CHAPTER 1

General Information

Chapter 1 Overview

Contents

This chapter contains all information which is not assigned to the other chapters.

Version **1.4**
Issue: **07.04.2004**

1. Purpose of the manual

The security of persons and equipment in hazardous areas depends on compliance with all relevant safety regulations.

The installation and maintenance personnel working in such systems therefore have special responsibilities. This requires exact knowledge of the applicable regulations and conditions.

This manual is based on those regulations and summarizes the main safety measures. The responsible personnel are still obliged to study the relevant regulations.

This manual contains the information required for the application and use of the product in the intended manner. It applies to technically qualified personnel with sufficient knowledge in the automation technology or data transmission technology sectors.

Qualified personnel are persons,

- who, as project leaders, are familiar with safety concepts in automation or data transmission technology
- **or** who, as operating personnel, have been trained on the devices or systems and who are familiar with the applicable contents of this manual
- **or** who, as experienced operators / service technicians, have been trained on similar systems according to safety technology standards.

This manual has been produced with due care. It contains all necessary information for project planning and for operation of the product. However, if important technical documents are missing, or you find any errors or discrepancies, please inform us.

For specific questions in individual cases, please contact BARTEC GMBH support.

2. Special markings

Notation

MENU Designations in dialogs, menu items and buttons will be displayed in capital letters.

< > Buttons or shortcuts will be displayed in pointed brackets, e.g. <CTRL + N>

[ ] Input strings will be displayed in square brackets, e.g. [A:\SETUP.EXE]

» Requests to operate the program will start with the character »

Italics Program reactions to an operation will be displayed in italics

Notes

⚠ Information highlighted by this symbol is intended to avoid danger to the health and safety of personnel and to avoid damage to property.

☞ Information highlighted by this symbol indicates important information that careful attention should be paid to.

🕮 Information highlighted by this symbol refers to a different chapter or section in this manual or other documentation.

3. Safety information

The detailed knowledge and correct technical implementation of the installation guidelines / safety instructions / functions described in this manual is a prerequisite for safe operation.
As the components or devices described can be used in various areas and systems, it is essential that their functions and the corresponding safety instructions are included in the safety concepts of the overall system.

- After removing the enclosure or opening the control cabinet door, device components with dangerous voltage may be accessible.
- Product safety requires correct transport, storage, installation and operation.
- Interventions regarding the product may only be implemented by qualified personnel, familiar with this manual.

Compliance with the handling regulations and safety instructions will ensure that, under normal circumstances, the product will not pose a danger to property or personnel.

Use the device only for the intended use. Comply with the declarations of conformity / EC-type examination certificates. Compliance with any “special conditions” is particularly important.
Incorrect or unpermitted use and non-compliance with the instructions in this manual will void any warranty on our part.

The following must be complied with for usage:

- National safety regulations
- National accident prevention regulations
- National assembly + installation regulations
- General recognized technical rules
- Safety instructions in these operating instructions
- Characteristic values and rated operating conditions on the rating and data plates
- Additional information signs on the device

Damage may remove EX-protection. The device must be returned to the manufacturer for repairs if there is any visible damage.

Conformity to standards
The devices comply with the following conditions and standards:
CENELEC ATEX 100a
EN 50014, EN 50020
EN 61000-6-2, EN 61000-6-3
Use permitted for Zone 1 and Zone 2.

4. Mechanical installation

Remove the display from the packaging. The delivery consists of:

- Operator interface
- Fastening elements
- Fixing frame
- Operating instructions
- CD with manuals

Installation can be directly in

- Control cabinet doors or
- Operating panels.

Select the **mounting location** according to the following criteria:

- Optimal height for device operation
- Good lighting conditions to ensure good display legibility
- The mounting surface should be level, smooth and stable
- If ambient temperature is high, there should be provision for ventilation
- Avoid mounting in the immediate vicinity of switching or current converter circuits.

Make a cut-out with the following dimensions:

Device	Width	Height	Installation depth	Material thickness
BDT 5	275.0 ± 0.5 mm	131.0 ± 0.5 mm	max. 80 mm	to 10 mm

Changing the **labeling strips** before mounting:
The labeling strips must be changed from the rear of the device (lower side).

- Remove strips carefully with tweezers. Under no circumstances insert pointed tools into the slit. Otherwise the membrane top will be damaged !
- Label the strips.
- Reinsert them carefully (at an angle of about 45 degrees to the front panel):
  - ♦ do not exert any pressure on the front plate
  - ♦ chamfering the corners will make this easier

🕮 If new strips are made, they must correspond exactly to the original strip size (see appendix "Labeling Strips").

☞ The labeling strips must not get trapped between the mounting wall and the rubber seal of the device.

Mount the device using all fasteners, the fixing frame and the seal provided:

- For operator interfaces BDT 5 the set of securing elements with 8 brackets are available.
- Fixing frame is for operator interfaces BDT 5.
  These fixing frames are used as guides for the fastener brackets and therefore serve to securely and stably position the operator interface.
- Fix the brackets in the corresponding cut-outs of the enclosure.

Optimal sealing:

- Tighten the screws lightly.
- Check the display position, ensure above all that the **rubber seals are correctly positioned**.
- Now tighten the clamping screws with a tightening torque between 0.3 and 0.4 Nm.

Attention:
IP65 is achieved with

- expert mounting and
- a level and smooth mounting surface

5. Suppression measures / Installation guidelines

Please note carefully !

The operator interfaces are state of the art designed electronic devices. Both the robust mechanical construction and the electronic components design make them ideal for industrial use.

The basis of fault-free operation is EMC compliant installation of the intrinsically safe incoming cables and the EMC compliant installation of the operating unit.

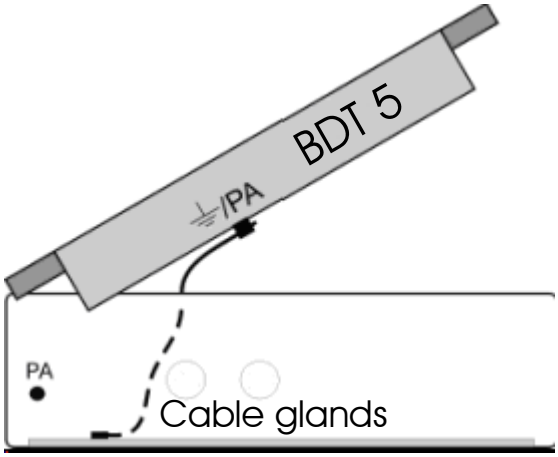
The interference energies coupled-in on the operating unit are removed via the functional earth connection (Ω/PA) on the rear.

This functional earth connection must be included with a low-resistance and the shortest possible Cu conductor in the potential equalization (permissible cable cross-section: 2.5mm² - 4mm²).

If this is not complied with, the measures taken in the device for high interference immunity and resistance to damage become partially ineffective.

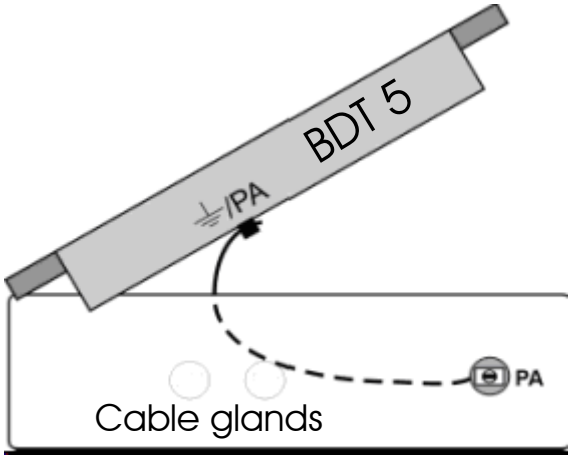
When installed in steel protective housing, this functional earth connection must be connected to the internal PA enclosure connection with a 2.5mm² yellow/green cable.

Wiring in stainless steel protective housing



The operating unit functional earth is fixed to the hole ring on the lower side of the enclosure

Wiring in plastic protective housing



The operating unit functional earth is fixed to the PA gland

When selecting the mounting position, ensure that the maximum possible distance is achieved from electromagnetic interference fields. This is particularly important with existing frequency transformers.

In some circumstances, screening against “stray rays” with screening plates is recommended.

5.1 EMC compliant installation

The basis of fault-free operation is the EMC compliant hardware installation of the supply and communication aggregates in non-hazardous areas and the appropriate installation of the operating unit in the hazardous location.

The use of interference-protected cables and their screened connection is another important measure.

Screen connection:

☞ In **non-hazardous areas**, a double-sided screen connection should be used between the controller and communication module for the data cable.
Optimal attenuation of all interference frequencies is normally only achieved **with a double-sided screen connection !**

☞ Screens for data cables used in **hazardous areas** should be connected on **one side** and with the lowest possible impedance in the **non-hazardous area** with the potential equalization (see installation example diagram on next page).

Alternative screen connection solutions are available for EMC interference but they must conform to national installation guidelines.

Screen connection:

To prevent interference currents, coupled into the cable screen, from becoming sources of interference, a low-impedance connection to the Ω/earth connector or the potential equalization is particularly important !

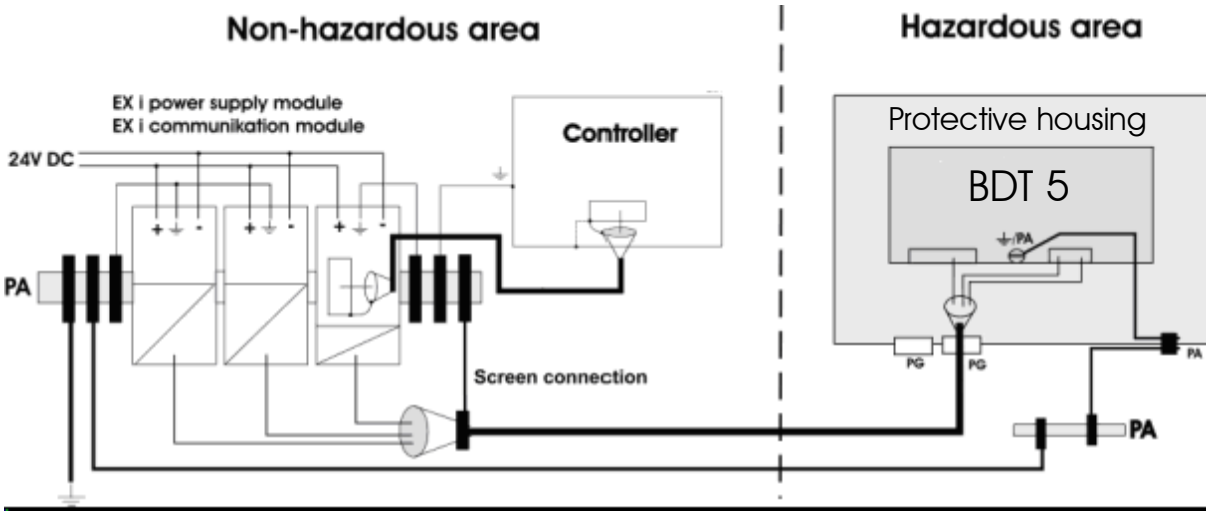
When using sub-D plug connectors you should always connect the screen to the metallic or metal-plated connector casing. Do not connect the screen to pin 1 on the plug connector !

With some controllers, the connector casing of the controller is not properly connected to the earth connection. In this case, it may be an advantage to isolate the screen on the sub-D connector of the PLC and make a direct connection to the earth lead or functional earth via a very short lead (0.75 mm^2...1.5mm^2).

With stationary operation we recommend that the screened cable be stripped fully and connected to the earth rail or potential equalization.
In this case the screen end at the interface should not be reconnected !

With this type of screen treatment use metal cable clips which have a large connection area to the screen surface and make good contact.

Installation example: Potential equalization and screening



The national installation guidelines apply to the fitter and operator (e.g. in Europe: EN 60 079-14).

Alternative screen connection solutions are available for EMC interference but they must conform to national installation guidelines.

Before commissioning, check which installation regulations the controller manufacturer requires for safe operation. These should be brought into line with the recommendations given here.

5.2 Protective housing with heating

Use of heaters:

Detailed description:

Use of heaters with dangerous voltages in V4A stainless steel enclosures:

This installation concerns a combination of devices, therefore an EC type examination is not required. The individual devices used are devices with EC type examination certifications and they therefore meet the requirements as in 94/9/EC.

The combination of these devices does not give rise to new electrical hazards !

As the components heating and sensor are devices in protective class 1 as in VDE0100, the protective earth (yellow/green) in the junction box must be connected to the system's protective earth !

The external PA connection of the stainless steel enclosure must also be included in the potential equalization of the system !

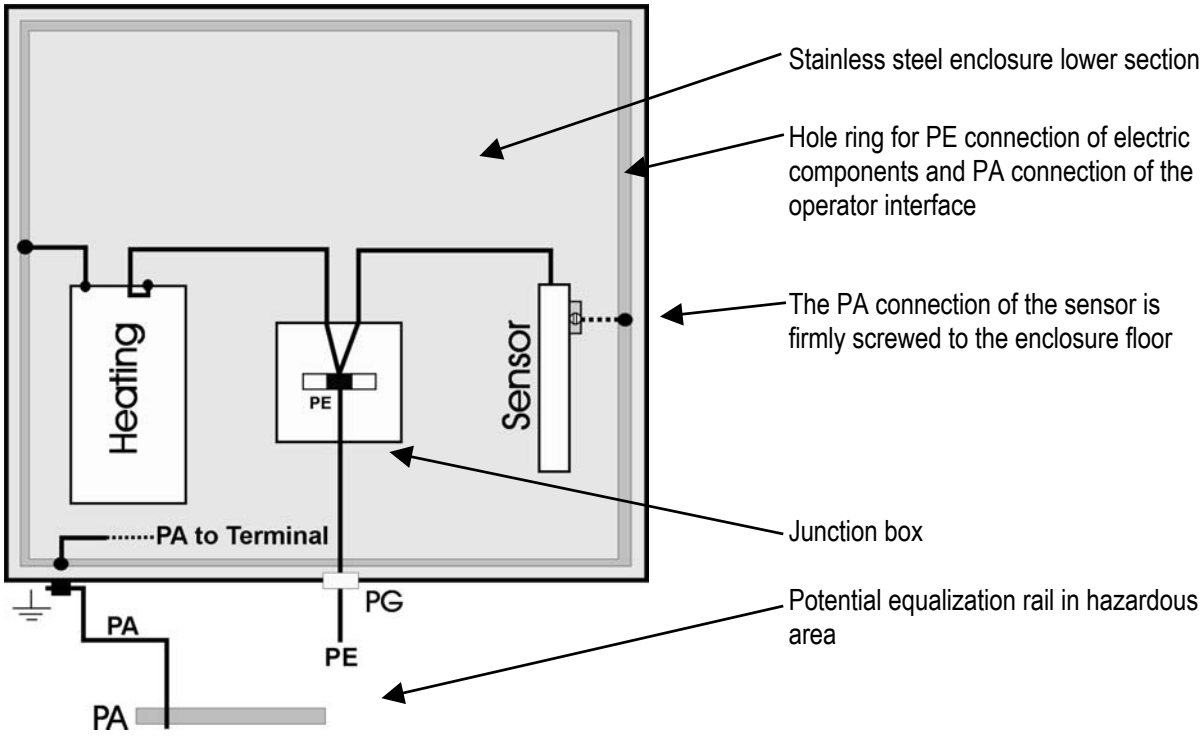


Diagram: PE/PA wiring in steel protective housing with heating

6. Cable length calculation

between the apparatus

BDT 5 and the power supply BSG 4 type 9143/10-120-200..

and

BDT 5 and the fieldbus isolating repeater BSG 5 type 9185/11-45-10

Cable values

The values of the cables recommended by us - LiYCY n x 2 x 0.75 / 77 blue - (n – number of cable pairs) are:

Inductance (wire/wire)	L_k	0.7 mH/km
Capacitance (wire/wire + 0.5*wire/screen)	C_k	165 pF/m
Wire resistance	R_k	25 Ω/km

Equation for cable length calculation

Dependent on external inductance: $Length_L = (Lo – Li) / L_k$

Dependent on external capacitance: $Length_C = (Co – Ci) / C_k$

6.1 Cable lengths for supply circuits

between

Power supply BSG 4 type 9143/10-120-200.. Terminal 10, 11

and

BDT 5 Connection X1, terminal 1 and 2

or Connection X1, terminal 3 and 4

Circuit values

	BSG 4 9143/10-120-200-.. Terminal 10,11		BDT 5 X1, terminal 1 and 2 X1, terminal 3 and 4
Uo	12 V		---
Io	200 Ma		---
Po	2.4 W		---
Co	IIB: 9 µF	IIC: 1.41 µF	---
Lo	IIB: 1.11 Mh	IIC: 95 µH	---
Ui	---		12.4 V
Ii	---		200 mA
Ci	---		0 nF
Li	---		0 µH

Determination of cable lengths for gas group IIC

Values			Calculated length (by equation)	Determined lengths = smallest calculated length
Lo	L_k	Li	135 m	**135 m (IIC)**
95 µH	0.7 mH/km	0 µH		
Co	C_k	Ci	8545 m	
1.41 µF	165 pF/m	0 µF		
Ro	R_k	Ri	254 m	
12.7 Ω	25 Ω/km	0 Ω		

Determination of cable lengths for gas group IIB

Values			Calculated length (by equation)	Determined lengths = smallest calculated length
Lo	L_k	Li	1585 m	**254 m (IIB)**
1.11mH	0.7 mH/km	0 µH		
Co	C_k	Ci	54545 m	
9 µF	165 pF/m	0 µF		
Ro	R_k	Ri	254 m	
12.7 Ω	25 Ω/km	0 Ω		

6.2 Cable lengths for data transmission circuit

between
Fieldbus isolating repeater BSG 5 type 9185/11-45-10 Pin 3, 5, 6 and 8
and
BDT 5 Connection X2, terminals 1 to 4

Circuit values

	BSG 5 type 9185/11-45-10 Pin 3, 5, 6 and 8		BDT 5 X2, terminals 1 to 4	
Uo	5.88 V		5.88 V	
Io	50 mA		40 mA	
Po	73.3 mW		58.8 mW	
Ri	117 Ω		147 Ω	
Co	IIB: 1000 µF	IIC: 43 µF	IIB: 1000 µF	IIC: 43 µF
Lo	IIB: 56 mH	IIC: 15 mH	IIB: 85 mH	IIC: 30 mH
Ui	5.88 V		8 V	
Ii	no restriction		no restriction	
Ci	0 nF		0 nF	
Li	0 µH		0 µH	

☞ The Li data can be ignored as this current is automatically set by the internal circuit (resistor combination) of the BSG 5 type 9185/11-45-10. The restriction here is the specification of the voltage Ui of the BSG 5 type 9185/11-45-10, which is 5.88 V.

6.2.1 Point to point operation

Determination of cable lengths for gas group IIC

Values			Calculated length (by equation)	Determined lengths
BSG 5 type 9185/11-45-10 (active) – BDT 5 (passive)				**1000 m (IIC) ***
Lo	L_k	Li	21428 m	
15 mH	0.7 mH/km	0 µH		
Co	C_k	Ci	260606 m	
43 µF	165 pF/m	0 µF		
BSG 5 type 9185/11-45-10 (passive) – BDT 5 (active)				
Lo	L_k	Li	42857 m	
30 mH	0.7 mH/km	0 µH		
Co	C_k	Ci	260606 m	
43 µF	165 pF/m	0 µF		

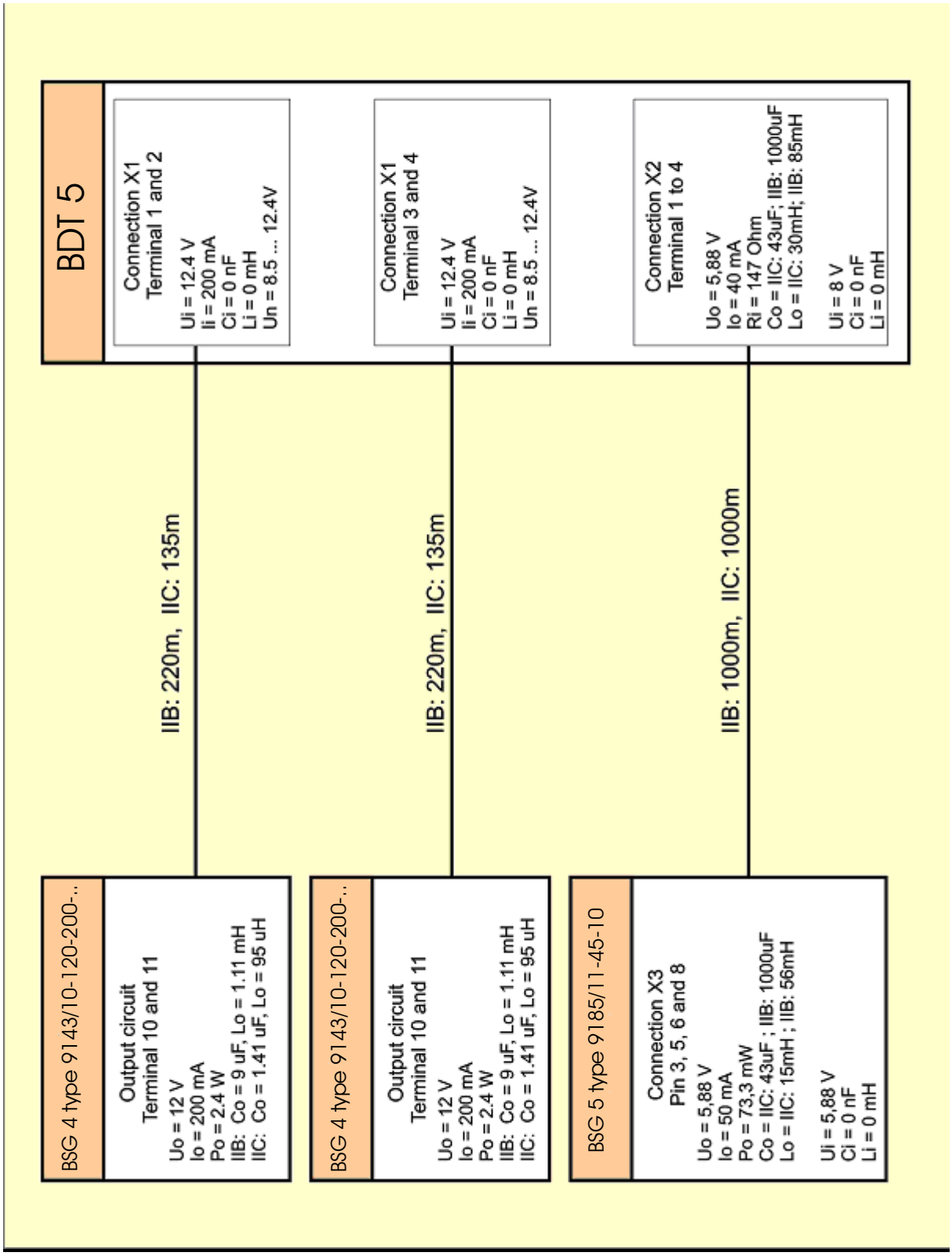
* maximum technical length is 1000m

Determination of cable lengths for gas group IIB

Values			Calculated length (by equation)	Determined lengths
BSG 5 type 9185/11-45-10 (active) – BDT 5 (passive)				**1000 m (IIB) ***
Lo	L_k	Li	80000 m	
56 mH	0.7 mH/km	0 µH		
Co	C_k	Ci	$6*10^6$ m	
1000 µF	165 pF/m	0 µF		
BSG 5 type 9185/11-45-10 (passive) – BDT 5 (active)				
Lo	L_k	Li	121428 m	
85 mH	0.7 mH/km	0 µH		
Co	C_k	Ci	$6*10^6$ m	
1000 µF	165 pF/m	0 µF		

* maximum technical length is 1000m

Diagram: BDT 5 with BSG4 type 9143/10-120-200-.. and BSG 5 type 9185/11-45-10 in point to point operation



6.2.2 Party line operation

Inductivity alone is considered here for the determination of the cable length. This, instead of capacitance, is the primary factor here.

Determination of cable lengths for gas group IIC

Number of operator interfaces	Effective short circuit current with safety factor	Inductivity determined as per EN 50020	Cable length for **IIC**
2	120 mA	4.4 mH	1000 m *
3	180 mA	1.8 mH	
4	240 mA	1.2 mH	
5	300 mA	0.7 mH	1000 m
6	360 mA	0.55 mH	786 m
7	420 mA	0.4 mH	571 m
8	480 mA	0.29 mH	414 m

* maximum technical length is 1000m

Determination of cable lengths for gas group IIB

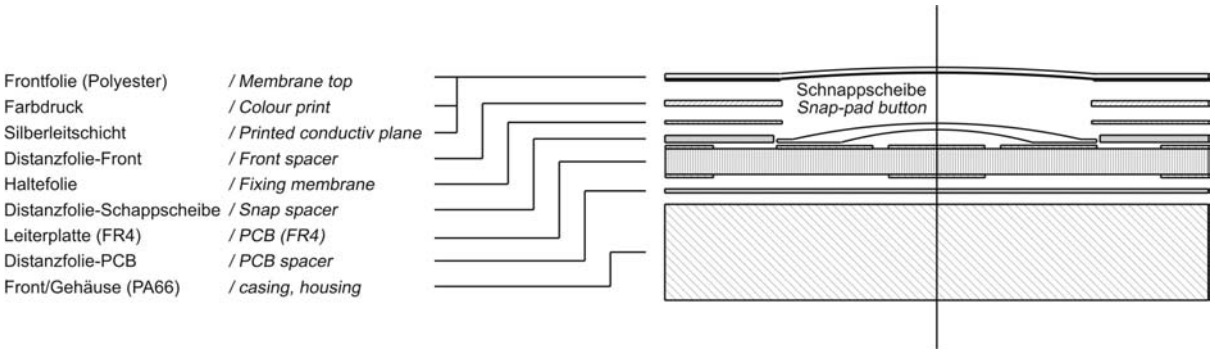
Number of operator interfaces	Effective short circuit current with safety factor	Inductivity determined as per EN 50020	Cable length for **IIB**
2	120 mA	27 mH	1000 m *
3	180 mA	10 mH	
4	240 mA	5 mH	
5	300 mA	3 mH	
6	360 mA	2.7 mH	
7	420 mA	1.5 mH	
8	480 mA	0.29 mH	

* maximum technical length is 1000m

7. Front panel resistance

7.1 Design

Schematic diagram:



7.2 Materials

Application	Material
Membrane top	Polyester
Display window	Polyester / safety glass
Printed conductive plane	Silver
Spacer	Polyester
Fixing membrane	Polyester
PCB	FR4
Enclosure	Ultramid PA66
Front panel seal	EPDM

7.3 Material properties

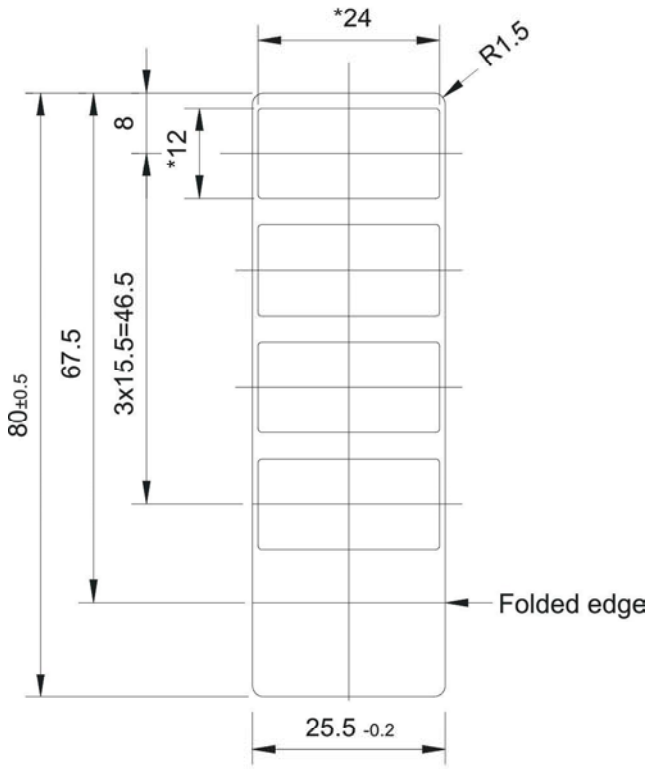
- ☞ The selection of chemicals listed here is not exhaustive.
- ☞ For further information, more comprehensive lists can be obtained from BARTEC GMBH.
- ☞ Because of the numerous chemicals available on the market, these lists can only represent a selection.
- ☞ Further information can also be found on the following homepages:
  http://www.autotype.com
  http://www.basf.de

Property	Chemical material class / group	Chemicals	Test method
Chemical • Chemical resistance	Alcohols	Ethanol Methanol Glycerin	DIN 42 115 DIN 53 461
	Amines	Ammonia <2%	
	Ketones	Acetone	
	Diluted acids	Acetic acid <5%	
	Diluted alkalis (bases)	Sodium hydroxide <2%	
	Household chemicals	Detergents	
Property	**Resistance**		**Test method**
Mechanical • Service life after imprint • MIT folding resistance	5 million touches >20000 folding operations		Autotype method ASTM D2176
Thermal • Dimensional • Dimension stability	Max. 0.2% at 120° longitudinal Typical 0.1%		Autotype method

☞ Polyester films have a limited resistance against UV light and should therefore not be exposed to sunlight for longer periods.

