

SIEMENS

SIMATIC HMI

Configuring Graphics Displays

Product Brief

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Safety Guidelines

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are marked as follows according to the level of danger:



Danger

indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



Warning

indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Caution

used with the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Caution

used without safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Attention

indicates that unwanted events or status can occur if the relevant information is not observed.

Note

draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

Qualified Personnel

Equipment may be commissioned and operated only by qualified personnel. Qualified personnel within the meaning of the safety notices in this manual are persons who are authorized to commission, ground and identify equipment, systems and circuits in accordance with safety engineering standards.

Correct Usage

Note the following:



Warning

The equipment may be used only for the applications stipulated in the catalog and in the technical description and only in conjunction with other equipment and components recommended or approved by Siemens.

Startup must not take place until it is established that the machine, which is to accommodate this component, is in conformity with the guideline 98/37 ECC.

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Introduction

Projects whose processes should be visualized are created using the ProTool configuration software on a configuration computer (PC or PU) under Windows® for the following operating units:

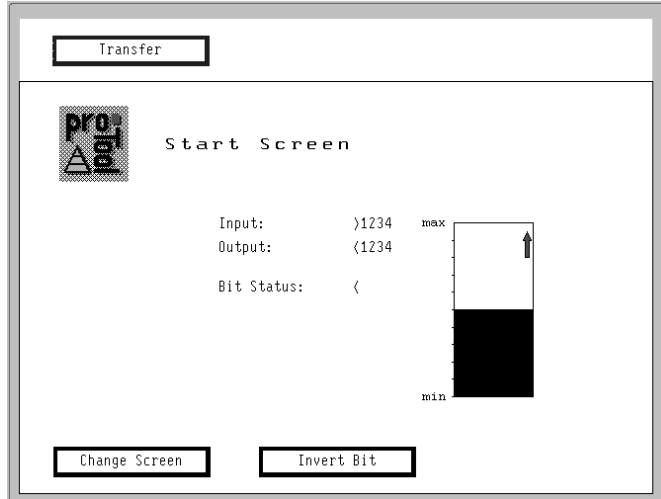
- Text Displays (e.g. TD 17)
- Operator Panels with text-based displays (e.g. OP 3, OP 7, OP 17)
- Operator Panels with graphics displays (e.g. OP 27, OP 37)
- Touch Panels (e.g. TP 27, TP 37)
- Windows-based systems
 - Panels (TP 170A, TP 170B, OP 170B, TP 270, OP 270)
 - Multi Panels (MP 270, MP 270B, MP 370)
 - OP 37/Pro
 - Panel PCs (Panel PC 670, Panel PC 870, Panel PC IL, FI 25, FI 45)
 - PCs
- C7 units (e.g. C7-621/623/624/626/633/634)

The configuration software is available in three release levels:

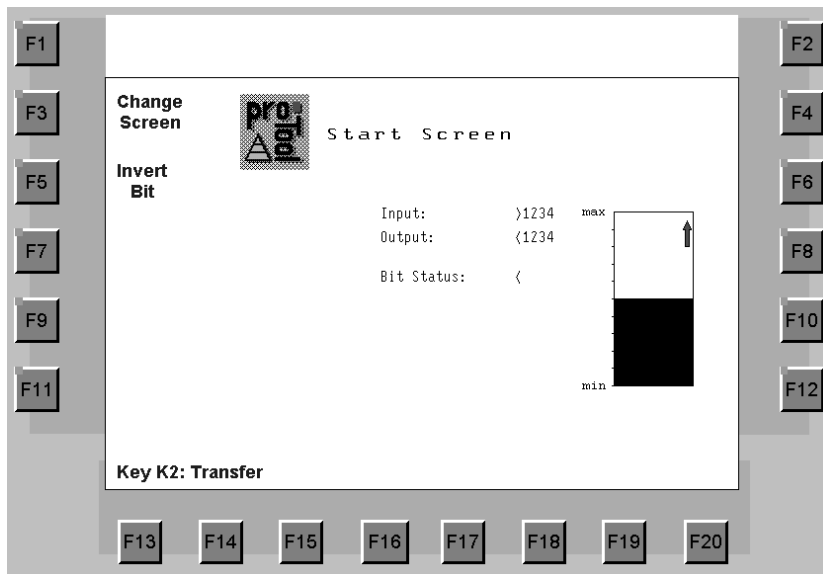
- **ProTool/Pro**
to configure the entire unit family
- **ProTool**
to configure text displays, text and graphic operator panels and the Windows-based units
- **ProTool/Lite**
to configure text displays, text-based operator panels and the Windows-based unit TP 170A

The procedures and descriptions in this product brief should provide initial help with regard to configuring units with graphics displays. The range of units with graphics displays includes both touch panels and operating units. PLC-specific details for creating the associated program are not provided.

