# BARTEC

# Software
# BMS Graf pro

**User Manual**
**Version 7.x.x.x**

# BARTEC

## User Manual

## BMS-Graf-pro Version 7.x.x.x

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# English

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## BMS-Graf-pro Version 7.x.x.x

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The user manual is a constituent part of the product.

## Changes to the document

BARTEC reserves the right to alter the contents of this document without notice. No guarantee is given for the correctness of the information. In case of doubt the German safety instructions shall apply because it is not possible to rule out errors in translation or in printing. In the event of a legal dispute, the "General Terms and Conditions" of the BARTEC group shall apply in addition.

The respective up-to-date versions of manuals and additional information may be downloaded at http://www.bartec.de/automation-download/ .

## Languages

The original user manual is written in German. All other available languages are translations of the original operating instructions.

If you require any other languages, please ask BARTEC or request them when placing the order.

## Safety Instructions

Safety instructions and warnings are specially highlighted in this manual and marked by symbols.

The safety instructions and warnings are assigned to the individual work steps. Careful handling and consistent observation of the instructions will prevent damages to property.

The adherence to all directions and safety instructions in this manual is a precondition for safe working and the correct handling of the device.

The graphic representations in these instructions serve to show the information being described and are not necessarily true to scale and they may deviate slightly from the actual construction of the device.

## Marking

Particularly important points in these instructions are marked with a symbol:

| | |
|---|---|
| ⚠️ **Caution!** | Warning of damage to property and financial and penal disadvantages (e.g. loss of guarantee rights, liability etc.). |
| ☞ **Attention!** | Important instructions and information on preventing disadvantageous behavior. |
| ℹ️ **Note** | Important instructions and information on effective, economical and environmentally compatible handling. |

# 1 Software Installation

## 1.1 Requirements

### 1.1.1 Minimum hardware

- 40 MB free hard-disk space

- Mouse

- Graphics resolution min. 1.024 x 768 pixels, 16- bit colour depth

- Printer (local or network)

- RS232 port or USB port or Ethernet connection for transfer of project

### 1.1.2 Recommended

- 60 MB free hard-disk space

- Graphics resolution 1.280 x 1.024 pixels, 32-bit colour depth

- USB port and/or Ethernet connection

### 1.1.3 Software

- Operating system MICROSOFT Windows XP, Windows VISTA or Windows 7

### 1.1.4 Copyright

**Important!** This software is protected by copyright. By opening the package, you automatically accept the conditions of the license agreement. You may make only one single copy of the original data-bearers for safety reasons and for archiving purposes.

### 1.1.5 Completion of the Registration Card

- Not planned at present.

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## 1.2　　Installation

A sub-directory into which all BMS-Graf-pro files will be written is created during the installation process.

(1)　　Before installing, make a back-up copy of any already existing version of BMS Graf pro.

(2)　　Check that one of the following operating systems is installed.

- MICROSOFT Windows XP

- MICROSOFT Windows Vista

- MICROSOFT Windows 7

(3)　　Ensure that you possess the necessary rights to install the software.

(4)　　Start installation.

(5)　　Follow the instructions in the installation software.

(6)　　BMS-Graf-pro can be started via the start menu "Programs".

Please see the Windows documentation for more details on Windows.

# 2      Description of Software

The BMS-Graf-pro 7.x.x.x program package permits the simple drafting of process visualizations.

Individual images and projects are drafted on a Windows computer and stored in the POLARIS Panel. The program is optimised to reduce the individual images′ storage requirements in the target system to a minimum. This makes it possible to store a large number of images in the POLARIS Panel.

Selecting the appropriate protocol driver enables links to the most diverse range of control systems. The available PLC protocols are listed in the following section.

## 2.1      Project Modules / Definitions

A project contains all the information necessary for execution in the POLARIS Panel.

A project is created on a Windows-compatible computer with the BMS-Graf-pro program package and then transferred into the POLARIS Panel via RS232 or a USB stick or Ethernet.

A project contains:

- Communications protocol and its settings
- Setting for the POLARIS target system
- Process links (variables)
- Fault or alarm messages
- Operating messages
- Text lists
- Graphics lists
- User administration
- Process images

In the POLARIS Panel, the BMS-Graf-Runtime works through the project. This runtime contains all available protocol drivers. Through the project the Runtime receiver the information required to activate the selected protocol drivers. The BMS-Graf-Runtime is transferred with the project into the POLARIS Panel.

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# 3 First Steps

## 3.1 Program Selection
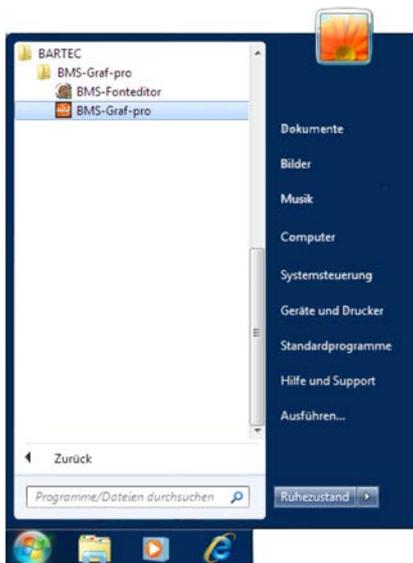


Start the program by clicking on the "BMS-Graf-pro" in the start menu.

| ℹ️ Note | If you are using Microsoft Windows Vista or Windows 7, you must run the software with administrator rights. |

## 3.2 The Splash Screen



After the start, the BMS-Graf-pro splash screen with the information window appears. The window closes automatically after a few seconds.

The status line contains the following information:

- Current time
- Current data
- Project status
- Status of Ethernet connection to the POLARIS Panel.

| ℹ️ Note | A screen resolution of 1024 x 768 pixels is assumed. |
| | A resolution of 1280 x 1024 pixels or higher facilitates software operation significantly, since it is then possible to see and edit the complete image in the image editor. |

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## 3.3 Menu and Toolbar (in closed project)

### 3.3.1 Menu
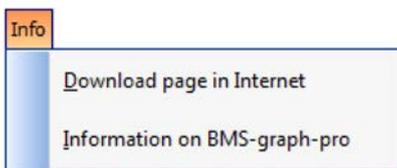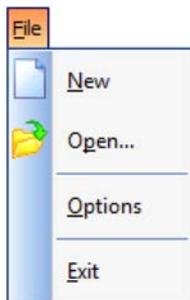
| | |
|---|---|
| New | Create a new project. |
| Open... | Open an existing project. |
| Options | Select language. |
| Exit | Close the program. |
| Download page in Internet | Opens the download page with the Internet browser. |
| Information on BMS-graph-pro | Information on BMS-Graf-pro. |

### 3.3.2 Toolbar

| | |
|---|---|
| | Create a new project. |
| | Open the existing project. |
| | Switch between full-screen/window mode. |

## 3.4 Menus and Toolbars (in opened project)

### 3.4.1 Menu
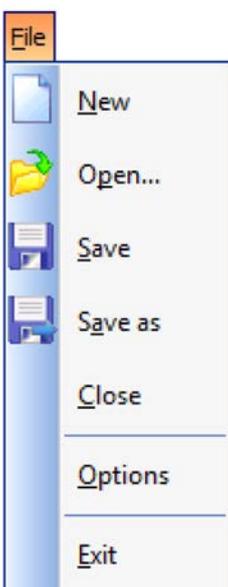
| | |
|---|---|
| New | Create a new project. |
| Open... | Open an existing project. |
| Save | Save project on disk. |
| Save as | Save under a new name. |
| Close | Close project. |
| Options | Select language. |
| Exit | Closes BMS-Graf-pro. |

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| | | |
|---|---|---|
| Σ | Overview | |
| | Alarms | |
| | Operating messages | |
| | User | |
| | Variables | |
| | Text lists | |
| | Graphics lists | |
| | Process images | |
| | Image editor | |

**Settings** — Grid

| | |
|---|---|
| Grid | Editing settings in the image editor. |
| Download page in Internet | Opens the download page with the Internet browser |
| Information on BMS-graph-pro | Information on BMS-Graf-pro |

**Info**
- Download page in Internet
- Information on BMS-graph-pro

### 3.4.2    Main Toolbar

| | | | |
|---|---|---|---|
| Create new project. | | Transfer of project into the POLARIS Panel via serial interface. | |
| Open an existing project | | Transfer of project to USB stick. | |
| Save project on disk. | | Transfer of project into the POLARIS Panel via Ethernet. | |
| Save project under a new name. | | Switch between full-screen/window mode. | |
| | | Check project for errors. | |

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## 3.5 Opening/importing of existing projects

The opening/importing of existing projects from versions earlier than BMS-Graf-pro V 7.x.x.x requires the:

■   setting of the LED register

■   setting of the interface parameters

■   alteration of the key assignment

■   assignment of the touch function (only when touch functions are integrated)

■   assignment of the user administration(optional)


## 3.6 Saving of existing projects

**Note**

Before the project is transferred into the POLARIS Panel it is essential to create a back-up copy of the project in order to be able to make changes to the project at a later date.

**Background:**
A transferred project cannot be read back any longer, i.e. it can no longer be edited or changed. If you have made a back-up copy, you will be able to make changes to the project later and transfer them again into the POLARIS Panel (See Chapter 5 Project Transfer).

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# 4 Project Creation

## 4.1 Project Overview Tab
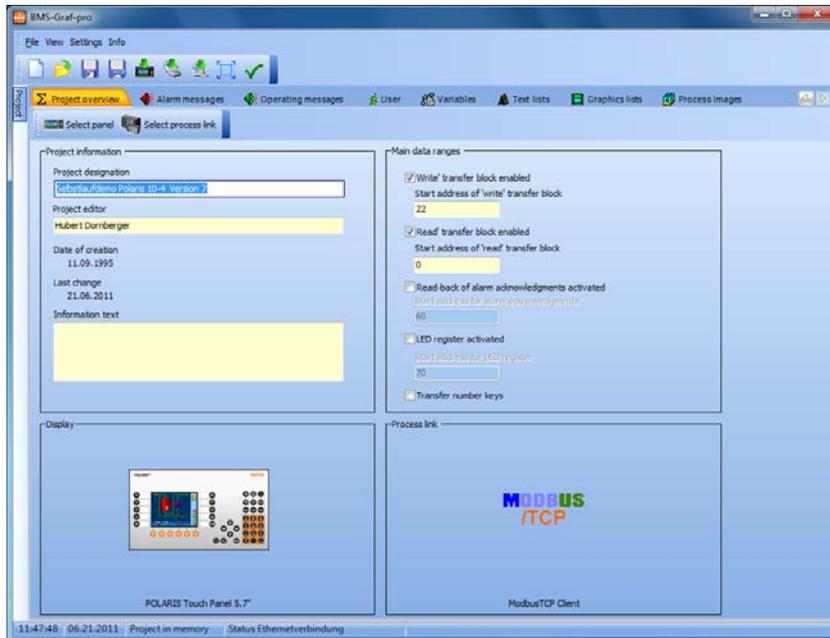


**Selection fields**

**Project information**

- Project designation
- Project editor
- Date of creation, last change
- Information text

**Main data ranges**

- Start address of "write" transfer block
- Start address of "read" transfer block
- "Read-back of alarm acknowledgments" activated
- Start address for LED register
- Transfer number keys

**Display**

- Selection of the POLARIS Panel

**Process link**

- Selection of the control and protocol being used include protocol-specific parameter assignment

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### 4.1.1 "Panel" Dialog Window
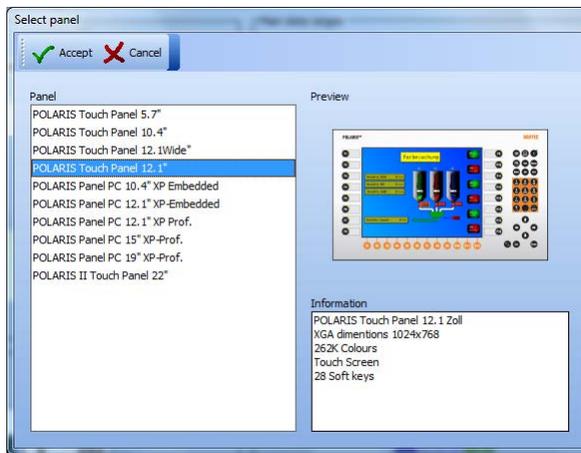




Only POLARIS Panels with a Windows XP Embedded or Windows XP Professional operating system are supported.

**List of the currently supported POLARIS Panels:**

| POLARIS Panel | Type number | Screen resolution |
|---|---|---|
| POLARIS Touch Panel 5.7" | 17-71V1-A000/X000 | VGA          640 x 480 pixels |
| POLARIS Touch Panel 10.4" | 17-71V1-9000/X000 | SVGA         800 x 600 pixels |
| POLARIS Touch Panel 12.1" | 17-71V1-8000/X000 | XGA          1024 x 768 pixels |
| POLARIS Panel PC 10.4" XP    - Embedded | 17-71V1-2000/X000 | VGA          640 x 480 pixels |
| POLARIS Panel PC 12.1" XP    - Embedded | 17-71V1-3000/X000 | SVGA         800 x 600 pixels |
| POLARIS Panel PC 12.1" XP    - Professional | 17-71V1-8025 | SVGA         800 x 600 pixels |
| POLARIS Panel PC 15" XP       - Professional | 17-71V1-4000 | XGA          1024 x 768 pixels |
| POLARIS Panel PC 19.1" XP    - Professional | 17-71V1-5000 | SXGA         1280 x 1024 pixels |
| POLARIS II Touch Panel 22" | 17-72V.-…. | WSXGA+   1680 x 1050 pixels |

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### 4.1.2 "Process Link" Dialog Window
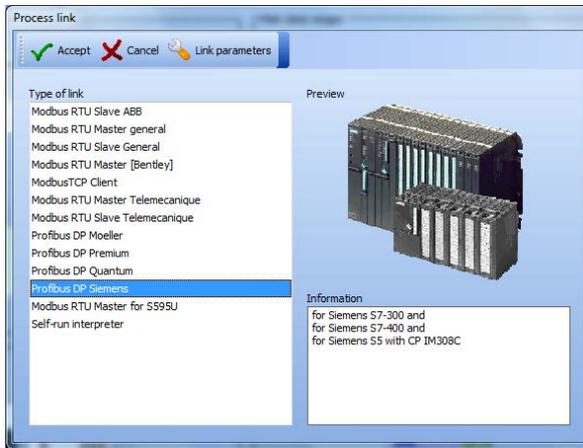


Several process links are available for selection.

If a process link is selected in the "**Link Parameters**" box, the dialog window with the driver settings opens when the icon is clicked:
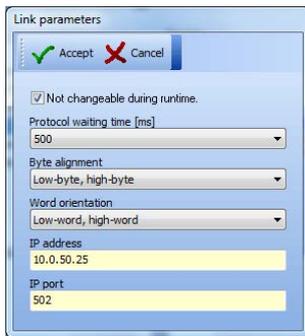




*Example: ModbusTCP*
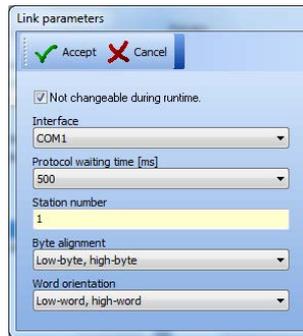


*Example: PROFIBUS-DP*
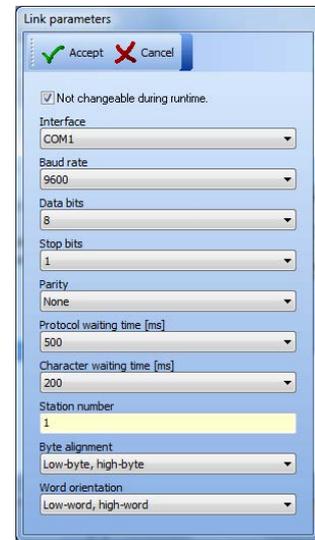


*Example: Serial Coupling*

The connection parameters can be fixed so that it will not be possible to alter them in the POLARIS Panel.

**List of the available connection possibilities:**

| Description | PLC |
|---|---|
| Modbus RTU Master | Address range 40001 to 49999 for telemechanique TSX series with TSXSCG1131 and address range 0 to 65535, General Definition |
| Modbus RTU Slave | Address range 40001 to 42000 for telemechanique TSX series with TSXSCG1131 and address range 0 to 1999, General Definition |
| PROFIBUS-DP | S5-135U via IM308C, S7-300 CPU 31x-2 DP, S7-400 CPU 41x-2 DP, PCS 7, freelance 2000 with field controller and AEG Quantum interface via PROFIBUS-DP |
| ModbusTCP | Connection via Ethernet to control |
| Host Link | OMRON SYSMAC COM1 |

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### 4.1.3    Selection Window for Main Data Ranges

The main data ranges of "write" transfer block, "read" transfer block, "read-back of alarm acknowledgments" acknowledgment bits and "LED tab" can be activated individually.

A start address is assigned to the respective data range for the data from the control or into the control.

The deactivation of the data ranges that are not required increases the speed of data updates in the system and optimises the project requirements.

**Note:**

– The address entries for the transfer block relate to the start addresses.

– All the addresses stated on the following pages must be added as an offset to these start addresses.

– All address data are word addresses, i.e., in the case of byte-oriented controllers.



Byte 0 and byte 1 in memory are word address 0

Byte 2 and byte 3 in memory are word address 1

etc.
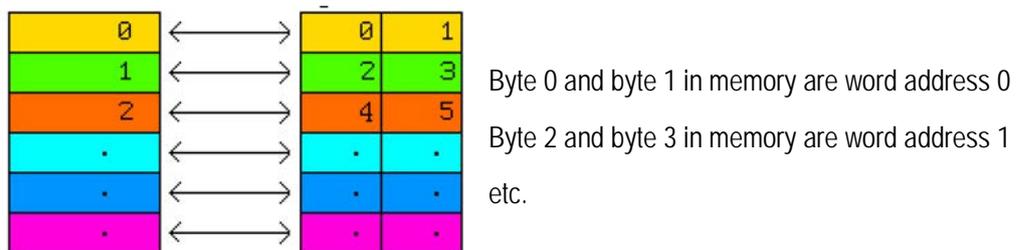
– In the case of Siemens controllers, the information relates to data words (DW).
– Data words can be read or written in data modules (DB 2 to DB 255).
– In the case of controllers from other manufacturers, the information relates to 16-bit-wide memory registers.
– The write and read ranges are controller-dependent.

**Example:**

If the start addresses of the transfer block are started as follows

– Read from data module 10             data word 0
– Write from data module 20            data word 30

The following addresses thus result:

– Image specification (start address "Reading" +0000)        ➡ DB 10 DW 0
– Function keys (start address "Writing"+ 0002)               ➡ DB 20 DW 32

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### 4.1.4 "Read" Transfer Block Data Range

Data structure for transferring from the control to the POLARIS Panel. Storage space of 22 data words must be reserved in the control for this range. The start address for the transfer block is freely selectable.

**Detail**

| Offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0000 | Image number "TARGET", image to be displayed on the POLARIS Panel | | | | | | | | | | | | | | | |
| +0001 | Value <> 0 ► Disable input fields | | | | | | | | | | | | | | | |
| +0002 | ✕ | ✕ | BL Off | Led4Fl | Led3Fl | Led2Fl | Led1Fl | Led4On | Led3On | Led2On | Led1On | Alarm | ✕ | Out1 | Out2 | Out3 |
| +0003 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +0004 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +0005 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +0006 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +0007 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +0008 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +0009 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +0010 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| +0011 | 143 | 142 | 141 | 140 | 139 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 128 |
| +0012 | 159 | 158 | 157 | 156 | 155 | 154 | 153 | 152 | 151 | 150 | 149 | 148 | 147 | 146 | 145 | 144 |
| +0013 | 175 | 174 | 173 | 172 | 171 | 170 | 169 | 168 | 167 | 166 | 165 | 164 | 163 | 162 | 161 | 160 |
| +0014 | 191 | 190 | 189 | 188 | 187 | 186 | 185 | 184 | 183 | 182 | 181 | 180 | 179 | 178 | 177 | 176 |
| +0015 | 207 | 206 | 205 | 204 | 203 | 202 | 201 | 200 | 199 | 198 | 197 | 196 | 195 | 194 | 193 | 192 |
| +0016 | 223 | 222 | 221 | 220 | 219 | 218 | 217 | 216 | 215 | 214 | 213 | 212 | 211 | 210 | 209 | 208 |
| +0017 | 239 | 238 | 237 | 236 | 235 | 234 | 233 | 232 | 231 | 230 | 229 | 228 | 227 | 226 | 225 | 224 |
| +0018 | BCD year tens | | | | BCD year ones | | | | BCD month tens | | | | BCD month ones | | | |
| +0019 | BCD day tens | | | | BCD day ones | | | | BCD hour tens | | | | BCD hour ones | | | |
| +0020 | BCD minute tens | | | | BCD minute ones | | | | BCD second tens | | | | BCD second ones | | | |
| +0021 | ✕ | ✕ | ✕ | ✕ | ✕ | ✕ | ✕ | ✕ | ✕ | ✕ | ✕ | WS | ZDG | AL | ✕ | HL |

| | |
|---|---|
| **Alarm** | = Do not show "ALARM" |
| **AL** | = Delete alarm message buffer |
| **WC** | = Watchdog control (not used) |
| **DH** | = Delete history |
| **TDV** | = Time and date valid |
| ✕ | = Not assigned, must be occupied with "0". |
| ▨ | = Alarm bits |
| ✕ (green) | = Input box number |

Explanations on the transfer control transfer block ⇨ POLARIS Panel ("Read")

| Address offset bit number | Description |
|---|---|
| + 0000 | **Image number "SETPOINT", image number specification of the control system**<br>The control system enters the number of the image which should appear on the POLARIS Panel display. If there is a change in this register, the POLARIS Panel shows the corresponding new image. |
| + 0002<br>Bit 4 | **(Alarm) message bit for "ALARM" 0 = display 1 = do not display**<br>For non-interrupting alarm signals the message "ALARM" is outputted in the top left corner of the display. This message can be suppressed by setting this bit. The operator should be informed by means of another object (rectangle, circle, text, …) with the aid of a variable. |
| + 0021<br>Bit 0 | **(HL) Delete histogram**<br>The histogram memory (flash) in the POLARIS Panel is deleted. This process can take several seconds. The bit should remain set until the bit 0 ("Histogram deleted") in the "Record" address offset +0005 field has been set by the POLARIS Panel. No further processing of messages etc. takes place. Communication with the control system is interrupted for this period. |
| + 0021<br>Bit 2 | **(AL) Delete alarm message buffer**<br>Non-dynamic alarm messages remain stored in the POLARIS Panel until they have been acknowledged by the operator with the ENTER key. If this bit is set, all alarm messages in the POLARIS Panel are deleted. Pending alarm messages from the control system are accepted again.<br>This bit may be set for only one cycle. |
| + 0021<br>Bit 3 | **(ZDG) Time / date valid**<br>If this bit is set, the values for time and date which are located in the address offset +0018 to +0020 of the control system are taken over in the POLARIS Panel.<br>This bit may be set for only one cycle. |
| + 0021<br>Bit 4 | **(WD) Watchdog control**<br>Has no function in the currently available protocols. |
| + 0021<br>High byte | **Input box number**<br>≠ 0 ➡ Specification to Runtime regarding which displayed image input box is to be focussed on.<br>The input box number is generated on the basis of the Z order of the objects when the project is loaded. Invalid specifications are ignored. Focus altered only if the value is altered. |
| + 0021<br>High-Byte | **Input box number**<br>≠ 0 ➡ Specification to Runtime with respect to which displayed image is to be focussed on.<br>The input box number is generated on the basis of the Z order of the objects when the project is loaded. Invalid specifications are ignored. The focus is altered only if the value is changed. |

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### 4.1.5 "Write" Data Range Transfer Block

Data structure for transferring from the POLARIS Panel to the control. Storage space for 21 data words must be reserved in the control for this range. The start address for the transfer block is freely selectable.

