SIEMENS

SIMATIC HMI

ProTool/Pro Runtime

User's Guide

Order No.: 6AV6594-1CA06-0AB0

Release 12/01
A5E00136778

Safety Guidelines

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

Danger

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

Warning

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

Caution

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

Caution

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

Notice

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

Note

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

Qualified Personnel

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

Correct Usage

Please note the following:

Warning

The device may only be used for the application cases specified in the catalog and the technical description and may only be used in combination with third-party equipment and components recommended or approved by Siemens.

Startup must not take place until it is established that the machine which is to accommodate this component is conforms with the guideline 98/37 EC.

Appropriate transport, and appropriate storage, installation and assembly, as well as careful operation and maintenance, are required to ensure that the product operates perfectly and safely.

Trademarks

The registered trademarks of the Siemens AG can be found in the preface. The remaining trademarks in this publication may be trademarks, whose use by third parties for their own purposes could violate the rights of the owner.

Impressum

Editor and Publisher: A&D PT1 D1

Siemens Aktiengesellschaft

Order no. 6AV6594-1CA06-0AB0

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:

- SIMATIC Panel PC FI25, FI45, PC670, PC670 Touch, PC 870, PC 870 Touch, PC IL 70,
- Standard PC,
- SINUMERIK Panel PC OP010, OP012, OP015,
- SIMOTION Panel PC P012K, P015K, P012T, P015T.

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 initial start up, restarting and downloading the configuration
6	Operating the runtime software
7	Handling recipes and data records
Appendix	HMI System Messages

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	From V5.0
01/99	Revised edition of the guide	From V5.1
12/99	New: devices, screen objects, recipes	From V5.2
07/00	New: PLC drivers, screen objects, touch panel operation	From V5.2 + Service Pack 2
12/01	New: devices, screen objects, PLC drivers	From V 6.0

Trademarks

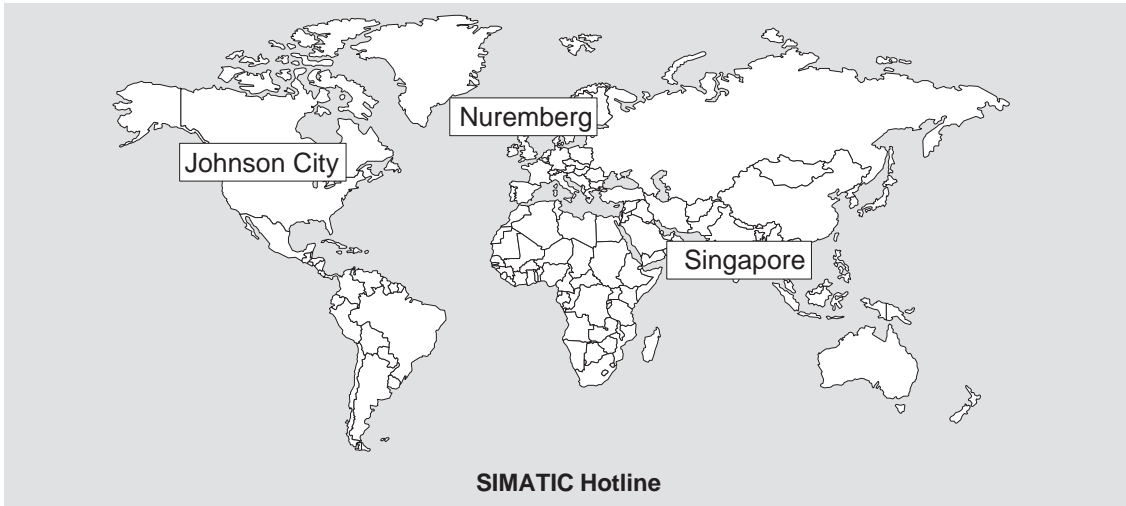The following names are registered trademarks of the Siemens AG:

- HMI®
- MP 270®
- MP 270B®
- MP 370®
- ProAgent®
- ProTool®
- ProTool/Lite®
- ProTool/Pro®
- SIMATIC®
- SIMATIC HMI®
- SIMATIC Multi Panel®
- SIMATIC Multifunctional Platform®
- WinCC®
- WinCC Add-on®

Other support

In case of technical queries, please contact the Siemens representatives in the subsidiaries and branches responsible for your area.

Customer and Technical Support

Available round the clock, worldwide:

SIMATIC Hotline

Worldwide (Nuremberg)	**Worldwide** (Nuremberg)	
Technical Support	**Technical Support**	
(FreeContact)	(fee-based, only with SIMATIC Card)	
Local time: Mon.-Fri. 7:00 to 17:00	Local time: Mon.-Fri. 0:00 to 24:00	
Telephone: +49 (180) 5050-222	Telephone: +49 (911) 895-7777	
Fax: +49 (180) 5050-223	Fax: +49 (911) 895-7001	
E-Mail: techsupport@ ad.siemens.de	GMT: +01:00	
GMT: +1:00		
Europe / Africa (Nuremberg)	**America** (Johnson City)	**Asia / Australia** (Singapore)
Authorization	**Technical Support and Authorization**	**Technical Support and Authorization**
Local time: Mon.-Fri. 7:00 to 17:00	Local time: Mon.-Fri. 8:00 to 19:00	Local time: Mon.-Fri. 8:30 to 17:30
Telephone: +49 (911) 895-7200	Telephone: +1 423 461-2522	Telephone: +65 740-7000
Fax: +49 (911) 895-7201	Fax: +1 423 461-2289	Fax: +65 740-7001
E-Mail: authorization@ nbgm.siemens.de	E-Mail: simatic.hotline@ sea.siemens.com	E-Mail: simatic.hotline@ sae.siemens.com.sg
GMT: +1:00	GMT: –5:00	GMT: +8:00
The languages spoken by the SIMATIC Hotlines are generally German and English, the Authorization Hotline is also provided in French, Italian and Spanish.		

SIMATIC Customer Support Online Services

The SIMATIC Customer Support provides you with additional information about SIMATIC products through online services:

- General current information can be obtained

  – in the **Internet** under `http://www.ad.siemens.de/simatic`

- Current product information and downloads which you may find useful are available:

  – in the **Internet** under `http://www.ad.siemens.de/simatic-cs` and

  – via the **Bulletin Board System** (BBS) in Nuremberg *(SIMATIC Customer Support Mailbox)* under the number +49 (911) 895-7100

    To dial the mailbox, use a modem with a capacity up to V.34 (28.8 kBaud) whose parameters are set as follows:
    – 8, N, 1, ANSI, or
    – dial via ISDN (x.75, 64 kBit).

- Your contact partner for Automation & Drives can be found in the contact partner database

  – in the **Internet** under
    `http://www3.ad.siemens.de/partner/search.asp`

Abbreviations

The abbreviations used in this manual 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
EM	Event Message
CF	Compact Flash
CPU	Central Processing Unit
CSV	Comma Separated Values
DP	Decentralized Periphery
DSN	Data Source Name
HMI	Human Machine Interface
ISA	Instrument Society of America
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

PELV	Protected Extra Low Voltage
PLC	Programmable Logic Controller
PPI	Point to Point Interface (SIMATIC S7)
PU	Programming Unit
RAM	Random Access Memory
SELV	Safety Extra Low Voltage
USB	Universal Serial Bus
USV	Unterbrechungsfreie Stromversorgung

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

SIMATIC HMI Documentation

Target groups

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

- Beginners
- Users
- Configuration planners
- Programmers
- Service engineers

Documentation structure

The SIMATIC HMI Documentation includes the following components:

- User guides for
  - configuration software
  - runtime software
  - communication between PLC and operating unit
- Equipment manuals for the following operating units:
  - SIMATIC PC
  - MP (Multi Panel)
  - OP (Operator Panel)
  - TP (Touch Panel)
  - TD (Text Display)
  - PP (Pushbutton Panel)
- Online help for the configuration software
- Installation guides
- Quick reference manuals

The following table provides an overview of the SIMATIC HMI Documentation helpful for this manual.

Documentation	Target group	Contents
ProTool Online Help	Configuration planners	Contains the following information while working with ProTool on the configuration computer: • context-sensitive help, • detailed instructions and examples, • detailed information, • all information from the user guides.
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.
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 deinstallation of authorizations.
Application Example Start-up Guide	Beginners	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.
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 • SIMATIC WinAC • SIMOTION • PLCs from other manufacturors This documentation describes • the configuration and parameters necessary to connect the units to the PLC and network, • the user data areas which serve for data exchange between the operating unit and PLC.

Contents

Appendix

Introduction

<div align="right">

1

</div>

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 98 SE, Windows ME, Windows NT 4.0 SP6a and Windows 2000 SP2.

Modern automation concepts make great demands on process visualization. In particular, process control in the machine-oriented sector must be able to fulfill 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 98 SE, Windows ME, Windows NT 4.0 SP6a and Windows 2000 SP2 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. ProTool/Pro RT is also used on the configuration computer to test and simulate the project file generated.

Windows-based systems

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

- SIMATIC Panel PC FI25, FI45, PC670, PC670 Touch, PC 870, PC 870 Touch, PC IL 70
- Standard PC
- SINUMERIK Panel PC OP010, OP012, OP015
- SIMOTION Panel PC P012K, P015K, P012T, P015T

Authorization

If the SIMATIC ProTool/Pro RT runtime software is installed on a standard PC or a SIMATIC Panel PC, the corresponding authorization license is required to enable unrestricted operation: If no authorization license is available, ProTool/Pro RT runs in Demo mode.

- **PC**:
  The authorization ust be ordered separately.

- **SIMATIC operating units with runtime software supplied**:
  The authorization is supplied with the unit (e.g. Panel PC 670).

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
- integrated alarm logging system
- 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 user's guide entitled *"Communication for Windows-based Systems"*.

Any new information, which could not be included in the manuals before going to press, is provided in the *readme.pdf* file in the ProTool Information System which can be referred to after installing *ProTool/Pro Runtime*. The *docs* directory contains further relevant documents as pdf files.

Functionality

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
	View all queued messages	In message page/message display
	Length of message text per line	70 characters (font-dependent) for message texts configurable in ProTool, 255 characters for message texts configurable in Step7
	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
	View all queued messages	In message page/message display
	Length of message text per line	70 characters (font-dependent) for message texts configurable in ProTool, 255 characters for message texts configurable in Step7
	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	√

Functions		
Alarm_S	Display S7 messages	√
Message logging	Output to printer	√
Volatile message buffer	Capacity	1,024 message events
	Viewing event/alarm messages	√
	Delete	√
	Print	√
	Message events queued simultaneously (max.) • Event messages: or • Alarm messages:	500 250
Archiving	Messages Process values	√ √
	Archive type	Cyclic/Sequence archive
	No. of archives	100
	Max. no. of tags which can be archived	100
	No. of sequence archives	40
	Entries per archive	500,000
	Memory location	• File (CSV) • Database (OBCD)
Message acquisition	Time of occurrence	Date/time
	Message events	Arrived, departed, acknowledged
Screens	Number	300
	View	√
	Printing (Print Screen)	√
	Screen objects	• Graphics • Text • Output field • Input field • Symbolic output field • Selection field • Date and time • Graphic display • Graphics list • Graphic box • Vector graphic • Button • Status button • State view • Switches

Functions		
Screens	Screen objects	• Hidden button • Trend view • Bar • Message view • Single message display • Status/Force • Password list • Recipe display • Slider controls • Analog display • Digital/Analog clock • SIMATIC HMI Symbol Library
	Operator prompting	• Softkey icons [1] • Dynamic attributes • Call/Hide objects • TAB sequence • Help text
	Fixed window	√
Limit monitoring	Inputs/outputs	√
Conversion functions	Inputs/outputs	√
Help text	Lines/characters	7/35 (font-dependent)
	For messages	√
	For screens	√
	For screen objects	• Input field • Selection field • Button • Status button • Switches • Hidden button
Print functions	Print screen	√
	Direct message logging	√
	Shift report	√
Password protection	Number of passwords	50
	Password level	10 (0...9)
Recipes	Number	1,000
	User data length	8,000 bytes per data record
	Total number of entries	20,000
	Entries per recipe	2,000
Online language switch	Number of languages	5
PU functions (Status/Force)	SIMATIC S5	√
	SIMATIC S7	√
Screen	Blanking circuit [2]	√
Scheduler	Trigger functions cylically or once	√

Functions		
VB Script	User-specific expansions of functionality	√
Simulator	Simulation of • Value changes within tags • Event messages • Alarm messages	√ √ √
LED control	Operator guidance [1]	√
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	√
	SIMATIC 505 • NITP • PROFIBUS-DP	√ √
	SIMOTION	√
	SIMATIC WinAC	√
Communication	**Connection to PLCs from other manufacturers**	
	Allen Bradley (PLC-5, SLC500) • DF1 • DH+ • DH485	√ √ √
	LG (Lucky Goldstar) • GLOFA GM	√
	Mitsubishi FX / **Mitsubishi Protocol 4**	√
	GE Fanuc	√
	Omron Hostlink/Multilink	√
	Modicon • Modbus	√
	Telemecanique TSX • Adjust • Uni-Telway	√ √

1) Not for standard PCs and touch screens
2) Standard screen saver for standard PC and SIMATIC Panel PC.

