SIEMENS

GRACIS
Interactive Graphics System for Process Monitoring and Diagnosis with Network Capabilities

LPF Configuring Guide

GRACIS V1.5

Edition February 1994
Note

Because of clear arrangement, this documentation does not inform about all details of all types of the product. Therefore, it cannot take into account all possible cases of installation, operation and maintenance.

If you require additional information or have special questions, please seek further particulars from your local SIEMENS office.

The contents of this documentation are not part of an earlier or existing agreement, acceptance or legal matter. All obligations by SIEMENS are set in the corresponding sales contract which also contains the complete and exclusively valid settlement. The contract warranty will not be enlarged or limited by this documentation.
1 Preliminary Remarks

What is the subject of this publication?
This publication shows you how to configure a GRACIS system. GRACIS configuring defines all the information required during process control for operator control, process monitoring and diagnostics.

Who should read this publication?
This publication is intended for configuration engineers. The level of qualification required is specified below.

What previous knowledge is required?
For an overview of the technical terms used in the Configuring Guide, we recommend that you read through the manual section entitled User Interface. This section explains basic terms such as slider, drop-down menu and work window.

How can you find your way around this publication?
A general overview is followed by a description of the management of the configuring data and system utilities. The remainder of the publication concerns the configuring of the GRACIS lists:
- Displays
- Texts
- GRAPH 5
- Messages
- Printouts

The documentation also provides a description of the configured lists.

Longer sections are preceded by a table of contents.
What do the following terms mean? For the purpose of this Installation Guide and product labels:

**A qualified person** is one who is familiar with the installation, construction and operation of the equipment and the hazards involved.

In addition, he has the following qualifications:

- Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- Is trained in the proper care and use of protective equipment in accordance with established safety practices.
- Is trained in rendering first aid.

---

**DANGER**

Death, severe injury or substantial damage to property will result if the stipulated safety precautions are not taken.

---

**WARNING**

Death, serious injury or considerable damage to property can result if the stipulated safety precautions are not taken.

---

**CAUTION**

Minor injuries or damage to property can result if the stipulated safety precautions are not taken.

---

This symbol highlights important information on the product or on a specific part of the Reference Manual.
2 Introduction to GRACIS Configuring

2.1 Introduction to Configuring ................................................ 2-2
2.2 Configuring Overview ......................................................... 2-2
2.3 Configuring Possibilities ...................................................... 2-4
2.4 List Types ............................................................................. 2-5
2.5 Structuring the Lists .............................................................. 2-5
2.6 Configuring Resources .......................................................... 2-7
  2.6.1 Operating Elements ............................................................... 2-7
  2.6.2 Macro Recorder ..................................................................... 2-8
2.7 Introductory Example ............................................................ 2-9
  2.7.1 Starting up a GRACIS Config. Station for the First Time ...... 2-9
  2.7.3 Creating a New Process Display ......................................... 2-10
  2.7.4 Example for Configuring Display Elements ....................... 2-11
Today’s high-performance automation systems make ever higher demands on operator control and visualization functions. The objective is to make the user’s job easier by preprocessing and presenting the constantly increasing volume of information ergonomically in a way that he can easily understand and manipulate. A convenient user interface, based on windowing technology and featuring intuitive dialog windows, makes configuring so easy that even untrained technicians can configure GRACIS (GRAphic Computer Integrated Supervising).

GRACIS configuring is the procedure used to define all the information required during process control for operation, monitoring, process supervision and diagnostics.

The GRACIS LPF system is configured on a configuring station (GRACIS PG/PC). The target hardware for running the LPF process control system is the OP 30-SM or CP 470. You must transfer the configured lists onto the memory cards of these units via the serial interface.

2.1 Introduction to Configuring

The configuring software contains a local process control simulator which you can use to test aspects of the configured displays (such as the display sequence) with the connection to the S5 PLC off-line.

GRACIS has two operating modes:

- Configuring
- Process control

Configuring mode is activated either directly following a system start-up or at any time from process control mode.

You can switch from process control mode to configuring using the key combination CTRL+ or CTRL-.

On start-up, the system responds as follows:

- Following installation of a new system
  The system branches to the HPF system parameter assignment screen. Here you can adapt and dimension GRACIS to the configuring environment.

- Restart after a RESET
  The GRACIS control program (MCP) terminates all of the GRACIS programs and restarts them. You can set parameters determining the subsequent response of the system.

There are two possibilities on start-up:

1) The system is loaded in process control mode
   * The start-up display appears
   * Configuring mode is started in the background

2) The system is loaded in configuring mode
   * The main configuring screen appears
   * Process mode is optionally started in the background
2.2 Configuring Overview

GRACIS configuring is called up either automatically on system start-up or, if the process display is running in the foreground, with the CTRL+ or CTRL- key combinations.

GRACIS subsequently displays the menu of the first operating level:

Use the F1 Configuring menu to start configuring the list type selected in the drop-down menu.

Select F2 Management to switch to project management, set the system parameters or save or load options and data.

With F3 System utilities you can set up the hard disk, format and copy diskettes and reset the system.

F7 GRACIS displays the version of the GRACIS configuring software.

F6 LPF opens the GRACIS LPF main menu for the OP 30-SM/CP 470 list transfer. All of the functions in the GRACIS LPF main menu are described in the LPF Technical Description.
2.3 Configuring Possibilities

You configure individual elements (such as display elements or text elements) in displays, reports and message lines, etc. These elements are stored sequentially in files. A linked list structure is the result produced in the file. The files are therefore referred to as lists.

Displays, reports, messages and texts are stored in files together with information on GRAPH 5. These files are known as lists.
2.4 List Types

The following list types can be generated by GRACIS during configuring:

A **process display list (PBL)** is created for each process display. This list contains the configured display elements, such as full graphics elements, bars, etc., and the dynamic response associated with the elements.

A **report list (DPL)** is created for a report. A report is a multiple-line page-oriented text which can contain process variables, system elements, static text elements and text from the text list. The report is output on a connected printer during process control.

The **message list (MDL)** is created for messages. A message can contain system elements (e.g. date/time) and text on one line.

**Text lists (TXL)** are created for texts. The texts of the text lists are output either in message text fields in process displays, in message fields or on a printer by the message system or on a printer by the report system.

The step blocks for GRAPH 5 diagnostics are defined in the **GRAPH 5 sequence lists (GSL)**.

Only one **system parameter list (SPL)** and **LPF system parameter list (SPU)** exist for the entire GRACIS system.

The **system parameter list (SPL)** is created for the system parameters of the configuring station. This list contains parameters used to adapt GRACIS LPF to the configuring environment.

The **LPF system parameter list (SPU)** is created for the system parameters of the target hardware (OP 30-SM, CP 470). This list contains parameters for adapting and dimensioning GRACIS to the process environment (see the **LPF Technical Description**).

2.5 Structuring the Lists

GRACIS configuring is organized so that you do not have to structure the configured lists.

If you use the default values, your lists are automatically stored in the list manager in Project 1, GRACIS System 1, Subproject 1 under a list number of your choice. The parameters which you enter during system parameterization are stored in the system parameter list located in Project 1, GRACIS System 1. You can configure 255 lists for each list type in this manner.

You only use the feature of structured list management if you use the project manager to create new projects, GRACIS systems or subprojects.

You configure until a change occurs in the preselected management path. This means that you don't have to select the complete management path for every list configuration.

You can create lists for different systems or projects on a configuring station. GRACIS allows you to combine or structure these lists in projects numbered from 1 to 255, in GRACIS systems from 1 to 255 within the projects and in subprojects from 1 to 255 within the GRACIS systems.
The ability to create projects on your configuring station allows you to prepare various stages of a system or to copy individual lists into a new project and then edit them. In this way you can record the initial state of an operating plant for subsequent reference at any time.

Each GRACIS system is a unit executable in LPF process control mode. All of the lists required for a system are stored within a GRACIS system.

The lists in subprojects are managed by GRACIS according to list types. You can configure up to 255 lists for each list type. Only one system parameter list and one LPF system parameter list exist on a GRACIS system and they apply to the complete system.

Subprojects 250-255 are reserved for special applications. See the Notes section in the Technical Description.

A list is defined in the management system in terms of a project, GRACIS system, subproject number, list type and list number.

The lists can only reference each other within a GRACIS system, because only one GRACIS system can be active in LPF process control mode. For example, a display in Project 1, GRACIS System 1 may not reference a text list in Project 1 GRACIS System 2.

Only one GRACIS system can be active at a time in LPF process control mode.
2.6 Configuring Resources

2.6.1 Operating Elements

Legend:

- Infobox (green) -> GRACIS output box displays information
- Input box (yellow) Values can be entered directly
- Continue button A pop-up menu or an additional dialog is opened
- Selection box (gray) Displays the menu item selected in the pop-up menu
- Activation box On/off toggle for the dialog item
- Proc. disp. A menu item which appears dimmed (gray lettering) is not available
- Check box Selection of one or more items

Infoboxes are displayed in green. You cannot edit the values in these boxes directly.

| No. of bytes: | 1 |

Input boxes are displayed on the screen in yellow with a black surround. The values displayed when these boxes appear on the screen are either the default values or the previous settings. You can enter your own settings in these boxes.

Continue buttons are activated by clicking the mouse or by positioning the line cursor on the line of the selection box with the arrow keys and pressing the F10 key. The activation of a Continue button initiates one of the following actions:

- A pop-up menu appears, in which you can select an item.
- A dialog box is opened containing more specific information on the function.
- A GRACIS list selection is started.

The menu item selected from the pop-up menu is displayed in a selection box.

<table>
<thead>
<tr>
<th>Selection box</th>
<th>Continue button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input device</td>
<td>Mouse</td>
</tr>
</tbody>
</table>

Activation boxes are displayed at the start of the line. You can activate the function by clicking the mouse or directing the cursor with the arrow keys and pressing CTRL-N. When the function is active, a black diamond appears in the gray activation box.

Framing

Check boxes only appear in the list directory during the selection of GRACIS lists. They are used to select lists or directories. Check boxes are selected by clicking the mouse or directing the cursor with the arrow keys and pressing CTRL-N or the SPACE bar.

| PBL | 2 | Sensor overview | 1335 | 01 | 02 | 93 | 12 |
2.6.2 Macro Recorder

You can use the macro recorder to record and replay keyboard input sequences and operator actions. The configuring operations are faster and easier, especially when editing existing lists.

The macro function can be used in all configuring applications. Only one macro can be used at a time. It is not possible to save the macros on a data storage medium. When you quit a program section, e.g. to switch from display configuring to report configuring, a recorded macro is deleted.

The following buttons are inserted in the message line for controlling the macro functions:

- **Delete macro** (CTRL-K)
- **Replay macro** (ALT-T)
- **Macro status** (ALT-R)
- **Record macro**

**Record macro**

When the macro recorder is started (by clicking the Record macro button or pressing the key combination ALT-R) all keyboard input and operator actions are recorded. During the macro recording, the Record macro and Macro status are highlighted in red. You should use the optimum number of keystrokes required to perform the action when recording the macro.

The size of the macro is limited solely by the size of the available memory. A warning is output in the message line if insufficient memory capacity is available.

To terminate the macro recording, you must reactivate the Record macro button. The Record macro button is displayed once more on a gray background. The macro status remains highlighted in red, thereby indicating that a macro has been saved.

The following restrictions apply to the use of the mouse for macro recording.

- The macro recorder does not record the selection of multiple elements with a surrounding rectangle or the moving of elements with the mouse.
- It is not permitted to enlarge, reduce or move a work window during a macro recording.

**Replay macro**

The macro is executed by activating the Replay macro button or pressing the key combination ALT-T. All other inputs are ignored while a macro is running.

**Delete macro**

The macro is deleted by activating the Delete macro button or pressing the key combination CTRL-K. It is not possible to recover a deleted macro.
2.7 Introductory Example

2.7.1 Starting up a GRACIS Configuring Station for the First Time

Following the installation of the GRACIS software on a GRACIS PG/PC you should enter the user GRACIS in the log-on table and log on again. You must then identify yourself with the IDs entered in the log-on table (user name: GRACIS, password: ******). When you have logged on, the system boots and the main GRACIS configuring display appears with the system parameterization dialog.

In this introductory example, please only change the system parameters if you are using a mouse as an input device. To activate the mouse, move the arrow cursor to the Input device line. Press the F10 function key to open a pop-up menu. Now move the triangle on the left-hand border with the arrow keys until it is pointing at the Mouse menu item. Press the RETURN key to enter the selection in the dialog box. If you now confirm the settings with the RETURN key, the system parameters are saved and the system is rebooted. The main menu of GRACIS appears immediately following the restart.

If you do not have a mouse, you can accept the system parameters without changing them by pressing the RETURN key. The system then takes you straight to the GRACIS main menu.

Now select the Process display menu item under F1 Configuring.
2.7.3 Creating a New Process Display

When you select display configuring, the list ID dialog for Project 1, GRACIS System 1 and Subproject 1 appears.

The Project ID and Name, GRACIS system ID and Name and the Subproject ID and Name are infoboxes. In this dialog, you enter the ID and name of the display. To do this, position the cursor by clicking the input boxes with the mouse or using the arrow keys. Save the settings by clicking the Accept box or by pressing the RETURN key.

A configuring window is opened for a display and the process display dialog is automatically initiated.
You can define the following parameters in the process display dialog:

- Background colour of the display
- The display refresh time frame
- Line intervals of the grid
- Cursor operating order
- User display ID

It is not possible to change the default values in the example. You can save the settings with the accept button or the RETURN key.

### 2.7.4 Example for Configuring Display Elements

Your process display does not yet contain any configured display elements.

The following example shows how to configure a display element.

Press the F1 function key or use the mouse to position the pointer on the **F1 Elem. type** menu item. The **Element type** drop-down menu appears. Press the left mouse button or use the arrow keys to select **Full graph**.

In the following example, you will add a rectangle to the existing elements. The rectangle will be used to represent a workpiece to be machined.
When you click the Rectangle symbol, the pop-up menu for selecting the full-graphics elements disappears.

- **You have selected the full graphics, rectangle element type.**

In the next step, you decide which function to use on the rectangle type.

Select New to create a new display element.

The system outputs a rectangle in the lower right-hand area of the screen. This element is positioned so that it is not covered by a dialog window. The Full graphics dialog/rectangle menu is automatically opened. In this dialog you define the X/Y position, foreground and background colour, the display level and the dynamic attributes.
You can now enter the parameters for the colour, display level, line thickness and fill pattern. You can also change the position and size (of full graphics elements only) directly in the process display with the mouse or the arrow keys.

Now open the dynamic dialog by activating the Continue button. You activate a Continue button by clicking it with the mouse or positioning the arrow cursor in the line containing the Continue button and then pressing the F10 function key.

Select the *Reveal/hide status* activation box by clicking it with the mouse or selecting it with the arrow keys and pressing the key combination CTRL-N. A diamond is entered in the activation box and the dynamic dialog is opened to enter the parameters for the dynamic reveal/hide function.
• Direct addressing means that you work with absolute addresses.
• Addressing type specifies the type of the data source (data block, flag, timer, counter, etc.).
• The Node ID is only relevant to networked systems. The default value 0 should be accepted for stand-alone operation.
• The CPU number is used for multi-processor operation on the SIMATIC S5 PLC (S5-135U or S5-155U). For mono-processor operation, accept the default value 1.
• The block number indicates the DB no. when a data block is to be used.
• The parameter type specifies the data format. The Bit format is defined for reveal/hide.

When you have finished defining the parameters you can save the values by pressing the RETURN key or clicking the Accept button. The dynamic dialog is closed. Now close the Full graphics dialog/rectangle menu. The rectangle is still selected as active. Cancel the selection by clicking a free area of the display or using the Cancel marking menu under F2 Elem. fct. The rectangle is no longer highlighted.

When you have finished configuring the display, exit the display by selecting Level up from the F7 GRACIS menu. An information window appears in the center of the screen.

Accept the list. The system takes you to the main process display directory screen.
3 Management

3.1 Project Management
  3.1.1 General Remarks on Management
  3.1.2 Overview of the Project Management Menu
  3.1.2.1 Operation (F1)
  3.1.2.2 Management (F2)
  3.1.2.3 Sort (F3)
  3.1.2.4 GRACIS (F7)
  3.1.3 Management Functions
    3.1.3.1 Copy, Save and Load
    3.1.3.2 Change ID

3.2 System Param. (SPL) for the Configuring Station
  3.2.1 Peripheral Interfaces
  3.2.2 Software Response

3.4 Save/Load Options/Data
  3.4.1 Data (F1)
  3.4.1.1 List Documentation
  3.4.2 Options (F2)
  3.4.2.1 Load Options
3.1 Project Management

3.1.1 General Remarks on Management

The list management software creates directories and subdirectories on the GRACIS master drive for projects (or GRACIS systems, subprojects or list types).

The names of the lists are defined uniquely by the project, the GRACIS system and subproject ID and the list type and list ID.

The lists are organized in a hierarchical tree structure with 5 levels.

- Level 0 - Project management (PJ)
- Level 1 - GRACIS system management (GS)
- Level 2 - Subproject management (TP)
- Level 3 - List type management (PBL, DPL, TXL, MDL, GSL)
- Level 4 - List management

A table of contents is assigned to each level for management of the objects.

You can use the functions of the project management to

1. copy, load, save or delete the lists of the various management levels.
2. structure your configuring by creating new projects, GRACIS systems and subprojects.

All of the lists are stored on the master drive in the \GRALST directory. This directory contains a directory structure corresponding to the 5 levels of the list system. In each subdirectory GRACIS creates a table of contents for the following level.

GRACIS lists can only be deleted, copied and loaded using the management functions, as the table of contents must be updated to include new lists and exclude deleted lists. GRACIS lists may not be copied with the FlexOS or DOS "copy" command or deleted with the "del" command. Changes in the \GRALST directory made without the management functions destroy the list directory.

CAUTION

Changes to the C:\GRALST directory may only be made using the GRACIS management functions.
Otherwise loss of data will result!!!

If you save lists on the GRACIS diskette drive, you will find an identical structure on the back-up diskette.

If data is lost on the master drive (e.g. after a hard disk set-up), the standard path with parameters PJ001, GS001, TP001 is automatically restored on system start-up.
A table of contents is assigned to each level for management of the objects.

The address of a list is composed of a path name, ID and name. Process display list PBL002 in project PJ020, in GRACIS system GS001, in subproject TP001 has the following identification:

<table>
<thead>
<tr>
<th>F1 Elem.type</th>
<th>F2 Elem.fct.</th>
<th>F3 Disp.</th>
<th>F4 Wrk. window</th>
<th>F5 Open</th>
<th>F7 GRACIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proc. disp. PJ: 020 GS: 001 TP: 001 No: 002 Name: Sensor overview</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Path name  Display list ID  Display name
3.1.2 Overview of the Project Management Menu

3.1.2.1 Operation (F1)

- **Project contents (GRACIS system, subproject or list type)**
  You switch to the next level down in the hierarchy of the selected project (or GRACIS system, subproject or list type). You can also switch down one level using the mouse by positioning the mouse cursor on a check box and activating it by double-clicking. The directory of this level is displayed.

- **Change ID**
  The window for the ID dialog of the selected project (or GRACIS system, subproject or list) is opened.

  The following information is displayed: ID, name, size in bytes, date created, date of last change, number of subdirectories configured (GRACIS systems, subprojects, list types or lists), user ID of the person who created it and the user ID of the last person to change it. You can change the ID and the name of the project (or GRACIS system, subproject or list).

- **New project (or new GRACIS system or subproject)**
  The window for the ID dialog is opened. The information is the same as for the menu item *Change ID*. You can enter the name of the new project (or GRACIS system or subproject). When you save the dialog, a new project (or GRACIS system or subproject) is created.

- **Delete**
  Deletes the selected projects, GRACIS systems, subprojects or lists. Existing subdirectories (GRACIS systems or subprojects or list types) and lists are also deleted. It is not possible to restore deleted directories.

- **Project active (or GRACIS system active)**
  The selected project (or GRACIS system) is activated for HPF process control. Only one project can be active at a time. When you activate another project (or GRACIS system), the system reboots. The GRACIS system ID is not changed when another project is activated.

- **Default list type**
  You switch directly from the project level to the directory of the list types where you last worked.

3.1.2.2 Management (F2)

- **Copy**
  The selected objects are copied from the source drive to the target drive. Lists are not overwritten during copying. If a list already exists on the target drive, the ID dialog appears. The first free list number is entered. You can accept or change the number.

- **Save**
  The selected objects are saved from the source drive to the target drive. The master drive cannot be used as the target drive. Existing lists are overwritten.
• **Load**  
The selected objects are loaded from the source drive to the target drive. The master drive cannot be used as the source drive. Existing lists are overwritten.

• **Document**  
The data configured for the selected objects can be output to a printer or file for plant documentation purposes.  
A detailed description is provided in the section entitled *List Documentation*.

• **Mark all**  
All lines in the directory are selected. The functions of the other menu items are performed on the selected directories or files.

• **Cancel marking**  
Terminates group-oriented manipulation. All selections are cancelled.

• **Select source**  
Selects the source drive for all functions.

The following drives are available:

- The master drive is the hard disk on the GRACIS PG/PC.

- The system drive is always exclusively a data source from where lists can be copied or loaded.  
The following lists are stored on the system drive in project 1, GRACIS system 2 when GRACIS LPF is delivered:

  Subproject 1: ✦ Main display for GRACIS process control
  Subproject 254: ✦ Service module displays and texts
  Subproject 255: ✦ GRAPH 5 diagnostics displays and texts

You must copy the complete subproject 255 into your GRACIS system. These system displays and system texts are always required for process control.  
Subproject 254 contains the displays and texts for the service module and GRAPH 5 diagnostics. You only need to copy these displays and texts into your GRACIS system if you want to use the GRAPH 5 diagnostics or service module functions.

- Diskette drive A, diskette drive B

- GRACIS master drive via GRATRANS is not relevant to GRACIS LPR.

- Diskette drive A via GRATRANS is not relevant to GRACIS LPR.

When you have selected the drive, a window appears with the contents of the drive.

• **Select target**  
Selects the target drive for all functions.  
The available drives are the same as for *Select source*, with the exception of the system drive. When you have selected the drive, a window appears with the contents of the drive.
3.1.2.3 Sort (F3)

- **by ID**
  All objects of the directory are sorted in ascending order of IDs.

- **by date/time**
  All objects of the directory are sorted according to the date and time of the last change.

- **by list name**
  All objects of the directory are sorted alphabetically according to list names.

3.1.2.4 GRACIS (F7)

- **Info**
  The actual version of the software is displayed.

- **Level up F9**
  You exit the level where you are presently working and return to the previous level.

- **Project level**
  You exit the level where you are presently working and return straight to the project level.

3.1.3 Management Functions

3.1.3.1 Copy, Save and Load

<table>
<thead>
<tr>
<th>F1 Project operation</th>
<th>F2 Management</th>
<th>F3 Sort</th>
<th>F7 GRACIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Save</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Document</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mark all</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancel marking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select source</td>
<td></td>
<td></td>
<td>Master drive GRACIS</td>
</tr>
<tr>
<td>Sel. target</td>
<td></td>
<td></td>
<td>GRACIS system drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Diskette drive GRACIS A=fd0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Diskette drive GRACIS B=fd1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GRACIS master drive via GRATRANS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Diskette drive A via GRATRANS</td>
</tr>
</tbody>
</table>

When you choose the Select source menu item, a pop-up menu appears with a list of possible source drives for selection.

A window is displayed with the contents of the selected drive. In this window, you can use the F1 ... menu functions to switch to any management level and select the projects, GRACIS systems, subprojects or lists which are to be copied, loaded or saved.

The second step is to specify the target drive. The GRACIS master drive is the default setting. When you have selected the target drive, the file directory of the drive is displayed. The diskette drives can only be used when a formatted diskette is in the drive.
If the path selected in the source drive directory exists on the target drive, the system switches automatically to the same management level as on the source drive.

The list IDs are retained when you save and load projects, GRACIS systems, subprojects or lists. If lists with these IDs already exist on the target drive, they are overwritten. All other lists remain intact.

You can select the destination on the target directory to which the GRACIS systems, subprojects or lists are to be copied. To do this, you must change to a management level containing the list to be copied.

When you have selected the target drive, switch back to the window with the directory of the source drive. The functions can only be activated from there. Now click the window of the source drive or press the key combination `CTRL-W` to activate the window of the source drive.

When you copy, load or save projects, GRACIS systems and subprojects, all subdirectories and lists are also copied.

When you load the current project/GRACIS system, the system parameter list is also loaded. Since other system parameters may be defined here, you should reboot the system.

### 3.1.3.2 Change ID

The following example illustrates how to change the IDs of projects, GRACIS systems, subprojects and lists.

In the project directory, select the project whose ID is to be changed.

Now select the Change ID menu item in the F1 Project operation menu. The window for the project ID dialog appears.

You can change the ID and name of the project. GRACIS checks that the project ID is unique. If the ID is already in use, the message Entry already exists is displayed and the last valid value is entered again in the input box.

You can assign any name to the project.
3.2 System Parameterization (SPL) for the Configuring Station

System parameterization is the procedure used to adapt GRACIS to a project-specific automation environment. For GRACIS LPF, the system parameters must only be defined for the response during configuring. All parameters linked to process variables are irrelevant. The parameters for process display processing refer exclusively to process simulation mode, which you can use to test the configured displays.
The system parameterization dialog is opened automatically following a new installation of GRACIS. You can set the system parameters for the current project/GRACIS system with the System parameterization menu item.

To change the system parameters for any project/GRACIS system, switch to the subproject level of another project/GRACIS system by selecting the Project management menu item in the F2 Management menu. In the subproject level, select the system parameter list (SPL) and then activate the System parameterization function in the F2 Management menu.

Since configuring does not have to be performed on the device used for subsequent process control, the entries in the system parameter list are not verified when created.

When you have changed the current system parameter list and saved the changes, GRACIS is rebooted.

If GRACIS can no longer be booted on a PG/PC when the current system parameter list has been changed, you can regain access to the GRACIS system by deleting the file C:\MCL.SPL. Following a warm start, you can access the operating system level by logging in as a user other than GRACIS. Now delete the file C:\MCL.SPL and log in again as the user "GRACIS".

### 3.2.1 Peripheral Interfaces

**Screen resolution:**

<table>
<thead>
<tr>
<th>Screen resolution</th>
<th>640 * 480</th>
<th>1280 * 1024</th>
</tr>
</thead>
</table>

The standard screen resolution is 640 * 480 pixels. The high resolution is presently only available on a GRACIS PG programming device with the CP-GRAPH card.

GRACIS performs a coordinate transformation during the configuring of process display lists. The displays are stored in a coordinate system which is independent of the screen format (GRACIS World Coordinates). It is therefore not necessary to convert the displays if you change the screen resolution.

**Language:**

<table>
<thead>
<tr>
<th>Sprach/Language/Langue</th>
<th>German</th>
<th>English</th>
<th>French</th>
<th>Italian</th>
<th>Russian</th>
<th>Other</th>
</tr>
</thead>
</table>

If the menus are required in another language, the language setting can be changed. If the text list of the configured foreign languages is not available, the menus appear in German. The standard languages installed on the system are German, English and French. Other languages are a GRACIS option and must be ordered separately.
Date/time:

The date and time are displayed and can be changed when the Continue button is activated. If you only change the date and/or time during system parameterization, GRACIS is not restarted when you save the changes.

Input device:

You can activate a mouse as an input device for configuring and process control. You cannot use a light pen on a GRACIS PG/PC.

Process display processing with mouse or light pen is not relevant to GRACIS LPF.

Current project/system:

This screen displays the project and GRACIS system to which the system parameter list is assigned. When the Continue button is activated, a list selection menu is opened from which you can select a GRACIS system.

You should only enter another ID if you want to use the same the parameters in another project or GRACIS system, because the original system parameter list is overwritten when the new one is saved.

Data requests:

Not relevant to GRACIS LPR.

CP S5 interface:

Not relevant to GRACIS LPR.
PG interface:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud rate</td>
<td>9600</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
</tr>
<tr>
<td>No. of data bits</td>
<td>8</td>
</tr>
<tr>
<td>No. of stop bits</td>
<td>1</td>
</tr>
</tbody>
</table>

The lists are transferred to an OP 30-SM/CP 470 via the serial interface. On the OP 30-SM/CP 470, the settings for the transmission speed and the data frame are permanent. The interface parameters must be set as below for data communication to take place.

Serial link active:

- Serial link active
- With GRATRANS link: GRACIS slave
- Load 3964R driver on system start-up: Yes

The lists are transferred to the OP 30-SM/CP 470 with the GRATRANS data back-up program. Activate the menu item for this function and enter GRACIS slave for the GRATRANS link.

Start-up procedure

- Start-up proc.
- Mandatory start-up on date/time input

The Mandatory start-up on date/time input always opens the input dialog for the time when the system is started up. This function allows the time to be synchronized on every restart.

Lower system priorities

You should not activate this function for GRACIS LPR.

Error log

The error log is not relevant to GRACIS LPR and should only be set to Error.

GRACIS system hotkeys enabled

The GRACIS system hotkeys are not relevant to GRACIS LPR.
Printer parameterization

You can use a printer during configuring for the list documentation and for hardcopies.

When you activate the Continue button in the Printer parameterization menu item, a dialog appears in which you can specify the number of printers connected (the maximum is 2). If you exit the input box with the arrow keys, the dialog is extended with the printer parameters for one or two printers. You can set the parameters for the printer type, interface and paper size on both printers.

![Printer parameterization dialog]

You can connect two printers to the GRACIS PG/PC. One is operated on the serial interface and the other on the parallel interface.