**Detail**

| Offset\Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0000 | "ACTUAL"Image number, image shown on POLARIS Panel | | | | | | | | | | | | | | | |
| +0001 | | | | | | | | | BL | | | | | | HV | WD |
| +0002 | | Alt | Ctrl | Shift | F12 | F11 | F10 | F9 | F8 | F7 | F6 | F5 | F4 | F3 | F2 | F1 |
| +0003 | | 'Info' | Del | Ins | - | . | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +0004 | | | | Home | Win2 | Win1 | F16 | F15 | F14 | F13 | Left | Right | Down | Up | CR | ESC |
| +0005 | S12 | S11 | S10 | S09 | S08 | S07 | S06 | S05 | S04 | S03 | S02 | S01 | Time | Alarm | | Hist. |
| +0006 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +0007 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +0008 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +0009 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +0010 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +0011 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +0012 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +0013 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| +0014 | 143 | 142 | 141 | 140 | 139 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 128 |
| +0015 | 159 | 158 | 157 | 156 | 155 | 154 | 153 | 152 | 151 | 150 | 149 | 148 | 147 | 146 | 145 | 144 |
| +0016 | 175 | 174 | 173 | 172 | 171 | 170 | 169 | 168 | 167 | 166 | 165 | 164 | 163 | 162 | 161 | 160 |
| +0017 | 191 | 190 | 189 | 188 | 187 | 186 | 185 | 184 | 183 | 182 | 181 | 180 | 179 | 178 | 177 | 176 |
| +0018 | 207 | 206 | 205 | 204 | 203 | 202 | 201 | 200 | 199 | 198 | 197 | 196 | 195 | 194 | 193 | 192 |
| +0019 | 223 | 222 | 221 | 220 | 219 | 218 | 217 | 216 | 215 | 214 | 213 | 212 | 211 | 210 | 209 | 208 |
| +0020 | 239 | 238 | 237 | 236 | 235 | 234 | 233 | 232 | 231 | 230 | 229 | 228 | 227 | 226 | 225 | 224 |

| | |
|---|---|
| **HV** | = History full |
| **Alarm** | = Alarm message buffer deleted |
| **WD** | = Watchdog panel |
| **Time** | = Time and date valid |
| **Hist** | = History deleted |
| (X) | = Not assigned, must be occupied with "0" |
| (blue) | = Alarm acknowledgment bit |
| (green X) | = Input box number |

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Explanations on the transfer from POLARIS Panel ⇨ ("Write")

| Address offset<br>Bit number | Description |
|---|---|
| + 0000<br>Bit 4 | **Image number of "ACTUAL" image shown on POLARIS Panel**<br>Into this register, the POLARIS Panel enters the number of the image which is shown in the POLARIS Panel display. The control can compare if the image has been changed with the aid of the function keys. |
| + 0001<br>Bit 0 | **(WD) Watchdog Terminal**<br>This bit is transferred in every cycle as 1 (set). The control system can reset this bit to 0 in order to check after a certain time (timeout in master systems, e.g. 10 secs) whether the bit has been reset from the PC display terminal. If it has, communication has proceeded correctly. |
| + 0001<br>Bit 1 | **(HV) Histogram full**<br>This bit is set from the POLARIS Panel when there are 500 entries in the histogram. |
| + 0005<br>Bit 0 | **(Hist) Histogram deleted**<br>This bit is set from the POLARIS Panel after the histogram has been successfully deleted. The bit remains set as long as the bit delete histogram is set to bit 0 in the field "Read" address offset +0021. |
| + 0005<br>Bit 2 | **(Alarm) Alarm indication buffer deleted**<br>This bit is set from the POLARIS Panel after the alarm indication buffer has been successfully deleted. The bit remains set as long as the bit delete alarm message buffer is set to bit 2 in the field "Record" address offset +0021. |
| + 0005<br>Bit 3 | **(Time) time / date accepted**<br>This bit is set from the POLARIS Panel after the time/date has been accepted by the POLARIS Panel. The bit remains set as long as bit 3 time/date is set as valid in the field "Record" address offset +0021. |
| +0001<br>High-Byte | **Input box number**<br>Feedback of the number of the displayed image input box focussed on.<br>The input box number is generated on the basis of the Z order of the objects when the project is loaded. |
| +0001<br>High-Byte | **Input box number**<br>Feedback of the number of the input box of the displayed image that is focussed on.<br>The input box number is generated on the basis of the Z order of the objects when the project is loaded. |

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### 4.1.6 "Read-Back of Alarm Acknowledgments" Data Range

If there are several POLARIS Panels in one system and all alarm messages are displayed on each POLARIS Panel, these messages must be explicitly acknowledged on each POLARIS also. BMS-Graf-pro offers the possibility of reading back the alarm acknowledgments and automatically confirming the alarms highlighted in this range.

Data structure for transferring from the control to the POLARIS Panel. Storage space for 15 data words must be reserved in the control for this range. The start address for the data block is freely selectable.

**Detail**

| Offset\Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0000 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +0001 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +0002 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +0003 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +0004 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +0005 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +0006 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +0007 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| +0008 | 143 | 142 | 141 | 140 | 139 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 128 |
| +0009 | 159 | 158 | 157 | 156 | 155 | 154 | 153 | 152 | 151 | 150 | 149 | 148 | 147 | 146 | 145 | 144 |
| +0010 | 175 | 174 | 173 | 172 | 171 | 170 | 169 | 168 | 167 | 166 | 165 | 164 | 163 | 162 | 161 | 160 |
| +0011 | 191 | 190 | 189 | 188 | 187 | 186 | 185 | 184 | 183 | 182 | 181 | 180 | 179 | 178 | 177 | 176 |
| +0012 | 207 | 206 | 205 | 204 | 203 | 202 | 201 | 200 | 199 | 198 | 197 | 196 | 195 | 194 | 193 | 192 |
| +0013 | 223 | 222 | 221 | 220 | 219 | 218 | 217 | 216 | 215 | 214 | 213 | 212 | 211 | 210 | 209 | 208 |
| +0014 | 239 | 238 | 237 | 236 | 235 | 234 | 233 | 232 | 231 | 230 | 229 | 228 | 227 | 226 | 225 | 224 |

### 4.1.7 LED Register Data Range

If there are function key LEDs in the POLARIS Panels, they can be controlled with these data blocks.
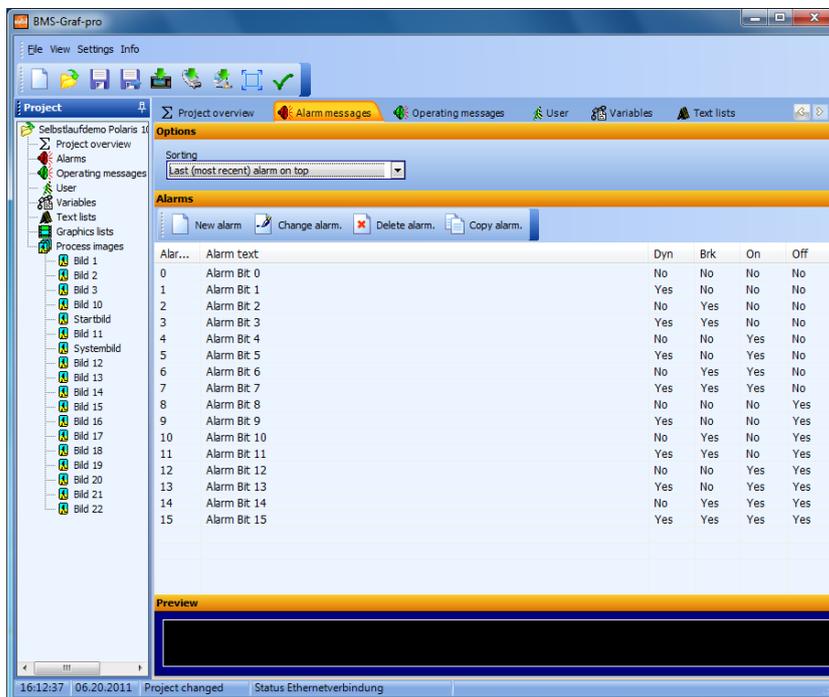
The first word contains the control bits for switching the LEDs on and off.

The second word contains the LEDs' flashing behaviour.

**Details**

| Offset\Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0000 | F16 | F15 | F14 | F13 | F12 | F11 | F10 | F9 | F8 | F7 | F6 | F5 | F4 | F3 | F2 | F1 |
| +0001 | F16 | F15 | F14 | F13 | F12 | F11 | F10 | F9 | F8 | F7 | F6 | F5 | F4 | F3 | F2 | F1 |

## 4.2 "Alarm Messages" Tabs



Alarm messages are handled specially in the BMS-Graf-pro. Up to 240 alarms are possible which are linked to the alarm bits in the "Read" transfer. The alarm number corresponds to the alarm bit number in the "Read" transfer block. If an alarm is generated, the next free alarm number is assigned automatically. This can be changed in the alarm dialogue. Double alarm numbers are not permissible.
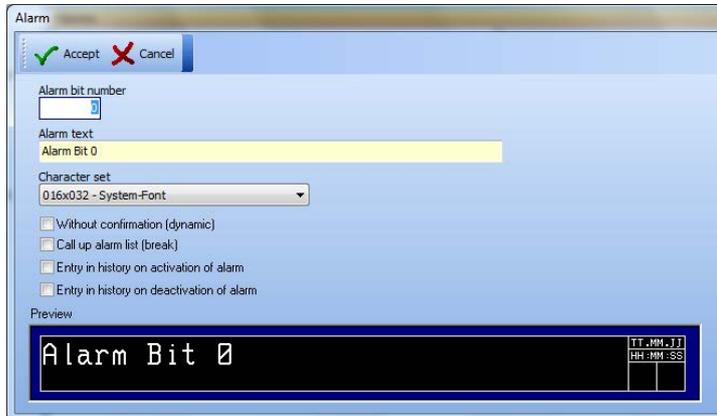
In the BMS-Graf-Runtime, the "Read" transfer block is read cyclically from the control. If an alarm bit is reset, the associated alarm (if any) is entered into the list of active alarms with date and time.

If the operator confirms the alarm, the alarm acknowledgment bit corresponding to the alarm number is set in the "Write" transfer block.

If the "read-back of alarm acknowledgments is activated" (see tab "project overview"), the alarm is acknowledged via the read-back.

If an alarm is pending which is to be acknowledged, the alarm acknowledgment bit is transferred to the control. Only when the alarm bit is reset by the control, is the corresponding alarm acknowledgment bit reset too.

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### 4.2.1 Generating or Processing an Alarm



"Alarm" Dialog window

| | |
|---|---|
| **Alarm bit number** | An alarm is linked by means of the alarm bit number<br><br>– to an alarm bit in the "Read" transfer block,<br><br>– for the alarm acknowledgement bits in the "Write" transfer block<br><br>– for the global acknowledgment bit in the "Read-back of the alarm acknowledgment" data range. |
| **Alarm text** | Shows the text with the selected **character set** as in the **preview** in the BMS-Graf-Runtime. |
| **Without confirmation (dynamic)** ☑ | Alarm does not need to be confirmed. It is automatically removed from the list of active alarms.<br><br>Not activated. The alarm must be confirmed even when the alarm is no longer active. Several entries of this alarm can be available in the list of active alarms. |
| **Call up alarm list (break)** ☑ | Changes into the list of the active alarms when the alarm occurs. |
| **Entry in history on activation of alarm** ☑ | Saves the activated alarm message into the POLARIS Panel's non-volatile memory (flash-file) with date, time and "+" marking. |
| **Entry in history on deactivation of alarm** ☑ | Removes the alarm message from the list. An entry follows in the POLARIS Panel's non-volatile memory (flash-file) with date, time and "-" marking. See also **"Without confirmation (dynamic)"** |

ⓘ **Note**  The list of the active alarms is filed in the volatile memory and is lost when the BMS-Graf-Runtime is ended.

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## 4.3    "Operating Messages" Tab
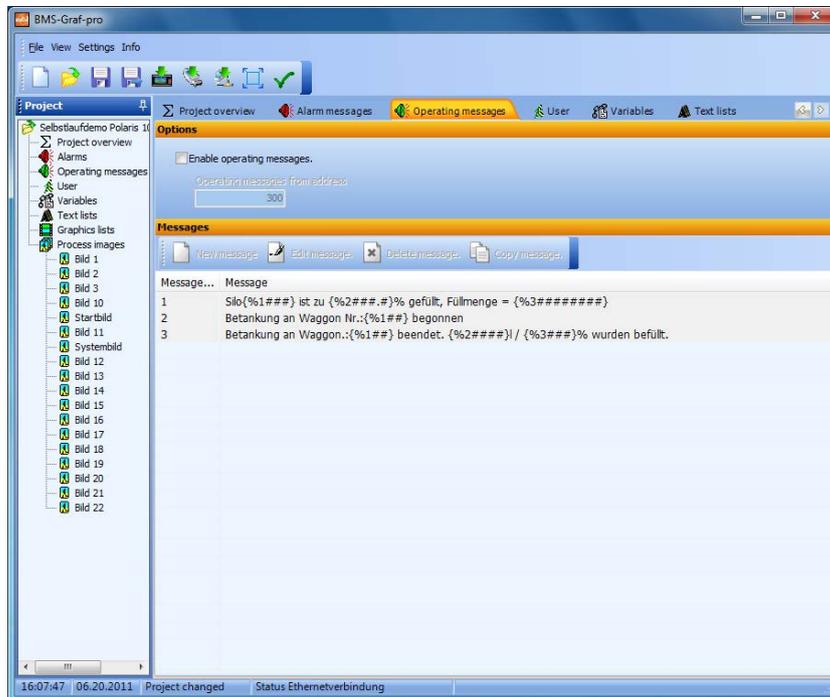


It is possible to process messages in the BMS-Graf-pro. A transfer range to the control is defined. It permits two types of operating messages:

1. Operating messages in text form
   Date and time are determined and used by the internal POLARIS Panel. The operating message text is accepted by the control and entered in the operating message buffer.

2. Operating messages, which were created in the BMS-Graf-pro interface can be called up by the control.

The operating message buffer can hold up to 2,000 entries. If more messages are generated, the oldest message is replaced. The most recent messages are at the beginning of the operating message buffer. In the BMS-Graf-pro interface, the processing of the operating messages is activated and the start address for the transfer range is specified.

Re procedure:    The first register with the specified start address is read cyclically by the POLARIS Panel. If the register is not equal to zero, the software checks if a text or message data was transferred.

### 4.3.1    Operating Message as Text of the Control

The identifier for a text message is $FF_{HEX}$ (255) in the high-byte of the identification register. The low-byte indicates the length of the following text. This text is read by the POLARIS Panel control and entered with date and time into the operating message buffer. The identifier register in the control is set to zero and the next message can be transferred from the control.

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Structure of the transfer range of the control when a text is transferred.

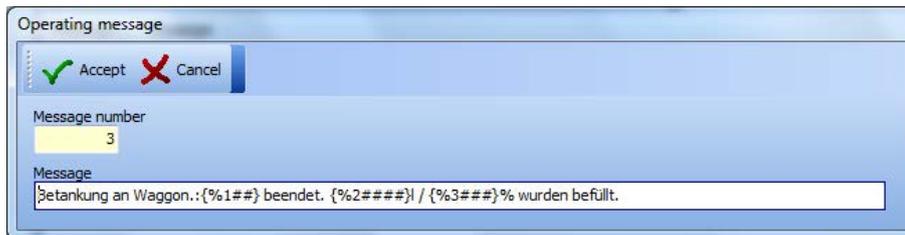| | |
|---|---|
| FF<sub>HEX</sub> | Identifier for text message [Byte] |
| Text length | Text length [Byte] (1,255) |
| "T" | 1. Character |
| "e" | 2. Character |
| "x" | 3. Character |
| "t" | 4. Character |
| " " | 5. Character |
| "M" | 6. Character |
| . | Further characters |
| . | |
| . | |

### 4.3.2 Operating Message as a Data Record from the Control

The text number register contains the number of the text which is to be shown. The operating message data record from the POLARIS Panel is read from the control. The date, time and values are read from the data record and inserted into the selected text in the positions occupied by the placeholders. The operating message is entered into the operating message buffer and the text number register in the control is set to zero. The next message can be transferred from the control.

Structure of the transfer range from the control when a message data record is transferred:

| | | |
|---|---|---|
| Text number | | Operating message number [Word / KH] |
| BCD hour | BCD minute | Date and time [BCD] |
| BCD second | BCD day | |
| BCD month | BCD year | |
| Long integer value 1 | | Value 1 [Longint / KD] |
| Long integer value 2 | | Value 2 [Longint / KD] |
| Long integer value 3 | | Value 3 [Longint / KD] |

### 4.3.3 Creating or Editing Operating Messages

Operating message

✓ Accept   ✗ Cancel

Message number
3

Message
Betankung an Waggon.:{%1##} beendet. {%2####}l / {%3###}% wurden befüllt.

The operating message texts can have a **message number** from 1 to 65279 (FEFF<sub>HEX</sub>).
Larger message numbers are interpreted as a transfer of text.

Three values are defined in the message data record. They are seen in sequence. Placeholders for the numerical values can be inserted in the **message**. The placeholders always begin with **{%** and the index of the value, followed by the formatting without spaces (e.g.: **##** or **##.#** or **#.###**). The placeholder is concluded by means of a closing curly bracket **}**.

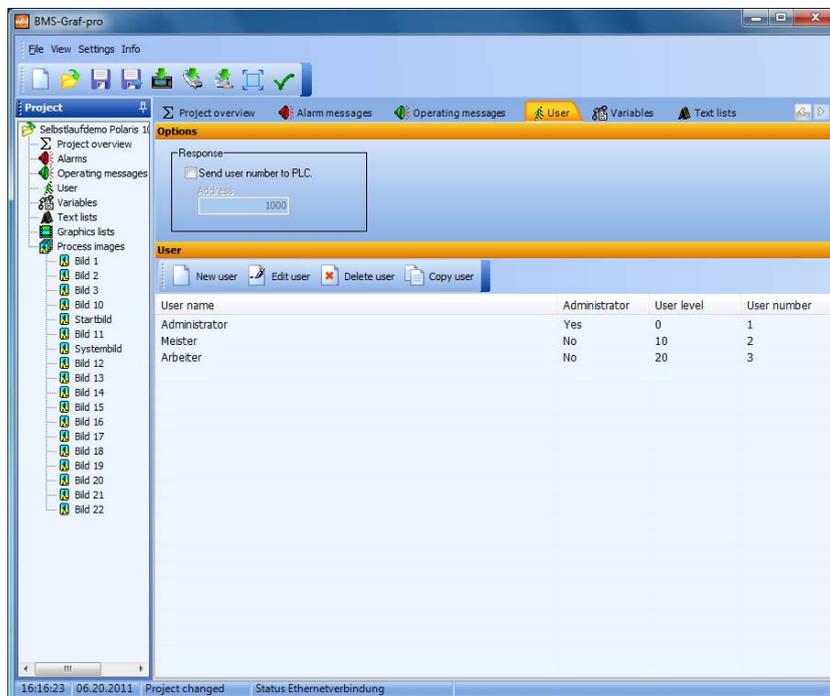The value is adjusted as the formatting is outputted and converted if necessary.