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 98 SE, Windows ME, Windows NT 4.0 SP6a and Windows 2000:

- SIMATIC Panel PC FI25, FI45, PC670, PC670 Touch, PC 870, PC 870 Touch, PC IL 70
- Standard PC
- SINUMERIK Panel PC OP010, OP012, OP015
- SIMOTION Panel PC P012K, P015K, P012T, P015T

SIMATIC ProTool/Pro RT is offered as a pure software variant, e.g. for PCs.

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:

- New communication, transfer and downloading possibilities via USB and Ethernet interfaces guarantee a high degree of configuration efficiency.

- Remote transfer using the ProTool/Pro RT Start menu.

- Simulation of the configuration on the configuration computer (no PLC required).

- 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 project without the plant being connected by using the simulator supplied. This means it is no longer necessary to load a project on the target system in order to test it.

3.1   Brief Description of Various Objects in a Project

Objects in a projects

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 by means of tags. The operating unit displays values from the PLC and accepts values entered manually.

This section provides information on operating the following objects:

- Screens (Page 3-4)
- Messages (Page 3-8)
- Tags (Page 3-10)
- Functions (Page 3-11)
- Archives (Page 3-12)
- Reports (Page 3-14)
- Scripts (Page 3-15)
- Scheduler (Page 3-15)

Information is also provided on the following topics:

- Printing (Page 3-16)
- LED control (Page 3-16)

Information concerning recipes is provided in Chapter 7.

3.1.1   Screens

The process is visualized by means of screens. Screens show the operator the current process status in the form of numeric 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
Graphics	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 distinguished by assigning different fonts and formats. Texts can be configured to cover several lines and in different languages.
Input field	The input field is used to enter values which are then transferred to the PLC. The values can be in numeric or alphanumeric form. 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 numeric or alphanumeric form.
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`.
Selection field	Values are not entered in the selection field character by character but are selected from a text list. This enables, for example, a motor to be switched on and off by means of the entries `ON` and `OFF`.

Screen object	Description
Date/Time	This screen object is used to display and enter the calendar date and time. The way in which the date and time are displayed depends on the language set on the operating unit.
Graphic display	The graphic display enables the dynamic positioning of graphics from external graphic programs in the project. **Example:** Instead of using a numeric value indicator, the position of an object (transported product) can be visualized by a dynamic graphic.
Graphic list	A graphic list displays current values from the PLC in the form of a graphic. It assigns a graphic to each tag value. The value of the tag during runtime determines which graphic is selected from the list and displayed on the operating unit. **Example:** Instead of the values `0` and `1`, the graphic list displays graphical representations for open and closed valves.
Graphic box	A graphic box enables the selection of a graphic by selecting an entry from a graphics list. **Example:** Using a graphic selection list it is possible to design the user interface as language independent, for example.
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 your configuration. The type, color and width of the lines and their transparency, color filling, rounding radius, 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. After pressing the button, the functions configured for the event *press* are triggered. On releasing the button, 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).
State view	The state viewcan be used to configure a warning display or the indicate the status of a unit which cannot be viewed from the operating unit (e.g. a motor).
	The response of the State viewcan be configured.
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 located over graphics, for example, it is possible to operate part of the graphic, e.g. a motor or valve.
	After pressing the button, the functions configured for the event *press* are triggered. On releasing the button, the functions configured for the event *release* are triggered.
Trend view	A trend view 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	Bars represent values from the PLC as rectangular areas. The operating unit thus provides a clear indication of how far the current value is from the limit values, or if a setpoint value has been reached, at a glance. Bars are often used to represent fill levels or workpiece numbers.
	Direction, scaling, bar and background color and labeling the Y-axis can be configured as required. In order to identify limit values, limit value lines can be called in.
Message view	Special filter criteria are configured in the message view for displaying the volatile message buffer and/or message archive.
Simple message view	A single message display can provide a subset of the functionality of a message display. It can be used, for example, to simply realize a message line in a screen.

Screen object	Description
Status/Force	By implementing Status/Force, the operating unit can be used to access the connected PLC (SIMATIC S5 and SIMATIC S7) in order to read and write values directly. PLC operands can be monitored and modified without having to connect an additional programming unit or PC to the PLC. This facility is of special use during the testing and commissioning phases of the 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.
SIMATIC HMI Symbol Library	The SIMATIC HMI Symbol Library, containing numerous graphics from production and techniques, enables graphics to be created in the project in both abundance and realistically. They include: valves, motors, tank containers, conveyor belts, cooling systems and heating equipment as well as ISA symbols.

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

3.1.2   Messages

Message classes

Messages on the operating unit indicate events and statuses related to control processes. 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.
- **HMI System Messages**
  are triggered by the operating unit. They are not configured. System messages indicate, for example, incorrect operations or communication faults.
- **SIMATIC Diagnostic Events**
  provide information on the status of the SIMATIC S7 and SIMOTION. They are not configured in the ProTool/Pro CS configuration software. Refer to the S7 and SIMOTION manuals for the error number indicated on the operating unit to determine the cause of the error.

Buffering messages

All message events (arrived, cleared, 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 6-19)
- Message window (refer to Page 6-19)
- Message page (refer to Page 6-22)
- Message buffer (refer to Page 6-23)
- Message view
  - Message view with full functionality (refer to Page 6-24)
  - Simple message view with restricted functionality (refer to Page 6-26)

3.1.3   ALARM_S

Definition

ALARM_S is a message number procedure. The message identification numbers are assigned automatically by the configuration in STEP 7 or SIMOTION SCOUT. The unique assignment of the message text is made according to these numbers. The advantage here is that the message texts can be used on various operating units but only need to be entered once.

If a fault occurs, the operating unit receives the message by means of the message number. The associated message is determined and issued according to the number.

In addition to the message status (*arrived*, *cleared*, *acknowledged*), the PLC also stores the time. This information is retained even after the message has been sent, so that individual network components (e.g. operating units) can log on later and be updated.

Configuring ALARM_S messages

ALARM_S messages are not configured in ProTool CS but in STEP 7, e.g. for S7-300/400-CPUs, or in SIMOTION SCOUT. Therefore, the display of ALARM_S messages can only be configured when a SIMATIC S7 PLC is used and the ProTool/Pro CS configuration software has been integrated in STEP 7 or SCOUT respectively.

When defining the configuration, it is useful to set the time of occurrence of a message to be displayed with milliseconds.

Detailed information on the configuration of ALARM_S messages is available in the *ProAgent/MP and ProAgent/PC* user guides.

Restarting S7 CPUs

Depending on the hardware configuration of the CPUs, it is possible that under certain circumstances all queued ALARM_S messages will be deleted when S7 CPUs are restarted. Older stocks of S7 300 CPUs cannot inform the operating units involved of the restart. The result of this is that messages are indicated on the operating unit as being queued although the CPU has already deleted them.

Remedy:
Disconnect the connection between the operating unit and CPU and then reconnect them again. Use the function *Connect_Disconnect_PLC* if configured.

3.1.4 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.

3.1.5   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 project on a process-specific basis,
- control the process,
- utilize properties of the operating unit,
- define system settings online on the operating unit.

Using functions

Functions are configured to events. These 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.

3.1.6   Archives

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 Data Engine 97 and 2000
- MS Access 97 and 2000
- MS SQL Server 7.0 and 2000

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	Action
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** • Activate the Windows Start menu, choose *Settings* → *Control Panel* and select the ODBC32 configuration program. • 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 archives possible may also be restricted by the database used, e.g. by the configuration, license, etc.
Please refer to your database manual for information on this.

• If process data is stored on disks, archiving is completed without an acknowledgement as soon as the disk is full.

3.1.7   Reports

Application

Reports are used to document process data and completed production cycles. Use the ProTool/Pro CS configuration software to define the content and layout of the various reports and configure the event which should trigger report printout. Up to 10 different reports can be configured. Each report can comprise a maximum of 10 pages.

In this way, for example, it is possible to configure a report which is printed at the end of a shift in order to document non-production times. It is also possible to configure a report which can be used for documentation purposes within the scope of a product or quality test (ISO 9000).

Triggering events

Printout of the report during runtime is triggered either automatically (e.g. via a scheduler) or manually (e.g. via a function key or softkey).

In order to automatically print a report at the end of each shift, for example, the *Print_report* function is configured on the timer.

In order to trigger printout of the report manually, configure the *Print_report* function to a function key, for example.

The following events can be configured to trigger printout:

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

Print message buffer

A report 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 report is correctly printed, the printer connected during runtime must support the paper format and layout of the report. Reports are printed in Graphics mode. Due to the quantity of data involved, a network or USB printer should be connected.

- In the report, a tag value is read out and printed at the moment of printing. In the case of reports 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 provides scrips which represent an interface for scripting using the Microsoft Visual Basic Script (VBScript). VBScript enables the configuration software to be extended with 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.

3.1.9   Scheduler

Purpose

A scheduler defines a periodically recurring or unique moment in time (per minute, hourly, daily, weekly, monthly, annually or one-off) at which specific functions are initiated. The functions, e.g. printing or archiving functions, are triggered when the event *Time_expired* occurs.

Change scheduler

Schedulers are preset during configuration. If the scheduler is linked to a time variable (scheduler type "daily", "annually" and "once") and the time variable is assigned to an input field for date and time, for instance, the scheduler times can be modified on the operating panel. Simply overwrite the times currently defined in the input fields with new values.

3.1.10 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, cleared, acknowledged) is logged via the printer.

- **Print report**
  (Refer to Chapter 3.1.7)

- **Print message buffer**
  (Refer to Chapter 3.1.7)

3.1.11 LED control

Purpose

The Light Emitting Diodes (LEDs) in the function keys on the SIMATIC operating unit can be controlled from the PLU. An LED which lights up or flashes can be used to indicate to the user, for example, that a certain function key on the operating unit must be operated.

Condition

In order that the PLC can trigger the LED, the relevant *LED Assignment* data area in the PLC must be set up and specified in the project in the project window under *Area Pointers*. The assignment of the individual LEDs to the bits in the LED Assignment must be defined when configuring the function keys.

Detailed information on LED control is provided in the *Communication for Windows-based Systems* user's guide.

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) [2] • S5-135U (CPU 928B) [2] • S5-155U (CPU 946/947, 948) [2]
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 [3]
• S7-200 (all CPUs with integrated PROFIBUS-DP interface) [4] • S7/M7-300 (all CPUs with integrated PROFIBUS-DP interface) [4] • S7/M7-300 with CPU342-5 [4] • S7/M7-400 (all CPUs with integrated PROFIBUS-DP interface) [4] • S7/M7-400 with CP443-5 [4]
SIMATIC S7 via SIMATIC WinAC [5]
• Internal communication
SIMATIC 505 via NITP
• Point-to-point connection via RS232/RS422
SIMATIC 505 via PROFIBUS-DP [6]
• All CPUs via CP5434-DP
SIMOTION

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

OPC [7)
• Client/Server
Allen Bradley via DF1, DH+ (KF2) and DH485
• PLC-5 • SLC 500
LG (Lucky Goldstar)
• GLOFA GM
Mitsubishi
• FX • Protocol 4
Modicon
• Modbus
Telemecanique via Adjust and Uni-Telway
• TSX
GE Fanuc SNP/SNPX
Omron Host-Link

_____

1) Special function block required (refer to the user's guide entitled
    Communication for Windows-based Systems)

2) With IM308C or CP5431

3) ProTool/Pro RT is an active node; communication takes place using the S7 protocol

4) Refer to Catalog ST70

5) Only with Windows NT

6) Special application required ((refer to the user's guide entitled
    Communication for Windows-based Systems)

7) Only with Windows NT and Windows 2000.