The figure below illustrates an example configuration of a touch panel using ProTool:



The figure below illustrates an example configuration of an operating unit using ProTool:



Notes on using the quick reference manual

Texts or inputs required for the configuration which can be selected from items provided appear in *Courier* typeface.

Menus, menu options, dialogs or texts in dialog boxes which can be selected appear in *italics*.

Further information

Further help and information is available in the following:

- Online help
- User's Guide ProTool - Configuring Graphics Displays
- User's Guide - Communications

Elements of a configuration

The following elements are those available for the configuration which are explained in the example configurations provided in this quick reference manual:

Creating screens

Screens enable processes to be visualized. Screens show the user the current status of a process in the form of numeric values, bars or trend curves and enable operational intervention by adjusting values, pressing function keys (OP) or configured buttons (TP).

Linking screens

The screens involved in a configuration can be linked to each other.

Setting and resetting bits in the PLC

Bits in the PLC can be influenced by means of function keys (OP) or correspondingly configured buttons (TP). This enables active intervention in the running of a process.

PLC process value input/output

Process values can be displayed and modified directly by using input and output fields. The entries can be assigned limit values and protected by a password. Output is possible in a number of display formats, such as decimal or binary.

Displaying PLC process values in graphical form

Bars represent a PLC value in the form of a rectangular area. A bar is suited, for example, for representing fill levels.

Integrating graphics

Graphic fields can be used to provide users with a visual representation of a system.

Integrating texts

Input/output fields and function keys can be labeled with text for the user.

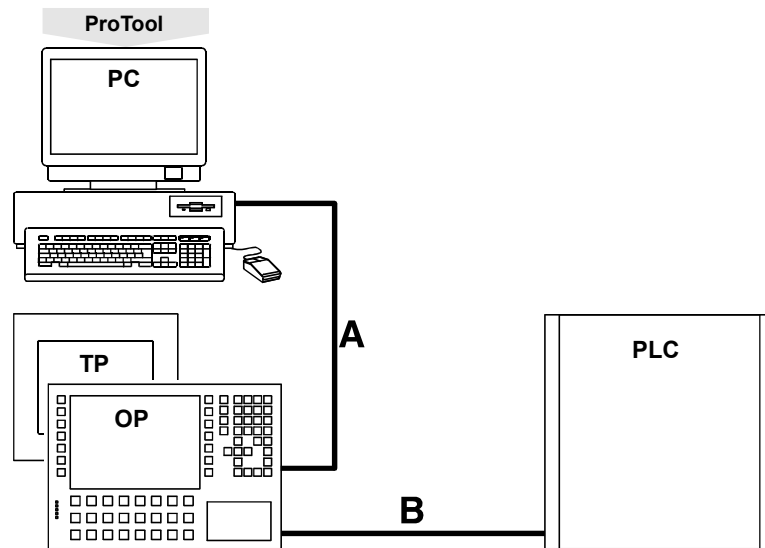
Display messages

Messages indicate events and statuses in the process. ProTool distinguishes between event messages and alarm messages. Event messages relate to the status of a machine or process. Alarm messages indicate operating faults concerning a machine or process and must be acknowledged.