Example:

| Value from the control | Formatting string | Display |
|---|---|---|
| `1234` | `{%x####}` | `1234` |
| `1234` | `{%x#.###}` | `1.234` |
| `1234` | `{%x###.#}` | `123.4` |
| `1234` | `{%x###}` | `***` |

*X is the index of the value register.*

If the number is larger than can be shown with the formatting, asterisks * are outputted.
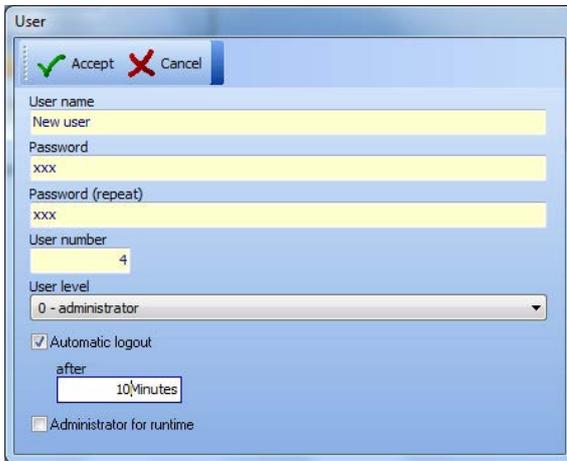
## 4.4 "User" Tab



User administration is integrated into the BMS-Graf-pro. A user with a unique name is set up and as an administrator (s)he can define the settings for the BMS-Graf-Runtime and adjust the user administration in the runtime. User access to input fields and images can be set by means of the assignment of user levels. 26 user levels are available whereby level "0" possesses more rights than level "25".

The following areas can be defined via the user levels:

- Screen changeover
- Input fields
- BMS-Graf-Runtime menu
- Key assignments
- Touch fields

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### 4.4.1 Creating or Editing a User



"User" Dialog window

| User name and user number | must be assigned<br><br>**Background:**<br>The user logs into the BMS-Graf-Runtime with user name and if required, the user number is sent to the control. |
|---|---|
| Password | Can be pre-set and changed by the respective user in the BMS-Graf-Runtime. |
| User level | Assigns the rights with regard to screen change and input fields. |
| Automatic logout ✔ | The user is logged out automatically after the selected period of time (in minutes). The user must log in again.<br><br>If **not activated**, the user will remain logged-in until s(he) logs out or the device shuts down. |
| Administrator for Runtime ✔ | This user can switch to the BMS-Graf-Runtime menu, make alterations and shut down the device. |

**ℹ Note**

The first user must always be a user with administrator rights for the BMS-Graf-Runtime.

If no user has been created, the system is fully accessible to the user even if user levels have been established for screen change and input fields.

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## 4.5 "Variables" Tab
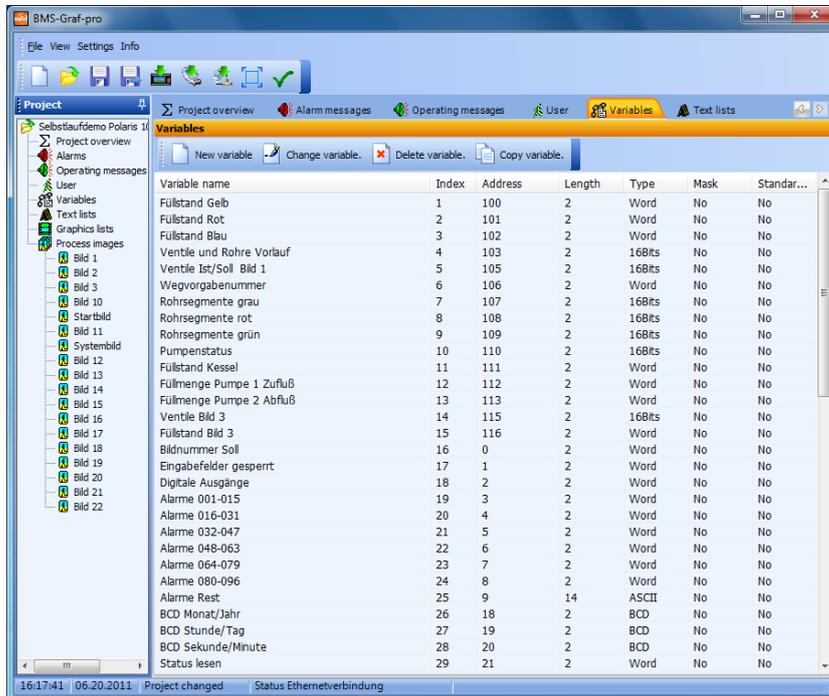


In the BMS-Graf-pro, a variable constitutes the process link to a target address in the control.

In the BMS-Graf-Runtime, a graphic object in a screen accesses the process value with the aid of a variable. In addition, a basic data type is assigned to a variable. The type conversion required for presentation is effected automatically depending on the data type in question.

The communication between the control and the POLARIS Panel presents a bottleneck. It is therefore necessary to create the variables carefully. It is advantageous if the variables being used are positioned beside each other in a screen without gaps. The protocols used in the BMS-Graf-Runtime transfer complete data blocks. Consecutive variables are obtained from the control with a minimum of communication protocols.

Variables with the same addresses are obtained only once from the control and the value is assigned to both or more variables. This means that there is no loss of speed if there is a multiple allocation of control addresses.

| | |
|---|---|
| **i** Note | It is recommended to create the required variables at the beginning of project planning. |

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### 4.5.1 Creating or Altering Variables



**"Variable" dialog window**

| | |
|---|---|
| **Variable name** | A name must be assigned to a process link and may exist only once in the project. |
| **Address** | An address must be assigned to the variable for access to the control memory. |
| | The address format varies depending on the type of the control (16-bit address or data module/data word). All address specifications are word addresses, which means in the case of byte-oriented controls: |
| |  Byte 0 and byte 1 in the memory correspond to word address 0<br><br>Byte 2 and byte 3 in the memory correspond to word address 1<br><br>etc. |
| | In the Siemens controls, the specifications refer to the data words (data modules / data words).<br>Data words from DW 0 to DW 255 can be read or written in data modules DM 2 to DM 255 (or D B2 to DB 255). In controls from other manufacturers the specifications refer to a 16-bit wide memory register. |
| **Type** | The input of the **data type** defines how the value from the POLARIS Panel is interpreted. The data length in bytes is calculated on the basis of the type. |

Only in the ASCII type can the byte length be entered, whereby the value must be even.

In the 16-bit types (16-bits, integer, word and hex) it is possible to select the "activate bit mask" field. The individual bits which are to form the variable value can be selected in the mask.



As the variable's value range is interrupted, the variable can be normalised. This means that the bits being used are moved to the right.
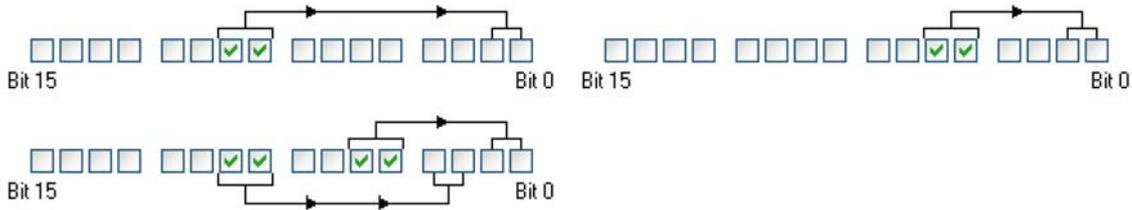


As shown in the example above, the effect is that a value range of 0 to x always arises no matter which bits are normalised. X is dependent on the number of selected bits; in the example, a value range of 0 to 3. and 0 to 15 resp. arises.

> **i**
> **Note**
>
> Masking out particular bits is an excellent means of handling the multiple use of text lists and graphics lists. As it is possible to write bits into the control via a mask, care must be taken in this case to ensure that the control itself does not have any access rights to write to the variable. The result would be inconsistent data.

**Supported Data Types:**

| Data type | min. access width | S5 data types | Value range |
|---|---|---|---|
| 16-bits | 16-bit register | KM | 00000000 00000000$_{BIN}$ to 11111111 11111111$_{BIN}$ |
| Integer | 16-bit register | KF | -32768 to +32767 |
| Word, Hex | 16-bit register | KH | +0 to +65535 (0000$_{HEX}$ to FFFF$_{HEX}$) |
| Longint | 32-bit register | KD o. KH | - 2147483648 to 2147483647 |
| ASCII | 16-bit register | KC | #0 to #255 ; #0 to #255 |
| BCD | 16-bit register | | 0000 to 9999 |
| S5Timer | 16-bit register | KT | 0.0 to 999.3 in BCD code (4-Bit = number from 0 to 9) |
| S5Counter | 16-bit register | KZ | 000 to 999 in BCD code (4-Bit = number from 0 to 9) |
| Single | 32-bit register | | Real/Float with 7-8 decimal place accuracy (2.9E$^{-39}$. 1.7E$^{38}$) |
| Real48 | 48-bit register | | Real/Float with 11-12 decimal place accuracy (1.5E$^{-45}$. 3.4E$^{38}$) |
| Double | 64-bit register | | Real/Float with 15-16 decimal place accuracy (5.0E$^{-324}$. 1.7E$^{308}$) |

> **i**
> **Note**
>
> The S5 timer automatically uses a second as a time basis. Single, Real48 and Double are floating point data types which are not supported by the control.
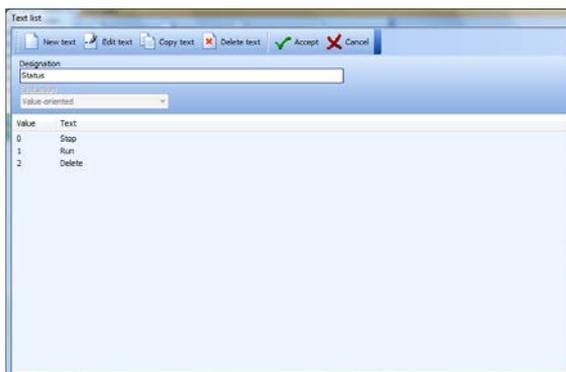
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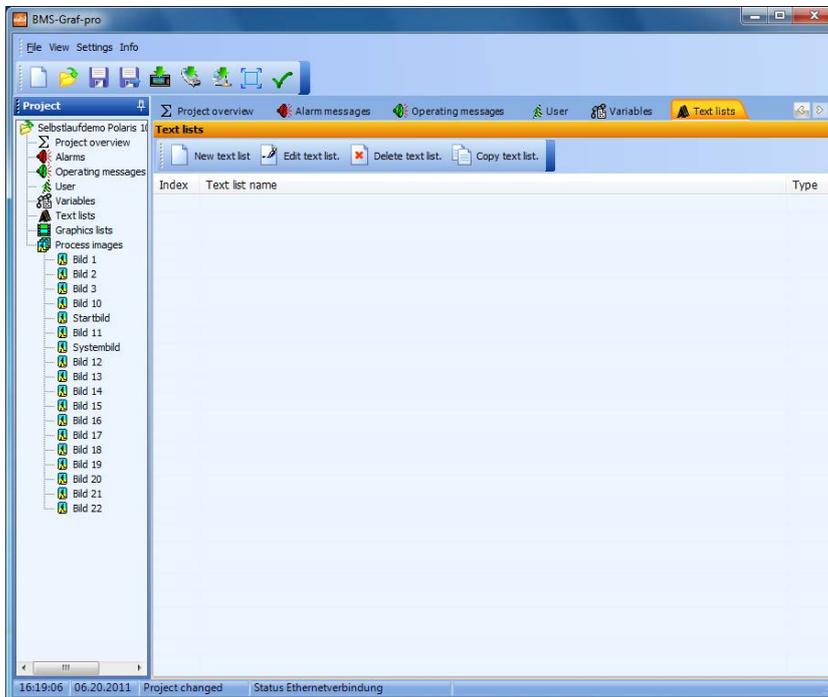
## 4.6 "Text Lists" Tab



**Simple administration of texts**

Text lists can be multiply used in text lists objects inside the process images.

### 4.6.1 Changing Text Lists



**"Text list" dialog window**

**Designation** is used in the text list objects

**Evaluation** can be carried out on the assigned variables in a bit-oriented or value-oriented manner

> ℹ️
> **Note**
> If the text list in the image is used together with a variable with mask, the value-oriented evaluation is to be used in preference.

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### 4.6.2 Bit-Oriented Lists Text
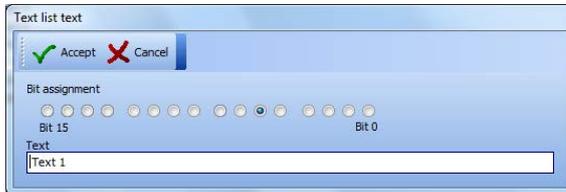
**Bit assignment** defines a bit.

**Text** The inputted text is outputted later.

If several bits of the variables are set, the text with the lowest bit number is assigned or displayed. If no bit is set, no text is displayed.

### 4.6.3 Value-Oriented Lists Text

**Reference value** defines the value

**Text** The inputted text is outputted later.

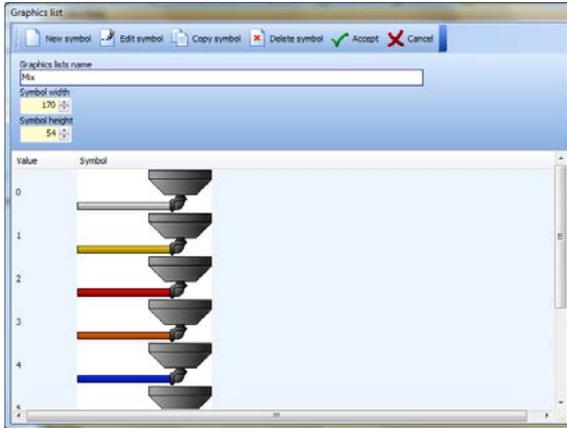If the process value is not given as a reference value in the text list, no text is displayed.

## 4.7 "Graphics Lists" Tab
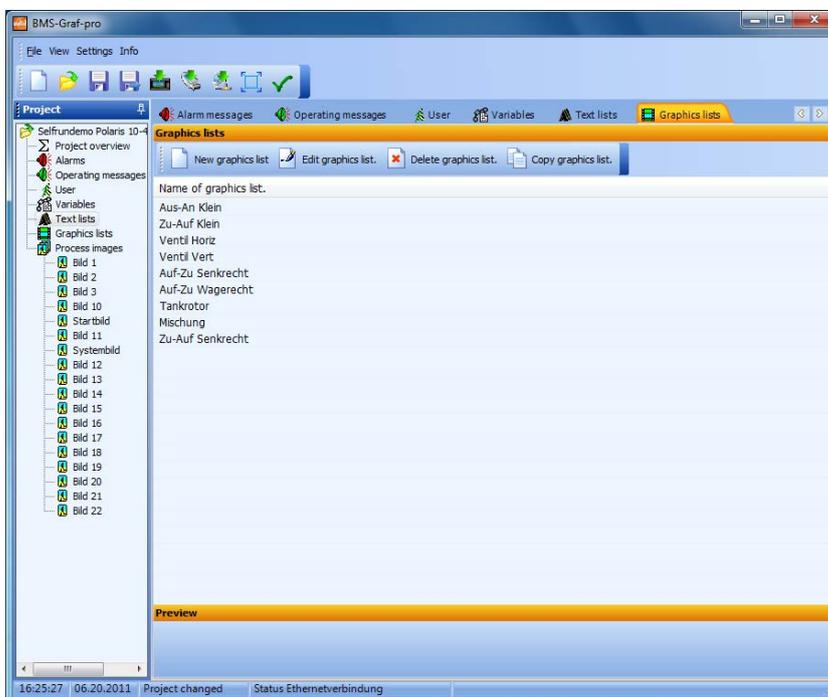
**Simple administration of symbols**

Graphics lists can be multiply used in graphics lists objects inside the process images.

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### 4.7.1    Changing the Graphics Lists

**Graphics lists name** may be used only once in the project.

The **symbol width** and **symbol height** can be defined for a new symbol.
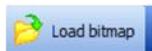
The graphics used should already conform to the approximately set symbol width and symbol height. This prevents a rough graphics output or a slow image build-up in the editor.

The inserted graphics are scaled to the entered size. The list is an overview of the graphics already contained and their reference values.

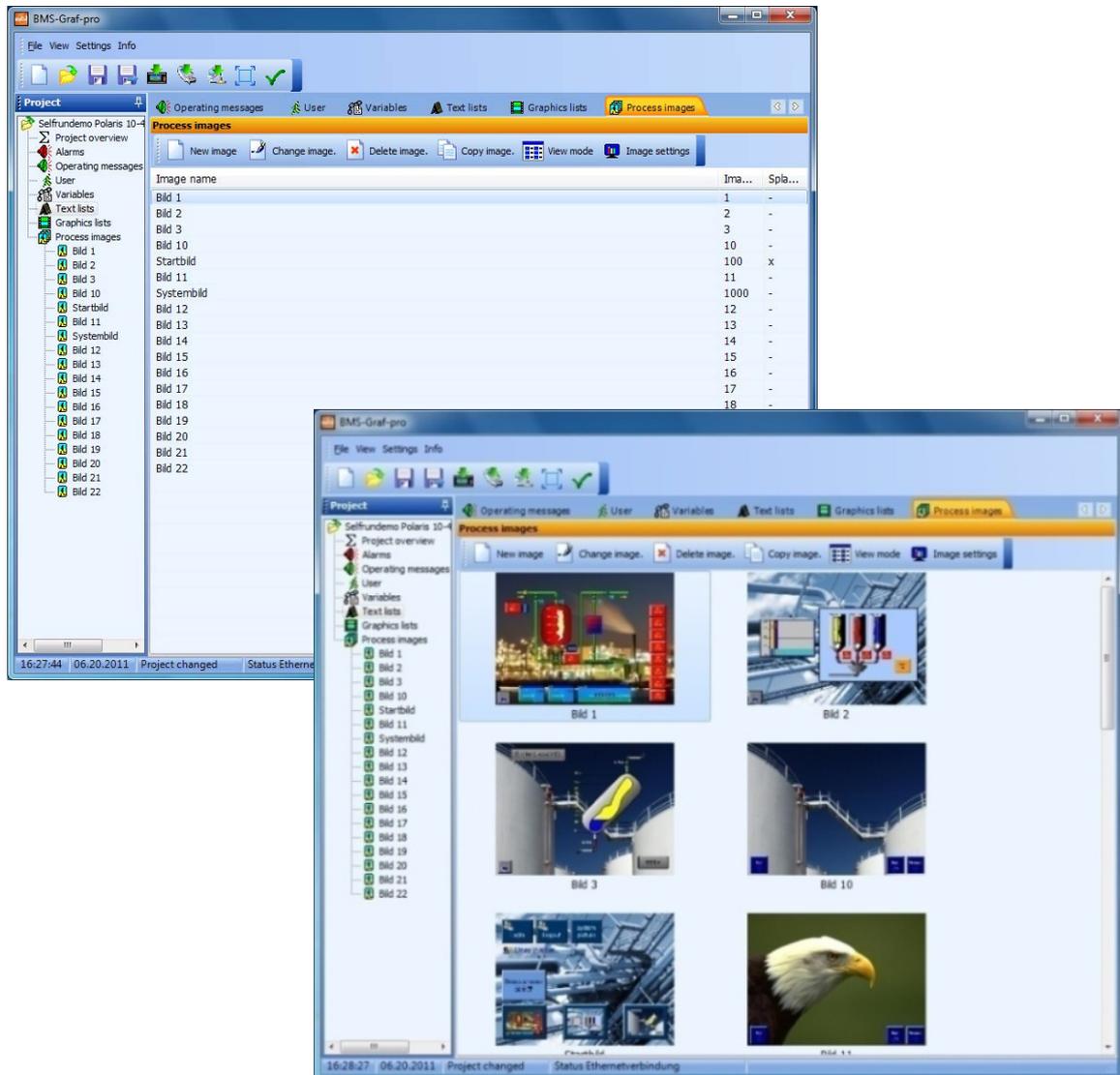### 4.7.2    Inserting the Symbol in the Graphics List
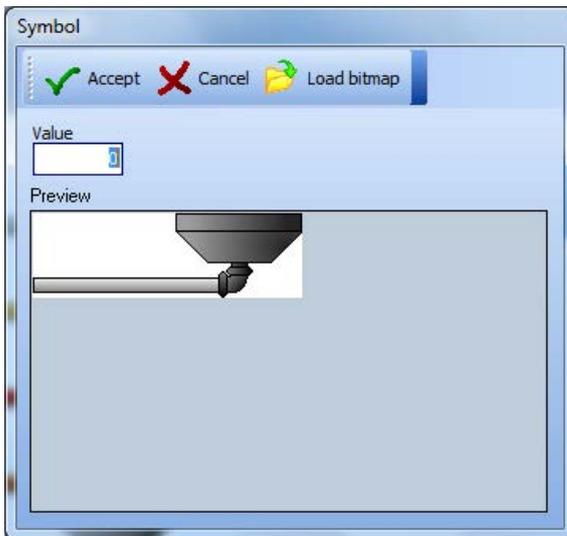
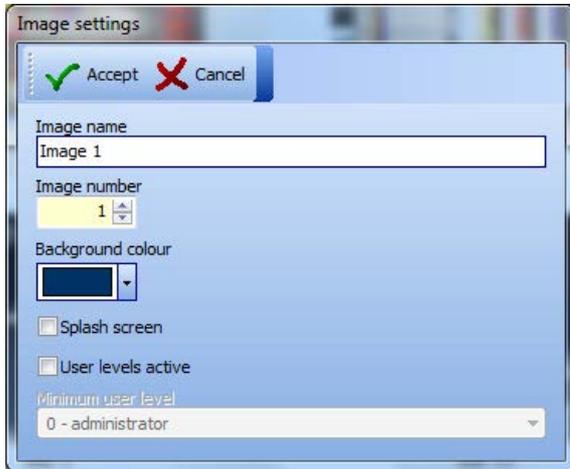| | |
|---|---|
| **Value** | presents the graphic's reference value |
| Load bitmap | A new graphic can be inserted with the icon as a BMP or JPG file. |

## 4.8 "Process Images" Tab



The image overview lists all available images in a project according to image name, image number and start image or preview with image name.