☞ Comprehensive further product information about Ultramid (A3X2G5) is available from BARTEC GmbH.

8. Labeling strips BDT 5



* = Area for labeling

CHAPTER 2

Quick Start

Chapter 2 Overview

Contents

This chapter contains all the information required to commission the devices in question rapidly and safely.

Version **1.1**

Issue: **15.04.2004**

1. Required components

The following components are required for fast commissioning and the initial test:

- BDT 5 text terminal
- Ex i power supply BSG 4 type 9143/10
- Fieldbus isolating repeater BSG 5 type 9185/11
- Power supply 24V DC / >500mA
- CD with programming software "BMS Text"
- Programming cable VB-300 to download created projects
- Connection cable to the PLC (dependent on the PLC interface)

2. Installation of programming software

- Insert the BMS Text CD into the CD-ROM drive and start the setup program with "Setup.exe". (The installation program will be started automatically if the option Autostart is selected)
- Follow the installation program instructions.

3. Operator interface preparation

- Connect the serial RS-422 interface (COM 1) of the operator interface with the RS-422 Ex i (X3) interface of the fieldbus isolating repeater.
- Connect the RS-232 interface (X1) of the fieldbus isolating repeater via the VB-300 to one of the serial COM interfaces of the PC.
- Connect the Ex i power supply and the fieldbus isolating repeater to 24V DC.
- Connect the operator interface (X1) to 12V DC via the Ex i power supply.
- The operator interface will start up and execute a self-test.
- The message *"Error 300 No communication with PLC"* will appear after a successful self-test.
- Select the function *"Download configuration / system"* in the system menu at the operator interface to transfer project data.
- Switch there for to the system menu by pressing the <CR + ESC> keys simultaneously. Scroll through the menu items to the function *"Download configuration / system"*, then select one of the menu items with the cursor keys and confirm the selection with <CR>.
- The operator interface then switches with the selected baud rate into programming mode and is ready to receive the data.

4. Download

- Start up BMS Text and open your or any demo project.
- It is possible to start the download via the menu item *"Project ⇨ transfer"*.
- Select your PC interface, set the baud rate to the same value as at the operator interface and confirm these settings with <OK>.
- BMS Text now attempts to connect to the operator interface, and if successful, a window will appear with the query "Would you like to download system too ?".
- Confirm this message with <No>.
- Skip the following *"Project protection"* message using the <Cancel> button.
- The project data will be loaded into the operator interface and BMS Text will indicate when the download is complete.
- The operator interface then displays the message *"Error 300 No communication with PLC"* again and is ready for coupling to the PLC.

5. Communication

- Connect the appropriate interface of the fieldbus isolating repeater to the PLC.
- The interface parameters of the operator interface must be the same as the PLC parameters for successful communication.
- Switch back to the system menu of the operator interface and scroll to the menu item *"Change serial interface ?"*.
- If this menu item is confirmed with <Yes>, it will then be possible to adapt the relevant interface parameters to the PLC.
- All other menu items present, except the final item, can be skipped using the <ESC> key as these settings are initially not required in "normal cases".
- To save all settings, confirm the final menu item *"Store conf.-settings into Flash-Eprom?"* with <Yes>.

CHAPTER 3

Technical data

Chapter 3 Overview

Contents

This chapter contains all technical data for the devices.

Version **1.6**

Issue: **29.04.2004**

1. Operator interfaces BDT 5

1.1 Overview technical data

Function / Equipment	BDT 5							
Certification / Testing	BVS 03 ATEX E 394 CE-0032							
Type of protection	e II 2G EEx ia IIC/IIB T4 / T3							
Display type	LCD monochrome graphic display, transflective, 240x64 pixels							
	Contrast adjustment using key combination							
Display	Transparent foil							
Illumination	LED background lighting							
Keyboard	Membrane keyboard (actions > 1 million)							
Function keys Freely assignable / number Softkeys Cursor keys Alphanumeric keys Numeric keys	16 Yes / 16 4 Yes Yes Yes							
System LED's	4 (STOP, COM, ONLINE, ALARM)							
Key LED´s, controllable	16							
Freely controllable LED's	-							
Total binary inputs / electrical parameters	8 floating contacts, switches/ pushbuttons / 3.3V , 2 mA each							
Real time clock / Data buffer	Yes (capacitor buffered, maintenance-free) / > 4 days							
1. Serial interface (communication)	RS-422 (bus-capable) connection to BSG 5 type 9185/11							
Program memory size [kByte]	8x64 (512) flash RAM							
Number of protocol drivers	3 (loadable via PC software)							
Main memory, buffered [kByte] Record memory [kByte]	128 (> 4 days) 12 / ca. 200 - 500 messages							
Conf. memory size [kByte]]	448							
Number of process pictures	100 / 20 bitmaps per language							
Number of texts / messages	Max. 5900							
Number of fault messages	512 (bit controlled)							
Font sets	3 (freely definable) IBM code table, 437 predefined in 3 sizes							
Predefined fonts (for all devices)	6x8	6x12	12x21	18x32	CYR6x8	CYR6x12	CYR12x21	CYR18x32
Number of lines BDT 5	8	5	3	2	8	5	3	2
Number of characters/ line	40	40	20	13	40	40	20	13
Character height [ca. mm]	6	6	10	15	6	6	10	15
Configuration memory type	Flash EEPROM							
Power supply	10.8 VDC, 8 – 12.5 VDC, BSG 4 type 9143/10 power supply							
Connections	Via plug-in screw terminals, 2.5 mm² green							
Current consumption [mA]	Max. 180							
Enclosure	Front frame: Plastic with polyester membrane, seal, IP 65 Backwall: Plastic with fastening / arrester plate, IP 20							
Ambient temperature, operation	-20...+70 °C (+60°C at T4)							
Storage temperature	-30...+80 °C							
Relative humidity	90% at 40 °C, without condensation							
Vibration	Operation: 0.075mm (10Hz ... 58Hz) 1g (58Hz ... 500Hz) Transport: 3.5mm (5Hz ... 12Hz) 1g (12Hz ... 500Hz)							
Shock loading	Operation: 5g / 11ms Transport: 25g / 6ms							
Dimensions [mm]	290 x 146							
Mounting depth [ca. mm] Wall thickness [mm]	80 <10							
Weight [g]	approx 1290							

1.2 Standards and guidelines

The compliance of the designated product with the regulations in guideline 89/336 EEC is verified by compliance with the following standards:

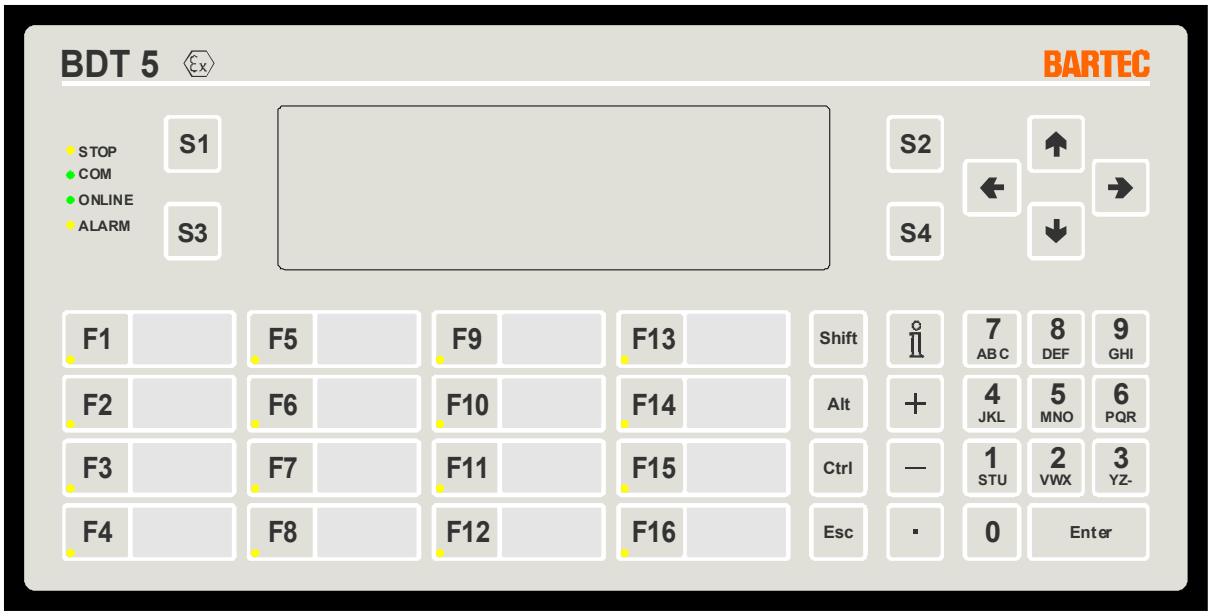
	BDT 5
Test according to:	**Standard/guideline**
Interference resistance	EN 61000-6-2
Static discharge (contact/air discharge)	EN 61000-4-2 (1993) 4kV / 8kV
HF irradiation	EN 61000-4-3 (1997) 10V/m
Burst coupling	EN 61000-4-4 (1996) 2kV
HF power supply	EN 61000-4-6 (1997) 10V/m
Interference emission	EN 61000-6-3
Noise suppression level	EN 55022 (1998) Class B

The compliance of the designated product with the regulations in guideline 94/9 EEC is verified by compliance with the following standards:

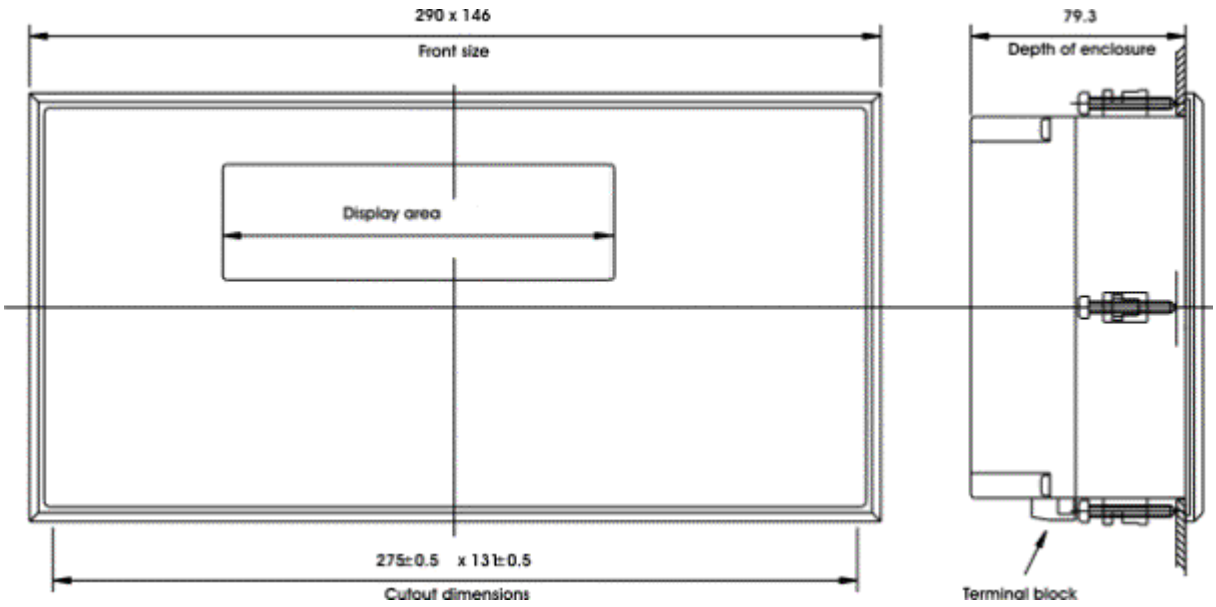
Test according to:	**Standard/guideline**
ATEX guideline	94/9 EEC
General conditions	EN 50014 (1997)
Protection class i	EN 50020 (2002)

1.3 Front view and mounting diagram BDT 5

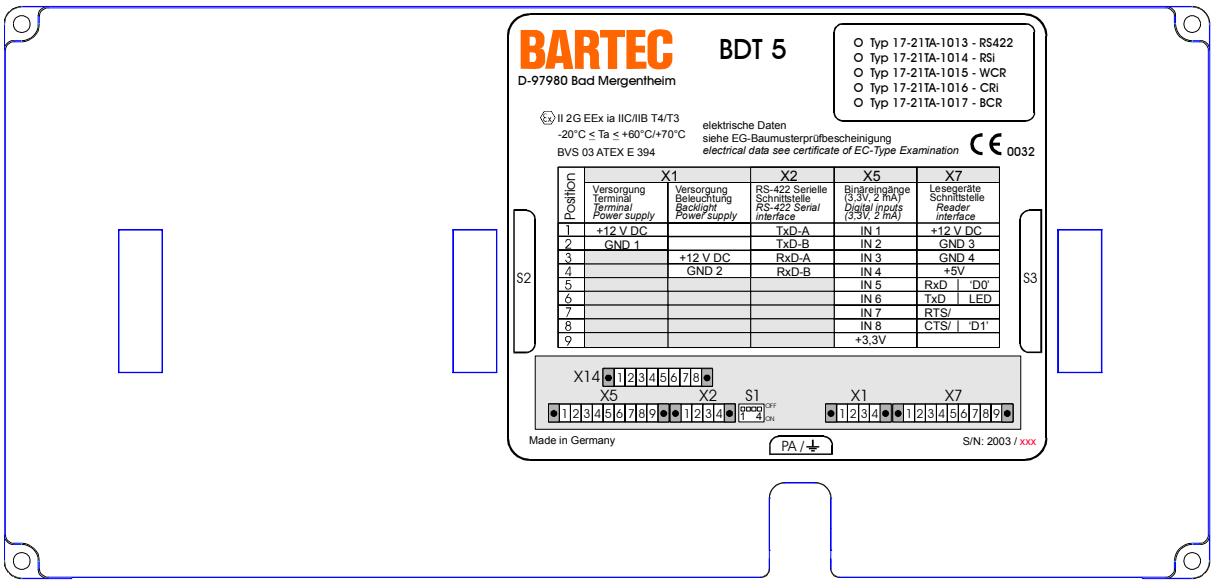
Front view:



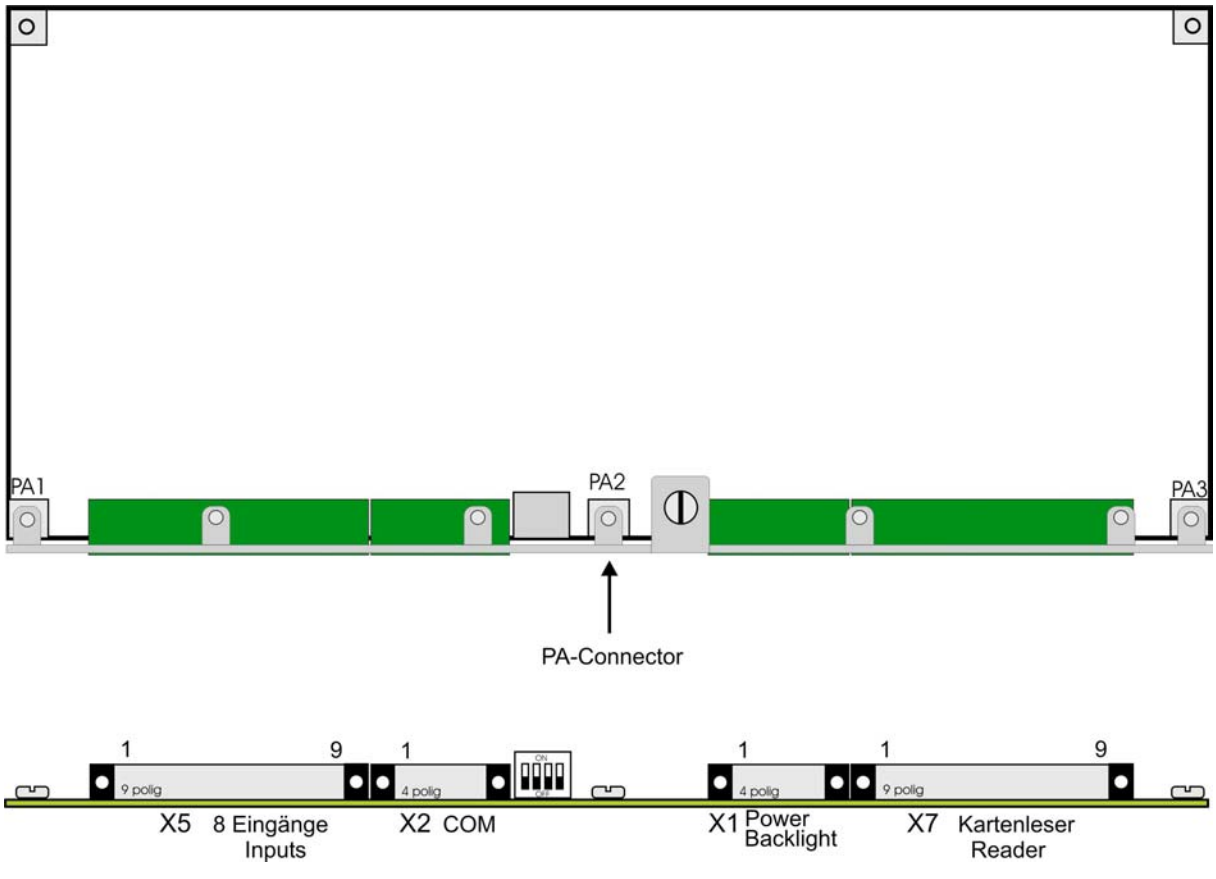
Mounting diagram:



1.4 Rear view and rating plate BDT 5



1.5 Connection and allocation overview BDT 5



Terminal	Pin	Significance		Connection
X1	1	Power supply operator interface +12V DC		Power supply of operator interface
	2	Power supply operator interface GND 1		
	3	Power supply background lighting +12V DC		
	4	Power supply background lighting		
X2	1	TxD-A		Serial Interface RS-422
	2	TxD-B		
	3	RxD-A		
	4	RxD-B		
X5	1	Input 1		Key or switch *
	2	Input 2		
	3	Input 3		
	4	Input 4		
	5	Input 5		
	6	Input 6		
	7	Input 7		
	8	Input 8		
	9	+ 3.3 V DC		
X7	1	Power supply reader module +12V DC		Card reader
	2	Power supply reader module GND 3		
	3	Power supply card reader GND 4		
	4	Power supply card reader +5V DC		
	5	RxD	D0	
	6	TxD	LED	
	7	RTS	N.C. **	
	8	CTS	D1	
	9	N.C. **		

* The key performance data should be max. 3.3V and 2 mA.
The maximum cable length is 1m.
The connection cables for the external keys or switches **MUST NOT** leave the protective housing !

** Not connected

1.6 DIP switch settings S1

Operating mode	Switch	Position
Point to point operation	S1-1	Open / Off
	S1-2	Closed / On
Bus operation		
First to penultimate device in bus	S1-1	Open / Off
	S1-2	Open / Off
Last device	S1-1	Open / Off
	S1-2	Closed / On
	S1-3	N.C. *
	S1-4	N.C. *

* Not connected

2. Ex i power supply BSG 4 type 9143/10

2.1 DC 24-V supply of the power supply BSG 4 type 9143/10

The power supply voltages of the Ex i power supply modules and Ex i communication modules must be generated as safe electrically separated extra-low voltages.

This DC power supply voltage must meet the following requirements:

- Safe separation can be realised following the requirements, among others, in VDE 0100 Part 410 / HD 384-04-41 / IEC 364-4-41 (as functional extra-low voltage with safe separation) or VDE 0805 / EN 60950 / IEC 950 (as safe extra-low voltage SELV) or VDE 0106 Part 101.

Only use power supply units manufactured according to the above mentioned standards !

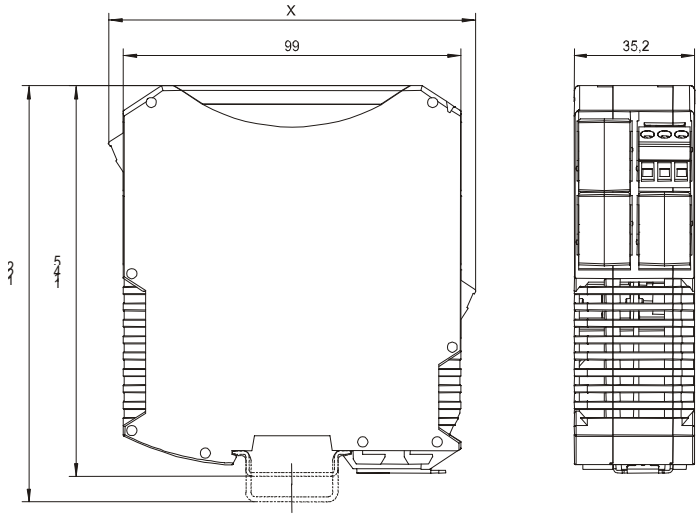
2.2 Overview technical data

Function / Equipment	**BSG 4 type 9143/10**	
Order designation	BSG 4 type 9143/10-vvv-ccc-10	
Certification / Testing	BVS 03 ATEX E 314 C-0102	
Type of protection	e II (2) G [EEx ib] IIC/IIB	
Display	LED green	
Power supply	BSG 4 type 9143/10-120-200-10	
Voltage range	24 V AC (20 - 28 V AC), 48 - 62 Hz 24 V DC (18 - 35 V DC), protected against polarity reversal	
Input current - **at Uin 20V and 160 mA load** - **at Uin 20 V and load free**	 210 – 230 mA 11 – 14 mA	
Short-circuit current	170 – 178 mA	
Mains interruption	20ms based on NAMUR	
Output **Rated voltage** **Rated current**	 10.8 V (10.6 V - 11.0 V) 160 mA	
	IIC	**IIB**
Max. connectable capacitance, C_0	1.41 µF	9 µF
Max. connectable inductance, L_0	95 µH	1.11 mH
Distance (BSG 4 type 9143/10 ⇔ operator interface) in m with cable LIYCY blue n x 2 x 0.75 mm²	135	254
Mounting type	On DIN rail NS35 (as per EN 50022)	
Enclosure	Plastic enclosure IS pac, IP 30	
Ambient temperature	0 – 50 °C	
Storage temperature	-40 – +80 °C	
Relative humidity	90% at 40°C <85% at Ta >40°C without condensation	
Electromagnetic compatibility	EN 55011 Gr.1Kl.B, EN 50082-2, IEC 1000-4-1...6, NAMUR NE21	
Dimensions (BxHxW)	35.2 x 114.5 x 106.0 mm	
Weight [g]	approx 158	

2.3 View and mounting diagram

View:

Mounting diagram:



	Size X
Screw terminal	108 mm
Sping clamp terminal	128 mm
Insulation displacement terminal	131 mm

2.4 Connection and allocation overview

Power supply BSG 4 type 9143/10-120-200-10			
Input		Output (intrinsically safe)	
Connection (pin)	Designation	Connection (pin)	Designation
Connector			
7	+ 24V DC	10	Output 1+
8	Functional earth	11	Output 1-
9	GND	12	N.C. **
Pac Bus			
1	+ 24V DC		
2	GND		
3, 4	LF *		
5, 6	N.C. **		

☞ * Contacts 3 and 4 (LF) on the Pac Bus must be short-circuited !

☞ ** Not connected

3. Fieldbus isolating repeater BSG 5 type 9185/11

3.1 DC 24-V supply of the fieldbus isolating repeater BSG 5 type 9185/11

The power supply voltages of the Ex i power supply modules and Ex i communication modules must be generated as safe electrically separated extra-low voltages.

This DC power supply voltage must meet the following requirements:

- Safe separation can be realised following the requirements, among others, in VDE 0100 Part 410 / HD 384-04-41 / IEC 364-4-41 (as functional extra-low voltage with safe separation) or VDE 0805 / EN 60950 / IEC 950 (as safe extra-low voltage SELV) or VDE 0106 Part 101.

Only use power supply units manufactured according to the above mentioned standards !