Commissioning Operating Units

Hardware structure

The figure below illustrates an example of one variant of a hardware structure:



- A** Serial connection to download the configuration (configuration phase only)
- B** Connection between operating unit and PLC (configuration phase and online operation)

Installing the software

Installing ProTool on a PC

- Insert the installation CD in the CD-ROM drive; setup starts automatically after a few seconds
- Follow the instructions on the screen

Using online help and context-sensitive help

If problems arise during the configuration, or further information concerning specific points is required, proceed as follows:



- Click on the question mark symbol
- Click on the elements for which information is required

Using context menus

Context menus are available for the elements of a configuration. Context menus can be used to trigger actions which are related to the corresponding element. Proceed as follows to call in a context menu:

- Select an element
- Click the right mouse button

Basic Steps for a Configuration

Start ProTool



- Double click on the ProTool icon on the desktop

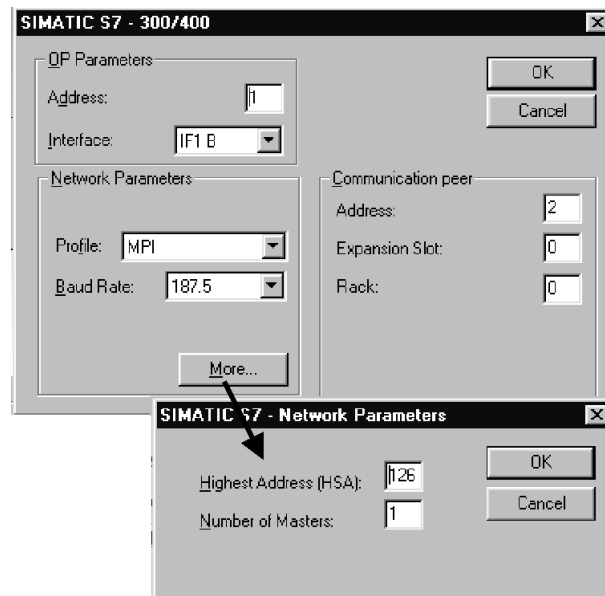
Define the new configuration



In the case of new ProTool users, it is recommended to use standard configurations as a basis for individual configurations. Standard configurations are available for all graphics displays. They contain screens in which generally used functions are already configured.

- Select *File* → *New*
- Select the operating unit to be configured
- Click on *Continue*
- Select PLC
- Set further parameters for the PLC under *Parameters*

Example: Parameters when an S7 is connected



- Click on *Continue*
- Activate checkbox *Use Standard Project*
- Click on *Continue*
- Enter a name for the configuration in *Project*
- Click on *Finish*

Define default settings



Before carrying out the actual configuration, certain settings must be defined concerning the division of the screen on the operating unit. These settings are valid for the entire configuration. In addition, communication areas required for messages, for example, must be defined.

Define division of the display

These settings are related to the representation, size and position of message areas for event and alarm messages.

The system setting contains the fixed window. The fixed window is an area in which each screen appears. Here, it is possible to label the system or position date/time fields, for example. When using a TP, buttons which should be available for all screens can be placed in the fixed window.

Leave the fixed window in the pre-defined position at the top of the screen.

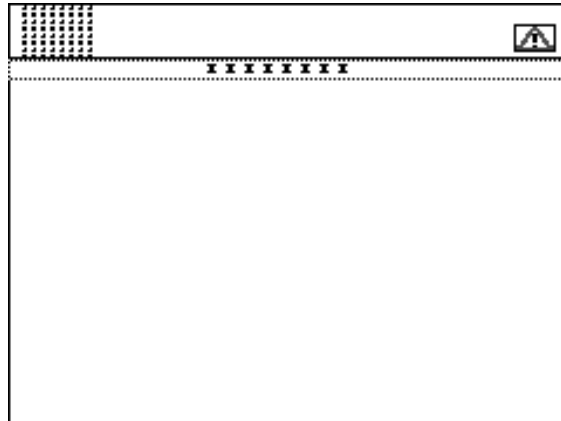
Proceed as follows to ensure that alarm messages are always displayed in the message window and event messages in a message line:

- Select *System* → *Screen/Keys*
- Under *Alarm/Event Mess.* select *Window/Line*

Proceed as follows to define the position of the message line:

- Under *Active* select *Message Area*
- Press the mouse button and position the message line in the screen layout.
- Click on *OK*

The figure below illustrates a possible configuration for the division of the display for an operating unit:



Define communication area

Communication areas must be defined in the PLC for special operating unit jobs. Communication areas are necessary, for example, to trigger and acknowledge messages. Operating unit and PLC both access the defined data areas in order to communicate with each other.

Proceed as follows to define a communication area for alarm messages:

- Select *System* → *Area Pointers*
- Under *Type*, select *Alarm Messages*
- Click on *Add*
- In *PLC*, select the PLC used in the system
- Define the other settings for alarm messages
- Click on *OK*

Set up this data area in the PLC program too.