The images can be sorted by clicking on the column heading. The images are also sorted in the project.

A large number of process images can be created. The quantity depends on the memory space in the respective POLARIS Panel.

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The "**New image**" icon determines the next free image number and opens a dialog window.



**"Image settings" Dialog Window**

| Image name | Can be selected at will and changed at any time. |
| --- | --- |
| | In the case of touch fields or function keys the image name is used to call up images. Each name must be unique in the project. |
| | The references in the touchfields and function keys must be checked after alteration. |
| Image number | is transferred from the control - while the POLARIS Panel is switched on – and enables the display of the correct image. |
| | The control can call up a particular image with the image number on the POLARIS Panel. |
| Background colour | selectable, sets a background colour for the image. |
| Splash screen ☑ | The first image that appears when the POLARIS Panel is booted. |
| | It another image was marked as the splash screen before, it now loses its status. |
| User levels active/ Minimum user level ☑ | The image appears only to certain users. |
| | Do not use while the splash screen is on. Changes can be made by means of the image editor. |
| ✓ Accept | accepts the image settings and creates the new image. |
| | The image editor opens to allow the image to be edited. |

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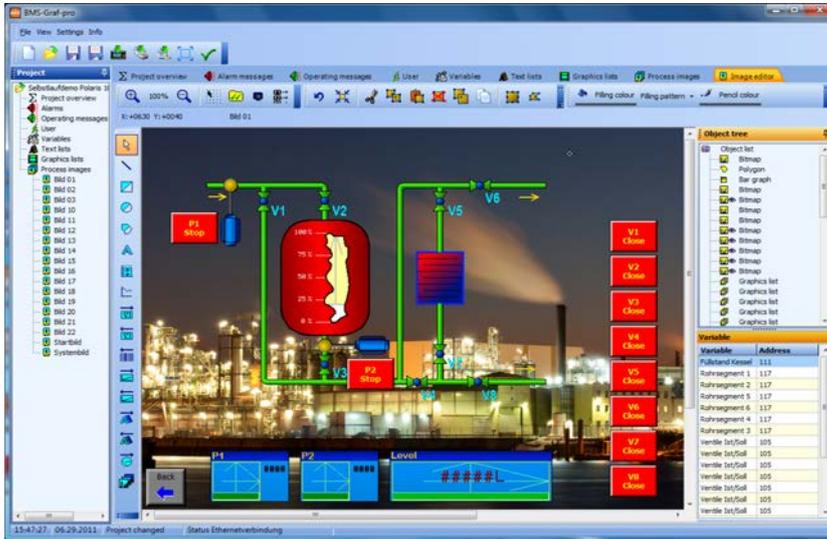
## 4.9 "Image Editor" Tab



The image editor is used to create process images.

The tool bar contains objects which can be placed and parameterised on the process image.

On the right-hand side of the screen, all placed objects are displayed in a tree structure and the levels of the individual objects are displayed. Objects, which are on the top of the tree structure will be the first objects shown on the image and are therefore positioned in the background.
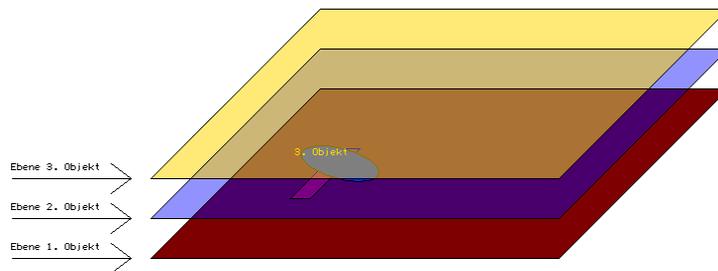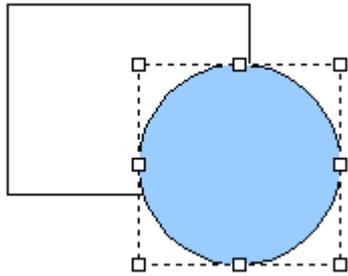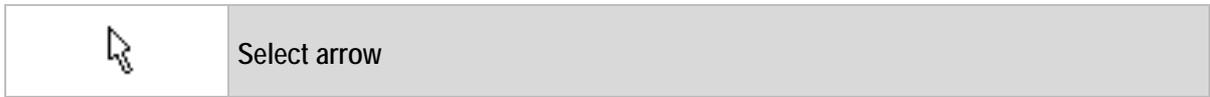


| | |
|---|---|
| **i** | In the BMS-Graf-pro versions up to 6.0.x.x layer structures existed only conditionally. |
| **Note** | In the BMS-Graf versions from 7.0.x.x on the layer structures must be taken into account when importing the BMS-Graf-pro project (older versions) to keep the presentation compatible. |

In the new BMS-Graf pro version, the object maintains the layer even if it is drawn later. It is possible to place animated objects over other animated objects without obscuring the object.

Example: in the above image a bargraph object can be seen behind a bitmap object with a transparent cut-out.

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### 4.9.1 Tool Bar (Graphic Objects)

| | |
|---|---|
| ⬡ | **Select arrow** |

An individual object is selected by clicking on the left mouse button. Objects that have been selected already are removed from the selection.

When the shift (⇧) key is pressed down, an object not yet marked is added to the selection or an object already selected is removed from the selection.

If the left mouse button is kept depressed, the selected object can be moved with the mouse.

**Types of editing:**
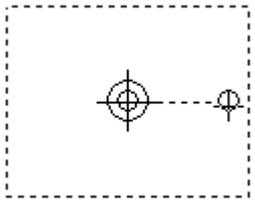
| | | |
|---|---|---|
| Alter size | Edit points | Free rotating |

– The object has various editing points in the highlighted frame depending on the type of editing.

– The mouse cursor changes when it is positioned over the object.

– Several forms of editing are possible depending on the type of object.
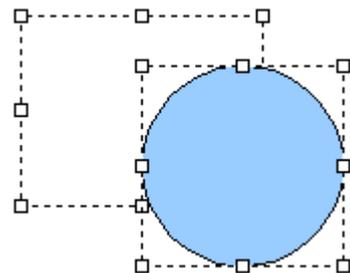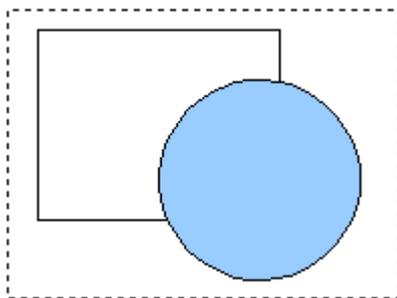
If no object is captured by a mouse click, pressing the mouse button can draw a frame around several objects. When the mouse button is released, the objects inside the frame are selected. If one or more objects are selected and the mouse button is pressed, they can be moved by holding down the shift or control key while using the cursor key.

| | Draw line |
|---|---|
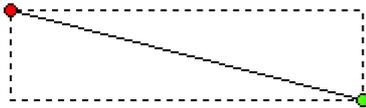
The first point of the line is fixed with the first mouse click, the second mouse click fixes the second point and closes the function.

The line is drawn with the current pen colour, line width and the current pen pattern.
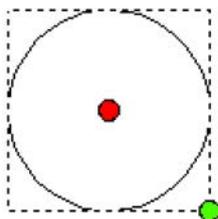
| | Draw rectangle |
|---|---|

The first mouse click sets the starting corner point, the second mouse click fixes the end corner point of the rectangle.

The rectangle is drawn with the current pen pattern, pen width, filling pattern and filling colour values.

| | Draw circle, ellipse |
|---|---|

The first mouse click establishes the centrepoint of the object, the second mouse click defines the arc of the circle or ellipse.

The object is drawn with the current pen pattern, pen colour, pen width, filling pattern and filling colour values.

| | Draw polygon |
|---|---|
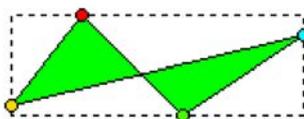
The second mouse click on the same point or on the starting point closes the polygon.

The object is drawn with the current pen pattern, pen colour, pen width, filling pattern and filling colour values.
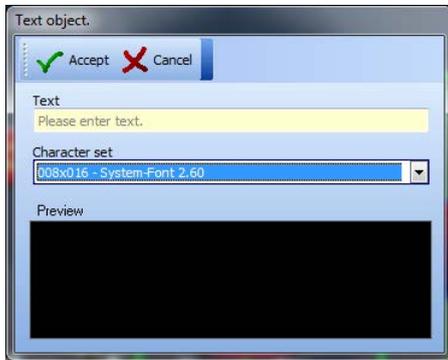
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| | |
|---|---|
| A | **Insert text** |

**"Text Object" Dialog Window**

| | |
|---|---|
| **Text** | text to be presented |
| **Character set** | is assigned |
| ✓ Accept | Place object |

| | |
|---|---|
| | **Insert bar graph** |
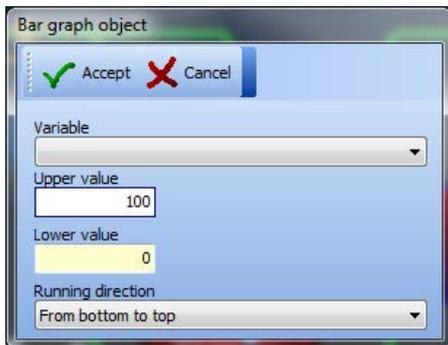
**"Bar graph object" dialog window**

| | |
|---|---|
| **Variable** | is the process link to the/from the control |
| **Upper/lower value** | defines the top and bottom value range that can be presented |
| **Running direction** | e.g. from top to bottom |
| ✓ Accept | To place the object |

**i Note**

Fixed labelling on the scale was dispensed with to allow bar graphs to be inserted individually.

The labelling must be created with the "object text" dialog window. Bar graphs can be placed by one mouse click and dragged to the required size by means of a second mouse click.

Colour changes can be implemented by bar graphs positioned vertically one over another.

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| | **Insert plot graph** |
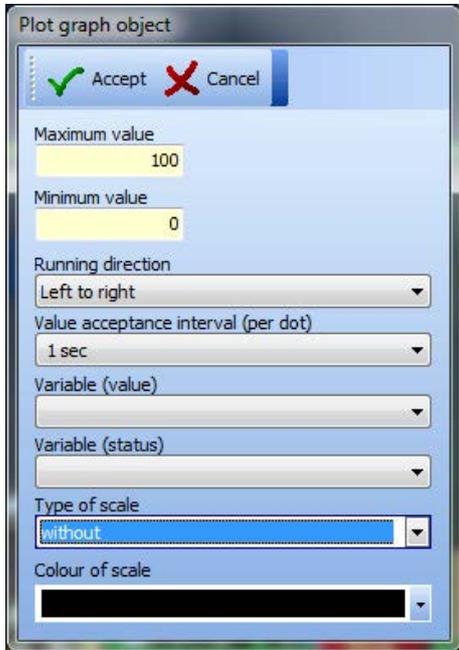
**"Plot graph object" dialog window**

| | |
|---|---|
| **Maximum/Minimum value** | Specification for value range |
| **Running direction** | e.g. from top to bottom |
| **Value acceptance interval (per dot)** | Unit of time when the new value is to be accepted by the control into the line plotter |
| **Variable (value)** | is the process link to the/from the control of the value |
| **Variable (status)** | is the process link to the/from the control to the start, stopping and deletion of the curve |

| Bit number | Value | Action |
|---|---|---|
| 0 | 1 | Start |
| 0 | 0 | Stop |
| 1 | 1 | Delete |
| 1 | 0 | None |

| | |
|---|---|
| **Type of scale** | Labelling of the time axis |
| **Colour of scale** | Colour of the line is pen colour, Filling colour of the background (general colour setting) |
| Accept | Placing an object. |

**Note**

The line plotter can be placed with a mouse click and dragged to size with a second mouse click.

A fixed labelling of the Y axis was dispensed with to allow the line plotter to be inserted individually.

The labelling must be created with the "object text".

Several line plotters can be placed on top of each other at the same position. All line plotters in the project are included in the writing in the background too, i.e. even if the image is not visible.

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**Insert input/output box**
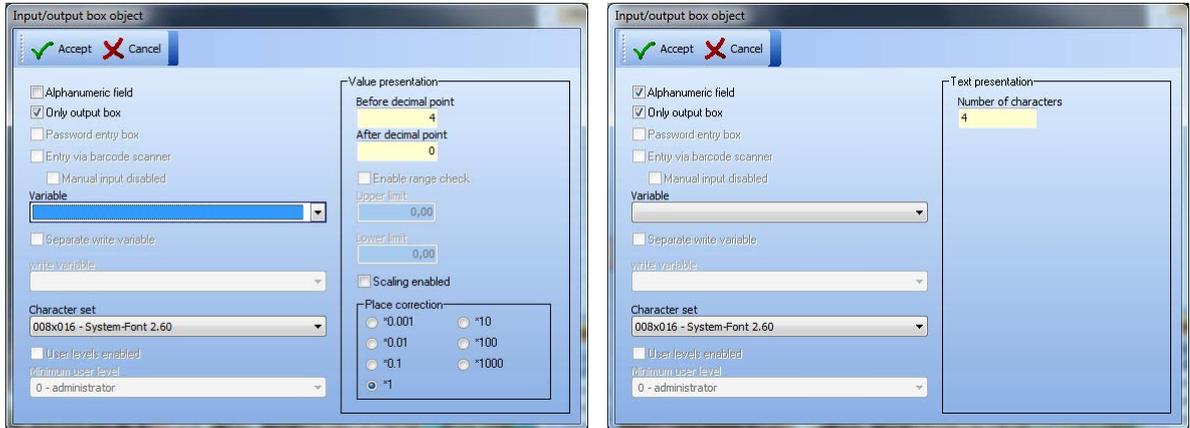


"Insert input/output box" dialog window

| | | |
|---|---|---|
| **Alphanumeric field** | ✔ | for numeric values or texts |
| **Only output box** | ✔ | no inputs in the Runtime |
| **Password input box** | ✔ | shows the input with asterisks " * " |
| **Entry via barcode scanner** | ✔ | The character strings are entered from the barcode scanner from the serial interface |
| **Manual input disabled** | | Inserts only characters from the barcode scanner |
| **Variable** | | is the process link to the / from the value control. |
| **Separate write variable** | ✔ | Reading and writing direction separated. First variable is only read. |
| **Write variable** | | is the process link to the / from the control |
| **Character set** | | Assigns a set of characters to the object |
| **User level enabled/ Minimum user level** | ✔ | Restricts input on the basis of the authorisation level<br><br>This is subject to the condition that a user profile was stored in Runtime; otherwise the setting is ignored. |

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| Text presentation | |
|---|---|
| Number of characters | Only when presenting text; specification of the text length |
| Value presentation | |
| Before decimal point/ after decimal point | Formatting is determined by the number of decimal places |
| Enable range check ✔ | Sets the upper limit and lower limit |
| Scaling enabled ✔ | Switching between scaling and decimal place correction |
| Place correction | A correction factor is selected. |
| Scaling | The output value is scaled with factor (m) and offset (b). |
| ✓ Accept | Accept inputs. |

Example of scaling:     (Formula f(x) = mx + b ➜ Slope of a straight line).

Before decimal point     = 3
After decimal point     = 2
Factor (m)     = 2.1555
Offset (b)     = 20

Calculation on this basis at a value of 10 in the control:
The Runtime displays the value (2.1555 * 10 +20) 41.56.

Conversely if 83.12, for example, is inputted, a value of 20 will be calculated in the PLC.

---

ℹ️
**Note**

In Master connections the momentary value in the control is displayed cyclically.
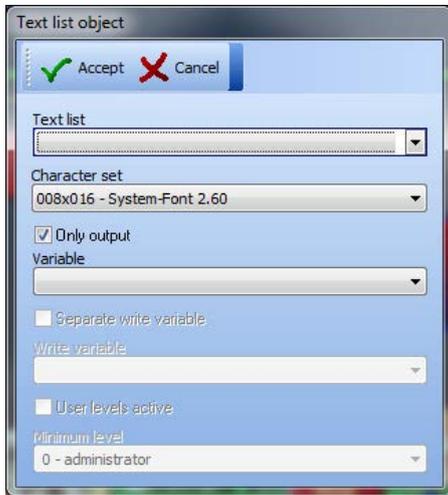
In slave connections the value is updated when it is received. The "⬆⬇" key on the POLARIS Panel is used for moving between input boxes.

If an input box is exited with the "⬆⬇" key, the original value is retained. If there has not yet been any action in an input box, the momentary value in the control is displayed. Once the "ENTER" key has been pressed on the POLARIS Panel, the inputted value is transferred into the control and the program goes to the next input box.

In principle, every source of data which works with pure ASCII characters is connected to the POLARIS as a barcode scanner. In view of the speed of the communication with the control, text fields should be kept as short as possible. Where scaleable output fields are concerned, only numeric inputs are possible.

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| | |
|---|---|
|  | **Insert input/output box text list** |



**"Text list object" dialog window**

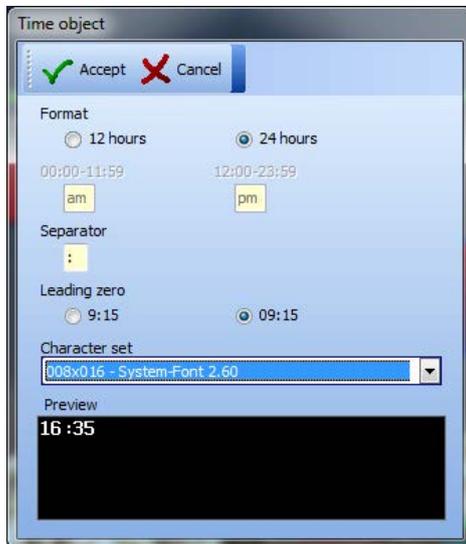| Text list | | Text lists already created are assigned to the object |
|---|---|---|
| Character set | | |
| Only output | ✔ | Assigns a set of characters to the object |
| Variable | | is the process link to the / from the control |
| Separate write variable | ✔ | Reading and writing direction separated. First variable is only read. |
| User levels active/ minimum user level | ✔ | Restricts input on the basis of the authorisation level. This is subject to the condition that a user profile was stored in Runtime; otherwise the setting is ignored. |

The text list output field is for presenting different texts at the same local position. The length of the text field is decided by the longest available text. If the variable contains a value that is not contained in the list (no text available), an empty field is presented in the set background colour with the length of the longest text. A text list field can contain a maximum of 200 texts.

ⓘ
**Note**

The "↑↓" key on the POLARIS Panel is used for moving between input boxes. One of the predefined texts is selected by means of the ←→" keys. Once the "ENTER" key has been pressed on the POLARIS Panel, the value corresponding to the text is transferred into the control and the program goes to the next input box. If an input box is exited with the "↑↓" key, the original value is retained.

Example: If the variable in the control contains the value 2, the POLARIS Panel presents the "AUTO" text.
　　　　　If the variable in the control contains the value 0, the POLARIS Panel presents the "OUT" text.
　　　　　If the variable in the control contains the value 5, the POLARIS Panel presents the empty text " ".