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"*.

Requirements for Commissioning

4

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 on a license disk.

The license is subdivided according to the number of process tags, the so called 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   Target Devices

Operating units supported

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

- OP37/Pro

- SIMATIC Panel PC FI25, FI45, PC670, PC670 Touch, PC 870, PC 870 Touch, PC IL 70

- Standard PC

- SINUMERIK Panel PC OP010, OP012, OP015

- SIMOTION Panel PC P012K, P015K, P012T, P015T

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

- **Text displays**
  TD17

- **Text-based display operator panels**
  OP3, OP5, OP7, OP15A, OP15C, OP17

- **Graphic display operator panels**
  OP25, OP27, OP35, OP37

- **Touch panels**
  TP27-6, TP27-10, TP37

- **Windows-based systems**
  - **Panels**
    TP170 A, TP170 B, OP170 B, TP 270, OP 270
  - **Multi Panels**
    MP270 , MP 270B, MP 370
    OP37/Pro
  - **Panel PCs**
    FI25, FI45, PC670, PC670 Touch
  - **PC**

- **C7 units**
  C7-621, C7-623, C7-624, C7-626, C7-633, C7-634

Please refer to the respective equipment manuals for a more detailed description of the SIMATIC operating units MP 270B, MP 370, TP 170A, TP 170B, OP 170B, TP 270 and OP 270.

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® 98 SE
- Microsoft® Windows® ME
- Microsoft® Windows® NT 4.0 with Service Pack 6a
- Microsoft® Windows® 2000 SP2

If the necessary Microsoft Service Pack is not installed on your PC, the service packs required for Windows NT 4.0 and Windows 2000 including Internet Explorer V6.0 are available on two additional CDs supplied.

Hardware

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

Hardware	Minimum requirements	Rec.
Operating system	Windows 98 SE, Windows ME	Windows NT 4.0 SP 6a, Windows 2000 SP2 for multilingual configurations Windows 2000 SP2 MUI
Processor	Pentium II, 233 MHz	≥Pentium III, 500 MHz
RAM [1]	64 MB	≥128 MB
Graphics	VGA	SVGA with hardware acceleration
Resolution	640 x 480	800 x 600
Hard disk [2]	≥100 MB	
Floppy disk drive [3]	3.5'' / 1.44 Mbytes	
CD-ROM	For software installation	

The PC hardware must fulfill the following requirements in order to operate the ProTool configuration software:

Hardware	Minimum requirements	Rec.
Processor	Pentium II, 233 MHz	≥Pentium III, 500 MHz
RAM [1]	64 MB	≥128 MB
Graphics	SVGA	SVGA with hardware acceleration
Resolution	800 x 600 [4]	
Hard disk [2]	≥300 Mbyte for ProTool + 40 Mbyte each further language	
CD-ROM	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 the swap file = 3 x size of the RAM memory.

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

3) For authorization of the runtime software.

4) ProTool/Lite also 640 x 480.

4.3   Electrical Installation

Connecting an OP37/Pro to the PLC

The OP37/Pro is connected to the PLC via the IF1A or IF1B interface. The interface to be used depends on the design (RS 232, RS 422 or RS 485).

Table 4-1 indicates which PLC can, in principle, be connected to which interface of the OP37/Pro. For more detailed information on this, please refer to the *OP37/Pro Equipment Manual*.

Table 4-1   Using the OP37/Pro interfaces

PLC	OP37/Pro interface
SIMATIC S5	IF1 A
SIMATIC S7	IF1 B In the OP37/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 OP37/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 OP37/Pro BIOS. This is carried out in the *Integrated Peripherals* screen under the *Serial 1* entry.
LG (Lucky Goldstar) • GLOFA GM	IF1A or IF1B If the IF1B interface is used, change the interface setting in the OP37/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 OP37/Pro BIOS. This is carried out in the *Integrated Peripherals* screen under the *Serial 1* entry.

Table 4-1   Using the OP37/Pro interfaces, continued

PLC	OP37/Pro interface
Modicon • Modbus	IF1 A
Telemecanique TSX	IF1 B In the OP37/Pro BIOS, use the *Integrated Peripherals* mask *Serial 1* entry to change the interface.

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 the 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-A2 [2]	–	√
CP5613 [2]	–	√
CP5614 [2]	–	√ [3]

1) Installation instructions can be found on Page 5-9

2) SIMATIC NET driver software is required

3) Use Master connection

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, RS232 interface
SIMATIC WinAC	COM1 to COM4, RS232 interface
SIMOTION	COM1 to COM4, RS232 interface
OPC	Ethernet network card
Allen Bradley via • DF1 • DH+ (via KF2 module) • DH485	COM1 to COM4, RS232 interface
LG (Lucky Goldstar) • GLOFA GM	COM1 to COM4, RS232 interface
Mitsubishi FX / Protocol 4	COM1 to COM4, RS232 interface
Modicon • Modbus	COM1 to COM4, RS232 interface
GE Fanuc	COM1 to COM4, RS232 interface
Omron Hostlink/Multilink	COM1 to COM4, RS232 interface
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. FI25 or FI45) or a PC, for example, 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 runtime software supplied**

  Before a SIMATIC operating unit can be started up for the first time with the runtime software supplied (e.g. Panel PC670), the runtime software must be installed.

  The runtime software authorization to use it 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.

Action

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

Step	Action	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 SIMATIC operating 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	Action
1	**Install Windows** (PC only)
	Information on commissioning Windows® is provided in the Windows manual supplied.
2	**Install the Service Pack for Windows® NT4.0 SP6a** (PC only).
	Install Service Pack 6a for Windows NT; it is contained on the CD supplied. Start the following program on the CD-ROM: `\servicep\winnt\deutsch\nt4sp6_i.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.
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.
	Define the following settings to enable messages to be printed line by line: **For Windows® 98 SE:** 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 *Properties* dialog of the printer. Click the *Print directly to the printer* option on the *Print job scheduling* tab.

Step	Action
4	**Activate multilanguage support** [1]
	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® 98 SE and Win ME are 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 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.
7	**Coloration of screen objects** (3D objects)
	The coloration of screen objects, such as message display, is defined in the Windows screen property settings under *Start → Settings → Control Panel → Display → Appearance.*

---

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

5.2 Install ProTool/Pro RT

Note

Chapter 5.2 is only relevant for operating units which are not ready to operate, such as PC670 or a standard PC.

5.2.1 Install the runtime software

Condition

The ProTool/Pro RT runtime software is contained on the *SIMATIC ProTool/Pro* CD. The runtime software requires a license (authorization) to be able to run it. This is acquired on purchasing a SIMATIC operating unit with runtime software; it is enclosed with the unit. In the case of a PC, the license (authorization) 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	Action
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.
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.

5.2.2   Communication

Connection to the PLC

ProTool/Pro RT supports communication with the PLCs listed in Chapter 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 5-14). 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	Action
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	Action
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.

5.2.3   ProTool/Pro Runtime integrated in PC workstation from Step 7

Special feature

1. The content of the SIMATIC NET CD is installed on the runtime PC from 7/2001.

2. ProTool/Pro RT is installed in the *HW Config* in the PC workstation.

3. The check box *S7RTM is installed* is activated in the SIMATIC Manager of the PC workstation.

Further information is available on the SIMATIC NET CD.

Action

1. Start the *Components Configurator*.

2. Add *ProTool/Pro RT*.

   Ensure that the same index and name are selected as in the *HW Config* from Step 7.

Condition

ProTool can be integrated as a standalone application or in the SIMATIC Step 7 configuration software when a SIMATIC PLC is used and the Step 7 configuration software is installed on the system. It is possible to select icons and data blocks from SIMATIC STEP 7 in ProTool as tags. This prevents errors caused by repeated input.

If, for example, a WinAC PLC is installed on a PC workstation on which the runtime is also installed, it can be triggered as the PLC in ProTool Runtime. In addition, it is also possible to communicate with SIMATIC PLCs outside the PC workstation via a network.

SIMATIC manager

When working with ProTool integrated in SIMATIC STEP 7, the SIMATIC Manager is available for use with the ProTool projects. The following tasks can be completed without opening ProTool:

- Generate and transfer ProTool projects

- Start ProTool RT via *File → Start Runtime*

- Export and import texts for translation

- Define language settings

- Copy or move ProTool projects

- Archive and dearchive ProTool projects within the scope of SIMATIC STEP 7 projects

Please refer to the documentation on the SIMATIC Manager for more detailed information.

Switch STEP 7 integration from ProTool

If ProTool has been installed integrated in SIMATIC STEP 7, the ProTool *File* menu provides the menu item *Integration in STEP 7*. This enables ProTool to be integrated in or deinstalled from (i.e. operated in standalone mode) SIMATIC STEP 7. After switching the integration mode, ProTool is automatically restarted.

The integration of ProTool in SIMATIC STEP 7 is still possible via the ProTool Setup, regardless of this.

In integrated mode, it is also possible to deinstall individual projects so that they can be processed by ProTool in standalone mode (e.g. on another configuration computer).

Integrating and removing individual ProTool projects

Projects created using ProTool in standalone mode cannot be called in directly via the SIMATIC Manager. In order to include such projects in a STEP 7 project, they must be integrated.

To do this, activate ProTool and select the menu items *File → Integrate*.

Conversely, in order to process projects, which were created integrated in SIMATIC STEP 7, in ProTool in standalone mode without SIMATIC STEP 7 being available, these projects must first be deinstalled.

To do this, activate ProTool and select the menu items *File → Unintegrate*.

5.3 Retrofitting a Communication Processor

Condition

SIMATIC Net CD 7/2001 is not installed.

Purpose

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

Information on the other communication processors is provided in the installation manual enclosed with the respective component.

Recommended procedure

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

Step	Action
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	Action
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 OP37/Pro

Settings in BIOS

Different settings must be defined in the BIOS of the OP37/Pro, according to the connection used. In the case of serial connections, the corresponding COM interface must be activated.

Information on this is provided in the *OP37/Pro* equipment manual, the *Communication for Windows-based Systems* User's Guide and in the ProTool/Pro CS configuration software online help.

Note

Restart the OP37/Pro after carrying out any changes in the BIOS so that the new BIOS settings take effect.

Direct key module

The hardware based control of the direct key module outputs via the OP37/Pro keyboard can be used without restrictions. However, the runtime software ProTool/Pro RT does not support defining ports by means of messages.

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 online. 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 5-11).

- 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 5-11).

- 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 5-14).

Configuration software and runtime software are on the same PC

1. 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`).

2. Start the ProTool/Pro RT runtime software directly from the configuration software currently running using the icon depicted.

3. 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 5.5.3.

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 `*.fwd` file from Windows® 98 SE 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.

Note

Before starting up a new project, delete all the archive files on your operating unit which were not created with the new project.

5.5.2   Start Menu for PC

Figure 5-1   Start menu for PCs

Start the PC Loader (Start menu) via the Windows Start menu *SIMATIC →
ProTool/Pro RT → ProTool/Pro RT Loader*. The PC Loader offers the following
options.

Press the *Transfer* button to switch the operating unit to download mode in order to
load a configuration.

Press the *Start* button to start the runtime software automatically.