In the case of connection to a SIMATIC S5, a communication area of the type *Interface Area* must always be set up for communication between the operating unit and PLC. The setup procedure is the same as for setting up a communication area for alarm messages described above.

Assign functions

In order to trigger certain operating unit functions, they must be assigned globally or locally.

The following options are available for selection:

- **Global assignment:**
A function with global assignment need only be configured once in ProTool. It can then be activated via the operating unit from all the screens in the configuration.
- **Local assignment:**
A function with local assignment can only be activated via the operating unit from one specific screen in the configuration.

Global function key assignment on the operating unit

In order to assign a function globally on the operating unit, select a K key. A K key is always available, regardless of the screen selected.

– Select *System* → *Screen/Keys*



- Click on the required function key
- Open the required folder in *Select Object*
- Double click on the function, thus assigning it to the function key
- If necessary, modify the function parameters
- Click on *OK*

Global button assignment on the TP

In order to assign a function globally on the TP, position a button in the fixed window. The fixed window appears in every screen.



- Click on the button icon
- Move to the required position in the fixed window at the top edge of the screen, click and hold the mouse button pressed.
- Position the button using the mouse and release the mouse button.
- Select the tab control *Functions*
- Open the required folder in *Select Object*
- Double click on the function, thus assigning it to the button
- If necessary, modify the function parameters
- Click on *OK*

The button can be allocated either a label text or icon. Proceed as follows to allocate a label to the button:

- Select the tab control *General*
- Under *Display* select *String*
- Under *Labeling* enter the label text for the button
- Click on *OK*

Proceed as follows to allocate an icon to the button

- Select the tab control *General*
- Under *Display* select *Graphic*



- Click on the context menu symbol
- Select *New* from the context menu
- Double click on the object type *Bitmap*, the graphics program is started

- Create the graphic
- Terminate the graphics program
- Click on *OK*



If a language change is defined in the configuration, ensure that the icon assigned is the same in all the languages.

Local function key assignment on the operating unit



- Click on the required function key in the screen
- Select the tab control *Functions*
- Open the required folder in *Select Object*
- Double click on the function, thus assigning it to the function key
- If necessary, modify the function parameters
- Click on *OK*
- Select the tab control *Icon*



- Click on the context menu symbol
- Select *New* from the context menu
- Double click on the object type `Bitmap`, the graphics program is started
- Create the graphic
- Terminate the graphics program
- Click on *OK*



If a language change is defined in the configuration, ensure that the icon assigned is the same in all the languages.


Local button assignment on the TP

- Click on the button icon
- Move to the required position in the screen, click and hold the mouse button
- Position the button using the mouse and release the mouse button
- Select the tab control *Functions*
- Open the required folder in *Select Object*
- Double click on the function, thus assigning it to the button
- If necessary, modify the function parameters
- Click on *OK*

The button can be allocated either a label text or icon. Proceed as follows to allocate a label to the button:

- Select the tab control *General*
- Under *Display*, select *String*
- Under *Labeling*, enter the label text for the button
- Click on *OK*

Proceed as follows to allocate an icon to the button

- Select the tab control *General*
 - Under *Display*, select *Graphic*
- 
- Click on the context menu symbol
 - Select *New* from the context menu
 - Double click on the object type *Bitmap*, the graphics program is started
 - Create the graphic
 - Terminate the graphics program
 - Click on *OK*



If a language change is defined in the configuration, ensure that the icon assigned is the same in all the languages.

Creating the start screen for the configuration

The start screen is the first screen displayed with regard to a configuration.

Add new screen to a configuration

Proceed as follows:

