SIEMENS

SIMATIC HMI

ProTool/Pro Runtime

User's Guide

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Preface

This manual

The ProTool/Pro Runtime User's Guide is a part of the SIMATIC HMI documentation. It describes:

- commissioning the ProTool/Pro RT runtime software
- downloading the configuration
- operating the configuration

The description is applicable for the following Windows-based systems:

- OP 37/Pro
- SIMATIC Panel PC FI 25, FI 45, PC 670, PC 670T
- Standard PC

An overview of the entire SIMATIC HMI documentation is provided in Appendix B.

Organization of the manual

The user's guide is organized into the following chapters:

Chapter	Contents
1 - 2	Introduction and overview of functions
3	Area of use, short description of the objects within a configuration and an overview of connection options to the PLC
4 - 5	Conditions for commissioning and downloading the configuration
6	Operating the runtime software
7	Handling recipes and data records
Appendix	• System Messages • SIMATIC HMI Documentation

Conventions

The following conventions are used in this User's Guide:

VAR_23	Text which appears on the screen is displayed in a typewriter font. This text includes: commands, file names, entries in dialog boxes and system messages.
Tag	Dialogs, and fields and buttons in the dialogs, appear in italics.
File → Edit	Series of menu items are linked by arrows. The entire path to the menu item is always specified.
F1	Key names are written in a different typeface.

History

The various editions of this User's Guide correspond to the following versions of the ProTool configuration software:

Edition	Comment	ProTool Version
07/98	First edition	as of V 5.0
01/99	Revised edition of the guide	as of V 5.1
12/99	New devices, new screen objects, recipes	as of V 5.2

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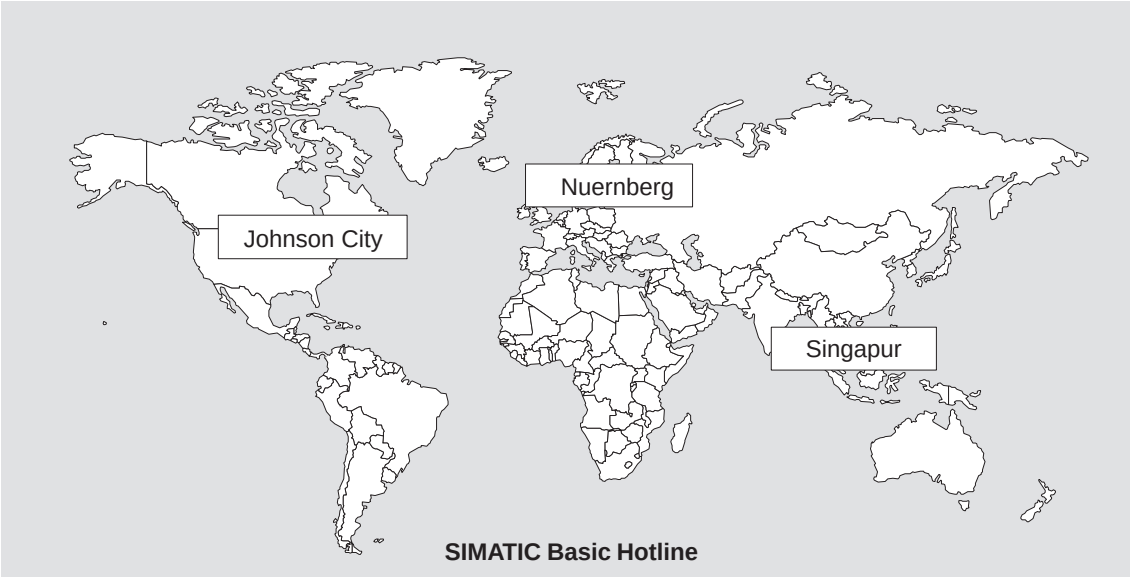

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  - in **Internet** under `http://www.ad.siemens.de/support/html–00/`

Abbreviations

The abbreviations used in this user's guide have the following meaning:

AG (PLC)	Programmable Logic Controller
AM	Alarm Message
ANSI	American National Standards Institute
AS 511	Protocol of the PU interface to SIMATIC S5
ASCII	American Standard Code for Information Interchange
CF	Compact Flash
CPU	Central Processing Unit
CSV	Comma Separated Values
DP	Decentralized Periphery
DSN	Data Source Name
EM	Event Message
HMI	Human Machine Interface
LED	Light Emitting Diode
MPI	Multipoint Interface (SIMATIC S7)
OLE	Object Linking and Embedding
OP	Operator Panel
OPC	OLE for Process Control
PC	Personal Computer
PLC	Programmable Logic Controller
PPI	Point to Point Interface (SIMATIC S7)
PU	Programming Unit
RAM	Random Access Memory

A list of all the specialist terms together with their explanations is provided in the Glossary at the end of this guide.

Contents

Introduction

1

What is ProTool/Pro?

SIMATIC ProTool/Pro is an easy-to-use, high-performance visualization software enabling the visualization of processes and runs under Windows® 95/98, Windows® 2000 and Windows® NT 4.0.

Modern automation concepts make great demands on process visualization. In particular, process control in the machine-oriented sector must be able to satisfy the demands made for high-performance and simple control of the processes. The aim is to present process data to the operator quickly and clearly, and in a form which can be easily understood; as a trend curve graphic, for example. It is becoming increasingly important that process representations are presented in ways which simplify the task of associating the graphics with the actual process. In addition, there is a growing demand for the possibility to archive data, for quality control purposes for example. This makes it necessary to archive process data even in the machine-oriented sector. SIMATIC ProTool/Pro satisfies these demands.

SIMATIC ProTool/Pro has been designed for the visualization and operation of machines and small plants. The high-performance runtime software enables reliable process control by providing short response times. One-touch operation on the machine and reliable data acquisition present no problems.

ProTool/Pro components

SIMATIC ProTool/Pro consists of the ProTool/Pro CS configuration software and ProTool/Pro Runtime (ProTool/Pro RT) process visualization software. Both systems can run under Windows® 95/98, Windows® 2000 and Windows® NT 4.0 operating systems.

ProTool/Pro CS is used to create a configuration on the configuration computer (PC or PU) under Windows®. ProTool/Pro RT is the program used to run the configuration and visualize the process under Windows®.

Windows-based systems

SIMATIC ProTool/Pro RT can be run on the following Windows-based systems:

- Operator Panel OP 37/Pro
- SIMATIC Panel PC, e.g. FI 25, FI 45, PC 670, PC 670T
- Standard PC

Authorization

If the SIMATIC ProTool/Pro RT runtime software is installed on a standard PC or a SIMATIC Panel PC, the corresponding authorization is required to enable unrestricted operation:

- **PC**:
  The authorization must be ordered separately.
- **SIMATIC Panel PC**:
  The authorization is supplied with the unit.

No authorization is necessary for the Operator Panel OP 37/Pro because it is released by means of the hardware.

Functionality

The SIMATIC ProTool/Pro RT runtime software distinguishes itself through its full graphic user interface which implements windows techniques. In addition to the standard functions provided by SIMATIC operating units up to now, it also offers:

- simple process visualization with a Windows-conform user interface
- a large selection of standard input/output fields, bars, trend curves, vector graphics and buttons
- dynamic positioning of objects
- the archiving of messages and process values
- recipes
- Visual Basic Script for user functions
- standard connections to SIMATIC S5, SIMATIC S7 and SIMATIC 505 as well as to PLCs from other manufacturers

A complete overview of the full functional scope of the SIMATIC ProTool/Pro RT runtime software is provided in Chapter 2.

Objectives

This guide has been conceived for commissioning, maintenance and system support engineers. It describes the commissioning and operation of the SIMATIC ProTool/Pro RT runtime software.

Further information

Detailed descriptions of the creation of projects and configuration software functions are provided in the *ProTool Configuring Windows-based Systems* user's guide and in the online help for ProTool/Pro CS.

Information on how to link the software to the various types of PLC can be found in the *Communication for Windows-based Systems* user's guide.

Any new information which could not be taken into account for printing in the guides is provided in the *Readme.wri* file on the *SIMATIC ProTool/Pro* CD.

Scope of Functions

2

The table below summarizes the scope of functions offered by ProTool/Pro RT. The values stated are maximum values that can be managed by the operating unit. These values are restricted by the size of the memory.

Functions		
Event messages	Number	2,000
	Display	In message line/message window/ message display
	Viewing all queued messages	In message page/message display
	Length of message text per line	70 characters
	Lines per message	1
	Process values in the message text	8
	Edit messages	✓
	Color-coding of different message states	✓
Alarm messages	Number	2,000
	Display	In message line/message window/ message display
	Display type	First/Last, selectable
	Viewing all queued messages	In message page/message display
	Length of message text per line	70 characters
	Lines per message	1
	Process values in the message text	8
	Acknowledging individual alarm messages	✓
	Acknowledge several alarm messages simultaneously (group acknowledgement)	16 acknowledgment groups
	Edit messages	✓
	Color-coding of different message states	✓
Alarm_S	Display S7 messages	✓
Message logging	Output on printer	✓

Functions		
Message buffer volatile	Capacity	1,024 message events
	Viewing event/alarm messages	✓
	Deleting	✓
	Print	✓
	Simultaneously queued message events (max.) • Event messages: or • Alarm messages:	 500 250
Message archive	Memory location	• File • Database
	Capacity	Restricted by storage medium
Message logging	Time stamp of the occurrence	Date/time
	Message event	Arrived, departed, acknowledged
Screens	Displaying	✓
	Printing (Print Screen)	✓
	Screen objects	• Graphic • Text • Output field • Input field • Symbolic output field • Selection field • Date/time • Graphic list • Vector graphic • Button • Status button • Switches • Invisible button • Trend display • Bar graph • Message display • Single message display • Status/Force • Password list • Recipe display • Slider controls • Analog display • Digital/Analog clock

Functions		
Screens	Prompting	• Softkey icons [1)] • Dynamic attributes • Show/hide objects • TAB sequence • Help text
	Fixed window	✓
Limit monitoring	Inputs/outputs	✓
Conversion functions	Inputs/outputs	✓
Help text	Lines/characters	7/35
	For messages	✓
	For screens	✓
	For screen objects	• Input field • Selection field • Button • Status button • Switches • Invisible button • Slider controls
Archiving	Messages Tags	✓ ✓
Print functions	Print screen	✓
	Direct message logging	✓
	Shift report	✓
Password protection	Number of passwords Password level	50 10 (0...9)
Recipes	Number	255
	Data records per recipe	[2)]
	Total number of entries	5,000
	Entries per recipe	[3)]
Online language switch	Number of languages	32
PU functions (Status/Force)	SIMATIC S5	✓
	SIMATIC S7	✓
Screen	Blanking circuit [4)]	✓
Scheduler	Trigger functions cylically or once	✓
VB Script	User-specific expansions of functionality	✓

Functions		
Communication	**SIMATIC S5**	
	• AS511	✓
	• PROFIBUS–DP	✓
	SIMATIC S7/M7	
	• PPI (S7 protocol)	✓
	• MPI (S7 protocol)	✓
	• PROFIBUS–DP (S7 protocol)	✓
	• SIMATIC WinAC from Version 2	✓
	• OPC (client/server)	✓
	OPC	
	• Client/Server	✓
	SIMATIC 505	
	• NITP	✓
	• PROFIBUS–DP	✓
	Connection to PLCs from other manufacturers	
	Allen Bradley (PLC-5, SLC 500)	
	• DF1	✓
	• DH+	✓
	• DH485	✓
	Mitsubishi FX	✓
	Telemecanique TSX	
	• Adjust	✓
	• Uni-Telway	✓

1) Not for standard PC and PC 670T.
2) Dependent on the storage medium.
3) Dependent on the number of licensed power tags. Power tags are tags linked to a process.
4) Standard screen saver for standard PC and SIMATIC Panel PC.

Information on how to link the software to the various types of PLC can be found in the *Communication for Windows-based Systems"* user's manual .

Product Description

3

Area of use

The SIMATIC ProTool/Pro RT runtime software shows its strengths wherever a dedicated hardware visualization configuration has reached its limits. SIMATIC ProTool/Pro RT can run on the following Windows-based systems under Windows® 95/98, Windows® 2000 and Windows® NT 4.0 operating systems:

- Operator Panel OP 37/Pro
- SIMATIC Panel PC, e.g. FI 25, FI 45, PC 670, PC 670T
- Standard PC

SIMATIC ProTool/Pro RT is available in a wide range of variations:

- as a pure software variant, e.g. for PCs
- pre-installed, e.g. for SIMATIC Panel PC 670
- installed ready for operation, e.g. for OP 37/Pro, FI 25, FI 45

The runtime software is capable of communicating with a wide range of PLCs. An overview is provided in Chapter 3.2.

Function extensions in the ProTool/Pro CS configuration software

Since the runtime software can run on any Windows-based PC, the functions with which the user is familiar can be combined according to individual requirements and run on one hardware system.

SIMATIC ProTool/Pro CS offers an extended range of functions, which has become possible as a result of a standardized operating system platform:

- The new screen objects simplify the creation of process screens considerably. Simple vector graphics can be created and dynamically updated directly in ProTool/Pro CS. Graphics from numerous other graphics programs can be integrated in a project. The user interface can be set out with a Windows® look and feel familiar to many users.
- Archiving enables process data, such as tags and messages, to be buffered over long periods. The amount of data that can be archived depends on the size of the hard disk.
- Expand the functionality of ProTool/Pro RT: Visual Basic scripts (VB Script) enable the implementation of your own functions.
- Optimized screen objects for touch-based operation enable operation without a keyboard via operating unit touch panels.

- The screen object *Recipe view* enables easy and quick handling of recipes and data records with a minimum of process configuration requirements. A specific system can be mapped in *Recipe screens* and the user interface individually laid out for editing data records.
- The configuration software is now even easier to use. Readily available screen objects, e.g. to display and edit recipes, messages and passwords or for system diagnostics in respect of PLCs, simplify the creation of individual screens.
- Menu options are available with which to convert existing projects for a new target device. Use the Clipboard to copy sections from existing projects and insert them in a new project.
- Test the configuration without the plant being connected by using the simulator supplied. This means it is no longer necessary to load a configuration on the target system in order to test it.

3.1 Brief Description of Various Objects in a Configuration

Objects in a configuration

A ProTool/Pro project is mainly comprised of screens with which to operate and monitor a machine or plant. It is also possible to configure more objects, such as messages, archives, recipes and scripts. Links are established to the PLC is made by means of tags. The operating unit displays values from the PLC and accepts values entered manually.

3.1.1 Screens

The process is visualized by means of screens. Screens show the operator the current process status in the form of numerical values, bar graphs and trend curves or in the analog displays. The current position of a production process can be displayed by means of dynamic screen objects.

The configuration software contains screen objects, listed in the table below, which can be used to create screens.

Screen object	Description
Graphic	Graphics can be used in the configuration, for example, to display the system or as explanatory symbols for display and operating elements which have been configured.
Text	Texts are used in the configuration to label display and operating elements, for example. Texts cannot be modified on the operating unit. The importance of different texts within a screen can be emphasized by using different fonts and formats. Texts can be configured to cover several lines and in different languages.
Input field	An input field is used to enter values that are transferred to the PLC. Either numerical or alphanumerical values can be entered. Depending on the limit values configured, inputs are rejected that are not within the respective specified range of values. The input can be protected by means of a password.
Output field	An output field displays current values from the PLC in numerical or alphanumerical form.

Screen object	Description
Symbolic output field	A symbolic output field displays current values from the PLC as plain text. **Example** Instead of the values `0` and `1` the symbolic output field displays the texts `Motor OFF` and `Motor ON`.
List box	The list box is used to enter a value selected from a list, not physically entered character by character. This enables a motor to be switched on and off using the two entries `ON` and `OFF`.
Date/Time	This screen object is used to display and enter the calendar date and time. The way the date and time are displayed depends on the language set on the operating unit.
Graphic list	A graphic list displays current values from the PLC in the form of a graphic. **Example** Instead of the values `0` and `1`, the graphic list displays graphics which represent a closed and an open valve.
Vector graphics	The following vector graphic objects can be configured: • Line • Rectangle/Square • Rounded rectangle/square • Circle/Ellipse • Polyline/Polygon These objects are combined to form vector graphics with simple, basic geometrical shapes in the configuration. The type, color and width of the lines and the transparency, fill color, radius of rounded corners etc. can be configured as desired.
Button	A button is a virtual key on the operating unit screen that can be assigned one or more functions, depending on the configuration. When the button is pressed, the functions configured for the event *Press* are triggered. When the button is released, the functions configured for the event *Release* are triggered.

Screen object	Description
Status button	A Status button is a display and operating element which has one of two states: *Touched* and *Untouched*. The states can be indicated by means of text or graphics. The Status button can be configured to be locking (switch function) or non-locking (keying function).
Switch	A switch serves to enter and display a binary status. It can only be switched on or off.
Invisible button	An invisible button is a transparent button that is not displayed on the operating unit. If invisible buttons are positioned, for example, on a graphic, only parts of this graphic can be operated; a motor or valve for example. When an invisible button is pressed, the functions configured for the event *Press* are triggered. When the button is released, the functions configured for the event *Release* are triggered.
Trend display	A trend display provides a particularly clear representation of process data when displayed as a continual progression. Several different trend curves can be displayed simultaneously in the trend curve display, e.g. current and archived trend curves.
Bar graph	Bar graphs present a value from the PLC in the form of a rectangular area. This makes it possible to recognize from a single glance at the operating unit how far away the current value is from the limits or whether a specified setpoint has been reached. Bar graphs are used, for example, to display fill levels or quantities. The direction, scaling, bar and background colors, and labeling of the Y axis can be configured as desired. Lines can also be displayed to mark limit values.
Message view	Special filter criteria for displaying the volatile message buffer and/or the message archive are configured in the message view.
Simple message view	A simple message view can provide a subset of the functionality of a message view. It can be used, for example, to simply realize a message line in a screen.

Screen object	Description
Status/Force	Status/Force enables direct access to values in the connected PLC (SIMATIC S5 and SIMATIC S7) via the operating unit and to read and write them. PLC operands can be monitored and changed without having to connect an additional programming unit or PC to the PLC. This is particularly useful during the testing and commissioning phase of your configuration.
Password list	The password list can be used to display, enter and modify passwords on the operating unit.
Recipe view	A recipe view can be used to create, save and transfer data records on the operating unit.
Slider control	Use a slider control to enter and display numerical values in analog form. To enter values, move the slider to the required position. When used as a display element, the value is represented by the position of the slider.
Analog display	An analog display indicates numerical values by means of a pointer instrument.
Digital/Analog clock	A digital/analog clock enables the system time to be displayed either as digits or as a traditional clock with hands.

Information on operating the screen objects is provided in Chapter 6.

3.1.2 Messages

Message classes

Messages indicate control-process events and states on the operating unit. ProTool/Pro differentiates between the following message categories:

- **Event Messages**
  indicate a status in the process, for example, `Motor ON`. Event messages are configured.
- **Alarm Messages**
  indicate an equipment failure, for example, `Motor temperature too high`. Alarm messages are configured. Alarm messages must be acknowledged due to their critical nature.
- **System messages**
  are triggered by the operating unit. They are not configured. System messages indicate, for example, incorrect operations or communication faults. A selection of important system messages for Windows-based systems is provided in Appendix A.
- **S7 system messages**
  provide information on the status of the SIMATIC S7. They are not configured in the ProTool/Pro CS configuration software. Refer to the S7 manual for the error number indicated on the operating panel to determine the cause of the error.

ALARM_S

ALARM_S is an active message procedure. If an alarm occurs, the CPU actively issues the respective message to all the network participants which are logged on. This means that the operating unit is relieved of continuous polling of the message area. ALARM_S messages are not configured in ProTool/Pro CS but in STEP 7. The message numbers are automatically assigned during configuration in STEP 7. The unique assignment of the message text is made according to these numbers.

The display of ALARM_S messages on the operating unit can only be configured when a SIMATIC S7 PLC is used and the ProTool/Pro CS configuration software has been integrated in STEP 7.

Buffering messages

All message events (arrived, departed, acknowledged) are stored in an internal volatile buffer. This buffer can contain 1024 message events. If a message archive has been configured, the message events are also stored in this message archive. The message archive capacity is only restricted by the storage medium.

Display messages

The events stored in the message buffer can be displayed according to different criteria. The following predefined objects are available for display purposes:

- Message line (refer to Page 6-12)
- Message window (refer to Page 6-12)
- Message page (refer to Page 6-14)
- Message buffer (refer to Page 6-15)
- Message view
  - Message view with full functionality (refer to Page 6-16)
  - Simple message view with restricted functionality (refer to Page 6-17)

3.1.3 Tags

Definition

Tags are fixed memory locations on the operating unit into which values are written and/or read. The actions can be initiated from the PLC or by operations executed on the operating unit.

Global and local tags

A fundamental distinction is made between the following types of tag:

- **Global tags**
  Global tags are process tags. They are used to establish a connection to the PLC. An address must be assigned in the PLC for each global tag. The operating unit accesses this address to write to or read from it.
- **Local tags**
  Local tags have no connection to the PLC. They are only available in the operating unit. Local tags are created in order, for example, to enter limit values via the operating unit.
- **VB script tags**
  Internal script tags must be defined with the DIM instruction and are only valid within the VB Script procedure.

3.1.4 Functions

Purpose

The ProTool/Pro CS configuration software provides a range of functions which can be used in a project. Functions serve to:

- set up the process on a process-specific basis
- control the process
- utilize properties of the operating unit
- define system settings on-line on the operating unit

Using functions

Functions are linked to objects within the project, e.g. to buttons, keys, fields or screens. In addition, events must be defined that trigger the functions, for example “Press button” or “Release button”.

Not every function is available for each object. ProTool/Pro CS only provides those functions in the selection list which can actually be used with the particular object being configured.

When configuring functions, it is normally necessary to enter input parameters. For example, in the case of the function *Select Screen*, an input parameter is the name of the screen to be opened.