After pressing the *Settings* button, the following window opens in which various
settings can be defined.
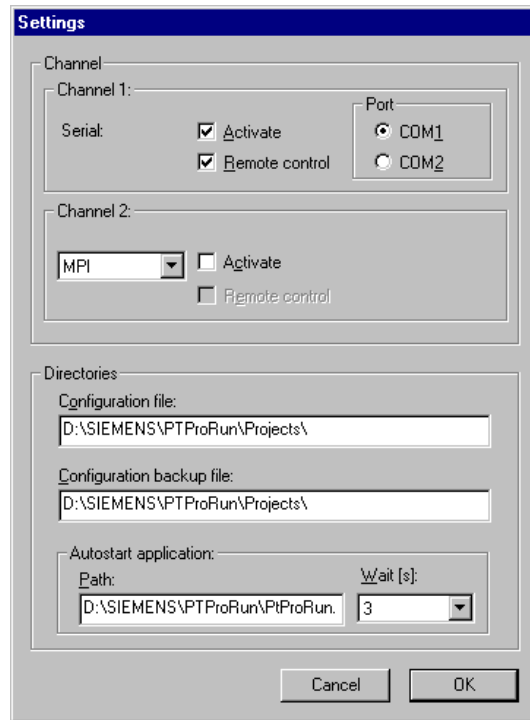
Figure 5-2   *Settings* window

- The *Channel* section of the Setting menu can be used to activate the required communication channel. In addition to the serial communication channel, a second channel can also be selected to download data from the configuration computer to the operating unit.

- The *Directories* section enables the following settings to be made:
  – *Configuration file*
  The predefined storage location for the project file can be changed here. During the next downloading process, the configuration is stored in the storage location specified.
  – *Configuration backup file*
  The predefined storage location for the source file of your configuration can be changed here. This file can be used for restoring (downloading back) the configuration. External Flash cards or network connections can be set for the operating unit.
  – *Autostart application*
  Path
  This defines the storage location for the ProTool/Pro runtime project. The path for a standard installation is:
  `c:\siemens\PtProRun\PtProRun.exe`
  Wait (s)
  It is possible to define the number of seconds the Start menu should remain on screen before the runtime is started (1 s, 3 s, 5 s, 10 s or constantly). If no ProTool/Pro runtime project is available, the unit automatically switches to download mode.

Press the *Exit* button to close the PC Loader.

5.5.3   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:
  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

There are several methods of simulating a finished project:

- **Simulation with connection to the PLC**

  The project can be simulated by running it directly during the runtime. In this case, tags and area pointers are only capable of functioning when the configuration computer is connected to a corresponding PLC.

  If the computer is connected to a PLC, the runtime provides an authentic simulation of the configured operating unit.

  For simulation with ProTool/Pro RT, select the menu item *File → Test → Start Runtime*.

- **Simulation without connection to the PLC**

  The simulation program automatically installed with ProTool/Pro RT can be used to simulate a project, including tags and area pointers, without the necessity of a connection to a PLC. The tag and area pointer parameters are entered in a simulation table which is read in during the simulation from ProTool/Pro RT.

  For simulation using the simulator, select the menu item *File → Test → Start Simulator*.

- **Simulation in integrated mode**

  If a configuration is created integrated in STEP 7, PLCSIM V5.0 can be used to simulate connection to a PLC. Please refer to the STEP 7 documentation for more detailed information.

The following steps describe the basic steps necessary to simulate a project without a connection to a PLC. Step-by-step instructions are provided in Table 5-1.

1. First of all, create a project as it 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 5-3).

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.

Simulation table

	Tag	Data Type	Current val	Format	Write cyle	Simulation	Set value	MinValue	MaxValue	Cycle	Start
	VAR_1	UINT	0000 0000 0	Bin	1,0	Sine		0000 0000 0	1111 1111	10,000	☐
	VAR_2	INT	0000 0000 0	Bin	4,0	Random		1000 0000 0	0111 1111		☐
	VAR_3	INT	0	Dez	2,0	Increment		-32768	32767	10,000	☐
	VAR_4	REAL	0	Dez	10,0	<Display>					☐
	VAR_5	INT	0000	Hex	2,0	Shift bit					☐
	VAR_7	INT	0000	Hex	4,0	Decrement		8000	7FFF	10,000	☐
	Event mes	UINT	0000 0000 0	Bin	1,0	Shift bit					☐
✎	Alarm mes	UINT	0000 0000 0	Bin	1,0	Shift bit	0000 0000 0				☑
✳	---										☐

Figure 5-3   Simulation table (example)

Figure 5-3 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.

Tags

Tags available

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.

Archive tags

In order to be able to simulate archive tags, activate the option *Read continuously* when configuring the tags in the tag dialog on the *Options* tab control.

Data formats

PLC-specific data formats

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.

Date and time

The simulator converts data formats for date and time, e.g. *DATE*, *DATE AND TIME* and *TIME OF DAY*, to an internal format which contains both the time as well as the date. If simply the time is entered for such a tag in the simulation table, for example, the missing part, in this case the date, is also modified. Therefore, enter the full value with time and date when simulating tags with time or date dependent formats.

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	Action
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 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 5-3). **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. Use the *Tag* column to select all the tags and area pointers to be modified 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.

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

Step	Action
6	Use the *Simulation* column to specify the manner in which the value of the tag is to be simulated: • *Sine* 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 *Cycle* column to specify the interval, in seconds, in which a tag value should be written in a project, e.g. sinusoidal.
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 5-4 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
- Cycle = 100 * 1s
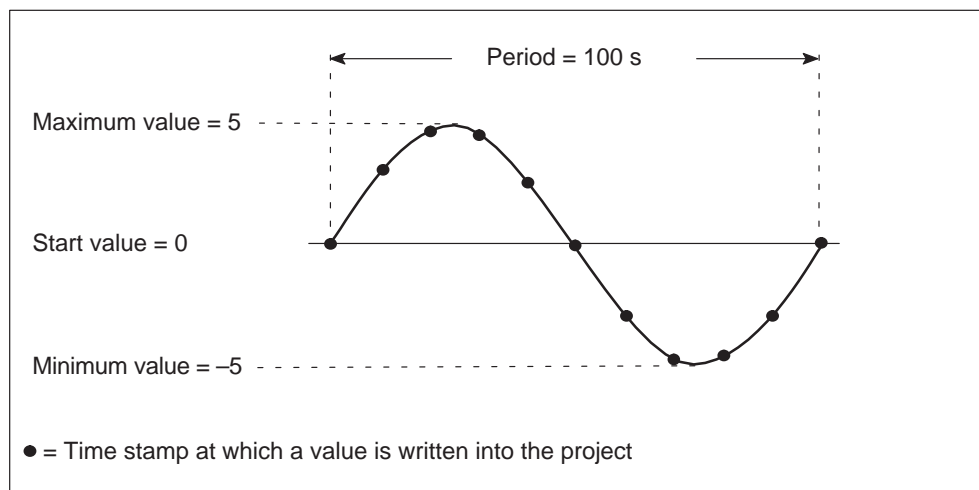
Figure 5-4   Simulating a tag as a sine curve

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 → ProTool Pro RT → 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	Action
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.

Start the project using the PC Loader menu

To start a project via the PC Loader menu (refer to Ch. 5.5.2 on Page 5-12), load the relevant project by using the *Transfer* button and start the runtime software by using the *Start* button.

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 PC direct connection can be set up to be serial or parallel.

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 parallel direct connection on the runtime PC

Settings on the runtime PC	
Step	**Action**
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 *Configuration* tab control. 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 parallel direct connection on the runtime PC, continued

Step	Action
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 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 parallel direct connection on the configuration PC

Step	Action
— **Settings on the configuration PC**	
1	Start the Direct Cable Connection program under *Start → Programs → Accessories → Direct Cable Connection.* 1)
2	In the *Direct Cable Connection* dialog, mark the option `Guest Computer`. 2)
3	Activate *Start → Settings → Control Panel → Network* to check the properties of the communication driver in the *Configuration* tab control. 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. PC670) is located under *Start → Settings → Control Panel → Network* on the *Identification* tab.

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

Step	Action
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. `\PC670\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, install it 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 may be restarted.

Setting up a dial-up network connection

The Dial-Up Network provided by Windows® 98 SE or the RAS package from Windows NT 4.0 SP6a and Windows 2000 SP2 can be implemented to set up a virtual network using serial or parallel cables, via Internet or modems.

Information concerning the installation of dial-up networks is provided in the Windows documentation. n the case of Windows 98 SE, Windows NT and Windows 2000 SP2, all the necessary components are supplied.

Operating ProTool/Pro Runtime

<div style="text-align:right; font-size:2em;">**6**</div>

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 .

Pressing several keys

Note

Never press more than one function key/softkey or button (when using touch panels) on the operating unit at the same time. Otherwise, actions may be inadvertently triggered under certain circumstances.
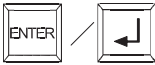
Operating screens via the keyboard

The navigation options indicated in the Table 6-1 are available for carrying out actions on a screen using the keyboard.
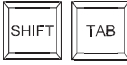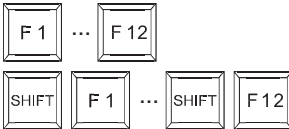
The type of cursor control via the keyboard can be defined in the ProTool/Pro CS configuration software (refer to Page 6-8). This guide describes the settings for ProTool versions from V 5.2.

Table 6-1   Operating screens via the keyboard

Navigation	PC	SIMATIC 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

  ENTER / ↵

- Use the ESCAPE key to cancel input.

  ESC

- Use the TAB key to access the next screen object which can be acted upon according to the configured tabulator sequence.

  TAB

  By pressing it simultaneously with the SHIFT key, access is made in the reverse sequence.

  SHIFT TAB

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

  F 1 ... F 12

  SHIFT F 1 ... SHIFT F 12

- In the case of a SIMATIC operating unit, it is possible to assign a different number of global and local function keys, according to the unit.

  The name of these keys is dependent on the unit, e.g.:

  K 1   S 1   F 1

⚠ **Caution**

If a function key is pressed before changing screens, it is possible that the corresponding function is triggered before the new screen has appeared.

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. The most important key combinations for the SIMATIC Panel PCs 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 F 10
Mark all	CTRL A
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 control	CTRL TAB
Open previous tab control	CTRL SHIFT TAB

Touch panels

Touch panels, e.g. Panel PC670 Touch, are operated by directly touching the operating elements on the contact sensitive screen. This represents the basic difference between touch panel operation and mouse operation.

In order to enter values, the touch panel automatically displays a screen keyboard after touching an entry field, for example. The screen keyboard is also displayed automatically if a password needs to be entered in order to activate a password protected function. After completing the input, the screen keyboard is automatically hidden. Depending on the input field configured, the screen keyboard provides buttons for pure numeric input or for alphanumeric input.

The screen keyboard is positioned dynamically during runtime. In this way, the corresponding input field always remains visible on the operating unit.

Figure 6-1 illustrates an example of a German screen keyboard for Panel PCs to enter alphanumeric values.

Figure 6-1   Example of a screen keyboard for Panel PCs

If the function *Use_On_Screen_Keyboard_ON/OFF* has been configured in your project, it is possible to suppress the screen keyboard, e.g. to implement an external keyboard or as a result of certain operating situations.

Fixed window

The fixed window is a configurable window positioned at the top edge of the screen. The content of the fixed window is independent of the current screen. Therefore, it is particularly suited for displaying process magnitudes or the time and date.

An operating element configured in the fixed window is available in every screen. When using touch panels, for example, a button can be configured in the fixed window to represent a globally effective function key.

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.

Keyboard units :

When using units equipped with a keyboard, proceed as follows to call in the configured help text, e.g. for an input field:

Step	Action	
	SIMATIC 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.	

Touch panels:

Help texts for messages, screens and input fields are available, if configured, when using touch panels. Proceed as follows in order to call in the configured help text:

- **Help on messages**
  Touch the following button in the message window, on the message page, in the message buffer or the message display [Help]
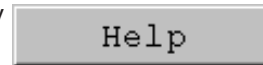
- **Help on input fields**
  Touch the Help key on the screen keyboard. This key only appears if a configured help text exists.

- **Help on current screen**
  If the function *Display_Help_Text* has been assigned to a button, for example, touch that button to call in the help text configured for the current screen.

- **Help on focussed screen object**
  Press the key combination ALT + H either on the screen keyboard or the USB keyboard connected to call in the configured help text to the trend view which has been focussed, for example.

Icons

Icons can be configured at the bottom and side edges of the screen for SIMATIC HMI operating units with integrated keyboard (e.g. Panel PC670, FI25 and FI45). Icons emphasize the screen-specific functions of the softkeys.

On pressing a softkey, the function assigned to the respective icon is triggered.