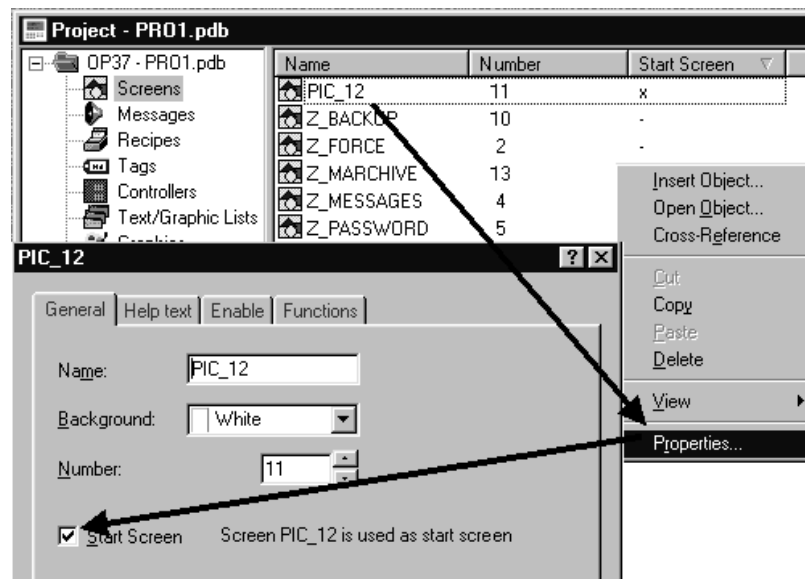
- Double click on *Screens* in the project window

A new screen is added and opened.

Identify new screen as start screen


Proceed as follows:

- Click on the screen entry on the right-hand side of the project window using the right mouse button
- Select *Properties* in the context menu
- Activate checkbox *Start Screen*
- Click on *OK*



Add descriptive text to start screen

Proceed as follows:

-  – Click on the icon for static text
- Click on the required position in the screen
- Enter the text `Start Screen`


Enable switch to download mode

Before a generated configuration can be downloaded from a PC to an operating unit, the operating unit must be set to Download mode. In order to access Download mode simply and quickly, assign the function *Mode* globally to a configured button (TP) or a function key (operating unit).

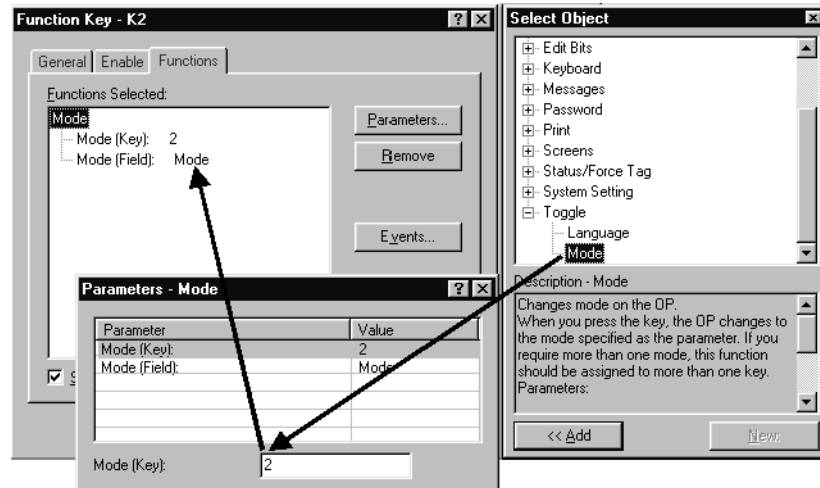
Assign function *Mode* globally

Select a K key on the operating unit or generate a button on the TP in the fixed window. Open the folder *Toggle* and select the function *Mode*. Proceed as described in Section **Assign functions** on Page 12.

At this point, define the following settings:

- Click on *Mode (Key)*:
- Under *Mode (Key)*: enter the parameter 2
- Click on *Mode (Field)*:
-  – Click on the context menu symbol
- Click on *New* in the context menu
- Do not alter the tag type predefined in *Type*
- Under *PLC* select `<No PLC>`
- Under *Name* enter the `Mode`
- Click on *OK* twice

The tag can be used to display the current operating mode on the operating unit. Creation of this tag is necessary for the function described. During the course of further configuration, no reference is made as to the use of the tag.



Activate configuration on operating unit

Compile operation-capable configuration

Proceed as follows:



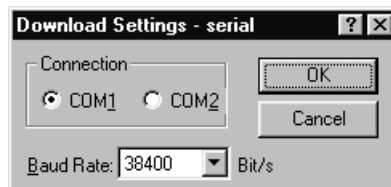
- Click on the icon for compiling
- Follow the instructions on the screen

Download and test operation-capable configuration to operating unit

The configuration must be downloaded to the operating unit for testing. Downloading is carried out via a direct serial connection between the PC and operating unit.

