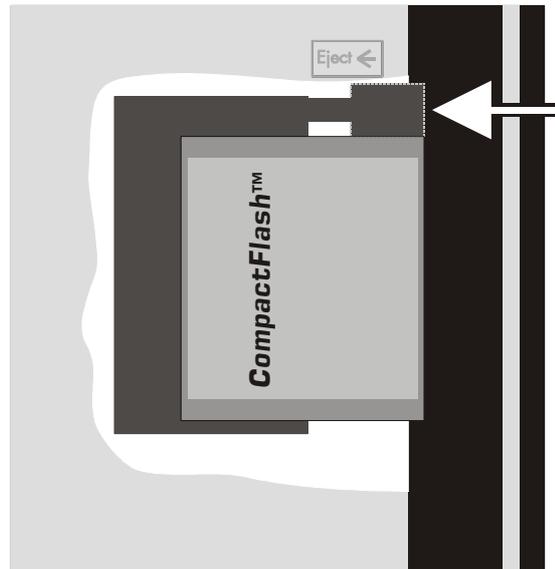

Figure 4-15   Ejecting the memory card

4.3.3   Accessories

You get the following accessories at Sütron electronic:

Table 4-22   Compact Flash accessories

Order No.	Description
81152.000	Compact Flash Card 16 MB
81166.000	Compact Flash Adapter for Laptop
81167.000	Compact Flash Adapter for PC

4.4   Shielding D-SUB Connectors

You must shield D-SUB connectors as follows:
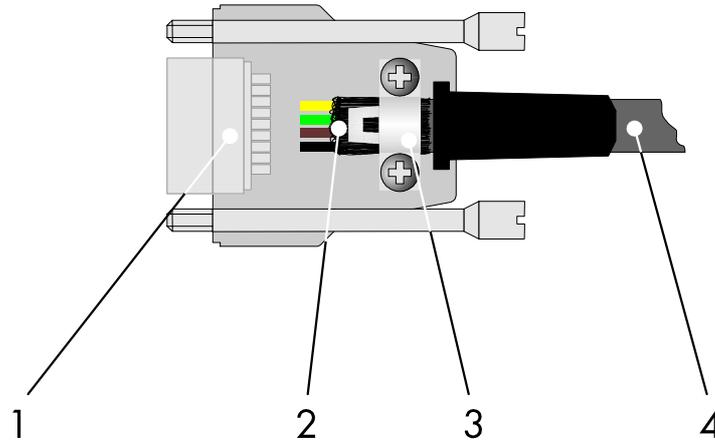

Figure 4-16   Shielding D-SUB connectors

1. D-SUB connector
2. Shield
3. Cable clip
4. Cable

The shield must be folded back into a flat position over the cable sheath.

When fastening the cable with the cable clip, as much of the shielding as possible must be in contact with the housing and sufficient strain relieve must be ensured.

Table of Contents of Chapter 5

5 Maintenance and Servicing

5.1 Front Panel

You should use a damp cloth only to remove any dirt from the panel.

5.2 Fuse

The semiconductor fuse cannot be replaced!

A semiconductor fuse is used to protect the device. Once the fuse has been tripped, the device must be disconnected from the supply voltage to allow the semiconductor fuse to regenerate. At an ambient temperature of 20° C (68° F), the regeneration takes approximately 20 seconds. The higher the ambient temperature, the longer the regeneration takes.

5.3 Battery

The built-in battery preserves the data in the CMOS-RAM and supplies the real-time clock. The minimum battery life is 5 years, even under unfavorable operating conditions. When the battery runs down, the message „Change battery" is generated automatically.

We recommend you change the battery approximately every 4 years as part of the regular maintenance work. A prepared battery including connector can be obtained directly from Sütron electronic (order no. 66757.000).

If the „Change battery" message is detected too late, e.g. the real-time clock stopped or shows the wrong date, data in the CMOS-RAM may have already been lost. For this reason, after changing a battery, always check data such as passwords that can be modified, parameters in the system variables, recipe data sets and entries in the message system.

5.3.1 Changing the Battery

Batteries must only be changed by authorized and trained experts.