![Printer type options]

You must set the transmission speed and the data frame for the serial interface in accordance with the connected printer. The dialog is extended to allow you to enter the transmission speed, parity and the data and stop bits. The parameters must match the settings on the printer.

Hardcopy active

A colour hardcopy feature allows you to print the displays for high-quality documentation. You can activate the hardcopy function during list configuring by pressing the Print key. Hardcopies are always output on printer 1 and can only be printer on the GRACIS printer.
### 3.2.2 Software Response

There are various start-up routines, according to the parameters you set for the system.

- **Process display processing**

  When you activate the *Process display processing* Continue button, a dialog is opened for setting the process display simulation parameters. When you have opened the process display processing menu, the dialog is extended.

If you activate *Branch directly to process display processing on start-up*, process control is loaded in the foreground and configuring runs in the background following system start-up. You can switch to the background program with CTRL+ or CTRL-.

You can define the initial display to appear at the start of process control. The project ID is entered automatically in accordance with the project selected in the *Current project node/system ID* dialog item. You can enter the IDs for the GRACIS system, subproject and display number directly or select one from the list.

**No other functions are relevant to GRACIS LPR.**
3.4 Save/Load Options/Data

You can use this menu to:

- Load options (languages etc.)
- Delete, copy and rename GRACIS list documents (GCOMXXX.DOK; path:\GLISTDOK\......)
- The error log is not relevant to GRACIS LPF
- The external data block is not relevant to GRACIS LPF
- The data tables are not relevant to GRACIS LPF
- The service module display blocks are not relevant to GRACIS LPF
- The local database is not relevant to GRACIS LPF

3.4.1 Data (F1)

Selecting a menu item from the *F1 Data* menu displays the menu for data management. A window is opened with the contents of the source drive and a second window shows the contents of the target drive. GRACIS automatically opens the master drive with the default paths as the source drive.
To copy files or directories, you must define the source and target drives.

The files or directory selected in the source drive window are copied into the same directory on the target drive.

If the same subdirectories do not exist on the target drive, they are automatically created. If the files already exist on the target drive, they are overwritten.

To delete files, you must define the source drive where the files are to be deleted. All of the selected files or the selected directory are deleted.

<table>
<thead>
<tr>
<th>F1 Directory</th>
<th>F2 Management</th>
<th>F3 File</th>
<th>F7 GRACIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directory contents</td>
<td>Mark all files</td>
<td>Delete file</td>
<td>Info</td>
</tr>
<tr>
<td>New directory</td>
<td>Cancel marking</td>
<td>Rename file</td>
<td>Level up</td>
</tr>
<tr>
<td>Delete directory</td>
<td>Select source</td>
<td>Copy file</td>
<td></td>
</tr>
<tr>
<td>Copy directory</td>
<td>Select target</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Directory F1**
  - Directory contents
    - Displays the contents of the selected directory.
  - Delete directory
    - Deletes the directory selected in the source drive window.
  - Copy directory
    - Copies the directory selected in the source drive window onto the target drive.

- **Directory F2**
  - Mark all files
    - Selects all files in the active window.
  - Cancel marking
    - Clears all selections.
  - Select source
    - You can select a local drive as the source.

Activating the Continue button opens a further dialog where you can select a drive. The GRACIS drives via GRATRANS are not relevant to GRACIS LPF.
Select drive

Symbolic drive name | Bytes free | Size
--- | --- | ---
GRACIS master drive | 2711552 | 33400832
GRACIS hard drive | 8351744 | 27772928
GRACIS diskette drive | 867328 | 1457664
GRACIS diskette drive | 0 | 0
GRACIS slave | 518144 | 521216
GRACIS system | 2711552 | 33400832
RAM drive | 518144 | 521216
SRTL drive | 2711552 | 33400832

All of the drives available on the GRACIS system are displayed and the current source drive is indicated by a check mark. To define another source drive, select the activation button in front of the drive and save the setting with Accept. The system returns to the "Device" dialog.

When you accept the "Device" dialog, GRACIS scans the drive contents of the selected device and enters them in the source drive window.

- Select target
  The procedure for selecting the target is the same as for the source.

- **File F3**
  - Delete file
    Deletes all of the files selected in the source drive window.
  - Copy file
    Copies all files selected on the source drive onto the target drive.

- **GRACIS F7**
  - Info
    Displays the current software version.
  - Level up
    Brings you to the next directory up in the active drive window.
    If the source drive window is active and you are in the root directory, the system returns to the main menu.

### 3.4.1.1 List Documentation

GRACIS allows you to create documentation of your configured GRACIS lists. You can output the documentation in files and save or delete the files with this menu item.

To save or delete the files, select the master drive as the source.

All of the GRACIS list documents are stored on the master drive in the \GLISTDOK\ directory.
3.4.2 Options (F2)

3.4.2.1 Load Options

To delete or load an option you need the installation file for the option. Options are always deleted from and loaded onto the master drive.

Selecting the menu opens a window with the contents of the source drive. Only files with the .OPT extension are displayed in the file directory.

- **Directory F1**
  - Directory contents
    Displays the contents of the selected directory.

- **Management F2**
  - Mark all files
    Selects all files in the active window.
  - Cancel marking
    Clears all selections.
  - Select source
    You can select a local drive on the GRACIS PG/PC as the source.

- **F3 File**
  - Load options
    All of the options selected in the source drive window are loaded onto the master drive. Before loading the options, GRACIS checks that sufficient capacity is available on the master drive. If there is insufficient free capacity, the loading process is cancelled.
  - Delete options
    Deletes all selected options from the master drive.
4 Process Displays

4.1 Editing the Process Displays .............................................. 4-3
  4.1.1 Process Display List Selection ..................................... 4-3
  4.1.2 Creating a New Process Display ................................. 4-5

4.2 Overview of Process Display Configuring ......................... 4-9
  4.2.1 Element Type (F1) ......................................................... 4-11
  4.2.2 Element Function (F2) .................................................. 4-11
  4.2.3 Display (F3) ................................................................. 4-14
  4.2.4 Work Window (F4) ....................................................... 4-15
  4.2.5 Open (F5) ................................................................. 4-15
  4.2.6 GRACIS (F7) ............................................................... 4-16

4.3 General Remarks on Display Elements .............................. 4-17
  4.3.1 Selecting an Element ................................................... 4-17
  4.3.2 Dialog for Elements ..................................................... 4-18
    4.3.2.1 Display Levels ....................................................... 4-18
    4.3.2.2 Line Thickness and Line Style ................................. 4-19
    4.3.2.3 Fill Pattern and Colours ........................................ 4-19
    4.3.2.4 X and Y Position ................................................... 4-19
    4.3.2.5 Scaling ................................................................. 4-19

4.4 Display Element Types .................................................... 4-20
  4.4.1 Full Graphics Elements ............................................... 4-20
  4.4.2 V-Field (Variable Field) ............................................. 4-23
    4.4.2.1 V-Field Dialog ..................................................... 4-24
  4.4.3 Bars ............................................................................ 4-30
    4.4.3.1 Bar Dialog ........................................................... 4-31
  4.4.4 Curves ........................................................................ 4-33
    4.4.4.1 Display of Process Data Recorded in Blocks ............... 4-33
    4.4.4.2 Display of Individual Process Data ......................... 4-33
    4.4.4.3 Curve Dialog ....................................................... 4-34
4.4.4.4 Structure of the Data Areas on the S5 PLC ..........................4-40
4.4.5 Text Field ..............................................................................4-41
4.4.5.1 Text Field Dialog ...............................................................4-42
4.4.6 Message Text Field .................................................................4-43
4.4.6.1 Message Text Field Dialog .................................................4-43
4.4.6.2 Display of the Message Text Field ......................................4-43
4.4.6.3 Overview of Text Processing ..............................................4-45
4.4.6.4 Table Management ............................................................4-47
4.4.6.5 Table Selection .................................................................4-47
4.4.6.6 Table Processing ...............................................................4-47
4.4.7 Message Field ........................................................................4-50
4.4.8 Active Field ..........................................................................4-50
4.4.8.1 Active Field Dialog ............................................................4-51
4.4.9 Element Network .................................................................4-55
4.4.9.1 Element Network Dialog ....................................................4-55
4.4.10 V-Field Group .................................................................4-56
4.4.10.1 V-Field Group Dialog ........................................................4-58

4.5 Data Source ..............................................................................4-60
4.5.1 Data Source Dialog ..............................................................4-60
4.5.2 Direct Input of the Data Source ............................................4-62

4.6 Dynamic Action ........................................................................4-63
4.6.1 Change Foreground Colour ..................................................4-64
4.6.2 Reveal and Hide, Enable/Disable ..........................................4-64
4.6.2.1 Revealing and Hiding Elements ...........................................4-64
4.6.2.2 Enabling/Disabling Active Fields ..........................................4-65
4.6.3 F/B-colour via Table .............................................................4-65
4.6.3.1 Index .....................................................................................4-65
4.6.3.2 Bit Address ...........................................................................4-66
4.6.4 Change 0% and 100% Bar Value ..........................................4-66
4.6.5 Change V-Field Lower Limit, Upper Limit .............................4-66
Plant displays are composed of graphical elements. These are full-graphics elements (straight lines, polygons, rectangles, triangles, circles, arcs and pie slices), variables fields, bars, curves, text fields, message text fields, message fields, active fields, element networks and V-field groups. All graphical elements can be modified dynamically. The parameters for the interfaces to the process and the dynamic action of the display elements are defined when the display is configured.

You work interactively with the system and you enter the definitions in dialog boxes. The dialogs are, in most cases, longer than the dialog window. The parts of the dialog which are hidden at first are surrounded by a dotted line in the manual. You can scroll the screen to reveal these parts of the dialog by moving the slider or operating the arrow keys.

4.1 Editing the Process Displays

When you start GRACIS, the main menu automatically appears.

4.1.1 Process Display List Selection

Select the Proc. disp. menu item in the F1 Configuring menu. A directory of the displays appears. You are located in the project, GRACIS system and subproject in which you last worked, in the Process display lists list type.

Select the display you wish to edit from this directory or create a new display.

© Siemens AG1999 All Rights Reserved
GRACIS (LPF Configuring Guide)
F1 List selection

- **Display (double-click on the check box)**
  The selected list is displayed on the screen and can now be configured or modified.

- **New (ALT-N)**
  Creates a new list.

- **Change ID**
  Opens the ID dialog for the selected list. You can now change the ID.

- **Enter ID**
  This function is only active when you select the list manager from another dialog box. The ID of the selected list is entered in the dialog box. An example use of this feature is when you want to configure an active field in a process display for controlling the display sequence.

- **Contents (double-click on the check box)**
  When you change subproject, GRACIS system or project, you can select a subproject, GRACIS system or project and change down one level. It is not possible to change list types at this point. If you are located in the list level, this menu item is dimmed and cannot be selected.

- **Change subproject**
  You can change subproject within a GRACIS system.

- **Change GRACIS system**
  You can change GRACIS system within a project.

- **Change project**
  You can change project completely.

- **Abandon selection**
  This function is only active when you select the list manager from another dialog box. The list which was previously entered in the dialog box is retained.

F3 Sort

- **by ID**
  All of the lists in the directory are sorted in ascending order of ID.

- **by date/time**
  All of the lists in the directory are sorted according to the date and time of the last change.

- **by list name**
  All of the lists in the directory are sorted alphabetically according to list names.
F7 GRACIS

- Info
  The actual version of the software is displayed.

- Level up (F9)
  You exit process display list editing and return to the main menu.

### 4.1.2 Creating a New Process Display

Select the *New* menu item from the *F1 List selection* menu. The system branches to the ID dialog of the process display.

The process display is assigned to the project, GRACIS system and subproject which is active for configuring.

The project, system and subproject ID appear as a header in the dialog.

![F1 List selection F3 Sort F7 GRACIS](image)

Enter the number and name of the display in the *List ID dialog* process display and save the settings with the RETURN key.

The configuring window opens automatically and the process display dialog is initiated.
The background colour is the main colour of the display. All parts of the display which are not covered by a display element or its fill pattern appear in the background colour.

The box for the *No. of elements* indicates the total number of elements which have already been configured in this display.

When you activate the *Element sums* Continue button, the number of individual graphics elements already configured in this display appear.

The permissible acquisition time frame appears in a pop-up menu which you select using the Continue button. All of the data in the display are updated according to this time frame. The following time frames are available:

- 100 ms
- 500 ms
- 1 sec
- 5 sec
- 10 sec
- 30 sec
- 1 min
- 5 min
- 10 min
- 30 min

The list ID is a unique identifier for the process display and is entered by GRACIS.

You can use the *Backgrnd pattern* function to wallpaper your process display. You can select the wallpaper by activating the *Fill pattern* Continue button. The wallpaper pattern is always displayed in the selected colour on a white background.
Grid

The grid is used as an aid for positioning display elements. The mouse trap function must be activated for alignment to the gridlines.

The dot interval specifies the distance in pixels between two dots on the grid. The line interval is the factor by which the dot interval is multiplied. The lines of the grid are then drawn at a distance of the dot interval * line interval. The grid is not displayed during process control.

Operating order

The order of the elements operable during process control (V-fields, active fields message fields and message text fields), can be controlled automatically or configured by the user.

With the automatic setting, the cursor is positioned in the first input V-field when the display is opened. When the cursor is advanced to the next element type (with CTRL-N), it is positioned on the first active field, followed by the first message text field and then the first message field.

It is not possible to configure which field is the "first". To position the cursor in a specific field when the display is opened, you must configure the operating order.

If you select Order Parameteriz. the dialog is extended and you can choose the element type to be selected by the cursor when the process display is opened. To position the cursor on a specific field, you must enter the number of the field next to the field type in the subsequent lines of the dialog.

In the other boxes you can define the field to which the cursor jumps when you change elements (CTRL-N).

The field number can also be entered with the aid of the Continue buttons. When you activate a Continue button, the dialog disappears and you can select an element. Pressing the RETURN key enters the field number in the input box.
The user display ID is a fixed-point number between 0 and 65535. This ID is not verified by GRACIS for uniqueness and can be chosen freely.

If you activate User display ID to controller, the user display ID is written to the configured address when the display is opened.

Activating the Transfer list ID function causes the GRACIS list ID to be transferred in addition to the GRACIS list ID. The list ID is written directly after the user display ID and has the following structure.

- **Active system**: Number of the system in which the process display appears.
- **Network**: Always 1.
- **Project**: Number of the active project.
- **System**: Number of the system in which the process display was configured.
- **Subproject**: Number of the subproject in which the process display was configured.
- **List type 1**: Always 11.
- **List type 2**: Always 10.
- **List number**: Number of the process display list.
4.2 Overview of Process Display Configuring

The GRACIS configuring system enters the display elements that you create, together with their attributes, in the process display list.

The definition of a display element is divided into:

- The basic definition of the graphics
  - Element type
  - Position created or interpolation points
  - Size (scaling factor, height/width)
  - Display level
  - Colour attributes (foreground/background colour)
  - Other attributes (line style/thickness, fill pattern)
- Process interface (depends on element type)
  - Data source/target on the SIMATIC S5 PLC
  - Data format (binary, decimal, ASCII, etc.)
  - Data length (bit, byte, word)

- Dynamic action
  - Reveal/hide status
  - F/B-colour via table

Each dynamic attribute has its own process interface. These process interfaces are independent of each other and of the process interface of the display element.

<table>
<thead>
<tr>
<th>F1 Elem. type</th>
<th>F2 Elem.fct.</th>
<th>F3 Disp.</th>
<th>F4 Wrk. window</th>
<th>F5 Open</th>
<th>F7 GRACIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol</td>
<td>Mark</td>
<td>N</td>
<td>Position</td>
<td>Proc. disp.</td>
<td>Info</td>
</tr>
<tr>
<td>Full graph.</td>
<td>New</td>
<td>N</td>
<td>Level</td>
<td></td>
<td>Level up F9</td>
</tr>
<tr>
<td>F-field</td>
<td>Dialog</td>
<td>O</td>
<td>Size</td>
<td></td>
<td>Insert on</td>
</tr>
<tr>
<td>Bars</td>
<td>Copy</td>
<td>C</td>
<td>Change window</td>
<td></td>
<td>Delete field</td>
</tr>
<tr>
<td>Curves</td>
<td>Move</td>
<td>M</td>
<td>Mouse trap on</td>
<td></td>
<td>Del. character</td>
</tr>
<tr>
<td>Text field</td>
<td>Mark all</td>
<td></td>
<td>Disp./param.</td>
<td></td>
<td>Cancel undo</td>
</tr>
<tr>
<td>Msg txt field</td>
<td>Cancel marking</td>
<td></td>
<td>N</td>
<td></td>
<td>Type sel. &quot;AND&quot;</td>
</tr>
<tr>
<td>Msg field</td>
<td>Close element</td>
<td></td>
<td>W</td>
<td></td>
<td>Config. mode ...</td>
</tr>
<tr>
<td>Act. field</td>
<td>Change operation</td>
<td>W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window</td>
<td>Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elem.network</td>
<td>Special functions</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V field group</td>
<td>Undo</td>
<td>U</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delete</td>
<td>K</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You can make selections in the menu using either the keyboard or the mouse. Key combinations (hot keys) are available for the immediate execution of commonly used functions. The hotkey is displayed in the menu next to the command. The diamond stands for the ALT key and the caret (^) stands for the CTRL key.

To control the menu with the keyboard, press the function key assigned to the menu item you wish to select.

When you use the mouse, a drop-down menu appears as soon as you position the mouse cursor in the menu bar. The selected function is highlighted by a bar and is executed when you click the mouse button.
4.2.1 Element Type (F1)

Select *F1 Element type* to specify the type of element you will edit next. The selected element type is identified by a wedge in the drop-down menu. The element type is deselected by selecting it again.

You can select one or several element types according to the setting of the *Type select "AND" or "OR"* menu item in the *F7 GRACIS* drop-down menu.

Selecting an element type causes the first element of this type to be highlighted by the element cursor.

4.2.2 Element Function (F2)

- **Mark (CTRL-N)**
  The element underneath the element cursor is selected. You can cancel the selection by reselecting each element individually or by activating *Cancel marking* (all selections). You can use the mouse to select an element by positioning the mouse cursor on the element and pressing the mouse button.

- **New (ALT-N)**
  Creates a new element. The attributes are assigned the default values. The dialog window for the new element is automatically opened.

- **Dialog (ALT-O, double-click on element)**
  The dialog window of the selected element is opened. The attributes of the element can now be changed.

- **Copy (ALT-C)**
  The selected element or elements are copied. If you select one or more elements in the active work window and then change to another work window, you can copy the selected elements into the second window. To copy from one work window to another, you can also select one or more elements and drag them into the other window with the mouse. The elements in the original work window are retained and copies are created in the new window. If you copy elements which have references to other elements in the process display, the references are not copied with the elements. For example, if you copy an active field which hides another element, this function is not copied when you copy the active field.

- **Move (ALT-M)**
  When this function is activated, you can move the selected element pixel by pixel with the arrow keys. Hold down the *SHIFT* key while pressing the arrow keys (on the numeric keypad) to move the element in larger steps. You can move a selected element with the mouse by positioning the mouse cursor in the centre of the selected element and dragging the mouse cursor to the desired point while keeping the mouse button depressed. If several elements are selected, all of the elements are moved together. If you move the elements into another work window with the mouse, the selected elements remain in their old positions and copies are created in the new work window. During the move operation, the message line displays the position and size of the elements in pixels.

- **Mark all**
  All elements of the element type selected in the *F1 Element types* menu item are selected. If no element type is selected in the menu, all of the elements are selected. The functions of the other menu items are applied to the selected elements.
• **Cancel marking**
  Terminates the manipulation of elements in groups. All selections are cancelled.

• **Size**
  Selected full graphics elements and active fields can be magnified or reduced in size pixel-by-pixel using the arrow keys. Holding down the SHIFT key while operating the arrow keys (on the numeric keypad) magnifies or reduces the size of the element in larger steps.

  You can magnify or reduce the size of a selected element with the mouse by positioning the mouse cursor on the bottom right-hand corner of the selected elements, holding down the mouse button and setting the desired size with the mouse cursor.

  If several full-graphic elements are selected, all of the selected elements are magnified or reduced in size together.

  During magnification or contraction, the position and size of the elements are specified in the message line.

• **Special functions (CTRL-P)**
  To use the special functions, you must first select the elements to which the special functions refer.

  The individual special functions:
  
  – **None:**
    Choose *None* if you don’t want to select any of the special functions. The pop-up menu is subsequently closed.

  – **Foreground colour:**
    The *Foreground colour* dialog appears.

    You can select the new foreground colour in the selection box. You can also enter the colour number directly. All of the selected elements are subsequently displayed in the new foreground colour.
- **Background colour:**
The procedure for changing the background colour is identical to that of the foreground colour.

- **Multiple copying:**
The *Multiple copying* dialog appears.

<table>
<thead>
<tr>
<th>Multiple copying</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number</th>
<th>X offset to origin</th>
<th>Y offset to origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

*Number* defines the number of copies of the selected elements which are generated. The copies are created on the screen with the specified offset.

- **Align:**
The following pop-up menu appears.

<table>
<thead>
<tr>
<th>Align</th>
</tr>
</thead>
<tbody>
<tr>
<td>No alignment</td>
</tr>
<tr>
<td>Left-aligned</td>
</tr>
<tr>
<td>Right-aligned</td>
</tr>
<tr>
<td>Top</td>
</tr>
<tr>
<td>Bottom</td>
</tr>
<tr>
<td>X-centred</td>
</tr>
<tr>
<td>Y-centred</td>
</tr>
<tr>
<td>X+Y-centred</td>
</tr>
</tbody>
</table>

The selected elements are aligned, according to the menu selection, within the rectangle surrounding all of the elements.
Format:
When the dialog is accepted, all of the selected elements are aligned according to the settings in the dialog. The selected element positioned farthest to the left determines the origin for the X offset. The origin for the Y offset is the highest element selected. If elements are in the same position, they are formatted in the order in which they were configured.

- Undo (ALT-U)
The last deletion operation is reversed.

- Delete (ALT-K)
The selected element or elements are deleted. It is only possible to restore them with Undo.

4.2.3 Display (F3)

- Display attributes
The process display dialog is opened again. You can now change all the attributes of the process display, such as the background colour, window updating time, grid and user display ID.

- Level
Enables the display levels for the elements of the display. The enabled levels are indicated by a wedge. Elements which do not belong to an enabled display level are not displayed on the screen during configuring. This selection has no effect on process control (see the section entitled Display level).

- Hardcopy
Outputs the contents of the screen to the connected printer (GRACIS printer).

- Grid on/Grid off
Activates and deactivates the grid for the display. The spacing of the grid dots can be configured in the display dialog.

- Mouse trap on/Mouse trap off
When the mouse trap is activated, the origin can only be positioned on the configured grid dots when you move elements with the mouse or the arrow keys. When the mouse trap is deactivated, the display elements can be positioned anywhere, independently of the grid.
• Display/parameter (CTRL-B)
  Changes from work mode to control mode. In control mode, the display is output completely without a frame as it appears later during process control. To switch back to work mode, either press the ESC key or reactivate CTRL-B.

• Save
  The list currently being edited is saved and you can continue with configuring.

• Close (ALT-L)
  When two work windows are open, this function can be used to close the active work window.

4.2.4 Work Window (F4)

• Position
  The position of the active work window can be changed pixel by pixel with the arrow keys. Holding down the SHIFT key while pressing the arrow keys (on the numeric keypad) moves the window in steps of 20 pixels. The active work window can be moved with the mouse by positioning the mouse cursor in the header of the window and dragging it while keeping the mouse button depressed.

• Size
  You can magnify or reduce the size of the active work window pixel by pixel using the arrow keys. Holding down the SHIFT key while pressing the arrow keys (on the numeric keypad) magnifies or reduces the size of the window in steps of 20 pixels. The active work window can be magnified or contracted with the mouse by positioning the mouse cursor in the right-hand bottom corner of the window and dragging it while keeping the mouse button depressed.

• Change windows (CRRTL-W)
  This function is used to change between two work windows. Selecting the function always activates the inactive window and deactivates the active window. To change windows with the mouse, simply position the mouse cursor anywhere in the window you want to activate and press the mouse button.

4.2.5 Open (F5)

• Process display
  When you select this function, a directory appears with the process display lists of the subproject in which you are currently located. You can now select and display any other process display or create a new one. A maximum of two work windows can be open at the same time.

  A second window is opened with the selected process display. Both windows are displayed, but only one window is ever active. The active window appears in the foreground and covers the inactive window if the two windows overlap. All functions are executed in the active window.
4.2.6 GRACIS (F7)

- **Info**
  Displays the actual version of the software.

- **Level up (F9)**
  Exits display configuring. Before you exit the display, you are prompted to save or discard the display.

- **Insert on/Insert off**
  Changes between insert mode and overwrite mode when you are editing texts. You can also use the INSERT key to switch mode. In overwrite mode, the cursor appears as an underscore (_) and in insert mode it takes the form of a vertical bar (|).

- **Delete field**
  Deletes the entire contents of the input box in which the cursor is positioned.

- **Delete character**
  Deletes the character underneath the cursor (overwrite mode) or the character to the right of the cursor (insert mode). You can also use the DEL key.

- **Cancel undo**
  You can use this function to delete the buffer in which the elements are saved when deleted. The memory area used for this buffer is made available for other purposes. You can no longer undo deletion operations.

  The size of the undo buffer is displayed graphically on the screen. To see the graphic, you must move your work window downwards.

  ![Size of buffer](image)

- **Type selection “AND”**
  You can define how the selection of the element types is made.

  "OR": Selecting an element type causes the last selected type to be deactivated. Only one element type is active.

  "AND": All element types remain active until they are deselected by reselecting them. Several element types can be active at the same time. The last selected type is highlighted by the cursor.

  This setting is required in order to select several elements of different types with the arrow keys.
4.3 General Remarks on Display Elements

4.3.1 Selecting an Element

First select the element type if you want to create a new display element or edit an existing one. You select the element from the F1 Element type menu. In this menu you can also see which element type is currently selected. The selected element type is highlighted by a wedge. Selecting the element type again deselects it.

For full graphics elements, a submenu appears from which you can select the full graphics element.

An element type must be selected before you can configure a new display element.

When you have selected an element type, the first element of this type is highlighted by the element cursor. You can use the arrow keys to move the element cursor across the elements of the selected element type.

You can use the Mark menu item of the F2 Element function menu or CTRL-N to select the element underneath the element cursor. You can also select several elements consecutively. Selected elements are highlighted by the graphics cursor.

You can move, copy or delete elements selected with the graphics cursor. The dialog is only initiated if only one element is selected.

If you are using the mouse and want to edit an existing element, you can select the element with the mouse without first selecting an element type. Position the mouse cursor on an element and click the element. The element is selected (graphics cursor). To select several elements, you can either click the elements with the mouse or hold down the mouse button and surround several elements with the 'rubber band'. You can edit the selected elements in the same way as elements selected with the arrow keys.

You can also open the dialog for an element by double-clicking the element with the mouse.

Tip:

If you position an element outside the visible area of the screen you can no longer select it with the mouse. Use the element cursor to select an element hidden in this way.
4.3.2 Dialog for Elements

A dialog window appears when you create a new display element or select the element dialog. All the attributes of the element are described and can be changed in the dialog window.

- Position of the element
- Input of X,Y coordinates
- Display level
- Foreground and background colour and frame and surface colour
- Scaling factor
- Other attributes such as line thickness, line style, text offset, etc.
- Dynamic definitions
  - Change F/B-colour via table
  - Reveal/hide status

The following limit values should be observed for all elements.

<table>
<thead>
<tr>
<th>Screen resolution</th>
<th>640 / 480</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position X</td>
<td>0 - 639</td>
</tr>
<tr>
<td>Position Y</td>
<td>0 - 479</td>
</tr>
<tr>
<td>Colour</td>
<td>0-7</td>
</tr>
<tr>
<td>Scaling</td>
<td>1-4</td>
</tr>
<tr>
<td>Line thickness</td>
<td>1,3,5,7</td>
</tr>
<tr>
<td>Height</td>
<td>1 - 640</td>
</tr>
<tr>
<td>Width</td>
<td>1 - 480</td>
</tr>
<tr>
<td>Radius</td>
<td>1 - 320</td>
</tr>
</tbody>
</table>

4.3.2.1 Display Levels

The number of the display level controls the overlapping. A display level can be assigned to each display element. Level 1 is the top level, level 15 is the bottom level.
If elements of the same display level overlap, the most recently configured element appears on top of the other elements.

You should use the display levels in order to ensure clear configuration of overlapping display elements. The *Levels* menu item is a useful feature that allows you to hide all the elements of one or more display levels. The hidden elements are no longer displayed and you can now edit the uncovered elements conveniently.

### 4.3.2.2 Line Thickness and Line Style

You can select the line thickness and the line style for straight line, polygon, rectangle, triangle, circle and arc display elements. You can surround the window, text field, message field, bar, V-field and message text field elements by a frame with a line thickness of your choice.

- The line thickness is specified in pixels - the line thickness settings are 1, 3, 5 and 7.
- The line style can only be changed when the line thickness is 1.

Continuous, dashed, dotted and dash-dot line styles are available.

### 4.3.2.3 Fill Pattern and Colours

16 fill patterns are available. The background of the fill pattern is always white.

You can colour in the lines of an element as well as the surface. The F-colour is the colour of the lines or text. The B-colour is the colour of the surface fill pattern. You can only enter one colour for elements which do not surround an area (such as straight lines and arcs).

### 4.3.2.4 X and Y Position

The position of each element and its size (height and width or radius) are specified in pixels. The origin of all the display elements, except for bars, is located in the top left-hand corner. The origin of a vertical bar is on the left-hand side of the zero line and the origin of a horizontal bar is at the top of the zero line.