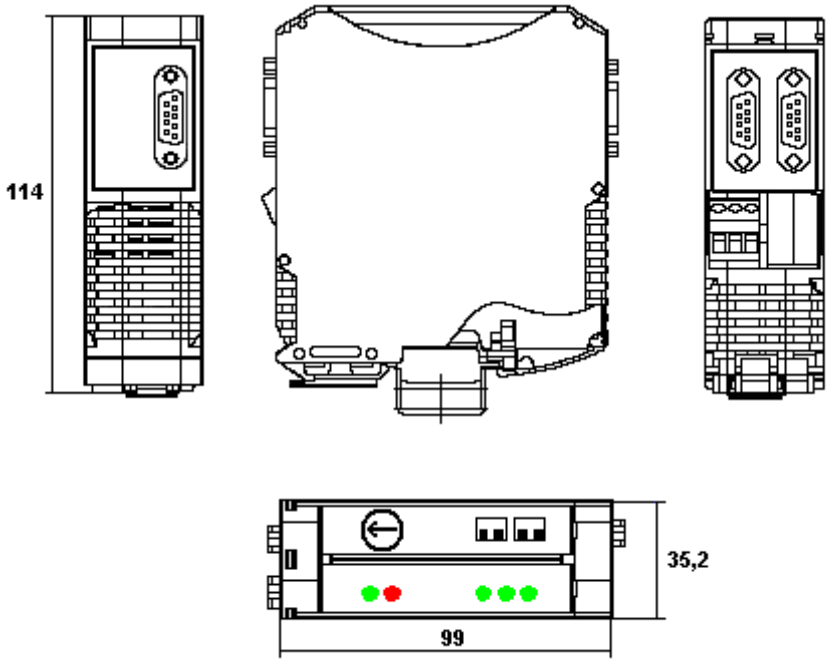
3.2 Overview technical data

Function / Equipment	BSG 5 type 9185/11
Order designation	BSG 5 type 9185/11-45-10
Certification / Testing	DMT 02 ATEX E 246 X CE-0102
Type of protection	e II (2) GD [EEx ib] IIC/IIB e II 3 G EEx nA II T4
Status LED's	Power supply ok, green Error (short circuit), red RxD 1 reception at RS-232 interface RxD 2 reception at RS-422/485 interface, field side RxD 3 reception at RS-422/485 interface, non Ex-side
Intrinsically safe interface **(BSG 5 type 9185/11 ⇔ operator interface)** **Connection**	RS-422/485 9-pin Sub-D socket
Distance BSG 5 type 9185/11 ⇔ operator interface **With twisted pair Ø 0.75mm²**	≤ 1000 m
Not intrinsically safe interfaces **(BSG 5 type 9185/11 ⇔ PLC)** **Connection RS-232** **Connection RS-422/485**	 9-pin Sub-D plug 9-pin Sub-D socket
Distance BSG 5 type 9185/11 ⇔ PLC **V.24 (RS-232-C)** **RS-422 and RS-485** **With twisted pair Ø 0.75mm²**	 15 m ≤ 1000 m
Rated voltage	24 V DC, 24 V AC
Voltage range	18 – 35 V DC ± 15% AC
Rated current	66 mA
Maximum power consumption	1.6 W
Mounting type	On DIN rail NS35 (as per EN 50022)
Enclosure	Plastic enclosure IS pac, IP 30
Ambient temperature	-20 – +70 °C
Storage temperature	-40 – +80 °C
Relative humidity	≤ 95% without condensation
Electromagnetic compatibility	As per IS pac standard
Dimensions (BxHxW)	35.2 x 114.5 x 106.0 mm
Weight [g]	approx 192

3.3 View and mounting diagram

View:

Mounting diagram:



3.4 Connection and allocation overview

BSG 5 type 9185/11-45-10	
Connection (pin)	**Designation**
X1 RS-232 (non Ex-side)	
2	RxD
3	TxD
5	GND
7	RTS
8	CTS
X2 RS-422 (non Ex-side)	
8	TxD-A
3	TxD-B
9	RxD-A
4	RxD-B
X2 RS-485 (non Ex-side)	
8	A (-)
3	B (+)
X3 RS-422 (Ex-side)	
8	TxD-A
3	TxD-B
9	RxD-A
4	RxD-B
X3 RS-485 (Ex-side)	
8	A (-)
3	B (+)
Power supply	
Pac Bus	
1	+ 24V DC
2	GND
3, 4	LF *
5, 6	N.C. **
Terminals	
7	U+ (+24V DC)
8	PA
9	U- (0V) (GND)

3.5 DIP switch settings S1 and S2

Switch	Abbreviation (front plate)	Position	Function	
S1-1	RS2	ON	RS-422 on the non Ex-side	
		OFF	RS-485 on the non Ex-side	
S1-2	SCAN	ON	If S1-1 = ON (RS-422): Transmitter	RS-422 = scanning
			If S1-1 = OFF (RS-485): Transmitter	RS-422 = constantly on
		OFF	If S1-1 = ON (RS-422):	RS-485 = bidirectional
			If S1-1 = OFF (RS-485): Transmitter	RS-485 = switched off
S2-1	RS3	ON	RS-422 on Ex-side (field side)	
		OFF	RS-485 on Ex-side (field side)	
S2-2	-	-	Not Connected	

- The default setting is:
  S1-1 = ON
  S1-2 = OFF
  S2-1 = ON
  S2-2 = OFF

3.6 Rotary encoder switch settings

Rotary encoder switch *	
Switch setting	**Baud rate**
2	2.4 K
3	4.8 K
4	9.6 K
5	19.2 K
8	57.6 K

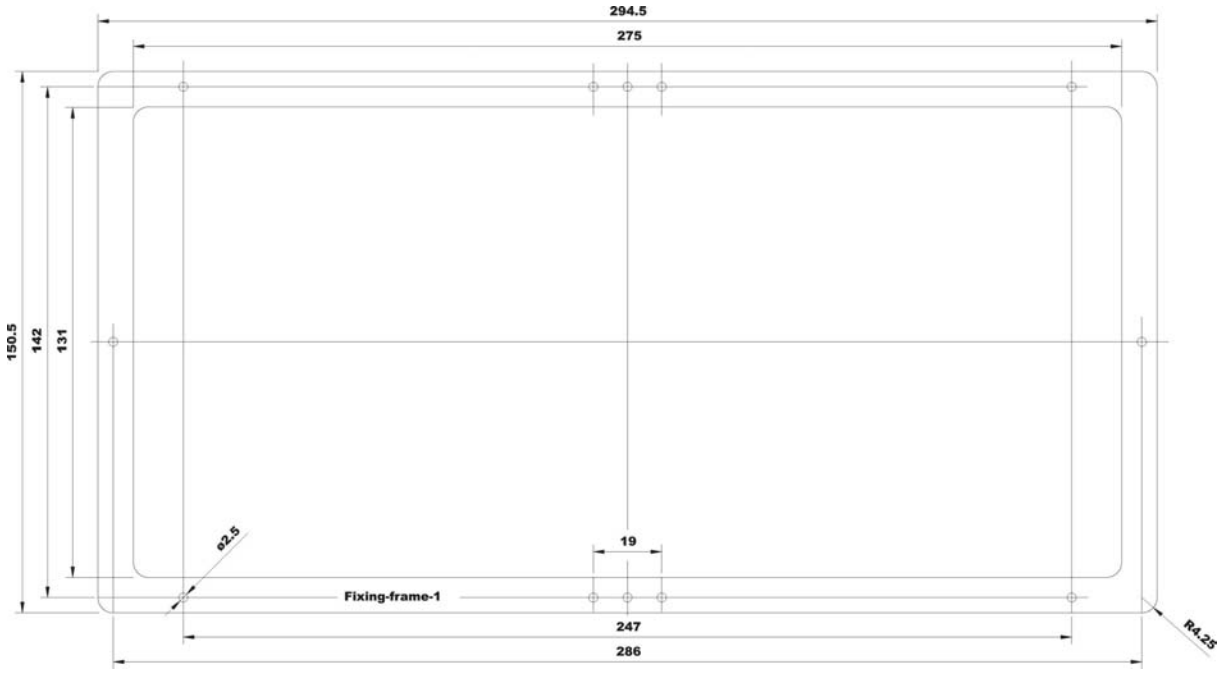
* Any other switch settings are not valid for this operator interface !

3.7 Status LED´s

LED	Abbreviation (front plate)	Color	Significance
1	PWR	green	Power supply OK
2	ERR	red	LED static on = short circuit
			LED flashing = baud rate search in automatic baud rate detection
3	RxD1	green	Reception at the RS-232 interface
4	RxD2	green	Reception at the RS-422/485 interface, field side
5	RxD3	green	Reception at the RS-422/485 interface, non Ex-side

4. Fixing frame BDT 5

Mounting diagram:



Chapter 4

Connection options

Chapter 4 Overview

Contents

This chapter lists the cable connections and overviews of possible connections between the operator interfaces and various controllers, as well as the programming cables and connections to Ex barriers.

☞ Please note that twisted pair cables must be used for all connection cables !

Version **1.2**

Issue: **29.04.2004**

ABB

Connection options

Chapter 4-1 ABB overview

Version **1.2**

Issue: **29.04.2004**

1. Connection options to AC31

Standard communication interface: **V.24/ RS-232-C**

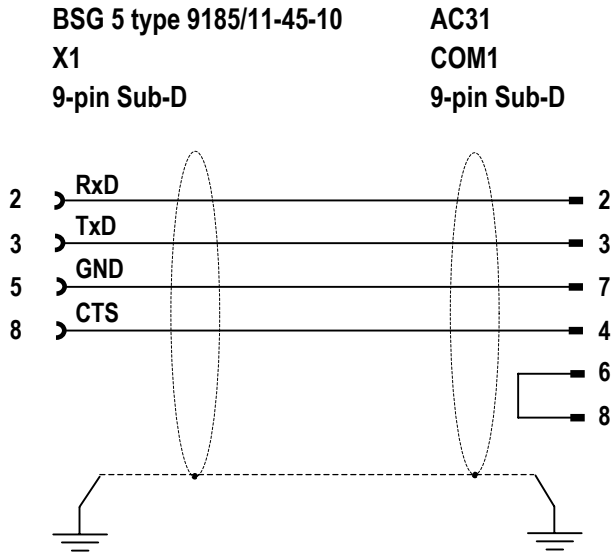
Access to ABB AC31 occurs at serial interface COM1 (COM2 with special ABB software).

Description				Page
Controller type	Device type	Protocol type	Interface type	
07 KR 91 07 KT 92 07 KT 93 07 KT 94 07 KT 97	BDT 5	Modbus RTU	V.24/ RS-232-C	1-3
07 KR 31 07 KT 31	BDT 5	Modbus RTU	V.24/ RS-232-C	1-3
07 MK 92 07 KP 93	BDT 5	Modbus RTU	V.24/ RS-232-C	1-4
			RS-422	1-4
07 CR 41 07 KR 51	BDT 5	Modbus RTU	V.24/ RS-232-C	1-5

Controller types:

07 KR 91, 07 KT 92, 07 KT 93, 07 KT 94, 07 KT 97

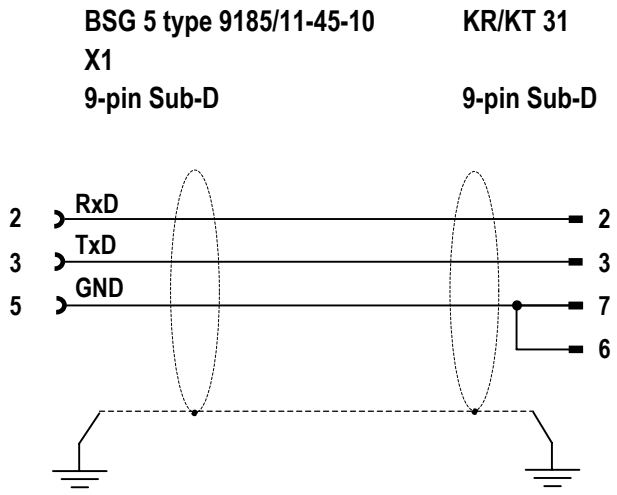
Connection via V.24/ RS-232-C to X1:



Controller types:

07 KR 31, 07 KT 31

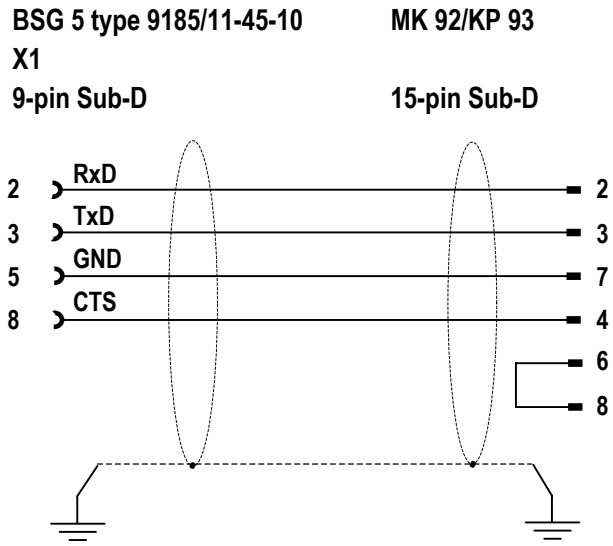
Connection via V.24/ RS-232-C to X1:



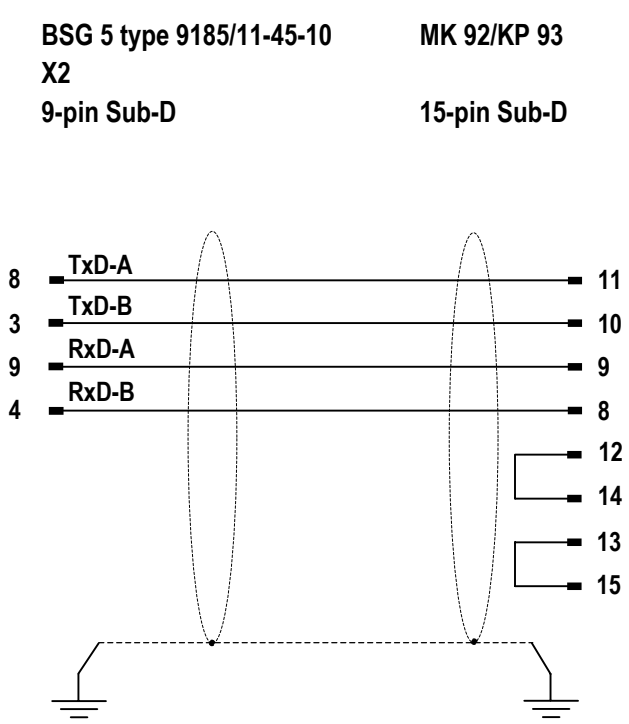
Controller types:

07 MK 92, 07 KP 93

Connection via V.24/ RS-232-C to X1:



Connection via RS-422 to X2:

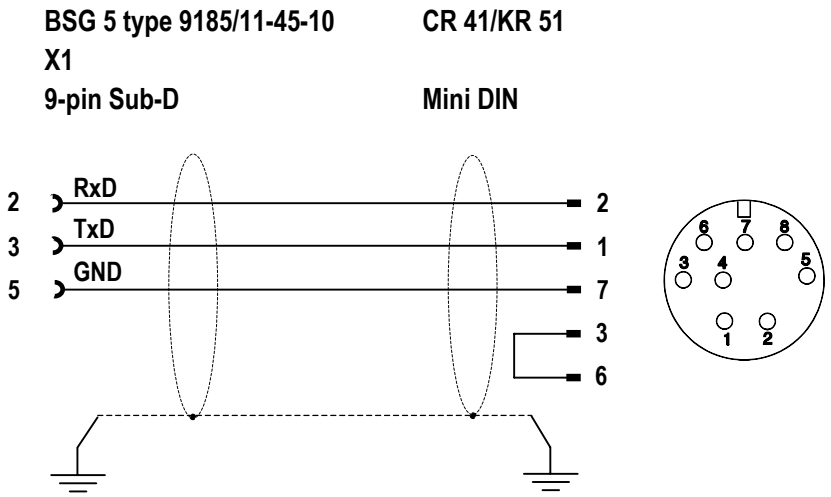


☞ **Please note that the TxD and RxD cables should all be twisted pairs !**

Controller types:

07 CR 41, 07 KR 51

Connection via V.24/ RS-232-C to X1:



Allen Bradley / Rockwell Automation

Connection options

Chapter 4-2 Allen Bradley / Rockwell Automation Overview

Description	Page

Version **1.2**

Issue: **29.04.2004**

1. Connection options to SLC 500

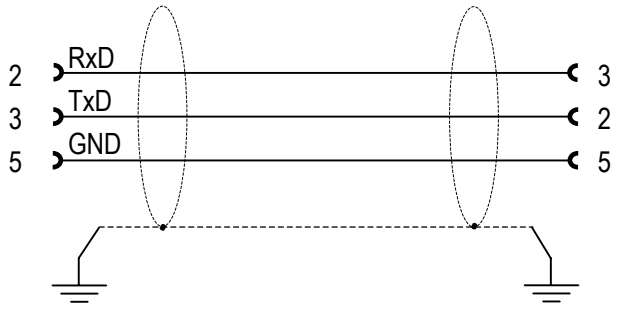
Standard communication interface: V.24/ RS-232-C

Description				Page
Controller type	Device type	Protocol type	Interface type	
SLC 500	BDT 5	DH-485	V.24/ RS-232-C	2

Controller type:
SLC 500

Connection via V.24/ RS-232-C to X1:

BSG 5 type 9185/11-45-10 **SLC 500**
X1
9-pin Sub-D **9-pin Sub-D**



Operator interface

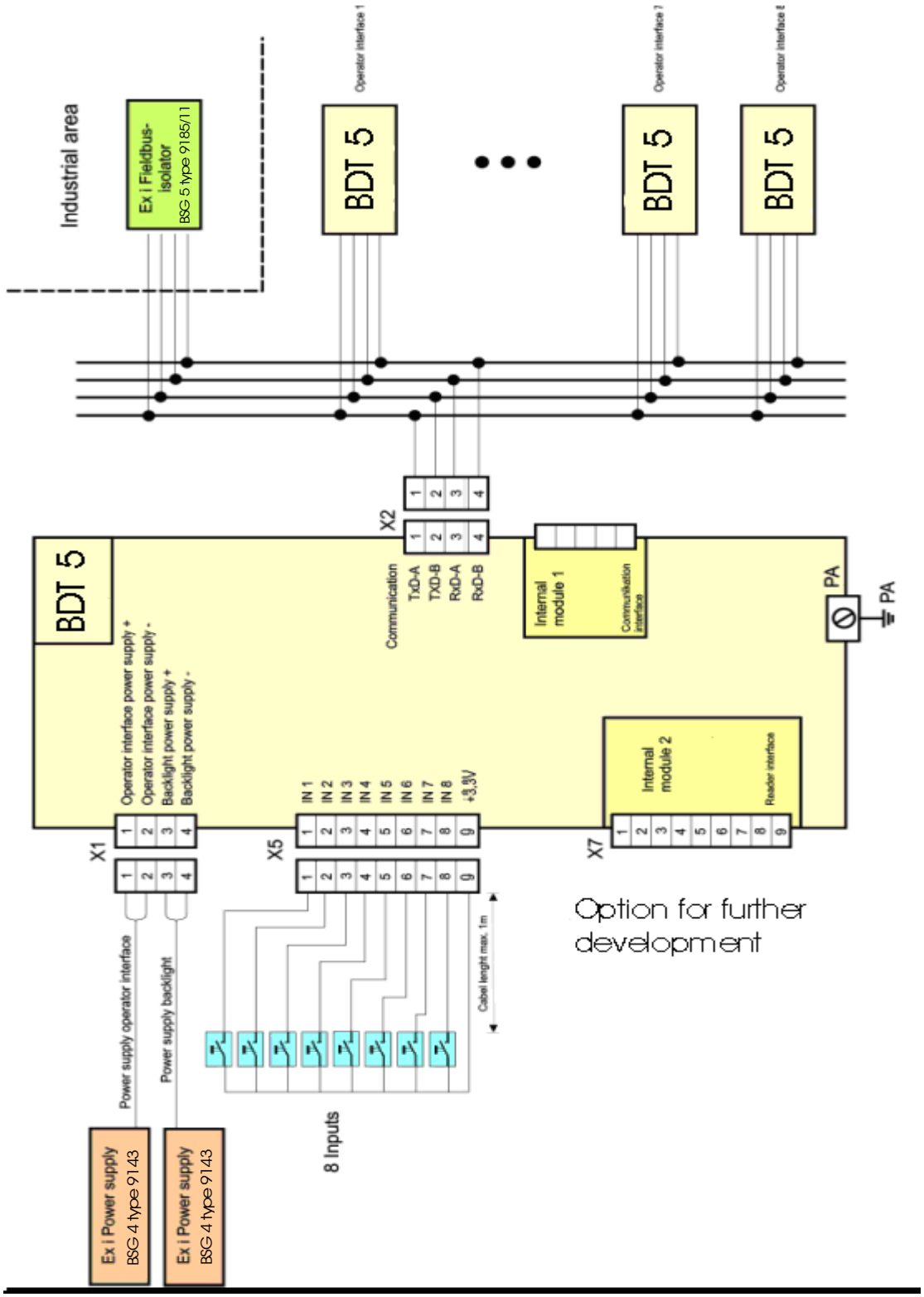
Connection options

Chapter 4-3 Operator interface overview

Version 1.2

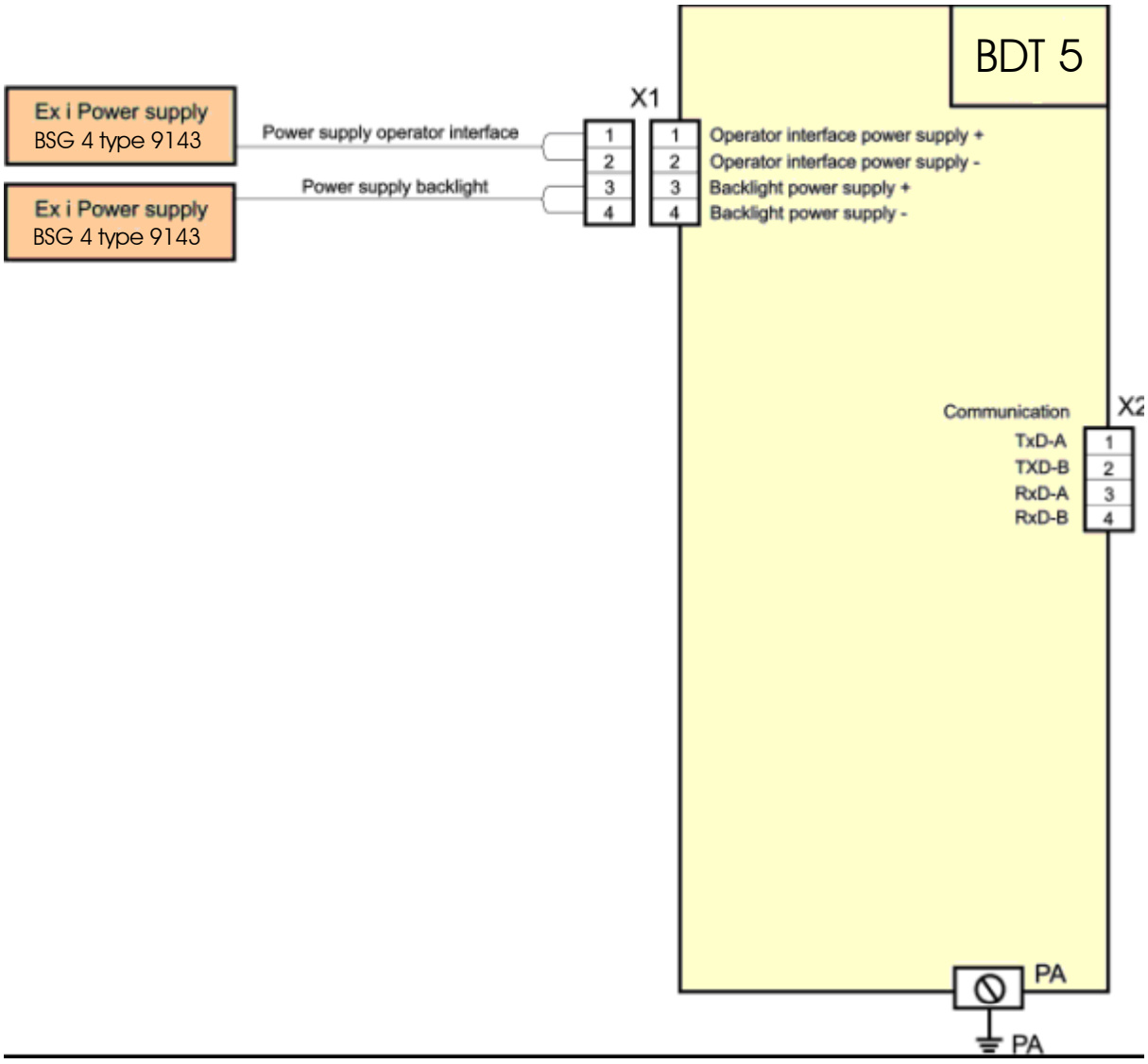
Issue: 29.04.2004

1. Complete connection options overview for BDT 5



2. Power supply for BDT 5

Overview:



☞ A separate power supply is required for the background lighting !

Connection:

Power supply BSG 4					Terminal BDT 5	
Input		**Output (intrinsically safe)**				
Designation	**Connection**	**Designation**	**Connection**		**Designation**	**Connection**
Connector					**Power supply operator interface**	
+ 24V DC	7	Output 1+	10		+ 12 V DC	X1 – 1
Functional earth	8	Output 1-	11		GND 1	X1 – 2
GND	9	N.C. **	12		**Backlight *** **	
Pac-Bus					+ 12 V DC	X1 – 3
+ 24V DC	1				GND 2	X1 – 4
GND	2					
LF *	3, 4					
N.C. **	5, 6					

☞ * The connection pin 3 and 4 (LF) of the pac-Bus short out !