3.1.5 Printing

Print functions

The following print functions are available in Online mode:

- **Hardcopy**
  If the *Hardcopy* function is implemented in the configuration, the screen currently displayed can be printed out.
- **Print messages**
  Each message event which occurs (arrived, departed, acknowledged) is logged via the printer.
- **Print protocol**
  (Refer to Chapter 3.1.7)
- **Print message buffer**
  (Refer to Chapter 3.1.7)

3.1.6 Archiving

Purpose

Different archives can be set up for message events and tags:

- **Message events**
  these relate to arriving, departing and acknowledging in the case of alarm messages
- **Tags**
  these can be assigned to a previously defined archive during configuration. During the process, it is necessary to specify when the value of the tag should be written to the archive.

Alternatively, it is possible to specify the name of a file or an existing database for the archives.

Archive storage in a CSV file

ProTool/Pro RT enables archives to be stored in a CSV file. In CSV format, table columns are separated by hyphens and table rows are terminated by a line feed. This enables archive data to be evaluated or edited easily, e.g. using an external text editor or a spreadsheet program.

In order to store the archive data in a CSV file, a directory must be specified in the ProTool/Pro CS configuration software. The storage location is thus referenced.

Archive storage in a database

ProTool/Pro RT also enables archives to be stored directly in a database instead of a file. This means that the entire functionality of the database is available for further processing and evaluating the archive data. The following databases have been tested and approved for ProTool/Pro RT:

- MS Access 97
- MS SQL Server 6.5

In order to store archive data, a so called *Data Source Name* (DSN) must be specified in the ProTool/Pro CS configuration software instead of a directory name. The DSN is provides a precise reference to the database and its location.

The following example emphasizes the necessary steps when using MS Access:

Step	Procedure
1	**Configuring the archive in ProTool/Pro CS** • Select the *Archive* dialog, *Settings* tab, *Database* memory location for the archive to be stored in a database. • Enter the name in *Data Source Name* under which the archive should be registered. • Enter the size of the archive and select the option *FIFO buffer*.
2	**Configure the database on the runtime computer** • Call in the ODBC32 configuration program from the Windows Start menu under *Settings* → *Control Panel*. • Insert a new User DSN by using the *Add* button. The required database driver must be selected. • Enter the DSN configured in ProTool/Pro CS in the dialog which appears. This dialog is specific to the database. • No other settings are necessary for MS Access. • More settings must be defined for MS SQL servers. Please refer to the database manual for information on these settings.

Note

The number of possible archives can also be restricted by the databases used, e.g. by the configuration, license, etc.
Please refer to the database manual for information on this.

3.1.7 Protocols

Application

Protocols are used to document process data and completed production cycles. The ProTool/Pro CS configuration software defines the content and layout of the various protocols and configures the event which should trigger protocol printout.

In this way, for example, it is possible to configure a protocol which is printed at the end of a shift in order to document non-production times. It is also possible to configure a protocol which can be used for documentation purposes within the scope of product or quality tests.

Triggering events

Printout of the protocol during runtime is triggered either automatically (e.g. via a scheduler) or manually (e.g. via a function key or softkey). The following events can be configured to trigger printout:

- Scheduler
- Softkey/Function key
- Modification of a tag value
- Script

Print message buffer

A protocol can be configured so that it can be used to print the message buffer contents. The following can be configured: the message categories to be printed, the columns (message number, date, time, message text, etc.) and sorting (most recent or oldest message first).

Special printing features

- In order that the protocol is correctly printed, the printer connected during runtime must support the paper format and layout of the protocol.
- In the protocol, a tag value is read out and printed at the moment of printing. In the case of protocols covering several pages, there may be a longer period of time between printing the first and last page. Therefore, it is possible that the same tag is assigned a different value on the last page than on the first.

3.1.8 Scripts

Purpose

ProTool/Pro CS provides an interface for scripting with Microsoft® Visual Basic Script (VB Script). The VB scripts can be used to extend the configuration software by adding customized functions. VB scripts are used similarly to functions.

Documentation

The detailed Microsoft® documentation on VB scripts is contained within the scope of the ProTool/Pro CS configuration software supplied.

3.2 Connecting to the PLC

Overview

Table 3-1 provides an overview of the connection options of the SIMATIC ProTool/Pro RT runtime software with various PLCs:

Table 3-1 ProTool/Pro RT connection options

SIMATIC S5 via AS511
• S5–90U • S5–95U • S5–100U (CPU 100, 102, 103) • S5–115U (CPU 941, 942, 943, 944, 945) • S5–135U (CPU 928A, 928B) • S5–155U (CPU 946/947, 948)
SIMATIC S5 via PROFIBUS-DP 1)
• S5–95U L2-DP Master • S5–115U (CPU 943, 944, 945) • S5–135U (CPU 928B) • S5–155U (CPU 946/947, 948)
SIMATIC S7 via PPI
• S7–212
SIMATIC S7 via MPI
• S7–200 (besides S7–212) • S7/M7–300 (all CPUs) • S7/M7–400 (all CPUs)
SIMATIC S7 via PROFIBUS-DP 2)
• S7–200 (all CPUs with integrated PROFIBUS-DP interface) 3) • S7/M7–300 (all CPUs with integrated PROFIBUS-DP interface) 3) • S7/M7–300 with CPU342–5 3) • S7/M7–400 (all CPUs with integrated PROFIBUS-DP interface) 3) • S7/M7–400 with CPU443–5 3)
SIMATIC S7 via SIMATIC WinAC 4)
• Internal communication
SIMATIC 505 via NITP
• Point-to-point connection via RS232/RS422
SIMATIC 505 via PROFIBUS-DP 5)
• All CPUs via CP5434–DP

Table 3-1 ProTool/Pro RT connection options, continued

OPC [6]
• Client/Server
Allen Bradley via DF1, DH+ (KF2) and DH485 (KF3)
• PLC-5 • SLC 500
Mitsubishi
• FX
Telemecanique via Adjust and Uni-Telway
• TSX

1) Special function block required (see User's Guide entitled *Communication for Windows-based Systems*)
2) ProTool/Pro RT is an active node; communication takes place using the S7 protocol
3) Refer to Catalog ST70
4) Only with Windows® NT
5) Special application required (see User's Guide entitled *Communication for Windows-based Systems*)
6) Only with Windows® NT and Windows® 2000. Not for OP 37/Pro

Information on how to link the software to the various types of PLC can be found in the user's guide entitled *"Communication for Windows-based Systems"*.

4 Requirements for Commissioning

Which components do you need?

The *SIMATIC ProTool/Pro* CD contains both the configuration software for all operating units and the runtime software to run the configuration. If the configuration should be run on an operating unit without the runtime software being installed at the factory (e.g. PC or SIMATIC Panel PC), both the runtime software and the authorization must have been installed on the system beforehand. The authorization for PCs must be ordered separately as a license disk.

The license is subdivided according to the number of process tags, known as “power tags”. A process tag contains a connection to the PLC. Licenses are available for power tags with 128, 256, 512 and 2048 tags. In addition, upgrades (power packs) are available for upgrading to a greater number of power tags.

4.1 Scope of Delivery

Operating units supported

SIMATIC ProTool/Pro supports all SIMATIC operating units and Windows-based PCs. These operating units are divided into the following groups:

- **Text Displays**
  TD 17
- **Text-based display operator panels**
  OP 3, OP 5, OP 7, OP 15A, OP 15C, OP 17
- **Graphic display operator panels**
  OP 25, OP 27, OP 35, OP 37
- **Touch panels**
  TP 27-6, TP 27-10, TP 37
- **Windows-based systems**
  - TP 170A, MP 270, OP 37/Pro
  - SIMATIC Panel PCs, e.g. FI 25, FI 45, PC 670, PC 670T
  - Standard PC
- **C7 units**
  C7-621, C7-623, C7-624, C7-626, C7-633, C7-634

The subsequent descriptions in this guide only relate to the following Windows-based systems:

- OP 37/Pro
- SIMATIC Panel PC
- Standard PC

For detailed descriptions of the hardware and operation of the SIMATIC operating units MP 270 and TP 170A, please refer to the respective equipment manual. An overview of the SIMATIC HMI documentation available is provided in the Appendix B of this guide.

Supported PLCs

An overview of the runtime software connection options to various PLCs is provided in Chapter 3.2.

4.2 System Requirements for PCs

Operating system

SIMATIC ProTool/Pro RT can be run under the following operating systems:

- Microsoft® Windows® 95 with Service Pack 1 (Build 950a) or higher
- Microsoft® Windows® 95 OSR 2 (Build 950b) or higher
- Microsoft® Windows® 98
- Microsoft® Windows® 2000
- Microsoft® Windows® NT 4.0 with Service Pack 4 or 5

Note

Service Pack 1 must not be installed on a Windows 95® OSR 2 (Build 950b) or higher.

If the required Microsoft® Service Pack is not available on the PC, it can be installed directly from the *SIMATIC ProTool/Pro* CD.

Hardware

The PC hardware must fulfill the following requirements in order to operate the ProTool/Pro RT runtime software:

Hardware	Windows® 95/98		Windows® NT 4.0		Windows® 2000	
	Minimum	Rec.	Minimum	Rec.	Minimum	Rec.
Processor	Pentium	Pentium 166 MMX	Pentium 133	Pentium 200 MMX	Pentium 200 MMX	Pentium II 366 MHz
Graphic	VGA	PCI SVGA with hardware acceleration	PCI VGA	PCI SVGA with hardware acceleration	PCI VGA	AGP
Resolution	640 × 480	800 × 600	640 × 480	800 × 600	640 × 480	800 × 600
RAM [1]	16 Mbytes	≧32 Mbytes	32 Mbytes	≧64 Mbyte	64 Mbytes	≧128 Mbyte
Hard disk (free memory space) [2]	≧100 Mbyte		≧100 Mbyte		≧100 Mbyte	
Disk drive	3.5” / 1.44 Mbytes		3.5” / 1.44 Mbytes		3.5” / 1.44 Mbytes	
CD-ROM	–	For software installation	–	For software installation	–	For software installation

1) The amount of RAM required mainly depends on the size of the project, which is largely dependent on the size of the graphics used.

2) Without taking archives into account. In addition to the space for ProTool/Pro RT, Windows® also requires a certain amount of free hard disk space, i.e. memory space must be reserved for the swap file. The following equation has proved applicable:
Size of swap file = 3 × size of RAM.

For further information, please refer to the Windows® documentation.

4.3 Electrical Installation

Connecting an OP 37/Pro to the PLC

The OP 37/Pro is connected to the PLC via the IF1A or IF1B interface. The interface to be used depends on the design (RS232, RS422 or RS485).

Table 4-1 indicates which PLC can, in principle, be connected to which interface of the OP 37/Pro. For more detailed information on this, please refer to the *OP 37/Pro Equipment Manual*.

Table 4-1 Using the OP37/Pro interfaces

PLC	OP 37/Pro interface
SIMATIC S5	IF1 A
SIMATIC S7	IF1 B In the OP 37/Pro BIOS, use the *Integrated Peripherals* mask to set the *Internal MPI/DP* entry to `IRQ5` (presetting). This activates the ASPC2.
SIMATIC 505	IF1A or IF1B If the IF1B interface is used, change the interface setting in the OP 37/Pro BIOS. This is carried out in the *Integrated Peripherals* screen under the *Serial 1* entry.
Allen Bradley via • DF1 • DH+ (via KF2 module) • DH485 (via KF3 module)	IF1A or IF1B If the IF1B interface is used, change the interface setting in the OP 37/Pro BIOS. This is carried out in the *Integrated Peripherals* screen under the *Serial 1* entry.
Mitsubishi FX	IF1A or IF1B If the IF1B interface is used, change the interface setting in the OP 37/Pro BIOS. This is carried out in the *Integrated Peripherals* screen under the *Serial 1* entry.
Telemecanique TSX	IF1A or IF1B If the IF1B interface is used, change the interface setting in the OP 37/Pro BIOS. This is carried out in the *Integrated Peripherals* screen under the *Serial 1* entry.

Detailed information on connection to the PLC and cables to be used is provided in the online help to the ProTool/Pro CS configuration software and in the *Communication for Windows-based Systems user's guide*.

Connecting a PC to the PLC

The PC is connected to the PLC via one of the interfaces COM1 to COM4. Please refer to the hardware manual provided by the manufacturer for instructions on how to carry out electrical installation of your PC. A communications processor is required to connect the PC to SIMATIC S7.

Table 4-2 indicates which communications processors are approved for use with the PC.

Table 4-2 Approved communications processors

Communications processor	SIMATIC S5 via PROFIBUS-DP	SIMATIC S7
CP5611 1)	✓	✓
CP5511 1)	✓	✓
CP5412	–	✓

1) Installation instructions can be found on Page 5-8

Table 4-3 indicates the basic options for connecting the PC to the PLC. Detailed information on connection to the PLC and cables to be used is provided in the online help to the ProTool/Pro CS configuration software and in the *Communication for Windows-based Systems* user's guide.

Table 4-3 Using the PC's interfaces

PLC	Interface on PC
SIMATIC S5 via AS511	COM1 to COM4 An RS232/TTY converter cable is required.
SIMATIC S5 via PROFIBUS–DP	Via communications processor (see Table 4-2)
SIMATIC S7	Via communications processor (see Table 4-2)
SIMATIC 505	COM1 to COM4
OPC	Network card
Allen Bradley via • DF1 • DH+ (via KF2 module) • DH485 (via KF3 module)	COM1 to COM4
Mitsubishi FX	COM1 to COM4
Telemecanique TSX	COM1 to COM4 with RS485 interface card

Commissioning ProTool/Pro Runtime

5

Initial startup

The procedure for commissioning is dependent on whether the operating unit is a ready-to-operate unit with the runtime software installed at the factory (e.g. OP37/Pro, FI 25, FI 45) or a PC on which the runtime software must be installed by the user.

- **Ready-to-operate SIMATIC operating unit**

  The ready-to-operate SIMATIC operating units are those in which the operating system and ProTool/Pro RT runtime software are fully installed at the factory. An authorization may not be necessary for the runtime software or it is supplied with the unit, depending on the unit concerned.

- **SIMATIC operating unit with preinstalled runtime software**

  When commissioning the SIMATIC operating units PC 670 and PC 670T, the runtime software must be installed from the operating unit hard disk using the Setup program. An installation CD is not necessary.

  Authorization for the runtime software is acquired with the operating unit; it is enclosed with the unit.

- **PC without runtime software**

  If a PC is used, the runtime software must be installed from the *SIMATIC ProTool/Pro* CD. In addition, an authorization for the runtime software is required for each PC. The authorization must be ordered separately.

Note

The SIMATIC Panel PCs described in this guide are either ready-to-operate systems or unit models with preinstalled runtime software.

This guide does not apply to SIMATIC Panel PCs without preinstalled runtime software.

Procedure

The initial commissioning is organized into three steps. Not all the steps described below are relevant to all the operating units.

Step	Procedure	Operating unit
1	Install and configure the Windows® operating system (Chapter 5.1)	PC
2	Install the ProTool/Pro RT runtime software (Chapter 5.2)	PC SIMATIC Panel PC
3	Download, test and start the project (Chapter 5.5)	All

Save configuration

The operating unit hard disk may cease to function after several years of use in a hostile industrial environment. In order to ensure that all the programs and settings can be reinstalled on a new hard disk without any problems, a detailed description is enclosed with the unit explaining how to make a backup copy of the configuration defined the hard disk.

Carry out the backup procedure according to the instructions set out in the description so that the operating unit is ready for use after replacing the hard disk and installing the backup data.

5.1 Installing and Configuring Windows

The following instructions describe the procedure for installing and configuring Windows®. These steps are necessary for the ProTool/Pro RT runtime software to run correctly. Make a note of all the settings so that the runtime software can be run if the operating unit hard disk needs to be replaced for any reason.

Step	Procedure
1	**Install Windows** (PC only) Information on commissioning Windows® is provided in the Windows manual supplied.
2	**Install service packs** [1] (PC only)

	• **Windows® 95**
	Install Service Pack 1 for Windows® 95; this is contained on the *SIMATIC ProTool/Pro* CD supplied. Start the following program on the CD-ROM:
	`\servicep\win95\deutsch\setup.exe`
	This program guides the user through the installation procedure. This directory contains documents from Microsoft that give a detailed description of the installation procedure.
	• **Windows® NT**
	Install service Pack 5 for Windows NT; this is contained on the *SIMATIC ProTool/Pro* CD supplied. Start the following program on the CD-ROM:
	`\servicep\winnt\deutsch\nt4sp5_i.exe`
	This program guides users through the installation procedure. This directory contains documents from Microsoft, that give a detailed description of the installation procedure.

3	**Install printer driver**
	The ProTool/Pro RT runtime software can be used with any printer for which a corresponding Windows printer driver is available. The printer must be installed under Windows as the default printer because ProTool/Pro RT only accesses the standard printer. No settings have to be made for the printer in the runtime software itself. The printer driver and installation instructions for your printer are supplied by the printer manufacturer. Windows itself actually includes suitable printer drivers for many printers. The printer drivers can be set up via *Start* → *Settings*→ *Printer*→ *New printer*. The printer must be specified as the default printer when installing it.

Step	Procedure
	Define the following settings to enable messages to be printed line by line: **For Windows®95/98:** The `Forward print jobs to printer` option must be set under printer properties. To do this, select the *Properties* dialog of the printer. Click the *Spool Settings* button on the *Details* tab. The dialog *Settings for printing in background* opens, in which to select the *Print directly to the printer* option. **For Windows® NT and Windows® 2000:** The `Print directly to the printer` option must be set under the printer properties. To do this, select the dialog *Properties* of the printer. Click the *Print directly to the printer* option on the *Print job scheduling* tab.
4	**Activate multilanguage support** [2]
	In the case of certain languages with special character sets, such as Greek, Polish, Russian, Slovenian, Czech or Hungarian, the multilanguage support must be activated if Windows®95/98 is used. To do this, select *Start* → *Settings* → *Control Panel*. Activate multilanguage support under *Add/Remove Programs* → *Windows Setup* → *Multilanguage Support.*
5	**Setting the time zone**
	Ensure that the correct time zone is set on the PC on which the runtime software is to run. To set the time zone in Windows, select *Start* → *Settings* → *Control Panel*→ *Date/Time* → *Time Zone*.
6	**Set screen saver** (option)
	The majority of modern monitors no longer need a screen saver, indeed a screen saver can actually be harmful to the CRT. These monitors have a power management function which means they switch themselves off as soon as the video signal has not been changed for a user-defined period of time. A conventional screen saver prevents or at least delays activation of this switch-off function that can lengthen the service life of the screen. However, if a screen saver is required, only the standard screen savers incorporated into Windows are approved for use with ProTool/Pro RT.

1) Not necessary for Windows®98
2) Not necessary for Windows® NT and Windows® 2000

5.2 Install ProTool/Pro RT

Note

Chapter 5.2 is only relevant for operating units in which the runtime software has not been installed at the factory (e.g. PC 670 or PC).

5.2.1 SIMATIC Panel PC 670 and PC 670T

Installation

All the files required to install the runtime software are already contained in the Backup directory on the operating unit hard disk. An installation CD is not necessary.

Proceed as follows to install the runtime software using the Setup program:

Step	Procedure
1	Access the Backup directory and start the Setup program on *Disk1*.
2	Follow the installation instructions displayed on the screen and
3	install the license when prompted.
4	Start up the unit again.

5.2.2 PC Without Runtime Software

Condition

The ProTool/Pro RT runtime software is contained on the *SIMATIC ProTool/Pro* CD. The runtime software requires a license to be able to run it. This must be ordered separately. If no license has been ordered, ProTool/Pro RT can only run in Demo mode. When running in Demo mode, a message appears at regular intervals stating that the runtime software is not licensed.

A detailed description on installation of the license disk is provided in the documentation enclosed entitled *Start-up guide Copy Protection*.

Installation

Proceed as follows to install the runtime software:

Step	Procedure
1	Install the runtime software from the CD. If the 'autorun' function for your CD-ROM drive is activated, the CD browser starts automatically after inserting the CD. If 'autorun' is not active, start the `install.exe` program in the root directory of the CD-ROM.
2	Use *Language* to select the user interface language of the Setup program.
3	Select *Installation* and start the installation with *ProTool/Pro RT*.
4	Follow the installation instructions displayed on the screen and
5	install the license when prompted. If there is no license available for the runtime software during installation, it can be loaded later. Call in the `authorsw.exe` program on the license disk and install the license.

5.2.3 Communication

Connection to the PLC

ProTool/Pro RT supports communication with the PLCs listed in 3.2. Connect the operating unit to the PLC in order that the project can also be tested when connected to the PLC. The simulator can also be started to test the project (Page 5-11). In this case, there is no need for a connection to the PLC.

Communication with PROFIBUS-DP

If the ProTool/Pro RT runtime software is to be run on SIMATIC S7 using the profile PROFIBUS-DP and no connection is established, it is possible that the bus parameters are incorrect.

Proceed as follows to reset the parameters to their default values:

Step	Procedure
1	Activate the Start menu and select *Settings* → *Control Panel* and open the *Set PU/PC interface* dialog. *PROFIBUS* must be selected in *Component configuration used*.
2	Click on the *Properties* button. In *Network Parameters*, *DP* is selected as the profile.
3	Select *Universal (DP/FMS)* and confirm the selection with OK.
4	Click on the *Properties* button again. In *Profile*, select *DP* again and confirm the selection with OK.

MPI setting

Step	Procedure
1	Activate the Start menu and select *Settings* → *Control Panel* and open the *Set PU/PC interface* dialog.
2	Press the *Properties* button and set the parameters for the operating unit on the *MPI Network* tab control so that it is the only master on the bus. **Note** If several operating units must be operated via MPI, ensure that only one unit is the master on the bus.