Language change

The ProTool/Pro CS configuration software enables a project to be stored in numerous languages. Up to 5 of these editing languages can be loaded on the operating unit at any one time. The ASIA language variants are also supported. It is possible to switch between the languages, online, at any time and display language-dependent objects (texts and formats) in the runtime in other languages.

Language-dependent texts involve, e.g.:

- Messages
- Screens
- Text lists
- Help texts
- Recipes
- Date/Time
- Decimal separating character
- Static texts

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 languages available during runtime are defined during configuration in ProTool/Pro CS under *System → Language Assignment → Online Languages.*
- The *Switch_Language* function must be linked to an operating element, e.g. to a button or a selection field.

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 items *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 items *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. Thus, when using Windows®NT and Windows®2000, it is not possible to log on to your unit again, e.g. after activating the screen saver.

When using Windows®2000, the key combination necessary to log on, CTRL + ALT + DEL, can be deactivated. To do this, select *Control Panel → User → Passwords*, then tab control *Extended* and deactivate the option *"Press CTRL + ALT + DEL before logon"*.

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*.

- **PC and SIMATIC Panel 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 Screen Objects

Screen objects

This section provides information on operating the following screen objects:

- Buttons/Switches:
  - Button [Page 6-11]
  - Status button [Page [6-13)]
  - State view [Page 6-13]
  - Switches [Page [6-15)]
- Input field [Page 6-16]
- List boxes [Page 6-18]
- Messages
  - Message line [Page 6-19]
  - Message window [Page 6-19]
  - Message indicator [Page 6-21]
  - Message page [Page 6-22]
  - Message buffer [Page 6-23]
  - Message view [Page 6-24]
  - Single message display [Page 6-26]
- Bar graph [Page 6-27]
- Trend view [Page 6-28]
- Slider control [Page 6-31]
- Analog display [Page 6-33]
- Calendar date/time, display and set:
  - Date/Time [Page 6-34]
  - Digital/Analog clock [Page 6-35]
- Passwort list [Page 6-36]
- Status/Force [Page 6-39]
- SIMATIC HMI Symbol Library [Page 6-41]

Further screen objects are available, e.g.

- Graphic list

  A graphic list displays current values from the PLC in the form of a graphic. It assigns a graphic to each tag value. The value of the tag during runtime determines which graphic is selected from the list and displayed on the operating unit.

- Graphic display

  The graphic display enables the dynamic positioning of graphics from external graphic programs in the project.

- Graphic box

  A graphic box enables the selection of a graphic by selecting an entry from a graphic list.

Information concerning the Recipe View is provided in Chapter 7.4.1.

6.3.1   Buttons

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
- Printing
- 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 6-2 illustrates examples of buttons which are pressed (right) and not pressed (left).

Figure 6-2   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, its contour can become visible as long as the button remains selected. The contour enables the user to detect the operable area of the button.

Operation

- **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.

Note

Click

In the case of a button, a function is triggered when the pressed button is released within the contours of the button.

If the button is pressed but the mouse button or finger (when using touch panels) moves outside the contour before releasing, the operating unit does not interpret the action as a *click* event. The action is not executed.

Release

In the case of a button, a function is triggered when the pressed button is released.

If the button is pressed using the mouse button or finger (when using touch panels) but moved outside, the function is triggered when the function is released.

Press

In the case of a button, a function is triggered as soon as the button is pressed.

6.3.2   Status button

Purpose

The Status button is an operating and display element with the two states *Pressed* and *Released*. Status buttons can indicate the status of units which cannot be seen by the operator (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 switch has two stable states. It toggles from one state to the other each time it is operated, and remains in the respective state until it is operated again.

*   **Key**:
    The button has a fixed, stable home position. When operated, it switches to the status *pressed* and remains in this state as long as it is kept pressed. When released, it automatically switches back to its *released* position.

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

*   Status change
*   Printing
*   Releasing

If the status of a *switch* type Status button changes as a result of a modification of configured tags, not through operation, the corresponding function is not executed.

Display

The two indicator statuses of the types *Switch* and *Button with acknowledgement* can be assigned different texts or graphics in ProTool/Pro CS which are displayed on the Status button during runtime.

Figure 6-3 illustrates an example of a *switch* type Status button when pressed (left) and not pressed (right).

Figure 6-3   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 6-11).

Note

Click

In the case of a button, a function is triggered when the pressed button is released within the contours of the button.

If the button is pressed but the mouse button or finger (when using touch panels) moves outside the contour before releasing, the operating unit does not interpret the action as a *click* event. The action is not executed.

Release

In the case of a button, a function is triggered when the pressed button is released.

If the button is pressed using the mouse button or finger (when using touch panels) but moved outside, the function is triggered when the function is released.

Press

In the case of a button, a function is triggered as soon as the button is pressed.

6.3.3   Switch

Purpose

A switch serves for the input and output 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:

- Status change
- Activate
- Deactivate

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

Display

Figure 6-4 illustrates an example of two switches with different orientation.
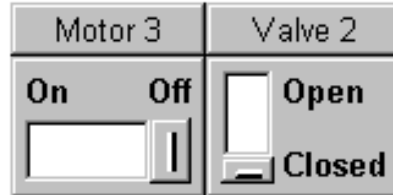
Figure 6-4   Switches with different orientation

Operation

- **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 Input field

Purpose

Numeric or alphanumeric values are entered character by character in an input field. A numeric value is a number, e.g. `80` as a setpoint value for a temperature. An alphanumeric value can contain text and digits e.g. `Valve_12`.

Limit value check

If limit values are configured for the input field tags, the values entered are only accepted when they are within the configured limits. If an attempt is made to enter a value which is outside the configured limits, it is rejected and the original value automatically reinserted. In this case, the operating unit issues a system message.

Note

On entering the first character, a tooltip appears with the lower and upper limit values related to the input window.

Display
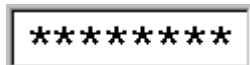
Input fields can be configured differently according to their purpose, e.g.:

- **Numeric input field**
  to enter numeric values in decimal, hexadecimal or binary format.

- **Alphanumeric input field**
  to enter character strings.

- **Input field for date and time**
  to enter calendar dates and the time. The format is dependent on the language currently set on the operating unit. The figure below illustrates examples of input fields for date and time in US English language format.

- **Input field for confidential password entry**
  to enter passwords confidentially. The character string entered is represented by placeholders (*). The figure below illustrates an example.

Operation

- **Mouse**

   Click the mouse button when the mouse pointer is in the input field and enter the required value using the keyboard.

   Confirm the entry by pressing   ENTER

   or discard it by pressing   ESC

- **Keyboard**

   Select the required input field, e.g. using the Tabulator key. The field content changes color when the field is accessed. Use the cursor keys to position the cursor and then enter the required value.

   Confirm or discard the input as described for mouse operation.

- **Touch screen**

   Touch the relevant input field on the operating unit touch screen. The screen keyboard automatically appears on the screen (refer to the figure on Page 6-4). Carry out the input as described for keyboard operation. After completing the input, the screen keyboard is automatically hidden.

6.3.5   Selection field

Purpose

In the case of selection fields, values are not entered character by character but are selected from a list (Figure 6-5).

bottom	▼
right	▲
left	
top	
bottom	
front	
back	▼
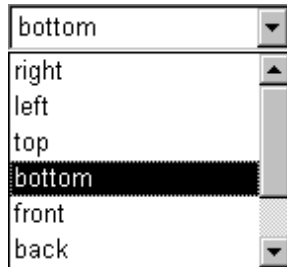
Figure 6-5   Selection field in opened state (example)

Operation

- **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.

6.3.6   Message line

Purpose

When a message line has been configured it is always displayed, regardless of the screen selected. The message line displays the last alarm or event message received. The message line is a permanent feature on the operating unit and always displays the current message. If a separate window has been configured for alarm messages, the message line only receives the current event message.

Display priorities

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

Alarm messages flash to distinguish them from event messages.

6.3.7   Message window

Purpose

The message window displays all messages in the respective message categories which are queued or need to be acknowledged.
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.

The precise fault location can be displayed with date/time of the message event in the message window.

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 6-6 illustrates an example.
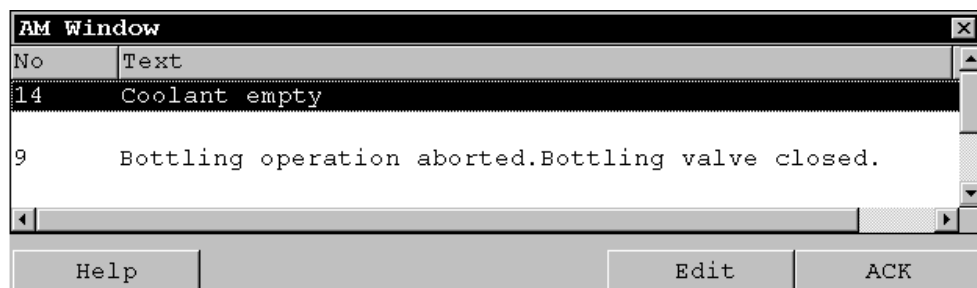
Figure 6-6   Alarm window (example)

Significance of the buttons
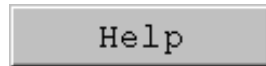
Help	**Call Help text** Use this button to call in the help text configured for the selected message.
Edit	**Edit Message** Use this button to trigger the function assigned to the `Edit Message` event for the selected message.
ACK	**Acknowledge alarm messages** Use this button to acknowledge an alarm 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 is closed automatically after the configured duration of display has expired or by pressing ESC or ⊠ .

6.3.8   Message indicator

Purpose

The message indicator is a configurable graphical symbol which is displayed on the screen when at least one alarm message is queued at the operating unit.

The indicator continues to blink as long as unacknowledged messages are present.
The number (in this case 3) represents the number of alarm messages present.

The message indicator can be operated by the touch screen or mouse.

Mouse operation

Click the mouse button when the mouse pointer is positioned on the message indicator in order to open the alarm message page (Page 6-22).

Touch operation on SIMATIC operating units

The response of the message indicator is dependent on whether or not alarm messages are present on the operating unit which still have to be acknowledged at the moment the indicator is touched (e.g. Panel PC670 Touch).

* **No alarm messages to be acknowledged**:
  The alarm message page is opened after operating the message indicator (Page 6-22).

* **Alarm messages to be acknowledged**:
  The alarm message window is opened after operating the message indicator (Page 6-19).

Use the button illustrated to close the alarm window in order to operate screens. The alarm message window can be opened again by touching the message indicator.

6.3.9   Message page

Purpose

The message page displays all messages allocated a time stamp. It is also possible to select whether the latest or oldest message is displayed first. Open message pages are 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: *Display_event_message_page*

• for alarm messages: *Display_alarm_message_page*

Figure 6-7 illustrates an example of the message page for alarm messages.

```
AM Page                                                      ☒
No      Time      Date      Status   Text                      ▲
14      07:30:51 01/25/01  K        Coolant empty
14      07:30:59 01/25/01  KQ       Coolant empty
9       07:31:04 01/25/01  K        Bottling operation aborted
37      07:31:07 01/25/01  K        Valve will not open
211     07:31:28 01/25/01  K        Fault compressor 4
9       07:32:41 01/25/01  KQ       Bottling operation aborted
37      07:32:43 01/25/01  KQ       Valve will not open
211     07:32:44 01/25/01  KQ       Fault compressor 4
138     07:39:51 01/25/01  K        Switch M201 open
139     07:39:51 01/25/01  K        Switch M202 open
140     07:39:51 01/25/01  K        Switch M203 open
211     07:39:59 01/25/01  K        Fault compressor 4
138     07:40:17 01/25/01  KQ       Switch M201 open
139     07:40:21 01/25/01  KQ       Switch M202 open      ▼
◄                                                        ►

   Help                               Edit        ACK
```

Figure 6-7   Alarm message page (example)

Information on the significance of the buttons is provided on Page 6-19.

It is possible to configure how the alarm messages are sorted.