☞ ** Not Connected

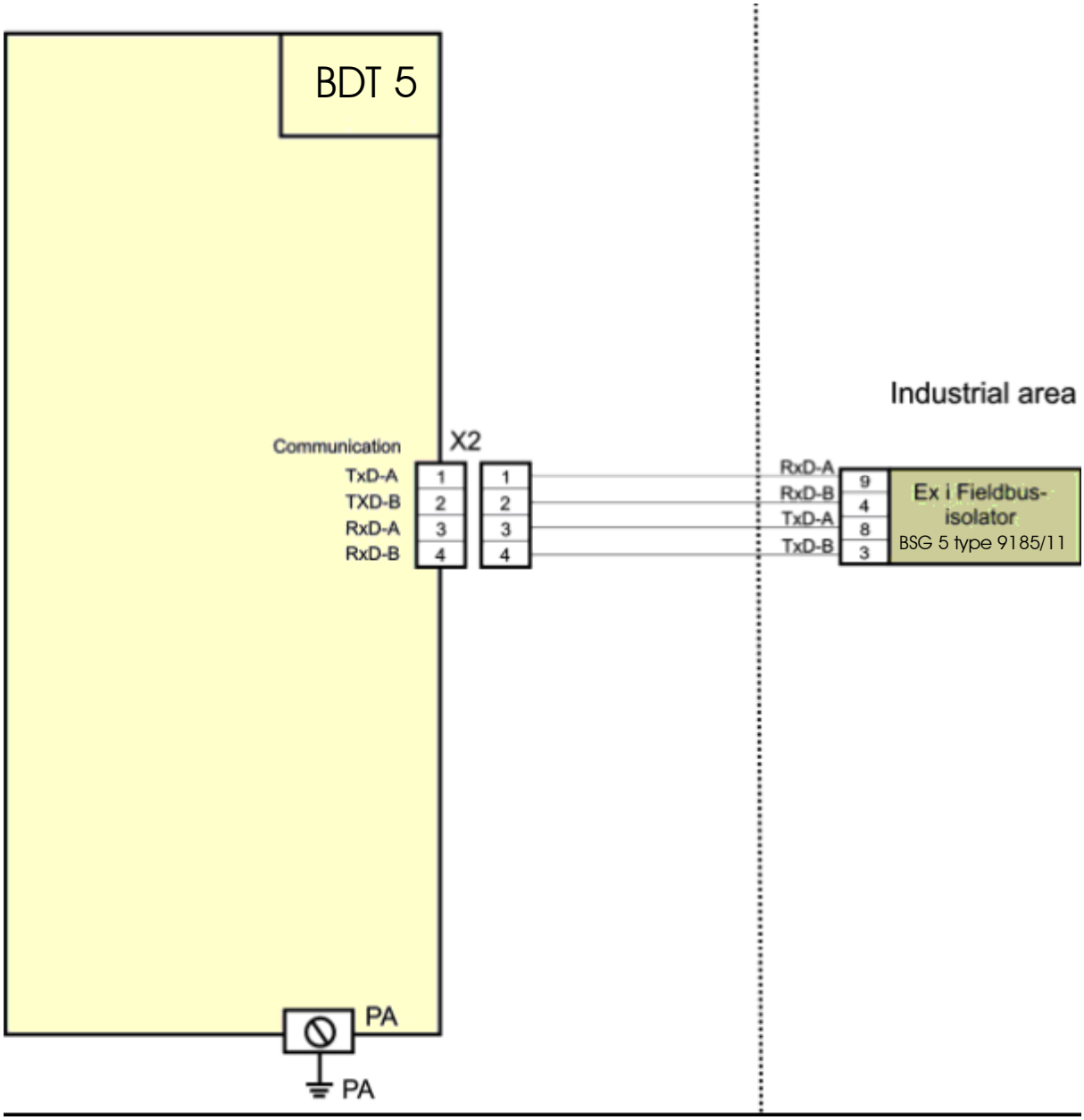
☞ *** For the backlight is need a separate Power supply BSG 4.

3. Connection between BDT 5 and Ex-i isolator

Standard interface: RS-422

Description					Page
Connection cable	**Device type**	**Signal isolator**	**Interface designation**	**Interface type**	
05-0068-0140 (VB-299) or field cable LIYCY	BDT 5	BSG 5 type 9185/11	X3	RS-422	7

Overview:


BDT 5
Industrial area
Communication
X2
TxD-A
TXD-B
RxD-A
RxD-B
1
2
3
4
1
2
3
4
RxD-A
RxD-B
TxD-A
TxD-B
9
4
8
3
Ex i Fieldbus-isolator
BSG 5 type 9185/11
PA
PA

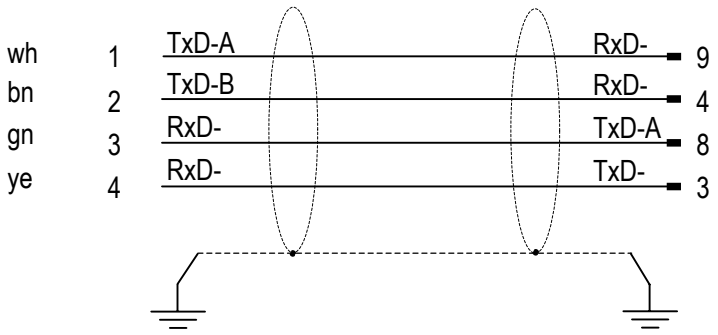
Connection cable:

05-0068-0140 (VB-299) or field cable LIYCY

BDT 5 connection to fieldbus isolating repeater BSG 5 type 9185/11 on X3:

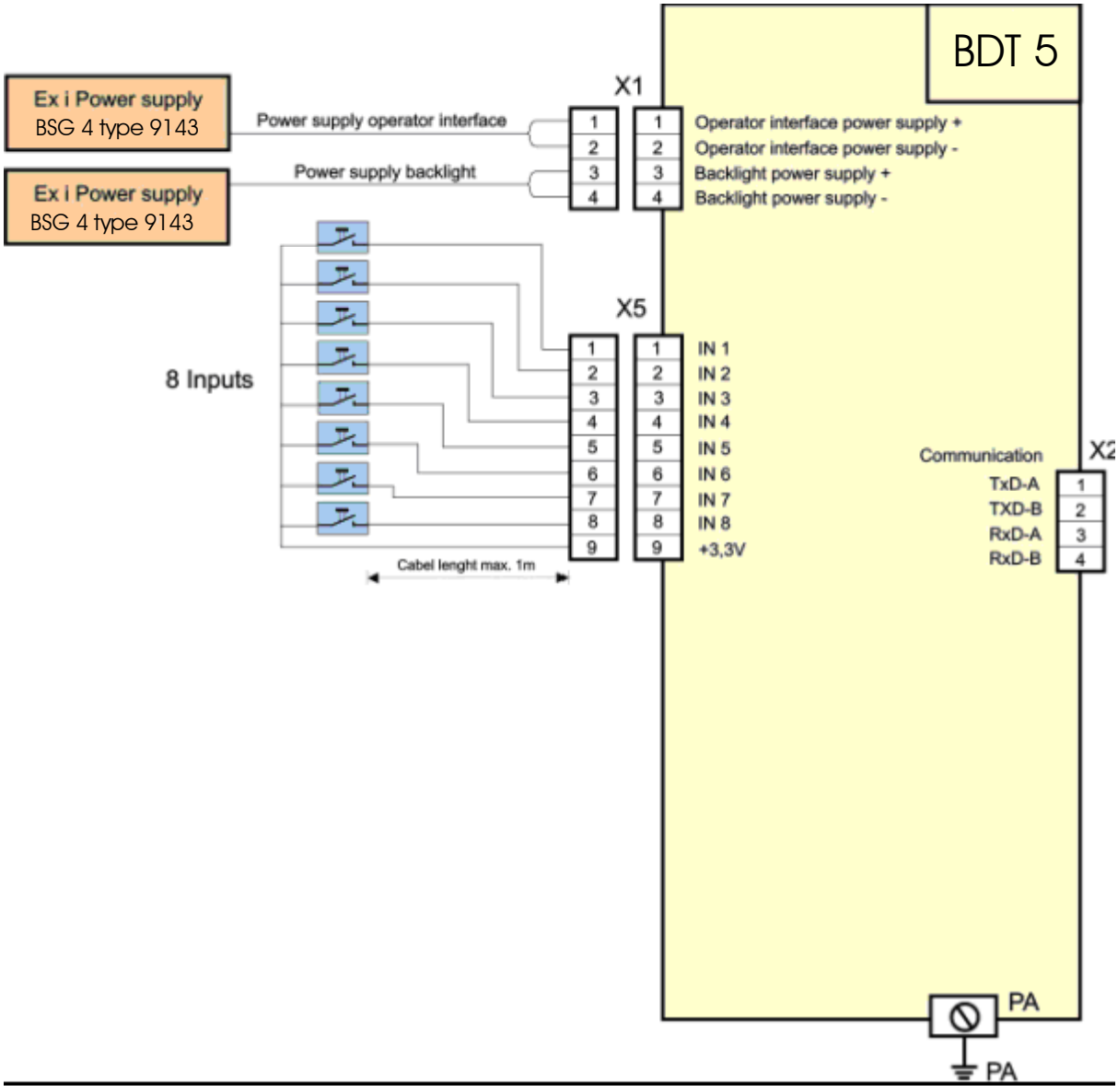
The connection cable **05-0068-0140 (VB-299)** (5m) is available as a special accessory.

	BDT 5		**BSG 5 type 9185/11**
	X2		**X3**
	Terminals		**9-pin Sub-D**
wh	1	TxD-A → RxD-	9
bn	2	TxD-B → RxD-	4
gn	3	RxD- → TxD-A	8
ye	4	RxD- → TxD-	3



4. Connection options for external switches

Overview:



- 8 digital inputs are available, to which external floating keys and switches can be connected.
- The key performance data should be max. 3.3V and 2 mA.
- The length of the cable connection may be only 1m.
- The connection cables for the external keys or switches **MUST NOT** leave the field enclosure!

OPC / PC-Systems

Connection options

Chapter 4-4 Overview OPC / PC-Systems

Description	Page

Version 1.2

Issue: 30.04.2004

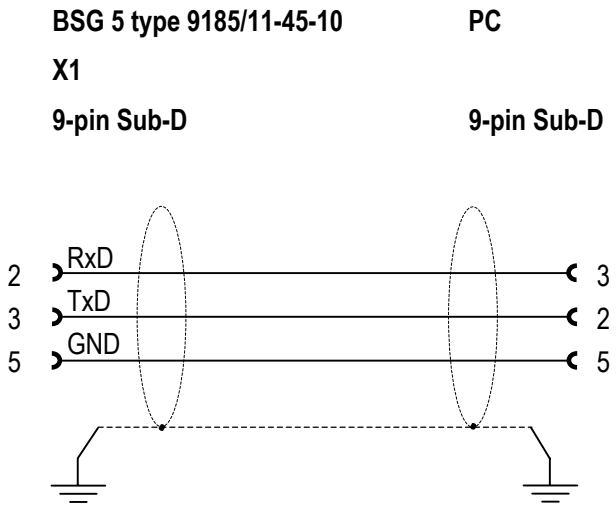
1. Connection options for OPC / PC systems

Standard communication interface: V.24/ RS-232-C

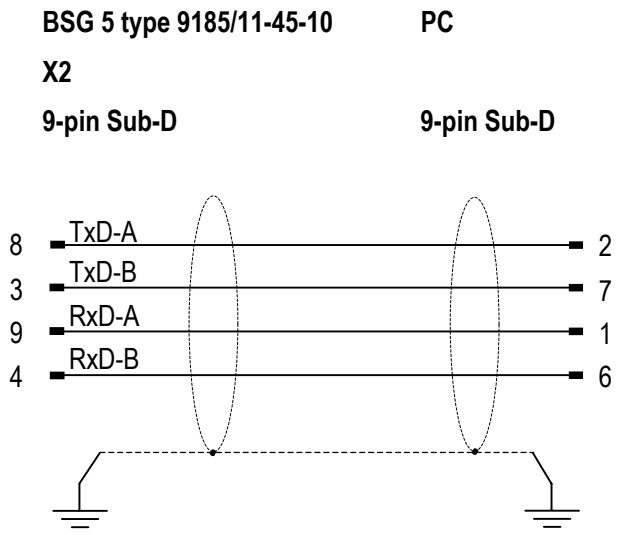
Description				Page
Controller type	Device type	Protocol type	Interface type	
PC	BDT 5	Modbus Slave	V.24/ RS-232-C	3
			RS-422	3

Controller type:
PC

Connection via V.24/ RS-232-C to X1:



Connection via RS-422 to X2:



Siemens

Connection options

Chapter 4-5 Siemens overview

Version **1.2**

Issue: **30.04.2004**

1. Connection options for S7

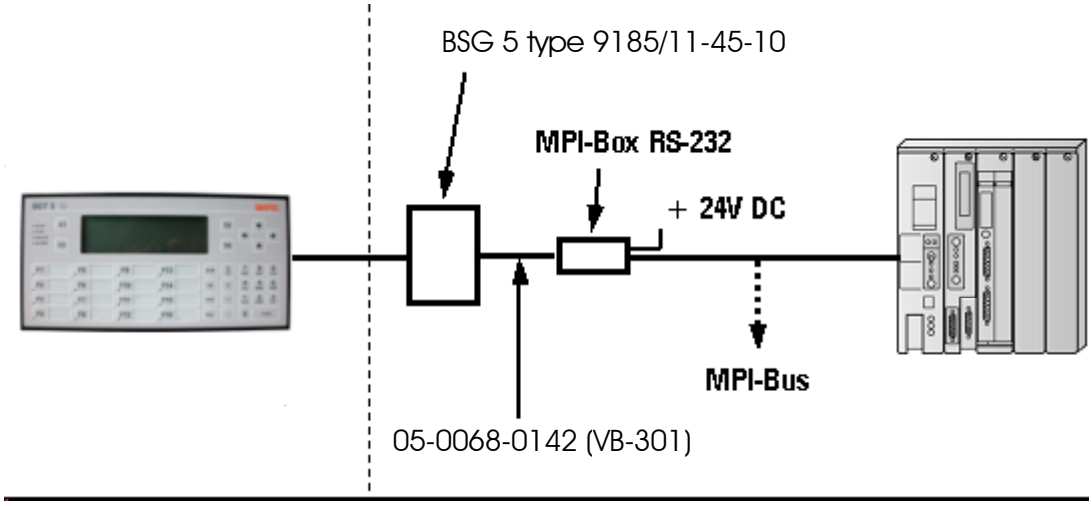
Standard communication interface: MPI

Description				Page
Controller type	**Device type**	**Protocol type**	**Interface type**	
Series CPU 300 Series CPU 400	BDT 5	MPI	MPI-Box RS-232	3
CP 340 CP 341 CP 441-1 CP 441-2	BDT 5	3964R / RK512	V.24/ RS-232-C	5
			RS-422	5

Controller type:
Series CPU 300, CPU 400

Connection via MPI-Box RS-232 to X1:

Connection diagram:



Pin assignment of MPI interface:

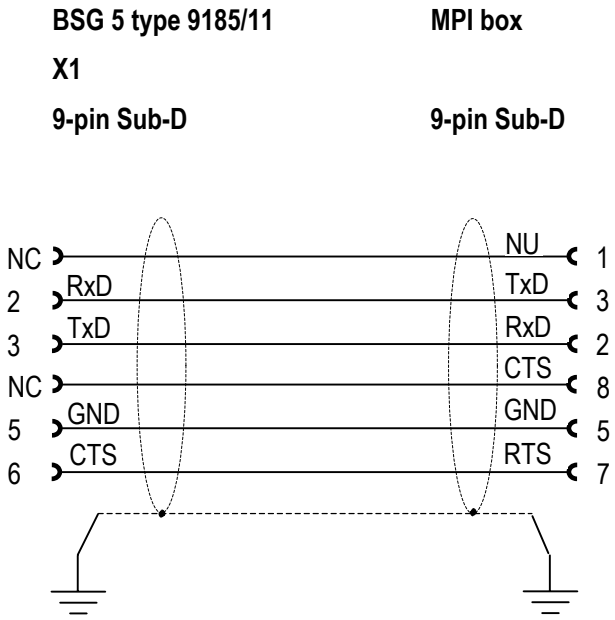
PIN	Signal name	Designation
3	RxD / TxD-P	Data line B
4	RTS / AS	Request to Send
5	GND	Data reference potential 0V
8	RxD / TxD-N	Data line A
9	RTS PG	Request to Send PG

☞ The operator interface bus connection to the MPI bus is implemented with the bus connection plug attached to the MPI box in compliance with the installation regulations applicable to the MPI bus.

Connection cable:
05-0068-0142 (VB-301)

Connection of the MPI box via V.24/ RS-232-C to X1 of BSG 5 type 9185/11:

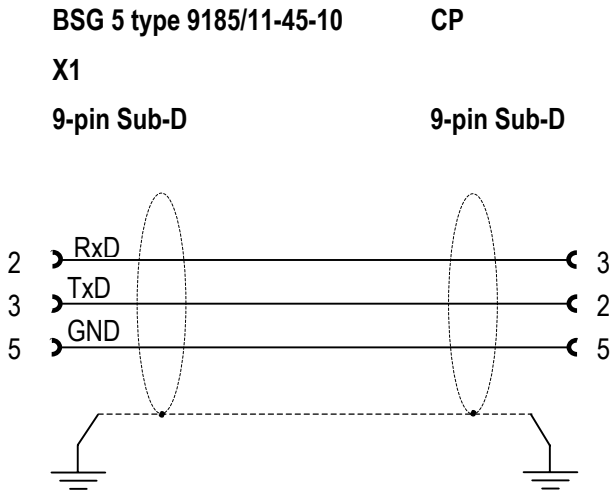
The programming cable **05-0068-0142 (VB-301)** (0.5m) is available as a special accessory.



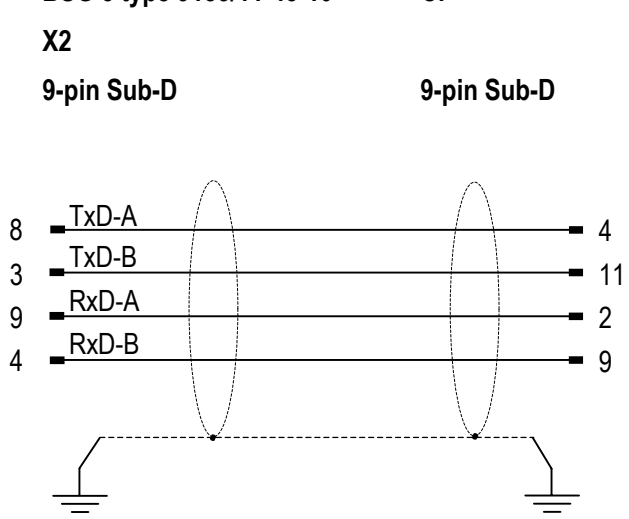
NC = Not Connected
NU = Not Used

Controller type:
CP 340, CP 341, CP 441-1, CP 441-2

Connection via V.24/ RS-232-C to X1:



Connection via RS-422 to X2:



Accessories

Connection options

Chapter 4-6 Accessories overview

Version **1.4**

Edition: **30.04.2004**

1. Programming cable

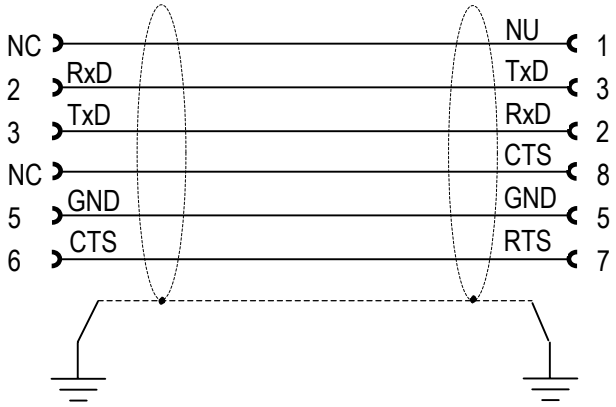
Standard programming interface: V.24/ RS-232-C

Description					Page
Programming cable	Device type	Signal isolator	Interface designation	Interface type	
05-0068-0141 (VB-300)	BDT 5	BSG 5 type 9185/11	X1	V.24/ RS-232-C	2

Programming cable:
05-0068-0141 (VB-300)

BDT 5 programming via V.24/ RS-232-C on X1 of BSG 5 type 9185/11:

The programming cable **05-0068-0141 (VB-300)** (5m) is available as a special accessory.



NC = Not Connected
NU = Not Used

CHAPTER 5

System menu, Operation

Chapter 5 overview

Contents

This chapter contains all information necessary for the operation of the devices.

Version **1.3**

Issue: **30.04.2004**

1. System menu

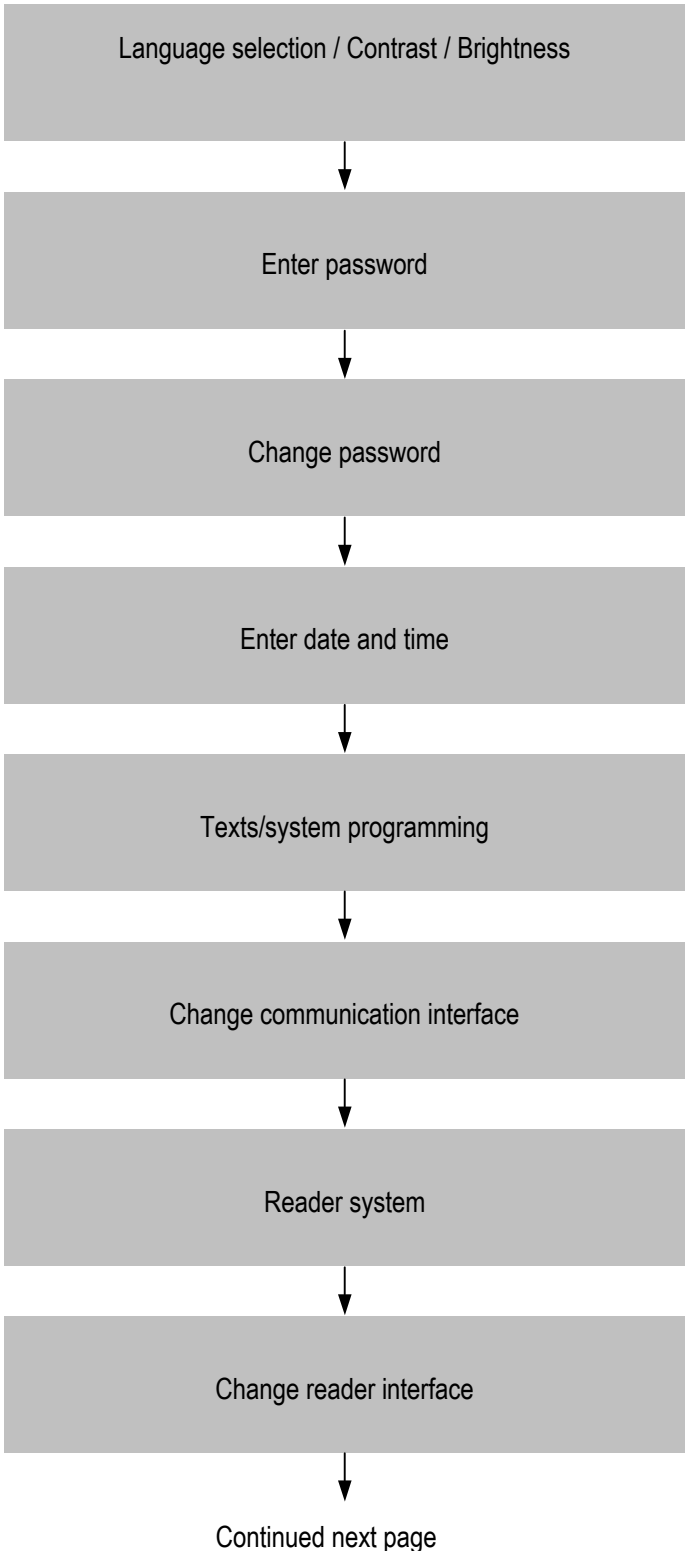
1.1 General information

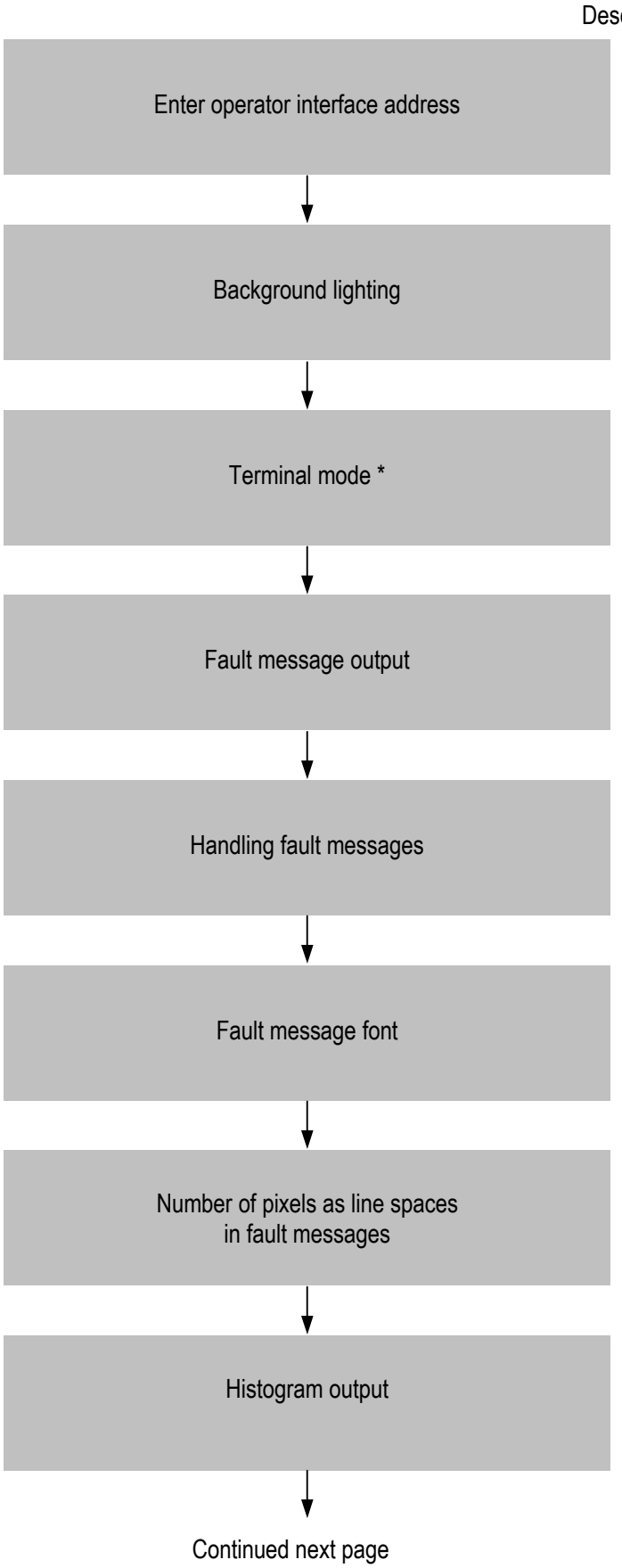
- The parameterization of the devices is done via menu.
- The configuration menu is called up by pressing the <ESC> and <CR> keys simultaneously.
- The pre-selected configuration items are marked with an inverse or flashing cursor bar.
- Selection is cursor controlled for the devices:
  - Move the cursor bar to the required position with the keys <CUP> or <CDN>.
  - Confirm and accept the selected position with the <CR> key.
  - Use <ESC> to save the pre-selected position and move to the next configuration item.
- The position of the configuration text in the BDT 5 differs slightly from the following description. However, the functionality is not affected.