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| | **Insert time output box** |
|---|---|

**"Time object" dialog window** for the current time on the internal clock in the POLARIS Panel.

| Format | 12-hour (AM/PM) or 24-hour |
|---|---|
| Separator | Punctuation mark between hours and minutes, e.g. 7:15 |
| Leading zero | Time display, e.g. 09:15 |
| Character set | Select font size |
| Accept | Accept settings |

| | **Insert date output box** |
|---|---|
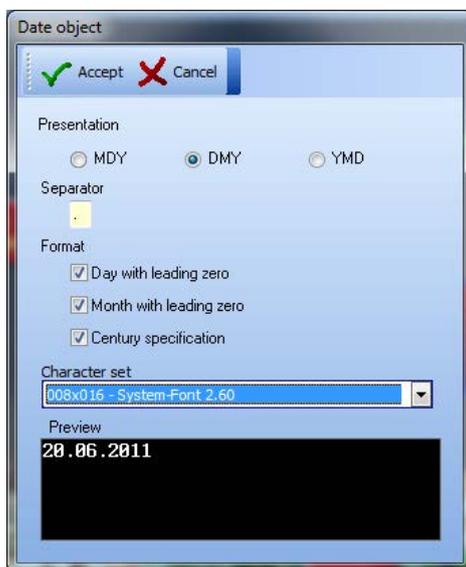
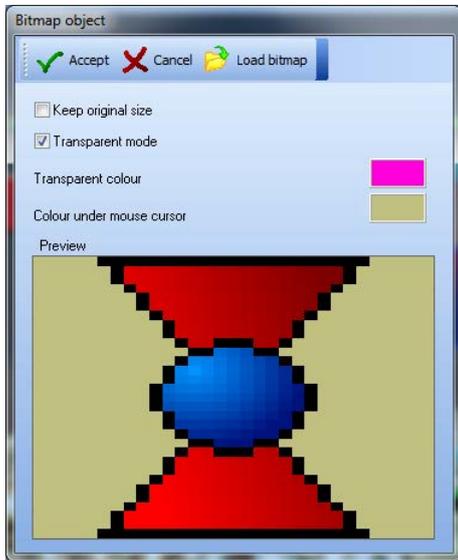**"Date object" dialog window** for the current date on the internal clock in the POLARIS Panel.

| Presentation | e.g. MDY (month, day, year), |
|---|---|
| Separator | Punctuation mark between day, month, year |
| Format | e.g. 05.04.2011 |
| Character set | Select font size |
| Accept | Accept settings |

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| | |
|---|---|
|  | **Insert bitmap** |



| | |
|---|---|
| **"Bitmap object" dialog window** for integrating standard BMP or JPG files. | |
| Load bitmap | Insert any graphic file in the BMP or JPG format |
| **Use original size** ☑ | Original size means that the size specified for the original graphics file is used. |
| | Once inserted, the size in the process image cannot be changed any longer. |
| **Transparent mode** ☑ | Selects a bitmap colour as a transparent colour; the areas in this colour are see-through. |
| Accept | Accept settings |

**Note**

The bitmap object cannot integrate any TIF, GIF or other formats. The maximum memory space in the respective POLARIS Panel must be taken into account for the BMP files.

Embedded BMPs with less than a 16-bit colour depth cause a false colour image with some graphics drivers of individual graphic cards under Windows 2000 and Windows XP. Remedy: convert the image to the 16-bit or 24-bit colour mode.

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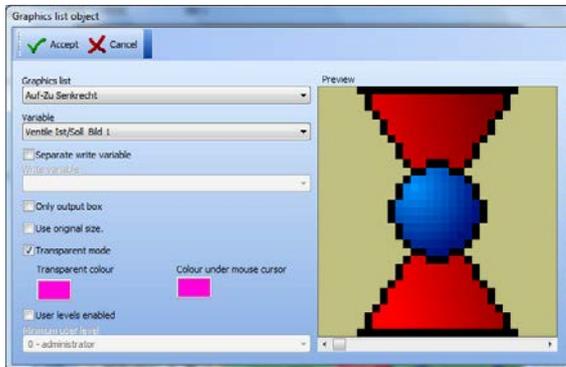
| | |
|---|---|
| | **Insert graphics list** |



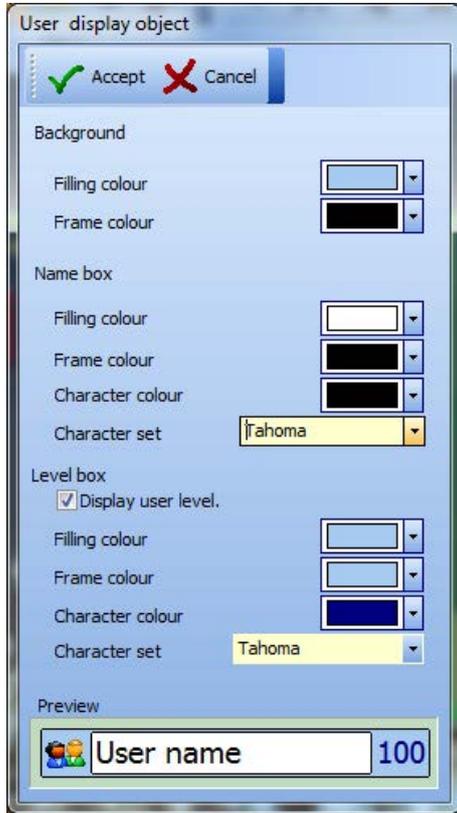| | | |
|---|---|---|
| **"Graphics list Object" dialog window** to assign graphics lists that have been created already to the object. | | |
| **Variable** | | is the process link to the / from the control. |
| **Separate write variable** | ✔ | The object is an input box. If only one variable is entered, read-write access takes place. |
| | | Reading access to the variable. |
| **Only output box** | ✔ | Reading access to the variable no inputs in the Runtime |
| **Use original size** | ✔ | Original size means the size specified in the graphics list. |
| | | The size of the object in the process image cannot be changed any longer. |
| **Transparent colour** | ✔ | Selects a bitmap colour as a **transparent colour**; the areas in this colour are see-through. The same transparent colour must be selected for all stored individual graphics. |
| **User levels enabled/ Minimum user level** | ✔ | Restricts input on the basis of the authorisation level. This is subject to the condition that a user profile was stored in Runtime; otherwise the setting is ignored. |
| Accept | | Accept settings. |

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| | Insert user display |
|---|---|

**"User display object" dialog window**

Presents the logged-in user in Runtime.

Shows the user name and if activated, user level.

The colours of the areas can be changed.

Accept    Accept settings

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| | Insert touch field |
|---|---|

**The "Touch field object" dialog window** makes it possible to prepare the screen areas for the touch input. The touch field design can be changed.

**General**

– Type of frame (none, 2-D or 3-D frame)

– Frame width

– Colour values for the different areas (frame, printed/non-printed area)

– Virtual LED display (control via additional reading variable)

– User access control
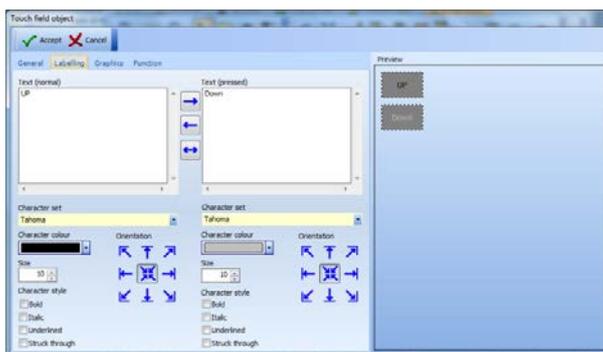
**Labelling**

– Use of Windows character sets

– Setting of character style, size and character colour

– Orientation in the object

**Graphics**

– Integrate BMP or JPG graphics

– Transparent presentation

– Orientation in the object
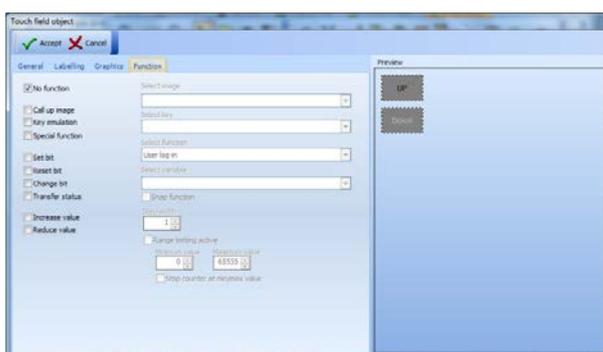
**Function**

– No function

– Call up image (specifying an image name)

– Key function (emulation of pressing a function key)

– Special function (select Runtime functions)

– Value manipulations (with specification of a variable)

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Functions in Detail

|  |  | The effects of the "Press touch field" action: |  |
|---|---|---|---|
| Call up image | ☑ | Calls up the corresponding image in Runtime. The assignment works exclusively with image name and makes a unique image name necessary. |  |
| Key emulation | ☑ | If the key function is selected, the specified function or special key is emulated in Runtime. The touch field behaves like a function or special key. The key bit in the transfer block and/or function definition of the selected function or special key is included. |  |
| Special function | ☑ | Call up one of the sub-functions in Runtime |  |
| Sub-functions: |  | User log-in | Opens the user login. User can log in if s(he) is known to the system as a valid user. |
|  |  | User log-out | The logged-in user is logged out without any further message. |
|  |  | Page for calling up active alarms | Shows the user the active alarms page. |
|  |  | Page for calling up alarm history | Shows the user the alarm history page. |
|  |  | Page for calling up operating messages | Shows the user the operating messages page. |
|  |  | Call up menu | Calls up the main BMS-Graf-Runtime menu without checking user authorisation! |
|  |  | Dialogue for calling up language | The user can set the language for the BMS-Graf-Runtime dialog. |
|  |  | Dialogue for calling up date/time | Opens the dialog window for the internal clock in the POLARIS Panel to set time and date. |
|  |  | Dialogue for calling up user administration | Calls up user administration without checking user authorisation. |
|  |  | Exit runtime / return to OS | After a prompt for confirmation, BMS-Graf-Runtime is exited. User authorisation is not checked. |
|  |  | Shut down system | After a prompt for confirmation, the POLARIS Panel is shut down. User authorisation is not checked. |
|  |  | Switching debug panel on/off | Switches debug panel on/off for test purposes. Shows information on the run time. |

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| Field | activated | Effects of the "Press touch field" action: |
|---|---|---|
| Set bit | ✔ | Set all bits in the specified variables to High. |
| Reset bit | ✔ | Sets all bits in the specified variables to Low. |
| Change bit | ✔ | Set all bits to the opposite of their value<br>Low→High, High→Low). |
| Transfer status | ✔ | Set all bits in the specified variables to High.<br>When released, all bits are set to Low. |
| Snap function | ✔ | Set all bits to High. Pressing a second time sets all bits to Low. |
| Increase value/<br>Reduce value | ✔ | The specified variable is increased or reduced by the step width in the field. |
| Range limiting active | ✔ | Minimum value or maximum value is reached. Continues to count at minimum value or maximum value. |
| Stop counter at<br>min/max value | ✔ | Stops when minimum value or maximum value is reached. |
| User levels enabled/<br>minimum user level | ✔ | Restricts the input on the basis of the authorisation level.<br>This is subject to the condition that a user profile was stored in Runtime; otherwise the setting is ignored. |

**i**

**Note**

To restrict access to certain users, it is necessary to activate user access control on the touch field. Depending on the setting, the touch field is invisible or cannot be activated when users are restricted.

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### 4.9.2 Depiction Tools

| | |
|---|---|
| ⊕ ⊖ | **Zoom functions** |

| | |
|---|---|
| ⊕ | Enlarge view |
| ⊖ | Reduce view |

| | |
|---|---|
| 🖥 | **Edit basic settings for image** |

**Image settings**

✓ Accept   ✗ Cancel

Image name
Image 1

Image number
1

Background colour

☐ Splash screen

☐ User levels active

Minimum user level
0 - administrator
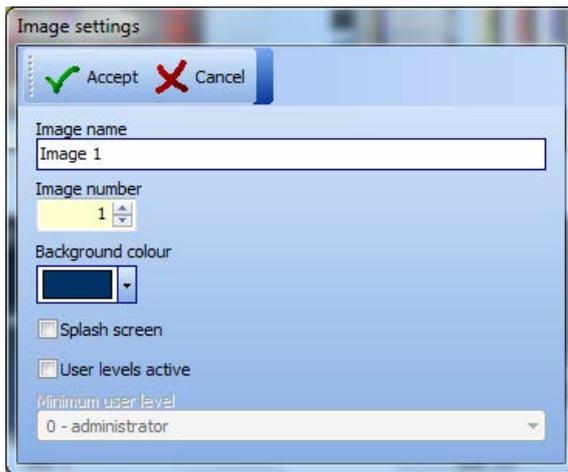
The basic data for the image are changed here. For more details, see the Process Images tab.

**Function key options**

These differ in quantity depending on the type of POLARIS Panel in the project planning.

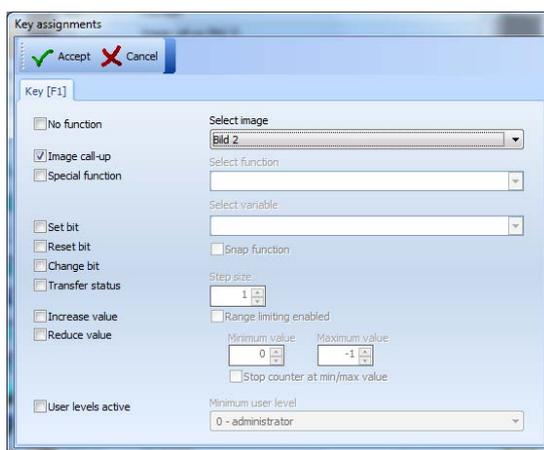The assignment of the key function(s) is restricted to the respective image. Global key assignment is not possible.

| Key | Function |
| --- | --- |
| F1 | Image call-up [Bild 2] |
| F2 | No function |
| F3 | No function |
| F4 | No function |
| F5 | No function |
| F6 | No function |
| F7 | No function |
| F8 | No function |
| F9 | No function |
| F10 | No function |
| F11 | No function |
| F12 | No function |
| S1 | No function |
| S2 | No function |
| S3 | No function |
| S4 | No function |
| S5 | No function |
| S6 | No function |
| S7 | No function |
| S8 | No function |
| S9 | No function |
| S10 | No function |
| Shift-F1 | No function |
| Shift-F2 | No function |
| Shift-F3 | No function |
| Shift-F4 | No function |
| Shift-F5 | No function |
| Shift-F6 | No function |

– No function
– Image selection
  (with specification of an image name)
– Special functions
  (selecting Runtime functions)
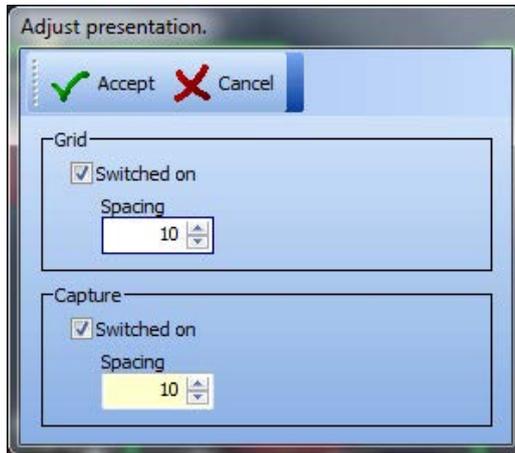– Value manipulations
  (with specification of a variable)

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Functions in Detail

| | | Effects of the "Press key" action: |
|---|---|---|
| **Image call-up** | ✔ | Calls up the corresponding image in Runtime. The assignment works exclusively with the image name and makes a unique image name necessary. |
| **Special function** | ✔ | Calls up one of the sub-functions in the Runtime. |
| **Image call-up** | ✔ | Calls up the corresponding image in Runtime. The assignment works exclusively with the image name and makes a unique image name necessary. |

| Sub-functions: | | |
|---|---|---|
| | **User log-in** | Opens the user login. User can log in if s(he) is known to the system as a valid user. |
| | **User log-out** | The logged-in user is logged out without any further message. |
| | **Page for calling up active alarms** | Shows the user the active alarms page. |
| | **Page for calling up alarm history** | Shows the user the alarm history page. |
| | **Page for calling up operating messages** | Shows the user the operating messages page. |
| | **Call up menu** | Calls up the main BMS-Graf-Runtime menu without checking user authorisation! |
| | **Dialogue for calling up language** | The user can set the language for the BMS-Graf-Runtime dialog. |
| | **Dialogue for calling up date/time** | Opens the dialog window for the internal clock in the POLARIS Panel to set time and date. |
| | **Dialogue for calling up user administration** | Calls up user administration without checking user authorisation. |
| | **Exit runtime / return to OS** | After a prompt for confirmation, BMS-Graf-Runtime is exited. User authorisation is not checked. |
| | **Shut down system** | After a prompt for confirmation, the POLARIS Panel is shut down. User authorisation is not checked. |
| | **Switching debug panel on/off** | Switches debug panel on/off for test purposes. Shows information on the run time. |

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|  |  | Effects of the "Press key" action: |
|---|---|---|
| **Set bit** | ✔ | Set all bits of the specified variables to High. |
| **Reset bit** | ✔ | Sets all bits of the specified variables to Low. |
| **Change bit** | ✔ | Set all bits to the opposite of their value<br>Low→High, High→Low). |
| **Transfer status** | ✔ | Set all bits of the specified variables to High.<br>When released, all bits are set to Low. |
| **Snap function** | ✔ | Set all bits to High. Pressing a second time sets all bits to Low. |
| **Increase / reduce value** | ✔ | The specified variable is increased or reduced by the **step width** in the field. |
| **Range limiting enabled** | ✔ | **Minimum value** or **maximum value** is reached. Continues to count at minimum value or maximum value. |
| **Stop counter at min/max value** | ✔ | Stops when minimum value or maximum value is reached. |
| **User levels enabled/ Minimum user level** | ✔ | Restricts the input on the basis of the authorisation level.<br>This is subject to the condition that a user profile was stored in Runtime; otherwise the setting is ignored. |

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Settings / Grid

**"Adjust presentation" dialog window**
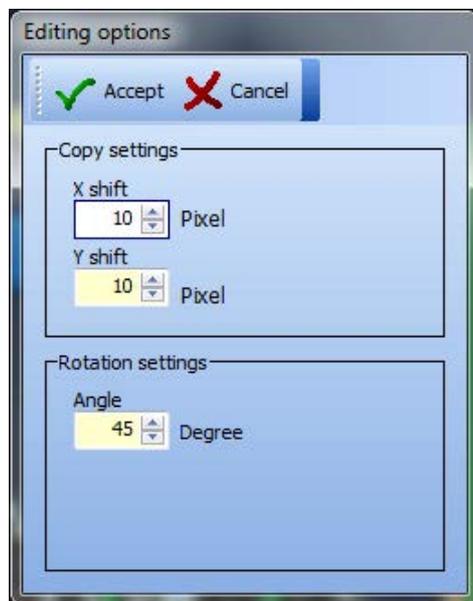
| | |
|---|---|
| Left mouse key | switches grid on/off |
| Right mouse key | opens dialog window |

**Grid type and spacing**
Capture spacing with drawing elements and shifts.

Settings / Copying / Rotating

"**Editing options**" dialog window

**Copy settings**

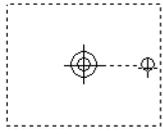Determines the position of the copy during duplication.

**Rotation settings**

Defines left or right rotation around an angle.

### 4.9.3 Editing Tools

| | | | |
|---|---|---|---|
| Grouping | | "Form object(s) into group" | |
| Separating | | "Break group" | |
| Foreground | | "Object(s) one position to front" | |
| Background | | "Object(s) one position to back" | |
| | | "Object(s) to front" | |
| | | "Object(s) to back" | |
| Cut | | "Cut object(s)" | (into clipboard) |
| Copy | | "Copy object(s)" | (via clipboard) |
| Paste | | "Paste object(s)" | (from clipboard) |
| Duplicate | | "Duplicate object(s)" | (without clipboard). |
| Delete | | "Delete object(s)" | (on request) |
| | | "Copy image as bitmap" | (in clipboard) |
| Centre | | Centre object(s) to middle of image. | |
| Undo | | Erases the last action done (max. 10 per image). | |

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**4.9.4**    Editing Mode Object

| | | |
|---|---|---|
| | | **"Normal highlighting mode"**<br>with "normal" selection frame.<br><br>**Possible actions:**<br>moving, reducing, increasing |
| | | **"Edit object vertices"**<br>in the point editing mode.<br><br>The corner points can be repositioned. |
| | | **"Rotate object(s) freely"**<br><br>The point of rotation can be moved and the object can be freely rotated around this point. |

| | |
|---|---|
| | **"Clockwise rotation of object around a given angle"** |
| | **"Anti-clockwise rotation of object around given angle"** |
| | **"Mirror object(s) vertical"** |
| | **"Mirror object(s) horizontal"** |

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## 4.10    Visibility of Objects

It is possible to control the visibility of each object by means of an additional process link (variable).
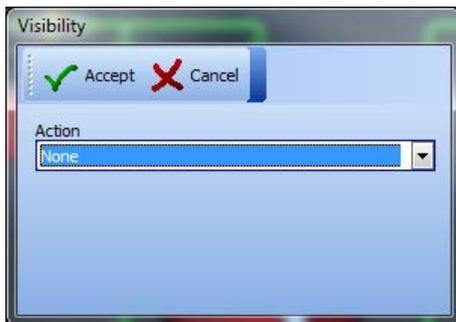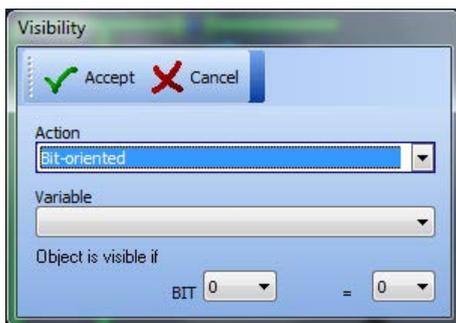
**No action**

The object is always visible.

**CAUTION:**

If used on group objects, all objects contained in the group are reset (to "none").