Detailed information on communication between the PLC and operating unit is provided in the *Communication for Windows-based Systems* User's Guide.

5.3 Retrofitting a Communication Processor

Purpose

The steps described below are only necessary if a **CP5511** or **CP5611** communication processor is retrofitted to enable connection to a SIMATIC S7.

Recommended procedure

First, install the runtime software before installing the communications processor. Proceed as follows:

Step	Procedure
1	Install the Runtime software.
2	Switch off the operating unit.
3	Slot in the communications processor.
4	Start up the operating unit again. The communications processor is detected and configured automatically (Plug&Play function) when the PC is booted.

If the communications processor is installed before the runtime software, the communications processor cannot be activated by the installation program.

Remedy:

Step	Procedure
1	Activate the Start menu, select *Settings* → *Control Panel*→ *System* and select the device manager.
2	Remove the unrecognized component, *PCI Network Controller*, from the list.
3	Start up the operating unit again. The communications processor is detected and configured automatically (Plug&Play function) when the PC is booted.

5.4 Settings for the OP 37/Pro

Settings in BIOS

Different settings must be defined in the BIOS of the OP 37/Pro, according to the connection used. In the case of serial connections, the corresponding COM interface must be activated.

Detailed information on this is provided in the *OP 37/Pro* Equipment Manual, *Communication for Windows-based Systems* User's Guide and in the online help for the ProTool/Pro CS configuration software.

Direct key module

The optional direct key module for the OP 37/Pro is not supported by the ProTool/Pro RT runtime software. The hardware based control of the direct key module outputs via the OP 37/Pro keyboard can be used, however, without restrictions.

5.5 Downloading, Testing and Commissioning the Project

5.5.1 Scenarios

Overview

ProTool/Pro RT is the application with which a project can be run on-line. However, this project must first be created with the ProTool/Pro CS configuration software. Detailed information on how to create projects can be found in the online Help of the ProTool/Pro CS configuration software and in the *ProTool Configuring Windows-based Systems* User's Guide.

A number of scenarios are possible for testing the project:

- The ProTool/Pro RT runtime software is installed on the same PC as the ProTool/Pro CS configuration software (Page 5-10).
- The ProTool/Pro RT runtime software is installed on a different PC from the ProTool/Pro CS configuration software. In this case, the project must be downloaded from the configuration computer to the target PC (Page 5-10).
- The project runs on the OP37/Pro. In this case, the project must be downloaded from the configuration computer to the OP37/Pro.
- The project is first tested using the simulator. The project can be tested on the same PC as that on which the configuration software is installed (Page 5-11).

Configuration software and runtime software are on the same PC

Create the project, for example, under the name `Myproject.pdb`, and then compile it. Once compilation has been completed, a compiled file with the extension `*.fwd` is stored in the same directory as the project file (for example, `Myproject.fwd`). Double-click this file to start the ProTool/Pro RT runtime software with this compiled project.

If the PC is connected to the PLC,the project can be tested immediately in connection with the PLC.

Information on how to simulate the project without a PLC using the simulation program is provided in Chapter 5.5.2.

Configuration software and runtime software are on different systems

Create the project, for example, under the name `Myproject.pdb`, and then compile it. Once compilation has been completed, a compiled file with the extension `*.fwd`, e.g. `Myproject.fwd` is stored in the same directory. Windows provides the following options for downloading the compiled files:

- Copy the `*.fwd` file on to a floppy disk and then from the disk to the target system (PC). If the project is too large for one disk, use the disk transfer option.
- Disk transfer:
  In ProTool/Pro CS, select the menu option *File* → *Download* and select drive *A:* in the *Destination Directory* dialog. The operation-capable project file is transferred to one or more disks in a compressed form.

  In order to decompress the compressed project file on the target device, activate the Start menu and select *SIMATIC* → *ProTool/Pro RT* → *ProTool/Pro Disk Transfer*. Select the compressed file, e.g. `Myproject.f00` in the Transfer dialog and enter the destination directory in which the decompressed project file should be copied.
- Copy the file `*.fwd` file from Windows® 95/98 to the target system via a parallel or serial cable using the Direct Cable Connection option.
- Copy the file `*.fwd` file from Windows ® NT or Windows® 2000 to the target system via a parallel or serial cable using the Dial-Up Connection option.
- Copy the `*.fwd` file to the target system via a network.

Double-click on the compiled project file to start the runtime software on the target system.

5.5.2 Simulation of a Project

Function

The scope of delivery in respect of the ProTool/Pro RT runtime software contains a simulator with which to test the project without a PLC. The simulator is a separate application. It enables the user to test whether the screens, screen objects, messages, etc. which have been configured function correctly.

The simulator simulates the PLC and

- modifies the values of configured tags in a definable way:
  e.g. incrementally, decrementally, sinusoidally, randomly or by shift bits
- sets bits in bit-by-bit organized area pointers[1)]:
  By shifting the bits in the two area pointers *Event Messages* and *Alarm Messages*, it is possible, for example, to trigger all the configured messages on the operating unit.

A condition for simulation is that the ProTool/Pro RT runtime software is also installed on the configuration computer.

Principle

The following steps describe the basic procedure for simulating a project.
Step-by-step instructions are provided in Table 5-1.

1. First of all, create a project as is to run later when connected to the PLC.
2. Save and compile the project.
3.  Start the simulator directly from the running configuration software by clicking on the icon depicted or via menu options *File* → *Test* → *Start Simulator*. If the simulator is started without having compiled the project beforehand, compilation is automatically triggered.
4. When the project is simulated for the first time, the simulator is started with a new, empty simulation table. If a simulation table already exists for the project, it is opened.

   All the settings are saved in simulation table `*.sim` defined for the simulation of tags and area pointers (refer to Figure 5-1).
5. Now manipulate the project tags and area pointers in the simulation table.
6. It is possible to watch how the values change by switching the task from the simulator to the project.

1) The simulator can simulate bit-by-bit organized area pointers (except trend transfer area), e.g. event messages and alarm messages. The simulation of byte-by-byte oriented area pointers (e.g. data mailbox or PLC job) is not possible.

Note

- Not all the configured tags are provided in the simulation table. Only referenced tags are available for the simulation, i.e. only those tags used in the project e.g. in a screen object.
- Since the simulator can only simulate the project offline, i.e. without a connection to the PLC, the data formats are converted to internal ProTool/Pro CS formats. Therefore, PLC-specific data formats cannot be realized.

Simulation table

Tag	Data Type	Current val.	Format	Write cyle (s	Simulation	Set value	MinValue	MaxValue	Cycle	Start
VAR_1	UINT	0000	Hex	1.0	Sine		0000	FFFF	10.000	☐
VAR_2	INT	0000 0000 000	Bin	4.0	Random		1000 0000 00	0111 1111 11		☐
VAR_3	INT	0	Dec	2.0	Increment		-32768	32767	10.000	☐
VAR_4	REAL	0	Dec	10.0	<Display>		-3.402823E+3	3.402823E+3		☐
VAR_5	INT	0000	Hex	2.0	Shift bit					☐
VAR_7	INT	0000	Hex	4.0	Decrement		8000	7FFF	10.000	☐
---										☐
---										☐
VAR_13	STRING		Text	1.0	<Display>					☐

Figure 5-1 Simulation table (example)

Figure 5-1 illustrates an example of a simulation table. All the settings defined in this table for simulating the project can be saved in a file. In this case, select *File* → *Save* in the simulator and enter a file name (`*.sim`).

This means that the project can be simulated again at a later date with saved settings. A condition for this is that the tags and area pointers to be simulated in the project have not be altered in the meantime.

Operate simulator

The following instructions provide a detailed description of the procedures for operating the simulator.

Table 5-1 Simulator operation, step-by-step

Step	Procedure
1	Start the simulator directly from the running configuration software by clicking on the icon depicted or via menu options *File* → *Test* → *Start Simulator*. 
2	When the project is simulated for the first time, the simulator is stated with a new, empty simulation table. If a simulation table already exists for the project, this is opened. All the settings are saved in simulation table `*.sim` defined for the simulation of tags and area pointers (refer to Figure 5-1). **Note** Use the two menu options *File* → *Open* and *File*→ *Save* to open and save the simulation tables in the simulator. This does not open and save the project to be simulated. To do this, use the corresponding menu options in the configuration software.
3	Now manipulate the project tags and area pointers in the simulation table. To do this, use the *Tag* column to select all the tags and area pointers to be modified (refer to Footnote 1 on Page 5-11) and observed during the simulation. Click on the following symbol in the last line for each tag to be inserted: 
4	Use the *Format* column to select the data format in which the values should be represented in the table, e.g. Text, Dec, Hex or Bin. The formats available are dependent on the configured data type.
5	Use the *Write Cycle* column to specify the intervals (in seconds) at which the value is to be written in the project. The smallest unit that can be entered is 0.1 seconds.

Table 5-1 Simulator operation, step-by-step, continued

Step	Procedure
6	Use the *Simulation* column to specify the manner in which the value of the tag is to be simulated: • *Sinus* The value of the tag is changed in the form of a sine curve. • *Random* The value of the tag is changed via a random function. • *Incrementation* The value of the tag is continuously increased up to a specified maximum value. The progression of the values corresponds to a positive saw-tooth curve. • *Decrementation* The value of the tag is continuously decreased down to a specified minimum value. The progression of the values corresponds to a negative saw-tooth curve. • *Shift bit* A set bit is continuously shifted one position forward. The previous position is reset each time. This enables all the configured event messages in the area pointer *Event Messages*, for example, to be triggered in succession. • *Display* The current value of the tag is displayed. The simulation types available are dependent on the configured data type.
7	Use the *Set value* column to specify the start value for the simulation. This is a numerical value. If you have selected the *Shift bit* option beforehand in the *Simulation* column, the most significant bit of the value is taken as the initial bit and the subsequent bits are appended after this bit. To set a single value, enter it here, directly.
8	Enter minimum and maximum values in the *MinVal* and *MaxVal* columns, respectively, for the simulation. The sinus curve, for example, is written within the value range defined here.
9	Use the *Period* column to specify the interval, in seconds, in which a tag value should be written in a project, e.g. sinusoidal. The smallest unit that can be entered is 0.1 seconds.
10	If the check box is activated in the *Start* column, the simulation is started with the specified values. After switching the task to project, the value changes are visualized and can be observed. To stop simulation, deactivate the *Start* check box.

Example of a simulation

The example in Figure 5-2 uses a sine curve to illustrate how the values of a tag are written into the configuration in accordance with the settings in the simulator. The following settings have been made in the simulator:

- Set value = 0
- MaxVal = 5
- MinVal = –5
- Write cycle = 10 * 1s
- Period = 100 * 1s

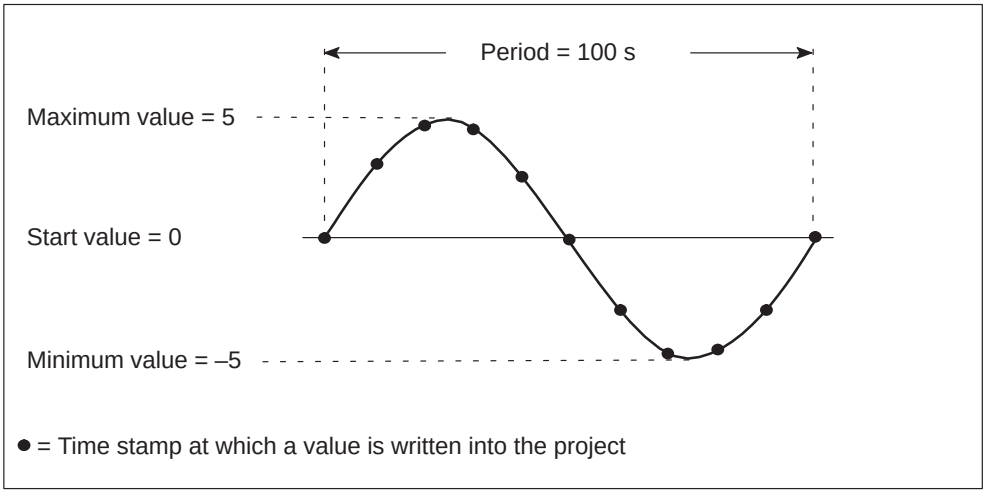


Figure 5-2 Simulating a tag as a sine curve

5.6 Starting a Project

Running a project in online operation

Once a project has been created, there are a number of different options with which to start it. A condition for this is that the compiled project is initially downloaded to the target system in cases where the configuration computer is not simultaneously the target system.

- Double-click on the `*.fwd` file generated. In this way, the ProTool/Pro RT runtime software is started with the selected file.
- Call in the ProTool/Pro RT runtime software under the program group *SIMATIC → SIMATIC ProTool/Pro → SIMATIC ProTool Pro RT*. The project file to be started can be selected when the runtime software is running.
- Call in the ProTool/Pro RT runtime software from the command line. The command could, for example, be as follows:
  `c:\siemens\ptprorun\ptprorun.exe c:\proj\myproject.fwd`
- If a project should be opened directly following startup of the runtime software, the file must be entered in the initialization file `ptprorun.ini`. The initialization file is located in the same directory as the ProTool/Pro RT runtime software. Enter the name of the project in the `[configuration]` section. The line entered could read as follows:
  `LoadConfigFile=MyProject.fwd`

Set up program icon

If the user wants to be able to start the project from the desktop by clicking on the program icon, the following settings must be made:

Step	Procedure
1	Position the mouse on a free area of the desktop and click the right-hand mouse button. Select *New → Link* from the context menu which appears.
2	Click on the *Browse* button in the subsequent dialog and select the program `ptprorun.exe`.
3	Enter a name for the icon in the next dialog which appears.
4	Click on the *Complete* button.
5	Click on the new icon with the right mouse button and select menu option *Properties* from the context menu which appears. Enter the ProTool/Pro RT runtime software and the project to be started in the *Target* field. The call could appear as follows, for instance: `c:\siemens\ptprorun\ptprorun.exe c:\project\myproject.fwd`

Start project when booting the system

In order to automatically run a project each time the system is started, the corresponding entry must be made in the Startup group in Windows. Firstly, create an icon on the desktop as described above and then move this icon to the Startup group by means of the Windows Explorer.

5.7 Further Downloading Options

Set up direct cable connection

A direct cable connection between PCs enables the transfer of files from one PC to another. This method of data transfer can also be used to download a compiled project file. A direct cable connection must be set up on both computers to be connected. The parallel cable required for the direct cable connection can be purchased from Siemens. Alternatively, it is possible to set up a direct cable connection using a standard, commercially available, serial null modem cable.

Tables 5-2 and 5-3 provide a step-by-step description of how to configure the runtime PC (PC on which the configuration runs) and the configuration PC (PC on which the configuration was created) for a direct PC cable connection.

Table 5-2 Setting up a direct connection on the runtime PC

Settings on the runtime PC	
Step	**Procedure**
1	Start the Direct Cable Connection program under *Start* → *Programs* → *Accessories* → *Direct Cable Connection*. [1)]
2	Use the *Direct Cable Connection* dialog box to activate the `Host Computer` option. [2)]
3	Activate *Start* → *Settings* → *Control Panel* → *Network* to check the properties of the communication driver in the tab control *Configuration*. Only `IPX/SPX-compatible protocol` must be activated on the *Bindings* tab of the `Properties` dialog box .
4	Then start the *Direct Cable Connection* program (steps 1 and 2).
5	Select `Parallel cable to LPT1` as the connection setting.
6	In the next dialog box, click the *File and Printer Enable* button.
7	Click on the *File and Printer Enable button once again in the next dialog box that appears for entering the network settings.* Activate the `Other users can access my files` option.
8	The `Password Protection` option in the next dialog box must be deactivated.
9	The runtime PC now monitors the interface and waits for data from the configuration PC.

Table 5-2 Setting up a direct connection on the runtime PC, continued

Step	Procedure
10	Now enable one of the drives or a directory, for example `c:\ptproj`, so that it can be accessed by the configuration PC. To do this, select the desired directory in the Windows Explorer. Click the right mouse button to open the context menu and select the *Enable* menu item. Enter an enable name, for example `PTProj`.

1) If the program is not on the PC, install it before doing anything else. Select *Start* → *Settings* → *Control Panel* → *Add/Remove Programs*. Then select the *Windows Setup* tab, double-click *Communications* and then activate the *Direct Cable Connection* check box.
2) If a dial-up network has not been installed, a prompt appears requesting insertion of the Windows CD-ROM. The dial-up network is installed and the PC may be restarted.

The direct cable connection is already set up on an OP37/Pro. The directory and enable name set up match those specified in Table 5-2 in Step 10. If this directory will not be used, the directories which will be used on the OP37/Pro must be enabled.

The ProTool/Pro RT runtime software is thus installed on the PC. Data can then be downloaded, e.g. the compiled project file. The next step to take is to install and configure the direct cable connection on the configuration PC.

Table 5-3 Setting up a direct connection on the configuration PC

Settings on the configuration PC	
Step	**Procedure**
1	Start the Direct Cable Connection program under *Start* → *Programs* → *Accessories* → *Direct Cable Connection*. [1)]
2	In the dialog *Direct Cable Connection*, mark the option `Guest Computer`. [2)]
3	Activate *Start* → *Settings* → *Control Panel* → *Network* to check the properties of the communication driver in the tab control *Configuration*. Only `IPX/SPX-compatible protocol` must be activated on the *Bindings* tab of the `Properties` dialog box.
4	Then start the *Direct Cable Connection* program (steps 1 and 2).
5	Select `Parallel cable to LPT1` as the connection setting.
6	Connection to the runtime PC is now set up.
7	Once the connection has been set up, a prompt appears requesting the name of the runtime PC. The name (e.g. OP37Pro) is located under *Start* → *Settings* → *Control Panel* → *Network* on the *Identification* tab.

Table 5-3 Setting up a direct connection on the configuration PC, continued

Step	Procedure
8	Use Windows Explorer to link a drive with the directory provided on the runtime PC (e.g. `D:\`). To do this, select the Explorer menu option *Options* → *Connect Network Drive*. In this case, it is possible to connect a drive with a network path enabled on the runtime, e.g. `\OP37Pro\PTProj`.
9	Then use Windows Explorer, for example, to simply copy a compiled project file from the configuration PC to the runtime PC. It is also possible to download the compiled project file directly from the ProTool/Pro CS configuration software to the runtime PC. Select the menu option *File* → *Download* and use the *Destination Directory* dialog to select the linked drive (e.g. `D:\`). Subsequently, each time a downloading process is activated, the compiled project file is automatically transferred to the runtime PC.

1) If the program is not on the PC, it must be installed before doing anything else. Select *Start* → *Settings* → *Control Panel* → *Add/Remove Programs*. Select the *Windows Setup* tab. Double-click *Communications* and then activate the *Direct Cable Connection* check box.
2) If a dial-up network has not been installed, a prompt appears requesting insertion of the Windows CD-ROM. The dial-up network is installed and the PC can be restarted.

Setting up a dial-up network connection

The Dial-Up Network provided by Windows®95/98 or the RAS package from Windows®NT and Windows®2000 can be used to set up a virtual network via serial or parallel cables, Internet or modems.

Information concerning the installation of dial-up networks is provided in the Windows documentation. In the case of Windows®95, the Windows®95 Plus package with the communication server must be installed on the runtime PC. In the case of Windows®98, Windows®NT and Windows®2000, all the necessary components are supplied.

Operating ProTool/Pro Runtime 6

6.1 General Operation

Overview

The operation of processes during runtime is dependent on the project created. This chapter only contains general information regarding settings for the runtime software and controlling predefined screen objects. Screen objects provide the user with general system functions. Screen objects can be used in screens implemented in a project and configured according to individual requirements.

Methods of operation

The ProTool/Pro RT runtime software can be operated via a mouse, keyboard or touch screen. In the case of mouse or touch panel operation, it is of particular advantage to integrate buttons, status buttons, switches and hidden buttons in the project. When it is possible to influence a screen object by means of a mouse action, the cursor symbol changes, by means of a button on the PC e.g. by the symbol 

Operating screens via the keyboard

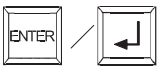
The navigation options indicated in the Table 6-1 are available for carrying out actions on a screen using the keyboard.

The type of cursor control via the keyboard can be defined in the ProTool/Pro CS configuration software (refer to Page 6-6). This guide describes the settings for ProTool versions from V 5.2.

Table 6-1 Operating screens via the keyboard

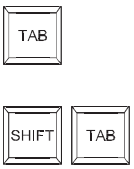
Navigation	PC	OP37/Pro Panel PC
Move to next field right/left	SHIFT → / SHIFT ←	▶ / ◀
Move to next field below/above	SHIFT ↓ / SHIFT ↑	▼ / ▲
Move in field right/left	→ / ←	SHIFT ▶ / SHIFT ◀

- Use the Enter key
  – to apply values (e.g. in input fields)
  – to open list boxes

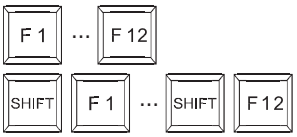


- Use the ESCAPE key to cancel input.

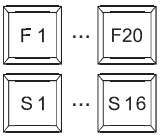
- Use the Tabulator key to access the next screen object which can be acted upon according to the configured tabulator sequence.
  By pressing it simultaneously with the SHIFT key, access is made in the reverse sequence.



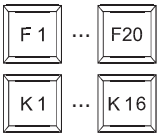
- In order to navigate between screens, for example, the function keys depicted on the right can be assigned functions, e.g. *Select Screen*:



- In the case of the SIMATIC Panel PC, 36 function keys can be assigned global and local functions:



- In the case of the OP37/Pro, 20 function keys can be assigned global and local functions:
  Global functions can be assigned to a further 16 function keys.



Note

If a function key is pressed directly after changing screens, the corresponding function associated with the new screen is triggered before the screen is generated.