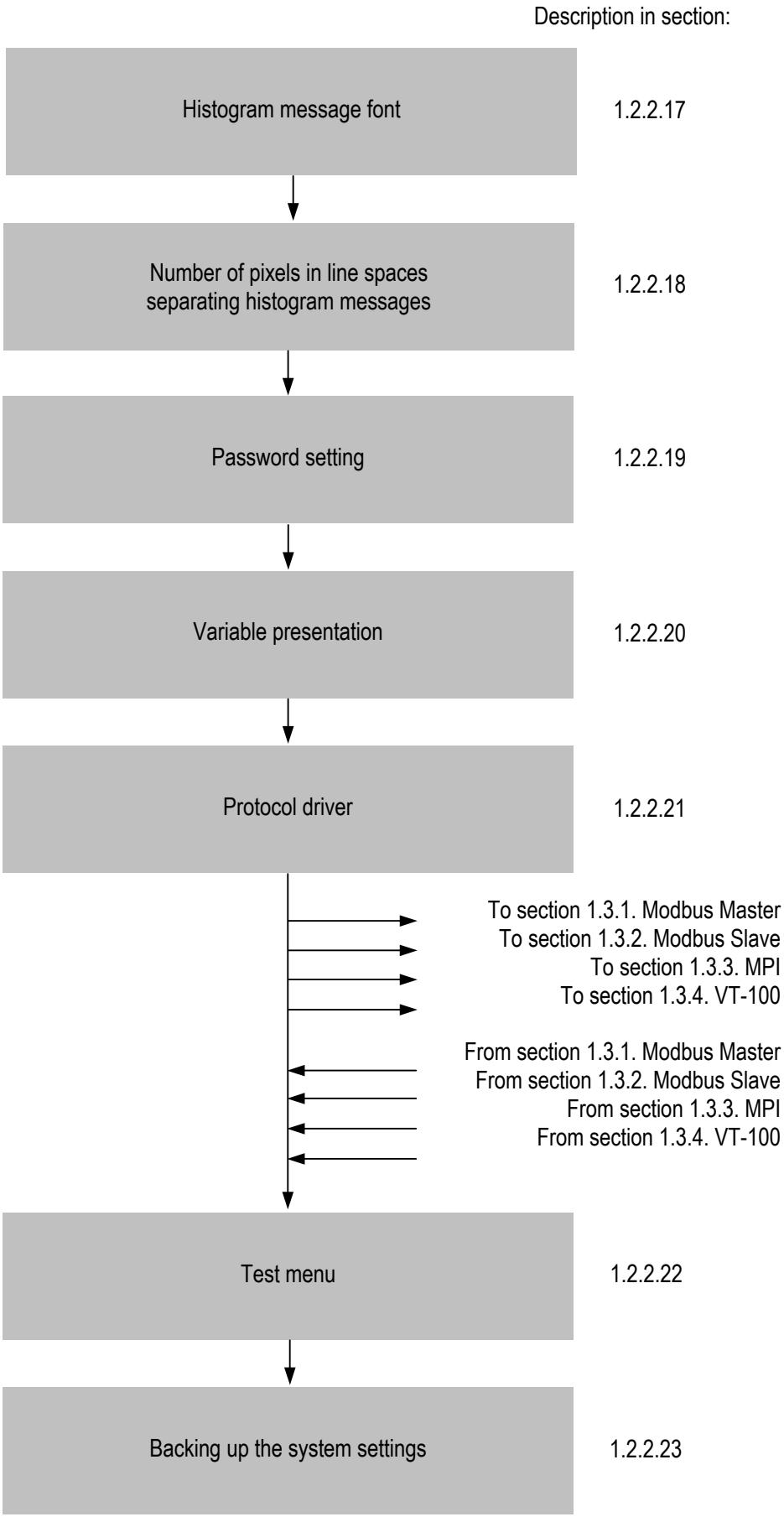
1.2 General settings

1.2.1 Overview/sequences of all system menu items

Description in section:




Description in section:
Enter operator interface address
1.2.2.9.
Background lighting
1.2.2.10.
Terminal mode *
1.2.2.11.
Fault message output
1.2.2.12.
Handling fault messages
1.2.2.13.
Fault message font
1.2.2.14.
Number of pixels as line spaces in fault messages
1.2.2.15.
Histogram output
1.2.2.16.
Continued next page


Description in section:
Histogram message font
1.2.2.17
Number of pixels in line spaces separating histogram messages
1.2.2.18
Password setting
1.2.2.19
Variable presentation
1.2.2.20
Protocol driver
1.2.2.21
To section 1.3.1. Modbus Master
To section 1.3.2. Modbus Slave
To section 1.3.3. MPI
To section 1.3.4. VT-100
From section 1.3.1. Modbus Master
From section 1.3.2. Modbus Slave
From section 1.3.3. MPI
From section 1.3.4. VT-100
Test menu
1.2.2.22
Backing up the system settings
1.2.2.23

1.2.2 Descriptions of all system menu items

1.2.2.1 Language selection / Contrast / Brightness

Conf-Version: x.xx Select Language / Change Brightness Language 1 Language 2 Language 3 <CUP/CDN> Select <0-9> Brightness <ESC> Exit <+/-/.> Contrast <CR> OK

Language selection:

- The language selection available here depends on the system settings of the project and the downloaded system files.
- The configuration menu is set to the required language when that language has been selected.
- The languages available in the project are also changed to match.

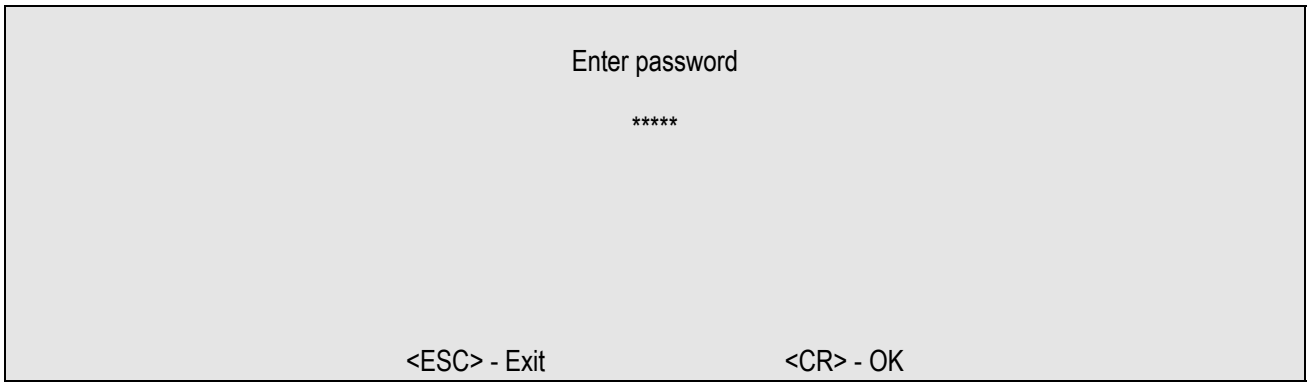
Brightness setting:

- The brightness setting has 10 stages
- Value "0" is the lowest brightness (minimum)
- Value "9" is the highest brightness (maximum)

Contrast setting:

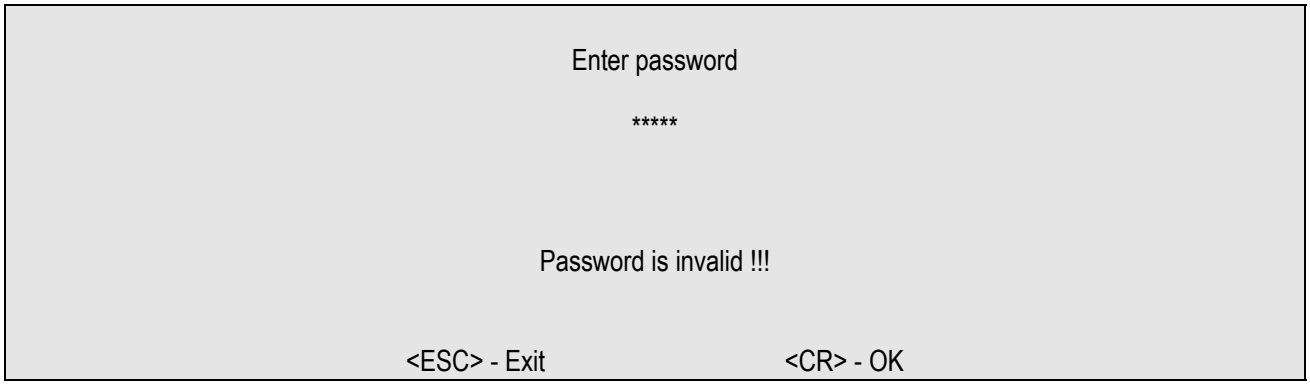
- Change the contrast to "darker" with the "+" key
- Change the contrast to "lighter" with the "-" key
- Use the "." key to set the contrast and brightness to the default position

1.2.2.2 Password



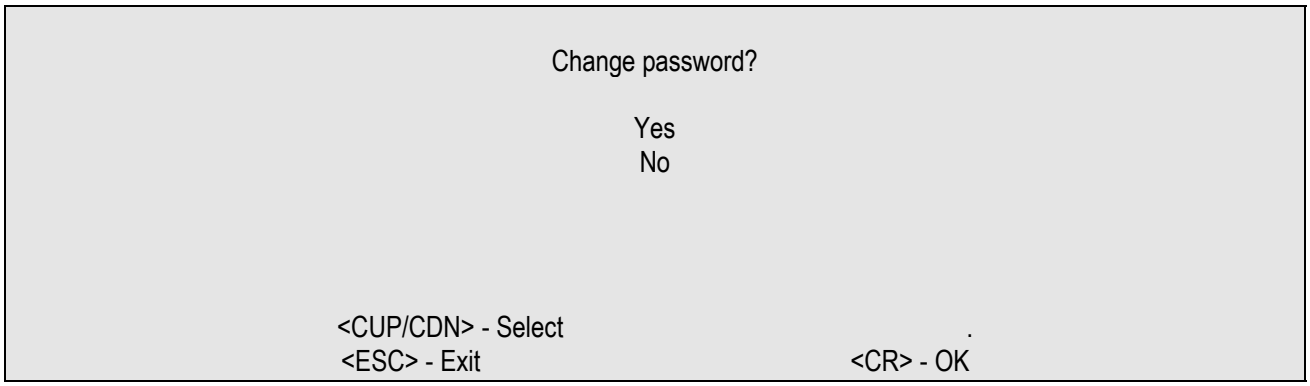
- Only the configuration menu is protected against unauthorized access with this password.
- The password is entered with the alphanumerical keys and remains invisible.
- Only numerical values are allowed for inputs.
- Accept (acknowledge) the input with <CR>, otherwise the configuration menu will be left.
- The factory password and the default password is "00000" (5 zeros)

If you enter an incorrect password the following message appears:



- The cursor jumps back to the first position in the input field and the password can be entered again.

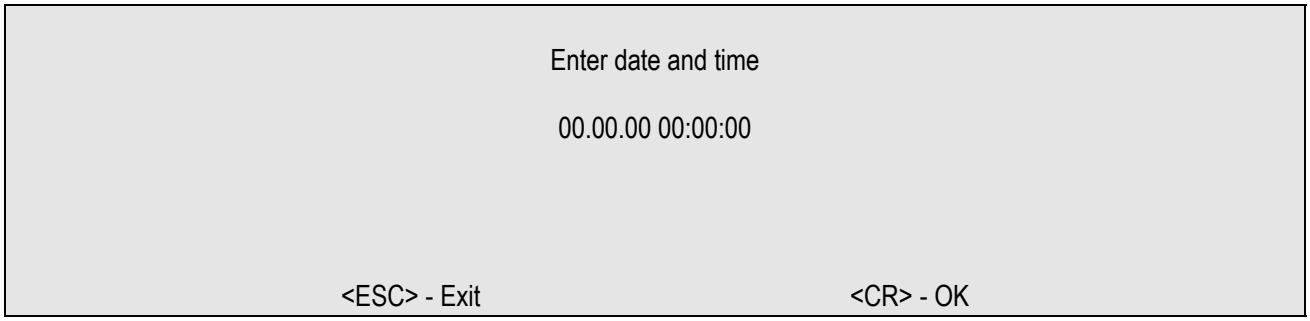
1.2.2.3 Change password



- To change the password, select the configuration item "Yes", confirm with <CR> and enter the new password.

☞ If the password has been forgotten, it is possible to reset the password to the factory default. This is implemented by simultaneously pressing the <ESC> and <CR> keys while switching on the device.
Please note that resetting this password also affects the histogram password (see section 2.3.7.1.) !

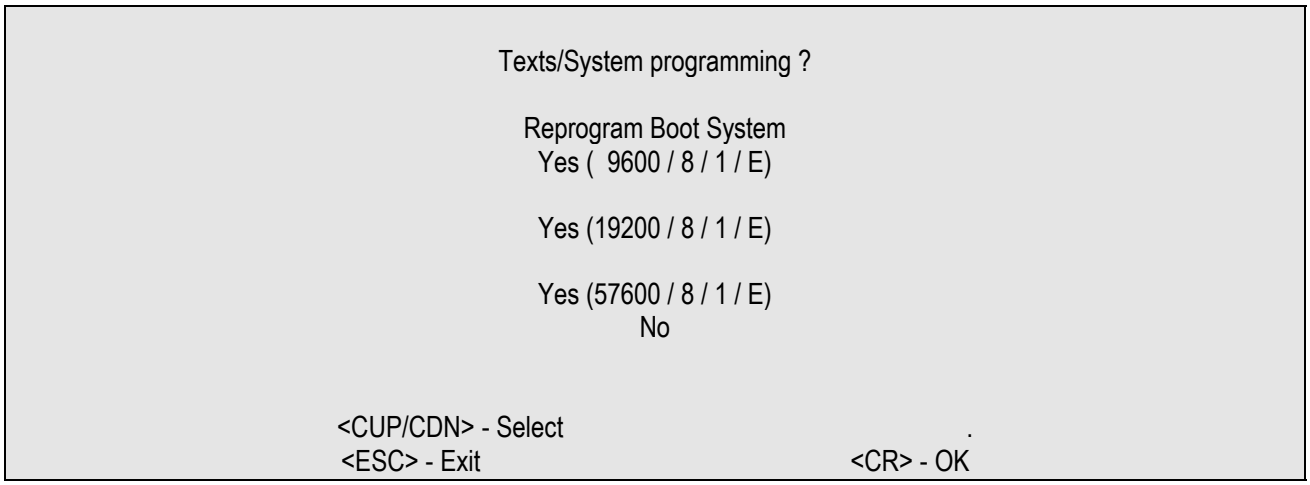
1.2.2.4 Date/Time:



- All devices are equipped with a real time clock which starts up independently and is buffered by a capacitor.
- The capacitor memory lasts approx. 5 days. After this period the clock module loses these values and the default value is displayed.
- The date and time must be reset.
- The date is entered in "dd.mm.yy" format (dd = day, mm = month, yy = year)
- The time is entered in European 24 hour format "hh:mm:ss"
  (hh = hours, mm = minutes, ss = seconds)

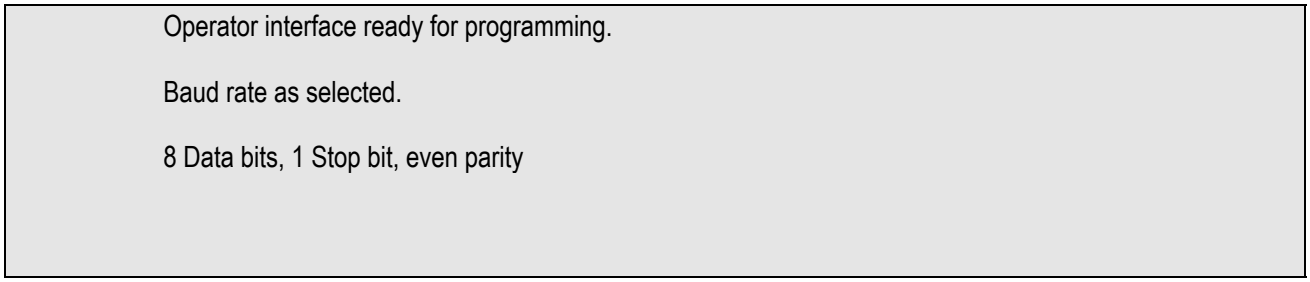
☞ If the clock module malfunctions, it is possible to reactivate it by entering an imaginary date and time value (e.g.: 99.99.99 99:99:99).

1.2.2.5 Texts / System programming



- Use this configuration item to switch the operator interface directly into programming mode so that the system and/or project can be downloaded.
- Select one of the configuration items prefixed with "Yes" and confirm with <CR>.
- The system contains the fonts, languages, driver protocols and the project (configuration) contains all other data, such as process pictures, texts, fault messages, etc.
- The transfer to the operator interface is set permanently to 8 data bits, 1 stop bit and even parity.
- Different speeds can be selected for the transfer. The following applies:
  - 9600 Bd - for slow PC´s and serial interfaces without "FIFO chips"
  - 19200 Bd - for average PC´s and serial interfaces without "FIFO chips"
  - 57600 Bd - for fast PC´s or serial interfaces with "FIFO chips"

If "Yes" is selected, the following message is displayed and the operator interface is ready to receive data:



Reprogram Boot system:

- This menu item is used to update the firmware (Boot system).

Attention!
Use this option only if absolutely necessary !
Recommendation: Only implement after contacting the manufacturer.
NEVER switch off the 24V power supply while the new boot system is reprogramming, otherwise the device will become defective and must be returned to the manufacturer.

If "Reprogram Boot System" is selected, the following message is displayed:

Reprogram Boot System ? Yes No   <CUP/CDN> - Select . <ESC> - Exit <CR> - OK

- It is now possible to irrevocably activate this function.
- Select the configuration item "Yes" and confirm with <CR>, the Boot system will be reprogrammed and updated.
- The following message appears on the operator interface:

071	Boot System Reprogram Function called. Do not switch off the system while this message is visible !!!
070	Code transfer function called

1.2.2.6 Interface parameters - operator interface

☞ **Attention:**

- Please note that the interface settings of the operator interface must be the same as the PLC !
- Further information about the relevant settings for the various PLC couplings can be found in the software manual for instructions in BMS Text.

Change communication interface? Yes No <CUP/CDN> - Select . <ESC> - Exit <CR> - OK

- If "Yes" is selected at this configuration item and confirmed with <CR>, the following configuration item will appear:

Select Data bit/Stop bit 7 Data bit / 1 Stop bit 7 Data bit / 2 Stop bit 8 Data bit / 1 Stop bit 8 Data bit / 2 Stop bit* <CUP/CDN> - Select . <ESC> - Exit <CR> - OK

☞ *) With the setting "8 Data bit, 2 Stop bit", "no parity" must be selected.

Select Parity No Parity Even Parity Odd Parity <CUP/CDN> - Select . <ESC> - Exit <CR> - OK

Select Baud rate	
2400 Baud 4800 Baud 9600 Baud 19200 Baud 57600 Baud	
<CUP/CDN> - Select <ESC> - Exit	. <CR> - OK

1.2.2.7 Reader system

```
                        Reader system

                      Scanner SK200
                      Scanner BCS 03
                        Chipcard

                        Wiegand

<CUP/CDN> - Select                                .
<ESC> - Exit                        <CR> - OK
```

- Select this configuration item to adapt the operator interface to an existing reader system.
- The requirement is that the operator interface is set up in hardware terms for a reader system.
- If the operator interface does not have the equipment set up for reader systems, this configuration item will not function.
- The following applies:
  - Scanner SK200 - For connection of a barcode laser scanner without decoder, type ELB SK200RSST, to the operator interface variant RSi.
    The default interface parameters of the scanner are:
    7 Data bits, 2 Stop bits, 9600 Baud, no parity
  - Scanner BCS 03 - For connection of a barcode laser scanner with decoder, type BCS03 ex, to the operator interface variant BCR.
    The default interface parameters of the scanner are:
    7 Data bits, 1 Stop bit, 9600 Baud, odd parity
  - Chipcard - *(in preparation)*
  - Wiegand - *(in preparation)*
- When the menu items Scanner SK200, Chipcard or Wiegand are selected, the configuration items then show the configuration item *Reader device interface parameters* (see Section 1.2.2.8).
- When the menu item Scanner BCS 03 is selected, the configuration item *Reader device interface parameters* (see Section 1.2.2.8) is skipped and there is no further option to change the reader device interface parameters.

1.2.2.8 Reader device interface parameters (option for further developments)

☞ **Attention:**

- Please note that the card reader interface settings of the operator interface must be the same as the reader device !
- The applicable parameters for the individual card readers can be found in Chapter 4 "Accessories" in the hardware manual.
- Please note also that any modification to the reader device interface parameters can lead to faulty presentation of the data read in or to "non-function" of the reader device.
- Further information can be found in the technical documentation of the reader device.

Change reader interface? Yes No <CUP/CDN> - Select . <ESC> - Exit <CR> - OK

- If "Yes" is selected at this configuration item and confirmed with <CR>, the following configuration item will appear:

Select Data bit/Stop bit 7 Data bit / 1 Stop bit 7 Data bit / 2 Stop bit 8 Data bit / 1 Stop bit 8 Data bit / 2 Stop bit* <CUP/CDN> - Select . <ESC> - Exit <CR> - OK

☞ *) With the setting "8 Data bit, 2 Stop bit", "no parity" must be selected.

Select Parity No Parity Even Parity Odd Parity <CUP/CDN> - Select . <ESC> - Exit <CR> - OK

Select Baud rate

2400 Baud
4800 Baud
9600 Baud
19200 Baud
57600 Baud

<CUP/CDN> - Select .
<ESC> - Exit <CR> - OK

1.2.2.9 Enter Operator interface address

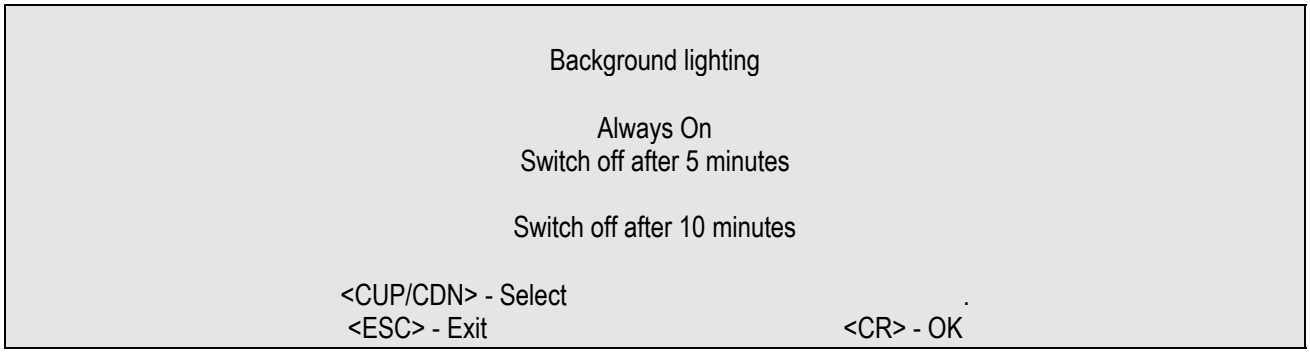
☞ **Attention:**

- The operator interface address serves to identify the device for programming and for station settings within a bus communication (only possible with some drivers).
- Further information about bus coupling can be found in Chapter 4 "Connection options".

Enter operator interface address 01   <ESC> - Exit <CR> - OK

- When this configuration item is selected, the cursor is activated and flashes in the first position of the input field.
- The default value is address 01.
- It is possible to set the operator interface (station) address with a value up to 32 (depending on necessity and protocol usage).

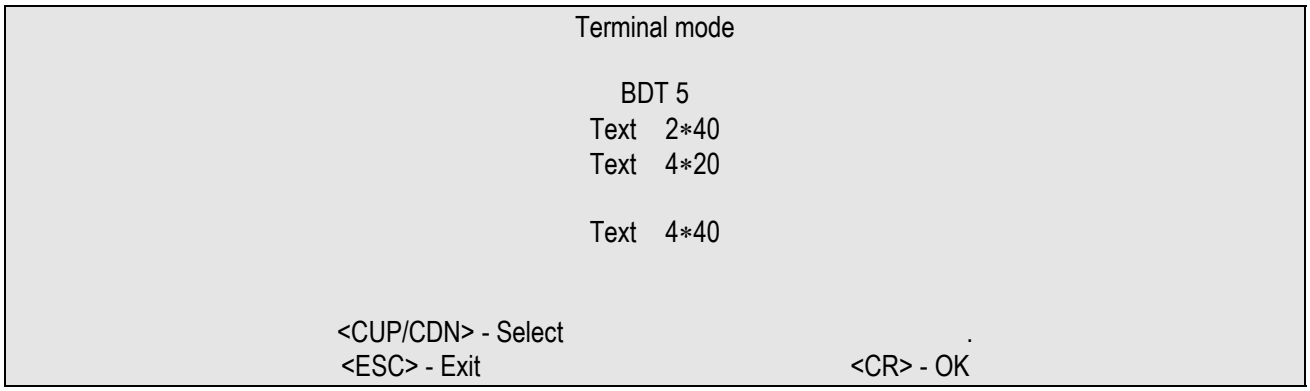
1.2.2.10 Background lighting



- The device background lighting must be supplied with a second power supply BSG 4 type 9143/10.
- You can change the background lighting behavior with this configuration item.
- If the keyboard is not used, the background lighting will switch off after the set period has elapsed.
- Pressing any key on the operator interface will switch the background lighting on again.

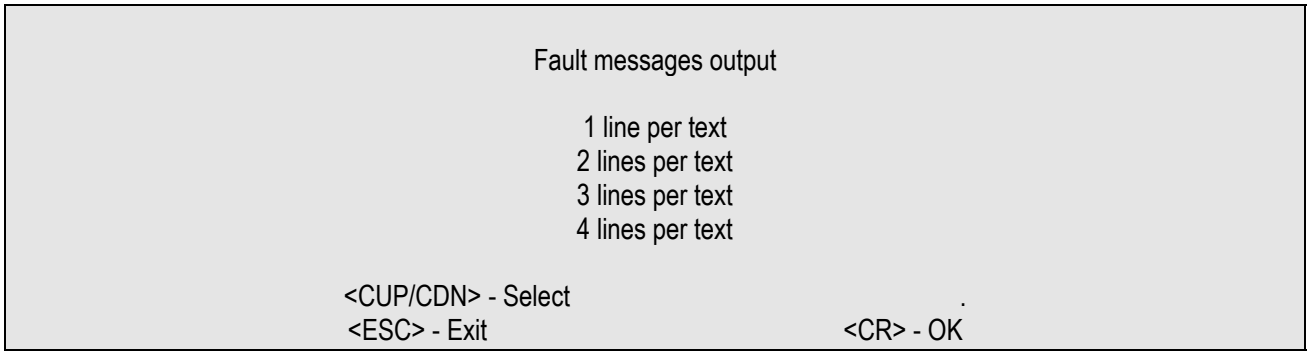
1.2.2.11 Terminal mode

☞ This configuration item is only available with BDT 5 !