Proceed as follows:

- Select *File* → *Settings* → *Download* to set *Serial*
- Set other downloading settings under *Edit*



- Click on *OK* twice

In order to download the configuration, the operating unit must be in Download mode. The procedure with which to activate Download mode depends on the configuration status of the operating unit:

- An operating unit which has not received a configuration switches to Download mode automatically.
- An operating unit which contains a configuration can be switched to Download mode directly after switching on the power supply by pressing the key combination `ESC` and `CURSOR UP`. This key combination deletes the existing configuration.

- A TP which already contains a configuration displays a power-on screen immediately after switching on the power supply. This screen contains the button `SERIAL DOWNLOAD`. The TP can be switched to Download mode by pressing this button. The existing configuration is thus deleted.
- If a button (TP) or function key (operating unit) has already been assigned for switching the unit to Download mode, as described in Section **Enable switch to download mode** on Page 17, simply press that button/key.

When the message `Ready for transfer` appears on the operating unit, proceed as follows:



- Click on the download icon

After downloading has been completed successfully, the operating unit is rebooted with the downloaded configuration. It can then be tested.

Extend Configuration with Simple Elements



A condition for the procedures described in this section is that the following configuration steps, defined in the Section **Basic Steps for a Configuration** have been carried out:

- **Define the new configuration** (Page 9)
- **Define default settings** (Page 10)
- **Creating the start screen for the configuration** (Page 16)
- **Enable switch to download mode** (Page 17)

Integrate graphic in start screen

Proceed as follows if a graphic or company logo should appear in the start screen of the configuration:



- Click the graphics icon
- Click on the required position in the screen and draw out the field to the desired size



When integrating graphics, ensure that the field which has been drawn out has the same border ratio as the graphic created. If this is not so, the graphic is represented distorted.

The following options are available:

- Call graphic file
- Create graphic using a graphics program

Proceed as follows to call in a graphic file:

- Click on *Create from file*
- Enter the path and file name of the graphic file
- Click on *OK*

Proceed as follows to create a graphic using a graphics programs:

- Click on *New*
- Double click on the object type `Bitmap`, the graphics program is started
- Create the graphic
- Terminate the graphics program



The configuration can be tested at this point. The procedure is described in Section **Activate configuration on operating unit** on Page 19.

Add second screen to configuration and configure changing screens

At this point, the configuration only contains the start screen. If other screens are to be added, the user must be able to switch between the screens.

This example illustrates how a second screen is linked to the start screen. A configured button (TP) or function key (operating unit) should be available in every screen to enable toggling between the screens.

Add second screen to configuration

Proceed as follows:

- Double click on *Screens* in the project window

A new screen is added and opened.

Add descriptive text to second screen

Proceed as follows:

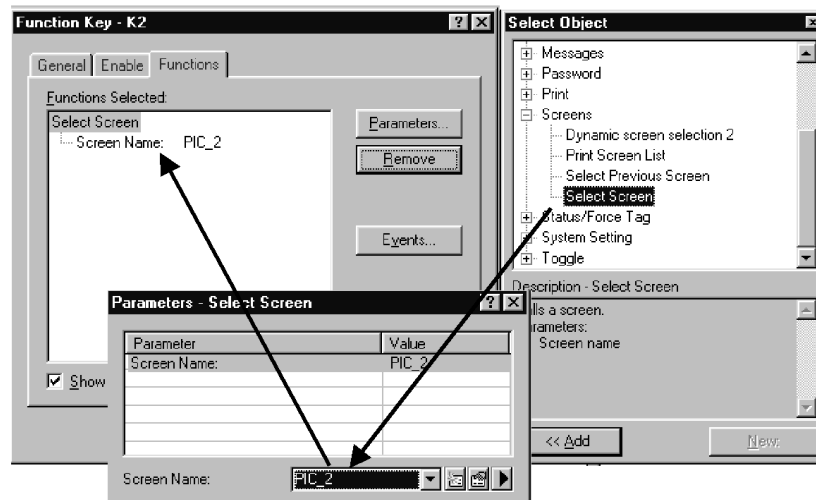


- Click on the icon for static text
- Click on the required position in the screen
- Enter text `Second Screen`

Configure switching to second screen

Proceed as follows to enable changing from the start screen to the second screen using the operating unit:

- Create a button (TP) or click on a function key (OP) in the start screen
- Open the folder *Screens* in *Select Object*
- Double click on *Select Screen*
- Select the name of the second screen under *Screen Name*



Configure change to start screen

Proceed as follows to enable changing from the second screen to the start screen using the operating unit:

- Create a button (TP) or click on a function key (OP) in the second screen
- Open the folder *Screens* in *Select Object*
- Double click on *Select Screen*
- Select the name of the start screen in *Screen Name*



The configuration can be tested at this point. The procedure is described in Section **Activate configuration on operating unit** on Page 19.