Operating Windows via the keyboard

It is possible to control the operating unit operating system via the keyboard, if necessary. Detailed information on this is provided in the Windows manual. Examples of the most important key combinations for the OP 37/Pro and SIMATIC Panel PC are depicted in Table 6-2.

Table 6-2 Operating Windows via the keyboard

Navigation	Operating unit
Open Start menu	CTRL ESC
Display pop-up menu for the marked element	SHIFT F10
Mark all	CTRL A

Table 6-2 Operating Windows via the keyboard, continued

Navigation	Operating unit
Display the properties of the marked element	ALT ENTER
Explorer:	
Change folders	F4
Change display area	F6
Activate menu bar	F 10
Dialogs:	
Continue to next field	TAB
Return to previous field	SHIFT TAB
Open next tab	CTRL TAB
Open previous tab	CTRL SHIFT TAB

Call help text

Help texts can be configured in ProTool/Pro CS for messages, screens and operable screen objects. Help texts provide additional information and operating notes on the operating units. Help text can involve information on permissible value ranges regarding an input field or the cause and elimination of a fault related to an error message.

Proceed as follows in order to call in the configured help text, e.g. for an input field:

Step	Procedure	
	OP37/Pro and Panel PC	**PC**
1	Select the required input field, e.g. using the Tabulator key.	Click on the input field.
2	The LED in the HELP key lights up, indicating that a help text is available. HELP Press the HELP key.	Press the operating element, e.g. function key F1, with which the *Display_Help_Text* function is linked.
3	The help text configured for the input field is displayed on the operating unit in the language set. If a help text has also been configured for the current screen, it is displayed too.	

Language change

The ProTool/Pro CS configuration software enables a project to be stored in numerous languages. Up to 32 of these editing languages can be loaded on the operating unit at any one time. It is possible to switch between the languages loaded on the operating unit online. Following a language change, all language-dependent texts are displayed in the new language.

Language-dependent texts contain, e.g.:

- Messages
- Screens
- Text lists
- Help texts
- Recipes

Conditions for changing languages

In order to change languages on the operating unit during runtime, the following conditions must be fulfilled:

- The selected language must have been loaded on the operating unit. The project languages available during runtime are defined in ProTool/Pro CS under *System → Language Assignment: OP Languages*.
- The *Language* function must be assigned to an operating element, e.g. a function key or button.

The language setting is stored by the operating unit, protected against a power failure. After power supply is resumed, all language-dependent texts automatically appear in the language last set.

6.2 Settings for the Runtime Software

Displaying the configuration on the target system

The ProTool/Pro CS configuration software can be used to define how the compiled project is represented during runtime. The project can be displayed in full screen mode or in a window which is smaller than the screen. In full screen mode, the project takes up the entire screen. The screen no longer contains a window and control elements (e.g. buttons).

In order to use the *Full Screen* view, select the menu option *System* → *Settings* in ProTool/Pro CS. Select *Display* and mark the option *Full Screen*. If the taskbar no longer needs to be displayed, deactivate it under Windows. Activate the Start menu, select *Settings* → *Taskbar* and use the *Taskbar Properties* dialog to deactivate the options *Always on Top* and *Auto hide*.

The full screen view provides more space during configuration as well, since there is no window frame. Therefore, select the full screen setting before beginning with the configuration.

Disable task switching

To prevent the user from calling up other applications during runtime, it is possible to disable the task switching function in ProTool/Pro CS. Select the menu option *System* → *Settings* and activate the options *Lock Task Switching* and *Full Screen*. In addition, deactivate the Taskbar under Windows. Activate the Start menu, select *Settings* → *Taskbar* and use the *Taskbar Properties* dialog to deactivate the options *Always on Top* and *Auto hide*.

Note

If Lock Task Switching is selected, it is essential to assign the function *Exit_runtime* to a key or button in the project. Otherwise, it is impossible to exit from ProTool/Pro RT and Windows. The key combination CTRL + ALT+ DEL is also no longer effective.

Cursor control compatibility (not PC)

The type of cursor control, e.g. within tabular structured screen objects (message view, recipe view and status/force), can be configured. In this case, select menu option *System* → *Settings* in the ProTool/Pro CS configuration software and use the *Settings* dialog to activate or deactivate the option *Cursor Control as with V 5.10*.

Using the new cursor control (check box deactivated), it is possible to navigate within tables and list boxes simply by pressing the cursor keys without having to implement the SHIFT key simultaneously.

Screen saver

- **OP37/Pro**

  A specific screen saver is available for the OP37/Pro which automatically switches off the screen if no entry is made on the OP37/Pro within a defined period. This screen saver is used in order to extend the service life of the back-lighting. The screen saver is active by default.

  Select the screen saver via *Control Panel* → *Display*→ *Screen Saver*. Select the screen saver called *ProTool*.

- **Panel PC, PC**

  The majority of modern monitors no longer need a screen saver, indeed a screen saver can actually be harmful to the CRT. These monitors have a power management function which means they switch themselves off as soon as the video signal has not been changed for a specific period of time, which the user can define. A conventional screen saver prevents, or at least delays, activation of this switch-off function which can lengthen the service life of the screen. However, if a screen saver is required, only the standard screen savers incorporated into Windows are approved for use with ProTool/Pro RT.

Setting the time zone

Ensure that the correct time zone is set for the operating unit. The time zone is set in Windows by calling the Start menu and selecting *Settings* → *Control Panel* → *Date/Time* → *Time Zone*.

6.3 Operating Special Screen Objects

Screen objects

This section provides information on operating the following screen objects:

- Buttons/Switches:
  - Buttons (Page 6-8)
  - Status button (Page 6-9)
  - Switches (Page 6-10)
- List boxes (Page 6-11)
- Messages
  - Message line (Page 6-12)
  - Message window (Page 6-12)
  - Message page (Page 6-14)
  - Message buffer (Page 6-15)
  - Message view (Page 6-16)
  - Simple message view (Page 6-17)
- Bar graphs (Page 6-18)
- Trend display (Page 6-19)
- Sliders (Page 6-21)
- Analog display (Page 6-22)
- Calendar date/time, display and set:
  - Date/Time (Page 6-23)
  - Digital/Analog clock (Page 6-24)
- Password list (Page 6-25)
- Status/Force (Page 6-27)

Information concerning the Recipe View is provided in Chapter 7.3.1.

6.3.1 Button

Purpose

A button is a virtual key on the operating unit screen that can be operated by the mouse or via the touch screen, according to the system.

Functions which have been assigned to buttons can be triggered, for example, by the following, configurable events:

- Clicking
- Pressing
- Releasing

Display

- **Labeling**
  Buttons can be labeled statically or dynamically. In the case of dynamic labeling, the text or graphic on the button changes during runtime according to the value of a configured tag.
- **Operation acknowledgement**
  As soon as the operating element detects a valid operation, it responds with a visual acknowledgement. The acknowledgement, however, does not infer that the required action is actually being executed.

Figure 6-1 illustrates an example of a button when pressed (right) and not pressed (left).

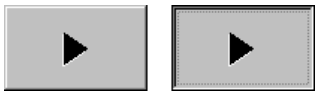


Figure 6-1 Example of a button

Hidden buttons

Hidden buttons are transparent buttons which may lie over graphics, for example. This enables plant parts which are graphically displayed on the operating unit to be operated easily (e.g. a motor or valve).

If a hidden button is selected on the operating unit, its contour becomes visible as long as the button remains selected. The contour enables the user to detect the operable area of the button.

Control

- **Mouse and touch screen**
  Click the mouse pointer on the button or press it on the operating unit touch screen.
- **Keyboard**
  Select the button, e.g. using the cursor keys, and press either the Enter key or Spacebar.

6.3.2 Status Button

Purpose

The Status button is an operating and display element with the two states, *ON* and *OFF*. Status buttons indicate the status of a device which cannot be determined from the operating unit (e.g. a motor). At the same time, it is also possible to change the status of the device concerned on the operating unit.

Behavior

The behavior of the Status button can be configured:

- **Switch**:
  The Status button toggles from one state to the other each time it is operated, and remains in the respective state until it is operated again.
- **Key**:
  When operated, the Status button changes to the *ON* status. It remains in this status as long as it is being pressed. When released, it automatically switches back to *OFF*, its home position.

Functions which have been assigned to the Status button can be triggered, for example, by the following configurable events:

- Change of status
- Pressing
- Releasing

If the status of the Status button changes from the type *switch* due to a modification of the configured tags, none of the described events is triggered.

Display

When the Status button is set to the *switch* type, the two states can be assigned different texts or graphics in ProTool/Pro CS which are displayed on the Status button during runtime.

Figure 6-2 illustrates an example of a Status button when pressed (left) and not pressed (right).

Figure 6-2 The two statuses relate to the Status button when the Switch option is set

Operation

The Status button is operated as a normal button (refer to Page 6-8).

6.3.3 Switches

Purpose

A switch serves for the input and out of a binary status. It can only be switched on or off. It is linked to a tag to do this. The status *OFF* corresponds to the value 0 (a logical FALSE) of the tag linked to the switch. All tag values other than zero (a logical TRUE) are interpreted as the status *ON*.

Behavior

Functions which have been assigned to the switch can be triggered, for example, by the following, configurable events:

- Change of status
- Switch on
- Switch off

If the switch status changes due to a change of the configured tag, none of the events described is triggered.

Display

Figure 6-3 illustrates an example of two switches with different orientation.

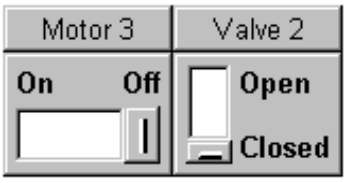


Figure 6-3 Switches with different orientation

Control

- **Mouse and touch screen**
  Point to the moveable switch lever and move it to the opposite position.
- **Mouse**
  Double-click on the mouse in the sliding slot between the two switch statuses.
- **Keyboard**
  Select the switch, e.g. using the cursor keys, and press either the Enter key or Spacebar.

6.3.4 List Box

Purpose

Values are entered in a list box by selection from a list provided (Figure 6-4), not character-by-character.

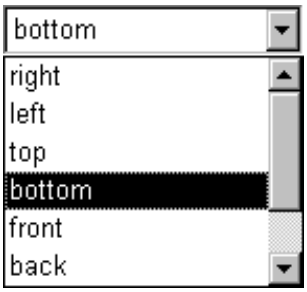


Figure 6-4 List box in opened state (example)

Control

- **Mouse and touch screen**

  Click the mouse pointer in the list box or touch it on the operating unit touch screen. In this case, the selection list opens up immediately. After selecting an element from the list, the selection list is closed and the selected text appears in the list box.

- **Keyboard**

  Select the required list box, e.g. using a cursor key. The field content changes color when the field is accessed.

  The following keys on the SIMATIC operating unit can be used to navigate in the selection list:

Keys	Function
ENTER	• Open selection list • Confirm entry The selection list is closed, the list box remains active
▼ or ▶	Mark the next entry
▲ or ◀	Mark the previous entry
ESC or TAB	Terminate editing The selection list is closed and the original content is reset in the list box. The list box remains active.

6.3.5 Message Line

Purpose

A configured message line is always present, irrespective of the screen selected. The message line displays the last alarm or event message received.

Display priorities

Alarm messages have priority over event messages. If there are no alarm messages, or they have all been acknowledged, the event messages are displayed.

Alarm messages flash to distinguish them from event messages.

6.3.6 Message Window

Purpose

The message window displays all queued messages without a time stamp. It is possible to configure how the alarm messages are sorted. It is also possible to select whether the latest or oldest message is displayed first.

Alarm messages

If one of the display modes *Window/Window*, *Window/Line* or *Window/Off* is configured, the message window for alarm messages opens automatically as soon as an alarm message arrives. Figure 6-5 illustrates an example.

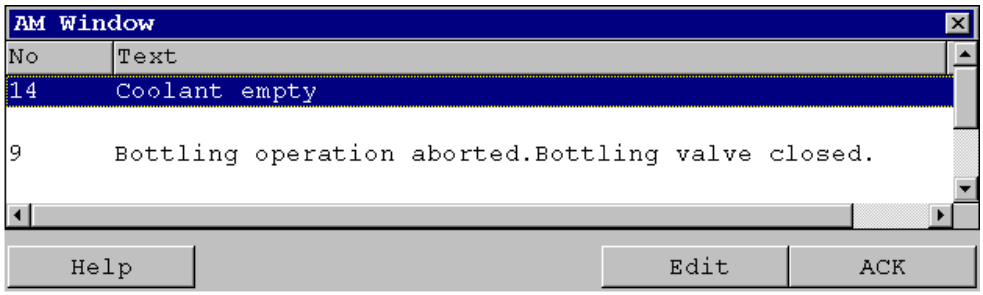


Figure 6-5 Alarm message window (example)

Significance of the buttons

Call help text
Use this button to call in the help text configured for the selected message.

Edit message
Use this button to trigger the function assigned to the `Edit Message` event for the selected message.

Acknowledge alarm messages
Use this button to acknowledge an alarm message that has not yet been acknowledged.

Event messages

In order to be able to open the event message window by means of the mouse or keyboard the function *Display_event_message_window*, for example, must be linked to a function key or button in the project.

System messages

The message window for system messages opens automatically as soon as a system message arrives. The window closes automatically once the configured duration for display has elapsed.

Use the ESCAPE key to close the message window manually.

6.3.7 Message Page

Purpose

The message page displays all queued messages with time stamp. It is possible to configure how the alarm messages are sorted. It is also possible to select whether the latest or oldest message is displayed first. An open message page is constantly updated.

Structure

In order to be able to access the message page for event messages and/or alarm messages from the operating unit, the following functions must be configured:

- for event messages: *Show_event_message_page*
- for alarm messages: *Show_alarm_message_page*

Figure 6-6 illustrates an example of the message page for alarm messages.

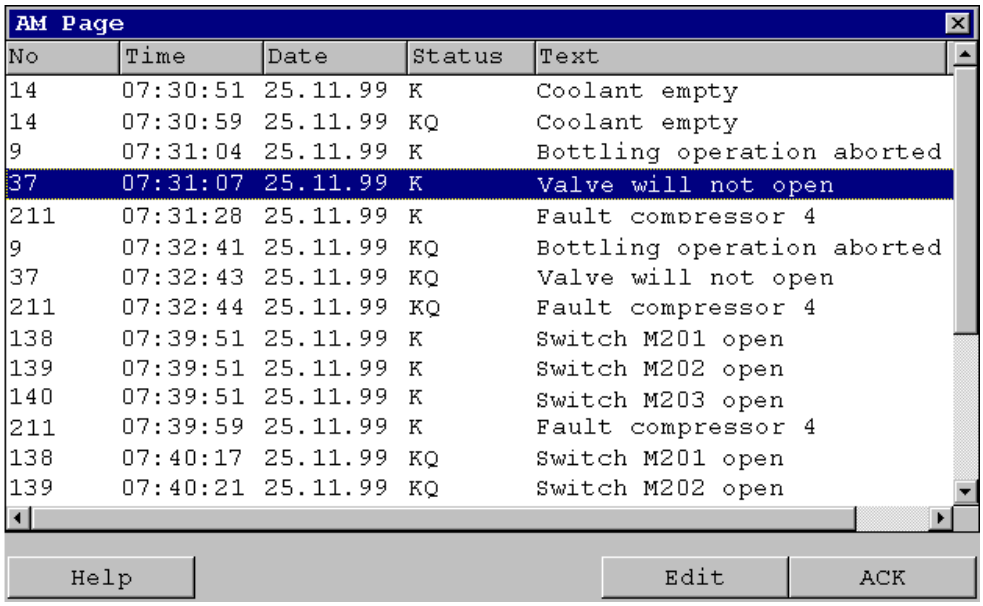


Figure 6-6 Alarm message page (example)

Information on the significance of the two buttons is provided on Page 6-12.

6.3.8 Message Buffer

Purpose

The message buffer displays all message events with time stamp. It is possible to configure how the alarm messages are sorted. It is also possible to select whether the latest or oldest message is displayed first. An open message buffer is constantly updated.

Structure

In order to be able to access the message buffer for event messages and/or alarm messages from the operating unit, the following functions must be configured:

- for event messages: *Show_event_message_buffer*
- for alarm messages: *Show_alarm_message_buffer*

Figure 6-7 illustrates an example alarm message buffer.

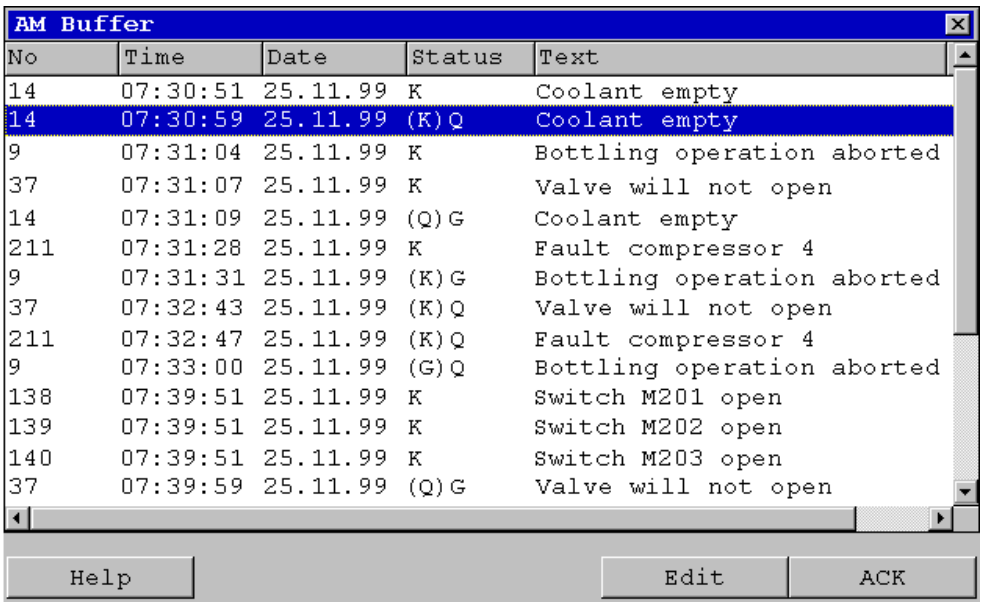


Figure 6-7 Alarm message buffer (example)

Information on the significance of the two buttons is provided on Page 6-12.

6.3.9 Message View

Purpose

Specific views of the message buffer (volatile or archive) are defined in the message view. Various filter criteria are available in ProTool/Pro CS for this purpose.

Structure

The message view (Figure 6-8) displays messages that are queued on the operating unit or still have to be acknowledged. The message view also enables acknowledgement of these messages.

Alternatively, the message view can also display a history of message events. In this case, messages cannot be acknowledged.

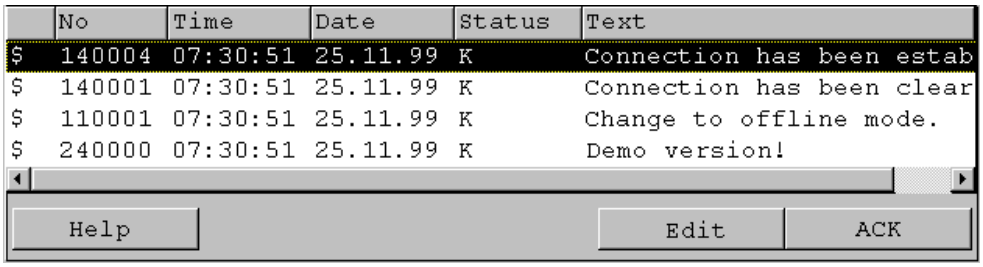


Figure 6-8 Example of a message view

Significance of the buttons

Call help text

Use this button to call in the help text configured for the selected message.

Edit message

Use this button to trigger the function assigned to the `Edit Message` event for the selected message.

Acknowledge alarm messages

Use this button to acknowledge an alarm message that has not yet been acknowledged.

Message categories

In order to be able to distinguish between the different message categories, they are marked in the first column of the message view:

!	Alarm messages
blank	Event messages
$	System messages
S7	S7 messages

Column properties

When correspondingly configured, the column sequence and sorting within each column can be modified during runtime.

- **Change column sequence**
  In order, for instance, to swap the columns *Time* and *Date*, position the mouse on the column heading *Date*, press and hold the mouse button and move the heading to the column heading *Time*.
- **Change sorting**
  In order to change the chronological sorting of the messages, double click in on the column heading of one of the two columns *Time* or *Date*.

6.3.10 Simple Message View

Purpose

A simple message view provides a subset of the functionality of a message view (Page 6-16). This provides a simple method with which, for example, to create a message line to display event and system messages in a screen.

Structure

The simple message view cannot be operated. The figure below provides an example of a simple message view with the following columns configured:

- Date
- Time
- Message number
- Message states
- Message text

```
12.12.99 14:27:06 110001 K
Change to operating status ‘online’

12.12.99 14:27:07 140001 K
Connection discontinued: Station 2, Rack 0, Slot 0
```

6.3.11 Bar Graph

Purpose

Bar graphs present a value in the form of a rectangular area. This makes it possible to recognize how far the current value is from the limits or whether a specified setpoint has been reached by a single glance at the operating unit. Bar graphs can be used to display fill levels or quantities, for example.