### 4.3.2.5 Scaling

The character set can be displayed in the scale factors of 1, 2, 3 and 4.
4.4 Display Element Types

4.4.1 Full Graphics Elements

Full graphics elements are elements which can be configured freely on the basis of standard geometrical shapes. The following full graphics elements are available:

- Straight line
- Polygon
- Rectangle
- Triangle
- Circle
- Arc
- Pie slice

You can define the display level, the line shape, the colour, the fill pattern and the dynamic attributes for each full graphics element.

**Straight line**

![Examples of straight lines](image)

The position and shape of the straight line is described by its X/Y position and X2/Y2 position.

**Polygon**

![Examples of polygons](image)

The position and shape of the polygon is described by the number and X/Y position of the interpolation points. Up to 250 interpolation points can be defined for a polygon. To define the interpolation points, you can use either the Select with mouse function or the interpolation point table.
**Select with mouse**

When you activate the *Select with mouse* function the dialog disappears and you can now position the interpolation points anywhere in the process display by clicking the desired points. Following selection of the Continue button, the element cursor is positioned at the end of the polygon. The position of the interpolation point is displayed at the element cursor.

You can use the key combinations CTRL-X (forwards) and CTRL-E (back) to position the element cursor on the individual interpolation points.

- **Move**
  To move an interpolation point, position the element cursor on the interpolation point that you wish to move. You can now move the interpolation point either with the arrow keys or by dragging the mouse.

- **Insert**
  To insert an interpolation point, position the element cursor on the interpolation point after which the new interpolation point is to be inserted. Now position the mouse cursor at the point where the new interpolation point is to appear. Click the mouse to create the new interpolation point. When using the keyboard, the same operation is performed using the key combination ALT N. The new interpolation point is now inserted at the default position. You can now move the new interpolation point as described above.

- **Delete**
  To delete an interpolation point, use the key combinations CTRL-X and CTRL-E to position the element cursor on the interpolation point which is to be deleted. Press the DEL key to delete the interpolation point.

**Interpolation point table**

First you must specify the probable number of interpolation points in the interpolation point table in order to configure their position. After creating a polygon with the mouse, you can change it with the interpolation point table. Similarly, you can use the mouse to change a polygon created with the interpolation point table.

**Rectangle**

The position and shape of the rectangle is described by its X/Y position, width and height. If you would like to frame the rectangle, select the *Framing* selection box. The dialog for configuring the lines subsequently appears.
**Triangle**

![Examples of triangles](image)

The position and shape of the triangle is described by the X/Y position of the three corner points.

**Circle**

![Examples of circles](image)

The position and size of the circle is described by the X/Y position of the centre point and the radius.

**Arc**

![Examples of arcs](image)

The position and shape of the arc is described by the X/Y position of the centre point, the radius and the start and end angle. The arc describes the path between the start and end angle in anticlockwise direction. The angle with value zero is located to the right of the circle centre point.
Pie slice

The position and shape of the pie slice is described by the X/Y position of the centre point, the radius and the start and end angle. The pie slice describes the path between the start and end angle in anticlockwise direction. The angle with value zero is located to the right of the circle centre point. A line cannot be configured for a pie slice.

4.4.2 V-Field (Variable Field)

A V-field is a rectangular area of the display in which numerical values and ASCII characters can be input or output. The date and time are also output in addition to numerical values and ASCII characters.

The position of the V-field is described by the X and Y position. The display level, the colour of the text (F-colour) and the background and the field scaling can also be defined in the dialog box.

The following section explains the V-field type. The special features of input/output fields and date/time output fields are described in the subsequent section.
4.4.2.1 V-Field Dialog

If the Hidden when opened function is activated, the V-field is not displayed at first when the process display is opened. Only by revealing the V-field dynamically can it become visible in process control mode.

The size of the V-field depends on the number of digits. You can, however, configure the field scaling irrespective of this. You can configure the field scaling to be symmetrical or selectable.

With symmetrical field scaling, you enter the offset in pixels. The V-field is now magnified by this number of pixels to the right, left, above and below the values. The value therefore always appears in the center of the V-field.

With selectable field scaling you can configure the size of the X and Y offset in pixels, in addition to the height and width of the V-field. You can also define whether the values are to be displayed right or left-aligned or centred. It is now up to you to size the V-field correctly and to resize it if, for example, more digits are to be displayed.
Frame

You can configure a frame around the V-field. The frame thickness is specified in pixels.

Leading zeros

If you select the *Leading zeros* function, the digit positions in all values to be input or output are filled with zeros up to the configured number of places. 
(e.g.: KM-number 0000 0001)

V-field type

The V-field type defines whether process values are to be input or output or whether the date and time are to be output in the field. The entire function of the field and the subsequent dialog depend on this parameter.

Field ID

You must assign a field ID to the V-fields. The ID is unique to a process display and is either entered by you or automatically assigned by GRACIS. You use the V-field ID to:

- transmit a feedback message to the SIMATIC S5 PLC when the entry in the V-field is complete.
- configure cursor jumps. You can set up your own customized operating sequence with the aid of cursor jumps.
- position the cursor on a specific field when the process display is opened.
- If you activate the *Operator info to PLC* in the LPF system parameters, this ID is transferred to the PLC whenever the cursor is positioned in this field.
Data type

The data type is the representation format for the data. The volume of data which the system has to process depends on the data type and the data length. This determines the maximum number of digits for the individual data types.

<table>
<thead>
<tr>
<th>Data type</th>
<th>Max. no. of digits</th>
<th>Value range</th>
<th>Size in bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitmap</td>
<td>32</td>
<td>0 to FFF FFF FFF FFF</td>
<td>4</td>
</tr>
<tr>
<td>Hex value</td>
<td>16</td>
<td>0 to $10^{16}$ -1</td>
<td>8</td>
</tr>
<tr>
<td>BCD absolute value</td>
<td>16</td>
<td>0 to $2^{32}$ -1</td>
<td>8</td>
</tr>
<tr>
<td>BCD fixed-point value</td>
<td>15</td>
<td>$-10^{15}$ +1 to $10^{15}$ -1</td>
<td>8</td>
</tr>
<tr>
<td>Binary absolute value</td>
<td>10</td>
<td>0 to $2^{31}$ -1</td>
<td>4</td>
</tr>
<tr>
<td>Binary fixed-point value</td>
<td>10</td>
<td>$-2^{31}$ +1 to $2^{31}$ -1</td>
<td>4</td>
</tr>
<tr>
<td>S5 KY format</td>
<td>4</td>
<td>2 digits from 0 to FF</td>
<td>2</td>
</tr>
<tr>
<td>ASCII</td>
<td>120</td>
<td>1 byte/character</td>
<td></td>
</tr>
</tbody>
</table>

You can configure the number of digits within the maximum number of places.

Complete data words are always transferred to the data block when data words are used for input fields. Bytes are transferred for I, O and F.

For example, with a single-digit hexadecimal value you can specify whether the value is to be entered in the right byte (Rbyte) or left byte (Lbyte) of the data word, but the other data byte is overwritten with 00.

Default values

The assignment of default values is only possible for process data which use a maximum of two words. The default value is entered in the input V-field if a configured lower or upper limit is exceeded on an input. The default value is accepted when the RETURN key is pressed and it is entered in the configured data interface.

Limit monitoring

An upper and a lower limit can be configured for limit monitoring. Only process values using a maximum of 4 bytes can be monitored. Limit monitoring can be performed for both input fields and output fields. A colour change can be configured for cases when the configured limit value is violated in input and output fields.
The Display lower limit and Display upper limit functions write a 1 to the configured process interface when a limit value is violated. The Display reset function resets the value to zero when the violation no longer applies. The display of a limit value violation can be performed for upper and lower limits in different data interfaces.

When a limit violation occurs in an input field, the default value can also be entered in the V-field. The Accept default menu item is not available for output fields.

V-field data interface

If V-field data interface is not activated, GRACIS does not request any process data.

Please refer to the section entitled Setting the Parameters for the Data Source for a detailed description of addressing.

• V-field input and input/output types

The following section describes the special features of the input and input/output V-field types compared with the output V-field type.

The Parameterize V-field ID is identical with the output V-field type.
**Next fields**

During process control, an input or input/output field can be selected in various ways. A determining factor is whether you have configured the next fields. If no next fields are configured, the following conditions apply to cursor movements. Message fields, message text fields and active fields are also included in the cursor control.

- **Fields which are surrounded by other fields:**
  - Element cursor **Up** means that the cursor jumps to the field with the same X coordinate and a smaller Y coordinate.
  - Element cursor **Down** means that the cursor jumps to the field with the same X coordinate and a larger Y coordinate.
  - Element cursor **Left** means that the cursor jumps to the field with the same Y coordinate and a smaller X coordinate.
  - Element cursor **Right** means that the cursor jumps to the field with the same Y coordinate and a larger X coordinate.

- **Fields in the top line:**
  - Element cursor **Up** causes the cursor to jump to the **lowest** line and search for the next field to the left.

- **Fields in the bottom line:**
  - Element cursor **Down** causes the cursor to jump to the **top** line and search for the next field to the right.

- **Fields on the left border:**
  - Element cursor **Left** causes the cursor to jump to the **right** border and search for the next field down.

- **Fields on the right border:**
  - Element cursor **Right** causes the cursor to jump to the **left** border and search for the next field up.

- **Fields in the top left corner:**
  - Element cursor **Up** or **Left** advances you to the field located to the **bottom right** (highest X, Y coordinates).

- **Fields in the bottom right corner:**
  - Element cursor **Down** or **Right** advances you to the field located to the **top left** (lowest X, Y coordinates).

If you configure next fields, the element cursor control keys cause the cursor to jump from the present field to the configured fields. You can assign each of the four element cursor control keys to a next field. If the next field does not exist or if the field ID is the same, the cursor does not move.

If you configure next fields, all of the V-fields in the display must be included in the cursor control. V-fields which are not configured as a next field cannot be operated.
Accept value

GRACIS accepts data input, i.e. it writes the input to the configured interface, when the RETURN key is pressed during process control. Activation of the Accept when input complete function causes the process value to be accepted as soon as you have entered the number of characters configured for the V-field. Activation of the Accept when cursor up/down function causes the input to be accepted when you leave the V-field by operating the arrow keys.

Cursor control

With cursor control using the arrow keys, the cursor can only be positioned on the next input V-field using the arrow keys. With Automatic, the cursor is positioned on the next input V-field using the arrow keys or the RETURN key.

With Automatic cursor control, you can define a next field to which the cursor jumps when an input is accepted. If you do not configure a next field, the cursor jumps without a next field in the same way as when you press the 'Down' element cursor key.

If a V-field, which is included in the cursor control, is hidden during process control, the cursor control is interrupted and the following fields can no longer be selected.

When the Skip removed field function is used, the cursor control is not interrupted even when the V-fields are hidden. During process control, GRACIS checks which field was selected from the hidden field and moves the cursor to this field.

Field attributes

Input without echo means that the entered characters are replaced by "*" characters. You can use this function to set up your own password via the SIMATIC S5 PLC.

Delete on new input has the effect of deleting the old entry from a V-field when you enter the first character in the field. For example, if you enter a three-digit number in a field with 5 digits, you do not have to delete the remaining digits separately.

Key switch is a security feature. You can only enter data in a field configured with the key switch when the key switch bit status is true (1 with positive logic, 0 with negative logic). The key switch address is configured in the system parameters.

The configured V-field ID is transferred to the address configured here when the input is complete.
•  **Year, month, day, hour, minute and second V-field type**

The following dialog box appears when you select the year, month, day, hour, minute and second *V-field type*.

 Aside from the V-field ID, you can only configure the dynamic dialog. The number of digits is fixed at two. This value is therefore output in an info field.

### 4.4.3 Bars

A bar is a rectangular area of the display which changes length according to a process value. The bar can be divided into several zones. When the value exceeds or falls below the levels represented by these zones, the bar or zone changes colour.

An upper and lower limit must be defined for the bar. The display of the bar is linear within these limits.

The resolution of the bar depends on the ratio of the size of the bar on the screen to the physical value. The smallest unit which can be displayed on the screen is one pixel.

For example:

The fluctuations in the level of a 500 litre tank are to be displayed in the form of a bar of 200 pixels in height. The display is to represent the range between 100 and 500 litres. The total display range is therefore 400 l. With a length of 200 pixels, 2 litres are represented by one pixel. Changes of under 2 litres in the value cannot be read from the bar.
4.4.3.1 Bar Dialog

Bar representation

You can configure the bar either in the colour of the zones or in the colour of the surface. This setting has no effect on process control.

The 100% display is the background which is visible behind the bar for as long as the bar has not reached its full value. The background is displayed in the configured area colour. With Frame+area a frame with a configurable colour and width is drawn around the bar.

You can assign a vertical (from top-to-bottom or bottom-to-top) or horizontal (right-to-left or left-to-right) bar direction.

Bar arms

Each bar can have either a positive, a negative or a positive and negative arm.

- With a positive bar arm, the direction of growth is to the right or top. The 0% value must be smaller than the 100% value.
- With a negative bar arm, the direction of growth is to the left or bottom. The 0% value must be larger than the 100% value.
- With a positive and negative bar arm, the bar grows from the 0% value upwards if the process value is greater than the 0% value and downwards if the process value is less than the 0% value.

You can configure positive and negative values for 0%, 100% and -100%.

Colour change

You can choose between two options as a reaction to reaching the zone limit values.

With the Bar colour change, the colour of the bar changes along its entire length up to the actual value when the zone limit value is reached. With Zone colour change, the colour only changes above the zone limit value. The zones of the bar are displayed beside or on top of each other in the different colours.

The values for defining the zone limits are always specified in percent.
You can configure the number of zones (up to 16), their initial value (zone limit value) and the zone colour for both the positive and the negative bar arm.

The volume of data which the system has to process depends on the data type and the data length. This determines the maximum number of digits for the individual data types.

<table>
<thead>
<tr>
<th>Data type</th>
<th>Max. digits</th>
<th>Value range</th>
<th>Size in bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hex value</td>
<td>8</td>
<td>0 to FFFF_FFFF</td>
<td>4</td>
</tr>
<tr>
<td>BCD absolute value</td>
<td>8</td>
<td>0 to 10^8 -1</td>
<td>4</td>
</tr>
<tr>
<td>Binary absolute value</td>
<td>10</td>
<td>0 to 2^{32} -1</td>
<td>4</td>
</tr>
<tr>
<td>BCD fixed-point value</td>
<td>7</td>
<td>-10^7 +1 to 10^7 -1</td>
<td>4</td>
</tr>
<tr>
<td>Binary fixed-point value</td>
<td>10</td>
<td>-2^{31} +1 to 2^{31} -1</td>
<td>4</td>
</tr>
</tbody>
</table>

You can configure the number of digits within the maximum number of places.

The data source is the process interface to the SIMATIC S5 PLC whose contents determine the growth of the bar. Please refer to the section entitled Data Source for a detailed description of addressing.

The 0% value must always be smaller than the 100% value. All values can be positive or negative. The 0%, 100% and -100% value can be changed dynamically.
4.4.4 Curves

Curves can be used for the analog display of process values. In contrast to bars, they provide information not only on the actual value of a process variable, but on an entire range and trend of values.

You can use two types of curves, each of which is tailored to a different type of problem:

- **Static curves** e.g. for representing limit curves
- **Dynamic curves** e.g. for recording process data

There are two variants of the dynamic curve:
- Display of process data recorded in blocks
- Display of individual process values

You can define the following dynamic axes according to your needs:
- X axis, e.g. for plotting a curve against time
- Y axis

4.4.4.1 Display of Process Data Recorded in Blocks

It is possible to represent a configured number of process values graphically using this type of curve. The process values are acquired and stored by the programmable controller. The GRACIS system requests the process values in blocks according to the configured update time frame and displays them in characteristic curves. These curves can display high-speed measurements accurately without time distortion, because the cycle time of the programmable controller is decoupled from the cycle time of GRACIS.

4.4.4.2 Display of Individual Process Data

With this variant, the system requests only individual values from the programmable controller according to the configured update time frame. The curve is generated and the values are stored on the GRACIS system.

Several types of representation are possible with cyclical process value requests:

- A recorder function, where the most recently requested process value is appended to the end of the curve.
- A replacement function, where the process values are always replaced from the smallest to the largest interpolation point. When the last interpolation point is reached, the replacement recommences with the first interpolation point.
- A replacement function where the programmable controller must transfer the number of the interpolation point where each process value is to be entered.
### 4.4.4.3 Curve Dialog

In order to display curves, the curve window must first be defined. Up to 5 curves can then be configured in the curve window.

You can configure a frame thickness from 1 to 7 pixels. The frame is displayed within the defined window. This reduces the size of the window pane where the curves appear by an amount equal to the width of the frame.

A list of the curves which you can configure is displayed in accordance with the number of curves (up to 5). Curves which are not configured are assigned default values and are not displayed during process control.

The curve ID is not evaluated on GRACIS LPF.

When you configure curves, each change in parameter is displayed. The parameters for static curves are entered; a standard function is used for the display of dynamic curves.

---

**Positioning the curves:**

The curve origin within the curve window is determined by the X and Y offset and the curve height and width. You use the height and width to define the size of the background on which the curve is visible. This background can be moved with the aid of the X and Y offset. The X offset moves the curve background from the origin of the curve window to the right. The Y offset moves the curve background from the origin of the curve window downwards. The origin of the curve background and the curve window are both located in the top left corner. The origin of the curve, however, is located in the bottom left corner of the curve background.
The maximum value is 639 for the X offset and 439 for the Y offset. If the curve window has a frame, you should set the offset at least as large as the frame width, because the curve section under the frame is otherwise not displayed.

**Characteristic representation**

The curve is represented as a *polyline*.

You can configure each axis of the curve as a static or dynamic line.

**Static curves**

If you select both axes as static (X/Y stat), all of the menu items for defining the process link are hidden and you simply configure the points of your curve in an interpolation point list. These curves do not change when the process is running and they can be used, for example, to display limit curves.
You use the curve height and width to define the window pane where the curve is displayed.

The settings in the interpolation point table are initialized with an interpolation point interval of 1. You can configure up to 250 interpolation points.

**Dynamic curves**

When configuring dynamic axes (X, Y-Dyn) there are two options for the process link.

**Blockwise updating**

With blockwise updating, the process values are transferred from the programmable controller and entered in the curve window according to the configured update time frame. The programmable controller handles the set-up and storage of the curves. The GRACIS system is used for the graphical display of the curve. You can record any characteristic with blockwise updating.

The link to the programmable controller uses a data area which must contain the same amount of process values as the number of configured interpolation points.
Individual value updating

With individual value updating the link to the programmable controller uses a data area containing the process value and an interpolation point number depending on the configuration. The data area is polled by the GRACIS system and updated by the programmable controller independently of the GRACIS cycle.

When the process values are updated individually, there are various ways of configuring them.

Recorder function

With the recorder function, the requested process value is entered, starting with the first interpolation point, and the new value is entered for the following interpolation point on each GRACIS update cycle. When the end of the curve has been reached, all of the recorded process values are shifted by one interpolation point and the new value is entered at the end of the curve. The oldest value is discarded.
Replacement function

You have the choice between four variants of the replacement function.

1. Without curve jump, without interpolation point number

The process values are entered in the curve starting with the first interpolation point. On each GRACIS cycle, the new value is entered for the following interpolation point. When the last interpolation point has been reached, the old process values are replaced by the new ones starting with the first curve point.

2. Without curve jump, with interpolation point number

The selection with interpolation point number enables you to change the values at certain interpolation points of the curve. To do this, the programmable controller must transfer first the interpolation point number and then the process value. The curve is always plotted with the interpolation points for which values have been received. It is only possible to plot a curve when at least two points have been received.
3. With curve jump, without interpolation point number

In this variant, the received process value is inserted in the curve along with the existing values and only transferred as a single interpolation point in the next cycle. This produces a vertical edge on a dynamic Y axis and a horizontal edge on a dynamic X axis each time the value at an interpolation point changes.

The link to the programmable controller uses a data area containing the interpolation point number followed immediately by the process value.

The window pane in which the curve appears is defined by the number of interpolation points multiplied by the length of the sections for the static axis and a fixed value for the dynamic axis. The values may not exceed 640 for the X axis and 480 for the Y axis.

You can configure the data type and the process link for the dynamic axis. If you do not enter a process value source, the curve is not displayed during process control.
The volume of data which the system has to process depends on the data type and the data length. This determines the maximum number of digits for the individual data types.

<table>
<thead>
<tr>
<th>Data type</th>
<th>Max. no. of digits</th>
<th>Value range</th>
<th>Size in bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hex value</td>
<td>8</td>
<td>0 to FFFF FFFF</td>
<td>4</td>
</tr>
<tr>
<td>BCD absolute value</td>
<td>8</td>
<td>0 to 10^8 -1</td>
<td>4</td>
</tr>
<tr>
<td>Binary absolute value</td>
<td>10</td>
<td>0 to 2^32 -1</td>
<td>4</td>
</tr>
<tr>
<td>BCD fixed-point value</td>
<td>7</td>
<td>-10^7 to 10^7 -1</td>
<td>4</td>
</tr>
<tr>
<td>Binary fixed-point value</td>
<td>10</td>
<td>-2^31 to 2^31 -1</td>
<td>4</td>
</tr>
</tbody>
</table>

You can configure the number of digits within the maximum number of places.

The configured byte or word is the base byte or base word for the data area in which the process values are stored.

Please refer to the section entitled Data Source for a detailed description of addressing.

4.4.4.4 Structure of the Data Areas on the S5 PLC

The size of the data area that you have to reserve depends on several parameters:

- The data type and the number of digits
- The type of updating: blockwise or individual

The data type and its number of digits determine the size of data area required for a process value.

\[ \text{e.g.: } \begin{array}{|c|c|c|} \hline \text{Data type} & \text{No. of digits} & \text{Required capacity} \\ \hline \text{Hex value} & 2 & 1 \text{ byte} \\ \text{Hex value} & 4 & 2 \text{ bytes} = 1 \text{ word} \\ \text{Hex value} & 8 & 4 \text{ bytes} = 2 \text{ words} \\ \hline \end{array} \]

Blockwise updating

With blockwise updating, one process value per interpolation point is transferred for each dynamic axis.

\[ \text{e.g.: } \begin{array}{c} \text{20 interpolation points, hex value with 8 digits:} \\ \text{Required capacity} : 20 \times 2 \text{ words} = 40 \text{ words} \end{array} \]
Addressing: DB 100 DW 1 for X: DB 100 DW 1

<table>
<thead>
<tr>
<th>DW 100</th>
<th>DW 1</th>
<th>Process value 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>DW 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DW 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DW 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DW 39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DW 40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Individual value updating**

With individual value updating without interpolation point, one process value is transferred.

e.g.: Process value 2 words, addressing DB 100 DW 1

<table>
<thead>
<tr>
<th>DB 100</th>
<th>DW 1</th>
<th>Process value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DW 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With individual value updating with interpolation point, the interpolation point must be stored in addition to the process value, requiring one word. The interpolation point is stored first in the data area, followed by the process value.

e.g.: Process value 1 word, addressing DB 100 DW 1

<table>
<thead>
<tr>
<th>DB 100</th>
<th>DW 1</th>
<th>Interpolation point</th>
</tr>
</thead>
<tbody>
<tr>
<td>DW 2</td>
<td></td>
<td>Process value</td>
</tr>
</tbody>
</table>

**4.4.5 Text Field**

A text field is a rectangular area of the display containing a static text. These texts are used to label process displays. They can output headings, help text and other information during process control. The text fields can consist of one or more lines.

**Examples of text fields**

<table>
<thead>
<tr>
<th>XX</th>
<th>TEXT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A20</td>
<td>Information</td>
</tr>
</tbody>
</table>

| Okay |

The position of the text field is described by the X and Y position. The size depends on the number of characters entered and the configured number of lines. You can enter up to 8 lines of 80 characters.
4.4.5.1 Text Field Dialog

When the Hidden when opened function is active, the text field is not displayed at first when the process display is opened. Only by revealing the text field dynamically can it become visible in process control mode.

The size of the text field depends on the number of digits. You can, however, configure the field scaling irrespective of this. You can configure the field scaling to be symmetrical or selectable. With symmetrical field scaling, you enter the offset in pixels. The text field is now magnified by this number of pixels to the right, left, above and below the values. The value therefore always appears in the center of the text field.

With selectable field scaling you can configure the size of the X and Y offset in pixels, in addition to the height and width of the text field. You can also define whether the values are to be displayed right or left-aligned or centred. The alignment always refers to the text offset.

You can configure a frame around the text field. The frame thickness is specified in pixels.

To enter the text, activate the Continue button in the Text input line. The dialog disappears and the message Text field: Terminate text fld input with ACCEPT (select symbol with HOME) appears in the system line.

When you press RETURN, the dialog reappears. When you press the HOME key, a window appears from which you can select characters from the complete symbol set.

When the text input is active, all other functions are blocked until the input is completed (RETURN key) or cancelled (ESC key).

If your text is longer than the displayed text field, the field is expanded automatically unless you have configured selectable field scaling. If this is the case, you must enter the required field width yourself.

Editing functions:

- The DEL key deletes the character underneath the cursor. The text field must contain at least one character. The last character in the field cannot be deleted.

- It is presently not possible to insert characters.

- When you reduce the number of lines in a text field, the lines are deleted from top to bottom.
4.4.6  Message Text Field

You can use message text fields to visualize process states by displaying or changing the attributes of the text. The messages are generated when the state of the process signals changes.

There is no signal edge evaluation and no archiving of the edge change. The message system is used for this function.

You must first configure the texts for the message text field in text lists. Please refer to the section entitled Text lists (TXL) for a detailed description of how to configure the text lists.

Example message text field for displaying a fault

<table>
<thead>
<tr>
<th>No. of pending messages</th>
<th>Display text page up</th>
<th>Display text page down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic field</td>
<td>Dynamic text</td>
<td></td>
</tr>
<tr>
<td>• Foreground colour</td>
<td>• Show top/bottom</td>
<td></td>
</tr>
<tr>
<td>• Background colour</td>
<td>• Text foreground colour</td>
<td></td>
</tr>
<tr>
<td>• Reveal/hide status</td>
<td>• Text background colour</td>
<td></td>
</tr>
</tbody>
</table>

| Oil pressure ->         |
| Max. T1                 |
| Safety door open        |
| Pump defective          |
| Limit switch S10        |

4.4.6.1  Message Text Field Dialog

The parameters for the message text field are divided into the following groups:

- Message text field/display
- Message text field/dynamic action
  Dynamic action of the complete field: reveal/hide, colour changes.
- Text/dynamic action
  Entry of the messages in the message text field. Attribute changes of the messages.

4.4.6.2  Display of the Message Text Field

GRACIS calculates the field width and the field height of the message text field independently. The characters in the message are inhibited from appearing directly on the border of the message text field. If the message uses fewer characters than the number of columns configured, the unused columns are filled with the background colour.
If the configured messages are longer than the number of characters configured for the message text field, the remainder of the text is not displayed. The longest message text should therefore determine the number of columns.

The origin of the message text field selected during configuring is retained even when the field is magnified or is allocated a frame or header.

The size of the message text field depends on the number of lines and columns. You can scale a field irrespective of this, however. You can choose whether the field scaling is symmetrical or selectable. With symmetrical field scaling, you specify the offset in pixels. The message text field is magnified by the specified number of pixels to the right, left, above and below the messages. The messages therefore always appear in the centre of the message text field. Please remember that the basic element of the message text field remains unchanged.

With selectable field scaling you can configure the size of the X and Y offset in pixels, in addition to the height and width of the message text field.

The field area is set according to the configured field width and field height. If the values you configure for the field height and field width are smaller than the default value evaluated by GRACIS, part of your message text is not displayed.

You can configure a frame thickness from 1 to 7 pixels. If you have chosen selectable field scaling, it is up to you to ensure that the field is correctly sized. Please remember that inserting a frame can truncate your text.

When you have configured a frame for your message text field, you can configure a message text field header. If you are working with selectable field scaling, please remember that all of the configured lines may not be visible when you insert a field header.
• The field header

When a trigger condition of a message is fulfilled, the message is entered in an internal message buffer and removed when the condition is not fulfilled. The number of the messages in the message buffer can be displayed.

If more messages are stored in the message buffer than can be displayed in the message text field (number of lines), two arrows appear (display text page up/down).

4.4.6.3 Overview of Text Processing

The following overview diagram provides an insight into the operating principle of the message text field. Both the message text field and the specified text lists must be configured for process control.

You can configure the texts that you wish to display in a message text field in 1 to 115 "message text tables". You can define 1 to 255 texts and their trigger condition in each message text table. The message text tables can only reference texts of defined partner text lists (TXL).

References can only be made to text lists of the same GRACIS system in which the message text field is located.

The trigger condition for displaying a text can be the status of a bit address or the enabling of an index number in a defined data source.
All of the trigger conditions configured in the message text tables are evaluated in process control mode. When a trigger condition is fulfilled, it is entered in an internal text processing buffer and removed again when the condition is not fulfilled.

You can choose between two display modes. Display mode, displays only the messages whose trigger conditions are fulfilled. All of the messages are entered in a text processing buffer in the order of occurrence.

You can configure in the dialog whether the text is to be entered at the start or end of the text processing buffer with Insert text top or bottom.

If more text trigger conditions are fulfilled than can be displayed simultaneously in the message text field, you can use Page up/down to scroll through the configured number of lines or Character left/right to scroll one line up or down when the message text field is selected with the graphics cursor.

Change attributes is available as the second display mode. All of the configured texts are displayed immediately the message text field is opened. A change in the attributes indicates the fulfilment of the trigger condition. You can choose any combination of attributes for the foreground and background colour of the text.