Integrating a standard configuration in a customized configuration

The use of the standard configuration as a basis for customized configurations was recommended in Section **Define the new configuration** on Page 9.

In order to access the standard configuration, a screen in the customized configuration must be linked to the basic standard configuration screen. The basic screen is linked to other screens in the standard configuration as a starting point.

In this example, the second screen of the customized configuration is to be linked to the basic screen of the standard configuration.

Configure changing screens to the basic screen of the standard configuration

Proceed as follows:

- Create a button (TP) or click on a function key (OP) in the second screen
- Open the folder *Screens* in *Select Object*
- Double click on *Select Screen*
- Select `Z_SYSTEM_MEN` in *Screen Name*




The configuration can be tested at this point. The procedure is described in Section **Activate configuration on operating unit** on Page 19.

PLC process value input/output

This example illustrates how a PLC process value is entered in an operating unit input field and output via an output field and a bar graph.


Inserting an input field

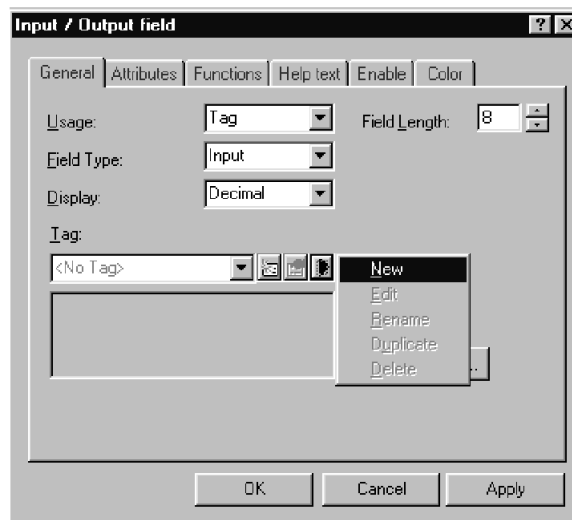
Proceed as follows:

-  – Click on the Input/Output Field symbol
- Click on the required position in the screen and draw out the field to the desired size
- Select *Field Type* Input

Generate a new tag

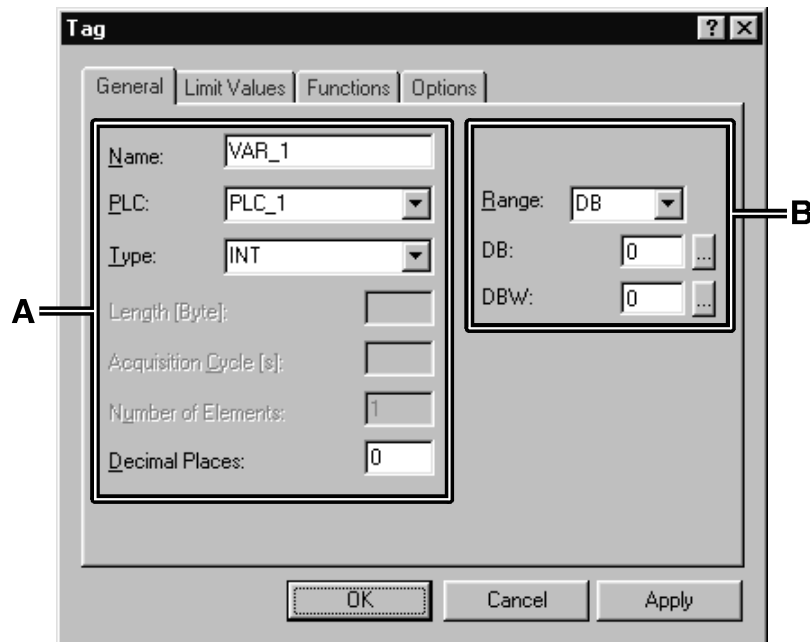
Proceed as follows:

-  – Click on the context menu symbol
- Click on *New* in the context menu



- Define tag parameters
- Click on *OK* twice

Example: Tag for S7 connection



A Formatting for display in the configuration

B Address in the PLC

Each tag has a symbolic name and defined data type. The value of the tag changes during execution of the PLC program. Tags with links to the PLC are referred to as global tags, those without as local tags.