Display

It is possible to configure minimum and maximum values and the direction a bar graph moves by increasing the tag value:

Figure 6-9 depicts three states of a horizontal bar graph:

1. Value drops below the minimum value configured
2. Value lies within the configured display range
3. Value exceeds the maximum value configured

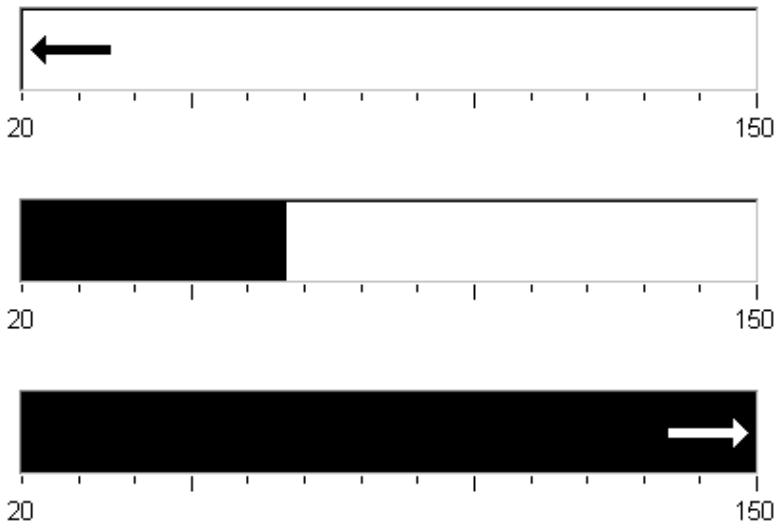


Figure 6-9 Three states of a bar graph

6.3.12 Trend Display

Purpose

The trend display is a particularly clear form of displaying process data in a continuous manner. In the case of processes that only change slowly, the trend display can visualize events that have already occurred and provides access to, and estimate of trends in the process sequence. On the other hand, data issued concerning processes which run quickly can be easily evaluated using this form of trend display.

Configurable properties

A number of different trends can be displayed simultaneously in the trend display. The following properties of a trend can be configured:

- **Trend Type**: *Realtime trend* or *History trend*
- **Triggering**: *Cycle triggering* or *Bit triggering*
- **Limit values**:The operating unit displays the points at which configured limit values are reached or exceeded by changing the color of the trend display.

Structure

Figure 6-10 illustrates an example of a trend graphic with buttons configured for navigating within the trend.

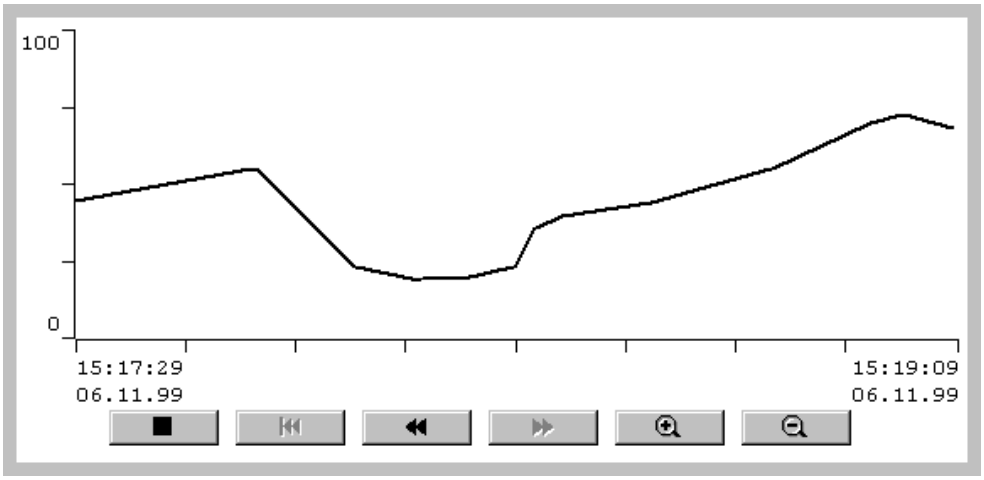


Figure 6-10 Operable trend display (example)

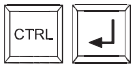
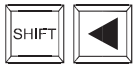
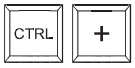
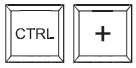
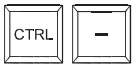
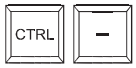
Navigation using buttons

The buttons configured enable the user to navigate in the trend display. The individual buttons have the following functions:

Button	Function
 Start/Stop update	Interrupts updating of the trend display until the button is pressed again.
 Return to start	Jumps back to the start of trend recording.
 Scroll back	Scrolls back one window width.
 Scroll forward	Scrolls forward one window width.
 Enlarge zoom area	Extends the trend display horizontally.
 Reduce zoom area	Compresses the trend display horizontally.

Navigation using the keyboard

If no buttons have been configured in the trend display, use the operating unit keyboard to navigate in the trend display. The precondition for this, however, is that the configuration supports navigation by means of the keyboard.

Function	Function	PC	OP37/Pro Panel PC
Return to start	Jumps back to the start of trend recording.		
Scroll back	Scrolls back one window width.		
Scroll forward	Scrolls forward one window width.		
Enlarge zoom area	Extends the trend display horizontally.		
Reduce zoom area	Compresses the trend display horizontally.		

Note

It is not possible to interrupt updating of the trend display by means of the keyboard.

Display archive data as a trend

If data stored in an archive is displayed in the trend display, it is represented as history trends, i.e. the trend data is read out of the archive and displayed according to events. Trends of this kind can be used for power-on processes or temperature patterns on heating up an oven.

The trend display is not updated when the archive data changes.

6.3.13 Slider Control

Purpose

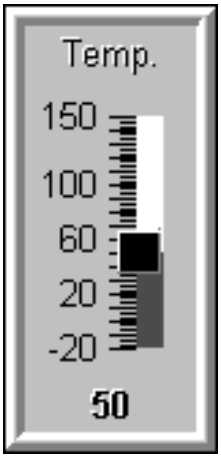
Use a slider control to enter and display numerical values in analog form. To enter values, move the slider to the required position. When used as a display element, the value is represented by the position of the slider.

Function

The slider control is linked to a tag. On moving the user-controlled slider, the corresponding value is written to the tag. Conversely, when the tag value is changed, the position of the moving slider is changed correspondingly, unless it being moved by the operator at that moment.

Display

The figure on the right illustrates an example of a slider for setting and displaying temperature values. The current value (in this case: 50) appears as plain text and as a bar graph.



Control

- **Mouse and touch screen**
  Point to the moveable slider and move it to the desired value.
- **Keyboard**
  In order to operate the slider, select it using a cursor key, for example. Use the following keys to actually move the slider:

Function	PC	OP37/Pro Panel PC
Increase value continually	↑ / →	SHIFT ▲ / SHIFT ▶
Decrease value continually	↓ / ←	SHIFT ▼ / SHIFT ◀
Increase/Decrease value in steps of 5%	Page ↑ / Page ↓	–
Move to maximum value/minimum value	Home / End	–

6.3.14 Analog Display

Purpose

An analog display indicates numerical values as a pointer instrument. Up to three areas can be set up on the instrument dial, each with a different color background. This enables visualizing different operating modes, e.g. normal operation, warning area and danger area.

Function

The analog display is linked to a tag. When the tag value changes, the pointer position changes correspondingly. The display can be configured to include a non-return pointer. At runtime, the non-return pointer indicates the maximum value reached so far by the value being displayed. It is reset when the current window is opened.

The analog display is purely a display element. It cannot be used to enter values on the operating unit.

Display

Figure 6-11 illustrates an example of an analog display indicating temperatures .

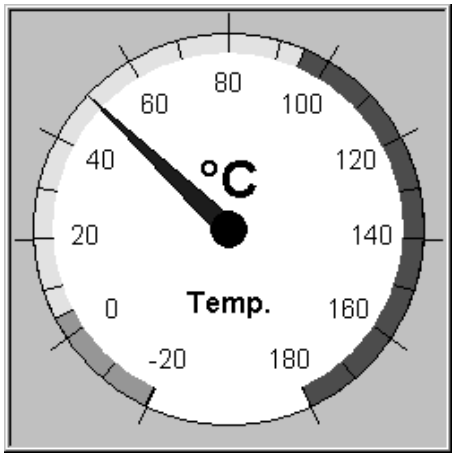


Figure 6-11 Example of a typical analog display

6.3.15 Date/Time

Purpose

The screen object *Date/Time* displays the current values for the time and/or date. If appropriately configured, these details can be changed online.

The calendar date and time values are synchronized with the system values of the operating system. The operating unit accesses these values in order, for example, to assign a time stamp to message events.

Format

The format of the date and time depends on the language currently set. It corresponds to standard international conventions:

Table 6-3 Examples of language-dependent formats for date/time

Language	Example		
	Date		Time
	long	short	
German	Samstag, 6. November 1999	06.11.99	12:59:32
English (USA)	Saturday, November 06, 1999	11/6/99	12:59:32 pm
French	samedi 6 novembre 1999	06/11/99	12:59:32
Italian	sabato 6 novembre 1999	06/11/99	12.59.32
Spanish (traditional)	sábado 6 de novembre de 1999	6/11/99	12:59:32

Note

When entering the date and time, ensure that the two values are separated by a space.

6.3.16 Digital/Analog Clock

Purpose

The digital/analog clock provides the option of displaying the system time in numbers (digital) or as a clock with hands (analog). The digital display also includes the current date. The display format is language dependent. It is based on the format defined by the operating unit operating system.

Display

The digital/analog clock is purely a display element. This means that the date and time cannot be set using the operating unit. In order to set the date and time, use the *Date/Time* screen object (refer to Page 6-23).

Figure 6-12 illustrates an example of a configured analog clock.

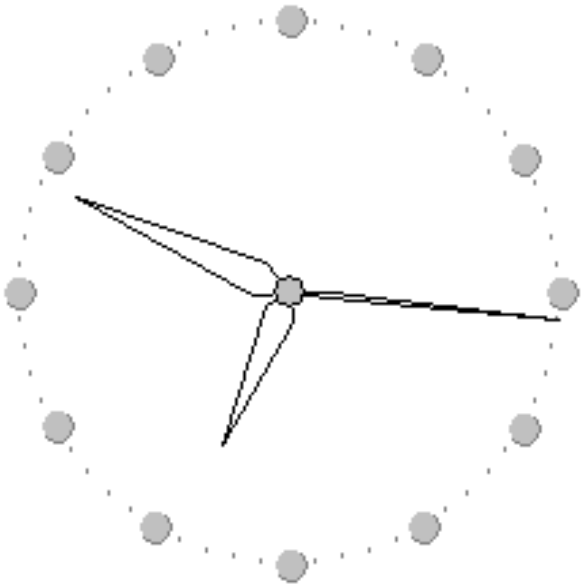


Figure 6-12 Example of a typical analog clock

6.3.17 Password List

Purpose

While the system is being configured using ProTool/Pro CS, operating elements can be protected against unauthorized use by means of passwords. In this way, important parameters and settings can only be changed by authorized personnel.

Password hierarchy

Hierarchically defined password levels from 0 to 9 exist for password protection purposes. At the same time a password is assigned for a user or for an entire user group, authorization is given to execute functions belonging to a specific password level. If, for example, a user is assigned to password level 4, he or she is authorized to execute functions of password levels 0 to 4.

Password level

Password level 0:
This minimum password level is assigned to functions that have no, or only a minimal effect on the course of the process. In order to trigger functions assigned to password level 0, no password needs to be entered on the operating unit.

Password levels 1 to 8:
Levels 1 to 8 are assigned according to the increasing importance of the functions. The operating unit requests a password before a function with a password level higher than 0 can be executed.

Password level 9
Only the supervisor (system support specialist or service technician) is granted authorization to execute functions assigned to password level 9. The supervisor is authorized to access all the functions on the operating unit.

Logging in on the operating unit (login)

After calling a password-protected function, the operating unit automatically prompts the user to enter a password. Once entered, the password need not be entered again in order to call in other functions of this password level or lower.

Logging off from the operating unit (logoff)

In order to prevent the software from being used by unauthorized persons, a password level higher than 0 should not be left active on the operating unit over a longer period of time. The following options are available to explicitly reset passwords levels:

- **Configured logout time elapsed**
  If the operating unit is not operated within the period of time configured (logout time), the current password level is automatically reset to `0`.
- **Manual logoff**
  If the function *Logoff_user* is linked to an operating element in the project, it can be used to reset the current password level to `0`.

Password management

The operating unit can be used to enter individual members of staff in a password list and assign password levels to them, according to their respective level of responsibility. When processing the list, conclude each field entry by pressing the Enter key. The password list contains all the passwords configured on the operating unit. The list is coded and stored on the operating unit, protected against a power failure.

Figure 6-13 illustrates an example of a password list with six entries.

Password	Level
12F19	9
1B33AC	2
514D	4
7BFCA91	1
8473128	4
CDA3FB2	3

Figure 6-13 Example of a password list

View password list

Only those passwords are displayed which have a password level equal to or lower than that with which the user is currently logged in. If the operating unit is equipped with a mouse or touch screen, the entries can be sorted according to name or password level during runtime simply by clicking on the column heading.

Creating a password

The user can only edit the password list up to the level with which he is currently logged in. All passwords used in the system must be unique. It is not possible to assign identical passwords to different users. It is possible, however, to assign the same password level to different users without any restrictions.

Deleting a password

To delete a password from the password list, overwrite the password level assigned to it with `0`.

6.3.18 Status/Force

Purpose

The operating unit can be used to access values in the PLC connected (SIMATIC S5 and SIMATIC S7) online, directly, and to read and write them. This means PLC operands can be monitored and changed in a simple manner without having to connect an additional programming unit or PC to the PLC.

This option is particularly useful during the testing and commissioning phase of the project.

Condition

In order to be able to access values in the PLC directly from the operating unit, the following preconditions must be fulfilled:

- The PLC connected must be a SIMATIC S5 or SIMATIC S7.
- The project must contain the screen object *Status/Force* (Figure 6-14).

Structure

Figure 6-14 illustrates the basic structure of the screen object *Status/Force*.

Connection	Type	DB Number	Offset	Bit	Data Type	Format	Status Value	Force Value
PLC_1	E		0		CHAR	BIN	0000 0...	
PLC_1	DB	10	10		WORD	DEC	42994	
PLC_1	M		25	0	BOOL	HEX	0	
PLC_1	A		34		WOR	DEC		

Figure 6-14 Status/Force: Example for SIMATIC S7

Each line represents an operand. If the operating unit is equipped with a mouse or touch screen, the column sequence on the operating unit can be changed. In order, for instance, to swap the columns *Format* and *Control Value*, position the mouse on the column heading *Control Value* press and hold the mouse button and move the heading to the column heading *Format*.

Table 6-4 explains the meaning of the individual columns and buttons.

Table 6-4 Status/Force: Significance of the columns and buttons

Column/Button	Function
Connection	Select the PLC whose address range is to be displayed and/or changed.
Type, DB Number, Offset, Bit	Specify the address in these columns.
Data Type, Format	The format of the output is defined in these columns.
Status Value	The operating unit displays the value read from the PLC in this column.
Control Value	Enter the value to be written to the PLC in this column.
	Use this button to update the display in the *Status Value* column. The button is locked after being pressed. None of the input fields can then be used until the button is pressed again, thus stopping the update.
	Use this button to accept the new value in the *Control Value* column. The control value is then written to the PLC.

Control

The table depicts the key combinations for various operating units.

Function	PC	OP37/Pro Panel PC
Operate Write button.	CTRL + ↵	CTRL + ENTER
Operate Read button.	CTRL +	CTRL + ␣
Select first field in current line.	CTRL + ←	CTRL + SHIFT + ◀
Select last field in current line.	CTRL + →	CTRL + SHIFT + ▶
Select first field in current column.	CTRL + ↑	CTRL + SHIFT + ▲
Select last field in current column.	CTRL + ↓	CTRL + SHIFT + ▼
Delete current line.	CTRL + Delete	CTRL + INS DEL
Open list box.	↵	ENTER

Recipes

7

7.1 Overview

Purpose

The purpose of recipes is to transfer of quantities of related data **together** and **synchronously** from the operating unit to the PLC and back again.

Principles of operation

Using the example of the filing cabinet (Figure 7-1), the two terms *Recipe* and *Data Record* should be defined because they are important for subsequent understanding of the process.

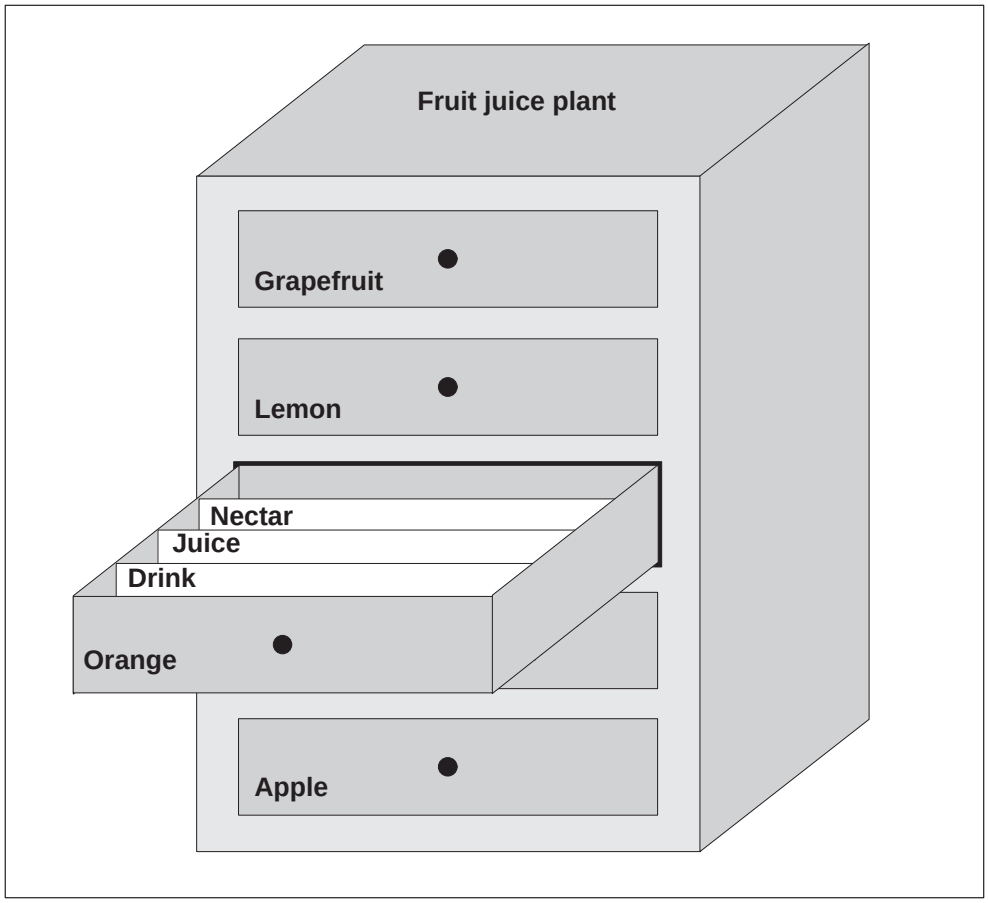


Figure 7-1 Recipe and data record, using a filing cabinet as an analogy

- **Recipe**

  Recipes correspond to the individual drawers of the filing cabinet illustrated (e.g. grapefruit or lemon). The reference value fields (tags) belonging to the particular recipe are defined in each drawer. The recipe defines the data structure in ProTool/Pro CS. This structure cannot be subsequently modified on the operating unit.

- **Data record**

  Data records correspond to the filing cards in the individual drawers of the cabinet (e.g. Drink, Juice and Nectar). A data record contains the values for a recipe. Data records are created, modified and deleted on the operating unit. The data records are also stored on the operating unit. This saves storage space on the PLC.

  The Import/Export function provides the additional option of using external tools to edit exported data records and then reimporting them on the operating unit.

Example of a recipe

An example for the use of a recipe is its application on a filling station of a fruit juice system. The same filling station is used to produce orange drink, orange juice and orange nectar. The mixing ratios are different for each product. The ingredients are always the same.

Assume that a recipe called *Mixture* is created which has the following data structure:

Tag	Name
Var_2	l orange
Var_3	l water
Var_4	kg sugar
Var_5	g flavor

The designations l Orange, g Aroma etc. of the tags are the so called *entry names.*The entry names are also displayed on the operating unit. In this way, for example, the tag Var_2 can be identified as the tag designating the mixture component Orange.

The data records contain the values for the different drink types. The data records may appear as follows, for instance:

Orange drink		Orange juice		Orange nectar	
l orange	**90**	l orange	**95**	l orange	**70**
l water	**10**	l water	**5**	l water	**30**
kg sugar	**1.5**	kg sugar	**0.5**	kg sugar	**1.5**
g flavor	**200**	g flavor	**100**	g flavor	**400**

7.2 Recipe Configuration

Basic procedure

The basic steps to configuring a recipe are listed below:

1. **Define the structure of the recipe:**

   Assign tags to the recipe structure. These tags are provided with entries from the data records.

   Define a name for the recipe. This name is used to select the recipe in the project and on the operating unit.

2. **Set recipe tag properties**

   The following options can be configured in ProTool/Pro CS:

   – *Synchronize Tags*
   This option defines that the data from a data record has been read from the PLC or data medium and written in the tag or read from the tags configured for the recipe. This establishes a connection between the tags configured in the recipe and the tags in the screens. When a data record is loaded, the values are written to the tags used in the screens.

   – *Tags Offline*
   If this option is also activated, the values entered are only stored in the tags, and not transferred to the PLC. Otherwise, values entered are transferred directly to the PLC.

3. **Define data record storage medium on the operating unit**

   The data storage location for data records can be configured. The following settings are possible, depending on the destination device:

   – any path and any drive
   – internal flash
   – storage card (PC card)

4. **Set download synchronization**

   It is possible to configure whether the data records are downloaded to the PLC with or without synchronization.

5. **Creating a recipe screen**

   Configure one or more screens in order to create, store and download data records on the operating unit.

Further information

Detailed information on how to create projects is provided in the online help to the ProTool/Pro CS configuration software and in the *ProTool Configuring Windows-based Systems* User's Guide.

System limits

The table provides an overview of the system limits for recipes according to the units.

Elements	Target device	
	OP37/Pro	PC, Panel PC
Number of recipes	255	255
Data records per recipe	5000 1)	5000 1)
Total entries	5,000	5,000
Entries per recipe	2,048	2)

1) Dependent on storage medium used.
2) Dependent on the number of licensed power tags. Power tags are tags linked to a process.