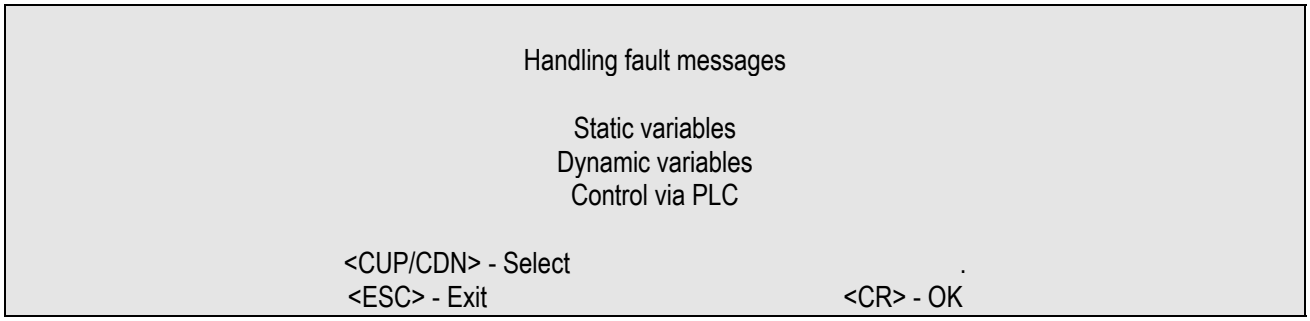
- Use this configuration item to set up the operator interface with a compatible mode for old text terminals.
- It is then possible to use existing projects from old text terminals without have to modify the display size.
- Because of the physical display size of old text terminals it is not possible to obtain 1:1 presentation.
- The following applies:
  - BDT 5 - for displaying all BDT 5 projects (display size 240x64 pixels)
  - Text 2∗40 - for displaying text projects that are arranged with 2 lines and 40 characters. (operator interfaces BDT 2 and BDT 3)
  - Text 4∗20 - for displaying text projects that are arranged with 4 lines and 20 characters. (operator interface BDT 4)
  - Text 4∗40 - for displaying text projects that are arranged with 4 lines and 40 characters. (Transferring ProVicom text projects to Exicom devices)

1.2.2.12 Fault messages output



- Planned and existing fault messages can be displayed with up to 4 lines in the operator interface.
- If the fault message text exceeds the specified number of lines and characters, the remainder of the fault message text is omitted and is not displayed by the operator interface.
- The omitted text is not lost and can be displayed if more lines are selected for the fault message text.
- The number of displayed characters per line depends on the font selected for the fault messages (see section 1.2.2.14.).

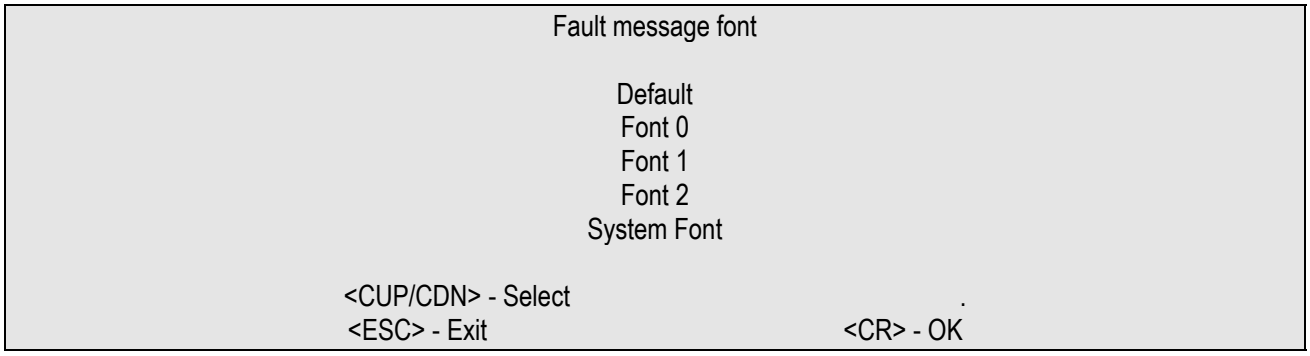
1.2.2.13 Handling fault messages



☞ This configuration item is only important if variables are used in dynamic fault messages.

- Use this configuration item to define variable behavior inside dynamic fault messages.
- The following applies:
  - Static variables: All variables are only updated when the fault message is called.
  - Dynamic variables: All variables are cyclically updated.
  - Control via PLC: It is possible to select variable behavior in dynamic fault messages via the PLC.
    - ☞ The software manual for BMS Text describes this handling function.

1.2.2.14 Fault message font

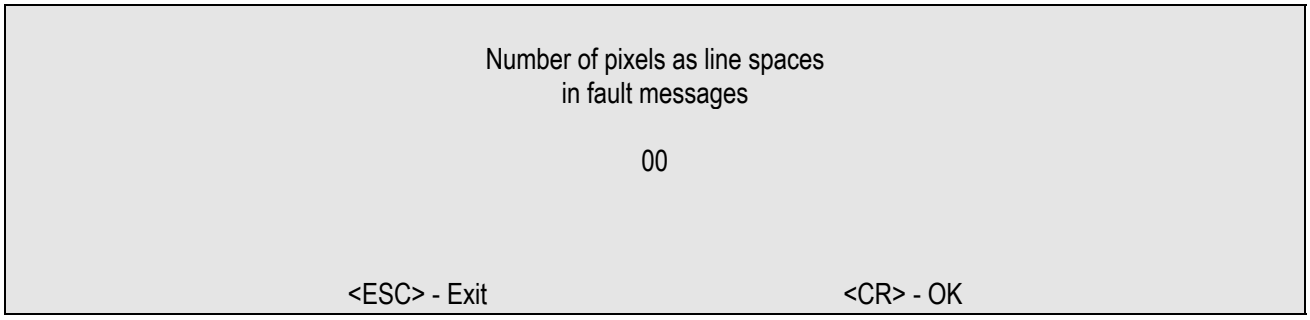


- Use this configuration item to specify the appropriate font and character size for fault messages.
- The following applies:
  - Default: This font is defined via the downloadable system files.
    This setting is currently the same as the system font.
  - Font 0: Corresponds to the font selected in BMS Text for font style 1.
  - Font 1: Corresponds to the font selected in BMS Text for font style 2.
  - Font 2: Corresponds to the font selected in BMS Text for font style 3.
  - System font: This font is a permanent font style and is a part of the boot system component of the software code and therefore cannot be changed.
    This font only displays capital letters.
    If fault messages have been generated with lower case letters, the lower case letters will be converted into capital letters.

☞ It is also possible to use special characters (like valves, engines, etc.) in fault messages. The applicable planning is implemented in BMS Text with the relevant font. The description can be found in the software manual from BMS Text.

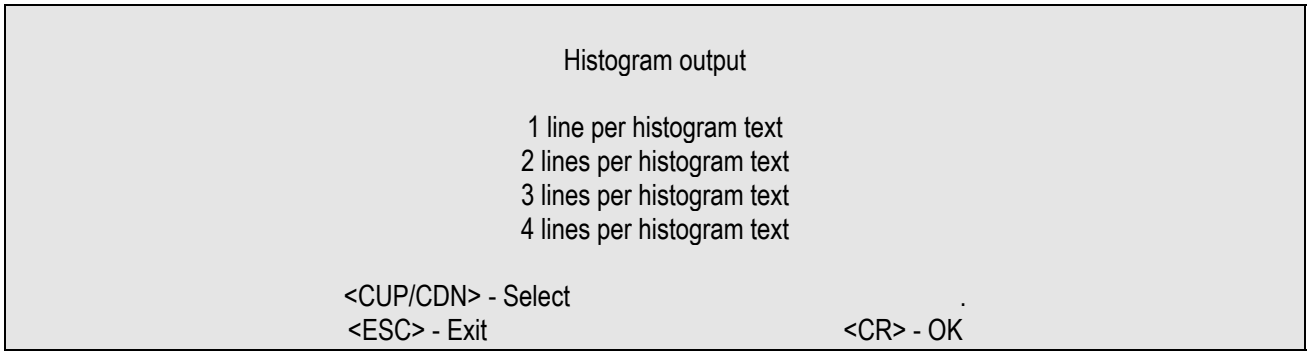
☞ Please note that the fonts are only transferred into the operator interface with a system download.

1.2.2.15 Numbers of pixels as line spaces in fault messages



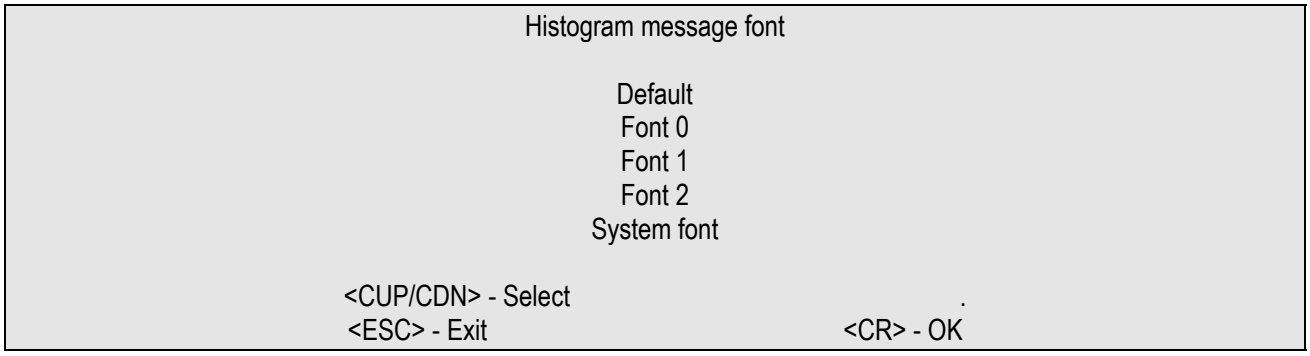
- Use this configuration item to define the number of pixels used as line spaces between individual fault messages.
- The default value is 00.
- With the default value the fault messages are displayed with 1 pixel distance between them.
- As maximum line space, the value (in pixels) can be half the size of the display.
- Permissible values, depending on the operator interface type and therefore the display, range from 00 to max. 64.
- The following applies here:
  - BDT 5: a maximum value of 32 (display 240x64 pixels)
- Incorrect inputs will not be accepted. The old value will not be overwritten.

1.2.2.16 Histogram output



- The histogram is a buffer area (10 kB) in which all texts and messages are filed in chronological order.
- The number of the entries depends on the type of texts entered as the texts are compressed before being saved in the buffer area.
- If the histogram buffer is full the oldest message will be deleted when a new message is entered (ring buffer).
- Memory requirement for one histogram entry is: 11 Byte + the memory requirement for variables, dependent on the variable type.
- The following applies for each variable type:
  - String — Per character 1 Byte
  - Binary — Total 2 Byte
  - Hexadecimal — Total 2 Byte
  - Integer — Total 2 Byte
  - Unsigned integer — Total 2 Byte
  - Long integer (32 Bit): — Total 4 Byte
  - Unsigned long integer (32 Bit): — Total 4 Byte
  - Floating point — Total 4 Byte
- Planned and existing histogram texts can be displayed with up to 4 lines in the operator interface.
- If the histogram text exceeds the specified numbers of lines and characters, the remainder of the histogram text is omitted and is not displayed by the operator interface.
- The omitted text is not lost and can be displayed if more lines are selected for the histogram text.

1.2.2.17 Histogram message font

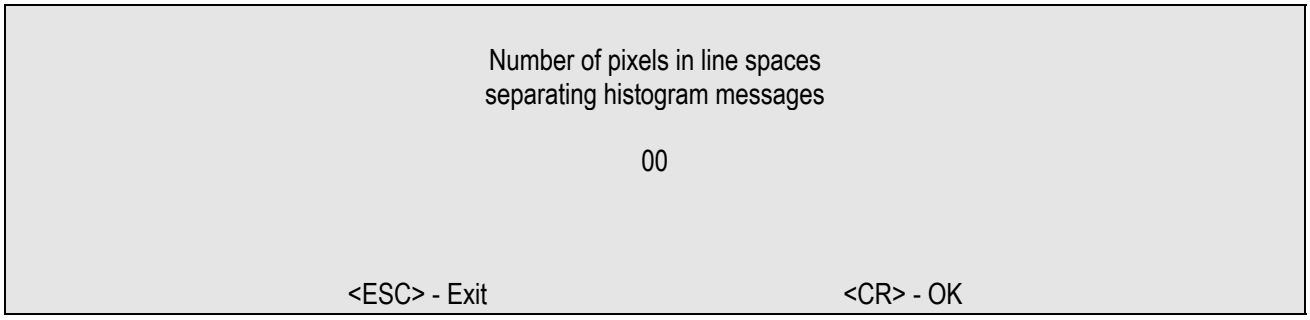


- Use this configuration item to set the corresponding font and the size of the characters for histogram messages.
- The following applies:
  - Default: This font is defined via the downloadable system files.
    This setting is currently the same as the system font.
  - Font 0: Corresponds to the font selected in BMS Text for font style 1.
  - Font 1: Corresponds to the font selected in BMS Text for font style 2.
  - Font 2: Corresponds to the font selected in BMS Text for font style 3.
  - System font: This font is a permanent font style and is a part of the boot system component of the software code and therefore cannot be changed.
    This font only displays capital letters.
    If fault or text messages have been generated with lower case letters, the lower case letters will be converted into capital letters.

☞ It is also possible to use special characters (like valves, engines, etc.) in fault or text messages. The applicable planning is implemented in BMS Text with the relevant font. The description can be found in the software manual from BMS Text.

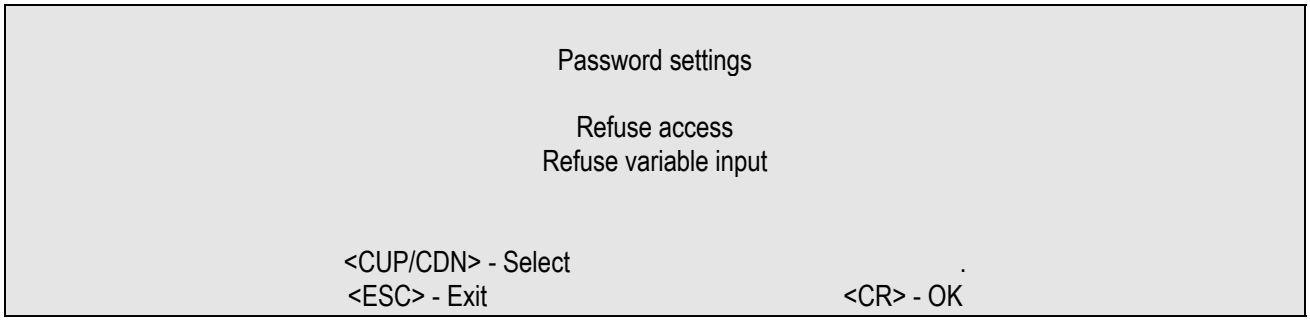
☞ Please note that the fonts are only transferred into the operator interface with a system download.

1.2.2.18 Number of pixels in line spaces separating histogram messages



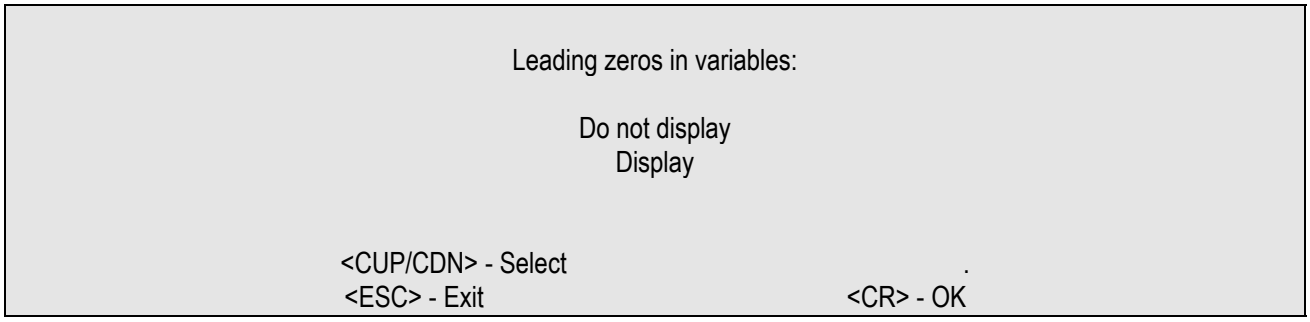
- Use this configuration item to define the number of pixels used as line spaces between individual histogram messages.
- The default value is 00.
- With the default value the fault messages are displayed with 1 pixel distance between them.
- As maximum line space, the value (in pixels) can be half the size of the display.
- Permissible values, depending on the operator interface type and therefore the display, range from 00 to max. 64.
- The following applies here:
  - BDT 5: a maximum value of 32 (display 240x64 pixels)
- Incorrect inputs will not be accepted. The old value will not be overwritten.

1.2.2.19 Password settings



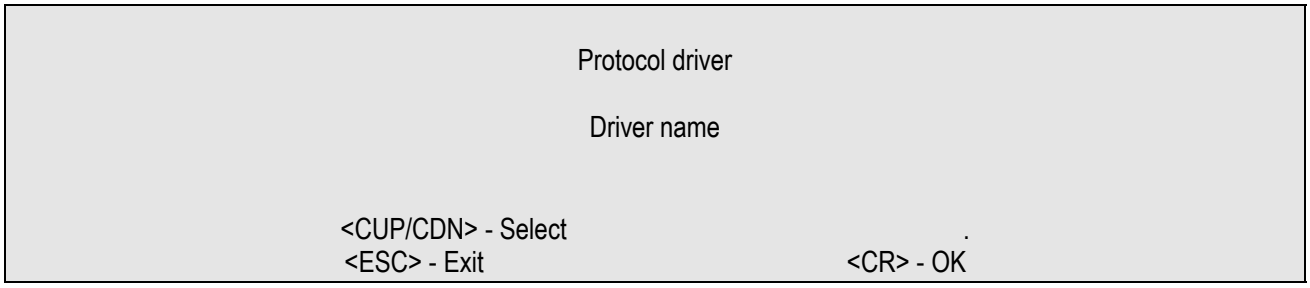
- Use this configuration item to define password protection behavior for operation.
- The following applies here:
  - Refuse access: The applicable page with password protection cannot be called up.
  - Refuse variable input: Variable input is disabled. The cursor is switched off.
- Password protection is implemented with password levels from 1 to 9.
- Detailed descriptions of these functions can be found in the software manual from BMS Text.

1.2.2.20 Variable presentation



- Use this configuration item to define if the full variable should be displayed or only the actual value.

1.2.2.21 Protocol driver



- The name of the driver is displayed here to identify the driver downloaded into the operator interface.

1.2.2.22 Test menu

Attention:

The following tests should only be implemented by qualified service personal. The operator interface is tested as a single component.

```
Implement test menu ?

Yes
No

<CUP/CDN> - Select                    .
<ESC> - Exit                  <CR> - OK
```

Keyboard test

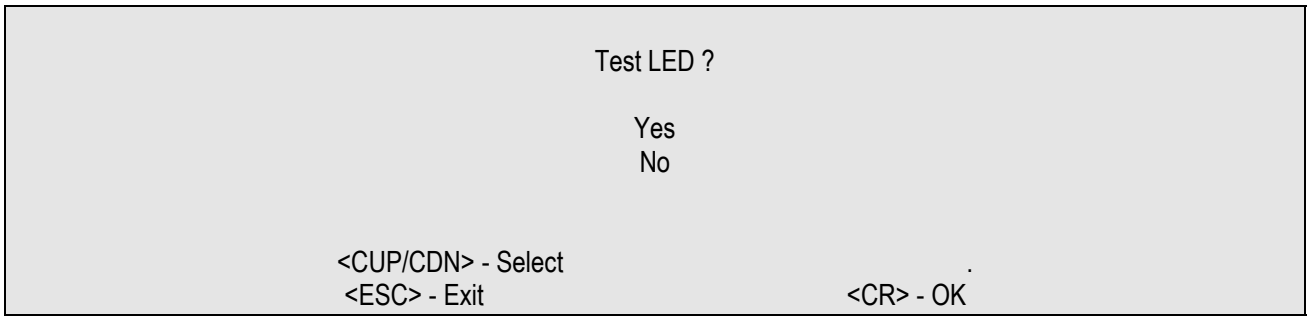
```
Test keyboard ?

Yes
No

<CUP/CDN> - Select                    .
<ESC> - Exit                  <CR> - OK
```

- If "Yes" is selected at this test menu item and confirmed with <CR>, the following message appears:

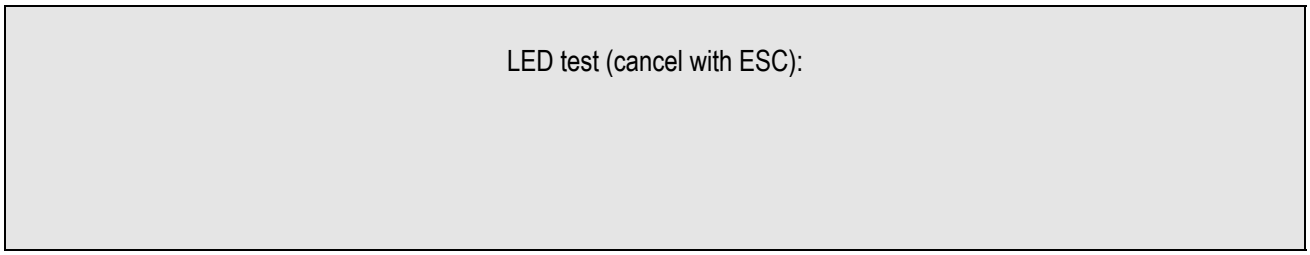
```
Keyboard test (cancel with ESC):
```

- Pressing a key will show the pressed key in the display.

LED test

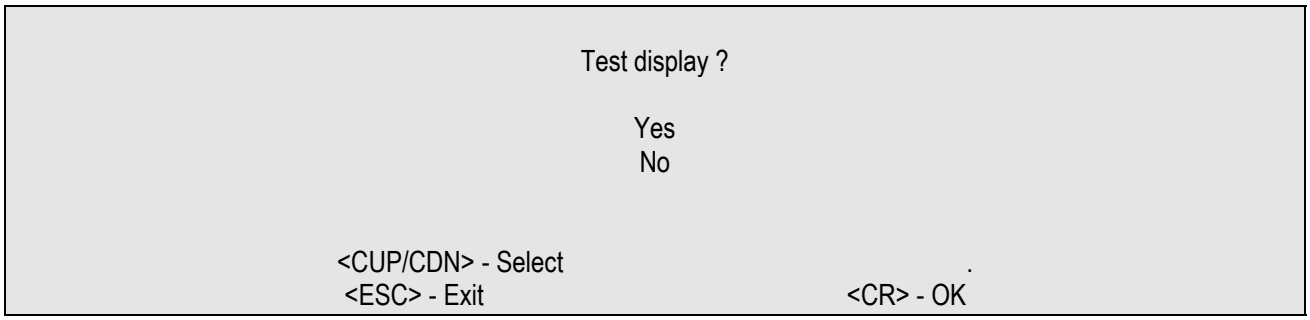


- If "Yes" is selected at this test menu item and confirmed with <CR>, the following message appears:

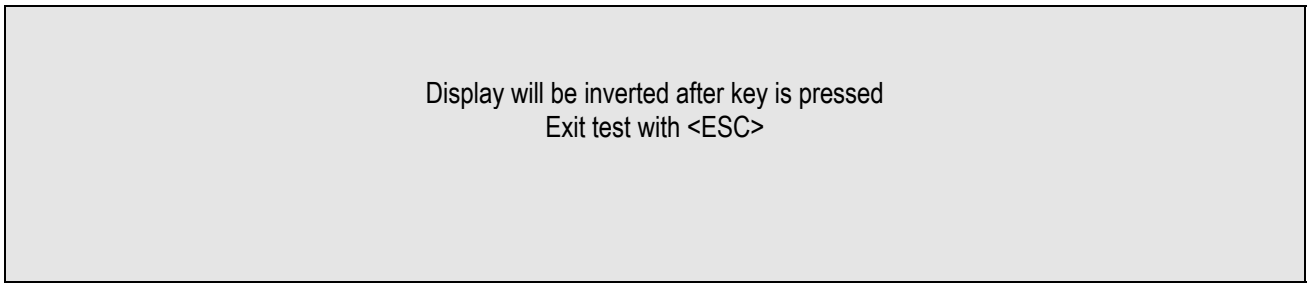


- Pressing the relevant function key will statically switch on the corresponding key LED.
- Pressing <Shift> + the relevant function key switches on the corresponding key LED which will flash rapidly.
- Pressing <Alt> + the relevant function key switches on the corresponding key LED which will flash slowly.
- Pressing <Ctrl> + the relevant function key will switch off the corresponding key LED.

Display test

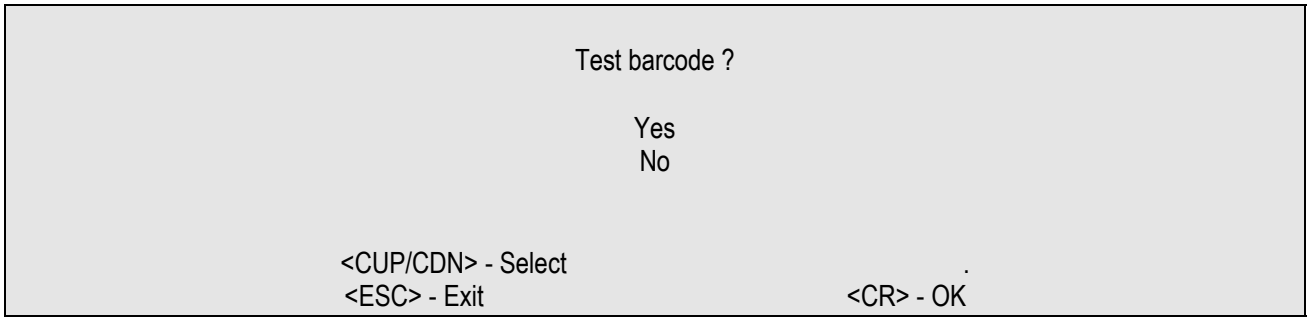


- If "Yes" is selected at this test menu item and confirmed with <CR>, the following message appears:

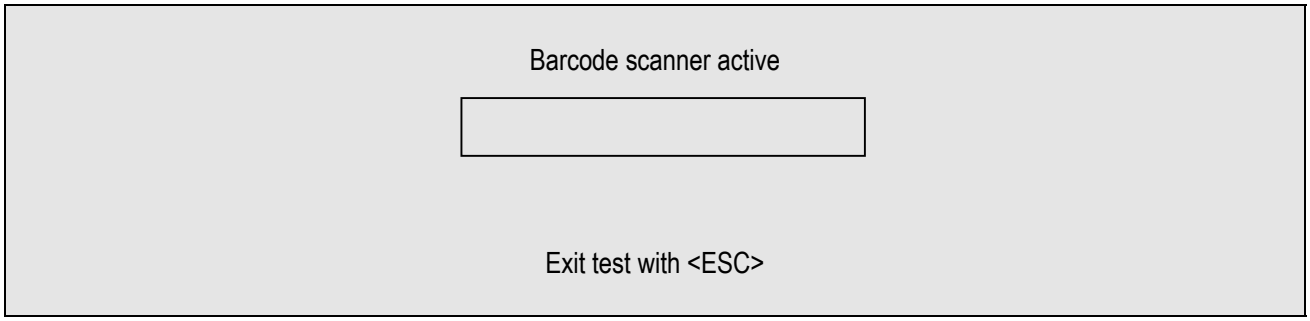


Reader device test

☞ This test menu item is only used in devices which have an optional reader interface (additional module for reader devices).