6.3.10   Message buffer

Purpose
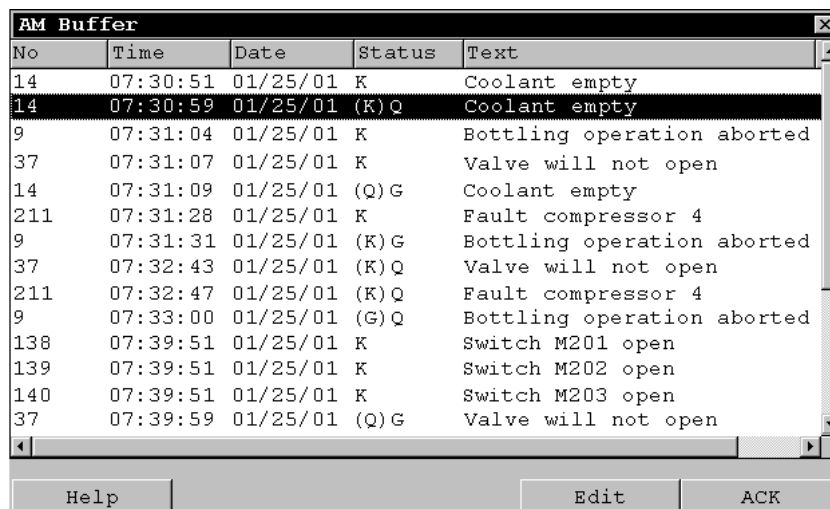
The message buffer displays all message events allocated a time stamp. It is also possible to select whether the latest or oldest message is displayed first. An open message buffer is constantly updated.

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: *Display_event_message_buffer*

* for alarm messages: *Display_alarm_message_buffer*

Figure 6-8 illustrates an example alarm message buffer.

```
┌──────────────────────────────────────────────────────────────┐
│ AM Buffer                                                 ×  ▲ │
├─────┬──────────┬──────────┬────────┬──────────────────────────┤
│ No  │ Time     │ Date     │ Status │ Text                     │
├─────┼──────────┼──────────┼────────┼──────────────────────────┤
│ 14  │ 07:30:51 │ 01/25/01 │ K      │ Coolant empty            │
│ 14  │ 07:30:59 │ 01/25/01 │ (K)Q   │ Coolant empty            │
│ 9   │ 07:31:04 │ 01/25/01 │ K      │ Bottling operation aborted│
│ 37  │ 07:31:07 │ 01/25/01 │ K      │ Valve will not open      │
│ 14  │ 07:31:09 │ 01/25/01 │ (Q)G   │ Coolant empty            │
│ 211 │ 07:31:28 │ 01/25/01 │ K      │ Fault compressor 4       │
│ 9   │ 07:31:31 │ 01/25/01 │ (K)G   │ Bottling operation aborted│
│ 37  │ 07:32:43 │ 01/25/01 │ (K)Q   │ Valve will not open      │
│ 211 │ 07:32:47 │ 01/25/01 │ (K)Q   │ Fault compressor 4       │
│ 9   │ 07:33:00 │ 01/25/01 │ (G)Q   │ Bottling operation aborted│
│ 138 │ 07:39:51 │ 01/25/01 │ K      │ Switch M201 open         │
│ 139 │ 07:39:51 │ 01/25/01 │ K      │ Switch M202 open         │
│ 140 │ 07:39:51 │ 01/25/01 │ K      │ Switch M203 open         │
│ 37  │ 07:39:59 │ 01/25/01 │ (Q)G   │ Valve will not open      │ ▼ │
├────────────────────────────────────────────────────────────┤
│ ◄                                                          ► │
├────────────────────────────────────────────────────────────┤
│  ┌─────────┐                        ┌────────┐  ┌────────┐  │
│  │  Help   │                        │  Edit  │  │  ACK   │  │
│  └─────────┘                        └────────┘  └────────┘  │
└────────────────────────────────────────────────────────────┘
```

Figure 6-8   Alarm buffer (example)

Information on the significance of the buttons is provided on Page 6-19.

The message buffer is organized so that in the case of a buffer overflow the oldest message events are overwritten ("FIFO buffer"). It is also possible to delete the entire buffer or specific message categories from time to time (*Delete_message_buffer*) function. This relieves the system load and provides a clearer overview of the message buffer.

It is possible to configure how the alarm messages are sorted.

6.3.11　　Message view

Purpose

Certain views are defined for messages which are queued or still to be acknowledged or for message events in the message buffer (volatile or archive) in the message indicator. Various filter criteria are available in ProTool CS for this purpose.

Filter criteria include:

- Message number
- Time
- Message states
- Message text
- Date
- Category name
- Acknowledgment group
- Diagnostics capability
- PLC

The attribute *PLC* is only useful when more than one PLC is configured as source of the message. In this way, the precise fault location can be displayed with date/time of the message event.

Structure

The message view (Figure 6-9) 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.

```
     No      Time     Date     Status  Text
$  140004  07:30:51  01/25/01  K       Connection has been estab
$  140001  07:30:51  01/25/01  K       Connection has been clear
$  110001  07:30:51  01/25/01  K       Change to offline mode.
$  240000  07:30:51  01/25/01  K       Demo version!

    Help                              Edit          ACK
```

Figure 6-9　　Example of a message view

Significance of the buttons
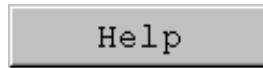
| Help | **Call Help text** Use this button to call in the help text configured for the selected message. |

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 display:

!	Alarm messages
Empty	Event messages
$	HMI system messages
S7	SIMATIC diagnostic events

Alarm-S messages are displayed either as alarm messages or event messages. SFM messages (System Fault Messages) are displayed as alarm 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*.