Electrostatic discharge can damage electronic components. **Observe the ESD protective measures.**

Do not throw lithium batteries into fire, heat to 100 °C (212 °F) or higher and do not recharge. **Danger - Explosive.**

Do not open lithium batteries. **Danger - Toxic.**

To ensure that the message data and time are preserved, it is possible to change the battery under operating voltage. Observe the safety notes.

1. Remove the threaded bolts of the interfaces (see figure).
2. Remove the screws (see figure) on the rear panel of the device and lift off the enclosure.
3. Remove the cable fastener of the battery.
4. Disconnect the connector from the battery and remove the dead battery.
5. Plug-in the connector of the new battery.
6. Use a cable fastener to attach the new battery to the enclosure.
7. Place the rear panel back onto the device.
8. Carefully tighten the screws of the rear panel and then the threaded bolts of the interfaces.
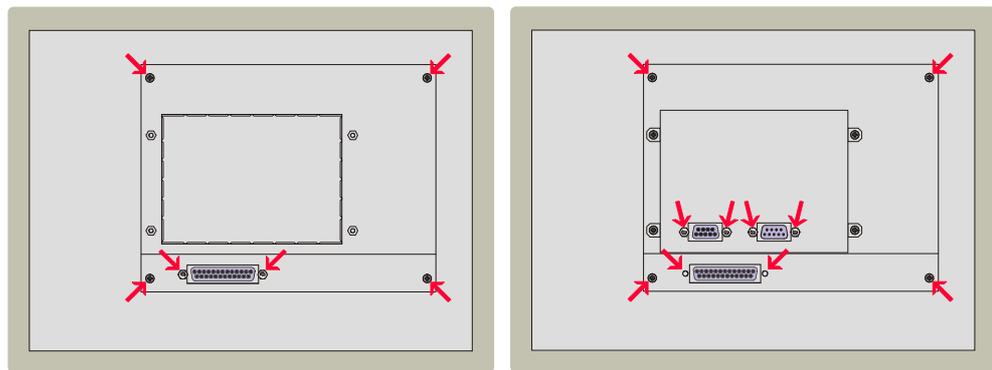
Figure 5-1   Screws at the standard device (left) / field bus device (right)

5.3.2   Battery Disposal

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.

You must always return old batteries to a dealer or to a returns depot set up for this purpose by the public waste disposal body or a licensed battery dealer for recycling. Only dispose of dead batteries in public or commercial collection boxes. The battery is drained when the message „Change battery" appears on the display of the device.

Table of Contents of Chapter 6

6   Technical Data

Table 6-1   Keyboard

Keyboard	
Type	Membrane Keyboard
Number of Keys	5 Function Keys
Key Area (Embossment)	12 mm x 12 mm (0.473" x 0.473")
Actuator Travel	0.6 mm (0.024")
Activation Power	3 N
Switching Cycles	Approx. 3 Million under the following conditions: Keystroke Element: Testing Ram (DIN 42115) Keystroke Load: 10 N Keystroke Frequency: 1 Hz
Display Elements	2 Status LEDs

Table 6-2   Touch

Touch	
Type	Analog Resistive, 4 Wire Technology
Activation Force	15 g (Standard) With R0.8 Polyoxymethy (POM) pen or R8 HS60 silicon rubber
Durability	No Damages or Malfunctions after 3 Million Keystrokes as the following: Keystroke Element: R8, HS40 Silicon Rubber Keystroke Load: 150 g Keystroke Frequency: 3 Hz
Protection Foil	Order No. 27291.000

Tabelle 6-3   Display

Display	
Type	TFT
Resolution	1024 x 768 Pixels
Reading Angle	90°
Default Brightness Setting	By User Mode Switch
LCD Lifetime	100.000 h
Half-Life Backlighting	50.000 h
Lines	64
Characters/Line	128
Display Area (H x W)	231 mm x 306 mm (9.094" x 12.047")

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Table 6-4   Electrical Data

Electrical Data	
Supply Voltage	24 V DC (SELV in Accordance with DIN EN 61131)
Residual Ripple	10% Maximum
Minimum Voltage	19.2 V
Maximum Voltage	30.2 V
Power Consumption (Field Bus Device)	0.8 A
Connected Load	19 W
Fuse	Semiconductor Fuse, Self-resetting
Protection Against Polarity Reversal	Integrated