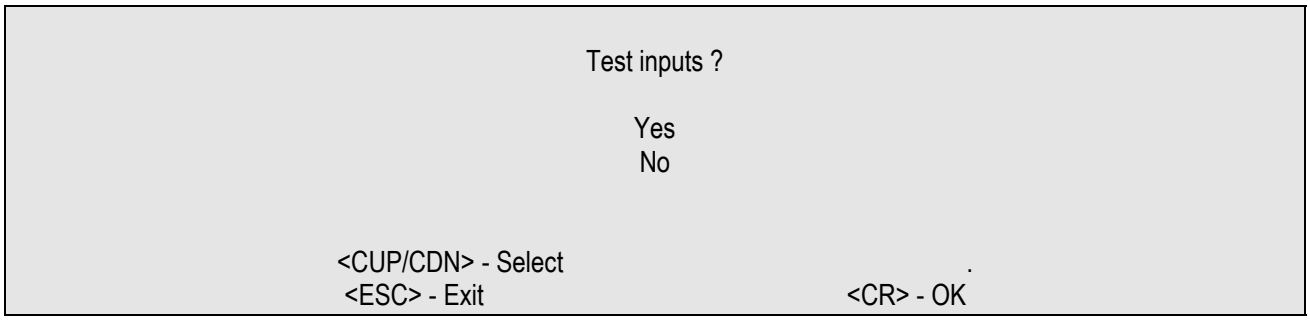


- If "Yes" is selected at this test menu item and confirmed with <CR>, the following menu window appears:

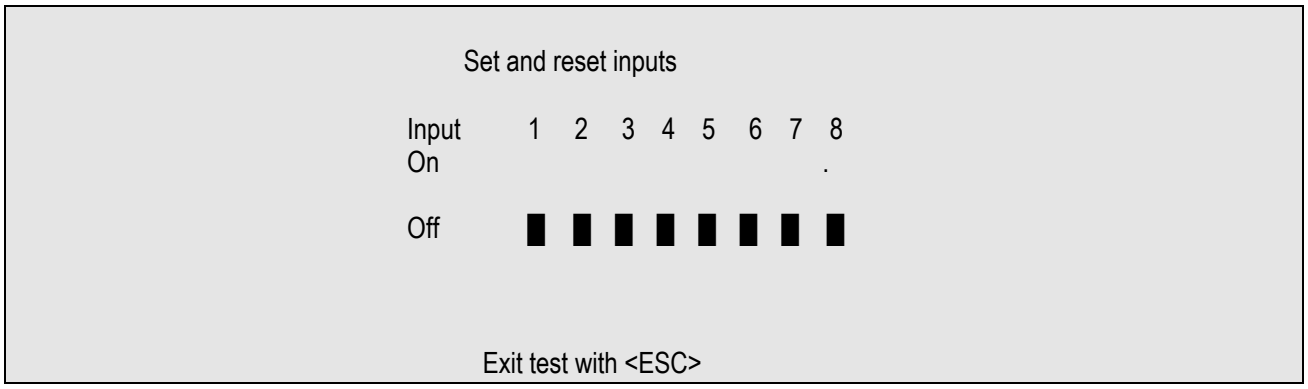


- Correct data recognition by the reader device will be shown in the display.

Test inputs



- If "Yes" is selected at this test menu item and confirmed with <CR>, the following menu window appears:



- The status "Off" changes to "On" when the inputs are supplied with +3.3V DC.
- The +3.3V DC is available on terminal 9 in X5 (see Chapter 3).
- The inputs can be connected with floating contacts, switches and keys.

Interface test

```
Test communication interface ?

Yes
No

<CUP/CDN> - Select                    .
<ESC> - Exit                  <CR> - OK
```

- If "Yes" is selected at this test menu item and confirmed with <CR>, the following menu window appears:

```
Test interface with loop back plug

Transmitted:                  .
Received:                     .

Exit test with <ESC>
```

- A requirement for the interface test is a connected loop back plug on the RS-232 interface of the fieldbus isolating repeater BSG 5 type 9185/11.
- It is also possible to bridge both pins 2 and 3 on the Sub-D plug of the RS-232 interface of the fieldbus isolating repeater BSG 5 type 9185/11.

Repeating the test

```
Repeat system test ?

Yes
No

<CUP/CDN> - Select                    .
<ESC> - Exit                  <CR> - OK
```

- If "Yes" is selected in this test menu item and confirmed with <CR>, the display returns to the beginning of the test menu.
- All the system tests described above can be repeated in this manner.

1.2.2.23 Backing up the system settings

Attention:

Changes to the system settings must be saved in the Flash-EPROM as the settings will otherwise be lost after a cold start.

Save configuration in Flash-EPROM?

Yes
No

<CUP/CDN> - Select .
<ESC> - Exit <CR> - OK

- If "Yes" is selected at this configuration item and confirmed with <CR>, the following message appears:

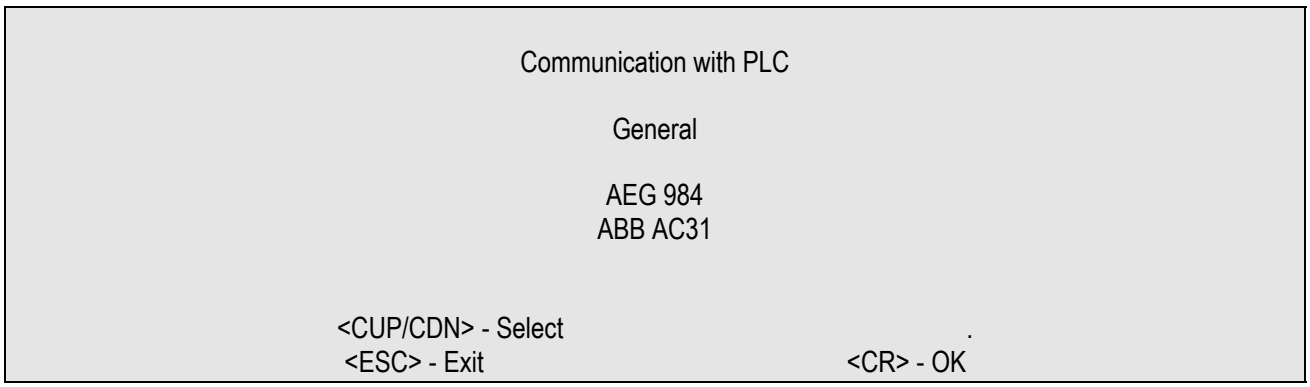
Configuration is being saved in the Flash-EPROM. Please wait…

- Following this message the operator interface will reboot then display the start page or a "communication error".

1.3 Protocol-specific settings

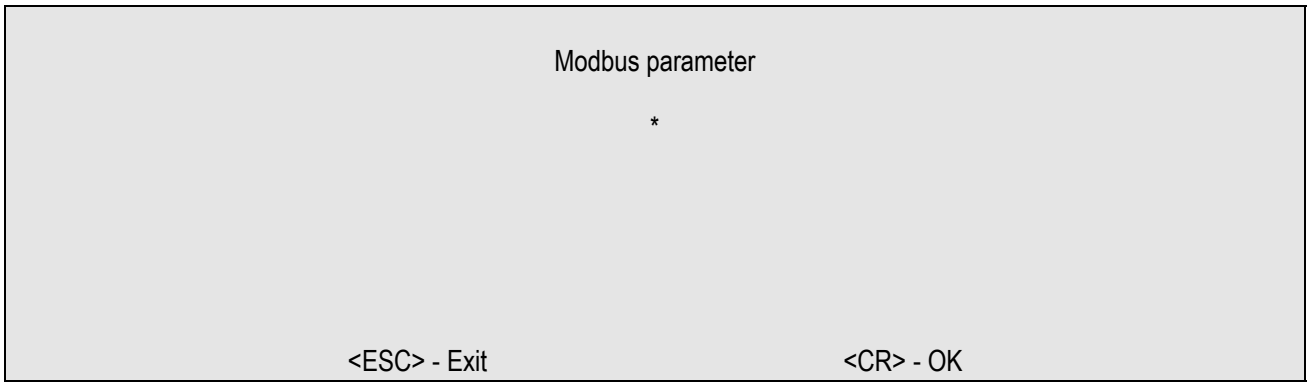
1.3.1 Modbus Master

continued from section 1.2.1.



- The Modbus Master protocol is supported by various PLC manufacturers.
- These manufacturers sometimes use different address or display formats in their PLC / PLC programs.
- Use this configuration item to adapt the Modbus protocol to the different variants.
- The following applies here:
  - General: Register addressing, representation from 0
  - AEG 984: Register addressing, representation from 1
  - ABB AC31: Flag word addressing

(continued on next page)



- This parameter can only be changed if the menu item "General" is selected in the previous configuration item.
- With the selection of the menu item AEG 984 this parameter is permanently set at 0.
- With the selection of the menu item ABB AC31 this parameter is permanently set at 4.
- This parameter allows the higher and lower byte within a word and/or the higher and lower word within a double word to be swapped around.
- Only the variable formats float, long integer, unsigned long integer and string (ASCII characters) are supported here. *
- It is also possible to implement a diagnosis via the Run/Stop operation of the PLC. **
- If this diagnostic is used via the selected Modbus parameter, only the operator interface Stop LED is involved, showing the actual status.
- The cursor in this input field is active and flashing.
- The input must be a single digit, value between 0 and 7.
- Invalid inputs will not be accepted and the old value is retained.

Parameter definition:

Modbus parameter	RUN/STOP diagnostic	Word swapped	Byte swapped
0	Yes	No	Yes
1	Yes	No	No
2	Yes	Yes	Yes
3	Yes	Yes	No
4	No	No	Yes
5	No	No	No
6	No	Yes	Yes
7	No	Yes	No

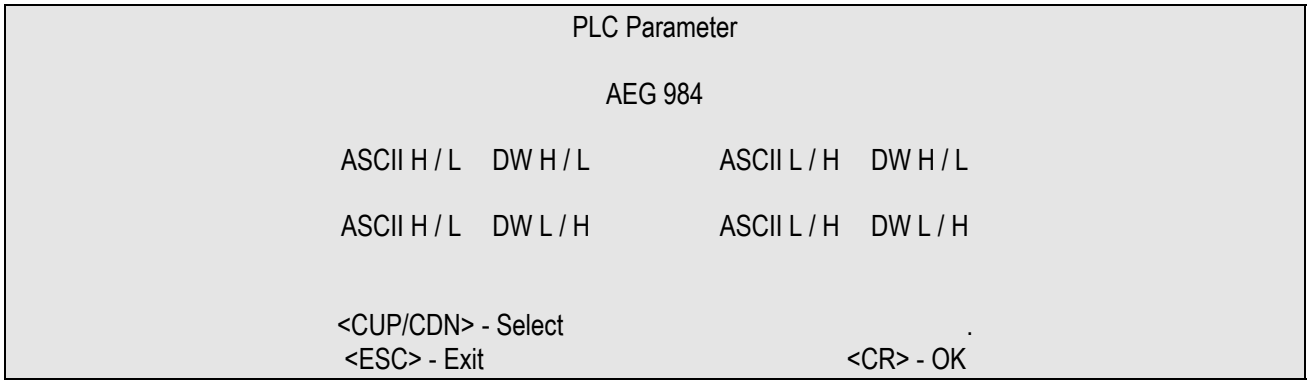
☞ * The variable formats are described in section 2.3.4.

☞ ** Please note that not every PLC can support this diagnostic.
Further information can be found in the manuals of the respective PLC manufacturers.

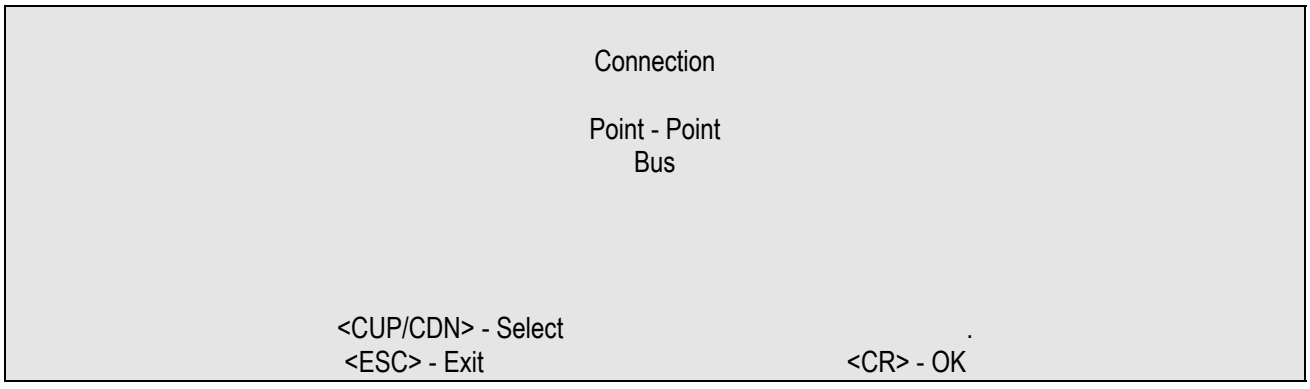
return to section 1.2.1.

1.3.2 Modbus Slave

continued from section 1.2.1.



- With the selection of the menu item AEG 984 the PLC parameters are set according to the AEG 984 definition.
- If one of the other menu items is selected, the higher and lower byte within a word and/or the higher and lower word within a double word (DW) will be swapped according to the indicated H/L format.
- The term ASCII represents the byte, H the high byte or word and L the lower byte or word.

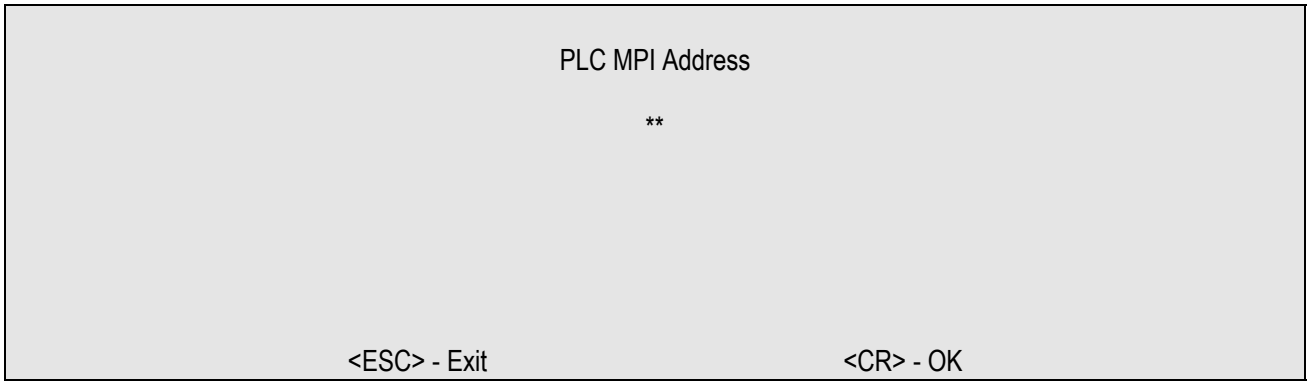


- With the selection of the menu item "Point to Point" no scanning is implemented by the driver. Therefore physically only a RS-232 or RS-422 connection (needs no scanning) can be used.
- If the menu item "Bus" is selected, scanning will be implemented by the driver. This is required for a physical RS-485 connection.

return to section 1.2.1.

1.3.3 S7-MPI

continued from section 1.2.1.

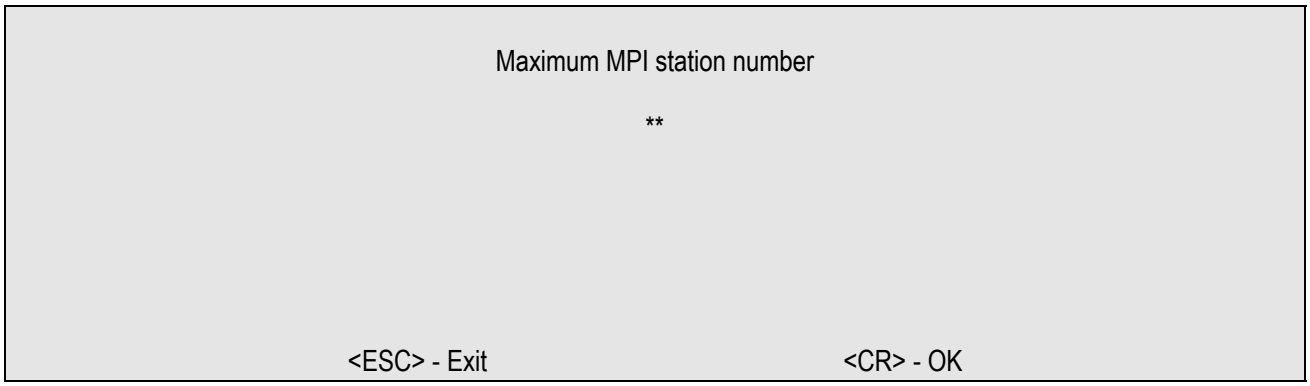


- Enter the S7-CPU address of the PLC with which communication is required.
- After a driver download only two ** will be shown in this field.
- The internal default value is 2.
- Communication is possible without further input in this field.
- Valid values within this configuration menu are 1 to 31.
- Invalid or overlapping values (with the following configuration item) will not be accepted.

☞ Please refer in all cases to the relevant Siemens manuals, which include more details about possible PLC addressing for various PLC types.

☞ In order to avoid problems within the MPI Bus, we recommend the permanent input of a valid value.

(continued on next page)



- Enter the maximum station number (HAS number) of the MPI Bus.
- The maximum station number can be found in the S7 hardware configuration.
- After a driver download only two ** will be shown in this field.
- The internal default value is 15, which is loaded in the background.
- Communication is possible without further input in this field.
- Valid values within this configuration menu are 1 to 31.
- Invalid or overlapping values (with the following configuration item) will not be accepted.

☞ The maximum station number which is set here must correspond with the connected PLC.

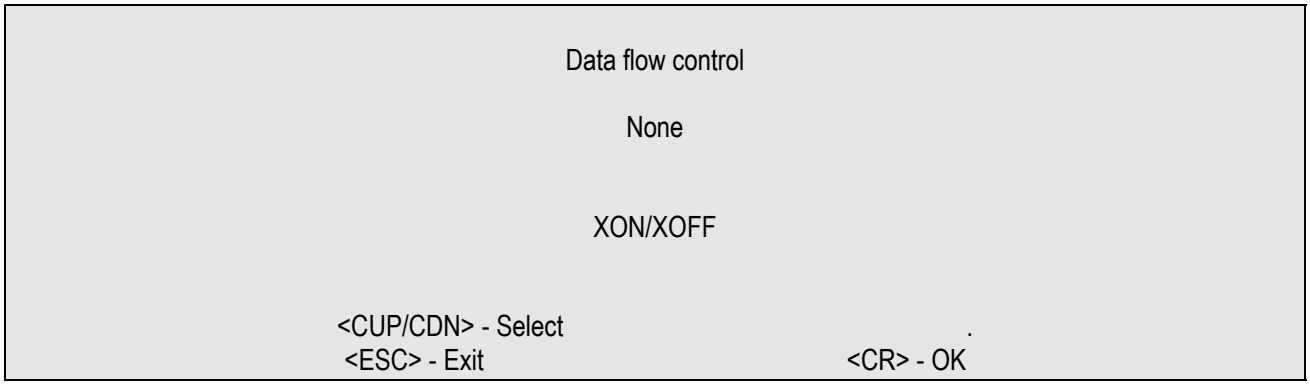
☞ Please refer in all cases to the relevant Siemens manuals, which include more details about possible PLC addressing for various PLC types.

☞ In order to avoid problems within the MPI Bus, we recommend the permanent input of a valid value.

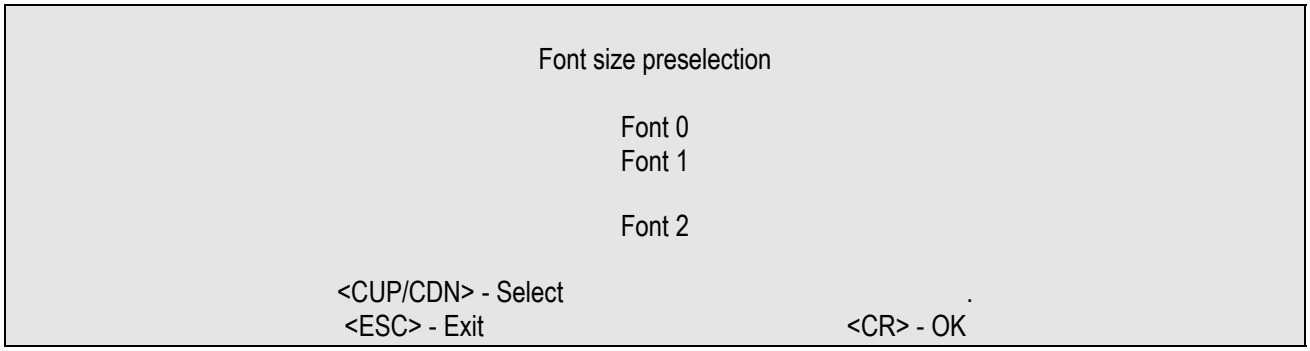
return to section 1.2.1.

1.3.4 VT-100

continued from section 1.2.1.



- Use this configuration item to switch the data flow control between the operator interface and host on or off.
- The following applies:
  - None: No handshake for data flow
  - XON/XOFF: Data flow with XON/XOFF handshake
- When the data flow control (XON/XOFF) is set, the imminent overflow of the receiver buffer in the host system is signaled by XOFF (DC3, 13 h).
- If a XOFF (DC3, 13h) is signaled to the host, it may only transmit further characters when the host has received an XON (DC1, 11 h).



- The font size preselection defines the font size set after the new start and therefore the size of the characters displayed.
- The actual font size is directly dependent of the fonts used. *
- 3 different or identical fonts can be used.
- If the same font is used 3 times, different sized characters cannot be displayed on the operator interface.

☞ *) The software manual from BMS Text describes this handling function.

(continued on next page)

Alpha keyboard lower case letters

No
Yes

<CUP/CDN> - Select .
<ESC> - Exit <CR> - OK

- Use this configuration item to switch between the upper (A – Z) and lower case letters (a – z) transmitted by the operator interface.
- The following applies:
  - No: Upper case letters (A – Z) are transmitted by the operator interface when keys are pressed.
  - Yes: Lower case letters (a – z) are transmitted by the operator interface when keys are pressed.
- Switching to transmission of lower case letters is important, e.g. for some UNIX systems.

Barcode

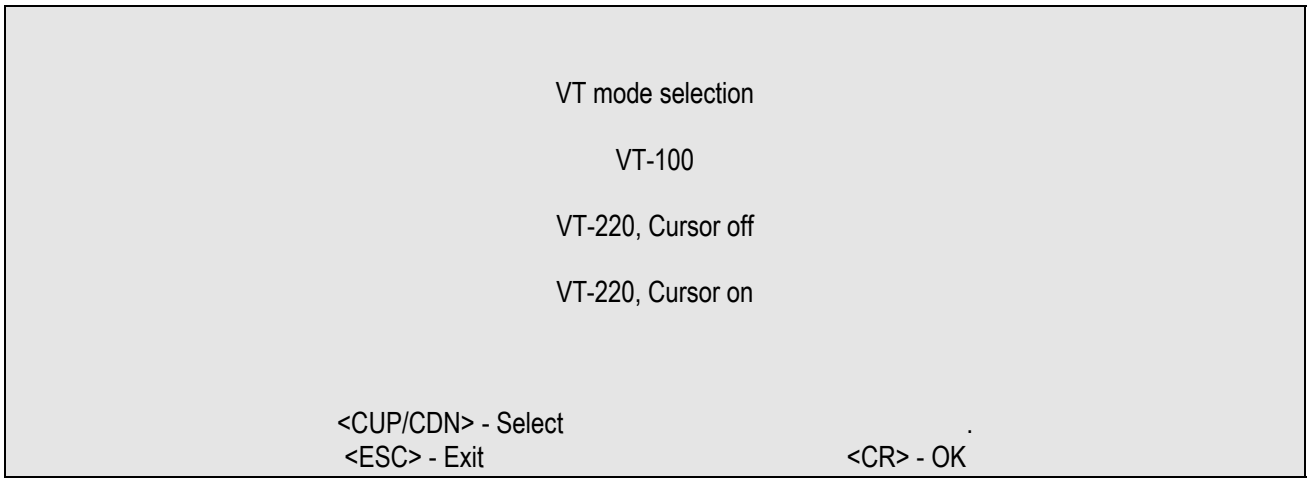
off
Barcode on, no header, end with CR
Barcode on, with header, end with CR
Barcode on, no header, end with TAB
Barcode on, with header, end with TAB

<CUP/CDN> - Select .
<ESC> - Exit <CR> - OK

- Use this configuration item to select whether a scanned barcode should be transmitted to the host or not. *
- The following applies:
  - Off: The scanned barcode will **NOT** be transmitted to the host.
  - On: The scanned barcode will be transmitted directly to the host.
- The appearance of the start and end sequences of the scanned barcode is also selected in the "Barcode on" setting.
- The following applies:
  - With header: The scanned barcode is prefixed by a STX (02h)
  - No header: The scanned barcode is transmitted without STX (02h)
  - End with CR: A CR (0Dh) is added as an end sequence to the end of the scanned barcode
  - End with TAB: A TAB (horizontal TAB) (09h) is added as an end sequence to the end of the scanned barcode

☞ *) Please note that this setting is only effective when the operator terminal concerned is set up as a variant with barcode scanner (various hardware).

(continued on next page)



- Use this configuration item to switch between the different VT modes.
- Switching the VT mode includes a different functionality with regards to transmitted and received control sequences (control code). *
- It is also determined when selecting the VT-220 mode what the cursor behavior will be after the operator terminal is started.
- The following applies:
  - Cursor off: The cursor is switched off.
  - Cursor on: The cursor is switched on and flashes in the first position of the display.