7.3 Editing Data Records

In this chapter

This chapter provides information on how to edit data records on operating unit. The following information is also included:

Methods

Data records can be edited on the operating unit in tables or screens:

- **Tabular editing**

  The recipe view is available for the tabular editing of data records (Page 7-7). The recipe view enables recipes and data records to be handled in an uncomplicated, quick way.

  It is typically used to edit data records of smaller recipes. Values entered on the operating unit are not directly transferred to the PLC when entered.

- **Editing in recipe screens**

  The project engineer can use recipe screens (Page 7-15) to customize the user interface for editing data records and, for example, simulating the system visually by providing graphics and individual masks for entering data records.

  This method is typically used for processing medium and large data records offline in the recipe view. The values entered on the operating unit are only saved in the tags, but not transferred directly to the PLC on input.

7.3.1 Recipe View

Purpose

The recipe view is typically used to edit recipe data records in tabular form. This provides an uncomplicated method of displaying, creating, copying, modifying, deleting and downloading data records.

All descriptions on editing data records provided in this Chapter 7.3.1 relate purely to the use of the recipe view. Information on editing data records in recipe screens is provided in Chapter 7.3.2.

Display

Figure 7-2 illustrates an example of the layout of the recipe view. Some of the operating and display elements can be configured so that they are faded out on the operating unit.

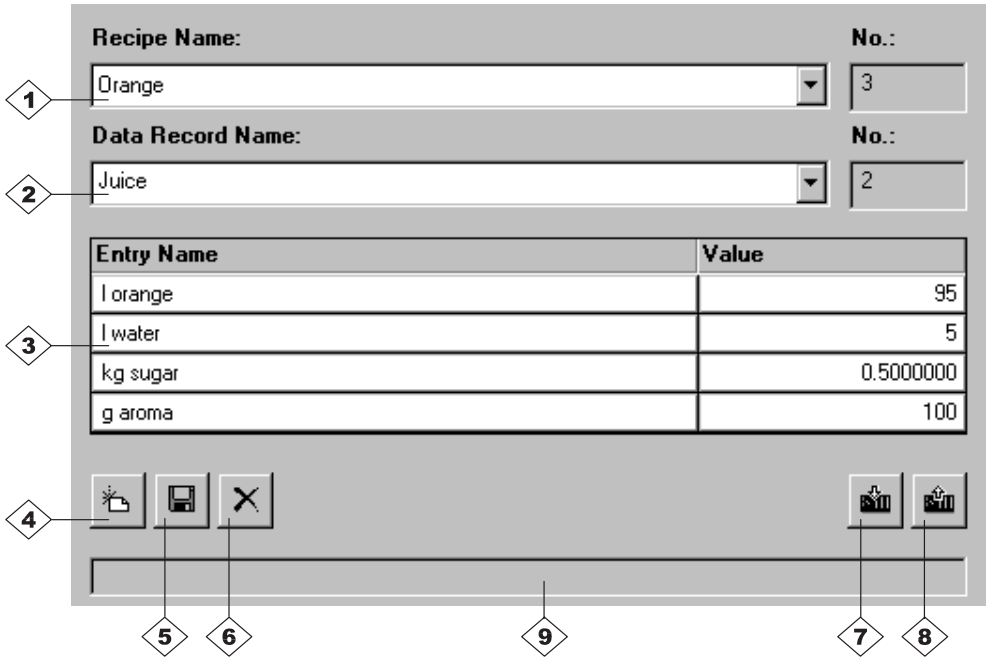
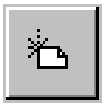
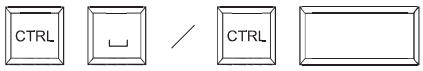
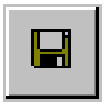


Figure 7-2 Layout of the recipe view (example)

Significance of the operating and display elements

No.	Function
1	**Select recipe** If the corresponding function is enabled in ProTool/Pro CS, it is possible to select a configured recipe in this selection field. The number of the selected recipe is displayed to the right of the selection field. This number is only relevant during the configuration. It cannot be modified on the operating unit.
2	**Select data record** As soon as a recipe has been selected, the data records available are displayed in this field. In addition, the data record number is displayed to the right. The number field only becomes active when the input of a data record number is permitted, e.g. after changing the data record number or creating a new data record.
3	**View /Edit entries** This table contains all the entries which are configured in the selected data record. Sorting complies to the configured sequence. The right-hand column displays the associated values. The entry names cannot be edited on the operating unit.
4	 **Create new data record** This button initiates the creation of a new data record. The setpoint values are predefined with default values configured as start values for the respective tags. Key combinations: 
5	 **Save data record** This button is used to save the current values of the date record displayed on the operating unit data medium. The memory location is specified in ProTool/Pro CS. The data record is stored under the currently defined name and number. Key combinations: 
6	 **Delete data record** This button is used to delete the data record currently displayed for the defined recipe from the operating unit data medium. Key combinations: 
7	 **Read data record from the PLC** This button is used to read the data record related to the currently set recipe from the PLC and display the values on the operating unit. Key combinations: 

No.	Function
8	 **Write data record in the PLC** This button is used to write the current data record values in the PLC. Key combinations: CTRL + ▼ / CTRL + ↓
9	**Status bar** The operating unit displays the status of the current operation in this line, e.g. `Downloading`.

Note

- If the two options *Synchronize Tags* and *Tags Offline* are activated in the project, the values from the table are applied when values in the tables and screens are changed simultaneously.
- If the data record currently being edited in the recipe view is changed in the background (e.g. by means of a PLC job), the recipe view is not automatically updated.

Tips on operating the recipe view

- **Quick selection of recipes and data records**

  When the selection field is opened up, enter the first letter of the recipe or data record to be selected to access the relevant area of long lists, thus speeding up the selection procedure.

- **Edit entries**

  If the value marked in the recipe view is to be modified, it is initially deleted by pressing one of the alphanumeric keys. This occurs with regard to all list elements in Windows. In order to prevent this, proceed as follows:

  – After selecting the value to be changed, press the Enter key. This clears the marking.
  – Move the text cursor to the relevant position by pressing the cursor key or *SHIFT* and cursor key.
  – Insert the modifications.
  – Confirm the changes, e.g. by pressing the Enter key.

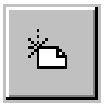
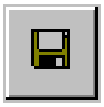
Displaying data records

Proceed as follows to display data records on the operating unit data medium:

Step		Procedure
1	Select recipe	Step 1 is only possible when recipe selection has been configured. • Select the selection field for the configured recipes (Position 1 in the figure on Page 7-7). • Open the selection field and mark the required recipe in the opened selection list. • Confirm the selection.
2	Select data record	• Select the selection field for the existing data records (Position 2 in the figure on Page 7-7). • Open the selection field and mark the required data record in the opened selection list. • Confirm the selection. The selected data record is loaded. The configured entries are displayed in table form with name and setpoint value.

Creating new data records

Proceed as follows to create new data records on the operating unit:

Step		Procedure
1	Select recipe	• Select the required recipe, as described in Step 1 on Page 7-10.
2	Create data record 	• Press the key depicted on the left. The name and number of the data record displayed are deleted. The entries in the table are assigned the configured start values.
3	Enter data record name	• Enter a new data record name in the selection field for data records (Position 2 in the figure on Page 7-7). • After entering the data record name, the next free data record number is automatically entered on the right. This number can be changed, if necessary.
4	Change values	• Enter a setpoint value for each entry configured in the table (Position 3 in the figure on Page 7-7).
5	Save data record 	• Press the key depicted on the left. The new data record is written on the data medium. The operating unit responds with a system message if the name or number entered already exist. The writing process is not executed in this case.

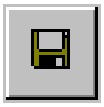
Note

The data storage location for the new data record can be configured. The following settings are possible, depending on the destination device:

- any path and any drive
- internal flash
- storage card (PC card)

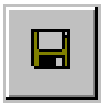
Copying data records

In order to copy data records, save them under new names. Proceed as follows:

Step		Procedure
1	Select recipe and data record	• Select the required recipe and the data record to be copied as described in Steps 1 and 2 on Page 7-10.
2	Enter data record name	• Enter a new data record name in the selection field for data records (Position 2 in the figure on Page 7-7). • After entering the data record name, the next free data record number is automatically entered on the right. This number can be changed, if necessary.
3	Save data record 	• Press the key depicted on the left. The new data record is written on the data medium. The operating unit responds with a system message if the name or number entered already exist.

Changing data records

Proceed as follows to change existing data records:

Step		Procedure
1	Select recipe and data record	• Select the required recipe and the data record to be changed as described in Steps 1 and 2 on Page 7-10.
2	Change values	• Change the setpoint value in the table (Position 3 in the figure on Page 7-7). The entry names cannot be edited on the operating unit.
3	Save data record 	• Press the key depicted on the left. The modified data record overwrites the original data record on the data medium.

Note

If large-scale modifications have been carried out in recipes in ProTool/Pro CS and, after downloading the modified project, the data records on the operating unit data medium deviate a great deal from the original recipe structure, it is recommended to:

- reorganize the data medium:
  Export the data records, delete the files with the prefix PTRCP_[1)] from the data medium and import the data records again

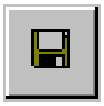
  or
- delete the files with the prefix PTRCP_[1)] from the data medium:
  In this case, use Windows Explorer.
  (Note: After the files have been deleted, the relevant data must be re-entered)

In this way, all the tags no longer used are deleted.

1) If necessary, only delete the files of the modified recipes

Renaming data records

Proceed as follows to rename existing data records:

Step		Procedure
1	Select recipe and data record	• Select the required recipe and the data record to be copied as described in Steps 1 and 2 on Page 7-10.
2	Enter data record name	• Enter a new data record name in the selection field for data records (Position 2 in the figure on Page 7-7). • After entering the data record name, the next free data record number is automatically entered on the right. Reset this number to its original value.
3	Save data record 	• Press the key depicted on the left. The data record is written on the data medium under the new name. The operating unit responds with a system message if the name or number entered already exist.

Deleting data records

Proceed as follows to delete data records on the operating unit data medium:

Step		Procedure
1	Select recipe and data record	• Select the required recipe and the data record to be changed as described in Steps 1 and 2 on Page 7-10.
2	Delete data record 	• Press the key depicted on the left. The data record is deleted from the data medium after confirming a confirmation request.

Reading data records from the PLC

Proceed as follows to update data records in the operating unit working memory with values from the PLC:

Step		Procedure
1	Select recipe	• Select the required recipe, as described in Step 1 on Page 7-10.
2	Read values 	• Press the key depicted on the left. • The current values are read from the PLC and displayed.
3	Edit data records	• The data can then be edited, e.g. values modified, saved, downloaded to PLC, etc. The operating unit responds with a system message if downloading from the PLC is not possible because, in cases where synchronization with the PLC is configured, for example, the data mailbox is currently locked.

Downloading data records to the PLC

In order that a modified or new data record can take effect in the PLC, it must be downloaded to the PLC.

Proceed as follows to download data records to the PLC:

Step		Procedure
1	Select recipe and data record	• Select the required recipe and the data record to be downloaded as described in Steps 1 and 2 on Page 7-10.
2	Write values 	• Press the key depicted on the left. The values are written in the PLC. The operating unit responds with a system message if downloading to the PLC is not possible because, in cases where synchronization with the PLC is configured, for example, the data mailbox is currently locked.

7.3.2 Recipe Screens

Purpose

Recipe screens are typically representations of the system. The screens provide display and operating elements with which to create, save, modify, delete and download data records. Large recipes can be split into several topic-specific screens and clearly displayed, e.g. with graphic elements.

Components for editing data records

In order to be able to edit data records in recipe screens on the operating unit, the corresponding components, e.g. input/output fields and functions, must be configured:

- **Recipe view**:
  Recipe screens can contain a recipe view (Page 7-7) not only to enable the easy selection of recipes and data records but also for editing data records. The configured functional scope of the recipe view can vary, according to the intended purpose.

  Information on editing data records with the recipe view is provided in Chapter 7.3.1. The instructions stipulated there generally also apply for editing data records in recipe screens. However, in this case, input is performed in the screens.
- **Functions**:
  Depending on whether a recipe view is configured in the project or not, and on the properties assigned to it, there are various functions available to transfer data records between operating unit and PLC, e.g.:
  – *Load_Data_Record*
  – *Save_Data_Record*
  – *Data_Record_PLC_to_Tags*
  – *Data_Record_Tags_to_PLC*

More functions and PLC jobs, which are linked to the downloading of data records, are described in the Chapter 7.3.3.

Editing data records offline

The way in which data records are edited on the operating unit is defined during configuration. It is typically used for the offline editing of data records in recipe screens. Values entered on the operating unit are not directly transferred to the PLC when entered.

Proceed as follows to edit data screens in recipe screens offline:

Step	Procedure
1	Select a data record.
2	Trigger reading of the selected data record from the storage medium: • **With recipe view** It is automatically loaded on selecting the data record. • **Without recipe view** Activate the operating element linked with the *Load_Data_Record* function. The function parameters must have been set accordingly beforehand.
3	The data of the data record is written to the tags.
4	Edit the tags using the configured input/output fields.
5	Save the modified tags. • **With recipe view** Click the Save button. If necessary, you must first specify a new name. • **Without recipe view** Activate the operating element linked with the *Save_Date_Record*. The function parameters must have been set accordingly beforehand.

Editing data records online

In order to edit data records online, the option must either be defined during configuration or the *Recipe_Tags_Online_Offline* function configured in the project. In the case of online editing, the values entered are transferred directly to the PLC. This method is normally used when commissioning the machine/system in order to test, run-up and position.

Proceed as follows to edit data records on the operating unit online:

Step	Procedure
1	Select a data record.
2	Trigger reading of the selected data record from the storage medium: • **With recipe view** It is automatically loaded on selecting the data record. • **Without recipe view** Activate the operating element linked with the *Load_Data_Record* function. The function parameters must previously have been set accordingly.
3	The data of the data record is written to the tags and thus also to the PLC.
4	Edit the tags using the configured input/output fields. This will simultaneously change the values in the PLC as well.

Step	Procedure
5	Save the modified tags. • **With recipe view** Click the Save button. If necessary, you must first specify a new name. • **Without recipe view** Activate the operating element linked with the *Save_Date_Record*. The function parameters must previously have been set accordingly.

Note

When editing data records online, the entered values are transferred to the PLC without synchronization. Therefore, when changing individual values, ensure that no impermissible operating statuses occur in the machine/system.

7.3.3 Functions and PLC jobs

Functions

The following functions can be used to import and export recipe data records for editing with external tools:

- *Export_Data_Records*
- *Import_Data_Records*

They can be used to import and export either individual data records or all data records in a recipe, according to the configured parameters.

The following functions can be used to transfer data records between the PLC and operating unit data medium.

- *Data_Record_DAT_To_PLC*
- *Data_Record_PLC_To_DAT*

The data medium is either the FLASH, memory card or hard disk, depending on the operating unit. Both the recipe and data record must be specified as parameters in which the values should be written.

PLC jobs

The following two PLC jobs can be used to transfer data records between the PLC and operating unit automatically:

- *No. 69*: “PLC → DAT” (read data record from PLC)
- *No. 70*: “DAT → PLC” (write data record in PLC)

Information on PLC jobs is provided in the *Communication for Windows-based Systems* User’s Guide.

7.3.4 Import/Export Data Records

Purpose

When the appropriate features have been configured, data records on the operating unit can be exported as CSV files to the data medium. This feature can be used to edit data records with external tools, e.g. with a spreadsheet program or text editor, and import them on the operating unit again.

Condition

In order to export and import data records during runtime, the project must contain the following functions:

- *Export_Data_Records*
- *Import_Data_Records*

These functions must be linked in the ProTool/Pro CS configuration software, e.g. to a function key or button.

File format CSV

With file format CSV, the table columns (entry name and value) are separated by a separator (e.g. semicolon). Each table row (entry) is terminated by a line feed.

The example in Figure 7-2 (Page 7-7) appears as follows in CSV format for the individually exported data record *Juice*:

```
Orange;Juice
3;2
Var_2;95
Var_3;5
Var_4;0.5
Var_5;100
```

Additional information is stored in the first two lines:

- Line 1:
  Name of the recipe and data record
- Line 2:
  Number of the recipe and data record

The operating unit interprets the information on importing the file.

Note

When the CSV files are edited with an external text editor, the modifications are saved in text format (without control codes).

Export/Import all data records in a recipe

When appropriately configured, all the data records in a recipe can be imported/exported together. The CSV file for the example on Page 7-3 then appears as follows:

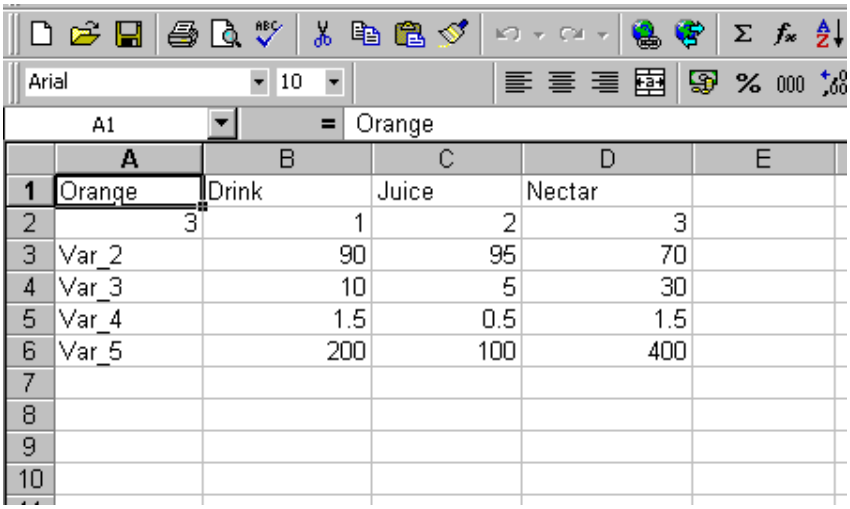
```
Orange;Drink;Juice;Nectar
3;1;2;3
Var_2;90;95;70
Var_3;10;5;30
Var_4;1.5;0.5;1.5
Var_5;200;100;400
```

Additional information is stored in the first two lines:

- Line 1:
  Name of the recipe and all the configured data records
- Line 2:
  Number of the recipe and all the configured data records

The operating unit interprets the information on importing the file.

In this way, the CSV file can be used, for example, to create new data records by means of a spreadsheet program (Figure 7-3). After importing the modified file, the new data records can be used on the operating unit.



	A	B	C	D	E
1	Orange	Drink	Juice	Nectar	
2	3	1	2	3	
3	Var_2	90	95	70	
4	Var_3	10	5	30	
5	Var_4	1.5	0.5	1.5	
6	Var_5	200	100	400	
7					
8					
9					
10					

Figure 7-3 Create data records externally (example: Microsoft® Excel)

Exporting, editing and importing data records

Proceed as follows in order to export data records on the operating unit in a CSV file, edit it using with an external tool (e.g. spreadsheet program or text editor) and mport it back on the operating unit:

Step		Procedure
1	Export data record	• Press the operating element linked with the *Export_Data_Records* function (e.g. function key or button). Depending on the configuration, either all the data records are exported to the data medium or only the data record defined in the project. The data records are exported in the file which was configured in the parameter *File Name* in the function *Export_Data_Records*. • Copy the CSV file onto a transferable data medium (e.g. disk) or in a directory which can be accessed by the external tool.
2	Edit CSV file	• Carry out the modifications in the CSV file with an external tool, e.g. Microsoft® Excel or a text editor. • Save the modifications on the data medium. • Copy the CSV file back to the original directory.
3	Import data records	• Activate the operating element linked with the *Import_Data_Records* function. The data records are copied in the data storage area configured for the recipe.

Note

If data records should be exported and the CSV files edited on a different Windows system using a spreadsheet program (e.g. Microsoft® Excel), ensure that the decimal separator and list separator are identical on the two different systems. This setting can be changed in Windows by selecting *Settings* → *Control Panel*→ *Language* and using *Numbers*.

7.3.5 Reaction on Changing the Recipe Structure

Standard behavior

The following section describes the standard behavior of the operating unit when it detects differences between the data record structure stored on the data medium and the recipe structure currently loaded on the operating unit.

Load and export data records, and write in the PLC

- The data record on the data medium contains additional tags:
  The values are rejected.
- The data record on the data medium contains values which cannot be converted to the assigned tag type:
  The configured start value for the tag is used.
- Tags are missing in the data record on the data medium:
  The configured start value for the tag is used.

Note

The assignment is lost on changing the tag name.

Import data records

- The imported data record contains additional tags:
  The values are rejected.
- The imported data record contains values which cannot be converted to the assigned tag type:
  The configured start value for the tag is used. This occurs, for example, when the tag type in the project has been changed.
- Tags are missing in the imported data record:
  The configured start value for the tag is used.

Tip

Export the data record after changing the recipe structure and check the exported values. In this case, observe the note on Page 7-12.

System Messages

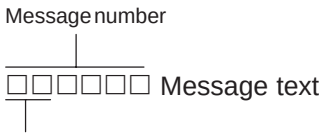
A

In this chapter

This chapter contains a selection of important system messages for Windows-based systems. The table indicates when the messages occur and how they, or their cause, can be cleared. Not every message is relevant for each operating unit.

Message number

Operating unit system messages can be divided into various categories. The information concerning the category to which a system message belongs is included in the message number:



01	Printer
02	Scripts
03	Scale
06	Win32 functions
07	Win32 functions
08	Archives
11	Function
12	Trends
13	System information
14	Channels and connections: S7
15	Channels and connections: AS511
16	Networking
17	S7 diagnostics
18	Miscellaneous
19	Tags and area pointers
20	PLC coordination
21	PLC jobs
22	PLC channels
23	Views
24	Authorization
25	Status / Control
26	Passwords
27	Messages
28	PLC connection
29	Recipes
30	Alarm_S
31	Protocols

The message category enables the identification of a general area in which the cause of the fault is to be found.