Texts can only be processed in either of the display modes Change attributes or Display but not both.
4.4.6.4 Table Management

All of the texts that you want to output in a message text field must be stored in text lists. You use the table manager to select the text lists that contain the texts you want to display.

To select the text lists, activate the Continue button in the dialog box. GRACIS displays the dialog for table management. Text list 1 of the currently active subproject is specified as the default setting. If you want to assign another text list, enter the list ID or activate the Continue button and select a text list from the list manager.

You can enter other text lists in the manager by pressing the key combination ALT-N or activating the New menu item. GRACIS subsequently displays an extra line.

You can create new entries in the table manager using the key combination ALT-N in the New menu item.

4.4.6.5 Table Selection

To choose a text list created with the table manager, select the desired text list and activate the Accept button.

4.4.6.6 Table Processing

When you have selected a text list, you configure the assignment between the message trigger and the text of this text list in the message text table.

You can use index or bit addressing for the message trigger. Activating the Addressing Continue button displays a pop-up menu from which you can select the type of addressing.

Bit addressing

Select bit addressing. You open the message text table with the Continue button in the Table contents item. When you press the key combination ALT-N or activate the New menu item in the F2 Elem. fct. menu, GRACIS displays an input line.
You must assign a bit address to each message in the input line. GRACIS replaces illegal entries by the old value and displays an error message in the message line.

You will find a detailed description of addressing in the section entitled Data Source.

When you have specified the bit address, you must assign a text from the currently selected text list. When you enter the text number, GRACIS fetches the text from the list and displays it on the screen.

### Table contents

<table>
<thead>
<tr>
<th>Index</th>
<th>Bit address</th>
<th>Text no.</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>K0 CPU1 DB100 D1.0 P</td>
<td>1</td>
<td>Switch 1 defective</td>
</tr>
</tbody>
</table>

If no text line has been configured in the text list with the index you have entered, question marks (???) appear in the text field.

**Index addressing**

Select index addressing. Open the message text table with the Assign: index text Continue button. When you press the key combination ALT-N or activate the New menu item, GRACIS displays an input line.

In the message text table, you assign any text number from the selected text list to an index. GRACIS allocates the indices in ascending order. You cannot edit the index. If you have any gaps in the numbering of the indices you must assign text number 0 to the non-assigned indices.
Example:
Data word 4 of DB 100 contains the feedback signal for the operating mode of a module. The English texts for the operating modes are not stored in ascending order in text list TXL 1. The value of the feedback message (3) is assigned through the table of text number 4 in text list 255.

This variable index text assignment also allows you to

- compensate for offsets in the text numbering and
- combine distributed texts easily.

You open the index addressing dialog with the Index address Continue button. When you press the key combination ALT-N or activate the New menu item, GRACIS displays a new input line.

You can assign multiple data sources to the index. GRACIS combines the data sources using an OR operation. Text 2 Reference travel is displayed if either DW 10 from DB 100, DL 3 from DB 90, DR 200 from DX 10 or flag byte 12 contains the value 2.

The defined addresses can contain different indices. In the message text table in the above example, therefore, 0 to 4 messages can be generated simultaneously.

GRACIS replaces illegal index address entries with the old value and displays an error message in the message line.
4.4.7 Message Field

Message fields are text windows in which messages can be entered by the message system. When a process display containing a message field is opened, the contents of the message buffer belonging to the active message list are output in the message window and updated according to the time frame configured in the message list.

In contrast to message text fields, the texts displayed in the message fields have no dynamic action. The entry and removal of messages in the buffer is controlled exclusively by the message system. The message field is used exclusively as an "output device" for the message system.

Display of the message field is identical to the message text field.

Message field ID

GRACIS assigns a default message field ID automatically. You can change the ID, but each ID must only appear once in a process display list. The message field ID is required

- when configuring the message list for the message field output device parameters.
- for positioning the cursor for opening the display or changing elements.

4.4.8 Active Field

An active field is a display-oriented element which you can use to trigger various actions in or from the display. You trigger these actions during process control by selecting the field. Active fields can be used, for example, for interactive user input via softkeys. You can also configure whether the active field is enabled or disabled during process control. An active field is not visible during process control, however it can be selected with a cursor. The cursor subsequently surrounds the active field.

Example uses of active fields

| Active fields are not visible during process control. |
| They are used for the following actions: |
| **Deselecting the display** |
| **Changing displays** |
| **Transferring constants to the controller** |
| **Triggering or cancelling a report printout** |

An active field can be selected by:

- positioning the cursor on the active field with the arrow keys and pressing the RETURN key, or
- pressing a key (e.g. a function key) or
- controlling it from the PLC.

You can also combine these methods of selection.
4.4.8.1 Active Field Dialog

Field ID

The field ID is required to position the cursor on a specific active field when changing elements. The ID is unique and is automatically assigned a default in ascending order of numbering during configuring.

Methods of selection

You can assign one or more triggering devices to each active field.

- Select using key

The key code is entered as follows:

Activate the key code input using the Continue button. The Continue button is displayed in red and the message Please press required key appears in the system message line. You can use any key on the alphanumeric keyboard, any of the function keys and key combinations with the CTRL or ALT key. The key code is entered in the output box in the dialog box.

You can also enter the key code directly if, for example, you want to use a key which is not available on the configuring station. During process control, the action assigned to the active field is triggered immediately the key is pressed.

- Select with cursor and RETURN

When this function is active, an active field is surrounded by the graphics cursor when selected during process control. The action of the selected active field is triggered by pressing the RETURN key. The active field is selected using the arrow keys (see next fields in the section entitled V-Field).

- Select by controller

The action is triggered when the bit assigned to the active field changes state from false to true (according to the configured logic). If the bit is already true when the display is opened, the action is triggered immediately.

Please refer to the section entitled Data Source for a detailed description.
Actions

The actions that you assign to the active field are executed during process control, not during configuring.

- **Quit display**

  ![Quit disp.(Return funct.)](image)

  Return value: 1

  The sequence of displays that you open during process control is stored in a display stack. Whenever you trigger the action *Quit display*, the system goes back by the number of displays which you have configured (up to 254) and the same number of displays are removed from the display stack. A return value of 255 always changes the system back to the main display and clears the display stack.

- **Change display**

  The action *Change display* removes the current display from the stack and loads and displays the one which is configured. You can determine the next display by entering the list ID directly. Activate the Continue button to open the list selection box. Select the process display list you want to output as the next display and activate *Enter ID* in the F1 menu. The complete ID is now entered in the dialog box.

- **Sequence list selection**

  ![Sequence list selection](image)

  The ID of the sequence list can be selected either directly or with the aid of the list dialog (Continue button). A sequence list should only be selected in conjunction with the display selection of the GRAPH 5 overview process display (TP 254, PBL 253). When the active field is activated, the configured sequence list in the GRAPH 5 diagnostics is processed.

- **Message list selection**

  ![Msg list selection](image)

  The ID of the message list can be selected either directly or with the aid of the list dialog (Continue button). The *Print message list* action prints and subsequently clears the message buffer of the selected message list. This message list must be selected in the LPF system parameters. See the section entitled *Configuring Message Lists*. 
• **Printout list selection**

![Printout list selection diagram]

The ID of the printout list can be selected either directly or with the aid of the list dialog (Continue button). The *Delete printout* action cancels the printout. *Print* updates all of the data in the printout list and outputs the printout immediately on the printer. The printout list must be selected in the LPF system parameters. See the section entitled *Configuring printout lists*.

• **V-field group acknowledgement**

You need the *V-field group acknowledgement* function to inform GRACIS during process control that the input within a V-field group is complete. When the active field is triggered, all the data from the V-fields of the active V-field group in which an input was made are transferred to the configured data target. If you have configured the *Group ID to controller* function, first the data and then the group ID are transferred to the data target. The group ID indicates the validity and end of the transferred data block.

• **Abort V-field group**

The *Abort V-field group* function is used to cancel input within a V-field group. All the new entries in the V-field group are cleared and the old values reentered.

The active fields with the functions *V-field group acknowledgement* and *Abort V-field group* only need to be configured once for each process display and apply to the active V-field group. During process control, a V-field group is activated as soon as GRACIS detects a value change in a V-field in the group. The cursor can then only be moved in the fields of the V-field group.

• **Transfer constant and list ID**

![Transfer constant and list ID diagram]

When the active field is selected, the constant is written to the configured data target. The constant is extended by 8 bytes with the GRACIS list ID when the *Transfer list ID* function is activated.
The list ID is always entered after the next word boundary. For example, if a constant is defined to be 5 bytes long, the list ID is entered in the target data area after the 4th word. Only the subproject and the list number are relevant for the evaluation of the list ID on GRACIS LPF. The other IDs are the same for all active fields.

<table>
<thead>
<tr>
<th>DB100</th>
<th>Left byte</th>
<th>Right byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>DW n</td>
<td>Constants (x words)</td>
<td></td>
</tr>
<tr>
<td>DW n+x</td>
<td>Active system</td>
<td>Network</td>
</tr>
<tr>
<td>DW n+x+1</td>
<td>Project</td>
<td>System</td>
</tr>
<tr>
<td>DW n+x+2</td>
<td>Subproject</td>
<td>List type 1</td>
</tr>
<tr>
<td>DW n+x+3</td>
<td>List type 2</td>
<td>List number</td>
</tr>
</tbody>
</table>

- **Element function**

You can use an active field to reveal, hide or reveal/hide display elements. Only one element function can be assigned to each active field.

**Reveal:** The display elements are revealed when the active field is selected. The display element remains visible until hidden by a dynamic function or another active field.

**Hide:** The display elements are hidden when the active field is selected. The display element remains hidden until revealed by a dynamic function or another active field.

**Reveal/hide:** When the active field is selected, the display elements are revealed if they were hidden and hidden if they were revealed. This process can be repeated any number of times, e.g. to reveal/hide a message text field.

If you have selected an element function, an extra line is displayed in the dialog. The dialog disappears when you activate the Continue button and you can now select the display elements which are to be revealed or hidden by the active field.

- **Key switch**

The operation of the active field is interlocked by the key switch interface configured in the system parameter list.

Example of positive logic:

Key switch = 0, operation/action is disabled,
Key switch = 1, operation/action is possible.
4.4.9 Element Network

An element network is a group comprising up to 255 elements to which dynamic attributes can be assigned. The elements can be displayed anywhere on the screen.

You can combine the following types of elements in a network:

- Full graphics elements
- V-fields
- Bars
- Curves
- Text fields
- Message text fields
- Message fields
- Active fields

Example:

4.4.9.1 Element Network Dialog

The fields for positions X and Y are info fields. They describe the element network origin using the smallest X and Y coordinate of the surrounding rectangle.

Hidden when opened

When this field is active, the element network is hidden when the process display is first opened. Only by revealing the element network dynamically can it become visible in process control mode. The individual elements in the network can, however, be revealed independently of the element network.

Element selection

To select the elements which are to belong to this element network, activate the Continue button. The dialog disappears. Select the individual elements you want to include in the network. GRACIS encloses all of the selected elements in a surrounding rectangle.
If you are using the mouse to configure, you can also "lasso" the desired elements by pressing the left button and dragging the mouse. All permissible elements inside the lasso are subsequently selected. Activate the Accept button to define the element network. The dialog reappears. GRACIS now enters the origin coordinates and the number of elements contained in the network in the dialog box.

An element can belong to one or more element networks.

**Example:** Element 1 and element 2 belong to element network 1  
Element 2 and element 3 belong to element network 2

---

**Dynamic action**

You must take particular care with the dynamic action of the element network. Both individual elements and the network can have dynamic attributes and this can lead to overlapping effects during process control.

**4.4.10 V-Field Group**

You can combine V-fields in groups. The types of V-fields permitted in these groups are

- input and
- input/output.

The aim of this function is to buffer the input data in GRACIS in order to transfer the data to the SIMATIC S5 in one unit with the aid of a group acknowledgement signal. In addition to group acknowledgement, GRACIS also allows you to detect the end of data transmission on the SIMATIC S5 PLC by means of a "group ID". GRACIS appends the group ID to the data transferred to the configured data target.
Example:

When you enter data in V-fields, the data are first buffered by GRACIS. The data are not yet available to the SIMATIC S5 PLC.

When you have finished making the entries in the V-fields, the data are enabled for transfer by an active field (group acknowledgement).

If the data targets are located in different data blocks or if a large amount of data is transferred, the transmission can last for several S5 cycles. It is often necessary to detect the end of the transmission, e.g. in order to prevent mixing of old and new values before the data are processed further. GRACIS provides the Group ID to controller function for this purpose.

When you activate this function, GRACIS appends the V field group ID to the transmitted data. The SIMATIC S5 PLC detects the end of the data transfer by evaluating the ID number.

A field can only ever belong to one V-field group. V-fields can overlap each other on the screen.
4.4.10.1 V-Field Group Dialog

The X and Y coordinates are displayed in info boxes. They describe the smallest X and Y coordinate of the surrounding rectangle that combines the V-fields in a group.

Hidden when opened

When this box is active, the V-field group is hidden when the display is first opened. Only by revealing the group dynamically can it become visible in process control mode. The individual V-fields can, however, be revealed independently of the V-field group.

Element selection

To select the V-fields which are to belong to this group, activate the Continue button. The dialog disappears. Select the individual V-fields you want to include in the group. When you select the second V-field, GRACIS encloses these two fields in a surrounding rectangle. If you attempt to select a V-field which does not match the permissible type, GRACIS displays a message window. If you are using the mouse to configure, you can also “lasso” the desired fields by pressing the left button and dragging the mouse. GRACIS automatically selects all V-fields of the input or input/output type.

Activate the Accept button to include the selected V-fields in the group Press the ESC key to cancel the group definition. When you return to the dialog, GRACIS displays the number of elements within this group.

Group ID to controller

When you activate this function, GRACIS appends the V field group ID to the data transmitted to the selected data target.

<table>
<thead>
<tr>
<th>Group ID to controller</th>
<th>Addressing</th>
<th>Address. type</th>
<th>CPU</th>
<th>Block number</th>
<th>DW</th>
<th>Param. type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct</td>
<td>DB</td>
<td>1</td>
<td>100</td>
<td>1</td>
<td>Word</td>
</tr>
</tbody>
</table>
V-field group acknowledgement and abort V-field group

When you have configured one or more V-field groups, you must configure an active field for their acknowledgement.

The active field dialog contains the following actions:

![V-field group acknowledgement and abort V-field group](image)

You need the V-field group acknowledgement function to inform GRACIS during process control that the input within a V-field group is complete. The data are subsequently transferred to the configured data target. If you have configured the Group ID to controller function, first the data and then the group ID are transferred to the data target on group acknowledgement.

The Abort V-field group function is used to cancel input within a V-field group. All the entries to the V-field group are cleared and the old values reentered.

The active fields with the functions V-field group acknowledgement and Abort V-field group only need to be configured once for each process display and apply to the active V-field group. During process control, a V-field group is activated as soon as GRACIS detects a value change in a V-field in the group. The cursor can then only be moved in the fields of the V-field group.

You must configure an active field for the V-field group acknowledgement and Abort V-field group functions for V-field groups in a process display.

Otherwise it is not possible to operate the V-field group during process control.

Dynamic action

You must take particular care with the dynamic action of the V-field group. Both individual elements and groups can have dynamic attributes and this can lead to overlapping effects during process control. The dynamic actions assigned to the individual fields are not cancelled when you change the settings for the whole group.
4.5 Data Source

When you configure the data sources you have free access to all data blocks, flags, inputs and outputs. However, you should take the following points into consideration to ensure fast updating of the data:

1. When transferring data from the SIMATIC S5 PLC to GRACIS, only data of the same data type can be transmitted at the same time.
2. The volume of data that can be transmitted in a cycle is limited to a specific amount.

The data are always requested and updated for the active process display. You can maximize the speed of data updating if you only access data of the same S5 data type within a process display.

4.5.1 Data Source Dialog

| Specification type, addressing | Only **Direct** is possible for the specification type and addressing. With direct addressing, the physical address of the data source is always specified in the dialog. |
| Addressing type | The following addressing types are available: |
| • DW from data block (DB) of the S5-CPU | • Outputs of the S5-CPU |
| • DW from extended data block (DX) of the S5-CPU | • Counters of the S5-CPU |
| • Flags of the S5-CPU | • Timers of the S5-CPU |
| Parameter type | The parameter type depends on the number of data to be transferred and indicates whether the data is accessed in words or bytes. |
| Flags, inputs and outputs can be addressed in bytes or words. With all other types of addressing the data access uses words. |
| The parameter type is entered automatically by GRACIS. If only one byte is required in a word access, you can choose the right or left byte. | The data are always transferred in bytes or words, depending on the parameter type. |

With the parameter types Bit<byte, Bit<word, Lbyte<word and Rbyte<word, the unused bits or bytes are overwritten with 0 when data are written.

Nodes

The node number is not evaluated by GRACIS LPF.
CPU
GRACIS LPR only evaluates the CPU number in conjunction with the CP 470 module. The CPU number is ignored with the OP 30-SM.

Up to 4 CPUs can be installed in the S5-135U and S5-155U programmable controllers (multiprocessor operation). Each CPU has its own data area, flag area and I/O area. It is therefore necessary to specify the CPU number. In monoprocessor mode, the number of the CPU is always 1.

Block number
The block number must always be specified for data blocks. The possible address area is listed in the table at the end of this section.

Address
The address is a word or byte address, depending on the parameter type. In data areas over one word in length, the address is the starting address of the data area.

With addressing types on a grey background, the unused bits or the unused byte is set to "0" on writing.

<table>
<thead>
<tr>
<th>Address. type</th>
<th>Description</th>
<th>Address. type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB-D</td>
<td>Data word bit</td>
<td>DB-D</td>
<td>Data word bit</td>
</tr>
<tr>
<td>DB-DL</td>
<td>Data word left byte</td>
<td>DB-DL</td>
<td>Data word left byte</td>
</tr>
<tr>
<td>DB-DR</td>
<td>Data word right byte</td>
<td>DB-DR</td>
<td>Data word right byte</td>
</tr>
<tr>
<td>DB-DW</td>
<td>Data word</td>
<td>DB-DW</td>
<td>Data word</td>
</tr>
<tr>
<td>M</td>
<td>Flag bit</td>
<td>A</td>
<td>Output bit</td>
</tr>
<tr>
<td>MB</td>
<td>Flag byte</td>
<td>AB</td>
<td>Output byte</td>
</tr>
<tr>
<td>MW</td>
<td>Flag word</td>
<td>AW</td>
<td>Output word</td>
</tr>
<tr>
<td>E</td>
<td>Input bit</td>
<td>TW</td>
<td>Timer word</td>
</tr>
<tr>
<td>EB</td>
<td>Input byte</td>
<td>ZW</td>
<td>Counter word</td>
</tr>
<tr>
<td>EW</td>
<td>Input word</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The data of timers and counters can only be read from the SIMATIC S5 PLC, not written.

Example: process one bit
Byte is specified as the parameter type for flags, inputs and outputs; the address is then a byte address. Lbyte<word or Rbyte<word, i.e. word addressing, is specified for all other addressing types. The address is then a word address. The whole byte or word is transferred when data are read or written. When writing data, the unused bits are set to 0 before the data transfer.
4.5.2 Direct Input of the Data Source

When setting the system parameters and assigning indices to message text fields, you must enter the data interface directly. GRACIS verifies the syntax of the input. When the syntax is incorrect, the input is cancelled and the old setting is displayed again.

**Bit addressing**

<table>
<thead>
<tr>
<th>K0</th>
<th>CPU 1</th>
<th>DB 100 D1.1</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network node number irrelevant to GRACIS LPF</td>
<td>CPU number for multiprocessing on PLC. CPU number always 1 for monoprocessing 1..4</td>
<td>Data source of the trigger condition</td>
<td>Positive or negative logic</td>
</tr>
<tr>
<td>0..255</td>
<td></td>
<td>Bit address</td>
<td></td>
</tr>
</tbody>
</table>

Syntax for bit addressing

- **Input**: E xxx.y
- **Output**: A xxx.y
- **Flag**: M xxx.y
- **Data block**: DB zzz D xxxx.y
- **Extended DB**: DX zzz D xxxx.y

**Byte word addressing**

<table>
<thead>
<tr>
<th>K0</th>
<th>CPU 1</th>
<th>DB 100 D1.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network node number irrelevant to GRACIS LPF</td>
<td>CPU number for multiprocessing on PLC. CPU number always 1 for monoprocessing 1..4</td>
<td>Data source of the trigger condition</td>
</tr>
<tr>
<td>0..255</td>
<td></td>
<td>Byte address</td>
</tr>
</tbody>
</table>

Syntax for byte addressing

- **Input**: EB xxx, EW xxx, MB xxx, MW xxx, Data block DB zzz DL xxx, DB zzz DR xxx, DB zzz DW xxx
- **Output**: AB xxx, AW xxx, Timer TW xxx, Counter ZW xxx, Extended DB DX zzz DL xxx, DX zzz DR xxx, DX zzz DW xxx

The possible values for x,y,z and v depend on the PLC.
4.6 Dynamic Action

Select the Continue button in the Dynamic dialog line to set the parameters for the dynamic process display attributes.

The dynamic action of a display element is controlled using data sources. A data source must be defined in the dynamic dialog for each dynamic attribute. When you have selected the activation button for a dynamic attribute, several lines are added to the dialog. These lines allow you to define the data source (see the section entitled Data Source).

Each display element can be controlled dynamically. The following table shows which parameter types are used for the individual dynamic functions and which element types you can use to execute the individual dynamic functions.
4.6.1 Change Foreground Colour

This function is used to change the foreground colour of curves dynamically during process control. The SIMATIC S5 PLC controls the colour change by transmitting the colour number. The colour number must always be transmitted in binary code (SIMATIC S5 KB format).

Only colour numbers between 0 and 7 are permitted.

If a colour number > 7 (> 15) is transferred, the value is divided by 8 on the OP 30-SM (16 on the CP 470) and the remainder of the division is used to display the colour:

\[
\text{OP 30-SM; value } = 17; \quad 17/8 = 2 \text{ remainder } 1; \quad \text{colour 1 is displayed.}
\]

4.6.2 Reveal and Hide, Enable/Disable

These functions are digital operations which can be controlled via a data interface by setting or resetting a bit from the SIMATIC S5 PLC. The bit format is permanently defined. With all bit queries, you have the choice between positive and negative logic with the following relationship between the signal state and the logic condition.

<table>
<thead>
<tr>
<th>Bit value</th>
<th>Logic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive logic</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Negative logic</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

Since the GRACIS update cycle is separate from the SIMATIC S5 cycle, a time shift can occur between the setting of a bit on the S5 and the reaction by GRACIS.

In the element network, the reveal/hide function is used to enable or disable active fields.

An element (active field, message text field, message field, V-field) cannot be disabled or hidden as long as it is operated during process control. Only when it is no longer selected and a status change occurs does the dynamic function become active.

4.6.2.1 Revealing and Hiding Elements

When an element is hidden, the element is removed from the screen and the process data (e.g. in a V-field) are no longer updated. When the element is revealed, it is displayed again and the system resumes updating of the process data.

The following dialog box determines whether or not an element is displayed at first during process control.

When this field is activated, the element is not displayed at first when the process display is opened. Only by revealing the display element dynamically can it become visible in process control mode.
4.6.2.2 Enabling/Disabling Active Fields

This function enables or disables active fields using a control bit on the PLC. A disabled active field can no longer be selected and no longer executes any functions.

You can use this function to allow the user to enable or disable the operation of a process easily according to the SIMATIC S5 program.

4.6.3 F/B-colour via Table

This function is used to change the foreground or background colour or the foreground and background colour of elements dynamically during process control. The colour is controlled either using an index of a data source (in this case the index is assigned to a colour in a table) or using bit addresses (in this case each bit address is assigned to a colour in a table).

4.6.3.1 Index

For colour change using an index, it is necessary to create a table in which a colour can be assigned to each value. Activation of the Assign index colour Continue button opens a dialog for performing the assignment.

You specify the No. of entries (up to 254) to create a table with consecutive numbering of the entries. A colour must then be assigned to each of the entries.

The Continue button is used to display the possible colours and their numbers. When you have created the table, you must define a data source which contains the table index during process control. The data source must be a byte address.

Please refer to the section entitled Data Source for a detailed description of addressing.
4.6.3.2 Bit Address

For colour change using bit addresses, it is necessary to create a table in which a colour can be assigned to each bit address. During process control, a change in any of the configured data bits updates the table, i.e. the table is searched from top to bottom for the first condition to be fulfilled and the element is then displayed in the colour specified there. If none of the conditions are fulfilled, the element is displayed in the colour defined in the element dialog.

Activation of the Addressing Continue button opens a dialog for assigning the address to the colour.

You specify the No. of entries (up to 200) to create a table for the assignment.

The data source must be a bit address and can be evaluated using positive or negative logic. Please refer to the section entitled Data Source for a detailed description of addressing.

4.6.4 Change 0% and 100% Bar Value

You can use these functions to define the 0% and 100% value of a bar from the SIMATIC S5 PLC in order to adapt the bar to different limit values.

If the process value for the 0% or 100% value is equal to 0 when the process display is opened, the configured value is retained. The value can only be set to 0 if a value not equal to 0 was previously entered in the process interface when the display was open or if the value was already not equal to 0 when the display was opened.

4.6.5 Change V-Field Lower Limit, Upper Limit

If you have activated limit value monitoring in the element dialog of the V-field, you can change these limit values dynamically. To do this, the limit value must be entered in the data interface in the accordance with the data size. If, for example, a byte value is displayed as a binary BCD number, the limit value must also be defined as a binary BCD byte number.

If the process value of the lower or upper limit is 0 when the display is opened, the configured values are used for limit value monitoring.
5 Message System

5.1 Configuring Messages ........................................................ 5-3

5.2 Selecting Message List Configuring .................................. 5-3

5.3 Creating a New Message List ............................................. 5-4

5.4 Overview of Message List Configuring Menu ................. 5-5
   5.4.1 Elements (F1) ................................................................. 5-5
   5.4.2 Element Functions (F2) ................................................. 5-5
   5.4.3 List (F3) ...................................................................... 5-6
   5.4.4 Open (F5) ................................................................. 5-6
   5.4.5 GRACIS (F7) ............................................................... 5-7

5.5 Elements of the Message List .......................................... 5-7
   5.5.1 General ................................................................. 5-7
   5.5.2 Element Dialog ......................................................... 5-7
   5.5.3 Message Line ............................................................. 5-8
   5.5.4 System Elements ....................................................... 5-10
   5.5.5 Text Element .............................................................. 5-11
   5.5.6 V-Field .................................................................. 5-12

5.6 Device Dialog .................................................................. 5-12
The message system is used to report and buffer events (operating states and faults) chronologically.

The recorded events are output in the form of messages in message displays on the monitor or in message logs on the connected printer. Messages can be output simultaneously on the printer and on the monitor.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Value</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.01.1992</td>
<td>08:10:20</td>
<td>Hydraulic pressure P1</td>
<td>2.9</td>
<td>K2 CPU1 E0.1 P</td>
</tr>
<tr>
<td>10.01.1992</td>
<td>09:12:30</td>
<td>Oil temperature</td>
<td>85 C</td>
<td>K3 CPU2 M100.0 N</td>
</tr>
<tr>
<td>10.01.1992</td>
<td>09:12:43</td>
<td>Limit switch SY1V</td>
<td></td>
<td>K2 CPU2 M10.0 P</td>
</tr>
<tr>
<td>11.01.1992</td>
<td>12:13:12</td>
<td>Volume limiter</td>
<td></td>
<td>K1 CPU1 M1.0 N</td>
</tr>
</tbody>
</table>

The GRACIS message system triggers the messages in response to changes in process states and outputs them to various logical output devices in a configurable format.

The following extended functions distinguish the message system from the message text field display element:

- Integrated signal edge monitoring
- Printer output in addition to screen-based display
- Buffered message management between acquisition and output.
- Message structure comprising system IDs, texts and V-fields.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Value</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.01.91</td>
<td>11.11</td>
<td>Msg 05000</td>
<td>Adhesive level</td>
<td>Top up</td>
</tr>
</tbody>
</table>
5.1 Configuring Messages

Trigger conditions, the message structure, message buffer processing and message output devices can be configured.

Configuring of a message system is divided into several steps:

- For each message line in the message list, you configure the structure of the lines and the conditions for triggering the message output. You set the general parameters for message buffer processing for all the message lines in the message list and define which devices are to be used for the message output.
- The settings for the printers are stored with the LPF system parameters; for output on the screen you configure the message fields in the process display lists.
- In the LPF system parameter list you can configure a message list which is activated when process control starts.

5.2 Selecting Message List Configuring

Select the Message menu item in the F1 Configuring menu. If message lists already exist for this subproject, the directory appears for the message lists of the project/GRACIS system/subproject in which you last worked. If no lists exist, the list ID dialog appears. You can only return to the main menu when you have created a message list.

The procedure for selecting a message list is identical to the procedure for selecting a process display list except that you can only select lists of the MDL type.
You will find a description of the list selection menu in the section entitled Process Display List Selection.
5.3 Creating a New Message List

Select the New menu item in the F1 List selection menu. The system branches to the ID dialog.

You can enter the number and the name of the message list in the message list dialog. Your input is accepted when you press the RETURN key or click the Accept button. The configuring window automatically appears and the List attribute dialog is opened.