Table 6-5   Standard Interfaces

Standard Interfaces	
Variable Baud Rates and Data Formats	
X3 SER1 TTY/20mA	According to CL 2 and DIN 66 348 T1 Transmission Length: 0 - 1000 m (3280.839 ft.), Twisted Pair, Shielded Electrically Isolated
X3 SER1 RS485	According to DIN 66 259-4 Transmission Length: 0 - 1200 m (3937.007 ft.), Twisted Pair, Shielded Electrically Isolated
X3 SER1 RS232c / X3 SER2 RS232c	According to DIN 66 259 T1, CCITT V.28 Transmission Length: 0 - 15 m (49.212 ft.), Layer-stranded, Shielded SER1 RS232: Electrically Isolated SER2 RS232: Not Electrically Isolated

Table 6-6   Field Bus Interfaces

Field Bus Interfaces	
Variable Baud Rates and Data Formats	
X2.1/X2.2 CAN Bus	Electrically Isolated
X2.1/X2.2 DeviceNet	Electrically Isolated
X2.1/X2.2 INTERBUS	Electrically Isolated
DO1/DI1/DO2/DI2 INTERBUS OPC Optical Fiber	Electrically Isolated
X2 MPI	Electrically Isolated
X2 PROFIBUS-DP	Electrically Isolated

Table 6-7   Central Unit

Central Unit	
Central Unit	32-bit RISC CPU
Clock Frequency	74 MHz
Other Characteristics	Watchdog Timer, Real-Time Clock, Temperature Compensation of the Display, Battery Monitoring

Table 6-8   Memory

Memory	
Application Memory	7 MByte Flash
RAM	512 Kbyte Static CMOS-RAM, Battery-Backed
Memory Card (Option)	Compact Flash Card

Table 6-9   Connection System

Connection System
D-SUB Female and Male Connector Strips, 9 Pin and 25 Pin
Female and Male Connector Strips, Phoenix COMBICON, 3 Pin
Connection FSMA Type 905

Table 6-10   Environmental Conditions

Environmental Conditions	
Operation	0 °C to 50 °C (32°F to 122°F)
Storage, Transportation	-20 °C to 60 °C (-4 °F to 140°F)
Relative Humidity for Operation and Storage	10% to 95%, No Condensation
Application Area	Degree of Pollution 1, Overvoltage Category II

Table 6-11   Standards and Guidelines

Standards and Guidelines	
Interference Immunity	EN 61000-4-2
	EN 61000-4-3
	EN 61000-4-4
	EN 61000-4-5
	EN 61000-4-6
	EN 61000-6-2
Emitted Interference	EN 50081-1
	EN 55022 Limit Class Value A
Equipment Requirements	EN 61131
Storage and Transportation	EN 61131 Part 2
Power Supply	EN 61131 Part 2
Electromagnetic Compatibility	89/336/EEC (Including all Applicable Amendments)
Degree of Protection	EN 60529
Impact Load, Shocks	EN 60068 Part 2-27
Sinusoidal Vibrations	EN 60068 Part 2-6
Corrosion Protection	IEC 60068

This is a class A device. This device may cause radio interference in residential areas. In this case, the user may be required to introduce appropriate countermeasures, and to bear the cost of same.

Table 6-12   Enclosure

Enclosure and Front Panel	
Enclosure	Steel Sheet, Galvanized
Front Panel	Aluminium, Varnished 329 mm x 400 mm x 5 mm (H x W x D) - (12.953" x 15.748" x 0.197")
Front Panel Cover	Polyester Foil
Seal	Circumferential Rubber Seal on the Rear
Mounting Cutout	302 mm x 373 mm (H x W) - (11.89" x 14.685")
Mounting Depth	Standard Device: Approx. 65.5 mm (2.579") - (without Connector) Field Bus Device: Approx. 87.5 mm (3.445") - (without Connector)
Degree of Protection	At the Front: IP65 At the Back: IP20
Total Weight	Approx. 3700 g

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