☞ *) The relevant description can be found in the protocol drive manuals for the VT mode or in the software manual from BMS Text.

return to section 1.2.1.

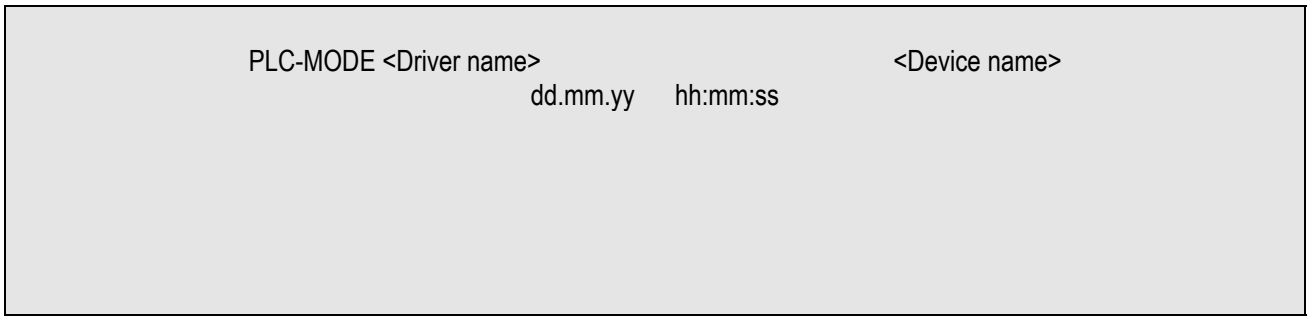
1.4 Boot-up and self test

- The devices have comprehensive self tests and error diagnostics, which are implemented when the system is booted up.
- Relevant messages are displayed during boot-up.
- If error messages are displayed, they are described in section 1.5.1.
- The version numbers of the boot, application and driver versions that are also displayed are particularly important.
- If problems occur on site (whatever kind), contact us with these version numbers.

The correct sequence is displayed as follows:

Output/sequence of messages at operator interface	Additional explanations
ET-xxx Exicom Main Boot	Output of the hardware version boot type
BOOT-VERSION 3.XX	Output of the boot version
000: SYSTEM IS BOOTING. PLEASE WAIT...	After the system is switched on, the
010: TESTING CODE BANKS…	program memory banks are checked
001: OK.	OK message with error-free process
080: Jump in Driver	Call up of driver routine
Appl. Version 5.xx	Output of application version
Driver Version: x.xx	Output of driver version
020: Testing system…	Testing the system messages and fonts
001: OK.	OK message with error-free process
040: Test Barcode Controller… *	Testing the barcode decoder
001: OK.	OK message with error-free process
022: Testing System Configuration…	Testing the system configuration
001: OK.	OK message with error-free process

- After the self test is successfully completed, the device displays the following mask:



- The start page is then displayed if communication occurs; otherwise a "communication error" will be output (see section 1.5.2.).

* The barcode controller test is only implemented in devices that also have this "On board", otherwise this message is not output.

1.5 Error messages

1.5.1 During boot-up

- The error messages described below may occur during boot-up:

Output text of error messages at the operator interface	Explanation, meaning	Remedy
011: Error! No Code Banks, Load New *	– No valid driver in the Flash memory chips	– Execute a system download
021: Error! No System, Load System **	– Faulty system tables within the Flash memory chips	– Execute a system download
024: Buffer Failure. Getting Flashdata	– No RAM data present, default values will be loaded – Capacitor discharged, (capacitor buffer < 5 days), RAM data could not be saved	– Reset system menu and save data in Flash – Recharge capacitor, operate device with power supply
025: Flash Invalid. Getting Default Data	– Configuration data in Flash is invalid, does not match driver, default values will be loaded	– Adapt configuration data to driver and save to Flash
041: Error! Barcode Controller	– Barcode controller could not be initialized	– Hardware defective, device must be repaired
056: Error! Out of Memory.	– Font memory area exceeded	– Execute system download with "original" fonts
100: Error! Flash not Empty	– Flash memory chip cannot be overwritten	– Hardware defective, device must be repaired
101: Text/configuration memory full !	– Text memory is full, project contains too many objects	– Reduce project and download it again

* Following this error message the operator interface displays the following message:
"012: Waiting For System Programming"
and is now ready to receive the system data again, with the interface parameter settings 8, 1, even, 9600 Baud.

** Following this error message the operator interface displays the following message:
"012: Waiting For System Programming"
and is now ready to receive the system data again, with the interface parameter settings 8, 1, even, 19200 Baud.

1.5.2 During operation

- The error messages described below may occur during operation:

Output text of error messages at the operator interface	Explanation, meaning	Remedy
*** Error 300 *** Communication error dd.mm.yy hh:mm:ss	- There is no (cable) connection to the PLC - The interface parameters do not agree - The programming cable is still plugged in - An incorrect operator interface address is set - PLC is in stop - The PLC has no program	- Set up a (cable) connection to the PLC - Fit the interface parameters of the operator interface to the PLC - Disconnect the programming cable - Set a correct operator interface address - Set the PLC into Run mode - Load a valid program into the PLC
*** Error 301 *** Address not present * dd.mm.yy hh:mm:ss	- The operator interface is attempting to access an address in the PLC, which is not defined / not present	- In the project, store all existing addresses in the PLC. - Note the necessary length of the various variable types
*** Error 302 *** dd.mm.yy hh:mm:ss	- Driver dependent	
*** Error 303 *** dd.mm.yy hh:mm:ss	- Driver dependent	
*** Error 304 *** Configuration error dd.mm.yy hh:mm:ss	- The station parameters are faulty - The addressing in the project does not match the driver loaded in the device	- Adapt the interface parameters so that they display valid values - Change the addressing so that they match the driver or load a driver which includes this addressing

* Message with S7-MPI driver: "Bad DB address or length"

- Error numbers 302 and 303 are driver dependent and may contain different messages:
- Error number 302 in:

Modbus RTU

Output text of error messages at the operator interface	Explanation, meaning	Remedy
Station Nr xx failure	- Failure of one communication partner (PLC)	- Integrate communication partner (PLC) in communication again

Modbus Slave

No key interrogation by PLC	- Keyboard register is not or too little interrogated by PLC	- Interrogate keyboard register, decrease interrogation time (must be interrogated cyclically < 10s)

Fieldbus

Bus error	- Communication OK, but operator interface not addressed	- Check PLC communication and settings

S7-MPI

MPI initialisation error	- MPI Box could not be initialized - Incorrect operator interface address - Incorrect PLC address	- Check MPI Box address and reset - Enter correct operator interface address - Enter correct PLC address

- Error number 303 in:

Modbus Slave

Output text of error messages at the operator interface	Explanation, meaning	Remedy
Text programming error	- Invalid or faulty image definition in called page	- Check page in project, rectify error and reload project into operator interface.

Fieldbus

Text programming error	- Invalid or faulty image definition in called page	- Check page in project, rectify error and reload project into operator interface.

S5/S7-3964R

Text programming error	- Invalid or faulty image definition in called page	- Check page in project, rectify error and reload project into operator interface.

2. Operation

2.1 Keyboard definition

- The device keyboards are divided into several functional blocks.
- The actions of different keys depends on:
  - The key itself
  - The programming of the key via the software
  - The global function within the various function menus

Attention:

For double key actuation, first press and hold the corresponding shift key down, then press the second key.

– **Function keys**

Key	Comment
F1 , F2 , …	Single operation
Shift + F1 , Shift + F2 , …	Simultaneous operation with Shift key
Alt + F1 , Alt + F2 , …	Simultaneous operation with Alt key
Ctrl + F1 , Ctrl + F2 , …	Simultaneous operation with Ctrl key

- The programmed command will be executed and the corresponding key bit will be set when the key is pressed.
  Information about key bits can be found in the software manual from BMS Text.

– **Soft keys**

S1 , S2 , …

- The soft keys are numbered from top to bottom.
- The programmed command will be executed and the corresponding key bit will be set when the key is pressed.
  Information about key bits can be found in the software manual from BMS Text.

– **System keys**

Key	Designation	Comment
Esc	<ESC>	Escape / cancel key
▲	<CUP>	Cursor up
▼	<CDN>	Cursor down
◀	<CUL>	Cursor left
▶	<CUR>	Cursor right
↵	<CR>	Enter / acknowledgement key
i	<Info>	Information key
Shift	<Shift>	Shift key for 2nd keyboard layout *
Alt	<Alt>	Shift key for 3rd keyboard layout *
Ctrl	<Ctrl>	Shift key for 4th keyboard layout *
+	<+>	Plus key **
–	<->	Minus key **
.	<.>	Point key **

- The relevant key command will be executed and the corresponding key bit will be set when the key is pressed.
- Information about key bits can be found in the software manual from BMS Text.

*) The shift keys do not have key bits assigned.

**) The applicable key function is dependent on the active menu.
These keys do not have key bits assigned.

– **Alphanumeric keys**

Operated key(s)	Produced key	Comment
7 ABC , 8 DEF , ...	Large imprint, here 7, 8	Single operation
Shift + 7 ABC	Left small imprint, here A	Simultaneous operation with Shift key
Alt + 7 ABC	Middle small imprint, here B	Simultaneous operation with Alt key
Alt + 7 ABC	Right small imprint, here C	Simultaneous operation with Ctrl key

- The corresponding key command will be executed when the key/key combination is pressed.
- These keys do not have key bits assigned.

2.2 Start keys

Some keys are assigned special functions that initiate special operations:

☞ To initiate these operations, the keys described below must be pressed BEFORE the power supply is switched on and held pressed until boot-up is complete.

Key	Designation	Effect
Esc + ↵	<ESC>+ <CR>	The histogram password and configuration menu are reset to the default value "00000".
7 ABC	7	The operator interface jumps directly to the configuration menu to the menu item “select language / change contrast”.
9 GHI	9	The operator interface jumps directly to system programming with the interface parameters: 57600 Baud/8/1/E *
6 PQR	6	The operator interface jumps directly to system programming with the interface parameters: 19200 Baud/8/1/E *
3 YZ-	3	The operator interface jumps directly to system programming with the interface parameters: 9600 Baud/8/1/E *
0	0	The entire program memory will be reset (delete). **
.	.	The contrast and the brightness will be reset to the middle position.

*) After the operator interface is started up with one of these start keys the following message appears:

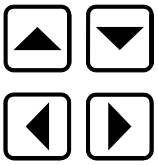
012 Waiting for System Programming…

☞ After this message appears it is essential to load the system into the operator interface.

☞ **) All data in the operator interface (driver and project) will be deleted.
The configuration will be restored from the boot area and loaded.
The operator interface jumps to the configuration menu and must be reprogrammed.
It is essential that the system is now loaded into the operator interface.

2.3 Operation/key function

2.3.1 Operation/functions in the system menu

Key	Effect
Esc	- Quit menu item without accepting changes. - Jump to next menu item - Cancel editing
	- Select a configuration item
	- Acknowledgement of selected configuration item - Jump to next menu item

- The system menu is described in section 1.
- No key bits will be transferred as there is no communication.

2.3.2 Operation/function in pages

- When a page is called, all variables are displayed with their value.
- The analog (numeric) variables can be displayed with or without leading zeros. ***
- One exception are variables in hexadecimal format. This type is always displayed with 4 characters.
- It is possible to define variable behavior (refresh) and scrolling between pages in the project. *
- The key bits are transferred with every key operation.

Key	Effect
Esc	- Cancel the menu / operation - Jump back to start page - Jumping back to the start page can be prevented by setting a bit in the static control word * / **
▲ ▼	- Select previous or next page - Condition: that the pages were set up consecutively that the "operation page" function was not used *
◄ ►	- No function, if static objects/variables only are used on the page - Otherwise see treatment in section 2.3.3
Shift + ◄ or Shift + ►	- No function, if static objects/variables only are used on the page - Otherwise see treatment in section 2.3.3
↵	- Cancel the menu / operation - Jump back to start page - Jumping back to the start page can be prevented by setting one bit in the static control word *
i	- Calls up the help page, if present
F1, F2,...	- The programmed command will be executed
S1, S2,...	- The programmed command will be executed
Other keys	- Have no effect

☞ *) The software manual from BMS Text describes this handling function.

☞ **) When the corresponding bit is set, the <ESC> key has no function here, only the relevant key bit is set.

☞ ***) Please refer also to section 1.2.2.20.

2.3.3 Operation/functions in pages with editing fields

- When a page is called, all variables are displayed with their value.
- The cursor flashes in the first editable variable on the first editable position.
- The analog (numeric) variables can be displayed with or without leading zeros. **
- One exception are variables in hexadecimal format. This type is always displayed with 4 characters.
- It is possible to define the variable behavior (refresh) and scrolling between pages in the project. *
- The key bits are transferred with every key operation.
- Exception: no key bits (cursor keys) will be transferred in editable fields.

Key	Effect
Esc	- Cancel the menu / operation - Jump back to start page - Jumping back to the start page can be prevented by setting one bit in the static control word * - If the bit "ESC/CR not in start page" is used, the previous value of the variable will be restored. *
↵	- Confirm the entered value and transfer to PLC - Jump to next editable variable (if present) - When the last editable variable is reached, the program jumps back to the first editable variable
i	- Calls up the help page, if present
F1, F2,...	- The programmed command will be executed
S1, S2,...	- The programmed command will be executed
▲ ▼	- Select previous or next page - Condition: that the pages were set up consecutively that the "operation page" function was not used *
Shift + ◀	- Select the previous editable field, left from the actual position, without changing the value in the actual field - The definition "left" depends on the positioning of the editable field on the respective page
Shift + ▶	- Select the next editable field, right from the actual position, without changing the value of the actual field - The definition "right" depends on the positioning of the editable field on the respective page

	- On the first position of an editable field: one edit field left Example: before: `VAR1: 1234 VAR2: 5678` after: `VAR1: 1234 VAR2: 5678` - On any position except the first in an editable field: one position left Example: before: `VAR1: 1234 VAR2: 5678` after: `VAR1: 1234 VAR2: 5678`
	- On the last position of an editable field: one edit field right Example: before: `VAR1: 1234 VAR2: 5678` after: `VAR1: 1234 VAR2: 5678` - On any position except the last of an editable field: one position right Example: before: `VAR1: 1234 VAR2: 5678` after: `VAR1: 1234 VAR2: 5678`
Other keys	- Only for editing in variables

☞ *) The software manual from BMS Text describes this handling function.

☞ **) Please refer also to section 1.2.2.20.

2.3.4 Operation/input of variables

- Input of values in variables can only be implemented if the field is of the type "Actual/setpoint value". *
- The input of values into analog (numeric) variables is the same as with a pocket calculator, from right to left.
- With signed variables the sign must be entered first, followed by the value.
- The input of a sign is not required for positive values as this sign is equivalent to the key <0> (value 0). Please note that the maximum digits of the variable will then reduce by 1. ***
- The entered values are transferred to the PLC when the <CR> key is pressed.
- The complete word (16 bit address) or double word (32 bit address) will be overwritten in the PLC each time, independent of the variable type, after the input and confirmation on the operator interface.
- If the entered value exceeds the allowed maximum value, a # symbol will be displayed for this variable.
- If the entered value undershoots the allowed minimum value, a # symbol will be displayed for this variable.
- If the PLC sends a value that is too big or small to the operator interface, * (stars) will be displayed.
- The display of # or * is independent of whether the exceeding or undershooting of the maximum or minimum values is specified in the variable definition or the project design.
- The input of variables depends on: *
  Variable type
  Variable format
  Field presentation mode
- The following variable types are available: *

Variable type	Presentation mode:	Format type:
Analog	Decimal	integer (signed numeric)
		unsigned integer (unsigned numeric)
		long integer (signed double word)
		unsigned long integer (unsigned double word) **
		float (floating point) **
	Hexadecimal	
	Binary	
Digital	Binary (bit format)	
String	String (ASCII characters)	

☞ *) Functionality/description of variables can be found in the software manual from BMS Text.

☞ **) Please note that these variable format types are not supported by all drivers (protocols). Further information can be found in the manuals of the respective PLC manufacturers.

☞ ***) The first position is permanently defined as the sign position for signed variables. This sign position is permanently part of the designed variables. The input of values can only be implemented therefore up to the maximum number of positions.

- Please note, during input at the operator interface, that these inputs must be done in a format suitable to the variable type.
  The following applies here:

Variable type	Correct key formats	Max. number of positions	Input area	Remarks
Analog, decimal, integer (signed numeric)	0 ,…, 9 GHI —	5 + sign	-32768 to 032767	"-" key for sign only ***
Analog, decimal, unsigned integer (unsigned numeric)	0 ,…, 9 GHI	5	0 to 65535	
Analog, decimal, long integer (signed double word)	0 ,…, 9 GHI —	10 + sign	-1.000.000.000 to 01.000.000.000	"-" key for sign only ***
Analog, decimal, unsigned long integer (unsigned double word)	0 ,…, 9 GHI	10	0 to 1.000.000.000	
Analog, decimal, float (floating point)	0 ,…, 9 GHI .	10 + sign	-1.000.000.000 to 01.000.000.000	
Analog, hexadecimal,	0 ,…, 9 GHI Shift + 7 ABC ,…, Ctrl + 8 DEF	4	0 to FFFF	
Analog, binary	0 , 1 STU .	16	0 to 1111111111111111	"." key for separator only *4
Digital, Binary (bit format)	+ , —	-	-	*5
String (ASCII characters)	All alphanumeric keys	20	-	

☞ ***) The first position is permanently defined as the sign position for signed variables. This sign position is permanently part of the designed variables. The input of values can only be implemented therefore up to the maximum number of positions.

☞ *4) The key "." is used as separator (decimal place) within binary analog variables.
The input via this key is only accepted if the variable being entered is also defined (designed) with a decimal place.
The decimal place is assigned to a fixed position within the variables. *

☞ *5) You can switch between both texts for digital variables with the keys "+" and "-".
When the text is changed, the value in the corresponding PLC address is also immediately changed (direct switch of value from 0 to 1 and vice versa).

2.3.5 Operation/functions in fault message menu

- The fault message page is called up with the programmed key.
- The following menu window appears when the fault message page is called:

☞ The software manual from BMS Text describes the functionality of fault messages.

Fault messages		
<CR> - Quit	<ESC> - Exit	Scroll - <CUP/CUD>

- All current fault messages are displayed in this menu window.
- The visual display of fault messages depends on the settings in the system menu. Please note sections 1.2.2.12. to 1.2.2.15.

Key	Effect
Esc	- Cancel the menu / operation - Jump back to start page - Jumping back to the start page can be prevented by setting one bit in the static control word * - If the bit "ESC/CR not in start page" is used, there is no reaction. **
▲ ▼	- Scroll within current fault messages
↵	- Acknowledgement of dynamic fault messages *
F1, F2,...	- The programmed command will be executed
S1, S2,...	- The programmed command will be executed
Other keys	- Have no effect.

☞ * The software manual from BMS Text describes this handling function.

☞ ** In this case, the fault message page can only be left by calling up another page with the function key or via the PLC.

- The key bits are transferred with every key operation.

2.3.6 Operation/functions within help pages

- A help page can be called up with a programmed key or the <Info> key.
- The functionality of help pages is basically identical to "normal" pages. *
- All types of variables can be used in the help pages.
- Only one help page can be called up per "normal" page.
- Scrolling between help pages is not possible.

Key	Effect
Esc	- End help page editing - Jump back to start page - Jumping back to the start page can be prevented by setting one bit in the static control word * / **
◄ ►	- No function, if static objects/variables only are used on the page - Otherwise see treatment in section 2.3.3
Shift + ◄ or Shift + ►	- No function, if static objects/variables only are used on the page - Otherwise see treatment in section 2.3.3
↵	- End help page editing - Jump back to start page - Jumping back to the start page can be prevented by setting one bit in the static control word * - If editable fields are used on a help page, this key has the same function as described in section 2.3.3.
i	- No key function
F1, F2,...	- The programmed command will be executed
S1, S2,...	- The programmed command will be executed
Other keys	- Only for editing in variables

☞ * The software manual from BMS Text describes this handling function.

☞ ** When the corresponding bit is set, the "ESC" key has no function here, only the relevant key bit is set.

2.3.7 Operation/functions in the histogram

- The histogram is called up with the programmed key.
- The following menu window appears when the histogram is called up:

Histogram		Position/Inputs:000/000
<CUP/CUD> - Scroll		
<ESC> - Exit	<SCUP> - Start	<SCDN> - End

- All current histogram messages are displayed in this menu window.
- The visual display of histogram messages depends on the settings in the system menu. Please note sections 1.2.2.16. to 1.2.2.18.
- All messages are saved consecutively. The last saved message is displayed first.
- If "message coming" AND "message going" are used for fault messages in the history report, this is marked by an entry after the corresponding message. *

  The following applies here:

  Message coming: Three "+" characters are displayed at the last position of the message

  Message going: Three "-" characters are displayed at the last position of the message

- The number and actual positions of all saved history messages are displayed in the top right corner of this menu window.

  The following applies here:

  Position: The actual position of the top message (first line) where you currently are located will be shown.

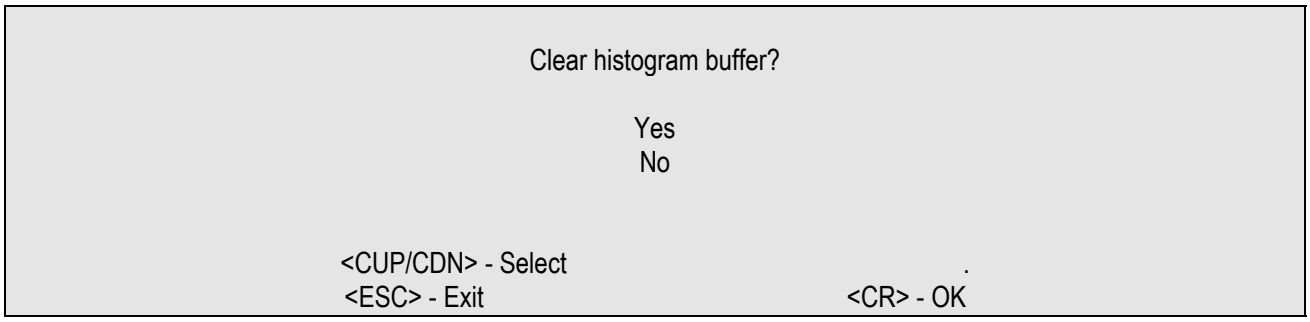
  Inputs: Total number of all current inputs.

Key	Effect
Esc	- End and quit the histogram (see also next page) - Jump back to start page
▲ , ▼	- Scroll within all current histogram messages - CUP: Scroll up to next histogram message - CDN: Scroll down to previous histogram message
Shift + ▲	- Jump back to start: to first entered histogram message
Shift + ▼	- Jump forward to end: to last entered histogram message
Other keys	- Have no effect.

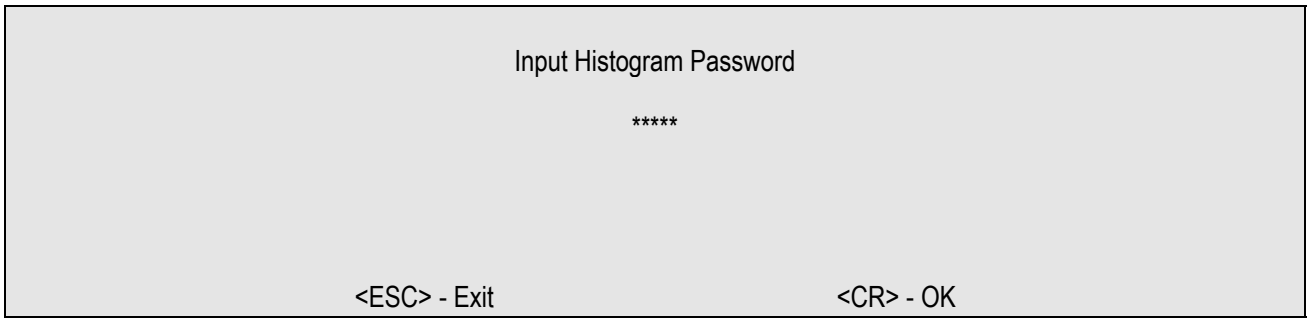
☞ * The description/design of these functions can be found in the software manual from BMS Text.

2.3.7.1 Leaving the histogram

- The histogram is monitored by a timeout. One minute after the last key operation the device jumps back automatically to the normal operating mode and displays the start page.
- If the histogram is left via the <ESC> key it is possible to delete the histogram memory. The following window appears:



- Press the menu item "No" or the <ESC> key to leave the histogram without deleting the memory and display the start page.
- If the menu item is confirmed with "Yes", the following window appears:



- This password protects the deletion of the histogram against unauthorized access.
- The password is entered with the alphanumerical keys and remains invisible.
- Only numerical values are permitted for inputs.
- Accept (acknowledge) the input with <CR>, otherwise this menu item will be left and the histogram buffer will not be deleted.
- The factory password and the default password is "00000"

☞ If the password has been forgotten, it is possible to reset the password to the factory default. This is implemented by simultaneously pressing the <ESC> and <CR> keys while switching on the device.
Please note that resetting this password also affects the configuration password (see section 1.2.2.3.) !

If you enter an incorrect password the following message appears:

Input Histogram Password

*****

Password is invalid !!!

<ESC> - Exit <CR> - OK

- The cursor jumps back to the first position in the input field and the password can be entered again.

2.3.8 Operation of image objects

2.3.8.1 Text lists

- Text lists can also be edited if the field is an "actual/setpoint value" type. *
- The editing options are different to those for "normal" variables.
- Only the <+> und <-> keys are available, with which it is possible to scroll through text lists.
  The following applies for the key:
  <+>: Scroll to previous text, one value lower
  <->: Scroll to next text, one value higher
- When the text is changed, the value in the corresponding PLC address is also immediately changed.

2.3.8.2 Dynamic menu branching

- It is possible to create "tree structures" within the project with dynamic menu branching without complex PLC programming. *
- These dynamic menu branches are identified by a prefixed "bigger than" sign: ">".
- The device supports up to 8 jump levels.

Key	Effect
Esc	- Cancel the menu / operation - Jump back to start page - Jumping back to the start page can be prevented by setting one bit in the static control word ** - If this bit is set, it is possible to jump back one step within the dynamic menu branch pressing the <ESC> key.
◄ ►	- Select the previous or next dynamic menu branch or the current edit field
Shift + ◄ Shift + ►	- Select the previous or next dynamic menu branch or the current edit field
↵	- Confirm the dynamic menu branch and jump to the next (designed) page

- The key bits are transferred with every key operation.

☞ * The description/design of these functions can be found in the software manual from BMS Text.

☞ ** The software manual from BMS Text describes this handling function.