Note

System messages are issued in the language currently set on the operating unit.

System message parameters

The system messages may contain parameters which are not decoded for the user but which are relevant in respect of the cause of an error since they provide a reference to the source code from ProTool/Pro Runtime. These parameters are issued according to the text “Error code:”

Number	Effect/Cause	Remedy
10000	The print job could not be started or was terminated for an unknown reason. The printer is incorrectly configured. Or: There are no rights for a network printer available.	Configure the printer again. Initiate the assignment of rights for a network printer.
10001	No printer has been installed or no standard printer configured.	Install a printer and/or mark one as standard printer.
10002	The intermediate buffer for printing graphics is full. Up to two graphics can be buffered.	Do not issue print jobs so quickly in succession.
10003	Graphics can be buffered again.	–
10004	The intermediate buffer for printing lines in text mode (e.g. messages) is full. Up to 1000 lines can be buffered.	Do not issue print jobs so quickly in succession.
10005	Lines of text can be buffered again.	–
10006	The Windows print system reports an error. For information on the cause, refer to the text printed and, if available, the error number. Printing is not performed or it is incorrect.	Repeat the action, if necessary.
20010	A fault has occurred in the script line called in from the specified script. Execution of the script function was, therefore, terminated. In this case, it is advisable to check any previous system messages too.	Select the specified script line in the configuration. Check tags, whether the types used are permissible. Check Functions, whether the number and types of parameter are correct.
20011	An error has occurred in a script called in by the script specified. Execution of the script function has, therefore, been terminated in the subscript. In this case, it is advisable to check any previous system messages too.	Select the scripts from the configuration which were directly or indirectly called in via the specified script. Check tags, whether the types used are permissible. Check Functions, whether the number and types of parameter are correct.
20012	Inconsistent configuration data is present. Therefore, the script could not be created.	Compile the configuration again.

Number	Effect/Cause	Remedy
20013	VBScript.dll is not correctly installed. Therefore, no scripts can be executed.	Re-install ProTool/Pro RT.
20014	A value is returned by the script function which is not written in any configured return tag.	Select the specified script in the configuration. Check whether the script name has been assigned a value.
20015	Too many scripts have been triggered in quick succession. If more than 20 scripts are queued to be processed, any subsequent scripts are rejected. In this case, the script indicated in the message is not executed.	Check where the scripts are being triggered from. Extend the times, e.g. the polling time of the tags, which trigger the scripts.
30010	The tag could not accept the function result, e.g. in the case of exceeding the value range.	Check the tag type of the function parameter.
30011	A function could not be executed because the function was assigned an invalid value or type in the parameter.	Check the parameter value and tag type of the invalid parameter. If a tag is used as a parameter, check its value.
40010	The function could not be executed since the parameters could not be converted to a common tag type.	Check the parameter types in the configuration.
40011	The function could not be executed since the parameters could not be converted to a common tag type.	Check the parameter types in the configuration.
50000	The operating unit receives data faster than it is capable of processing. Therefore, no further data is received until the data currently available has been processed. Data exchange then resumes.	–
50001	Data exchange has been resumed.	–
60000	This message is generated by the function “Display system messages”. The text to be displayed is transferred to the function as a parameter.	–
60010	The file could not be copied in the direction defined because one of the two files is currently open or the source/target path is not available. It is possible that the Windows NT user has no access rights to one of the two files.	Restart the function or check the paths of the source/target files. Using Windows NT with NTFS: The user executing ProTool/Pro RT must be granted access rights for the files.
60011	An attempt was made to copy a file to itself. It is possible that the Windows NT user has no access rights to one of the two files.	Check the path of the source/target file. Using Windows NT with NTFS: The user executing ProTool/Pro RT must be granted access rights for the files.
70010	The application could not be started because it could not be found in the path specified or insufficient memory space was available.	Check whether the application exists in the specified path or close other applications.

Number	Effect/Cause	Remedy
70011	The system time could not be modified. This may be due to the following: • an impermissible time was transferred in the PLC job, • the Windows NT user has no user rights to modify the system time.	Check the time which is to be set. Under Windows NT: The user executing ProTool/Pro RT must be assigned the rights to modify the system time from Windows NT (administration/user manager, guidelines).
70012	An error occurred when executing the function “Exit Runtime” with the option “Exit also Windows”. Windows and ProTool/Pro RT are not terminated. A possible cause is that other applications cannot be terminated.	Terminate all applications currently running. Then terminate Windows.
70013	The system time could not be modified because an invalid value was entered. Incorrect separators may have been used.	Check the time which is to be set.
70014	The system time could not be modified. This may be due to the following: • an impermissible time was transferred, • the Windows NT user has no user rights to modify the system time, • Windows rejects the setting request.	Check the time which is to be set. Under Windows NT: The user executing ProTool/Pro RT must be assigned the rights to modify the system time from Windows NT (administration/user manager, guidelines).
70015	The system time could not be read because Windows rejects the reading function.	–
70016	An attempt was made to select a screen by means of a function or job. This is not possible because the screen number specified does not exist. Or: a screen could not be generated due to insufficient system memory.	Check the screen number in the function or job with the screen numbers configured. Refer the number to a screen, if necessary.
80001	–	Store the file or table by executing a ‘move’ or ‘copy’ function.
80002	A line is missing in the specified archive.	–
80003	The copying process for archiving was not successful. In this case, it is advisable to check any subsequent system messages, too.	–
80006	Since archiving is not possible, this causes a permanent loss of the functionality.	In the case of databases, check whether the corresponding data source exists and start up the system again.
80009	A copying action has been completed successfully.	–
80010	Since the path was incorrectly entered in ProTool, this causes a permanent loss of the functionality.	Configure the path for the respective archive again and restart the system when the full functionality is required.

Number	Effect/Cause	Remedy
80012	Archive values are stored in a buffer. If the values are read to the buffer faster than they can be physically written (e.g. using a hard disk), overloading may occur and recording is then stopped.	Archive less values. Or increase the recording interval.
80013	The overload status no longer applies. Archiving resumes the recording of all values.	–
80014	The same action was triggered twice in quick succession. Since the process is already in operation, the action is only carried out once.	–
80016	The archives are separated by the function *Close archive* and the incoming entries exceed the defined buffer size. All the jobs in the buffer are deleted.	Reconnect the archives.
80017	The incoming entries cause the defined buffer size to be exceeded. This can be caused, e.g. by several copying actions being activated at the same time. All the copy jobs in the buffer are deleted.	Terminate the copy process.
80018	All the archives are reconnected by means of the DB layer, e.g. after executing the function *Open_Archives*. Values are then written back into the tables.	–
80019	All the archives are separated from the DB layer and all connections terminated, e.g. after executing the function *Close_Archives*. Values are temporarily buffered and written in the tables when the connection is re-established. There is no connection to the storage medium and a change can take place.	–
80020	The max. number of simultaneously activated copy actions has been exceeded. Copying is not executed.	Wait until the current copying actions have been completed and restart the last copy action.
80021	An attempt was made to delete an archive which is still involved with a copy action. Deletion has not been executed.	Wait until the current copying action has been completed and restart the last action.
80022	An attempt was made to start a sequence archive, which is not a sequence archive, from an archive using the function *Start_Sequence_Archive*. No sequence archive is created.	Check the project for the following: • the function *Start_Sequence_Archive* is correctly configured. • the variable parameters are being correctly provided at the operating unit.
80023	An attempt was made to copy an archive to itself. The archive is not copied.	Check the project for the following: • the function *Copy_Archive* is correctly configured. • the variable parameters are being correctly provided at the operating unit.

Number	Effect/Cause	Remedy
80024	The function *Copy_Archive* is configured not to permit copying when the target archive already contains data (Parameter: *Write mode*). The archive is not copied.	Modify the function *Copy_Archive* in the project, if necessary. Before initiating the function, delete the target archive.
80025	The copy action is interrupted. Data written up to this point is retained. Deletion of the target table (if configured) is not executed. The cancellation is documented by an error entry *RT_ERR* at the end of the target table.	–
110000	The operating mode status has been changed. The operating mode is now *offline*.	–
110001	The operating mode status has been changed. The operating mode is now *online*.	–
110002	The operating mode status has not been changed.	Check the connection to the PLCs. Check whether the address area for the area pointer “Coordination” in the PLC is available.
110003	The operating status of the PLC specified is changed by the function *PLC_Connect_Isolate*. The operating mode is now *offline*.	–
110004	The operating status of the PLC specified is changed by the function *PLC_Connect_Isolate*. The operating mode is now *online*.	–
110005	An attempt was made to use the function *PLC_Connect_Isolate* to switch the specified PLC to operating mode *online* although the entire system is in operating mode *offline*. This switch-over is not permissible. The PLC remains in operating mode *offline*.	Switch the complete system to operating mode *online* and execute the function again.
120000	The trend is not displayed because an incorrect axis to the trend, or incorrect trend, has been configured.	Change the configuration.
120001	The trend is not displayed because an incorrect axis to the trend, or incorrect trend, has been configured.	Change the configuration.
120002	The trend is not displayed because the tag assigned tries to access an invalid PLC address.	Check whether the data area for the tag exists in the PLC, the configured address is correct or the value range for the tag is correct.
130000	The action was not executed.	Close other applications. Delete files no longer required from the hard disk.
130001	The action was not executed.	Delete files no longer required from the hard disk.

Number	Effect/Cause	Remedy
130002	The action was not executed.	Close other applications. Delete files no longer required from the hard disk.
140000	Online connection to the PLC has been successfully established.	–
140001	Online connection to the PLC has been disconnected.	–
140003	No tag updating or writing is executed.	Check the connection and whether the PLC is switched on. Check the parameter definitions in the Control Panel using “Set PU/PC interface”. Restart the system.
140004	No tag updating or writing is executed because the access point or the subrack configuration is incorrect.	Check the connection and whether the PLC is switched on. Check the access point or the subrack configuration (MPI, PPI, PROFIBUS) in the Control Panel with “Set PU/PC interface”. Restart the system.
140005	No tag updating or writing is executed because the address of the operating unit is incorrect (possibly too high).	Use a different operating unit address. Check the connection and whether the PLC is switched on. Check the parameter definitions in the Control Panel using “Set PU/PC interface”. Restart the system.
140006	No tag updating or writing is executed because the baud rate is incorrect.	Select a different baud rate in ProTool/Pro (according to subrack, profile, communication peer, etc.).
140007	No tag updating or writing is executed because the bus profile is incorrect (see %1). The following parameters could not be entered in the registry: 1: Tslot 2: Tqui 3: Tset 4: MinTsdr 5: MaxTsdr 6: Trdy 7: Tid1 8: Tid2 9: Gap Factor 10: Retry Limit	Check the user defined bus profile. Check the connection and whether the PLC is switched on. Check the parameter definitions in the Control Panel using “Set PU/PC interface”. Restart the system.

Number	Effect/Cause	Remedy
140008	No tag updating or writing is executed because the configuration data is incorrect: The following parameters could not be entered in the registry: 0: General errors 1: Incorrect version 2: Profile cannot be entered in the registry. 3: Sub-network type cannot be entered in the registry. 4: Target rotation time cannot be entered in the registry. 5: Highest address (HSA) incorrect.	Check the connection and whether the PLC is switched on. Check the parameter definitions in the Control Panel using “Set PU/PC interface”. Restart the system.
140009	No tag updating or writing is executed because the module for the S7 communication was not found.	Re-install the module in the Control Panel using “Set PU/PC interface”.
140010	No S7 communication peer could be found because the PLC is switched off. DP/T: The option “Is not active as the only master” is set in the Control Panel under “Set PU/PC interface”.	Switch the PLC on. DP/T: If only one master is connected to the network, deactivate the option “Is not active as the only master” in “Set PU/PC interface”. If the network has more than one master, switch this master on. Do not modify any settings here, otherwise a bus fault may occur.
140011	No tag updating or writing is executed because communication is interrupted.	Check the connection and that the communication peer is switched on.
140012	There is an initialization problem (e.g. when ProTool/Pro RT has been terminated in the Task Manager). Or: another application (e.g. STEP7, WINCC) is active with different bus parameters and the driver cannot be started with the new bus parameters (e.g. baud rate).	Restart the operating unit. Or start ProTool/Pro RT first and then the other applications.
140013	The MPI cable is not plugged in and, thus, there is no power supply.	Check the connections.
140014	–	Modify the operating unit address in the configuration in *PLC*.
140015	Incorrect baud rate Or: incorrect bus parameter (e.g. HSA) Or: OP address HSA Or: incorrect interrupt vector (interrupt does not arrive at the driver)	Correct the incorrect parameters.
140016	–	Change the interrupt number.
140017	–	Change the interrupt number.

Number	Effect/Cause	Remedy
150000	No more data is read or written. This can have various causes: • The cable is defective. • The PLC does not respond, is defective, etc. • Connection made to the wrong interface. • The system is overloaded.	Check that the cable is plugged in, the PLC is operational, the correct interface is used. Reboot the system if the system message is displayed continuously.
150001	Connection is re-established because the cause of the interruption has been eliminated.	–
160000	No more data is read or written. This can have various causes: • The cable is defective. • The PLC does not respond, is defective, etc. • Connection made to the wrong interface. • The system is overloaded.	Check that the cable is plugged in, the PLC is operational, the correct interface is used. Reboot the system if the system message is displayed continuously.
160001	Connection is re-established because the cause of the interruption has been eliminated.	–
160010	There is no connection to the server because the server identification (CLS-ID) cannot be established. Values cannot be read or written.	Check the access rights.
160011	There is no connection to the server because the server identification (CLS-ID) cannot be established. Values cannot be read or written.	Check, for example, whether: • the server name is correct • the computer name is correct • the server is registered
160012	There is no connection to the server because the server identification (CLS-ID) cannot be established. Values cannot be read or written.	Check, for example, whether: • the server name is correct • the computer name is correct • the server is registered Information for experienced users: Interpret the value from HRESULT.
170000 [1)]	S7 diagnostics messages are not displayed because it is not possible to logon to the S7 diagnostics with this unit. The service program is not supported.	–
170001 [1)]	The S7 diagnostics buffer cannot be displayed because communication with the PLC has been switched off.	Switch the PLC *online*
170002[1)]	The S7 diagnostics buffer cannot be displayed because reading in the diagnostics buffer (SZL) was terminated due to an error.	–

Number	Effect/Cause	Remedy
170003 [1)]	The display of an S7 diagnostics message is not possible. An internal error %2 has been reported.	–
170004 [1)]	The display of an S7 diagnostics message is not possible. An internal error with error class %2, error number %3 has been reported.	–
170007 [1)]	It is not possible to read in the S7 diagnostics buffer (SZL) because it was terminated with an internal error with error class %2 and error code %3.	–
180000	A component/OCX receives configuration data with a version identification which is not supported.	Install a newer component.
180001	The system is overloaded because too many actions have been activated simultaneously. Not all the actions can be executed, some are rejected.	• Increase the configured cycle times or basic clock. • Generate the messages slower (polling). • Trigger the scripts and functions at greater intervals. • If the message appears more frequently: Restart the operating unit.
190000	It is possible that the tag will not be updated.	–
190001	The tag is updated following an error status after the cause of the last error state has been eliminated (return to normal operation).	–
190002	The tag is not updated because communication to the PLC has been switched off.	Switch on communication via the function “Set Online”.
190004	The tag is not updated because the configured address is not available for this tag .	Check the configuration.
190005	The tag is not updated because the configured PLC type does not exist for this tag .	Check the configuration.
190006	The tag is not updated because it is not possible to map the PLC type in the tag type.	Check the configuration.
190007	The tag values are not modified because the connection to the PLC has been terminated or the tag is offline.	Switch *Online* or re-establish connection to the PLC.
190008	The threshold values configured for the tag have been violated, e.g. by • an entered value, • a function, • a script.	Observe the configured or current threshold value of the tag.
190009	An attempt has been made to assign a value to a tag which is outside the value range permitted for this type. E.g. a value of 260 entered for a byte tag or a value of -3 for a signless word tag	Observe the value range for the tag type.

Number	Effect/Cause	Remedy
190010	The tag is described with values too often (e.g. in a loop triggered by a script). Values are lost because the maximum of 100 event have been stored in the buffer.	Increase the time interval between the multi-writing tasks.
190011	There are two causes for this message: • The value entered could not be written to the configured PLC tag because it was either above or below the value range. The input is rejected and the original value is reset.	Ensure that the value entered is within the value range of the PLC tags.
	• Connection to the PLC has been interrupted.	Check the connection to the PLC.
190012	It is not possible to convert a value from a source format to a target format, e.g.: • A value should be assigned to a counter which is outside the valid, PLC-dependent value range. • A tag of the type *Integer* should be assigned a value of the type *String*.	Check the value range or type of the variable.
190100	The area pointer is not updated because the configured address for this area pointer is not available. Type: 1 Event messages 2 Alarm messages 3 PLC acknowledgment 4 Operating unit acknowledgment 5 LED assignment 6 Trend request 7 Trend transfer 1 8 Trend transfer 2 No. is the consecutive number displayed in ProTool/Pro.	Check the configuration.
190101	The area pointer is not updated because it is not possible to map the PLC type in the area pointer type. Parameter type and no.: See message 190100	–
190102	The area pointer is updated following an error status after the cause of the last error state has been eliminated (return to normal operation). Parameter type and no.: See message 190100	–
200000	Coordination is not executed because the address configured in the PLC does not exist/has not been set up.	Change the address or set up the address in the PLC.
200001	Coordination is not executed because the address configured in the PLC cannot be written.	Change the address or set up the address in the PLC in an area which can be written.

Number	Effect/Cause	Remedy
200002	Coordination is not executed at present because the address format of the area pointer does not match the internal storage format.	– (Internal error)
200003	Coordination can be executed again because the last error status has been eliminated (return to normal operation).	–
200004	It is possible that coordination is not executed.	–
200005	No more data is read or written. This can have various causes: • The cable is defective. • The PLC does not respond, is defective, etc. • The system is overloaded.	Check that the cable is connected and the PLC is in order. Reboot the system if the system message is displayed continuously.
210000	Jobs are not processed because the address configured in the PLC does not exist/has not been set up.	Change the address or set up the address in the PLC.
210001	Jobs are not processed because the address configured in the PLC cannot be written to/read from.	Change the address or set up the address in the PLC in an area which can be written to/read from.
210002	Jobs are not executed because the address format of the area pointer does not match the internal storage format.	– (Internal error)
210003	The job mailbox is processed again because the last error status has been eliminated (return to normal operation).	–
210004	It is possible that the job mailbox is not processed.	–
210005	A PLC job was triggered by an impermissible number.	Check the PLC program.
210006	A fault occurred while attempting to execute the PLC job. The PLC job is, therefore, not executed. Observe the subsequent/previous system message, if appropriate.	Check the parameter types in the PLC job. Compile the configuration again.
220000 [2)]	See footnote	See footnote
220001	The tag is not downloaded because the associated channel/the unit does not support downloading the data type bool/bit.	Change the configuration.
220002	The tag is not downloaded because the associated channel/the unit does not support downloading the data type byte.	Change the configuration.
220003	The associated driver could not be uploaded. It is possible that the driver is not installed.	Install the driver by re-installing ProTool/Pro RT.

Number	Effect/Cause	Remedy
220004	Communication is terminated and no update is executed because the cable is not connected or is defect etc.	Check the connection.
220005	Communication is running.	–
220006	The connection is established to the specified PLC via the specified interface.	–
220007	The connection to the specified PLC at the specified interface is disconnected.	Check that: • the cable is plugged in, • the PLC is OK, • the correct interface is used, • the configuration is OK (interface parameters, protocol settings, PLC address). Reboot the system if the system message is displayed continuously.
220008	The PLC driver cannot access the specified interface or open it. It is possible that another application is using this interface or an interface is used which is not available on the target device. There is no communication with the PLC.	Terminate all the programs which access the interface and reboot the computer. Use another interface which is available in the system.
230000	The value entered could not be accepted. The entered value is rejected and the previous value is specified again. Either the value range has been exceeded or impermissible characters were entered.	Enter a permissible value.
230002	Since the current password level is inadequate or the password dialog box was closed with ESC, the entry is rejected and the previous value is specified again.	Activate an adequate password level using Login.
230003	Changeover to the specified screen is not executed because the screen is not available/configured. The current screen remains selected.	Configure the screen. Check the selection function.
240000 [3)]	Runtime is operating in Demo mode. There is either no Stopcopy license or it is defect.	Load the license.
240001[3)]	Runtime is operating in Demo mode. Too many tags are configured for the installed version.	Load an adequate license / powerpack.
240002[3)]	Runtime is operating with a time-limited standby authorization.	Restore the full authorization.
240003	Authorization cannot be executed. ProTool/Pro RT is running in Demo mode.	Restart ProTool/Pro RT or reinstall it.
240004	Error during reading the standby authorization. ProTool/Pro RT is running in Demo mode.	Restart ProTool/Pro RT, install the authorization or repair the authorization (see Commissioning Instructions Software Protection).