ProTool has the following tag types, but they are not all necessarily available in each PLC:

- STRING tags
- BOOLEAN tags
- Numeric tags
- Array tags

The acquisition cycle of a tag determines the time interval at which they are updated by a value from the PLC.

The address defines the memory location of a global tag in the PLC. It is therefore dependent on the PLC implemented.

Set up a data area for the tag, used in this example, in the PLC. Using the operating unit input field it is possible to enter a process value in the PLC.



The use of a tag should be taken into consideration when defining tag types. If the value selected for the acquisition cycle is too low, it affects communication between the PLC and operating unit.

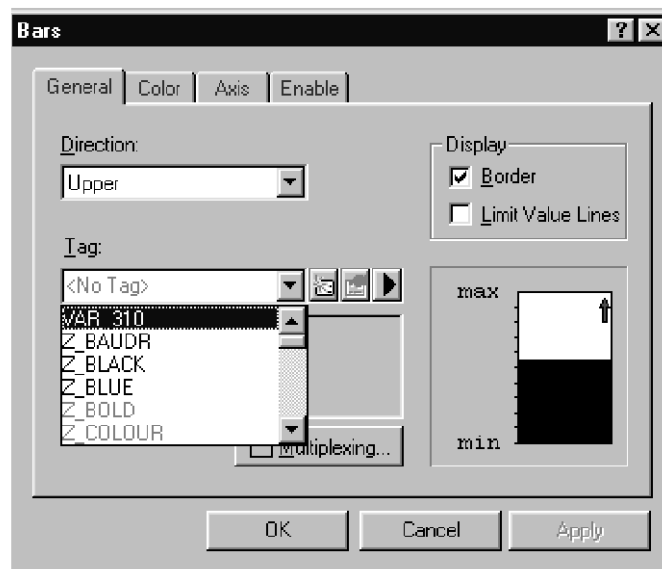
The following steps of this example describe the configuration of an output field and bar display used to output the process values entered.

Inserting a bar display

Proceed as follows:



- Click on the bar icon
- Click on the required position in the screen and draw out the field to the desired size
- Select the newly created tag in *Tag*
- Click on *OK*



Insert an output field

Proceed as follows:



- Click on the Input/Output Field symbol
- Click on the required position in the screen and draw out the field to the desired size
- Select *Field Type* Output
- Select the newly created tag in *Tag*
- Click on *OK*



The configuration can be tested at this point. The procedure is described in Section **Activate configuration on operating unit** on Page 19.

Setting and resetting bits in the PLC

Proceed as follows to enable influencing bits in the PLC using the operating unit:

- Create a button (TP) or click on a function key (OP) in the start screen
- Open the folder *Edit Bits* in *Select Object*
- Double click on *Set/Reset Bit*



- Click on the context menu symbol
- Click on *New* in the context menu
- Define tag parameters
- Click on *OK* twice



The configuration can be tested at this point. The procedure is described in Section **Activate configuration on operating unit** on Page 19.

Display messages

In order to issue information concerning current process faults in the form of messages, a communication area was configured for alarm messages in Section **Define communication area** on Page 11.

Proceed as follows to configure alarm message texts for output:

- Click on *Messages* in the project window
- Double click on *Alarm Messages* on the right-hand side of the project window
- Enter the alarm message text for Alarm Message 1 in line 0001
- Enter the alarm message text for Alarm Message 2 in line 0002
- Enter the alarm message text for Alarm Message 3 in line 0003

The status line, at the bottom right of the screen, indicates the respective address linking the alarm message to the PLC. This information is PLC-specific.

In order to display the configured alarm messages on the operating unit, the corresponding bits must be set in the PLC using the PLC program.



The configuration can be tested at this point. The procedure is described in Section **Activate configuration on operating unit** on Page 19.