The update time of a message list is calculated from the update time unit * the multiplier. All of the data in the message list are updated according to this time frame. You can enter different values for the multiplier depending on the update time unit that you choose:

<table>
<thead>
<tr>
<th>Update time unit</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ms</td>
<td>1..10</td>
</tr>
<tr>
<td>1 sec</td>
<td>1..120</td>
</tr>
<tr>
<td>1 min</td>
<td>1..120</td>
</tr>
<tr>
<td>1 hr</td>
<td>1..24</td>
</tr>
</tbody>
</table>

When you activate the Synchronization with PLC function, the dialog is extended and you must enter a data interface for controlling the synchronization with the PLC. When synchronization with the PLC is active, the message system only updates this data word cyclically. All other data in the message list are only updated when bit 0 of the synchronization word = 1. When all the data have been updated, GRACIS resets the synchronization word to 0.

Click the Accept button or press the RETURN key to save the settings. The Message line dialog appears automatically and you can start configuring the first line.
5.4 Overview of Message List Configuring Menu

<table>
<thead>
<tr>
<th>F1 Elements</th>
<th>F2 Elem.fct.</th>
<th>F3 List</th>
<th>F4 Wrk.window</th>
<th>F5 Open</th>
<th>F7 GRACIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Msg line</td>
<td>Mark</td>
<td>List attributes</td>
<td>Position</td>
<td>Msg list</td>
<td>Info</td>
</tr>
<tr>
<td>System elements</td>
<td>New</td>
<td>Device</td>
<td>Size</td>
<td></td>
<td>Level up</td>
</tr>
<tr>
<td>Text element</td>
<td>Dialog</td>
<td>Hardcopy</td>
<td>Change window</td>
<td></td>
<td>F9</td>
</tr>
<tr>
<td>F-field</td>
<td>Copy</td>
<td>Save</td>
<td></td>
<td></td>
<td>Insert on</td>
</tr>
<tr>
<td></td>
<td>Cut</td>
<td></td>
<td></td>
<td></td>
<td>Delete</td>
</tr>
<tr>
<td></td>
<td>Paste</td>
<td></td>
<td></td>
<td></td>
<td>character</td>
</tr>
<tr>
<td></td>
<td>Move element</td>
<td></td>
<td></td>
<td></td>
<td>Cancel undo</td>
</tr>
<tr>
<td></td>
<td>Mark all lines</td>
<td></td>
<td></td>
<td></td>
<td>Delete Clipboard</td>
</tr>
<tr>
<td></td>
<td>Mark all elements</td>
<td></td>
<td></td>
<td></td>
<td>Deletes all lines</td>
</tr>
<tr>
<td></td>
<td>Cancel marked lines</td>
<td></td>
<td></td>
<td></td>
<td>Mark marked elements</td>
</tr>
<tr>
<td></td>
<td>Cancel line</td>
<td></td>
<td></td>
<td></td>
<td>Cancel line</td>
</tr>
<tr>
<td></td>
<td>Undo</td>
<td></td>
<td></td>
<td></td>
<td>Mark</td>
</tr>
<tr>
<td></td>
<td>Delete</td>
<td></td>
<td></td>
<td></td>
<td>Mark</td>
</tr>
</tbody>
</table>

From the F1 Element menu select the element you want to edit next. The selected element is highlighted by a wedge in the drop-down menu. Selecting the element a second time deselects it. You can select one or more elements depending on the setting in the Type selection AND or OR menu item in the F7 GRACIS menu.

5.4.1 Elements (F1)
- Message line
- System elements (date, time, incoming/outgoing message, message length)
- Text element
- V-field

5.4.2 Element Functions (F2)
- Mark (CTRL-N)
  Selects the element underneath the cursor. The selection can be cancelled by selecting the element again. The selected elements are highlighted in red. A red bar appears in the first column when you select the whole message line. You can select an element with the mouse by positioning the mouse cursor anywhere in the element and pressing the mouse button.

- New (ALT-N)
  Creates a new element. With the Message line element type, a new line is appended to the list. A dialog window for the new line appears automatically. With the other element types, the new element is appended to the line selected by the cursor, With text elements, the dialog for the new element is automatically opened.

- Dialog (ALT-O, double-click on element)
  Opens the dialog for the selected element. You can now change the attributes of the element. With system elements, the dialog refers to all elements of the same type (all elements of the same type have the same attributes).

- Copy (ALT-C)
  The selected element or elements are copied to the Clipboard. The elements are stored in the Clipboard until they are overwritten by another copy or cut operation or the contents of the Clipboard are deleted. The elements in the Clipboard can be pasted into the message list any number of times.
• Cut (ALT-A)
The selected element or elements are removed and stored in the Clipboard. If elements are already stored in the Clipboard, these are overwritten by the new ones.

• Paste (ALT-P)
Inserts the contents of the Clipboard in the list. If message lines are contained in the Clipboard, they are appended to the end of the list. The other elements are copied to the same position in the selected line as they occupied in the original line. This can lead to overlapping of existing elements. The new element can be moved to reveal the old one again.

• Move element (ALT-M)
You can use the arrow keys to move one or more selected elements by one character within a line. Holding down the SHIFT key moves the elements through 10 characters. You can move selected elements with the mouse by positioning the mouse cursor in the element and dragging the mouse cursor while holding down the mouse button.

• Cancel line
Cancels all of the changes in the line you are currently editing. The state that existed when the line was selected is restored.

• Undo (ALT-U)
The contents of the Undo memory are inserted in the list and the Undo memory is cleared. If the Undo memory contains message lines, they are appended to the end of the list. The other elements are copied to the same position in the selected line as they occupied in the original line. This can lead to overlapping of existing elements. The new element can be moved to reveal the old one again.

• Delete (ALT-K)
All of the selected elements are deleted. A copy of the deleted elements is kept in the Undo memory.

5.4.3 List (F3)

• List attributes
Reopens the list attribute dialog. You can change the attributes of the message list.

• Device
Here you define the output devices used by the message list, the size of the message buffer and the routine for buffer overflows.

5.4.4 Open (F5)

• Message list
Selection of this function displays a directory of the message lists of the subproject in which you are currently located. You can now select and display any other message list. Two work windows can be open simultaneously, but only one window is ever active. If the two windows overlap, the active window appears on top of the inactive window. All functions are executed in the active window.
5.4.5 GRACIS (F7)

- Delete Clipboard
  You use this function to delete the elements saved in the Clipboard during Cut and Copy operations. This frees the memory occupied by the Clipboard for reallocation. The size of the Clipboard is displayed in a graphic on the screen. You can see the graphic by moving your work window downwards.

5.5 Elements of the Message List

5.5.1 General

The elements of the message list can be divided into two groups:

1. Message lines provide the framework for all the other elements. You set general parameters for a line, such as trigger conditions, output device, etc.
2. System elements, text elements and V-fields are configured in the selected message line and are combined to form the text which is output when a message is triggered.

An element type must be selected in order to create a new element. You select the element type in the F1 Elements menu. The selected type is identified by a wedge. You create a new element with the New menu item in the F2 Elem.fct menu.

5.5.2 Element Dialog

You can define the following attributes for the elements of a message line:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background colour</td>
<td>0..7</td>
</tr>
<tr>
<td>Foreground colour</td>
<td>0..7</td>
</tr>
<tr>
<td>Scaling</td>
<td>1..4</td>
</tr>
</tbody>
</table>
The attributes configured in the message line also apply to all system and text elements and V-fields. The evaluation of the attributes depends on the device on which the message is output:

- Colour attributes are only evaluated when output is on the screen or on a colour printer.

### 5.5.3 Message Line

The message line is a common reference point for all elements required for the output of a message. Here, the settings apply to all elements of a message.

#### Message line dialog

![Message line dialog](image)

**Message targets:**

You must define one or more devices for the output of the message lines. However, the message lines are only output on devices that you have already configured in the *Devices* dialog of the *F3 List* menu.

If the messages are to be output on the printer *only* when an active field is activated (*Print message list*), the printer should not be selected here, but only in the device dialog.

**Type of message:**

- "Normal" message
  
  The message output is triggered from the configured data interface.

**Message removal:**

![Message removal](image)

Two options are available for removal of the message from the message buffer.
• **Automatic**
  The message is only removed when the message buffer is cleared. This variant allows you to collect messages in the buffer and output them together to the printer when the buffer overflows or an active field is triggered.

• **Output and trigger condition no longer valid**
  The message is cleared from the message buffer when the message has been output completely on all defined devices and the trigger condition no longer applies.

**Message output:**

When the type of message output is *Trigger condition given*, the message is output as soon as the configured trigger condition has been fulfilled. With *Trigger condition given/not given*, the message is output a second time as soon as the trigger condition no longer applies.

**Trigger conditions:**

The message trigger uses signal edge evaluation.

Activating the selection box extends the dialog, allowing you to configure a data word in a data block as the data interface.

Updating is performed according to the time frame defined in the message list attributes if you have not activated the *Synchronization with PLC* function in the list attribute dialog.
If the *Synchronization with PLC* function has been activated, the data are only updated if bit 0 in the configured data word = 1.

**Synchronization with PLC**

Synchronization with the PLC is used to offload the GRACIS system and the PLC by limiting the data requests from the message list to one word. A group fault bit on the PLC can be used to trigger the update of all the data interfaces of the message list. When all the data have been updated, GRACIS resets the group fault bit to 0. GRACIS subsequently evaluates the actual fault that has occurred.

- When synchronization with the PLC is active, GRACIS cyclically updates only the data interface configured in the *Synchronization with PLC* function in the list attribute dialog.
- If synchronization bit 0 = 1, all of the data interfaces configured in the message list are updated. As soon as all the data have been read, GRACIS resets the synchronization bit on the PLC to 0.

### 5.5.4 System Elements

System elements are permanently defined message components, such as the time and date, and they are configured globally in the message list. When you create a new system element, it is immediately appended to the line without opening a dialog. You can use the *Dialog* menu item in the *F2 Element functions* menu to open the dialog for a system element type.

The following system elements are available:

<table>
<thead>
<tr>
<th>System elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
</tr>
<tr>
<td>Time</td>
</tr>
<tr>
<td>Incoming msg</td>
</tr>
<tr>
<td>Outgoing msg</td>
</tr>
<tr>
<td>Inc./out. message</td>
</tr>
<tr>
<td>Message list ID</td>
</tr>
<tr>
<td>List name</td>
</tr>
<tr>
<td>Message class</td>
</tr>
<tr>
<td>Message address</td>
</tr>
<tr>
<td>No. of pending messages</td>
</tr>
<tr>
<td>Buffer occupancy</td>
</tr>
<tr>
<td>No. of msg since start</td>
</tr>
<tr>
<td>User list ID</td>
</tr>
<tr>
<td>Message length</td>
</tr>
<tr>
<td>Message ID</td>
</tr>
</tbody>
</table>

- **Date**
  The date is output when the message is triggered. You can set the format of the date.

<table>
<thead>
<tr>
<th>Configuring</th>
<th>Monitor output</th>
</tr>
</thead>
<tbody>
<tr>
<td>dd.mm.yy</td>
<td>16.01.1992</td>
</tr>
</tbody>
</table>

- **Time**
  The time is output when the message is triggered. You can set the format of the time.

<table>
<thead>
<tr>
<th>Configuring</th>
<th>Monitor output</th>
</tr>
</thead>
<tbody>
<tr>
<td>hh:mm:ss</td>
<td>11:24:34</td>
</tr>
</tbody>
</table>
• **Incoming/outgoing message**
  The ▲ symbol is output when the message trigger condition is fulfilled. When a message is outgoing (the trigger condition is no longer fulfilled) the ▼ symbol is output. The Ü symbol is entered for the **Incoming/outgoing message** system element during configuring as a placeholder for the two possible states.

• **Message length**
  The time for which the trigger condition is fulfilled. The length of time can only be given for lines output on trigger condition given/not given. The time recording starts when the trigger condition is fulfilled. During process control, ???????? is output in the message line, since the length of time is not yet known. When the trigger condition is no longer fulfilled, the time recording is terminated and the message is output again with the length of time.

5.5.5 **Text Elements**

Text elements are used to insert text in the message line. You can use text from a maximum of 128 text lists in the text system.

Since only one GRACIS system is ever active during process control, only the text lists of this GRACIS system can be accessed.

The colour and text attributes are taken from the message line. The number of characters specifies how many characters are displayed in the message line. If the text in the text list is longer, only a part of it is displayed in the message line.

You can enter the ID of the text list directly. If you do not know the list ID, you can call up the list ID selection dialog by activating the Continue button. You must enter the text number directly. This is the number you assign to a text line when you configure the text lists.

When you enter the text number, the text is displayed in the info box, provided a line has been configured with this number. If no line has been configured, ??? is displayed in the info box. When the dialog is accepted, the text with the configured length is entered in the message line.
5.5.6 V-Fields

You can use V-fields to output process data in the message line from a data block via a configurable data interface. Up to 16 V-fields can be configured in a message.

![F field dialog](image)

The colour and text attributes are taken from the message line.

The data interface of an Output field type is a data block containing the process values to be output.

Depending on the data type that you define, you can configure various extra conditions, such as:
- No. of digits
- No. of integer and decimal places
- Display with negative leading sign
- Display with positive leading sign

Updating takes place according to the time configured in the message list attributes as long as you have not activated the Synchronization with PLC function in the list attribute dialog.

If you have activated the Synchronization with PLC function, the data are only updated when bit 0 in the configured data word = 1.

5.6 Device Dialog

In this dialog, you define the output devices used by the message list, the size of the message buffer and the routine for buffer overflow.

![Device dialog](image)

The selection boxes are used to assign the output devices to the message list. The message lines can only be output on the devices defined here.
Output device: printer:

*Printer* 1 addresses the printer which you have entered in the LPF system parameters.

Output device: message field:

When you select *Message field*, the dialog is extended for the input of a process display list ID and a message field ID.

The process display ID is not evaluated on GRACIS LPF, i.e. messages in any of the process displays that have the configured ID are output. This means that the messages of the message list can be displayed in all process displays.

Message buffer:

The message buffer is used to store messages which cannot be output immediately or which are still active.

The message buffer can be configured with up to 63 Kbytes. 46 bytes are required for each message stored in the buffer.

22 messages can be stored in a buffer with a capacity of 1 Kbyte.

Setting the buffer size correctly

You should make an estimate of the number of messages in a list which can occur simultaneously (in a message burst). There should be sufficient capacity in the buffer for all of these messages. If you want to output these messages even when the trigger conditions are no longer fulfilled, e.g. to establish the length of time of the message, you will also need to provide sufficient capacity for these messages in the message buffer.

Example:

You have configured a list with 200 messages which can all occur simultaneously. To measure the length of time of the messages, you output the messages even when the trigger condition no longer applies.

Calculation:

One message uses 46 bytes in the buffer.

The 200 messages can be present in the message buffer at the same time with *trigger condition given* and *trigger condition not given*.

The required capacity of the message buffer is:

400 messages * 46 bytes/message = 18400 bytes.

You should therefore choose 19 Kbytes for the buffer size. If you choose a larger size than you need for the buffer, you are using up system memory unnecessarily.
**Buffer overflow routine**

There are various strategies available for overflow routines.

- **Overwrite oldest entries**
  When the buffer overflows, the oldest entries are deleted until 10% of the message buffer is free again.

- **Forced output + delete**
  The contents of the message buffer are output on printer 1 if the Output on printer 1 function is active. The message buffer is cleared after the printout. If the Output on printer 1 function is not active, the message buffer is cleared but the contents of the buffer are not printed.

No messages are lost during overflow handling as long as you have selected the correct size for the message buffer. An overflow buffer is only generated for each message list when the overflow occurs. The overflow buffer is deleted again when the overflow handling is complete.

If an overflow occurs for a message list, 10% of the messages or all of the messages (depending on the handling method) are copied into an overflow buffer and output from there. This frees the message buffer for further messages. However, if another message buffer overflow occurs before the overflow handling is complete, messages are lost.

**Message buffer output with active field**

The message buffer can be output on printer 1 by triggering an active field (*Print message list*). The Output on printer 1 function must be activated for this purpose. The message buffer is cleared after the printout. If the Output on printer 1 function is not active, the message buffer is cleared but the contents of the buffer are not printed.

You can use this function, for example, to collect messages in the message buffer and save them for output at a time of your choice.
6 Printing

6.1 Print Job Processing ........................................................... 6-2

6.2 Selecting the Printout List ................................................. 6-3

6.3 Creating a New Printout List .............................................. 6-3

6.4 Printout List Configuring Menu ....................................... 6-5
  6.4.1 Elements (F1) .............................................................. 6-5
  6.4.2 Element Functions (F2) .............................................. 6-6
  6.4.3 List (F3) ................................................................. 6-7
  6.4.4 Open (F5) ............................................................... 6-7

6.5 Elements of the Printout List ......................................... 6-8
  6.5.1 Pages ................................................................. 6-9
  6.5.2 Element Dialog ..................................................... 6-9
  6.5.3 Lines ..................................................................... 6-9
  6.5.4 Page Feed .......................................................... 6-10
  6.5.5 System Elements ................................................... 6-10
  6.5.6 Text Elements ....................................................... 6-11
  6.5.7 Static Text Element .............................................. 6-11
  6.5.8 Variable Fields .................................................... 6-12

6.6 Device Dialog .............................................................. 6-13
  6.6.1 Trigger Conditions ................................................... 6-14
The configurable printout system allows you to output information on plant states or other data (such as message logs) on a connected printer.

The trigger for output of a printout can be issued by the programmable controller or the operator of the plant. Printouts can comprise multiple pages containing system identifiers, text and any combination of variable fields with process variables.

Page headers and footers and page feeds can be configured before and after the actual body of the printout.

The generated printouts are stored in the list memory of the GRACIS system in the form of printout lists (DPL). If messages are issued by the message system while the printout is being output, these can be inserted on a separate page between the pages of the printout. When the messages have been output, the printout continues on a new page. The format of the printout is not altered by the insertion of messages.

### 6.1 Print Job Processing

The printer manager provides two functions:

- **Print**
  The printout list is printed regardless of whether or not a trigger condition exists.

- **Delete**
  The output of the printout is cancelled and deleted from the printer spooler.

When the system is booted a printout list must be registered in the LPF system parameters for processing.
6.2 Selecting the Printout List

Select the Printout item in the F1 Configuring menu. If printout lists already exist for this subproject, a directory of the printouts is displayed. If no lists exist, the list ID dialog is opened. You can only return to the main menu when you have created a printout list. You are located in the project, GRACIS system and subproject in which you last worked.

The procedure for selecting printout lists is identical to the procedure for selecting a process display list except that you can only select lists of the DPL type.

You will find a description of the list selection menu in the section entitled Process Display List Selection.

6.3 Creating a New Printout List

Select the New menu item in the F1 List selection menu. The system branches to the ID dialog. The printout list is assigned to the project, GRACIS system and subproject which is active for configuring. The ID and names of the project, GRACIS system and subproject are displayed in the dialog header.

GRACIS enters the list ID automatically, but you can change it. You can also enter a list name with up to 24 characters. The changes are saved when you press the RETURN key.
The configuring window and the list dialog open automatically.

The window acquisition time is displayed in a pop-up window which you can activate with the Continue button.

**Status message to PLC**

When you activate the *Status message to PLC* function, the dialog is extended for input of a data interface. The data interface is always a data word of a data block on the PLC. During process control, GRACIS enters the status messages in this data interface for output to the printer.

The status word has the following assignment:

<table>
<thead>
<tr>
<th>Value</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Process value acquisition running</td>
</tr>
<tr>
<td>2</td>
<td>Print job running</td>
</tr>
<tr>
<td>0</td>
<td>New print trigger possible</td>
</tr>
</tbody>
</table>

When the printout list has been triggered, all of the V-fields in the printout are updated. The status word = 1 during this update. You can synchronize the PLC with GRACIS using the status word; no data are changed as long as the status word = 1.

When all the data have been recorded, the status word is set to 2 and the printout is output on the printer. When the printout has been transferred to the spooler, the status word is set to 0.

Another printout can be initiated when the status word is 0.

**Active device**

The printout is output on printer 1.
### 6.4 Printout List Configuring Menu

<table>
<thead>
<tr>
<th>F1 Elements</th>
<th>F2 Elem. fct.</th>
<th>F3 List</th>
<th>F4 Wrk.window</th>
<th>F5 Open</th>
<th>F7 GRACIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page</td>
<td>Mark N</td>
<td>List attributes N</td>
<td>Position</td>
<td>Printout list Info</td>
<td></td>
</tr>
<tr>
<td>Header</td>
<td>New N</td>
<td>Device O</td>
<td>Size</td>
<td>Level up F9</td>
<td></td>
</tr>
<tr>
<td>Footer</td>
<td>Copy C</td>
<td>Hardcopy A</td>
<td>Change window Delete field</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Printout line</td>
<td>Paste P</td>
<td>Save F</td>
<td></td>
<td>Insert on Del. character</td>
<td></td>
</tr>
<tr>
<td>Page feed</td>
<td>Move element</td>
<td>Close</td>
<td></td>
<td>Cancel undo Delete Clipboard</td>
<td></td>
</tr>
<tr>
<td>System elements</td>
<td>Mark all</td>
<td></td>
<td></td>
<td>Type sel.&quot;AND&quot;</td>
<td></td>
</tr>
<tr>
<td>Text element</td>
<td>Cancel marking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stat. txt element</td>
<td>Edit page</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-field</td>
<td>Cancel page</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cancel line</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Undo U</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delete K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 6.4.1 Elements (F1)

From this menu select the element you want to edit next. The selected element is highlighted by a wedge. Selecting the element a second time deselects it. You can select one or more elements depending on the setting in the Type selection AND or OR menu item in the F7 GRACIS menu.

Depending on which work window is active, some of the menu items are deactivated (displayed in grey) and cannot be selected. When the work window for the page manager is active, you can choose the Page element. None of the other elements are edited here.

When the work window for the page editor is active and you are editing a normal printout page, the following elements are available for setting up the printout page:

- Printout line
- Page feed
- System element (time, date, page number)
- Text element
- Static text element
- V field

When you edit the master page, the following elements are available:

- Header
- Footer
- System element (time, date, page number)
- Text element
- Static text element
- V field
6.4.2 Element Functions (F2)

- **Mark (CTRL-N)**
  Selects the element underneath the cursor. The selection can be cancelled by selecting the element again. The selected elements are highlighted in red. A red bar appears in the first column when you select a line. You can select an element with the mouse by positioning the mouse cursor anywhere in the element and pressing the mouse button.

- **New (ALT-N or RETURN)**
  Creates a new element. Elements are inserted at different points, depending on which one is created.
  - Pages are inserted underneath the page highlighted by the page cursor.
  - Printout lines are inserted underneath the line highlighted by the line cursor.
  - If the cursor is positioned on a header, a new header is inserted underneath this line. If the cursor is positioned on a footer, the new header is inserted below the last header.
  - If the cursor is positioned on a footer, the new footer is inserted underneath the selected line. If the cursor is positioned on a header, a new footer is inserted above the last footer.
  - Line elements are always appended to the end of the selected line.

- **Dialog (ALT-O, double-click on element)**
  Opens the dialog for the selected element. You can now change the attributes of the element. With system elements, the dialog refers to all elements of the same type (all elements of the same type have the same attributes).

- **Copy (ALT-C)**
  The selected element or elements are copied to the Clipboard. The elements are stored in the Clipboard until they are overwritten by another copy or cut operation or the contents of the Clipboard are deleted. The elements in the Clipboard can be pasted into the printout list any number of times.

- **Cut (ALT-A)**
  The selected element or elements are removed and stored in the Clipboard. If elements are already stored in the Clipboard, these are overwritten by the new ones.

- **Paste (ALT-P)**
  Inserts the contents of the Clipboard in the list. The elements are inserted at different points depending on which ones are stored in the Clipboard:
  - Pages and lines are inserted in the same way as when a new element is created.
  - Line elements are copied to the same position in the selected line as they occupied in the original line. This can lead to overlapping of existing elements. The new element can be moved to reveal the old one again.

- **Move element**
  You can use the arrow keys (on the numeric keypad) to move one or more selected elements by one character within a line. Holding down the SHIFT key moves the elements through 10 characters. You can move selected elements with the mouse by positioning the mouse cursor in the element and dragging the mouse cursor while holding down the mouse button.
• Mark all
Activation of this function opens a pop-up menu where you can choose which elements are
to be selected. All pages, all lines or all elements in the line highlighted by the line cursor
can be selected.

• Edit page (ALT-L)
Opens the work window for editing the page selected by the page cursor.

• Close page (ALT-L)
Closes the work window for page editing and saves the changes.

• Cancel page
All of the changes made since the work window was opened are cancelled.

• Cancel line
All of the changes in the line in which you are currently working are cancelled and the line
is restored to the state it had at the time of selection.

• Undo (ALT-U)
The contents of the Undo memory are inserted in the list and the Undo memory is cleared.
The elements are inserted at different points depending on which ones are stored in the
Undo memory. The elements are inserted in the same way as when pasting an element.

6.4.3 List (F3)
• List attributes
Reopens the list attribute dialog. You can change the attributes of the printout list.

• Devices
The following menu is opened.

<table>
<thead>
<tr>
<th>Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialog</td>
</tr>
<tr>
<td>Configuring</td>
</tr>
</tbody>
</table>

  – You set the attributes and page formats for the printer in the Dialog menu, (see the
    section entitled Device Dialog).
  – The Configuring menu item is not relevant to GRACIS LPF.

6.4.4 Open (F5)
• Printout list
Selection of this function displays a directory of the printout lists of the subproject in which
you are currently located. You can now select and display any other printout list with the list
selection menu. Two printout lists can be open simultaneously. All functions are executed
in the active window.
6.5 Elements of the Printout List

The elements of the printout list can be divided into four groups:

- **Pages**
  A separate work window is provided for page management. To edit the contents of a page, first select the page with the page cursor. Then select the *Edit page* menu item in the *F2 Element functions* menu or press the key combination ALT-L to open a second window for editing the contents of the page. There is no dialog for the pages. The attributes, such as the size of a page, depend on the parameters of the output device (printer) selected for configuring. This is defined in the device dialog.

- **Lines**
  A printout page is composed of lines. These lines provide the framework for the system elements, text elements, static text elements and V-fields.

- **Page feed**
  A page feed can be configured in any line on any page.

- **V-fields, system, text and static text elements**
  These elements are configured in the line highlighted by the line cursor.

An element type must be selected in order to create a new element. You select the element type in the *F1 Elements* menu. When you select the *System elements* element type, a submenu is displayed with a list of all the available system elements. The selected type is identified by a wedge. You can now create a new element with the *New* menu item in the *F2 Elem.fct.* menu.

To edit an existing element, you must first select it with the arrow keys and the *F2 Elem.fct.* menu. Alternatively you can simply click the element with the mouse. The selected element is highlighted in red. Selecting the element a second time deselects it. When you have selected an element, you can edit it with the *Dialog* menu item. You can edit a selected page with the *Edit page* menu item in the *F2 Elem.fct.* menu.
6.5.1 Pages

A printout consists of a master page and one or more printout pages. The master page is a permanent component of every printout and is used exclusively to configure the headers and footers. You can configure up to 32 lines in the master page. The printout pages comprise an area with a configurable number of columns and pages in which the printout is assembled from text, system and V-field elements.

During configuring, a work window is displayed in which you can manage (i.e. create, delete and copy) printout pages. To edit an individual page, you open a second window and configure the individual lines of the page selected with the page cursor. The edited page is highlighted by a wedge.

The size of the individual page depends on the printer selected for configuring. The printer parameters form the basis for the set-up of the printout page. The printer parameters are monitored during page configuring. For example, you cannot configure a number of lines on a page that exceeds the value entered in the printer parameters. If the printer parameters are changed after you have configured a page, the length of the page subsequently also changes.

6.5.2 Element Dialog

Select the Dialog menu item in the F2 Elem. fct. menu to open the dialog of the selected element. All the properties and attributes are described and can be changed in these dialogs. The dialogs are different for each element type.

You can define the following elements for all of the elements:

- Bold text
- Italic text
- Underlined text

The attributes configured in the lines apply to all text elements and variable fields which have not been specifically assigned different attributes.

All of the system elements of one type have the same attributes in a printout list. If the attributes are changed in the dialog for a system element, the new attributes apply to all the other system elements of the same type.

6.5.3 Lines

Two different types of line are available:

- Printout lines
- Headers and footers

Headers and footers can only be configured in the master page. You can subsequently define in the device dialog whether and how many of these lines are to be output. The headers and footers are then output on each printout page in accordance with the parameter settings. The printout lines are required for the set-up of a normal printout page.

You can configure system, text, static text and variable fields in all line types.
6.5.4 Page Feed

The Page feed element enables you to force a page feed in any line of a printout page. The line in which the page feed is configured is then the last line of that printout page. The footers are output irrespective of this setting.

When you insert a page feed in a page, the following lines are shifted onto the next page.

You can use one of two methods to delete the line feed:

1. Using the line cursor, select the line containing the page feed and reselect the Page feed element type
   - The page feed is removed and lines are fetched back from the following page and inserted until the present page is full.

2. Delete the complete line
   - No lines are fetched back.

The insertion of a page feed can inhibit the automatic page length control which adapts the page length to the setting entered in the printer parameters.

6.5.5 System Elements

System elements are permanently defined components of a printout, such as the time, date, etc., which are configured globally in the printout list. When you create a new system element, it is automatically appended to the line, without opening a dialog. You can use the Dialog menu item in the F2 Elem. fct. menu to open the dialog for a system element. The dialogs are generally limited to text attributes, which then apply to all elements of the same type.

The following system elements are available:

<table>
<thead>
<tr>
<th>System elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
</tr>
<tr>
<td>Time</td>
</tr>
<tr>
<td>Printout list ID</td>
</tr>
<tr>
<td>Printout list name</td>
</tr>
<tr>
<td>Printout type</td>
</tr>
<tr>
<td>Trigger address</td>
</tr>
<tr>
<td>User list ID</td>
</tr>
<tr>
<td>Line number</td>
</tr>
<tr>
<td>Page number</td>
</tr>
</tbody>
</table>

- Date
  The date is output when the printout is triggered. You can set the format of the date.