Number	Effect/Cause	Remedy
250000	The tag in the specified line in Status/Control is not updated because the address configured for this tag is not available.	Check the set address and then check that the address has been set up in the PLC.
250001	The tag in the specified line in Status/Control is not updated because the PLC type configured for this tag is not available.	Check the set address.
250002	The tag in the specified line in Status/Control is not updated because it is not possible to map the PLC type in the tag type.	Check the set address.
260001	A password has been entered which is unknown to the system. Therefore, the lowest password level has been set. This corresponds to the status following *Logout*.	Enter a known password in the password input field (with corresponding level).
260002	A password has been entered whose assigned level does not permit execution of the function. The password level currently set is displayed for information purposes.	Modify the password level in the password input field or enter a password with a sufficiently high level.
270000	A tag is not displayed in the message because it attempts to access an invalid address in the PLC.	Check whether the data area for the tag exists in the PLC, the configured address is correct or the value range for the tag is correct.
270001	There is a unit-dependent limit as to how many messages may be queued simultaneously in order to be displayed (see GHB). This limit has been exceeded. The display no longer contains all the messages. However, all the messages are recorded in the message buffer.	–
270002	Messages are displayed from the archive for which there is no data in the current project. Placeholders are issued in the messages.	Delete the old archive data, if necessary.
280000	Connection is re-established because the cause of the interruption has been eliminated.	–
280001	No more data is read or written. This can have various causes: • The cable is defective. • The PLC does not respond, is defective, etc. • Connection made to the wrong interface. • The system is overloaded.	Check that the cable is plugged in, the PLC is operational, the correct interface is used. Reboot the system if the system message is displayed continuously.
280002	A connection is used which requires a function module in the PLC. The function block has replied. Communication can now proceed.	–

Number	Effect/Cause	Remedy
280003	A connection is used which requires a function module in the PLC. The function block does not reply.	Check that the cable is plugged in, the PLC is operational, the correct interface is used. Reboot the system if the system message is displayed continuously. The remedy is dependent on the error code: 1: The function block must set the COM bit in the response container. 2: The function block may not set the ERROR bit in the response container 3: The function block must respond within the specified time (timeout) 4: Establish an online connection to the PLC
280004	The online connection to the PLC has been interrupted. There is no data exchange at present.	Check the PLC parameters in ProTool Pro: baud rate, block length, station address. Check that the cable is plugged in, the PLC is operational, the correct interface is used. Reboot the system if the system message is displayed continuously.
290000	The tag could not be read or written. It is assigned the start value. The message can be entered in the message buffer for up to four more failed tags, if necessary. After that, the message number 290003 is issued.	Check in the configuration that the address has been set up in the PLC.
290001	An attempt has been made to assign a value to a tag which is outside the value range permitted for this type. The message can be entered in the message buffer for up to four more failed tags, if necessary. After that, the message number 290004 is issued.	Observe the value range for the tag type.
290002	It is not possible to convert a value from a source format to a target format. The message can be entered in the message buffer for up to four more failed tags, if necessary. After that, the message number 290005 is issued.	Check the value range or type of the variable.
290003	This message is issued when message number 290000 is triggered more than five times. In this case, no further individual messages are generated.	Check in the configuration that the tag addresses have been set up in the PLC.
290004	This message is issued when message number 290001 is triggered more than five times. In this case, no further individual messages are generated.	Observe the value range for the tag type.

Number	Effect/Cause	Remedy
290005	This message is issued when message number 290002 is triggered more than five times. In this case, no further individual messages are generated.	Check the value range or type of the variable.
290006	The threshold values configured for the tag have been violated by values entered.	Observe the configured or current threshold value of the tag.
290007	There is a difference between the source and target structure of the recipe currently being processed. The target structure contains an additional data record tag which is not available in the source structure. The data record tag specified is assigned its start value.	Insert the specified data record tag in the source structure.
290008	There is a difference between the source and target structure of the recipe currently being processed. The source structure contains an additional data record tag which is not available in the target structure and therefore cannot be assigned. The value is rejected.	Remove the specified data record tag in the specified recipe from the project.
290010	The storage location configured for the recipe is not permitted. Possible cause: Impermissible characters, write protected, data medium full or does not exist.	Check the path specification configured.
290011	The data record specified by the number does not exist.	Check the source for the number (constant or variable value).
290012	The recipe specified by the number does not exist.	Check the source for the number (constant or variable value).
290013	An attempt was made to save a data record under a data record number which already exists. The process is not executed.	• Check the source for the number (constant or variable value). • Delete the data record beforehand. • Change the function parameter “Overwrite”.
290014	The file specified to be imported could not be found.	• Check the file name. • Ensure that the file is in the specified directory.
290020	Acknowledgement that downloading of data records from operating unit to PLC has started.	–
290021	Acknowledgement that downloading of data records from operating unit to PLC has been completed without any errors.	–

Number	Effect/Cause	Remedy
290022	Acknowledgement that downloading of data records from operating unit to PLC has been terminated due to an error.	Check the configuration: • have the tag addresses been set up in the PLC? • does the recipe number exist? • does the data record number exist? • has the function parameters “Overwrite”?
290023	Acknowledgement that downloading of data records from the PLC to the operating unit has started.	–
290024	Acknowledgement that downloading data records from the PLC to the operating unit has been completed without any errors.	–
290025	Acknowledgement that downloading of data records from the PLC to the operating unit has been terminated due to an error.	Check the configuration: • have the tag addresses been set up in the PLC? • does the recipe number exist? • does the data record number exist? • has the function parameters “Overwrite”?
290026	An attempt has been made to read/write a data record although the data mailbox is not free at present. This error may occur in the case of recipes for which downloading with synchronization has been configured.	Set the data mailbox status to zero.
290027	No connection to the PLC can be established at present. Therefore, the data record can neither be read nor written. Possible cause: No physical connection to the PLC (no cable plugged in, cable is defect) or the PLC is switched off.	Check the connection to the PLC.
290030	This message is issued after reselecting a screen that contains a recipe display in which a data record has already been selected.	Reload the data record from the data medium or retain the current values.
290031	While saving, it was detected that a data record with the specified number already exists.	Overwrite the data record or cancel the process.
290032	While exporting data records, it was detected that file with the specified name already exists.	Overwrite the file cancel the process.
290033	Confirmation request before deleting data records.	–
290041	A data record or file cannot be saved because the data medium is full.	Delete files no longer required.

Number	Effect/Cause	Remedy
290042	An attempt was made to execute several downloads/memory functions simultaneously. The last action was not executed.	Trigger the function again after waiting a short period.
290050	Acknowledgement that the exportation of data records has started.	–
290051	Acknowledgement that the exportation of data records has been completed successfully.	–
290052	Acknowledgement that the exportation of data records has been terminated due to errors.	Ensure that the structure of the data records on the data medium and the current recipe structure on the operating unit are identical.
290053	Acknowledgement that the importation of data records has been started.	–
290054	Acknowledgement that the importation of data records has been completed successfully.	–
290055	Acknowledgement that the importation of data records has been terminated due to errors.	Ensure that the structure of the data records on the data medium and the current recipe structure on the operating unit are identical.
290056	The value in the specified line/column could not be read/written without errors. The action was canceled.	Check the specified line/column.
300000	Process monitoring (e.g. with PDiag or S7-Graph) has been programmed incorrectly. More messages are displayed simultaneously than specified in the technical data related to the CPU. The CPU cannot manage subsequent Alarm_S messages and transfer them to the operating units.	Modify the configuration in the CPU.
310000	An attempt is being made to print too many protocols simultaneously. Since only one protocol can be printed at a time, the print job is rejected.	Wait until printout of the last active protocol has been concluded. Repeat the print job, if necessary.
310001	An error occurred on triggering the printer. The protocol is either not printed or printed with errors.	Evaluate the additional system message, related to this message, which is also issued. Repeat the print job, if necessary.

1) The optional parameter %1 at the start of the message may contain an identification for the S7 connection when several S7s are in parallel operation and are connected to diagnostics equipment.
2) A WinCC channel provides the message texts via an interface. This text is issued via this message. ProTool/Pro RT has no influence on this text.
3) The specified text comes from the component resources.

Procedure in the case of “internal errors”

Please proceed as follows in the case of all system messages related to “internal errors”:

1. Start up the operating unit again.
2. Download the configuration again.
3. Switch the operating unit off, stop the PLC and then restart both.
4. If the error occurs again, please contact the SIMATIC Customer Support. Make reference to the specified error number and message tags.

SIMATIC HMI Documentation

B

Target groups

This manual is part of the SIMATIC HMI documentation. The documentation is aimed at the following target groups:

- Newcomers
- Users
- Configurers
- Programmers
- Commissioning engineers

How the documentation is organized

The SIMATIC HMI documentation consists of the following components:

- User's Guides for:
  - Configuration software
  - Runtime software
  - Communication between PLCs and operating units
- Equipment Manuals for the following operating units:
  - SIMATIC PC
  - MP (Multi Panel)
  - OP (Operator Panel)
  - TP (Touch Panel)
  - TD (Text Display)
  - PP (Push Button Panel)
- Online Help on the configuration software
- Start-up Guides
- First Steps

Overview of complete documentation

The following table provides an overview of the SIMATIC HMI documentation and shows you when you require the different documents.

Documentation	Target Group	Content
First Steps with ProTool Product Brief	Newcomers	This documentation guides you step by step through the configuration of • a screen with various objects • changing from one screen to another • a message. This documentation is available for: • OP 3, OP 5, OP 7, OP 15, OP 17 • OP 25, OP 27, OP 35, OP 37, TP 27, TP 37 • Windows-based systems
ProTool Configuring Windows-based Systems User's Guide	Configurers	Provides information on working with the ProTool/Pro configuration software. It contains • information on installation • basic principles of configuration • a detailed description of configurable objects and functions. This documentation is valid for Windows-based systems.
ProTool Configuring Graphics Displays User's Guide	Configurers	Provides information on working with the ProTool configuration software. It contains • information on installation • basic principles of configuration • a detailed description of configurable objects and functions. This documentation is valid for graphic display operating units.
ProTool Configuring Text-based Displays User's Guide	Configurers	Provides information on working with the ProTool/Lite configuration software. It contains • information on installation • basic principles of configuration • a detailed description of configurable objects and functions. This documentation is valid for text-based display operating units.
ProTool Online Help	Configurers	Provides information on the configuration computer while working with ProTool. Online Help contains • context-sensitive help • detailed instructions and examples • detailed information • all the information from the user guide.
ProTool/Pro Runtime User's Guide	Commissioning engineers, Users	Provides information on working with ProTool/Pro Runtime software. It contains • installation of the ProTool/Pro Runtime visualization software • commissioning and running the software on Windows-based systems.

Documentation	Target Group	Content
Copy Protection Start-up Guide	Commissioning engineers, Users	The ProTool/Pro Runtime visualization software is a copyright product. This manual contains information on the installation, repair and uninstallation of authorizations.
Application Example Start-up Guide	Newcomers	ProTool is supplied with example configurations and the corresponding PLC programs. This documentation describes how you • load the examples onto the operating unit and PLC • run the examples and • upgrade the connection to the PLC to suit your own specific application.
SIMATIC Panel PC 670 Equipment Manual	Commissioning engineers, Users	Describes the computer unit and operating unit of the SIMATIC Panel PC 670.
MP 270 Equipment Manual TP 170A Equipment Manual	Commissioning engineers, Users	Describes the hardware and the general operation of Windows-based Panels: • installation and commissioning instructions • a description of the equipment • operating instructions • instructions for connecting the PLC, printer and programming computer, • maintenance instructions.
OP 37/Pro Equipment Manual	Commissioning engineers, Users	Describes the hardware, installation and inclusion of upgrades and options for the OP 37/Pro.
TP 27, TP 37 Equipment Manual OP 27, OP 37 Equipment Manual OP 25, OP 35, OP 45 Equipment Manual OP 7, OP 17 Equipment Manual OP 5, OP 15 Equipment Manual TD 17 Equipment Manual	Commissioning engineers, Users	Describes the hardware and general operation. It contains • installation and commissioning instructions • a description of the equipment • instructions for connecting the PLC, printer and programming computer, • operating modes • operating instructions • description of the standard screens supplied with the operating unit and how to use them • fitting options • maintenance and fitting of spare parts.
OP 3 Equipment Manual	Commissioning engineers, Users, Programmers	Describes the hardware of the OP3, its general operation and the connection to the SIMATIC S7.
PP 7, PP 17 Equipment Manual	Commissioning engineers, Users	Describes the hardware, installation and commissioning of push-button panels PP 7 and PP 17.

Documentation	Target Group	Content
Communication User's Guide	Programmers	Provides information on connecting text-based and graphics displays to the following PLCs: • SIMATIC S5 • SIMATIC S7 • SIMATIC 500/505 • drivers for other PLCs This documentation describes the • configuration and parameters required for connecting the devices to the PLC and the network • user data areas used for exchanging data between operating unit and PLC.
Communication for Windows-based Systems User's Guide	Programmers	Provides information on connecting Windows-based systems to the following PLCs: • SIMATIC S5 • SIMATIC S7 • SIMATIC 505 • OPC • Allen Bradley PLC-5/SLC 500 • Mitsubishi FX • Telemecanique TSX This documentation describes the • configuration and parameters required for connecting the devices to the PLC and the network • user data areas used for exchanging data between operating unit and PLC.
Other PLCs Online Help	Programmers	Provides information on connecting devices to PLCs, such as: • OPC • Mitsubishi • Allen Bradley • Telemecanique • Modicon • Omron • SIMATIC WinAC When the drives are installed, the relevant Online Help is installed at the same time.
ProAgent for OP User's Guide	Configurers	Provides the following information about the ProAgent optional package (process diagnosis) for OPs • configuring system-specific process diagnosis • detecting, locating the cause of and eliminating process errors, • customizing standard diagnostic screens supplied with the software.

Glossary

Acknowledgement

Acknowledgement of an **alarm message** on the operating unit confirms that it has been noted. After acknowledgement, the message disappears from the operating unit. Alarm messages can be acknowledged either on the operating unit or PLC. Alarm messages can be compiled into groups so that several messages can be acknowledged simultaneously.

Acknowledgement groups

During configuration, several alarm messages can be compiled to form an acknowledgement group. After acknowledging the first message, all the other messages belonging to the same group are simultaneously acknowledged. This enables, for example, acknowledgement of alarm messages for the cause of a fault and all resulting faults (**group acknowledgement**).

Alarm message

Provides information on the operating unit concerning operating errors on the machine or system connected to the **PLC**. The message text may also contain current measured values.

Since alarm messages indicate abnormal operating status, they must be acknowledged.

Alarm time

Time interval between the **arrival** and **departure** of an alarm message.

Archive

A memory area on a data storage medium in which messages or tags can be stored. The size of the archive is defined in ProTool/Pro CS.

Area pointer

Defines a memory area in the **PLC** for data exchange between the PLC and operating unit.

Bar graphs

Represent values from the **PLC** as rectangular areas. This is a way of displaying filling levels or workpiece numbers, for example, on the operating unit.

Baud rate

Rate of speed at which data is downloaded. Baud rate is specified in Bit/s.

Blank

Switch off or fade out the screen saver.

Boot

A loading process which downloads the operating system in the working memory of the operating unit

Buttons

A virtual button on the operating unit screen. Buttons on operating units with touch screens are contact sensitive.

Configuration

Definition of system–specific default settings, messages and screens using the configuration software **ProTool**.

Data record

Is a **recipe** containing data. A recipe can be comprised of several data records. When a data record is downloaded, all the assigned data is transferred to the PLC together and synchronously.

Display period

Defines whether and how long a system message is displayed on the operating unit.

Download

The transfer of run–capable project data to the operating unit. Connect the operating unit to the configuration computer with a standard cable beforehand.

Download mode

Operating unit operating mode in which data can be downloaded from the configuration computer to the operating unit (also refer to **Download**).

Event

Functions are triggered after defined events are received, e.g. on pressing or releasing a button. Events can be configured according to objects.

Event message

Provides information on the operating unit concerning the operating statuses of the machine or system connected to the **PLC**. The message text may also contain current measured values.

Fixed window

The window which always appears at the top of the operating unit screen. The content of the fixed window is independent of the screen currently open.

Flash memory

Programmable memory which can be electrically deleted and written to again segment–by–segment.

Function key

Key on the operating unit to which a configurable function can be assigned. A function key with a global function assignment always initiates the same function regardless of the screen currently open. A function key with a local function assignment (**softkey**) can have a different function for each screen.

Global tag

This is a process tag linked to the PLC. Global tags have a fixed address in the PLC. The operating unit accessed this address for reading and writing purposes.

Graphics list

A list in which each value relates to a tag assigned to a graphic. This enables, for example, the assigned graphic to be displayed on the operating unit output field instead of the value.

Group acknowledgement

During the configuration, each **alarm message** can be assigned to an **acknowledgement group**. When the alarm message is acknowledged, all the other alarm messages in the same group are simultaneously acknowledged.

Hardcopy

Represents a printout of the current screen content. Windows called in on top are not printed.

Help text

Configurable, additional information on messages, screens and fields. The help text concerning an alarm message can, for example, contain information on the cause of the fault and methods of elimination.

Hidden buttons

Buttons which are only visible during configuration, not on the operating unit. If hidden buttons are superimposed on components in the process screen, the respective components can be operated by clicking the button with the mouse or pressing them on the touch screen.

Icon

Pixel graphic of a fixed size, e.g. assigned to a **softkey**, to identify its function.

Input field

Enables the user to enter values which are subsequently downloaded to the **PLC**.

Limit value

Configurable values of a tag defining a value range. Attempts to define values outside these limits, may cause the following effects on the operating unit:

- Input field
  input is rejected
- Output field
  values are displayed in the configured color
- Trend/Bar
  values are displayed in the configured color

Local tag

Is a tag which is not linked to the PLC. Local tags are only available on the operating unit.

Logout time

Configurable interval of time after which the password level is reset to zero when the operating unit is not used.

Message arrival

Time at which a message was triggered by the **PLC** or operating unit.

Message buffer

Memory area on the operating unit in which **message events** can be stored in chronological order as they arrive. Event messages and alarm messages are stored in separate message buffers.

Message departure

Time at which a message was withdrawn by the **PLC**.

Message events

These are stored in chronological order in the operating unit message archive. Message events consist of:

- Message arrival
- Message acknowledgement
- Message departure

Message indicator

A graphical symbol displayed on the operating unit when at least one alarm message is present.

Message logging

Printout of messages parallel to their display on the operating unit display.

Multi Panel

Multi–functional, configurable operating unit with graphics display and Windows® CE operating system for operating and monitoring machines and systems.

Normal operation

Operating unit operating mode in which messages are displayed and screens can be operated.

Object

Is a component part of a screen or message. Depending on the object type, objects serve to display or enter texts and values on the operating unit.

Operator Panel

Operating unit which can be configured for operating and monitoring machines and systems.

Output field

Displays current values from the **PLC** on the operating unit.

Password

A character string which must be entered on the operating unit before a protected function can be activated. Each password is assigned to a **password level**.

Password level

The rights to use operating units can be specifically restricted to certain users and user groups. To do this, the individual functions and operating elements are assigned to hierarchically defined password levels. The password level linked to the **password** allocates the rights to execute functions on the operating unit belonging to that level or lower.

PCL

Hewlett® Packard (**P**rinter **C**ontrol **L**anguage).

PCMCIA

Personal **C**omputer **M**emory **C**ard **I**nternational **A**ssociation

Joint operation of computer companies with the aim of defining one international standard for memory cards and PC expansion cards. Cooperation with **JEIDA**.

PLC

General term for units and systems with which the operating unit communicates (e.g. SIMATIC S7 or PC).

PLC job

PLC jobs can be used by the **PLC** to trigger functions on the operating unit, e.g. display a screen.

Power–up test

Checks the status of the CPU and memory each time the power is switched on.

Print screen

Printout of a copy of the screen contents.

Process screen

The display of process values and process progress on the operating unit in the form of screens, which may contain graphics, texts and values.

Profile trend curve

A type of trend curve whereby, after setting a triggering bit, all the trend values are read from the PLC and displayed on the operating unit as a curve. Profile trend curves are excellent for displaying quick changes in cases where the overall view (profile) of the trend is the feature of interest, not the individual values.

Programmable controller

PLC from the SIMATIC S5 series (e.g. AG S5-115U/135U).

Programmable system

PLC from the SIMATIC S7 series (SIMATIC S7-200/300/400).

ProTool/Pro CS

Full graphics based configuration software for the entire SIMATIC HMI unit range and for Windows–based systems.

ProTool/Pro RT

Process visualization software with which the project created with **ProTool/Pro CS** can be run on a Windows–based system.

Recipe

A combination of tags to a fixed data structure. The data structure configured can be assigned data on the operating unit and is then referred to as a data record. The use of recipes ensures that when a data record is downloaded, all the assigned data is transferred to the PLC together and synchronously.

Remaining buffer

Configurable size of the message buffer. In the case of a buffer overflow, the operating unit deletes message events until the configured remaining buffer capacity is reached.

RS232

Standard interface for serial data transfer at a defined voltage level. Transmitter and receiver are electrically connected.

RS485

Standard interface for serial data transfer at a very high transmission rate.

Runtime software

The program visualization software SIMATIC ProTool/Pro RT with which the project created using ProTool/Pro CS can be run on your Windows–based system.

Screen

A screen displays all the logically related process data on the operating unit, whereby the individual values can be modified. Screens are composed of static and dynamic parts. Static parts refer to text and graphics, dynamic parts to input and output fields.

Selection field

Contains a list of entries from which one can be selected on the operating unit.

Softkey

Function key on the operating unit with a local function assignment. The function triggered by a softkey varies according to the screen currently open.

Start screen

The first screen, which automatically appears after the unit has started up.

Status button

A status button is a display and operating element with two possible states: **ON** and **OFF**, i.e. **touched** and **untouched**. Both states can be configured for display with text or graphics, which then label the status button.

Status/Force tag

Screen object with which individual address areas in the connected SIMATIC S5 or SIMATIC S7 can be accessed for reading and writing directly from the operating unit.

Superuser

A user with permissions to trigger functions of the highest **password level**. The superuser has access to all the operating unit functions.

System message

Provides information on the operating unit concerning internal statuses of the operating unit and **PLC**.

Tag

A defined memory location in which values can be read from and written to. This can be performed from the **PLC** or via the operating unit. Depending on whether the tag is linked to the PLC or not, a distinction is made between “global” tags (process tags) and “local” tags.

Trend curve

Curve type by which just one curve value is read from the PLC per cycle or trigger resulting in a curve display. If the configured number of measured values is not achieved, each new value overwrites the oldest value. Trend curves are especially suited to displaying continual progress.

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