6.3.12   Single message view

Purpose

A single message display provides a subset of the functionality of a message display (Page 6-24). 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 single message view cannot be operated. The figure below provides an example of a single message display 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
```

6.3.13   Bar

Purpose

Bar graphs present a value in the form of a rectangular area. The operating unit thus provides a clear indication of how far the current value is from the limit values, or if a setpoint value has been reached, at a glance. 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 bar graph moves by increasing the tag value:

Figure 6-10 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
4. Value lies within the configured limit range
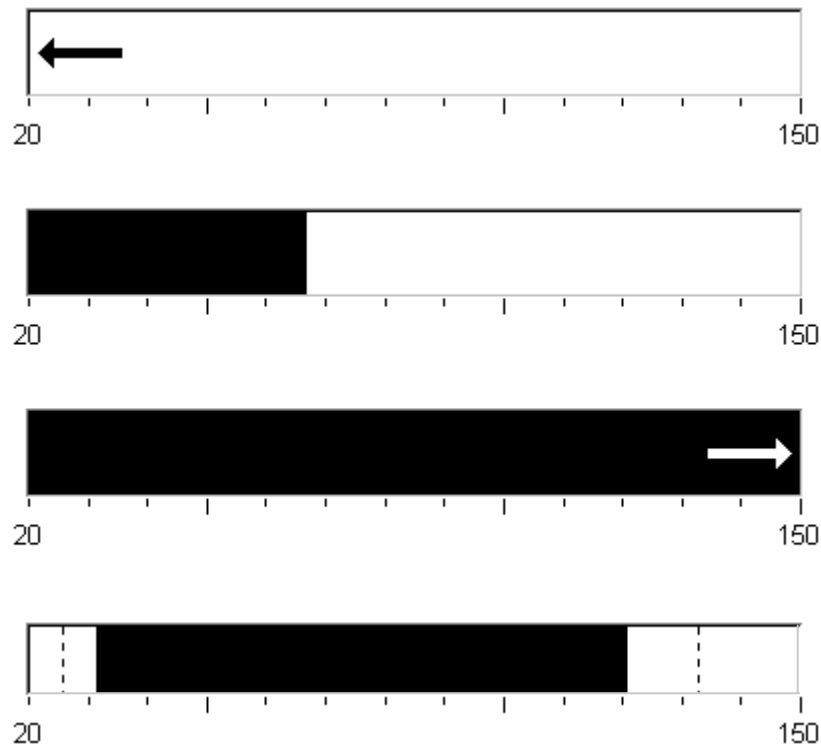
Figure 6-10   Different bar states

6.3.14   Trend view

Purpose

The trend view is a particularly clear form of displaying process data in a
continuous manner. In the case of processes that only change slowly, the trend
view 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 view.

Configurable properties

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

*   **Trend type**: *Realtime trend* or *History trend*

*   **Triggering**: *Cycle triggering* or *Bit triggering*

*   **Limit values**: *Upper and lower limits*
    The operating unit displays the points at which configured limit values are
    reached or exceeded by changing the color of the trend view.

*   **Color**: *Uncertain status*

    The *uncertain status* function highlights areas of the trend view in which
    communication to the unit was interrupted and, as a result, no values could be
    recorded.

Read line

The *read line* function is used in a trend graphic to display or hide a read line which
displays Y-values associated to an X-value.

The read line can be activated by means of the *Trend_view_read_mark_on_off*
function or the *X-axis* tab control of the trend view Properties dialog (default: Off).
When the function is activated, a button is provided in the trend view with which to
activate and deactivate the read line. The color of the read line can be configured
in the *Color* tab control.

If the *Display Values Table* function is activated in the *Value Table* tab control, a
table appears in the trend view containing the values of the trend curve displayed.

The read line can be operated in the trend view by means of touch, mouse
(cursor), keyboard (Ctrl + Alt + cursor right/left) or button. It is also possible to
configure buttons for the functions *Trend_view_read_mark_forward* and
Trend_view_read_mark_backward. When the read line is moved, the values in the
value table (when activated) are automatically updated accordingly.

Structure

Figure 6-11 illustrates an example of a trend view with buttons configured for navigating within the trend.
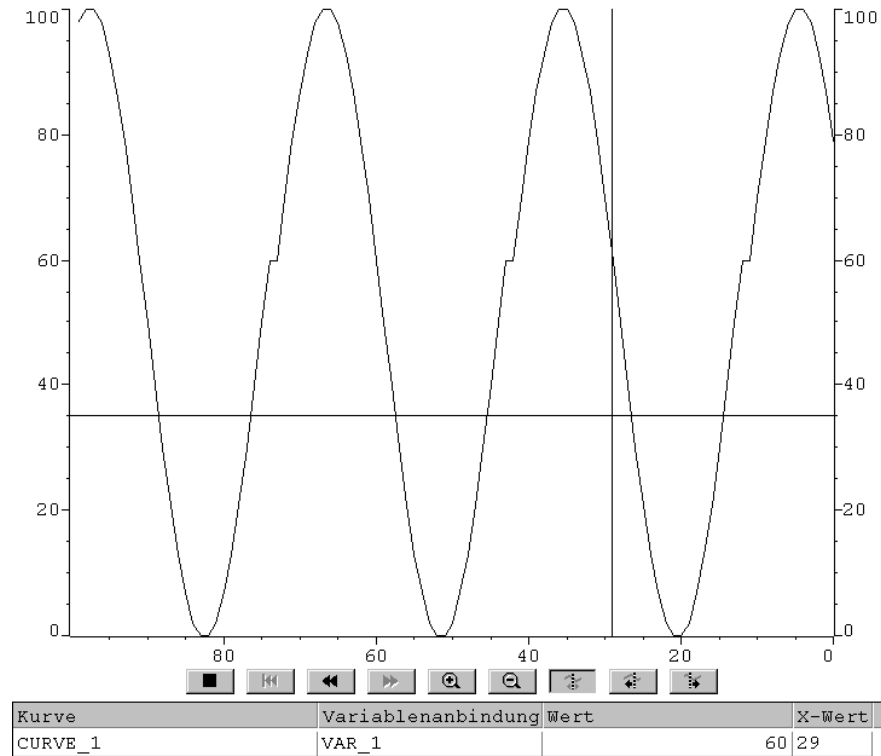
Figure 6-11   Operable trend view with read line (example)

Navigation using buttons

It is possible to navigate through the trend using the configured buttons. The individual buttons have the following significance:

Button		Function
■	Start/Stop update	Interrupts the current updating process for the trend until the button is pressed again.
|◀◀	Back to start	Scrolls back to the start of the trend recording.
◀◀ / ▶▶	Scroll	Shifts the trend section half a window width to the left/right.
⊕ / ⊖	Zoom in/out section	Expands/compresses the trend view horizontally.
🔅	Read line on/off	Switches the read line on or off.

Button		Function
	Read line forwards	Moves the read line to the right.
	Read line backwards	Moves the read line to the left.

Navigation using the keyboard

If no buttons have been configured in the trend view, use the operating unit keyboard to navigate in the trend view. A condition for this is that the configuration supports navigation using the keyboard.

Function	Function	PC	Panel PC
Back to start	Scrolls back to the start of the trend recording.	CTRL ↵	CTRL ENTER
Scroll back	Scroll one screen width back.	←	SHIFT ◄
Scroll forward	Scroll one screen width forward.	→	SHIFT ►
Zoom section	Expands the trend horizontally.	CTRL +	CTRL +
Reduce section	Compresses the size of the trend horizontally.	CTRL –	CTRL –
Read line forwards	Moves the read line to the right in the trend curve.		CTRL ALT ►
Read line backwards	Moves the read line to the left in the trend curve.		CTRL ALT ◄

Note

It is not possible to interrupt the updating of the trend using the keyboard.

Display archive data as a trend

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

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

6.3.15   Slider control

Purpose

Use a slider control to enter and display numeric 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.
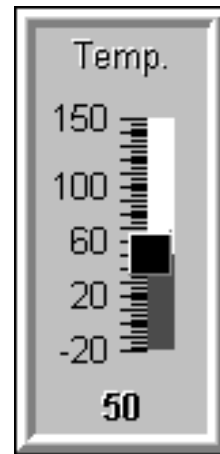
Operation

- **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		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	–	

⚠️ **Caution**

In the following cases, it is possible that the value indicated by the slider control differs from the real value of the related tag:

- The value range configured for the slider control (minimum and maximum values) does not correspond with the limit values configured for the slider control tag.

- An invalid password is entered for a slider control protected by a password.

6.3.16   Analog display

Purpose

An analog display indicates numeric values as a pointer instrument.

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. Therefore, it is not possible to enter values.

Display

Figure 6-12 illustrates an example of an analog display indicating temperatures.
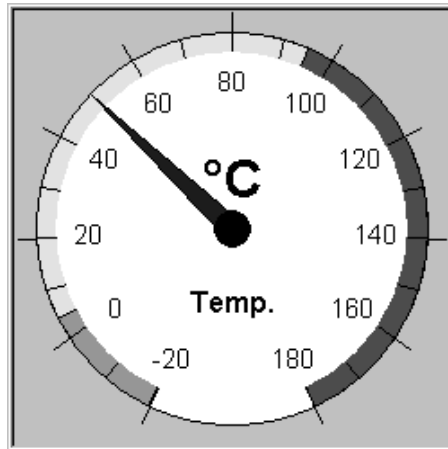
Figure 6-12   Example of a typical analog display

6.3.17   Date/Time

Purpose

The screen object *Date/Time* displays the current values for the time and/or date. The time can be modified online if the corresponding feature is configured.

The calendar data and time values are synchronized with the operating system values or are read from the PLC. The operating unit accesses these values, for example, to assign time stamps to message events.

Format

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

The format set for Date and Time can be modified using the *Language* option in the Windows Control Panel. To do so, select the icon depicted on the right.

Note

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

6.3.18   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 6-34).

Figure 6-13 illustrates an example of a configured analog clock.
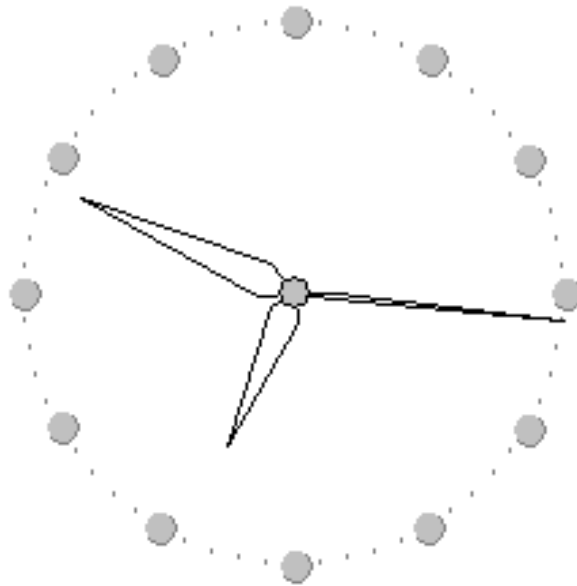
Figure 6-13   Example of a typical analog clock

6.3.19 Password list

Purpose

While the system is being configured using ProTool CS, additional operating elements can be protected against unauthorized use by means of passwords. Important parameters and settings can then only be modified by authorized personnel. The password level and user name are stored with the password.

The *Report_password_change* function causes a system message to be issued when a different password is entered on the operating unit, i.e. a new user logs on. If the system messages are archived, all login and logout procedures can be established.

The *Write_user_name_to_tag* function is used to write the name of the user currently logged on into a tag of type "STRING". If the tag is one with a PLC link, the user name also exists in the PLC and can be used for the user-dependent enabling of certain functions. User names must always be unique for the assignment. They are stored in a password file.

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:
Functions are assigned to levels 1 to 8 according to their increasing importance. Before triggering a function with a password level greater than 0, the operating unit requests the corresponding password to be entered.

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 function protected by a password, the operating unit automatically requests the entry of a password. Once entered, the password need not be entered again in order to call in other functions of this password level or lower.

When correspondingly configured, it is also possible to log in on the operating unit via an input field for confidential password entry (Page 6-16). The character string entered is represented by placeholders (*).

A system message may be issued after logging in. More information on this is provided on Page 6-36.

Logging off from the operating unit (logoff)

In order to rule out operation by unauthorized personnel, a password level greater than 0 should not remain active on the operating unit over too long a 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 logout**
  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.

  Note
  It is also possible to reset the current password level to 0 by entering an incorrect password.

Password management

Individual users can be entered in a password list on the operating unit and assigned a password level according to their specific responsibilities. 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 6-14 illustrates an example of a password list with six entries.

User	Password	Level	
Superuser	100	9	
Bayer	pw1	1	
Lerp	pw2	2	
Müller	pw3	3	
Schmidt	pw4	4	
Service	pw5	5	

Figure 6-14   Example of a password list

View password list

Only those passwords with user names are displayed which have a password level equal to or lower than that with which the user is currently logged in. The operating unit displays the password list entries in alphabetic order.

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 the same password to different password levels. 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`.

Export/Import password list

Purpose

If a system includes several operating units which are accessed by the same users, the same passwords must be installed on each operating unit. In order that the password lists need not be re-entered on each unit, it can be created on one unit and then exported and imported on other units.

Note

During an import, all currently valid passwords are overwritten. The imported passwords become valid immediately.

If an existing user name or password is entered, the corresponding system message is issued.

Condition

In order to be able to export/import password lists on the operating unit, the *Export_Import_Passwords* function must be linked to a button or function key, for example. The file name of the password list to be exported/imported must be specified as the function parameter during configuration.

Notice

- The password list is coded. It cannot be edited with external tools.

- Do not export a password list directly after it has been modified. Exit the screen object *Password List* after changing it and wait with the export function until modifications have been written on the data medium.

6.3.20   Status/Force

Purpose

The operating unit access the connected PLC and periphery to read and write values. PLC program operands can be monitored and modified easily 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 connected PLC is a SIMATIC S5 or SIMATIC S7

• The project must contain the screen object *Status/Force* (Figure6-15)

Structure

Figure 6-15 illustrates the basic structure of the screen object *Status/Force*. Each line represents an operand.