- Time
  The time is output when the printout is triggered. You can set the format of the time.

- Page number
6.5.6  Text Elements

Text elements are used to insert text, contained in text lists, in the line. You can use text from a maximum of 128 text lists in the text system. Since only one GRACIS system is ever active during process control, only the text lists of this GRACIS system can be accessed.

The text attributes are taken from the line. You can, however, activate the Own colours/text attributes function to define separate attributes for each text element. The number of characters specifies how many characters are displayed in the line. If the text in the text list is longer, only a part of it is displayed in the line.

You can enter the ID of the text list directly. If you do not know the list ID, you can call up the list ID selection dialog by activating the Continue button. You must enter the text number directly. This is the number you assign to a text line when you configure the text lists. When you enter the text number, the text of the selected text line is output in the info box.

If no text has been configured yet for the configured list and text number, ??? is displayed in the info box. When the dialog is accepted, the text with the configured length is entered in the text element. If no text has been configured, ??? is entered.

6.5.7  Static Text Element

You can use the static text field to enter a text of up to 199 characters directly. This text is stored in the printout list; a text list is not required. The total length of all the static texts is limited to 63 Kbytes. The length of the text field is determined by the number of characters entered.

The text attributes are taken from the line. You can, however, activate the Own colours/text attributes function to define separate attributes for each text element.
6.5.8 Variable Fields

You can use variable fields to output process data in the line from a data block via a configurable data interface. You can configure up to 16 variable fields in a line. During process control, all the process data assigned to the printout are read when the printout is triggered.

The text attributes are taken from the line. You can, however, activate the Own colours/text attributes function to define separate attributes for each V-field.

The Output field is the only field type permitted. An output field only ever has one data interface where the process values are stored for output.

Depending on the data type that you define, you can configure various extra conditions, such as:

- No. of digits
- No. of integer and decimal places
- Display with negative leading sign
- Display with positive leading sign
- Display with leading zeros

Only data in data blocks (DBs) can be displayed.
6.6 Device Dialog

In this dialog, you define the
1. trigger condition for the printout and
2. the format

- Interruptible by messages
  If messages are triggered for output on the same printer during output of a printout, the printout is interrupted when the current page has finished printing. The messages are printed and the printout is continued on a new page. The format of the printout is unchanged.

- Lines per page
  The number of lines per page depends on the printer connected. If you change this value after configuring the page, the printout pages are adjusted accordingly.

- Left margin
  A left margin can be defined for the printout. The lines begin printing at this point. The value refers to the character width.

- Width
  The width of the printout is specified in characters. The entire width can be defined; the margin is added to this value. The width plus the left margin should not exceed the number of characters the printer can print on a line. If the value is exceeded, the end of the line is truncated.

- Top and bottom margin
  You can define a top and bottom margin which is not printed.

- No. of headers and footers
  These parameters specify the number of headers and footers to be output. If the full amount of headers and footers is not used, empty lines are inserted. If more lines are used than specified in the parameters, only the number of lines in the setting are actually printed.

- Character width
  You can choose between 10, 12 or 17 CPI. The character width is the same throughout the printout.

The values entered for Lines per page, Top margin, Bottom margin, No. of headers and No. of footers are verified by the software, i.e. there must be one line more per page than the total number of margins, headers and footers.
6.6.1 Trigger Conditions

Trigger via S5

The printout is triggered by signal edge evaluation. The data interface is always a data bit in a data block on the PLC.

If a printout is triggered again during the output, the trigger is ignored. Only when the printout has been output completely does another trigger result in a printout. Activating the selection box extends the dialog, allowing you to configure a data interface for the trigger condition.

Trigger via active field

An active field can also be used to trigger a printout. You must first create an active field in the process display with the Printout list selection action.

The Print action updates all the data in the printout list and starts the printout immediately. The printout list must be selected in the LPF system parameters.

The Delete action can be used to cancel printing.
7 Text Lists

7.1 Text List Selection ................................................................. 7-2
7.1.1 Creating a New Text List....................................................... 7-2
7.2 Text List Menu Overview ....................................................... 7-3
7.2.1 General Remarks................................................................. 7-3
7.2.2 Element Functions (F2)....................................................... 7-3
7.2.3 Open (F5) ............................................................................. 7-4
7.3 Configuring Texts ................................................................. 7-4
During GRACIS configuring, text lists are required for configuring the printouts, message text fields, the message system and the GRAPH 5 sequencer lists.

The same texts often recur frequently, e.g. in the message system and in printouts. To limit the volume of data, texts are configured centrally. You can configure up to 255 text lists (TXL 1 to TXL 255) in each subproject. You can enter up to 255 texts, each with 120 ASCII characters, in each text list (text number 1 to text number 255).

7.1 Text List Selection

When you select the Text item in the F1 Configuring menu, a directory of the text lists is displayed. You are located in the project, GRACIS system and subproject in which you last worked, in the Text list list type.

The procedure for selecting text lists is identical to the procedure for selecting a process display list except that you can only select lists of the TXL type.
You will find a description of the list selection menu in the section entitled Process Display List Selection.

7.1.1 Creating a New Text List

Select the New menu item in the F1 List selection menu. The system branches to the ID dialog for the text lists. The text list is assigned to the project, GRACIS system and subproject which is active for configuring. The numbers and names of the project, GRACIS system and subproject are displayed in the dialog headers.
Enter the number and name of the text list in the **Text list ID dialog**. Save the settings by pressing the RETURN key or clicking the Accept button with the mouse. The configuring window opens automatically.

### 7.2 Text List Menu Overview

#### 7.2.1 General Remarks

The texts that you create are entered in the text list. The text definition is divided into:

- the text number and
- the contents of the text

<table>
<thead>
<tr>
<th>F2 Elem.fct.</th>
<th>F3 List</th>
<th>F5 Open</th>
<th>F7 GRACIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
<td>Hardcopy</td>
<td>Text list</td>
<td>Info</td>
</tr>
<tr>
<td>New</td>
<td>Save</td>
<td></td>
<td>Level up F9</td>
</tr>
<tr>
<td>Copy</td>
<td>Close</td>
<td></td>
<td>Insert on</td>
</tr>
<tr>
<td>Sort</td>
<td></td>
<td></td>
<td>Delete field</td>
</tr>
<tr>
<td>Mark all</td>
<td></td>
<td></td>
<td>Del. character</td>
</tr>
<tr>
<td>Cancel marking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delete</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 7.2.2 Element Functions (F2)

- **Mark (CTRL-N)**
  Selects the text line in which the cursor is located. The selection can be cancelled by selecting the line again (individual selections) or by activating the **Cancel marking** menu item (all selections). You can select a text line by clicking the check box with the mouse.

- **New (ALT-N)**
  Creates a new text line. The new text line is inserted at the end of the text list. It is assigned the lowest free text number as a default value.

- **Copy (ALT-C)**
  Copies the selected text line. A new text line is inserted at the end of the list for this purpose. It is assigned the lowest free text number as a default value.

- **Sort**
  All texts in the text list are sorted and displayed in ascending order of text numbers.

- **Mark all**
  Selects all texts. The functions of the other menu items are performed on the selected texts.

- **Cancel marking**
  Terminates the manipulation of elements in groups. All selections are cancelled.

- **Undo (ALT-U)**
  Cancels the last delete function.

- **Delete (ALT-K)**
  Deletes the selected text line. It can only be restored with the **Undo** menu item.
7.2.3 Open (F5)

- Text list
  Selection of this function displays a directory of the text lists of the subproject in which you are currently located. You can now select and display any other text list or create a new one. Up to two work windows can be open simultaneously.

A second window is opened with the selected text list. Both of the work windows are displayed simultaneously, but only one window is ever active. The active window is in the foreground and appears on top of the inactive window when the two windows overlap. All functions are executed in the active window.

You can press the key combination CTRL-W or click the inactive window with the mouse to switch between the windows.

7.3 Configuring Texts

You can change the texts in the text editor. You can edit the text number and the contents of the text. Select the New menu item in the F2 menu to create a new text line. You can allocate text numbers from 1 to 255. GRACIS inhibits the input of two identical text numbers. When a new text is created, GRACIS assigns the lowest free text number as the default value. The text can contain up to 120 characters. When a new text is created, the contents are empty.
The following keys are available for editing:

- **Alphanumeric keyboard**
  You can edit the contents of the text with all characters and special characters on the alphanumeric keyboard.

- **Arrow keys**
  The cursor is moved with the arrow keys in the text list input screen.
  The Up and Down arrow keys move the cursor one line up or down.
  The Right and Left arrow keys move the cursor one character to the right or left.
  The key combinations SHIFT right and SHIFT left move the cursor to the right or left border of the input box in which it is currently located.

- **Page Up and Page Down**
  The Page Up and Page Down keys are used to scroll the screen one page up or down.

- **HOME**
  The HOME key scrolls the screen one slider width to the left.

- **SHIFT+HOME**
  Scrolls the screen to the far left border, with the result that the selection boxes in the first column are visible again.

- **END**
  Scrolls the screen one slider width to the right.

- **SHIFT+END**
  Scrolls the screen to the far right border.

- **INSERT key**
  You can use the INSERT key to switch between insert and overwrite mode. In overwrite mode, the cursor appears as an underscore (_) and in insert mode it appears as a vertical bar (|).

- **DEL key**
  The DEL key deletes the character underneath the cursor in overwrite mode and the character to the right of the cursor in insert mode.

- **Backspace key**
  The backspace key deletes the character to the left of the cursor.
8 GRAPH 5

8.1 Procedure for Installation .................................................. 8-2

8.2 GRAPH 5 Sequence Lists ................................................... 8-3
  8.2.1 Creating a New GRAPH 5 List ...................................... 8-3
  8.2.2 Sequence List Menu Overview ..................................... 8-4
  8.2.3 Configuring Sequence Lists ......................................... 8-5

8.3 GRACIS Assignment List ............................................... 8-7
  8.3.1 Converting the Assignment List .................................. 8-7
  8.3.2 Inserting the GRACIS Assignment List ....................... 8-8

8.4 SIMATIC S5 Software .................................................... 8-9
  8.4.1 GRAPH 5 Diagnostics ................................................ 8-9
    8.4.1.1 Function Blocks ................................................ 8-10
    8.4.1.2 Data Block DBWF .............................................. 8-12
    8.4.1.3 Example Call .................................................. 8-14
    8.4.1.4 Conditions ....................................................... 8-16
  8.4.2 GRAPH 5/II Diagnostics ........................................... 8-17
    8.4.2.1 Function Blocks ................................................ 8-18
    8.4.2.2 Data Block DBWF .............................................. 8-20
    8.4.2.3 Example Call .................................................. 8-22
    8.4.2.4 Conditions ....................................................... 8-23
  8.4.3 Serial Communication ............................................. 8-23
The GRACIS GRAPH 5 diagnostics software enables you to diagnose and display the status of GRAPH 5 and GRAPH 5/II sequences during process control.

The symbols of S5-DOS/ZULI can be used for the symbolic representation of the operands.

8.1 Procedure for Installation

1. Process displays 253 GRAPH 5 overview and 254 GRAPH 5 diagnostics (x depends on the language setting, e.g. TXL 21 for German text, see the section entitled Tips). These displays and texts are stored on the system drive in project 1, GRACIS system 2, subproject 254 and must be copied into subproject 254 of your active project and GRACIS system. The list IDs may not be changed.

2. The sequence blocks and the connection parameters for the PLC to be monitored must be configured in GRACIS sequence lists. You must create at least one sequence list. See the section entitled GRAPH 5 Sequence Lists.

3. The S5-DOS/ZULI assignment list must be converted into a GRACIS assignment list for the symbolic representation of the operands. See the section entitled GRACIS Assignment List.

4. The GRAPH 5 and GRAPH 5/II sequence blocks must be programmed on the PLC in the usual way. The DBKA and DBWF data blocks must be set up for GRAPH 5 diagnostics, and function blocks FB 76, FB 77 and FB 79 must be called. The standard sequence blocks SB 0, SB 2, and SB 3 must be replaced with the diagnostic SBs. The DBKA and DBWF data blocks must be set up for GRAPH 5/II diagnostics and function blocks FB 81 and FB 82 must be called. See the section entitled SIMATIC S5 Software.

5. An active field is used to call up GRACIS GRAPH 5 diagnostics during process control. The active field selects the GRAPH 5 sequence list to be diagnosed and calls up process display 253 GRAPH 5 overview.

![Active fld / dialog](image)
8.2 GRAPH 5 Sequence Lists

Select the GRAPH 5 menu item in the F1 Configuring menu. You are located in the project, GRACIS system and subproject in which you last worked, in the GRACIS sequence list list type.

The procedure for selecting GRAPH 5 lists is identical to the procedure for selecting a process display list except that you can only select lists of the GSL type.

You will find a description of the list selection menu in the section entitled Process Display List Selection.

8.2.1 Creating a New GRAPH 5 List

Select the New menu item in the F1 List selection menu. The system branches to the ID dialog for the sequence list. The sequence list is assigned to the project, GRACIS system and subproject which is active for configuring. The numbers and names of the project, GRACIS system and subproject are displayed in the dialog headers.

Enter the number and name of the GRACIS sequence list in the sequence list ID dialog. Save the settings by pressing the RETURN key or clicking the Accept button with the mouse. The configuring window opens automatically.
8.2.2 Sequence List Menu Overview

<table>
<thead>
<tr>
<th>F2 Elem.fct.</th>
<th>F3 List</th>
<th>F5 Open</th>
<th>F7 GRACIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
<td>Hardcopy</td>
<td>Sequencer list</td>
<td>Info</td>
</tr>
<tr>
<td>New</td>
<td>Save</td>
<td></td>
<td>Level up F9</td>
</tr>
<tr>
<td>Copy</td>
<td>Close</td>
<td></td>
<td>Insert on</td>
</tr>
<tr>
<td>Sort</td>
<td></td>
<td></td>
<td>Delete field</td>
</tr>
<tr>
<td>Mark all</td>
<td></td>
<td></td>
<td>Del. character</td>
</tr>
<tr>
<td>Cancel marking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undo</td>
<td>*U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delete</td>
<td>*K</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Element functions (F2)

- **Mark (CTRL-N)**
  Selects the sequence in which the cursor is located. The selection can be cancelled by selecting the sequence again (individual selections) or by activating the *Cancel marking* menu item (all selections). You can select a sequence by clicking the check box with the mouse.

- **New (ALT-N)**
  Creates a new sequence. The new sequence is inserted at the end of the sequence list. It is assigned the lowest free sequence number as a default value.

- **Copy (ALT-C)**
  Copies the selected sequence. The copied sequence is inserted at the end of the sequence list and is assigned the lowest free sequence number as a default value.

  If you select sequences in the active work window and then change to another work window, you can use this function to copy the selected sequences to the window which is now active.

- **Sort**
  All sequences in the sequence list are sorted and displayed in ascending order of sequence numbers.

- **Mark all**
  Selects all sequences. The functions of the other menu items are performed on the selected sequences.

- **Cancel marking**
  Terminates the manipulation of elements in groups. All selections are cancelled.

- **Undo (ALT-U)**
  Cancels the last delete function.

- **Delete (ALT-K)**
  Deletes the selected sequence. It can only be restored with the *Undo* menu item.
Open (F5)

- Sequence list
  Selection of this function displays a directory of the sequence lists of the subproject in which you are currently located. You can now select and display any other sequence list or create a new one.

A second window is opened with the selected sequence list. Only one window is ever active. All functions are executed in the active window. You can press the key combination CTRL-W or click the inactive window with the mouse to switch between the windows.

8.2.3 Configuring Sequence Lists

You enter the interface parameters of the PLC, the sequence block to be monitored and the sequence block comments in this screen form.

The **Nodes** are not evaluated on GRACIS LPF.

The **CPU** number (1-4) is required for multiprocessor operation on the S5-135U and S5-155U PLCs. If only one processor exists, it always has CPU number 1. You should always enter CPU number 1 for the OP 30-SM.

You can enter any data block for the **DBWF**, as long as it matches the parameters in diagnostic blocks FB 76/77/79 and FB 81/82 on the PLC.

For the **DWNR** you specify the data word number where the transfer area starts. With GRAPH 5, the data word number depends on the parameters of the FBs, with GRAPH 5/II you must enter data word number 20.

The **Control flag** is a user-configurable flag byte required for the operation of the sequences during diagnostics. The bit addresses of the flag byte are permanently assigned:

- M xxx.0 Manual/Auto (Diagnosis of all sequences/only sequences with malfunctions)
- M xxx.1 Jog (Switching of display to action, transition or SUL)
- M xxx.2 Next/Branch + 1 (Switching between parallel branches)
The following bit addresses are also assigned for initial messages for GRAPH 5/II diagnostics

- M xxx.3 initial message (displays initial message)
- M xxx.4 acknowledgement of initial message (clears the buffer for the initial message)

The remaining bits cannot be used on the PLC, as they are overwritten by GRACIS.

A program is required on the PLC for generating the signals for FB 79 and FB 81/82 (edge evaluation).

You can choose between Own texts or Text lists as a text source for the sequence block comments.

If you choose Own texts, you must enter the number of the sequence block and the block comments. You can generate an input line with the New menu function or the key combination CTRL N.

If you select Text list as the text source, you can enter any text from a text list of the current GRACIS system for the sequence block comment. When you activate the Continue button, GRACIS displays the current text list directory. You can select a text list from the directory and then enter the text number of any text from the text list for the block comment.

During configuring of the GRACIS sequence lists, you enter the sequence blocks which are to be diagnosed during process control. You can enter up to 64 sequence blocks. The block number can be between 10 and 255.

The text for the sequence block can be up to 255 characters in length. Display is limited, however, to 50 characters during process control.
8.3 GRACIS Assignment List

In order to access the data of S5-DOS/ZULI in GRACIS, the assignment list must be converted to a GRACIS list (ZWL assignment list) and included in the GRACIS list structure. The ZWL assignment list cannot be edited with the GRACIS configuring software. The programs ZULI.286 in the C:\ZULI directory and GRAZULI.286 in the C:\GRACIS directory are used for the conversion.

8.3.1 Converting the Assignment List

To convert the S5-DOS/ZULI assignment list, first open a new FlexOS console (ALT+). Then change to the directory where your S5-DOS/ZULI assignment list @@@@Z0.SEQ is located and load the program ZULI.286

Program call: C:\ZULI\ZULI

The program starts by displaying all of the possible data types in an assignment list.

First select the data types to be saved in the GRACIS assignment list. You can select inputs, outputs, flags, S-flags, timers and counters. You can choose the length of the symbol and comment. GRAPH 5 diagnostics can represent a symbol with a maximum of 8 characters and a comment with a maximum of 31 characters.

F1 Read in
You can read in a S5-DOS/ZULI assignment list from the directory in which you called the program. When you enter the name of the assignment list, the message Preparing list appears on the screen. When the preparation is complete, the message @@@@Z0.SEQ read in appears.

F2 Edit
When the file has been read in, you can change any of the entries. To do this, first select the type to be edited. You must enter the type in large case letters. When you press RETURN, the assignment list is displayed and you can change the texts or add or delete the entries. The changes are only performed on the GRACIS assignment list. The S5-DOS/ZULI assignment list is not modified.

F3 Save
All of the symbols and comments of the selected data types are saved in the file @@@@Z0.END.

F7 Exit
Terminates the program.

When the S5-DOS/ZULI assignment list is read in, the program creates several files. You can now delete these files by entering the following command:

    del GRACISZ0.*
8.3.2 Inserting the GRACIS Assignment List

The GRACIS assignment list @@@@@Z0.END must be incorporated into the list structure of your project/GRACIS system.

To do this, call the GRAZULI.286 program with the following parameters:

GRAZULI <project> <system> <CPU> <file name>

- **Project**: specify the project which is active on the target hardware.
- **System**: specify the GRACIS system which is active on the target hardware.
- **CPU**: is the number of the CPU, to which this assignment list applies. In monoprocessor mode, the CPU number is always 1.
- **File name**: is the name of the converted assignment list file -> @@@@@Z0.END

**e.g.** call: \GRACIS\GRAZULI 20 1 1 @@@@@Z0.END

The GRACIS assignment list is subsequently inserted in the GRACIS list structure as an assignment list (ZWL) at subproject level. Up to 4 assignment lists can be created in a GRACIS system (one assignment list per CPU).

When diagnostics is started during process control, the system checks that the ZWL assignment list exists for the CPU configured in the sequence list. If the assignment list does not exist, the diagnosis is performed but the symbols cannot be displayed.
8.4 SIMATIC S5 Software

8.4.1 GRAPH 5 Diagnostics

Standard function blocks are used to record the GRAPH 5 malfunctions on the PLC.

The sequence blocks created off-line with the standard GRAPH 5 editor are loaded on the PLC and embedded in the GRAPH 5 system there. The GRAPH 5 system includes the GRAPH 5 sequential control standard function blocks and the GRAPH 5 diagnostics function blocks. Both packages must be installed on the PLC.

The sequence blocks are processed on the PLC under the management of a sequence control block. If malfunctions occur in a sequence, the sequence is reported to the GRAPH 5 diagnostic blocks on the PLC. These diagnose the sequence, localize the error, perform a criteria analysis and enter the results of the analysis and the MC5 code in the DBWF.

Function blocks are provided for diagnostics in the SIMATIC S5 software. These are: SB 0, SB 2, SB 3, FB 76, FB 77 and FB 79.

The above blocks only relate to diagnostics. The SB 0, SB 2 and SB 3 blocks contained in the GRAPH 5 software should be replaced by the diagnostics blocks, because the latter also contain additional functions. You must also set up two additional data blocks. You can assign any number to these blocks.

When data is requested via the serial interface, the timing of the access on the PLC is arbitrary. If a diagnostic FB is being processed at the time of the access, invalid data are present in the DBWF. This leads to errors in the diagnostics display. You must therefore make a copy of the diagnostic data in the DBWF as soon as they are valid whenever GRACIS data are requested via the serial interface (OP 30-SM). Please refer to the section entitled Serial Communication for more information.

If the data are requested using pages (CP 470), the standard data handling blocks SYNCHRON, SEND ALL and RECEIVE ALL should also be configured for communication with the CPU (see example). These function blocks are not a component of the GRACIS GRAPH 5 diagnostics software package and must be ordered separately.

- **Data block DBKA**

  The criteria analysis and criteria display function blocks store the MC5 code of the examined step enable conditions and the IDs of the unfulfilled step enable conditions in the DBKA (data block for criteria analysis).

  You must set up this data block up to and including data word DW 120 (minimum length: 126). It must be called before blocks FB 76 and FB 77.

- **Data block DBWF**

  This data block must be the data block specified in the GSL configuring display. FB 79 enters all the data required for the GRACIS display in this data block.

  You must set up this data block up to and including data word DW 154.
8.4.1.1 Function Blocks

The ABL:KRAY function block examines a sequence or program block for the step enable conditions. The following instructions are interpreted as step enable conditions:

| U E x, UN E x, O E x, ON E x, | U A x, UN A x, O A x, ON A x, | U M x, UN M x, O M x, ON M x, | U S x, UN S x, O S x, ON S x, | U T x, UN T x, O T x, ON T x, | U Z x, UN Z x, O Z x, ON Z x | U(, |

The step enable conditions which are found are transmitted to the DBKA data block. Up to 64 permitted criteria can be examined for each step.

**FB 76 parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Notes</th>
<th>Class</th>
<th>Type</th>
<th>Perm. values</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRAB</td>
<td>Criteria display block</td>
<td>No. of FB77</td>
<td>E</td>
<td>D</td>
<td>KF +77</td>
</tr>
<tr>
<td>ZAKU</td>
<td>Perm no. of criteria exceeded</td>
<td>'1' signal with over 64 criteria</td>
<td>A</td>
<td>B</td>
<td>M0.0-M199.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A0.0-A127.7</td>
</tr>
</tbody>
</table>

**Technical data**

<table>
<thead>
<tr>
<th>Block number</th>
<th>S5-115U with CPU 943 and 944</th>
<th>S5-135U with CPU 928 and 922</th>
<th>S5-155U with CPU 946 and 947</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block name</td>
<td>ABL:KRAY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blocks called</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flags assigned</td>
<td>MB200-254</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timers/counters</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data blocks</td>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FB 77 parameters**

<table>
<thead>
<tr>
<th>Technical data</th>
<th>S5-115U with CPU 943 and 944</th>
<th>S5-135U with CPU 928 and 922</th>
<th>S5-155U with CPU 946 and 947</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block number</td>
<td>FB 77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block name</td>
<td>ABL:KRAK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blocks called</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flags assigned</td>
<td>MB200-254</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timers/counters</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data blocks</td>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The MC5 code for the step enable condition found is entered directly in the ABL:KRAN function block at run-time. This FB must be available in the RAM for this purpose.
### FB 79 parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Notes</th>
<th>Class</th>
<th>Type</th>
<th>Perm. values</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBWF</td>
<td>GRACIS DB interface</td>
<td>DB No., DW no. for data block DBWF</td>
<td>D</td>
<td>KY</td>
<td>001,020 to 255,100</td>
</tr>
<tr>
<td>DBKA</td>
<td>DB for criteria analysis</td>
<td></td>
<td>B</td>
<td></td>
<td>DB001-255</td>
</tr>
<tr>
<td>TIPP</td>
<td>Next alternative branch</td>
<td>Next alternative branch for diagnosis with positive edge</td>
<td>E</td>
<td>BI</td>
<td>E0.0-E127.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M0.0-M199.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A0.0-A127.7</td>
</tr>
<tr>
<td>NEXT</td>
<td>Next parallel branch</td>
<td>Next parallel branch for diagnosis with positive edge</td>
<td>E</td>
<td>BI</td>
<td>E0.0-E127.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M0.0-M199.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A0.0-A127.7</td>
</tr>
<tr>
<td>FBNR</td>
<td></td>
<td></td>
<td>D</td>
<td>KC</td>
<td>A1, A2</td>
</tr>
</tbody>
</table>

### Technical data

<table>
<thead>
<tr>
<th>Block number</th>
<th>S5-115U with CPU 943 and 944</th>
<th>S5-135U with CPU 928 and 922</th>
<th>S5-155U with CPU 946 and 947</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block name</td>
<td>UEBER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blocks called</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flags assigned</td>
<td>MB200-254</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timers/counters</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data blocks</td>
<td>DBWF/DBKA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 8.4.1.2 Data Block DBWF

The data block number is defined in the GRACIS sequence list. The first 20 words in the DBWF data block are used for internal functions.

The interface block for GRAPH 5 diagnostics is defined from data word DW 20 onwards.

<table>
<thead>
<tr>
<th>DW no.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>16 Started sequences 1</td>
</tr>
<tr>
<td>21</td>
<td>32 17</td>
</tr>
<tr>
<td>22</td>
<td>48 33</td>
</tr>
<tr>
<td>23</td>
<td>64 49</td>
</tr>
<tr>
<td>24</td>
<td>16 Seq. malfunctions 1</td>
</tr>
<tr>
<td>25</td>
<td>32 17</td>
</tr>
<tr>
<td>26</td>
<td>48 33</td>
</tr>
<tr>
<td>27</td>
<td>64 49</td>
</tr>
<tr>
<td>28</td>
<td>SB no. Sequence no.</td>
</tr>
<tr>
<td>29</td>
<td>valid=FF FF=Autom;00=Man.</td>
</tr>
<tr>
<td>30</td>
<td>Branch no. Step no.</td>
</tr>
<tr>
<td>31</td>
<td>Total no. of steps ACT/TRAN</td>
</tr>
<tr>
<td>32</td>
<td>Branch no. 1 Branch no. 2</td>
</tr>
<tr>
<td>33</td>
<td>Branch no. 3 Branch no. 4</td>
</tr>
<tr>
<td>34</td>
<td>Branch no. 5 Branch no. 6</td>
</tr>
<tr>
<td>35</td>
<td>Branch no. 7 Branch no. 8</td>
</tr>
<tr>
<td>36</td>
<td>Branch no. 1 Branch no. 2</td>
</tr>
<tr>
<td>37</td>
<td>Branch no. 3 Branch no. 4</td>
</tr>
<tr>
<td>38</td>
<td>Branch no. 5 Branch no. 6</td>
</tr>
<tr>
<td>39</td>
<td>Branch no. 7 Branch no. 8</td>
</tr>
</tbody>
</table>

- For serial communication, you must make a copy of data words 20-154 of DBWF. The copy is also stored in the DBWF. The offset where the copy is stored is specified (relative to DW20) in data word 19. If no copy is created, the DW must be = 0.
- Data words DW 20 to DW 27 and DW 30 to DW 107 are written by FB 79.
- Data word DW 28 and data words DW 110 to DW 141 are written by GRACIS.
- The GRACIS module uses data word DW 28 to specify which sequence block is to be examined. Only sequence blocks with malfunctions can be selected for examination in automatic mode.
• A sequence has a malfunction if the monitoring time has expired. If no monitoring time has been programmed, there is no diagnosis of the step. Transition T0 can therefore not be displayed in automatic mode, as no monitoring time can be programmed in step 0.

• Automatic mode is specified by KHFF in data byte DR 29. If KH00 is entered in data byte DR 29, any sequence can be enabled for diagnosis. The missing step enable conditions or operations in the action part are displayed continuously. The sequence can be observed in this mode. Data byte DR 29 is written by the user with the MANUAL/AUTO function key in accordance with the control flag setting.

• In data words DW 110 to DW 141, GRACIS enters the first 32 sequence block numbers left-aligned and the remainder right-aligned.