**Bit-oriented action**

The specified bit of the specified variable is checked for 0 or 1.

| | |
|---|---|
| Result "true" | Object visible |
| Result "not true" | Object not visible |

**Value-oriented action**

The value of the variables is checked.

| | |
|---|---|
| Result "true" | Object visible |
| Result "not true" | Object not visible |

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### 4.10.1 Assigning Filling Colour or Pen Colour

| | | Colour chart | RGB Colours |
|---|---|---|---|
| Filling colour | **"Chose filling colour"** for text = background | | |
| Pen colour | **"Chose pen colour"** for text = text colour | RGB colours Transparent | |
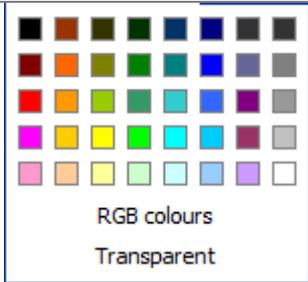
### 4.10.2 Assigning Filling Pattern

| Filling pattern | **"Chose filling pattern"** |
|---|---|

### 4.10.3 Assigning Pen Pattern

| | **«Chose pen colour/text colour»** |
|---|---|
| | Choice between: ⎯ Line |
| | ···· Dots |
| | ·⎯· Line-Dot |
| | ⎯ ⎯ Line-line |
| Pen pattern<br>- - - - | Note:<br>The pen pattern is formed only with the pen width of a dot. When another pen width is used, the pen draws a continuous line. |

### 4.10.4 Assigning Pen Width

| Pen width | **"Chose pen width"** |
|---|---|
| | Pen width of 1 to 11 in steps of 2. |

## 4.11    Object Tree with the Variables Used
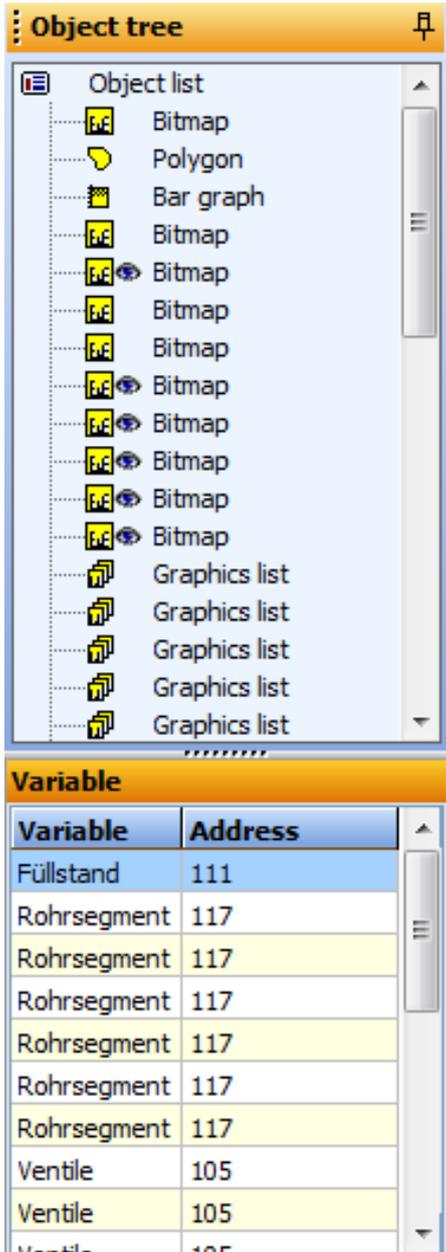


**List of all objects used in the image.**

The object that is in first place in the list of objects is also the first object drawn. It is positioned in the image background.

Each object is represented by a symbol.

The "eye" symbol shows if visibility is stored in the setting.

If "visibility" is set for an object, the "visibility" symbol appears with all higher ranking groups.

Assigning a name to an object simplifies the structure in the object tree.

If an object is selected in the working area, the corresponding line in the object tree is highlighted.

**Lower area:**

Shows all variables used in the image. If an entry is selected, all objects referring to the variable are highlighted.

The list also contains function key references to the variables. These are not displayed when a variable is selected.

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# 5 Project Transfer

There are three possibilities for data transfer:

■ via serial interface

■ via BARTEC Ex-i USB stick

■ via FTP Transfer using Ethernet

---

**ⓘ Note**

Before the project is transferred into the POLARIS Panel it is essential to create a back-up copy of the project in order to be able to make changes to the project at a later date.

**Background:**
A transferred project cannot be read back any longer, i.e. it can no longer be edited or changed. If you have made a back-up copy, you will be able to make changes to the project later and transfer them again into the POLARIS Panel.

## 5.1 "Serial Interface" Transfer of Project

The POLARIS Autostart software is run when the POLARIS Panel is booted.

The application opens when you press a key or click on the window.
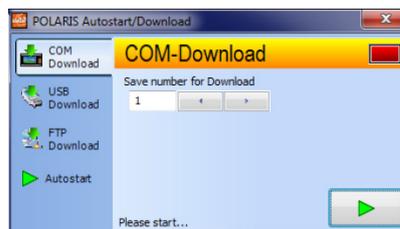
– Set the station number and activate the download server.
– Start download in the BMS-Graf-pro with .

**Selection of the COM Interface in the PC**
The only interfaces that can be selected are those marked "enabled" by the operating system. A baud rate set at higher than 57600 bps will increase the total runtime of the project transfer and transmission errors will occur more frequently.
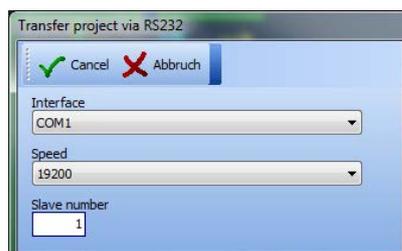
Enter the POLARIS Panel number from the download server. Each POLARIS Panel possesses a number with which it can be uniquely addressed in the network. In the POLARIS Panel the number "1" is pre-set on delivery (can be changed at any time).

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**Notes:** In transfers through a TTY interface, a baud rate of less than 19200 bps may be necessary because the quality of the transfer is impaired partly by interface converters and partly by the length of the conductor. On the basis of the bitmap-related increase in the quantity of data to be transferred into the POLARIS Panel, a longer transfer time is to be expected. It is not possible to transfer the project via an RS485 (half-duplex) or via the PROFIBUS-DP interface.
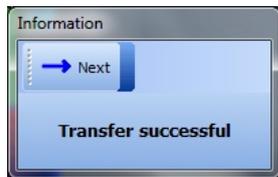
## 5.2 Transfer of Project via "USB Stick"

– Insert the BARTEC Ex-i USB stick into a free port on the PC.
– Create a folder with the name "bgxp2005" on the BARTEC Ex-i USB stick.
– Press the button on the BMS-Graf-pro and select the "bgxp2005" folder on the BARTEC Ex-i USB stick.
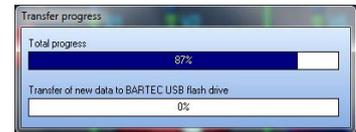


**The following window appears if the transfer has been successful:**



Conclude the transfer with → Next .

– Click on the "Safely remove hardware" symbol on the task bar before removing the USB flash drive.
– The saved project can be installed on a POLARIS.



**POLARIS Autostart**
Version 2.1.0.0

The POLARIS Autostart software is run when the POLARIS Panel is booted.

The application opens when you press a key or click on the window.



**Transfer from the BARTEC USB-Ex-i Stick to the POLARIS.**

– Insert a BARTEC USB stick containing BMS-Graf-pro into an intrinsically safe USB port and start the transfer.
– The BMS-Graf-Runtime starts automatically if the project has been transferred successfully.

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## 5.3 "Ethernet" Transfer of Project

The POLARIS Autostart software is run when the POLARIS Panel is booted.

The application opens when you press a key or click on the window.

POLARIS Autostart
Version 2.1.0.0
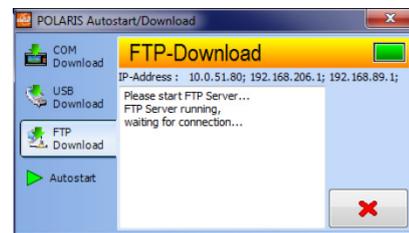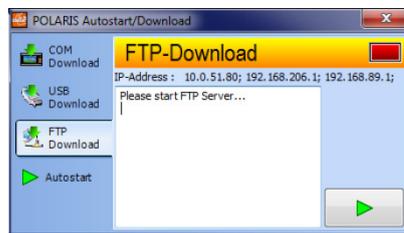
**Transfer the data from the BMS-Graf-pro to the POLARIS Panel**

– Start the FTP server.

– Once the FTP server has booted after being switched on, data can be transferred at any time; it is not necessary to start the FTP server again.

– Press the 🖳 button in the BMS-Graf-pro and ✓ Start transfer .
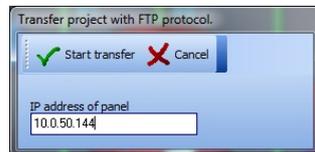
– The BMS-Graf-pro searches the network for the POLARIS and establishes a connection.
– If the BMS-Runtime is still running, it is ended.
– The BMS-Graf-pro deletes the files in the project directory in the POLARIS and copies all necessary files into the POLARIS.
– The BMS-Graf-pro logs out and the BMS-Runtime is started automatically.

**The following window appears if the transfer has been successful:**

→ Next

**Transfer successful**
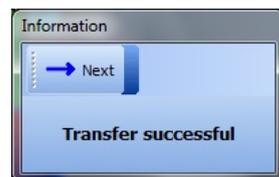
Conclude the transfer with → Next .

The following window appears if there is a fault in the transfer::

→ Next

**Panel [10.0.50.144] not reached or not present**

Conclude the transfer with → Next .

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# 6   The Target System POLARIS Panel

## 6.1   Booting the Device

Once the operating voltage has been applied, the POLARIS Panel boots in XP Embedded or in XP Professional.

The user [administrator] is logged on automatically with a password [22021963]; an input is not necessary. The Explorer starts, which in turn runs the Autostart menu in Autostart.

## 6.2   Autostart Menu

Splash screen



If no key is pressed, the last application selected is started, which can be:

a: BMS-Graf-Runtime

b: Internet Explorer

c: Remote desktop

If a key is pressed or a mouse button clicked within 5 seconds of the appearance of the start screen, the following settings can be made:

Download the BMS-Graf-pro Project through the serial interface.
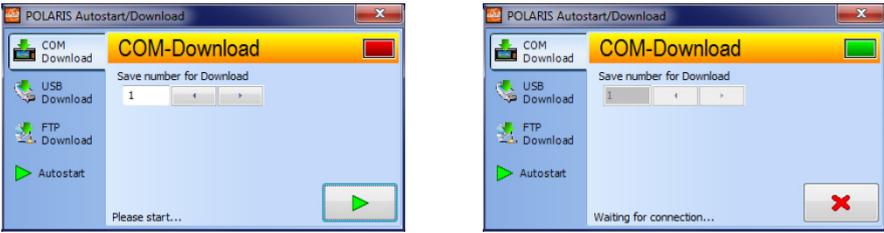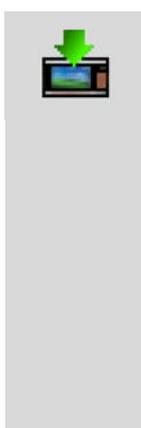


– Set the station number and activate the download server ▶ .
– Start the transfer into BMS-Graf-pro.
– The BMS-Graf-Runtime starts automatically after the transfer.

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### Transfer of the BMS-Graf-pro project data from the BARTEC USB stick to the POLARIS
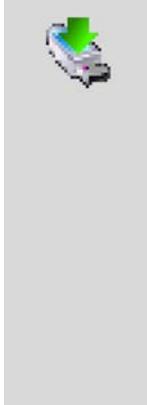


– Insert the BARTEC USB stick (containing BMS-Graf-pro) into the intrinsically safe USB port and start the transfer  .

– The BMS-Graf-Runtime starts automatically if the project was transferred successfully.

### Start the FTP transfer into the BMS-Graf-pro
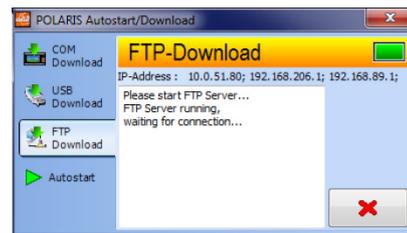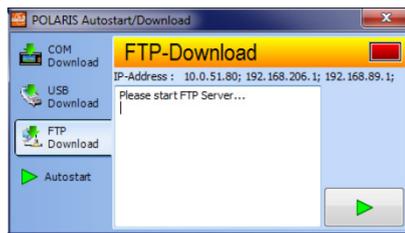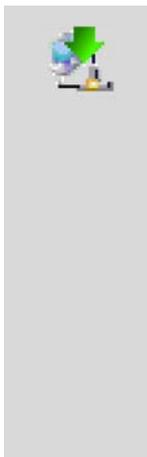


– Start the FTP server  .

– Once the FTP server has booted after being switched on, data can be transferred at any time; it is not necessary to start the FTP server again.

– The BMS-Graf-Runtime is ended automatically and starts after transfer.

### Setting of the application to be automatically started.
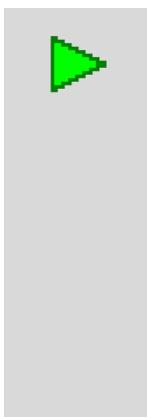


In Autostart Options, the standard application is selected which is to be started immediately and when the device is next booted. The settings in the applications (Remote Desktop and Internet Explorer) must be parameterised in the corresponding program-specific option.

## 6.3 BMS-Graf-Runtime

**Splash screen:**



Once the BMS-Graf-Runtime starts, an entry window appears

While this window is shown, the Runtime loads the visualisation project. Once all data has been loaded, the window closes automatically.

After that, the BMS-Graf project start page appears.
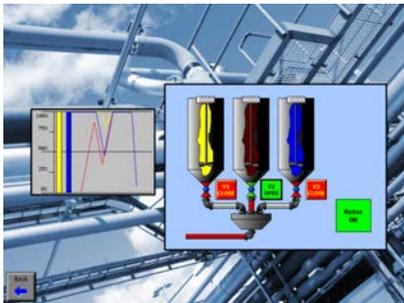


### 6.3.1 Key Assignment

Key



The "I" key is used to switch to the alarm, history and message screen.
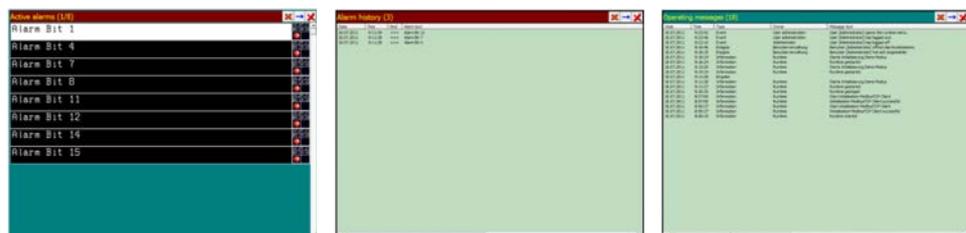




The "ESC" key is used to return to the process image

 **Attention!**

If the POLARIS Panels do not have a keypad or have just a limited keypad, a suitable touchbutton object must be integrated into the project.

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## 6.4    Runtime menu

If users have been set up, login will be required before the menu opens. Only the user with the "Runtime administrator" property is authorised to open the menu this way.

**Opening the runtime menu**

It is possible here to

- ◼ edit user profiles
- ◼ change panel date and time
- ◼ change system language
- ◼ change program settings
- ◼ end runtime
- ◼ shut down the system

Navigate through the menu items

Activate the menu entry

Press the "ESC" key to return to the process image.
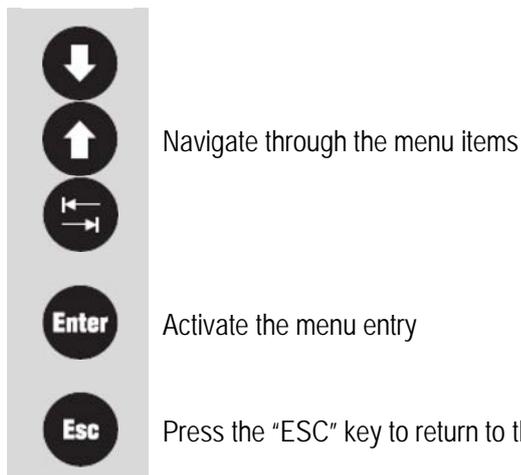
**Attention!** If the POLARIS panel does not have a keypad or has only a restricted keypad, an appropriate touchbutton object must be integrated into the project and all operations are performed by touch.

### 6.4.1 User Administration
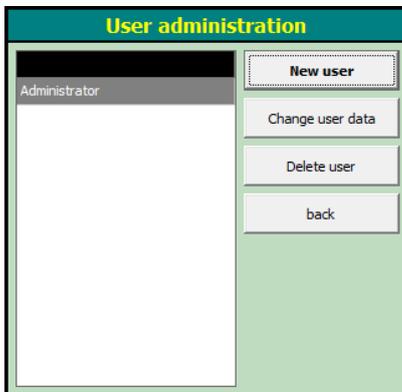


Users can be changed, deleted or created in the POLARIS Panel. This serves to adjust the system without the necessity of downloading again. Changes are limited to the POLARIS panel.

  Press the "ESC" key to return to the Runtime menu.

### 6.4.2 Change/create user data



The **Name** and **User number** must be entered when creating the user and this cannot be changed later.

**Background:**
by entering the user name, the user logs into the BMS-Graf-Runtime and the user number is sent to the control when required.

A default **password** may be assigned and this can be changed by the user at any time.

The **User level** is used to enable an action in image changing and entry boxes.

An **Auto logout** can be activated to logout the user automatically if no entry is made within a specified time. The user must then login again. If auto log-out is not selected, the user remains logged in until (s)he logs out or the device is shut down.

If **Administrator for runtime** is selected, this user can switch to the BMS-Graf-Runtime menu, make changes and shut down the device.

  The "ESC" key is pressed to return to the User Administration.

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### 6.4.3 Time / Date
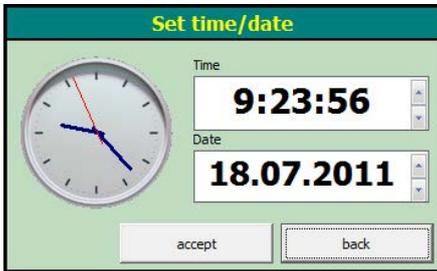


**Accept** writes the set values into the internal system clock module.

The **Back** key discards the settings.



**Attention**

Depending on the operating system, the format for inputting into the time and date boxes is country-specific. As the operating system in the POLARIS touch panel is installed in English, the entries are made according to the English style.

### 6.4.4 Language



If a language is provided, it can be set by selecting the corresponding national flag.

**Accept** sets all system texts to the set language.

**Cancel** discards the settings.



**Attention!**

The settings concern exclusively the Runtime texts. Texts in the user project must be set separately.

### 6.4.5 Settings



Depending on the setting in the BMS-Graf-pro project, the **process link interface parameters** can be altered. If changing is necessary, the settings on the device are saved separately and loaded on starting. If no change is possible, only the settings from the project are used. In this case, this dialogue only displays the parameters.

The **Runtime settings** are intended for troubleshooting purposes. Individual settings, such as e.g. login of communication blocks, can cause serious problems with speed. For that reason, these settings should only be used for troubleshooting during the commissioning.

The **Barcode scanner interface settings** are required when connecting e.g. a barcode scanner to the POLARIS Panel. The data in the connected device is entered into the input field, which is highlighted in the currently displayed picture as the barcode entry. If the device sends a <CR> as the last characters, the contents of the input box are transmitted to the control.

**Accept** activates all settings and closes the dialogue.

**Cancel** discards the settings and closes the dialogue.

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### 6.4.6 Back to Runtime

Closes the menu and returns to Runtime.

### 6.4.7 Exiting Runtime

| Enquiry |
| --- |
| **Are you sure you want to exit runtime?** |
| yes    no |
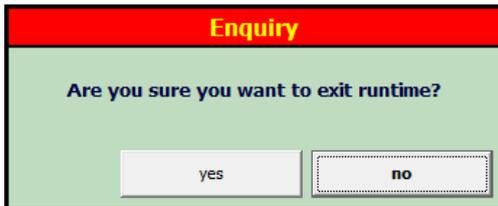
**Ends Runtime**

After a prompt for confirmation Runtime is exited and the Windows desktop appears.

☞

**Attention!** The Windows-Desktop (explorer.exe) is not active or it is closed during the Runtime process.

### 6.4.8 Switching off the System

| Enquiry |
| --- |
| **Are you sure you want to shutdown the system?** |
| yes    no |

The POLARIS Panel (system) is shut down after a prompt for confirmation so the device can be switched off.

☞

**Attention!** The POLARIS Panel must be shut down before it is disconnected from the voltage supply.

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# 7 Connection to the Control

## 7.1 MODBUS RTU connection

### 7.1.1 The following connections have already been implemented:

■ Telemechique TSX series with communications processor TSXSCG1131

■ APRIL

■ AEG A series with Modbus-module

■ AEG Modicon with Modbus Plus to Modbus RTU bridge

■ AEG Quantum

■ Allen Bradley SLC500 with Pro Soft module (3150MCM)

■ Allen Bradley PLC5/40 or PLC5/60 with communications board/module 17-71-DBMM

■ HIMA H51

■ HIMA H41

■ HIMA H11

■ Yokogawa SMCC Micro XL with communications processor PX1

■ GE-FANUC with communications processor CMM311E

### 7.1.2 Modbus function codes in use

Function code 3 „READ HOLDING REGISTERS"

Request:

| SLAVE ADDR | FUNC. CODE | DATA START HI | DATA START LO | LEN HI | LEN LO | ERROR CHECK CRC16 | ERROR CHECK CRC16 |
|---|---|---|---|---|---|---|---|
| 1 | 3 | 00 | 00 | 00 | 02 | xx | xx |

Reply:

| SLAVE ADDR | FUNC. CODE | BYTE COUNT | HI DATA | LO DATA | HI DATA | LO DATA | ERROR CHECK CRC16 | ERROR CHECK CRC16 |
|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 04 | 01 | 02 | 03 | 04 | xx | xx |

Function code 16 "PRESET MULTIPLE REGISTERS"

Request:

| SLAVE ADDR | FUNC. CODE | DATA START HI | DATA START LO | LEN HI | LEN LO | BYTE CNT | HI DATA | LO DADA | HI DATA | LO DATA | ERROR CHECK CRC16 | ERROR CHECK CRC16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | 00 | 00 | 00 | 02 | 04 | 01 | 02 | 03 | 04 | xx | xx |

Reply:

| SLAVE ADDR | FUNC. CODE | DATA START HI | DATA START LO | LEN HI | LEN LO | ERROR CHECK CRC16 | ERROR CHECK CRC16 |
|---|---|---|---|---|---|---|---|
| 1 | 10 | 00 | 00 | 00 | 02 | xx | xx |

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### 7.1.3 Special notes

The Modbus-RTU protocol is very intolerant of errors. If an error occurs due to:

■ The wrong Baud rate, data bit length, parity or stop bits

■ The checksum

■ The slave or station number

Then the query is not answered. Make sure, therefore, that you check all settings very carefully.