• Data words DW 142 to DW 146 are used by FB 79 for the temporary storage of data.
8.4.1.3 Example Call

Start-up example for page addresses 0 and 1 and a block size of 512 bytes on a GRACIS S5 module. Synchronization is not required for serial communication (OP 30-SM).

OB 20/21/22 Network 1

0000: SPA FB 125
0001: NAME: SYNCHRON
0002: SSNR: KY 0, 0 SYNCHRONIZATION PAGE 0
0003: BLGR: KY 0, 0
0004: PAFE: MB 240
0005: SPA FB 125

Example program for GRACIS sequences:

The standard data handling blocks are not required for serial communication (OP 30-SM).

OB 1 NETWORK 1

0000: SPA FB 126 !!!!!!!! GRACIS !!!!!!!!!!!!
0001: NAME: SEND-A
0002: SSNR: KY 0, 0 SERVING THE CP 470
0003: A-NR: KY 0, 0 IN CYCLIC MODE
0004: ANZW: MW 220
0005: PAFE: MB 242
0006: SPA FB 127
0007: NAME: REC-A
0009: SSNR: KY 0, 0
0009: A-NR: KY 0, 0
000A: ANZW: MW 224
000B: PAFE: MB 243
000C: SPA FB 72 !!!!! GRAPH 5 SEQUENCES !!!!!!!
000D: NAME: GPH:SIM1
000E: SBNR: KF +20
000F: AUS: M 6.0
0010: A/H: M 6.1
0011: TIPP: M 6.2
0012: T+1: M 6.3
0013: QIT: M 6.4
0014: STO: M 6.7
0015: SPA FB 73
0016: NAME: GPH:LIN1
0017: SBNR: KF +10
0018: AUS: M 5.0
0019: A/H: M 5.1
001A: TIPP: M 5.2
001B: T+1: M 5.3
001C: QIT: M 5.4
001D: STO: M 5.7
001E: **********************************
001F: SPA PB 12 CALL SEQUENCE DIAGNOSTICS
0020: **********************************
Example program for calling diagnostic blocks FB 76, FB 77, FB 79:

PB 12 Network 1

```
0000: A   DB  24   CALL DBKA
0001: SPA FB  76
0002: NAME: ABL:KRAY
0003: NRAB: KF +77
0004: ZAKU: M  62.7
0005: SPA FB  77
0006: NAME: ABL:KRAN
0007: U M  100.1   "!!!! EXTRA WITH GRACIS !!!!!"
0008: = M  62.2   USER FLAG -> ALLOCATION FLAG
0009: U M  100.2   M 100.1 = " JOG "
000A: = M  62.3   M 100.2 = " NEXT "
000B:                       "!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!"
000C: SPA FB  79
000D: NAME: UEBER
000E: DBWF: KY 100,  20   DBWF DB100 DW20
000F: DBKA: DB  24
0010: TIPP: M  62.2
0011: NEXT: M  62.3
0012: FBNR: KC A2
0013:                       "!!!!EXTRA WITH GRACIS !!!!!"
0014: U M  100.1
0015: R M  100.1   DELETE GRACIS USER FLAG
0016: U M  100.2
0017: R M  100.2
0018: UN M  100.0   M 100.0 = Manual/Auto
0019: BEB
001A: R M  100.0   CHANGE MAN/AUTO
001B: A   DB  100   OPEN DBWF
001C: L   DR  29
001D: L   KB  255
001E: T   DR  29   DR29 FOR HAND/AUTO ENTRY
001F: <>F
0020: BEB
0021: L   KB  0
0022: T   DR  29   DR29 !
0023:                       "!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!"
0024: BE
```

0021: A   DB  100   "** Only with serial interface !!!!!!!"
0022: U   D  29.8   DATA IN DBWF VALID
0023: BEB
0029: L   KF  160   Offset in DBWF DW19
0030: T   DW  19
0024: SPB FB  12   COPYING DBWF
0025: NAME: COPY135
0026: QDW: KY 100,19   DBWF, DATA SOURCE DW19
0027: ZDW: KF 179   DATA TARGET DW 179
0028: LAE: KF 125   NO. OF DATA -COPY 125 DW
0031: BE
8.4.1.4 Conditions

- Up to 64 sequences are permitted for diagnostics.

- Up to 8 parenthesis expressions per action/transition may be programmed in one parenthesis level.

- One logic operation with 64 criteria (interlock criteria for actions; step enable criteria for transitions) can be diagnosed per action/transition. The logic must be contiguous. No operation may therefore be inserted between the first logic instruction and the last assignment in the instruction code. Any number of auxiliary flags are permitted for transmitting the result of the logic operation between two pseudosegments in ladder diagram or function block diagram format.

- The following operations of the standard operation set are permitted in the action or transition zoom:

| 0001: U E | 0007: UN E | 0013: O E | 0019: ON E | 0025: U( |
| 0002: U A | 0008: UN A | 0014: O A | 0020: ON A | 0026: O( |
| 0004: U S | 0010: UN S | 0016: O S | 0022: ON S | 0028: ) |
| 0005: U T | 0011: UN T | 0017: O T | 0023: ON T |
| 0006: U Z | 0012: UN Z | 0018: O Z | 0024: ON Z |

GRAPH 5 diagnostics is currently suitable for use with the SIMATIC S5-115U (CPU 943/944), S5-135U (CPU 928/922) and S5-155U (CPU 946/947) PLCs with FB 70, FB 72 or FB 73.

8.4.2 GRAPH 5/II Diagnostics

Standard function blocks are used to record the GRAPH 5/II malfunctions on the PLC.

The sequence blocks created off-line with the standard GRAPH 5/II editor are loaded on the PLC and embedded in the GRAPH 5/II system there. The GRAPH 5/II system includes the GRAPH 5 sequential control standard function blocks and the GRAPH 5/II diagnostics function blocks. Both packages must be installed on the PLC.

The sequence blocks are processed on the PLC under the management of a sequence control block. If malfunctions occur in a sequence, the sequence is reported to the GRAPH 5 diagnostic blocks on the PLC. These diagnose the sequence, localize the error, perform a criteria analysis and enter the MC5 code and command statuses in the DBWF.

Function blocks are provided for diagnostics in the SIMATIC S5 software. These are: FB 81 and FB 82.

The above blocks only relate to diagnostics. You must also set up an additional data block. You can assign any number to this block.

When data is requested via the serial interface, the timing of the access on the PLC is arbitrary. If a diagnostic FB is being processed at the time of the access, invalid data are present in the DBWF. This leads to errors in the diagnostics display. You must therefore make a copy of the diagnostic data in the DBWF as soon as they are valid whenever GRACIS data are requested via the serial interface (OP 30-SM). Please refer to the section entitled Serial Communication for more information.
If the data are requested using pages (CP 470), the standard data handling blocks SYNCHRON, SEND ALL and RECEIVE ALL should also be configured for communication with the CPU (see example). These function blocks are not a component of the GRACIS GRAPH 5 diagnostics software package and must be ordered separately.

- **Data block DBWF**

  This data block must be the data block specified in the GSL configuring display. FB 82 enters all the data required for the GRACIS display in this data block.

  You must set up this data block up to and including data word DW 170.

### 8.4.2.1 Function Blocks

The UEBER function block examines a sequence or program block for the step enable conditions. The following instructions are interpreted as step enable conditions:

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U E x, UN E x, O E x, ON E x</td>
<td>Step enable conditions for step x</td>
</tr>
<tr>
<td>U A x, UN A x, O A x, ON A x</td>
<td>Step enable conditions for step x</td>
</tr>
<tr>
<td>U M x, UN M x, O M x, ON M x</td>
<td>Step enable conditions for step x</td>
</tr>
<tr>
<td>U S x, UN S x, O S x, ON S x</td>
<td>Step enable conditions for step x</td>
</tr>
<tr>
<td>U T x, UN T x, O T x, ON T x</td>
<td>Step enable conditions for step x</td>
</tr>
<tr>
<td>U Z x, UN Z x, O Z x, ON Z x</td>
<td>Step enable conditions for step x</td>
</tr>
<tr>
<td>U(, O(</td>
<td>Step enable conditions for step x</td>
</tr>
</tbody>
</table>

The step enable conditions which are found are transmitted to the DBKA data block. Up to 64 permitted criteria can be examined for each step.

Up to 64 permitted criteria can be examined per step.

**FB 81 parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Notes</th>
<th>Class</th>
<th>Type</th>
<th>Perm. values</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLD1</td>
<td>Not relevant to GRACIS</td>
<td>E/A</td>
<td>BY</td>
<td>MB&lt;200</td>
<td></td>
</tr>
<tr>
<td>BLD2</td>
<td>Not relevant to GRACIS</td>
<td>E/A</td>
<td>BY</td>
<td>MB&lt;200</td>
<td></td>
</tr>
<tr>
<td>BLD3</td>
<td>Not relevant to GRACIS</td>
<td>E/A</td>
<td>BY</td>
<td>MB&lt;200</td>
<td></td>
</tr>
<tr>
<td>CHAN</td>
<td>Change current stored diagnosis</td>
<td>E</td>
<td>BI</td>
<td>M0.0-M199.7 E0.0-E127.7</td>
<td></td>
</tr>
<tr>
<td>QUIT</td>
<td>Acknowledge stored diagnosis</td>
<td>Enables DBHP for next entry</td>
<td>E</td>
<td>BI</td>
<td>M0.0-M199.7 E0.0-E127.7</td>
</tr>
<tr>
<td>DBHP</td>
<td>Auxiliary DB for initial value acquisition</td>
<td>B</td>
<td>DB2-DB255</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BILD</td>
<td>Not relevant to GRACIS</td>
<td>E</td>
<td>BI</td>
<td>M0.0-M199.7 E0.0-E127.7</td>
<td></td>
</tr>
</tbody>
</table>

FB 81 is used to record and store initial messages.
FB 82 parameters

FB 82 must be called. It monitors all the sequences entered in DBWF DW 110 - DW 141 and diagnoses the selected sequence according to the settings in DW28, DW 29.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Notes</th>
<th>Class</th>
<th>Type</th>
<th>Perm. values</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBWF</td>
<td>GRACIS DB interface</td>
<td>DB no. DBWF</td>
<td>D</td>
<td>KF</td>
<td>1 to 255</td>
</tr>
<tr>
<td>JOG</td>
<td>Next alternative branch</td>
<td>Next alternative branch for diagnosis</td>
<td>E</td>
<td>BI</td>
<td>E0.0-E127.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with positive edge</td>
<td></td>
<td></td>
<td>M0.0-M199.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Next parallel branch for diagnosis with</td>
<td></td>
<td></td>
<td>A0.0-A127.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>positive edge</td>
<td></td>
<td></td>
<td>E0.0-E127.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M0.0-M199.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A0.0-A127.7</td>
</tr>
<tr>
<td>NEXT</td>
<td>Next parallel branch</td>
<td>Next parallel branch for diagnosis with</td>
<td>E</td>
<td>BI</td>
<td>E0.0-E127.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>positive edge</td>
<td></td>
<td></td>
<td>M0.0-M199.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A0.0-A127.7</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th></th>
<th>S5-115U with CPU 943 and 944</th>
<th>S5-135U with CPU 928 and 922</th>
<th>S5-155U with CPU 946 and 947</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block number</td>
<td>FB 82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block name</td>
<td>G5/II-WF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block called</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flags assigned</td>
<td>MB200-254</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timers/counters</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data blocks</td>
<td>DBWF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 8.4.2.2 Data Block DBWF

The data block number is defined in the GRACIS sequence list. Words 0-20 in the DBWF data block are used for internal functions.

The interface block for GRAPH 5/II diagnostics is defined from data word DW 20 onwards.

<table>
<thead>
<tr>
<th>DW no.</th>
<th>DBWF</th>
<th>1= Sequence started 0= Sequence idle</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>16</td>
<td>Started sequences 1</td>
</tr>
<tr>
<td>21</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>SB no.</td>
<td>Sequence no.</td>
</tr>
<tr>
<td>29</td>
<td>valid=FF</td>
<td>FF=Autom;00=Man.</td>
</tr>
<tr>
<td>30</td>
<td>Branch no.</td>
<td>Step no.</td>
</tr>
<tr>
<td>31</td>
<td>Total no. of steps</td>
<td>ACT/TRAN/SUL</td>
</tr>
<tr>
<td>32</td>
<td>Branch no. 1</td>
<td>Branch no. 2</td>
</tr>
<tr>
<td>33</td>
<td>Branch no. 3</td>
<td>Branch no. 4</td>
</tr>
<tr>
<td>34</td>
<td>Branch no. 5</td>
<td>Branch no. 6</td>
</tr>
<tr>
<td>35</td>
<td>Branch no. 7</td>
<td>Branch no. 8</td>
</tr>
<tr>
<td>36</td>
<td>Branch no. 1</td>
<td>Branch no. 2</td>
</tr>
<tr>
<td>37</td>
<td>Branch no. 3</td>
<td>Branch no. 4</td>
</tr>
<tr>
<td>38</td>
<td>Branch no. 5</td>
<td>Branch no. 6</td>
</tr>
<tr>
<td>39</td>
<td>Branch no. 7</td>
<td>Branch no. 8</td>
</tr>
</tbody>
</table>

- For serial communication, you must make a copy of data words 20-154 of DBWF. The copy is also stored in the DBWF. The offset where the copy is stored is specified (relative to DW20) in data word 19. If no copy is created, the DW must be = 0.
- Data words DW 20 to DW 27 and DW 30 to DW 107 are written by FB 81/82.
- Data word DW 28 and data words DW 110 to DW 141 are written by GRACIS.
- The GRACIS module uses data word DW 28 to specify which sequence block is to be examined. In automatic mode, only sequence blocks with malfunctions can be selected for examination.
A sequence has a malfunction if the monitoring time has expired. If no monitoring time has been programmed, there is no diagnosis of the step. Transition T0 can therefore not be displayed in automatic mode, as no monitoring time can be programmed in step 0.

Automatic mode is specified by KHFF in data byte DR 29. If KH00 is entered in data byte DR 29, any sequence can be enabled for diagnosis. The missing step enable conditions or operations in the action part are displayed continuously. The sequence can be observed in this mode. Data byte DR 29 is written by the user with the MANUAL/AUTO function key in accordance with the control flag setting.

In data words DW 110 to DW 141, GRACIS enters the first 32 sequence block numbers left-aligned and the remainder right-aligned.

Data words DW 142 to DW 170 are used by FB 81/82 for the temporary storage of data.
8.4.2.3 Example Call

The example program can also be used here if you replace PB12 with the call of diagnostic blocks FB 81 and FB 82. With serial communication, you must also adapt the call parameters of the copy FB to the modified length of the DBWF.

PB 12 Network 1

0000 : U M 100.3 !!!!! EXTRA WITH GRACIS !!!!!
0001 : = M 62.3 USER FLAG -> ALLOCATION FLAG
0002 : U M 100.4 M 100.4 = " Initial value "
0003 : = M 62.4 M 100.5 = " Quit EW "
0004 : !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
0005 : SPA FB 81
0006 : NAME: G5/II-ME
0007 : BLD1: MB 60 NOT EVALUATED
0008 : BLD2: MB 60 BY GRACIS
0009 : BLD3: MB 60
000A: CHAN: M 62.3 ACTIVATE INITIAL VALUE DISPLAY
000B: QUIT: M 62.4 ENABLE INITIAL VALUE MEMORY
000C: DBWF: B 100 DBWF DB100
000D: DBHP: B 101 DBHP DB101
000E: BILD: M 60.0
000F:
0010 : U M 100.1 !!!!! EXTRA WITH GRACIS !!!!!
0011 : = M 62.2 USER FLAG -> ALLOCATION FLAG
0012 : U M 100.2 M 100.1 = " JOG "
0013 : = M 62.3 M 100.2 = " NEXT "
0014 : !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
0015 : SPA FB 82
0016 : NAME: G5/II-WF
0017 : DBWF: B 100 DBWF DB100
0018 : TIPP: M 62.2
0019 : NEXT: M 62.3
002A : !!!!!EXTRA WITH GRACIS !!!!!
002B : U M 100.1
002C : R M 100.1 DELETE GRACIS USER FLAG
002D : U M 100.2
002E: R M 100.2
002F: U M 100.3
0030 : R M 100.3
0031: U M 100.4
0032: R M 100.4
0033:
8.4.2.4 Conditions

- Up to 64 sequences are permitted for diagnostics.

- Up to 8 parenthesis expressions per action/transition may be programmed in one parenthesis level.

- One logic operation with 64 criteria (interlock criteria for actions; step enable criteria for transitions) can be diagnosed per action/transition. The logic must be contiguous. No operation may therefore be inserted between the first logic instruction and the last assignment in the instruction code. Any number of auxiliary flags are permitted for transmitting the result of the logic operation between two pseudosegments in ladder diagram or function block diagram format.

- The following operations of the standard operation set are permitted in the action or transition zoom:

  | 0001: U E | 0007: UN E | 0013: O E | 0019: ON E | 0025: U( |
  | 0002: U A | 0008: UN A | 0014: O A | 0020: ON A | 0026: O( |
  | 0004: U S | 0010: UN S | 0016: O S | 0022: ON S | 0028: ) |
  | 0005: U T | 0011: UN T | 0017: O T | 0023: ON T |
  | 0006: U Z | 0012: UN Z | 0018: O Z | 0024: ON Z |

GRAPH 5/II diagnostics is currently suitable for use with the SIMATIC S5-115U (CPU 943/944), S5-135U (CPU 928/922) and S5-155U (CPU 946/947) PLCs with FB 81 and FB 82.

8.4.3 Serial Communication

When data is requested via the serial interface, the timing of the access on the PLC is arbitrary. If a diagnostic FB is being processed at the time of the access, invalid data are present in the DBWF. This leads to errors in the diagnostics display. You must therefore make a copy of the diagnostic data in the DBWF as soon as they are valid whenever GRACIS data are requested via the serial interface (OP 30-SM).

The offset where the copy is stored must be entered in DW 19 of the DBWF. This data word must also be copied.

With GRAPH 5 diagnostics, you must copy at least data words 19-144 (125 data words); the DBWF is assigned up to and including DW 154. With GRAPH 5/II diagnostics, you must copy at least data words 19-154 (135 data words); the DBWF is assigned up to and including DW 170.
Example for the S5-135 PLC with CPU 928. FB 12:

The following parameters must be passed:

- Data block number (only DB permitted)
- 1. DW source
- 1. DW destination
- Length to be transmitted

The system does not verify whether the data block exists, whether its length is sufficient or whether it is permitted. The block should be configured so that the data word is transmitted with the copying destination. Allowance must be made for this data word in the length. The user must also entry the copying destination in this data word before calling the FB. It is assumed that the length to be transmitted is smaller than 255 words.

Name :COPY135
LW =DBNR DB number
L BS 34 Address DB 0
+F
LIR 1
T MW 200 = Start address DB
LW =QDW Start of source area
+F
LW =LAE +
T MW 206 Length to be transferred
+F
ADD BF -1
T MW 202 = End address of source area
LW =ZDW start of destination area
L MW 206 + length
+F
ADD BF -1
L MW 200 + start address DB
+F
T MW 204 = end address destination area
TNB
L MW 202 End address source area
L MW 204 End address destination area
B MW 206
TNW 0
BE
9 List Documentation

9.1 General Remarks ................................................................. 9-2

9.2 Documentation Scope ......................................................... 9-3

9.3 Output Formatting ............................................................... 9-4

9.3.1 Page Layout ........................................................................ 9-4

9.3.2 Line Structure ................................................................. 9-5

9.3.3 Description of Document Elements .................................... 9-6

9.4 Selection and Operation ...................................................... 9-7

9.4.1 Selecting the Documentation Scope .................................. 9-7

9.4.2 Selection Dialog ............................................................. 9-9

9.4.2.1 List Selection ................................................................. 9-9

9.4.2.2 Selecting the Output Device ........................................... 9-9

9.4.2.3 Layout .......................................................................... 9-11

9.4.2.4 Footer ......................................................................... 9-11

9.4.3 Starting the Documentation Job ....................................... 9-12

9.4.4 Cancelling the Documentation Job ................................... 9-12

9.4.5 Querying the Job Status .................................................. 9-13

9.4.6 Running the Documentation in the Background ............... 9-14

9.5 Selecting and Sorting the Element Data of a List .............. 9-14

9.6 Examples for Paper Consumption and Run-Time ............. 9-14
9.1 General Remarks

You can use the GRACIS list documentation feature to document the lists you have created by printing the tables of contents or storing them in a file. This function is an invaluable aid for checking the lists and documenting the operator control and process monitoring system.

The ability to save the plant documentation in a text file means you can edit the documentation on an external word processor. The selection of text and the layout are therefore easy to customize.

You can start list documentation when you have selected the desired lists or tables of contents from the GRACIS list manager. You can continue with configuring or list management while the software is running in the background. The current state of documentation processing can be requested at any time from the list manager.

You can document all GRACIS LPF lists.

- Process display lists
- Message lists
- Printout lists
- Text lists
- Sequence lists
- LPF system parameter list
- Tables of contents
9.2 Documentation Scope

You can document all GRACIS LPF lists and tables of contents. To do this, you must choose the desired drive in the list manager and select the projects, GRACIS systems, subprojects, list type level or individual lists in the project structure.

- Drive
  
  You can document data on all drives selectable from the project manager.

- Project structure and levels
  
  - Project (PJ)
  - System (GS)
  - Subproject (TP, SPU)
  - List type (PBL, TXL,...)

- Lists
  
  - Process displays (PBL)
  - Text (TXL)
  - Sequence lists (GSL)
  - Message lists (MDL)
  - Printout lists (DPL)
  - LPF system parameters (SPU)
  - Tables of contents (IHV)

- Special functions
  
  List tree
  This function provides you with a clear tree representation of the projects, systems, subprojects and lists.

The lists selected for documentation are always processed completely. It is not possible to make another selection according to elements or data groups.

For example, if project 20 is selected in the project level and the documentation is started, all of the relevant lists are processed and saved in a file or printed.
9.3 Output Formatting

9.3.1 Page Layout

A printed page is divided into the following components:

- Top margin
- Headers
- Data lines
- Footers
- Bottom margin

The left margin is common to all areas. The line width is oriented to a print density of 17 CPI. The number of lines per page is determined by the paper size defined in the system parameters. In most cases, the data output is formatted in columns. The number of columns is determined by the paper size setting.

The header and footer layout on the printed pages is permanently defined. They contain the list ID and page number for the list being output and the start time and date for the entire documentation, in addition to the total page number. The footer contains the text entered in the selection dialog (e.g. the plant designation).

The paper width and length are determined by the HPF system parameters. The number of columns is calculated according to the paper width and the output format. The total number of lines is calculated from the paper width and the constant of 6 lines/inch. The system calculates the data independently and optimizes the paper consumption.
9.3.2 Line Structure

In order to present information clearly while minimizing paper consumption, the output format for each list type is generated automatically in accordance with the configuring dialog.

The line structure depends on the list or table of contents to be output. The configured data are output in the same format as in the configuring dialog. The complete printing width of the page is used when documenting tables of contents (i.e. the no. of columns = 1).

Where possible and appropriate, the data of multiple dialog lines are presented in continuous columns (as in a newspaper). The texts used are taken directly from the configuring dialog. This output format ensures clear presentation of the list documentation as related to configuring.

The user list documentation only records data which are actually archived.

This method provides the lowest possible paper consumption. All data of an element are presented together and are therefore easy to pinpoint. It is possible to configure the data again in original form with the aid of a list printout.
Example: Configuring dialog and documentation format of a V-field

The element data are documented in the order of the configuring dialog. In the above example, the clearest layout was chosen for the printout. The two columns are read as in a newspaper. The column presentation is interrupted by a page break or element change.

9.3.3 Description of Document Elements

The list documentation uses document elements in addition to the pure project data. These elements are used to enhance documentability and the clarity of the document.

Function active/deactivated

The activation box in the dialogs cannot be represented on the printer. The activation of functions is indicated by the # symbol. A deactivated function is indicated by the ~ symbol.

Examples: 

# Hidden when opened
~ Disabled on display start
Element type/index

Before the dialog is printed, the element type and an index is output in front of every element. The element type describes the element in plain text. The index is a consecutive number which is allocated automatically by the GRACIS configuring software. The index is not visible in the dialogs and is unique within a list. The index is used for element networks and V-field groups. During documentation of the element network and the V-field group, a table is output with the indices of the individual elements or V-fields. The individual V-fields are assigned by means of this internal index.

Example: Element type/index: V field/4

Text fields

The configured text of a text field is enclosed in angle brackets.

Example: <Oil temperature motor 1>

Message text field

When you configure message text fields, texts in a text list are referenced. These texts are read out and printed during documentation. The text is only ever output up to the end of the column.

Example:

<table>
<thead>
<tr>
<th>Index</th>
<th>Bit address</th>
<th>Text number</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>K0 CPU1 DB100 D1.1 P</td>
<td>1</td>
<td>Motor 1 de</td>
</tr>
</tbody>
</table>

9.4 Selection and Operation

The user list documentation is activated from the GRACIS project manager. In the main display, select the Project management menu item from the F2 Management menu. The Document menu item is available in the F2 Management menu.

9.4.1 Selecting the Documentation Scope

You select the directories or individual lists to be documented in the project manager.

The operating functions (Project contents, System contents, Mark, etc.) in the project manager facilitate the selection of the scope of the documentation. At least one item must be selected in the desired level.

Project level:

You can document all lists and tables of contents of the selected projects and all of the systems, subprojects, etc. in the project. Selecting all of the projects outputs the complete plant documentation.

System level:

Documents all of the GRACIS LPF lists of these systems and their subprojects, etc.
Subproject level:

Only lists and tables of contents of a specific project and system can be documented at this level.

List level:

At this level, you can only select lists within a specific type. You can only process these lists and their tables of contents.

When you have selected the lists in the project manager, activate the Document menu item. A further series of menus for selecting the documentation appears.

Example: Selecting the documentation scope (project 20)

<table>
<thead>
<tr>
<th>ID</th>
<th>Roll version May 90</th>
<th>Roll version June 90</th>
<th>Press line 83P</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJ 1</td>
<td>27531 30.5.90 2</td>
<td>30764 27.6.90 2</td>
<td>188429 22.10.90 5</td>
</tr>
<tr>
<td>PJ 2</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PJ 20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When you have activated the Document menu item, the menu line changes so that only the documentation functions are available. The table of contents with the selections remains on the screen as an aid. You can no longer change the selections at this level. To change the selections, you must change to the project manager with F7 Level up.
9.4.2 Selection Dialog

You can only start the documentation when you have made a further selection with the \textit{F1 Select} menu item.

When you have entered all the data correctly in the selection dialog, you can terminate the dialog with \textit{Accept}. If you activate the \textit{Abort} button, the data are not saved. You can still change the print job by selecting \textit{Change} in the \textit{F1 Select} menu. The documentation is now ready to start.

9.4.2.1 List Selection

The possible list types displayed in the selection dialog depend on the level selected in the list manager. The default preselection is all list types, excluding the tables of contents and the special list tree function. The source drive is also displayed as an aid.

9.4.2.2 Selecting the Output Device

When you activate the Continue button, a selection dialog appears for the output devices. You can now select the output device.

- Printer 1/Printer 2
  The data are output, one page at a time, via the GRACIS spooler to the printer selected in the HPF system parameters. The values entered in the HPF system parameters for the paper size are used to calculate the number of lines per page.

  You can also specify whether a message system printout can interrupt the documentation output.
• Single files

Each list is stored in a text file on the GRACIS master drive in a directory structure in the same levels as the original list structure (project, system, subproject, list type and list). You can process these files further with the GRACIS management menu F2 Save/load options/data. The lists in each level can be displayed from the F1 Documentation menu.

The text file created for a total plant documentation can be very large. It is not possible to copy this file onto multiple diskettes with the functions of the management menu. It is possible to perform a selective transfer from hard disk to diskettes by breaking the documentation up into individual files.

The lists at project level are stored at the path /GLISTDOK/GP001ppp. The lists in the GRACIS system level are stored at the path /GLISTDOK/GP001ppp/GSpppsss. The lists from the subproject level are stored at the path /GLISTDOK/GP001ppp/GSpppsss/GTsssstt. The lists of the lowest level (list types) are stored in /GLISTDOK/GP001ppp/GSpppsss/GTsssstt/GLtttxxx.

The abbreviation "ppp" stands for the project ID, "sss" for the system ID, "ttt" for the subproject ID and "xxx" for the list type. The lists themselves have the file name Gxxxnnn.DOC, where "xxx" refers to the list type and "nnn" to the list number.

The assignment of the "xxx" list types to the file names is as follows:

<table>
<thead>
<tr>
<th>PBL</th>
<th>Process displays</th>
<th>GSL</th>
<th>GRAPH 5 sequence lists</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXL</td>
<td>Text lists</td>
<td>SPU</td>
<td>LPF system parameters</td>
</tr>
<tr>
<td>MDL</td>
<td>Message lists</td>
<td>IHV</td>
<td>Tables of contents</td>
</tr>
<tr>
<td>DPL</td>
<td>Printout lists</td>
<td>TRE</td>
<td>Special list tree function</td>
</tr>
</tbody>
</table>

Example:

The documentation of process display 25 from project 2, system 1, subproject 5 is located at the path: /GLISTDOK/GP001002/GS002001/GT001005/GL005PBL/ and has the following file name: GPBL025.DOC

When you output tables of contents, additional information is provided on:

• The length of the list in bytes
• The number of elements
• The date and time created and the user ID
• The date and time of the last change and the user ID
• The GRACIS version number for the creation and modification of the list
• Configuring lock

When the documentation is produced for the second time, existing files are overwritten. You can create a complete set of documentation by individual selection and printing.
9.4.2.3 Layout

- **Clear**

Where the data in lists are output in columns, 2 columns are printed (DIN A4) with the distance between them sufficient to ensure clear legibility. This layout generates slightly more paper or larger text files.