As the settings in the control unit vary widely, depending on the type we must refer you to the various manufacturers´ manuals at this point.

Do not use the RS 485 (2-wire-technology) for slave systems. As all bus subscribers would be listening at the same time, there may be delays to the timing. If you have a slave system, we therefore recommend RS 422 (4-wire technology).

| Description MODBUS RTU Interpreter (Master) |
|---|
| The BMS-Graf-pro software has two MODBUS RTU interpreters (masters). |
| *MODBUS RTU interpreter (master) at the address ″ 40001″*<br><br>The first MODBUS RTU interpreter (master) has been developed for better address allocation. The address "40001" in BMS-Graf-pro corresponds to the address "0" in the MODBUS protocol. The address rage is defined from "40001" to "49999". All address rage violations are intercepted in the terminal as faulty. Make sure you use the correct address location in the control unit, i.e. consult the relevant control unit manual for the subsequent allocation of a MODBUS address to an address in the control unit.<br><br>We recommend that you do not use this interpreter for new projects. |
| **MODBUS RTU interpreter (master) address "0"**<br>This MODBUS RTU interpreter (master) has been kept for historical reasons.<br><br>The address "00000" in BMS Graf pro, corresponds to "0" in the MODBUS protocol. The address rage is defined from "00000" to "65535". Make sure you use the correct address location in the control unit, i.e. consult the relevant control unit manual for the subsequent allocation of a MODBUS address to an address in the control unit. You also need to ensure that the addresses of your variables are within a narrow range, to avoid too many time-consuming read/write operations. |

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| Description of the MODBUS RTU interpreters (slaves) |
| --- |
| The BMS-Graf-pro software has two MODBUS RTU interpreters (slaves). |
| **MODBUS RTU interpreter (slave) at the address "40001"**<br><br>The first MODBUS RTU interpreter (slave) has been kept for historical reasons. The address "40001" in BMS-Graf-pro corresponds to the address "0" in the MODBUS protocol. The address range is defined from "40001" to "42000". All address range violations are intercepted in the terminal as faulty, and no reply is given to the control unit. Make sure you use the correct address location in the control unit, i.e. consult the relevant control unit manual for the subsequent allocation of a MODBUS address to an address in the control unit.<br><br>We recommend that you do not use this interpreter for new projects. |
| **MODBUS RTU interpreter (slave) with the address "0"**<br><br>This MODBUS RTU interpreter (slave) has been developed for better address allocation. The address "00000" in BMS Graf pro, corresponds to "0" in the MODBUS protocol. The address range is defined from "00000" to "01999". The available address range has a maximum of 2000 registers. All address range violations are intercepted in the terminal as faulty, and no reply is given to the control unit. Make sure you use the correct address location in the control unit, i.e. consult the relevant control unit manual for the subsequent allocation of a MODBUS address to an address in the control unit. You also need to ensure that the addresses of your variables are within a narrow range, to avoid too many time-consuming read/write operations. |

☞ **Attention**   To obtain an adequate processing speed with slave coupling, make sure you do not connect more than 3-4 POLARIS panels in series.

### 7.1.4    Process Link Interface Parameters

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## 7.1.5    Error Messages

Example of an error message display:

Kommunikation

10:48:23 -> Waiting time expired

## 7.1.6    Possible Error Messages:

| Message | Cause | Possible remedy |
|---------|-------|-----------------|
| Waiting time expired. | SPC connection has failed | – Check connection cable: may not be plugged in or faulty<br>– Check COM port settings<br>– Check slave number<br>– Check if function codes in SPC have been parametricised? |
| No project available | The interpreter did not find any project file in the terminal | – Repeat download |
| Project faulty | The interpreter has found faults in the project file. The last download was faulty | – Repeat download |

## 7.2 Connection of the OMRON host link protocol

Supported SPS-systems:

■ OMRON SYSMAC CPM1/CPM1A

■ OMRON SYSMAC SRM1

■ OMRON SYSMAC CQM1

■ OMRON SYSMMAC C200HE/-HG/-HX

■ OMRON SYSMAC CV/CVM1

### 7.2.1 Special Notes

The required settings in the PLC for transmitting data via the RS 232 (not the programming interface) are:

| Word | Bit(s) | Function |
|------|--------|----------|
| DM6645 | 00..07 | Interface settings<br>**00: Standard (1 start bit, 7 data bits, even parity, 2 stop bits, 9600 baud)**<br>01: Settings in DM6646 |
| | 08..11 | Connection words for 1:1-communication<br>0 : LR00 for LR63<br>1 : LR00 for LR 31<br>2 : LR00 for LR15 |
| | 12..15 | Communication mode<br>0 : host link protocol<br>1 : RS-232C (freely defined protocol)<br>2 : 1:1-communication slave<br>3 : 1:1-communication master |
| DM6646 | 00..07 | baud rate 00 : 1200 baud; 02 : 4800 baud; 03 : 9600 baud; 04 : 19200 baud |
| | 08..15 | Frame format (start / data / stop / parity)<br>00 : 1 / 7 / 1 / even       01 : 1 / 7 / 1 / odd       02 : 1 / 7 / 1 / none<br>03 : 1 / 7 / 2 / even       04 : 1 / 7 / 2 / odd       05 : 1 / 7 / 2 / none<br>06 : 1 / 8 / 1 / even       07 : 1 / 8 / 1 / odd       08 : 1 / 8 / 1 / none<br>09 : 1 / 8 / 2 / even       10 : 1 / 8 / 2 / odd       11 : 1 / 8 / 2 / none |
| DM6647 | 00..15 | Transmission delay (host link protocol) 0000-9999 (BCD):<br>settings in units of 10 ms, e.g.: a setting of 0001 is equivalent to 10 ms |

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| DM6648 | 00..07 | **Node no. (host link protocol) also see „PLC station number" in the interpreter set up 00 to 31 (BCD)** |
| | 08..11 | Start code activated (RS-232C)<br><br>0 : deactivated<br>1 : activated |
| | 12..15 | End code activated (RS-232C)<br><br>0 : deactivated (number of bytes received)<br>1 : setting of specific end codes<br>2 : CR, LF |
| DM6649 | 00..07 | Start code (RS-232C)<br>00 to FF(binary) |
| | 08..15 | • Bits 12 to 15 of the data word DM6648 are set to 0::<br>  number of bytes received<br>    00 : default setting (256 bytes)<br>    01 to FF : 1 to 255 bytes<br><br>• Bits 12 to 15 of the data word DM6648 are set to 1:<br>    End code (RS-232C))<br>    01 to FF (binary) |

All necessary settings are marked in bold.

☞ **Attention!** The pin assignment of the RS232 interface of the PLC does not conform to the standard pin assignment. The PLC or POLARIS panel can become damaged if connected with an RS232 pin assignment !

**Note:**

■ Some addresses (e.g.: interface settings) only allow write access by the terminal when the DIL switch (for CQM1 CPU21 number 1) MEMORY PROTECT is set accordingly. Other areas only allow write access when the PLC is operated in a particular mode (RUN / MONITOR / PROGRAM)..

### 7.2.2 Description of the OMRON interpreter (master)

Because of the 16 bit addressing (equivalent to 5 digits) in the BMS-Graf, it is not possible to enter direct OMRON addresses. For this reason a special address coding is used. The 5 digital address, and the OMRON sector is defined by the 1st digit.

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The following table shows how and which parts of the OMRON address are supported:

| ONRON sector | Description | 1st digit | Address part | BMS-Graf address |
|---|---|---|---|---|
| DM | Data flag words | 0 | 0-6650 | 00000-06655 |
| IR/SR | Input/Output words | 1 | 0-255 | 10000-10255 |
| AR | Auxiliary flag words | 2 | 0-27 | 20000-20027 |
| HR | Lock flag words | 3 | 0-99 | 30000-30099 |
| LR | Interface flag words | 4 | 0-63 | 40000-40063 |

Sector damage is acknowledged using an error message in the interpreter.

In larger PLC systems, the DM sector is larger than that specified here (e.g.: C200HE 102 kWorte), BMS-Graf-pro uses only the sectors specified here.

### 7.2.3 Interface settings

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### 7.2.4    Error messages

Example of an error message:



```
Kommunikation
10:48:23 -> Waiting time expired
```

**Possible error messages:**

| Message | Cause | Possible rectification |
|---------|-------|------------------------|
| No communication with the control | Establishment of connection with the PLC failed | – Check connecting cable, it may not be connected or it may be faulty<br><br>– Check interface parameters<br><br>– Check node/station number<br><br>– Are the function codes in the PLC parameterised? |
| No project available | The interpreter has found no project file in the terminal. | Repeat download |
| Project has errors | The interpreter has found errors in the project file, the last download has errors | Repeat download |
| Access error at address xxxx | OMRON error code $01 Cannot be executed in the RUN operating mode ! | Set PLC to Monitor Mode. |
| | OMRON error code $02 Cannot be executed in the MONITOR mode ! | Check variables. Check PLC sectors. |
| | OMRON error code $0B Cannot be executed in the PROGRAM mode ! | Set PLC to Monitor Mode |
| | OMRON error code $23 Application memory is write ! | e.g.: DIP switch 1 of CQM1 is ON. Check variables. |
| Checksum error indicated by the PLC ! | OMRON error code $13/$A3 | Check interface parameters! |
| Format error | OMRON error code $14/$A4 | Check interface parameters |
| Error on data input to address | OMRON error code $15/$A5 | |
| Command is not supported ! | OMRON error code $ 16 | Should never appear, mentioned only for completeness. |
| Frame length exceeded ! Block start : xxxx Block length : xxxx | OMRON error code $ 18/$A8 Data block too large. | |
| Access cannot be executed ! Block start : xxxx Block length : xxxx | OMRON error code $ 19 | |
| Sector damage ! | Error discovered in the variable declaration | Check variables |

## 7.3　Connecting PROFIBUS-DP

PLC's supported:

- S5 95U with DP master interface

- S7 300

- S7 400

- Freelands 2000

- Quantum

- Premium

### 7.3.1　Connection to the Siemens S5 Control

In order to be able to use function block S5 95U with DP master interface the DP interface must be parametered. This is possible with the help of the software packet by Siemens **"Com PROFIBUS Version V3.3"**.

**Necessary steps:**

- The GSD data for the terminal is to be entered into the register/compb33/GSD.

- Activate "file/GSD-file read" in the Com PROFIBUS.

- Create a master system with "S5-95U with DP master" interface in the Com PROFIBUS.

- For slaves insert "miscellaneous" into the system.

- Assign PROFIBUS address.

- Select BAT 2.

- Configure entry and exit (These must be the same, each time 32 bytes address space is used).

- Put configuration into memory via file/export/DP-master transmit to CPU after defaulting

- Include function blocks FB11 and FB10 into the project (FB 10 is called up by FB11).

- Call up function block FB11 in the OB1 with SPA.

- Enter the reserved data block for the relevant slave the start-up variable.

- Set up data block with 82 words for each slave. This is required as a data buffer.

- Enter the I/O address of the configuration in hexadecimal form into affiliated data building block of the slave in data word 81.

**Notes:**

- The blocks were provided via the software **"Simatic S5 Step 5 / ST Version 6.6"**.

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| 7.3.2 | Connection to the Siemens S7 Control |
|---|---|

For any data transfer between PLC & PC display terminal it is necessary to input into the PLC a function block and to call it up in the PLC operating cycle

FB 10 is a building block for S7 without SFC 24.

This FB can be called up on the terminal with the help of the slave address. The slave address is not the PROFIBUS address. It is the physical address in "Step 7 manager" of the hardware configuration. Input must be in hexadecimal form (please see example). The entry and exit address must be the same, because one address is transferred when called up.

For FB to function the following is necessary:

- Read SFC 14 data from slave in PLC.

- Write SFC 15 data for the slave in PLC

- The issued function FCI (CRC 16 test sum)

Correct working of the FB10 is ensured only if SFC 14 and SFC 15 are present in the PLC and FCI is loading into the PLC.

The data building blocks for the terminal must be entered and the length must be the same as the length required by the terminal, otherwise the PLC will display an error message. When calling up the FB10, a designated building block must be named. Each terminal requires its own specific DB. The OB 121 prevents the PLC going into STOP mode if DB is missing or wrong. Therefore it is essential that OB 121 is entered within the PLC.

| Sample: | Call up FB 10 | // Data exchange with terminal 1 |
|---|---|---|
| | Call up FB 10, DB1 | // Call up FB 10 with data instance 1 |
| | Slave address:=W#16#0 | // DP-Slave projected from address 0 |
| | | // Data exchange with terminal 2 |
| | CALL FB 10 , DB2 | // Call up FB 10 with data instance 2 |
| | Slave address:=W#16#20 | // DP-Slave projected from address 32 |

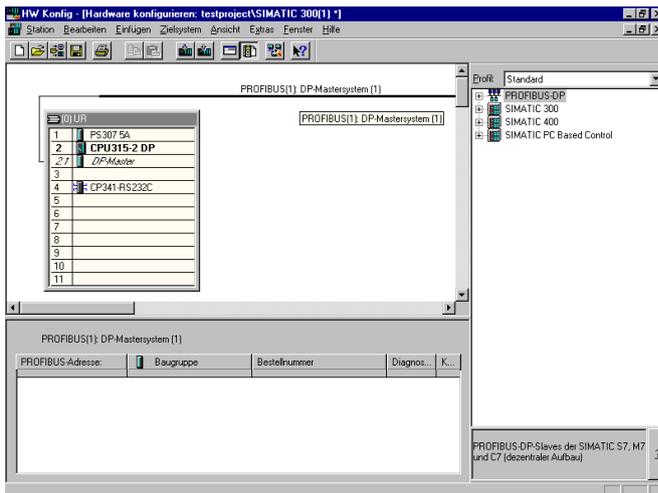**Attention!** The handling block requires a PROFIBUS-DP interface to the S7-CPU. A PROFIBUS-DP interface to a communication processor is not supported.

Technical data subject to change without notice.
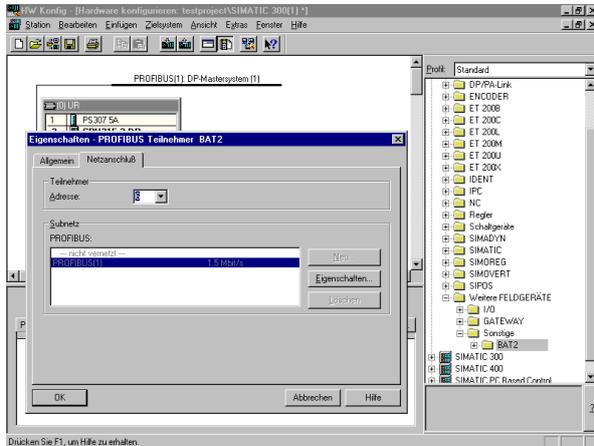Revision 1 / 02-2012

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**Integrating the GSD file:**
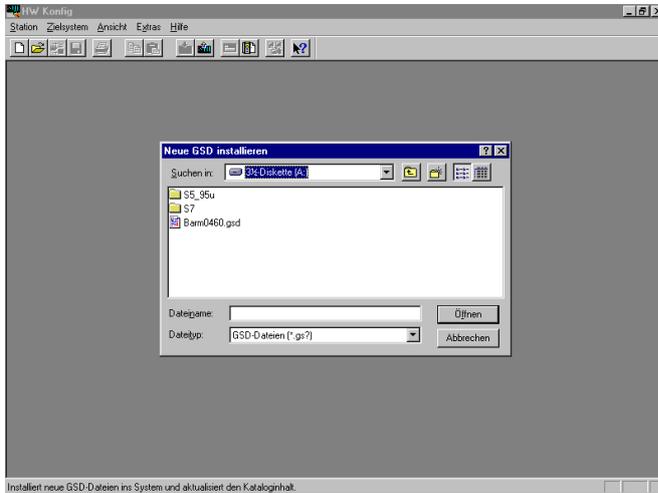


GSD-file for BAT 2 / BAT VGA with PROFIBUS from:
„C:\programs\BARTEC\BMSGrafpro\PLC_PRG\"
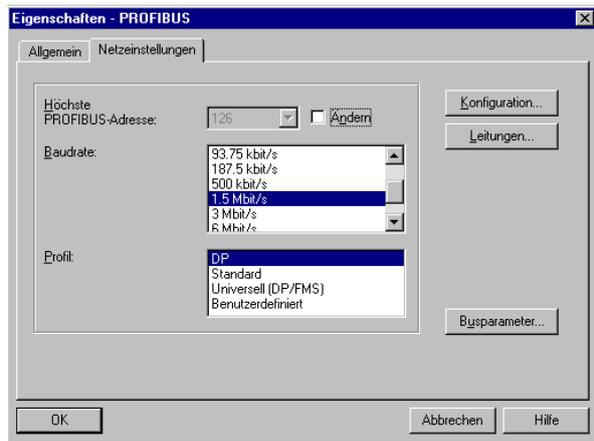into Step 7

**Select terminal as hardware configuration**
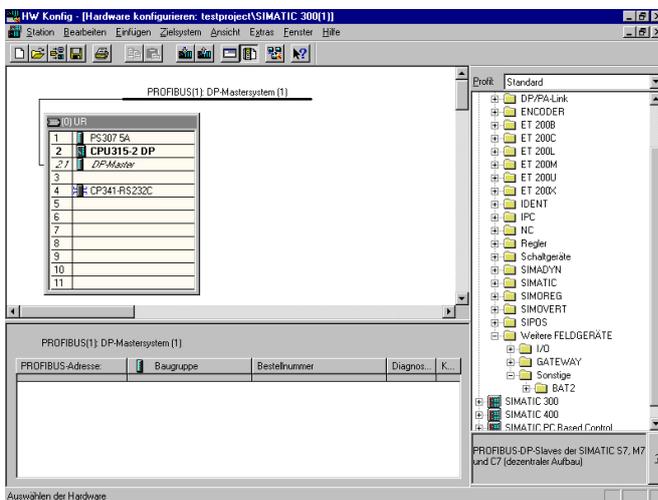
## PROFIBUS-DP Slave number



PROFIBUS-DP Slave number also to be set at the POLARIS panel.



A double click on "**BAT 2**" or "**BAT 2 / BAT VGA**" opens the dialogue window.

By pressing the [OK] button the input data is accepted/stored and the Panel is integrated as PROFIBUS-slave.

Note: The PROFIBUS-DP bridge is identical in the BAT series and the POLARIS series and for that reason all devices are marked "BAT".
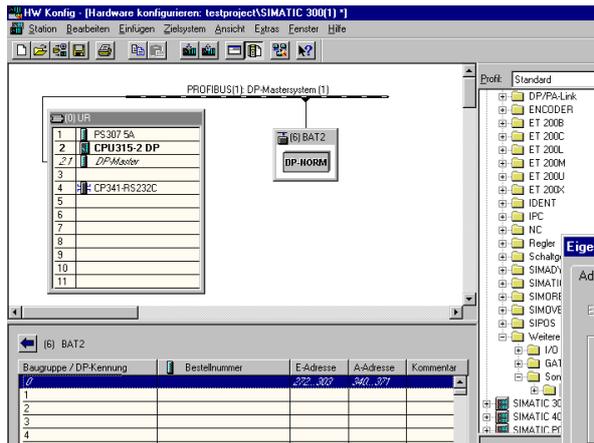


After double clicking the highlighted row, the following dialogue window can be used for the starting address from the address range of the PROFIBUS.

**Both addresses must be the same !**

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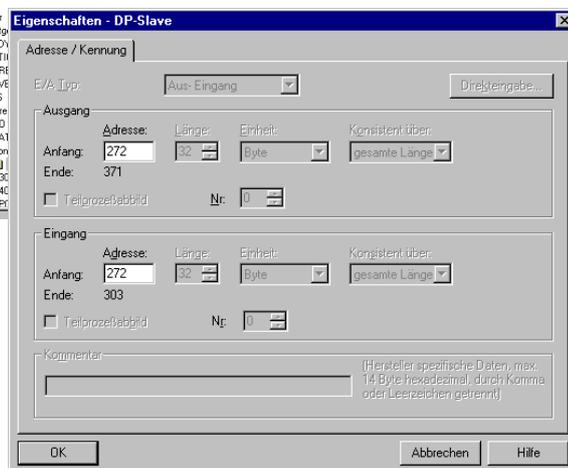
**Integration of the handling blocks into the PLC program**
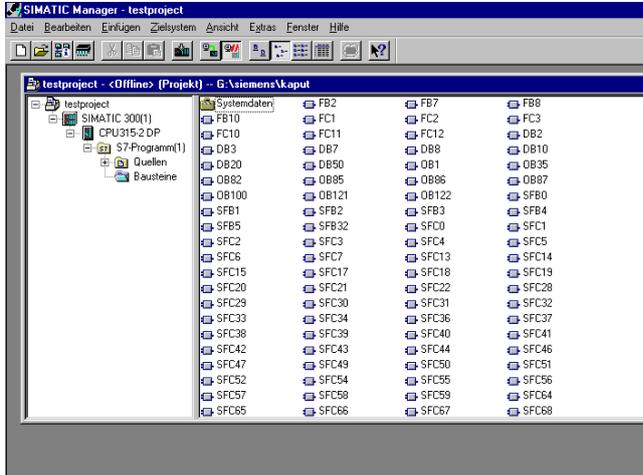


Example for an existing project...
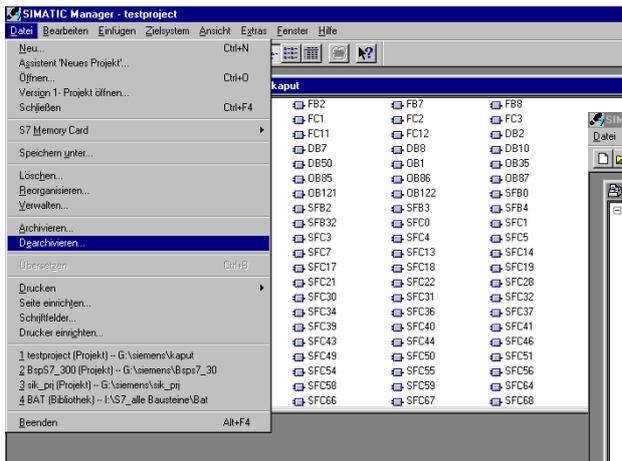


Library open from
**(C:\programs\BARTEC\BMSGrafpro\PLC_PRG\)**
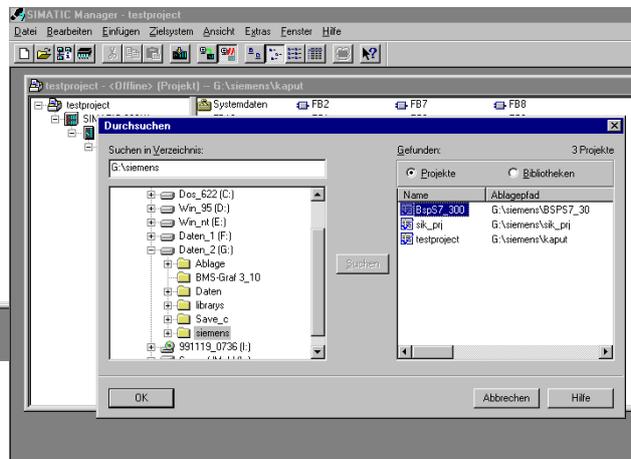


After opening the project "BspS7_300"...



... the "FB10" and "FC1" building units can
be copied into the project.

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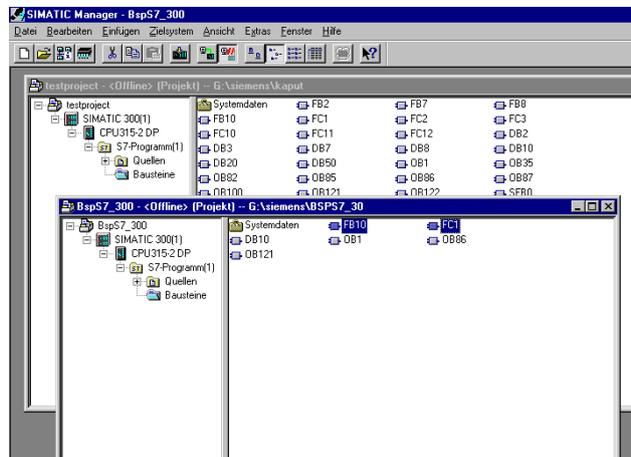
### 7.3.3 Copying into the PLC program (OB1)

Call up the handling unit in OB1



### 7.3.4 Process Link Interface Parameters

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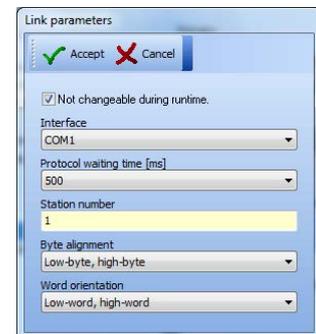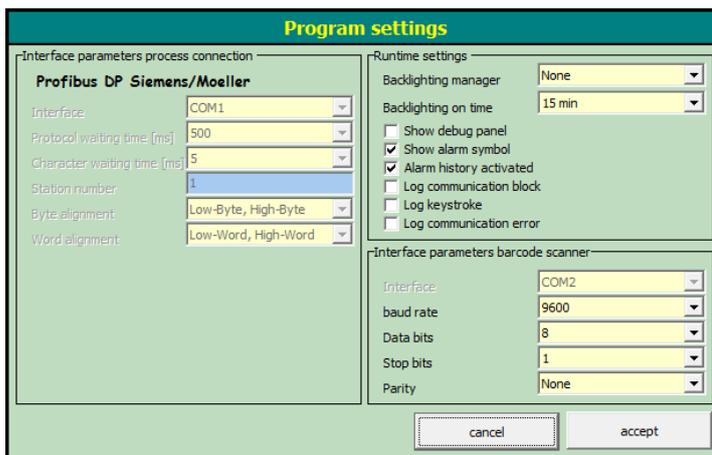
### 7.3.5 Possible Source of Error

| Source | Description |
|---|---|
| PLC programme | Errors found in the PLC programme (function blocks) |
| Profibus DP line | Errors found during transmission via Profibus DP |
| Interface card | Errors found during communication with internal |
| BMS-Graf driver | Errors found in the driver software |

### 7.3.6 Error Reporting

Example of an error message:

Kommunikation

10:48:23 -> Waiting time expired

### Possible fault messages

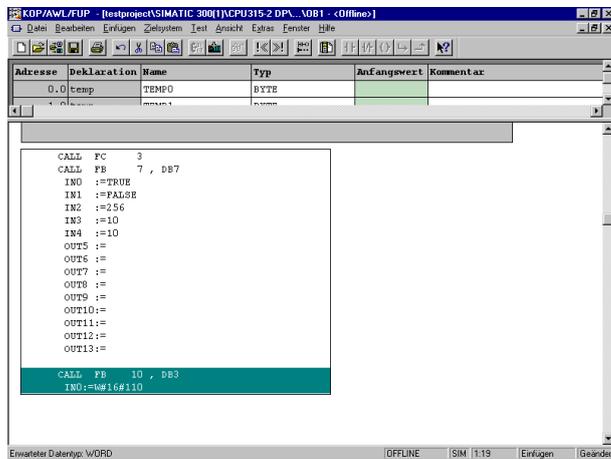| Message | Reason | Possible correction |
|---|---|---|
| No project | The interpreter has found no project file in the terminal. | Repeat downloading |
| Project faulty | The interpreter has found faults in the project file, last download was faulty. | Repeat downloading |
| CRC test sum error | Check sum error found in protocol | |
| Wrong length details | Buffer overflow found | |
| Range Check Error | Found area offence | |
| Slave number faulty | | Check slave number |
| Wrong function code | Command is not supported | |
| Initialisation faulty | The PROFIBUS module could not be initialised | |
| Time out | Violated waiting time | May be tall protocol delay time in the set up |
| Address invalid | Demands outside the valid area | Check DB and length of DB |
| Details about length invalid | Length demands outside the valid area | Check DB and length of DB |

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### 7.3.7 Coupling to Freelands 2000 Field Controller

See separate documentation

### 7.3.8 Coupling to the Schneider Quantum Control

See separate documentation.

### 7.3.9 Coupling to the Schneider Premium Control

See separate documentation.

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### 7.3.10 Coupling to Controls that are Not Listed

The necessary handling block can be developed on the basis of the following description for the respective control: programming of a handling block to the POLARIS Panel with PROFIBUS-DP interface.

The programme in the control system should react to events in the PROFIBUS EA range of the BAT terminal, of size 32 bytes, in the following way. Two commands are defined. If the function code (FC) equals "1" the terminal transmit data to the control system. If FC equals "2" the terminal requests data from the control system.

ℹ️ **Note**    The CRC test sum is not required and not used, but is defined in the protocol.

**Transmission event:**

In the transmission event a response includes only error code and cycle counter.

**Transmission request**

| Cycle Counter | FC = 1 | Address 1 | Address 2 | Length | Data - byte 1 | ... | Data - byte N | CRC Low | CRC High |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 04 | 01 | 02 | 03 | 04 | xx | xx | Xx |

**Transmission response**

| Error code | Cycle counter | CRC Low | CRC High |
|---|---|---|---|
| 1 | 10 | 00 | 00 |

**Fetch event:**

In the fetch command a distinction is made between an error-free and faulty request.

■ In the case of faulty request the address and legth are overwritten with zero. The error code and cycle counter are transferred correctly.

■ In the case of a faulty request the unseful data are attached according to their length.

**Fetch request**

| Cycle counter | FC = 2 | Address 1 | Address 2 | Length | CRC Low | CRC High |
|---|---|---|---|---|---|---|
| 1 | 3 | 04 | 01 | 02 | 03 | 04 |

**Fetch response (error-free)**

| Error code | Cycle counter | Address 1 | Address 2 | Length | Data - byte 1 | ... | Data - byte N | CRC Low | CRC High |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 04 | 01 | 02 | 03 | 04 | xx | xx | xx |

**Fetch response (faulty)**

| Error code | Cycle counter | Address 1 = 0 | Address 2 = 0 | Length = 0 | CRC Low | CRC High |
|---|---|---|---|---|---|---|
| 1 | 3 | 04 | 01 | 02 | 03 | 04 |

Note: One block stands for one byte

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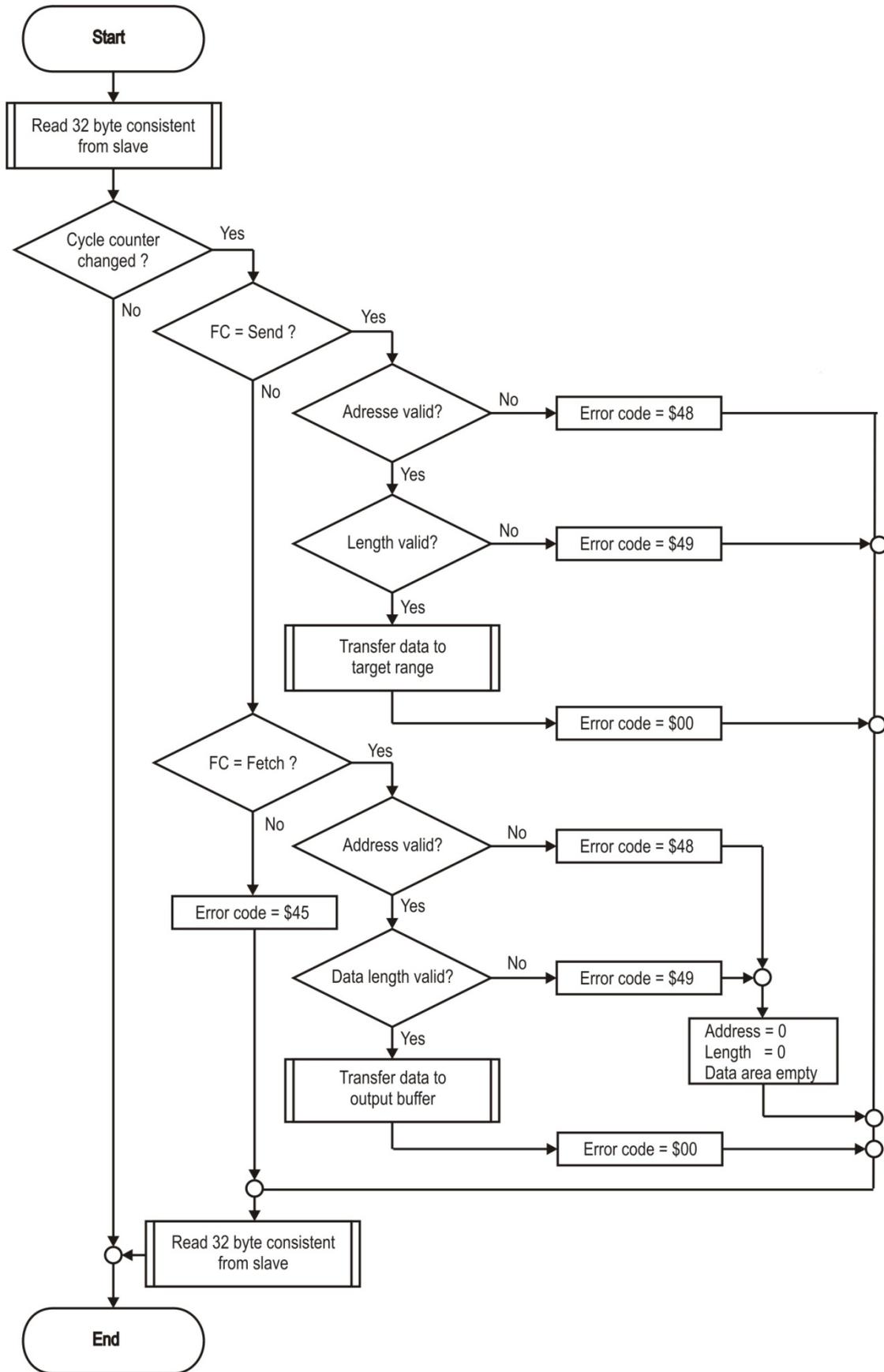
### 7.3.11 Error Reporting

Sample of a screen error:

| Kommunikation |
|---|
| 10:48:23 -> Waiting time expired |

### 7.3.12 Possible sources of error

| Source | Description |
|---|---|
| PLC programme | Errors found in the PLC programme (function blocks) |
| Profibus DP line | Errors found during transmission via Profibus DP |
| Interface card | Errors found during communication with internal |
| BMS-Graf driver | Errors found in the driver software |

### Possible fault messages

| Message | Reason | Possible correction |
|---|---|---|
| No project | The interpreter has found no project file in the terminal. | Repeat downloading |
| Project faulty | The interpreter has found faults in the project file, last download was faulty. | Repeat downloading |
| CRC test sum error | Check sum error found in protocol | |
| Wrong length details | Buffer overflow found | |
| Range Check Error | Found area offence | |
| Slave number faulty | | Check slave number |
| Wrong function code | Command is not supported | |
| Initialisation faulty | The PROFIBUS module could not be initialised | |
| Time out | Violated waiting time | May be tall protocol delay time in the set up |
| Address invalid | Demands outside the valid area | Check DB and length of DB |
| Details about length invalid | Length demands outside the valid area | Check DB and length of DB |

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## 7.4 Coupling to the MODBUS/TCP

The following connections have been established already:

■ SIEMENS S7-300/400 MODBUS/TCP
Order number Siemens: 2XV9 450-1 MB00

■ Diverse OPC servers

### 7.4.1 MODBUS TCP Client

Modbus TCP is very similar to Modbus RTU but TCP/IP packets are used to transmit the data. The TCP-Port 502 is reserved for Modbus TCP. Since 2007, Modbus TCP has been specified in the IEC 61158 standard and is referred to as CPF 15/1 in IEC 61784-2.

The Modbus communication requires the establishment of a TCP connection between a client (POLARIS) and the server (control). Normally, the TCP port 502, which is reserved for Modbus, is used for communication. However, the user can configure another port no. also. Servers are normally designed to allow several connections through port 502 simultaneously. This is not the case in some controls, e.g. the Siemens S7 Control permits only one connection per port. Where several POLARIS devices are connected, each device must be assigned its individual port.

The BMS-Graf-Pro uses an address range from "0" to "65535" for the visualisation data. Data is exchanged by means of the function codes 03h and 10h.

If a firewall is installed between the server and client, it must be ensured that the configured TCP ports are enabled.

Possible sources of errors:

■ incorrect IP address

■ incorrect port number

■ incorrect address entries for variables

■ mapping errors in the control

As the settings in the control differ greatly depending on the respective type, we must refer you at this point to the individual manuals provided by the manufacturersSee separate documentation.

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## 7.4.2    Modbus Function Codes Used

**Function 03H : READ HOLDING REGISTERS**

Example : readout of a float number (32-bit) on register addresses108 and 109 of device 17

| Request | Transaction identifier | | Protcoll identifier | | Number of Data bytes | | Unit identifier | Fonction | Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Start adress | | Number of registers | |
| Client->Server | 0x00 | *tno* | 0x00 | 0x00 | 0x00 | 0x06 | 0xFF | 03H | High | Low | High | Low |

| Response | Transaction identifier | | Protcoll identifier | | Number of Data bytes | | Unit identifier | Fonction | Data | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Number of data bytes | Information |
| Server->Client | 0x00 | *tno* | 0x00 | 0x00 | 0x00 | 0x06 | 0xFF | 03H | n | n/2 Register |

Example (Hex)    >>>    00 00 00 00 00 06 FF 03 00 6B 00 02

                 <<<    00 00 00 00 00 07 FF 03 04 **CC CD 42 8D**

**Note**:  The register address 108 is addressed as Register 107 in accordance with the MODBUS specification. In a communication via gateway, the unit identifier must be set to the device address (17).

*tno* = Identification no. where there are several simultaneous queries

**Function 10H : PRESET MULTIPLE REGISTERS**

Example : Setting a long integer (32-bit) on register addresses 400 and 401 in device 17

| Request | Transaction identifier | | Protcoll identifier | | Number of Data bytes | | Unit identifier | Fonction | Data | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Start Address | | #Reg | | #Bytes | #Info |
| Client->Server | 0x00 | *tno* | 0x00 | 0x00 | 0x00 | 0x06 | 0xFF | 10H | High | Low | High | Low | n | n Bytes |

| Response | Transaction identifier | | Protcoll identifier | | Number of Data bytes | | Unit identifier | Fonction | Data | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Start Address | Information |
| Server->Client | 0x00 | *tno* | 0x00 | 0x00 | 0x00 | n+7 | 0xFF | 10H | n | n/2 Register |

Example (Hex) >>> 00 00 00 00 00 0B FF 10 01 8F 00 02 04 **d2 d1 d4 d3**

<<< 00 00 00 00 00 06 FF 10 01 8F 00 02

**Note**:   Register address 400 is addressed as register 399 in accordance with the MODBUS specification. In a communication via gateway the unit identifier must be set to the device address (17).

*tno* = Identification no. where there are several simultaneous queries.

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### 7.4.3 Interface Parameters Process Connection
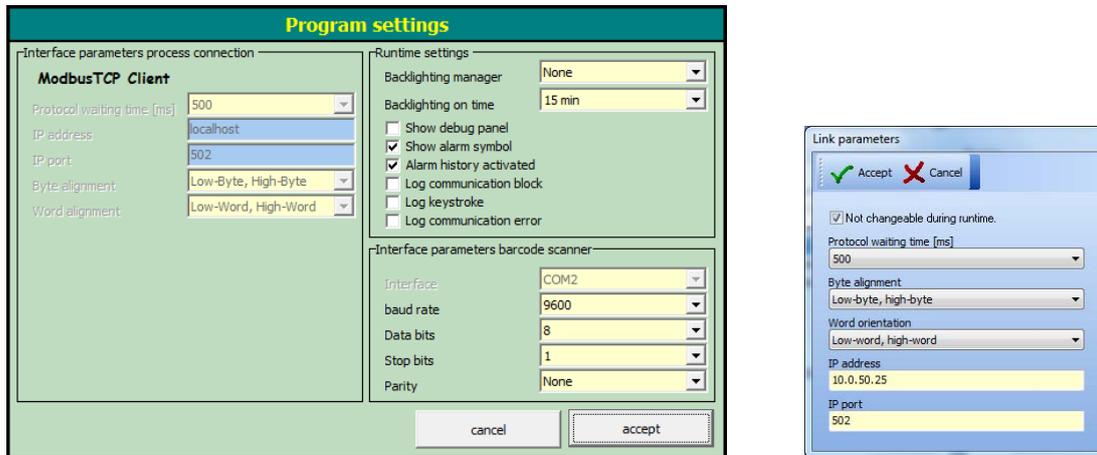


### 7.4.4 Error messages

Example of an error window:



Possible Error Messages:

| Message | Cause | Possible remedy |
|---|---|---|
| Waiting time expired | Establishment of connection to the PLC failed. | – Check connection cable; it might not be connected or it might be faulty.<br>– Check the IP address and port number.<br>– Have the parameters been set for the function codes in the PLC? |
| General Modbus TCP errors | Network faults | – Check the connection cable; it might not be connected or it might be faulty.<br>– Check the IP address and port number.<br>– Check the firewall settings.<br>– Check the filter functions (MAC address enabling).<br>– Check the switch communication. |
| Modbus TCP errors when sending data | | |
| Modbus TCP errors when receiving data | | |
| Modbus TCP errors when establishing a connection | | |
| Modbus TCP errors on disconnection | | |
| Modbus TCP connection not accepted | | |
| Modbus TCP look-up errors | | |
| ModbusTCP data errors | | |
| No project available | The interpreter did not find any project file in the terminal. | – Repeat download |
| Project faulty | The interpreter did not find any project file in the terminal. | – Repeat download |

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![BARTEC]

BARTEC protects

people and the

environment by

the safety of

components,

systems

and plants.