- **Space-saving**

3 columns (DIN A4) are generated on a page. These columns are separated by a smaller distance and are themselves slightly smaller. Sacrifices are made in clarity but less paper or disk space for the text files is required.

9.4.2.4 Footer

You can enter a footer text, such as the plant designation, in this text field. If the footer is not selected, 3 more lines are available on each page for documentation data.
9.4.3 Starting the Documentation Job

To start processing and output of the documentation job generated by your selections, activate the F1 Start menu item. The message line displays the message Please wait, the table of contents is being read in, until all selected lists have been recorded by the system. The status dialog subsequently appears with information on the progress of the documentation job.

A print job can only be started when the selection has been successfully completed!!!

F1 Documentation
Select  >
Start
Cancel
Status

9.4.4 Cancelling the Documentation Job

You can terminate a running documentation job immediately by activating the F1 Cancel menu item. The data already stored in the text file are retained.

You can only cancel a print job after it has started!!!

The cancellation of a print job is documented on the output device
(******** Print job cancelled *********)
9.4.5 Querying the Job Status

You can query the status of the job using the F1 Status menu item. Before you can do this, there must be no selection in the list manager. The status dialog is terminated with Accept.

The following information is displayed in the status dialog.

The dialog is updated every 4 seconds. The Number of errors occurred box contains all the lists which could not be processed or where an error occurred. Possible causes of errors can include:

- Insufficient system memory capacity. In this case, it is advisable to deactivate other GRACIS functions.
- The list could not be loaded. It is possible that the list has since been deleted in the list manager.

An error page with the reason for the error is generated in the printout for these lists. The documentation is subsequently continued with the next list.
9.4.6 Running the Documentation in the Background

When you activate the F7 Level up menu item, the system exits the interactive documentation interface. The job continues in the background. You can perform any actions with the list manager or carry on configuring while the documentation is running in the background.

9.5 Selecting and Sorting the Element Data of a List

All of the element data configured in a list are processed and output. It is not possible to select the elements according to their functional attributes (e.g. dynamic action or graphical parameters). However, the ability to output the data in a text file allows you to edit the files afterwards on a word processor or editor, e.g. in order to use filters or search functions to find all elements with dynamic actions.

The sorting of the elements for the output is defined in the software and cannot be changed. Each list type is sorted for maximum clarity of order and layout. "Important" elements with functional attributes are output first.

Process display lists are sorted according to element types.

- Main display, list attributes
- Active fields
- V fields
- Message fields
- Message text fields
- ...
- Full graphics elements

With message and printout lists, the device descriptions and the system elements are output first, followed by the messages with their trigger conditions and the individual message elements for each message.

9.6 Examples for Paper Consumption and Run-Time

Since high volumes of data are present in the lists, particularly in the case of process displays, message and printout lists, a large amount of paper will be required, even in space-saving mode.

The following key data were recorded for plant documentation on a WF 486 for a project with 190 lists. The size of the project was approximately 860 Kbytes.

The documentation was configured for a single total file in clear layout format. The result was a text file of approximately 20 Mbytes in size, which required roughly 3500 pages for printing. The run-time of the complete plant documentation was approximately 9 hours.
10 Index

0
0% value .................................................. 4-32

1
100% display ........................................... 4-31

A
abort V-field group ..................................... 4-53; 4-59
accept value ........................................... 4-29
Accept when input complete ......................... 4-29
acquisition time frame ................................ 4-6
action ..................................................... 8-16; 8-22
activation boxes ........................................ 2-7
active device ........................................... 6-4
active field ............................................. 4-50; 5-14
actions .................................................... 4-52
field ID .................................................. 4-51
key switch .............................................. 4-54
methods of selection .................................. 4-50; 4-51
active system ......................................... 3-10
addressing types ..................................... 4-61
align ..................................................... 4-13
alphabetic keyboard ................................... 7-5
arc ....................................................... 4-22
arrow keys ............................................. 7-5
assignment list ....................................... 8-7
assignment list conversion ........................... 8-7
assignment of the list types ......................... 9-10
attributes ............................................... 5-7
automatic mode ...................................... 8-13; 8-20

B
background colour .................................... 4-13
background pattern ................................... 4-6
bar arms ................................................. 4-31
bar colour change ..................................... 4-31
bar direction .......................................... 4-31
bar representation .................................... 4-31
bars ....................................................... 4-30
bit addressing ........................................ 4-62
blockwise updating ................................... 4-36; 4-40
bottom margin ........................................ 6-13
buffer overflow routine ............................. 5-14
buffer size ............................................. 5-13
byte/word addressing ................................ 4-62

C
Cancel line ............................................. 5-6; 6-7
cancel marking ....................................... 3-5; 4-12; 7-3
Cancel page ........................................... 6-7
cancel undo ........................................... 4-16
cancelling a documentation job .................... 9-12
change display ........................................ 4-52
change element colour ................................ 4-64
change GRACIS system ................................ 4-4
change ID .............................................. 3-4; 3-7
change lower limit .................................... 4-66
change project ........................................ 4-4
change subproject .................................... 4-4
change windows ...................................... 4-15
colour attributes ..................................... 5-8
colour change ........................................ 4-31; 4-65; 4-66
colour numbers ....................................... 4-64
colours .................................................. 4-19
counter ............................................... 8-7
counting possibilities ............................... 2-4
configuring texts ..................................... 7-4
configuring window .................................. 4-5
Continue button ...................................... 2-7
ccontrol flag ......................................... 8-5
copy ..................................................... 3-4; 3-6; 4-11; 5-5; 6-6; 7-3; 8-4
counters ............................................... 4-60
CP S5 interface ....................................... 3-10
creating a new printout list ......................... 6-3
creating a new process display .................... 4-5
creating a new text list ................................ 7-2
criteria analysis ...................................... 8-9; 8-16
current project ....................................... 3-10
cursor control ........................................ 4-29
cursor in process control ......................... 4-7
curve axis ............................................. 4-35
curve background ..................................... 4-34
curve data type ....................................... 4-40
curve ID ................................................ 4-34
curve jump ............................................. 4-38
curve origin .......................................... 4-34
curves .................................................. 4-33
Cut ...................................................... 5-6; 6-6

d
data requests ........................................ 3-10
data source
  address ............................................. 4-61
  addressing type ................................... 4-60
  block number ..................................... 4-61
  CPU .................................................. 4-61
  nodes ............................................... 4-60
  parameter type ................................... 4-60
  data sources ...................................... 4-60
date ................................................... 3-10; 5-10
  DB .................................................. 4-60
DBWF ................................................................. 8-5
default list type ................................................ 3-4
delete .............................................................. 4-14; 5-6; 7-3
delete character .............................................. 4-16
delete field ........................................................ 4-16
delete interpolation point .................................. 4-21
delete macro ...................................................... 2-8
Delete on new input ......................................... 4-29
delete option ...................................................... 3-17
device dialog ..................................................... 5-12
devices .................................................................. 6-7
diagnostic blocks ................................................ 8-5
diag ................................................................. 4-11; 5-5; 6-6
diag for elements ................................................ 4-18
diags ................................................................. 0-3
direct input of data source................................. 4-62
diskette drive ...................................................... 3-5
display attributes ................................................ 4-14
display element definition .................................. 4-9
display levels ....................................................... 4-14; 4-18
display of individual process data ....................... 4-33
display/parameter ............................................... 4-15
document ............................................................ 3-5
document elements ............................................ 9-6
documentation .................................................... 9-2
documentation job ............................................. 9-12
documentation scope ......................................... 9-3
dot interval .......................................................... 4-7
DWR ................................................................. 8-5
DX ....................................................................... 4-60
dynamic action .................................................... 4-63
dynamic axis ....................................................... 4-35
dynamic curves ................................................... 4-33; 4-36
dynamic dialog .................................................... 4-63
dynamic functions .............................................. 4-63

E
Edit page ........................................................... 6-7
editing functions ............................................... 4-42
element cursor .................................................... 4-17
element function ............................................... 4-11; 4-54
element network .................................................. 4-55
element selection ............................................... 4-55
element types ..................................................... 4-55
hidden when opened .......................................... 4-55
element sums ..................................................... 4-6
element type ....................................................... 4-11; 4-17; 9-7
enable/disable .................................................... 4-65

F
F/B-colour
bit address ........................................................ 4-66
index ................................................................. 4-65
F/B-colour via table ............................................. 4-65
FB 76
parameters ....................................................... 8-10
technical data ................................................... 8-10
FB 77
parameters ....................................................... 8-10
technical data ................................................... 8-10

FB 79
parameters ....................................................... 8-11
technical data ................................................... 8-11

FB 81
parameters ....................................................... 8-17
technical data ................................................... 8-18

FB 82
parameters ....................................................... 8-18
technical data ................................................... 8-18
fill pattern ....................................................... 4-19
flags ................................................................. 4-60
footer ............................................................... 9-11
footers ............................................................. 6-9
foreground colour ........................................... 4-12
format .............................................................. 4-14
Frame+area ...................................................... 4-31
full graphics elements ....................................... 4-20

g
GRACIS assignment list ..................................... 8-8
GRACIS configuring ......................................... 2-3
GRACIS list documents ....................................... 3-14
GRACIS printer .................................................. 3-12
GRACIS system active ....................................... 3-4

GRAP 5 ............................................................. 8-2
data block DBKA ................................................ 8-9
data block DBWF .............................................. 8-9; 8-12
diagnostics ....................................................... 8-9
example call ..................................................... 8-14
installation ....................................................... 8-2
malfunctions .................................................... 8-9
sequence lists ................................................... 8-3
sequential control ............................................ 8-9; 8-16
serial communication ........................................ 8-22
standard operation set ....................................... 8-16

GRAPH 5 list ..................................................... 2-5
GRAPH 5/II
data block DBWF ............................................... 8-17; 8-19
diagnostics ....................................................... 8-16
example call ..................................................... 8-21
malfunctions .................................................... 8-16
standard operation set ....................................... 8-22

graphics cursor ............................................... 4-17
GRTRANS .......................................................... 3-5
grid ..................................................................... 4-7
grid dots ........................................................... 4-7
grid off ............................................................. 4-14
grid on .............................................................. 4-14
group acknowledgement ..................................... 4-57
group ID to controller ....................................... 4-58

H
hardcopy .......................................................... 4-14
hardcopy active ............................................... 3-12
headers ............................................................ 6-9
hide display elements ......................................... 4-54
hot keys ........................................................... 4-10
hotkeys enabled ............................................... 3-11
### I
- ID dialog..............................4-5; 7-2; 8-3
- incoming/outgoing message ...5-11
- individual updating ............4-41
- individual value updating ......4-37
- infoboxes............................2-7
- initial display ......................3-13
- input boxes .........................2-7
- input device .........................3-10
- input without echo ...............4-29
- inputs ..................................4-60
- insert interpolation point .......4-21
- insert mode .........................4-16
- insert on ................................4-16
- interpolation point
  - positioning .......................4-21
- interpolation point number ....4-38
- interpolation point table ......4-21
- interpolation points .............4-20
- interruptible by messages ......6-13

### K
- key code..................................4-51
- key combination
  - ALT-A .........................5-6; 6-6
  - ALT-C ..........................4-11; 5-5; 6-6; 7-3; 8-4
  - ALT-K ..........................4-14; 5-6; 7-3; 8-4
  - ALT-L .........................4-15; 6-7
  - ALT-M .........................4-11; 5-6
  - ALT-N ..........................4-4; 4-11; 5-5; 6-6; 7-3; 8-4
  - ALT-O .........................4-11; 5-6; 6-6
  - ALT-P .........................5-6; 6-6
  - ALT-R .........................2-8
  - ALT-T .........................2-8
  - ALT-U .........................4-14; 5-6; 6-7; 7-3; 8-4
  - CTRL- ..........................2-2
  - CTRL-B .........................2-2
  - CTRL-E .........................4-15
  - CTRL-K .........................4-21
  - CTRL-N ..........................4-11; 5-5; 6-6; 7-3; 8-4
  - CTRL-P .........................4-12
  - CTRL-W .........................4-15
  - CTRL-X .........................4-21
- Key switch ..........................4-29

### L
- language ................................3-9
- layout
  - clear ................................9-11
  - space-saving .....................9-11
- left margin .........................6-13
- level ..................................4-14
- light pen ..........................3-10
- limit monitoring ..................4-26
- limit value monitoring ..........4-66
- limits..................................5-7
- line structure .....................9-5
- line style ..........................4-19
- line thickness ....................4-19
- lines per page .....................6-13
- list address ...........................3-3
- list attributes ........................3-3
- list dialog ..................................6-4
- list documentation ..............3-16; 9-2
- list ID ..................................6-3
- list ID dialog ..........................6-3
- list level ................................9-8
- list selection .......................4-4; 6-3; 9-9
- list structure .......................2-4
- list tree ................................9-3
- list types .............................2-5
- lists ....................................2-4; 9-3
- load .....................................3-5; 3-6
- load options .........................3-17
- log-on table ..........................2-9
- lower limit ............................4-27
- lower system priorities ..........3-11
- LPF system parameter list ..........2-5

### M
- macro recorder ..........................2-8
- magnify element .....................4-12
- management functions ............3-6
- MANUAL/AUTO ..........................8-13; 8-20
- mark ....................................4-11; 4-17; 5-5; 6-6; 7-3; 8-4
- mark all .............................3-5; 4-11; 6-7; 7-3
- master drive ..........................3-2; 3-5
- MCL.SPL ..................................3-9
- message buffer ........................5-13
- message buffer output .............5-14
- message field .........................4-50
- message field ID .....................4-50; 5-13
- message length ......................5-11
- message line ..........................5-8
- message lines ........................5-7
- message list dialog .................5-4
- message list selection .............4-52
- message output ........................5-9
- message removal .....................5-8
- message system ......................5-2
- message targets .....................5-8
- message text field .................4-43; 9-7
  - bit addressing .....................4-47
  - display ................................4-43
  - display mode .......................4-46
  - example ............................4-49
  - field header .......................4-45
  - field scaling ......................4-44
  - index addressing ..................4-48
  - field processing .................4-47
  - field selection ....................4-47
  - text processing ...................4-45
  - message text field header .......4-44
- message text list ....................2-5
- message text tables ...............4-45
- monitoring time .....................8-13; 8-20
- mouse trap off .......................4-14
- mouse trap on .........................4-14
- move ....................................4-11
- Move element .........................5-6; 6-6
<table>
<thead>
<tr>
<th>Index</th>
<th>02.94</th>
</tr>
</thead>
<tbody>
<tr>
<td>move interpolation point</td>
<td>4-21</td>
</tr>
<tr>
<td>multiple copying</td>
<td>4-13</td>
</tr>
<tr>
<td>N</td>
<td></td>
</tr>
<tr>
<td>negative bar arm</td>
<td>4-31</td>
</tr>
<tr>
<td>new</td>
<td>4-11; 5-5; 6-6; 7-3; 8-4</td>
</tr>
<tr>
<td>new GRACIS system</td>
<td>3-4</td>
</tr>
<tr>
<td>new project</td>
<td>3-4</td>
</tr>
<tr>
<td>new subproject</td>
<td>3-4</td>
</tr>
<tr>
<td>normal message</td>
<td>5-8</td>
</tr>
<tr>
<td>number of footers</td>
<td>6-13</td>
</tr>
<tr>
<td>number of headers</td>
<td>6-13</td>
</tr>
<tr>
<td>O</td>
<td></td>
</tr>
<tr>
<td>operating elements</td>
<td>2-7</td>
</tr>
<tr>
<td>operating modes</td>
<td>2-2</td>
</tr>
<tr>
<td>operating order</td>
<td>4-7</td>
</tr>
<tr>
<td>output device</td>
<td></td>
</tr>
<tr>
<td>message field</td>
<td>5-13</td>
</tr>
<tr>
<td>printer</td>
<td>5-13</td>
</tr>
<tr>
<td>output devices</td>
<td>9-9</td>
</tr>
<tr>
<td>output field</td>
<td>5-12</td>
</tr>
<tr>
<td>output formatting</td>
<td>9-4</td>
</tr>
<tr>
<td>outputs</td>
<td>4-60</td>
</tr>
<tr>
<td>overlapping</td>
<td>4-18</td>
</tr>
<tr>
<td>overwrite mode</td>
<td>4-16</td>
</tr>
<tr>
<td>P</td>
<td></td>
</tr>
<tr>
<td>page layout</td>
<td>9-4</td>
</tr>
<tr>
<td>page up and page down</td>
<td>7-5</td>
</tr>
<tr>
<td>pages</td>
<td>6-9</td>
</tr>
<tr>
<td>paper consumption</td>
<td>9-5; 9-14</td>
</tr>
<tr>
<td>Paste</td>
<td>5-6; 6-6</td>
</tr>
<tr>
<td>peripheral interfaces</td>
<td>3-9</td>
</tr>
<tr>
<td>PG interface</td>
<td>3-11</td>
</tr>
<tr>
<td>pie slice</td>
<td>4-23</td>
</tr>
<tr>
<td>plant displays</td>
<td>0-3</td>
</tr>
<tr>
<td>plant documentation</td>
<td>9-2</td>
</tr>
<tr>
<td>Polygon</td>
<td>4-20</td>
</tr>
<tr>
<td>position</td>
<td>4-15; 4-19</td>
</tr>
<tr>
<td>positive bar arm</td>
<td>4-31</td>
</tr>
<tr>
<td>print job processing</td>
<td>6-2</td>
</tr>
<tr>
<td>printer parameterization</td>
<td>3-12</td>
</tr>
<tr>
<td>printout</td>
<td></td>
</tr>
<tr>
<td>attributes</td>
<td>6-9</td>
</tr>
<tr>
<td>date</td>
<td>6-10</td>
</tr>
<tr>
<td>delete</td>
<td>6-2</td>
</tr>
<tr>
<td>device dialog</td>
<td>6-13</td>
</tr>
<tr>
<td>field type</td>
<td>6-12</td>
</tr>
<tr>
<td>lines</td>
<td>6-9</td>
</tr>
<tr>
<td>output field</td>
<td>6-12</td>
</tr>
<tr>
<td>page feed</td>
<td>6-10</td>
</tr>
<tr>
<td>page number</td>
<td>6-10</td>
</tr>
<tr>
<td>print</td>
<td>6-2</td>
</tr>
<tr>
<td>static text element</td>
<td>6-11</td>
</tr>
<tr>
<td>system elements</td>
<td>6-10</td>
</tr>
<tr>
<td>text elements</td>
<td>6-11</td>
</tr>
<tr>
<td>time</td>
<td>6-10</td>
</tr>
<tr>
<td>trigger conditions</td>
<td>6-14</td>
</tr>
<tr>
<td>trigger via active field</td>
<td>6-14</td>
</tr>
<tr>
<td>variable fields</td>
<td>6-12</td>
</tr>
<tr>
<td>printout lines</td>
<td>6-9</td>
</tr>
<tr>
<td>printout list selection</td>
<td>4-53</td>
</tr>
<tr>
<td>process data recorded in blocks</td>
<td>4-33</td>
</tr>
<tr>
<td>process display list</td>
<td>2-5</td>
</tr>
<tr>
<td>process display list selection</td>
<td>4-3</td>
</tr>
<tr>
<td>project</td>
<td>2-6</td>
</tr>
<tr>
<td>project active</td>
<td>3-4</td>
</tr>
<tr>
<td>project level</td>
<td>9-7</td>
</tr>
<tr>
<td>project management</td>
<td>3-2</td>
</tr>
<tr>
<td>project management menu</td>
<td>3-4</td>
</tr>
<tr>
<td>project structure</td>
<td>9-3</td>
</tr>
<tr>
<td>Q</td>
<td></td>
</tr>
<tr>
<td>quit display</td>
<td>4-52</td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>record macro</td>
<td>2-8</td>
</tr>
<tr>
<td>recorder function</td>
<td>4-33; 4-37</td>
</tr>
<tr>
<td>rectangle</td>
<td>4-21</td>
</tr>
<tr>
<td>replacement function</td>
<td>4-33; 4-38</td>
</tr>
<tr>
<td>replay macro</td>
<td>2-8</td>
</tr>
<tr>
<td>report list</td>
<td>2-5</td>
</tr>
<tr>
<td>restart</td>
<td>2-2</td>
</tr>
<tr>
<td>reveal and hide</td>
<td>2-4</td>
</tr>
<tr>
<td>reveal display elements</td>
<td>4-54</td>
</tr>
<tr>
<td>run-time</td>
<td>9-14</td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>SS-DOS/ZULI</td>
<td>8-2</td>
</tr>
<tr>
<td>save</td>
<td>3-4; 3-6; 4-15</td>
</tr>
<tr>
<td>save/load options/data</td>
<td>3-14</td>
</tr>
<tr>
<td>scaling</td>
<td>4-19</td>
</tr>
<tr>
<td>screen resolution</td>
<td>3-9</td>
</tr>
<tr>
<td>select by controller</td>
<td>4-51</td>
</tr>
<tr>
<td>select drive</td>
<td>3-15</td>
</tr>
<tr>
<td>select source</td>
<td>3-5</td>
</tr>
<tr>
<td>select target</td>
<td>3-5</td>
</tr>
<tr>
<td>select with cursor and RETURN</td>
<td>4-51</td>
</tr>
<tr>
<td>selectable field scaling</td>
<td>4-24</td>
</tr>
<tr>
<td>selection box</td>
<td>2-7</td>
</tr>
<tr>
<td>selection dialog</td>
<td>9-9</td>
</tr>
<tr>
<td>sequence block comments</td>
<td>8-6</td>
</tr>
<tr>
<td>sequence list</td>
<td>8-2</td>
</tr>
<tr>
<td>sequence list ID dialog</td>
<td>8-3</td>
</tr>
<tr>
<td>sequence list menu</td>
<td>8-4</td>
</tr>
<tr>
<td>sequence list selection</td>
<td>4-52</td>
</tr>
<tr>
<td>sequence lists</td>
<td>8-5</td>
</tr>
<tr>
<td>sequences</td>
<td>8-2</td>
</tr>
<tr>
<td>serial link active</td>
<td>3-11</td>
</tr>
<tr>
<td>size</td>
<td>4-12; 4-15</td>
</tr>
<tr>
<td>skip removed field</td>
<td>4-29</td>
</tr>
<tr>
<td>software response</td>
<td>3-13</td>
</tr>
<tr>
<td>Sort</td>
<td>7-3</td>
</tr>
<tr>
<td>special functions</td>
<td>4-12</td>
</tr>
<tr>
<td>SPL</td>
<td>3-8</td>
</tr>
<tr>
<td>start-up procedure</td>
<td>3-11; 3-13</td>
</tr>
<tr>
<td>static axis</td>
<td>4-35</td>
</tr>
<tr>
<td>static curves</td>
<td>4-33; 4-35</td>
</tr>
</tbody>
</table>
status dialog ................................................... 9-13
status message to PLC .................................... 6-4
step enable conditions ..................................... 8-9
straight line ................................................... 4-20
structured list system ....................................... 3-2
structuring ........................................................ 2-5
subproject .................................................................. 2-6
subproject level ..................................................... 9-8
symbol ..................................................................... 8-7
symbolic representation ........................................ 8-2
symmetrical field scaling ...................................... 4-24
Synchronization with PLC .................................... 5-4; 5-10
system elements ................................................. 5-10
System level .......................................................... 9-7
system parameter list ......................................... 2-5
system parameterization ..................................... 3-8
system start-up .................................................... 2-2

T
table index ...................................................... 4-65
table of contents .............................................. 3-3
tables of contents ............................................. 9-3
text content ...................................................... 7-4
text elements ..................................................... 5-11
text field .......................................................... 4-41
text fields .......................................................... 9-7
text input .......................................................... 4-42
text list .................................................................. 2-5; 7-4
text list menu ....................................................... 7-3
text list selection ................................................ 7-2
text lists ............................................................. 7-2
text number ....................................................... 7-3
time ...................................................................... 3-10; 5-10
timers ................................................................. 4-60
top margin .......................................................... 6-13
transfer constant and list ID ................................ 4-53
Transfer list ID .................................................... 4-53
transition ......................................................... 8-13; 8-16; 8-20; 8-22
triangle .............................................................. 4-22
trigger conditions .............................................. 5-9
type selection "AND" .......................................... 4-16

U
undo ................................................................. 4-14; 5-6; 6-7; 7-3
update time ....................................................... 5-4
update time unit .................................................. 5-4
upper limit ........................................................ 4-27
user display ID ................................................... 4-8

V
V-field group ID .................................................. 4-57
V-field .............................................................. 4-23
data type .......................................................... 4-26
default values .................................................... 4-26
field attributes ................................................... 4-29
field ID ............................................................. 4-25
frame ................................................................. 4-25
leading zeros .................................................... 4-25
next fields ........................................................ 4-28
V-field data interface ......................................... 4-27
V-field group ..................................................... 4-56
V-field group acknowledgement ................... 4-53; 4-59
V-field group dynamic action ......................... 4-59
V-field type ....................................................... 4-27
V-fields ............................................................. 5-12

W
width .................................................................... 6-13
work window ..................................................... 4-15

Z
Zone colour change .......................................... 4-31
zone limit values ............................................... 4-31
zones ................................................................... 4-30
Suggestions and / or corrections:

Should you come across any printing errors when reading this publication, please notify us on this sheet. Suggestions for improvement are also welcome.
Content and target group of the GRACIS documentation

**Acquisition phase**

<table>
<thead>
<tr>
<th>Product Brief HPF/LPF</th>
<th>Description HPF/LPF</th>
<th>AR10 Catalog HPF/LPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>6ZBS 440-OTX02-0BA1</td>
<td>6ZBS 440-0TY02-0BA0</td>
<td>E86060-K6310-A101-A4-7600</td>
</tr>
<tr>
<td>Target group: O/I users</td>
<td>Target group: O/I users</td>
<td>Target group: Special machine builders</td>
</tr>
<tr>
<td>General, brief overview of the GRACIS system covering hardware and software components.</td>
<td>General system overview</td>
<td>Order numbers / scope of supply</td>
</tr>
</tbody>
</table>

**General GRACIS publications**

<table>
<thead>
<tr>
<th>Operator Interface HPF/LPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>6ZBS 440-0UD02-0AA0</td>
</tr>
<tr>
<td>Target group: GRACIS configur. engineer</td>
</tr>
<tr>
<td>Like all system, GRACIS has its own term. Terms like &quot;work window&quot;, &quot;slider&quot;, etc. are explained for you. You will also get to know the GRACIS operator panels. The last chapter lists the operator panels against their functs.</td>
</tr>
</tbody>
</table>

**GRACIS LPF**

<table>
<thead>
<tr>
<th>Technical Description LPF</th>
<th>Configuration LPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>6ZBS 440-0VD02-0AA1</td>
<td>6ZBS 440-0VE02-0AA0</td>
</tr>
<tr>
<td>Target group: Startup engineers/system configuration engineers/process operators</td>
<td>Target group: GRACIS configur. engineer</td>
</tr>
<tr>
<td>This publication enables you to start up a GRACIS system. The emphasis is on hardware startup. There is a description of how to incorporate the components from the configurational stage (S5 program list and GRACIS list) . You will become familiar with the GRACIS-specific characteristics in process mode.</td>
<td></td>
</tr>
<tr>
<td>With its information on how to configure GRACIS, you are certain to use this publication frequently in the future.</td>
<td></td>
</tr>
<tr>
<td>• Service modul</td>
<td></td>
</tr>
<tr>
<td>• GRAPH 5 sequence diagnostics</td>
<td></td>
</tr>
<tr>
<td>• First steps in configuring</td>
<td></td>
</tr>
<tr>
<td>• Management, system services</td>
<td></td>
</tr>
<tr>
<td>Configuring from</td>
<td></td>
</tr>
<tr>
<td>• Process displays</td>
<td></td>
</tr>
<tr>
<td>• Printouts</td>
<td></td>
</tr>
<tr>
<td>• Text list</td>
<td></td>
</tr>
<tr>
<td>• Messages</td>
<td></td>
</tr>
<tr>
<td>• GRAPH 5</td>
<td></td>
</tr>
</tbody>
</table>
### Configuration stage GRACIS HPF

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>Target Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SIMATIC S5 Interface</strong> (local and SINEC H1)</td>
<td>6ZB5 440-0UB02-0AA0</td>
<td>S5 programmers</td>
</tr>
<tr>
<td>6ZB5 440-0UC02-0AA1</td>
<td>Process operators</td>
<td>Process operators</td>
</tr>
<tr>
<td><strong>Configuration HPF</strong></td>
<td>6ZB5 440-0UF02-0AA0</td>
<td>Networking engineers</td>
</tr>
<tr>
<td><strong>Networking</strong></td>
<td>6ZB5 440-0UG02-0AA0</td>
<td>Configuring Options</td>
</tr>
</tbody>
</table>

### Process mode phase GRACIS HPF

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>Target Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SIMATIC S5 Interface</strong> (SINEC L2)</td>
<td>6ZB5 440-0UW02-0AA1</td>
<td>Process operators</td>
</tr>
<tr>
<td><strong>Technical Description HPF</strong></td>
<td>6ZB5 440-0UA02-0AA0</td>
<td>Startup engineers/system configurat. engineers</td>
</tr>
</tbody>
</table>

---

**Technical Description HPF**

- **Target group:** Startup engineers/system configurat. engineers
- **Description:**
  - This publication enables you to start up a GRACIS system.
  - The emphasis is on hardware startup. There is a description of how to incorporate the components from the configuration stage (S5 program list and GRACIS lists).