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 6-15   Status/Force: Example for SIMATIC S7

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 *Format* and *Force Value* columns, move the column heading *Force Value* onto 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
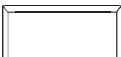
Column/Button	Function
Connection	Select the PLC whose address area is to be displayed and/or modified.
Type, DB number, Offset, Bit	Specify the address in this column.
Data type, Format	This column is used to change the format of the output.

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

Column/Button	Function
Status value	This column displays the values of the operands read from the PLC.
Force value	Use this column to enter the values to be written to the operands.
	This button is used to update the display in the column *Status value*. 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.
	This button is used to apply the new value specified in the column *Force value*. The value is then written to the PLC.

Operation

The table depicts the key combinations for various operating units.

Function	PC	Panel PC
Operate button Write.	CTRL ↵	CTRL ENTER
Operate button Read.	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 or use the *Connection* column and select No PLC
Open selection field.	↵	ENTER

6.3.21   SIMATIC HMI symbol library

Purpose

The *SIMATIC HMI Symbol Library* is a comprehensive library containing graphics from the areas of techniques and production. The library extends the possibilities of producing screens for the project in large numbers and representing aspects realistically. The following screen objects (graphics) are included, for example, in a wide range of categories:

- valves, motors, tank containers,
- conveyor belts,
- factory buildings,
- 3D ISA symbols,
- cooling and heating systems.

Settings

Using the screen editor, any object in the SIMATIC HMI Symbol Library can be inserted in the current screen and edited as required. In addition to the standard tab controls for all the screen objects (*Functions*, *Position*, *Color*, *Attributes*, *Name* and *Enable*, the SIMATIC HMI Symbol Library provides two further tab controls:

- **Symbol:**

  Selection of the required symbol.

- **Style:**

  Settings for color filling, transparency and orientation of the screen object and configuration of a tag:

  – It is possible to modify the appearance and representation of symbols and background.

  – Symbols can be mirrored and/or turned in steps of 90˚.

  – The cursor can assigned an additional lightning symbol when moving over the screen in order to emphasize to a user the configuration of a function, for example (only possible with touch panels).

  – It is possible to configure a tag for the symbol and, thus, control its color representation in accordance with falling below or exceeding limit value ranges.

Behavior

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

- Clicking
- Double-click
- Printing
- Releasing

Operation

Symbols on the SIMATIC HMI Symbol Library can be operated via the mouse or touch screen:

- **Mouse**
  Click the mouse button when positioned on the symbol. The possibility of operating the symbol via the mouse, when configured, is indicated by the cursor symbol changing.

- **Touch screen**
  Touch the relevant symbol on the operating panel touch screen.

There is no operation acknowledgement, e.g. color change.

Figure 6-16 illustrates examples of four icons from different categories.

| 1 | 2 | 3 | 4 |
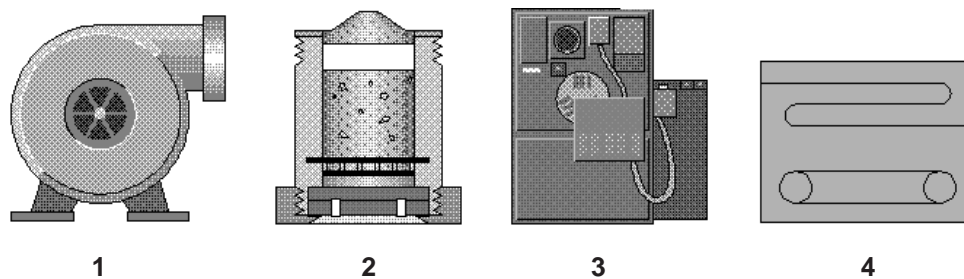
Figure 6-16   Examples of symbols from different categories

No.	Symbol	Category
1	Pumps	Pumps
2	Filter system 1	Chemical
3	Furnace	HVAC
4	Band dryer	ISA Symbols

Note

Click

In the case of a button, a function is triggered when the pressed button is released within the contours of the button.

If the button is pressed but the mouse button or finger (when using touch panels) moves outside the contour before releasing, the operating unit does not interpret the action as a *click* event. The action is not executed.

Release

In the case of a button, a function is triggered when the pressed button is released.

If the button is pressed using the mouse button or finger (when using touch panels) but moved outside, the function is triggered when the function is released.

Press

In the case of a button, a function is triggered as soon as the button is pressed.

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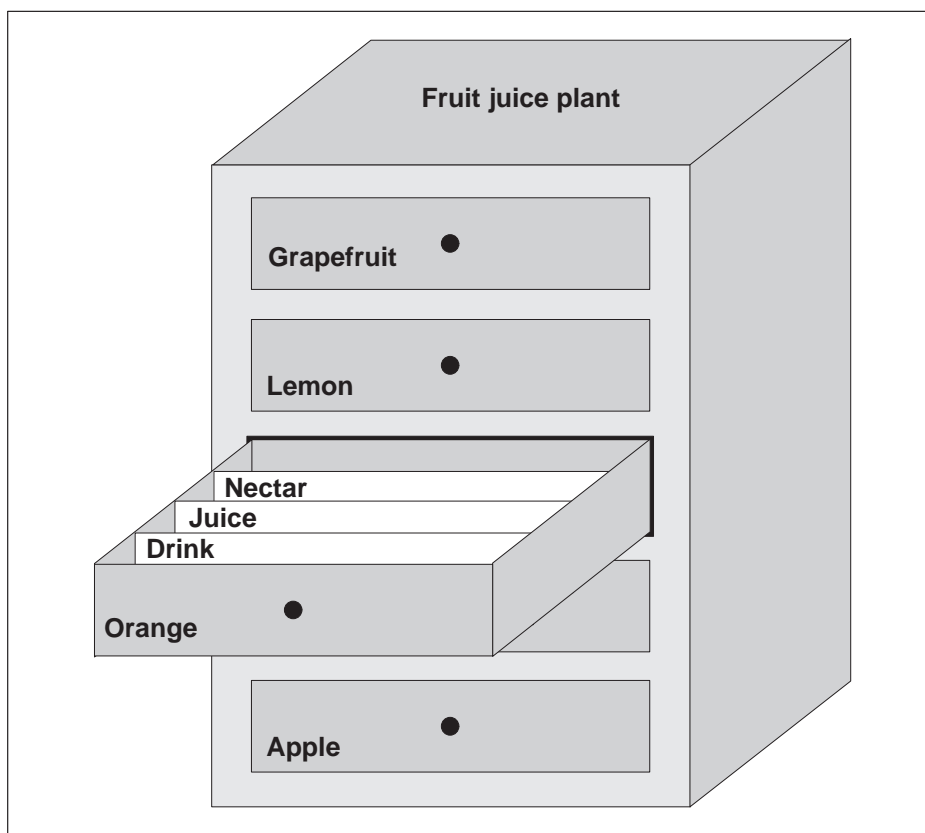
Figure 7-1   Recipe and data record, using a filing cabinet as an analogy

- **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 modified later 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, e.g. Excel, and then reimporting them on the operating unit.

Example of a recipe

An example for 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   Use of Recipes

The following section contains a description of the data flow for recipes and three application scenarios illustrating the use of recipes in the form of short, practical examples. They should provide a top level overview of the possibilities for using recipes:

- The first scenario illustrates a recipe configuration in which the data entered is not immediately transferred to the PLC. This configuration is used, for example, when it is necessary to enter data on the operating unit without interfering with an active process.

- In the second scenario, data is immediately transferred to the PLC. This configuration can be used, for example, to start up a machine and correct the positioning data online.

- The third scenario implements data record functions in order to control production automatically via a job list.

7.2.1   Data Flow for Recipes

The diagram illustrates various possibilities concerning data flow when using recipes. The data flow between the active components operating unit (A), PLC (B) and external data medium (C) is dependent on the configuration of the recipe and the functions used.
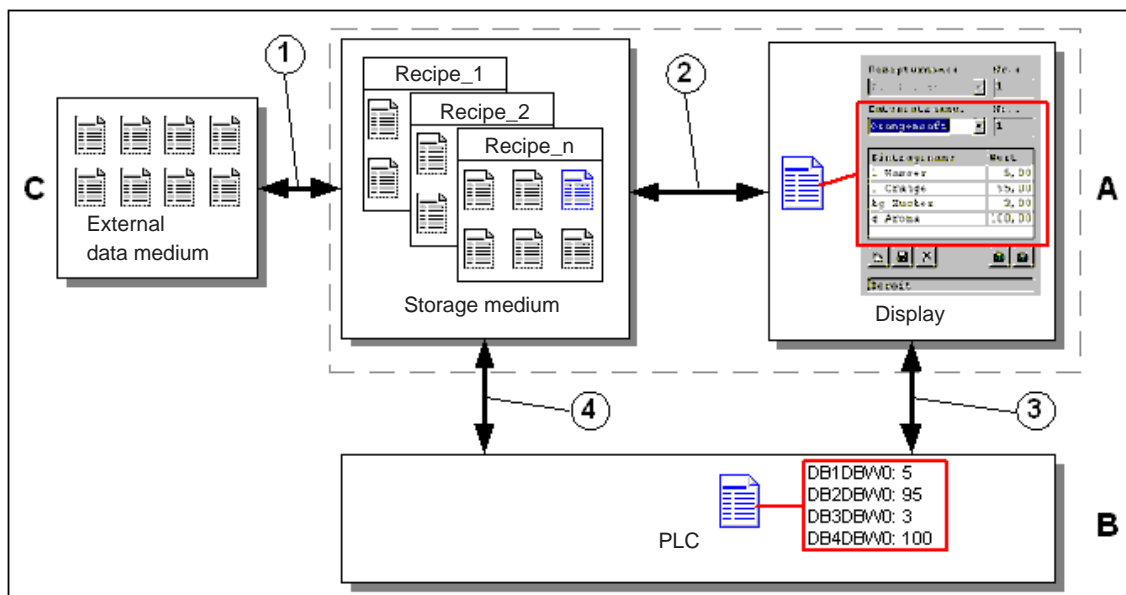
Figure 7-2   Data flow for recipes

The operating unit (A) stores the recipe data records on a storage medium, e.g. Flash or hard disk. The recipe data record can be edited in a recipe view or recipe screen on the operating unit display:

- A new data record can be entered and can then, for example, be stored (2) on the storage medium and transferred (3) to the PLC (B).

- The data record can be exported to an external data medium (C), e.g. a PC. The data record is saved in CSV format, regardless of the recipe. This file can then be loaded and edited in MS Excel, for example.

- A data record can be loaded (2) from the operating unit storage medium or import (1) it as a *.CSV file from an external data medium.

A recipe data record can also be transferred (4) directly from the storage medium to the PLC or loaded from the PLC to the storage medium. In the same way, a recipe in the display can be transferred (3) to the PLC or loaded from it.

7.2.2   Application examples

Scenario 1: Enter data record

Production data must be entered on operating unit (A) without interfering in the active process. The production data should not be transferred to the PLC (B).
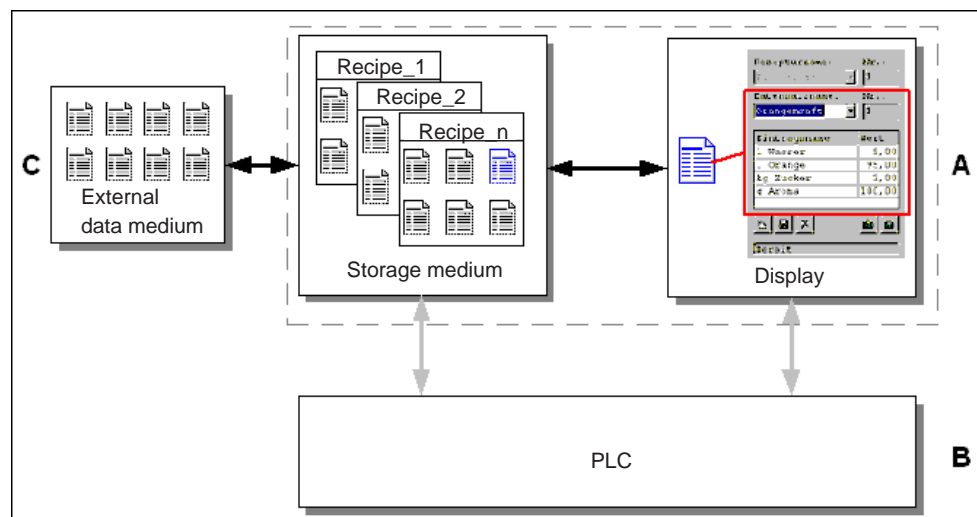
Figure 7-3   Process

Enter the production data in the recipe view or recipe screen, assign a data record name and save the new data record on the operating unit storage medium.

Scenario 2: Manual production process

The production data should be read from the PLC (B) according the workpiece to be processed and displayed on the operating unit screen (A) to be checked. It should be possible to correct the production data transferred online, if necessary.

Notice

This is a special application scenario because it cannot be realized on all HMI devices.
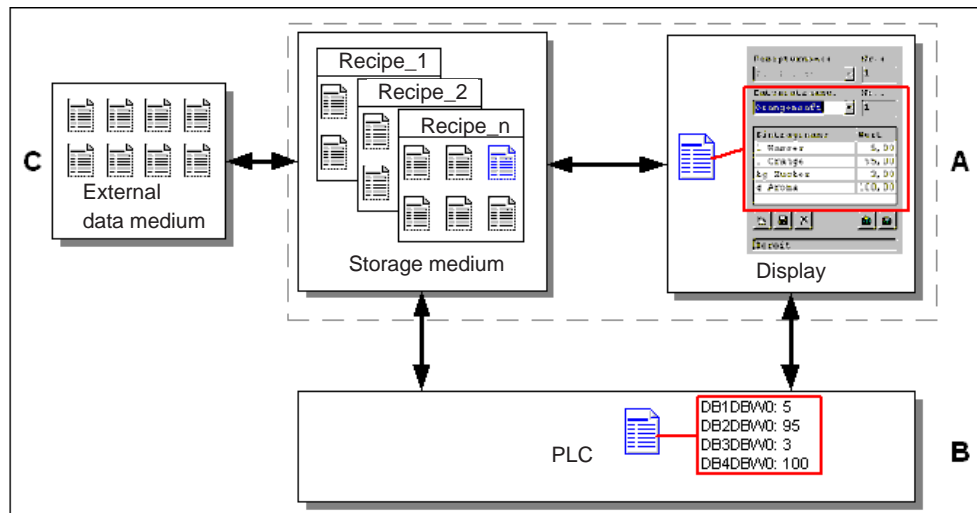
Figure 7-4   Process

A reading device, e.g. connected to the PLC, reads out a bar-code from the workpiece to be edited. The data record name corresponds to the respective bar-code designation. As a result, the PLC can load the required data record from the operating unit's storage medium. The data record appears in the display for control purposes. Modifications are immediately transferred to the PLC.

Scenario 3: Automatic production process

Production should be automated by means of a job list. The production data should be transferred directly to the PLC (B) either from the data medium in the operating unit (A) or from an external data medium (C). It is not necessary to show it in the display.

Figure 7-5   Process

Production can be controlled via one or more VB scripts which automatically transfer the production data records to the PLC. The process can be controlled by means of return values of the functions used

The automatic production process can be realized using the data record functions provided: The *Import_Data_Records* function loads data records from a *.CSV file to the data medium. The *Data_Record_DAT_to_PLC* function transfers a data record from the data medium to the PLC.

7.3   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. **Defining the storage location for the data records on the operating unit**

   The storage location for data records can be configured to any path or any drive.

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. Depending on the application, use either the recipe view or create a copy of the system, e.g. using input/output fields in recipe screens.

   – Recipe view:
     The recipe view enables an uncomplicated, quick method of handling recipes and data records with a minimum of configuration work. Normally, they are used to process data records with smaller recipes in table form.

   – Recipe screen:
     The operator can use recipe screens to customize the user interface for editing data records and, for example, simulating the system visually, providing graphics and individual masks for entering data records. Recipe screens are particularly recommended for data records with a relatively large number of entries.

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 PC, Panel PC
Number of recipes	1000
User data length	8,000 bytes per data record
Total entries	20,000
Entries per recipe	2,000

7.4   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:

- Layout of the recipe view (Page 7-10)
- Displaying data records (Page 7-14)
- Creating new data records (Page 7-14)
- Copying data records (Page 7-15)
- Modifying data records (Page 7-16)
- Copying data records by selecting a data record name (Page 7-16)
- Renaming data records (Page 7-17)
- Deleting data records (Page 7-17)
- Reading data records from the PLC (Page 7-18)
- Downloading data records to the PLC (Page 7-18)
- Synchronizing a data record (Page 7-18)
- Editing data records in recipe screens (Page 7-19)
- Functions and PLC jobs (Page 7-22)
- Exporting/Importing data records (Page 7-23)
- Exporting, editing and importing data records (Page 7-26)
- Reaction to changing the recipe structure (Page 7-27)

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 7-10). 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 7-19) to customize the user interface for editing data records and, for example, simulating the system visually, 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, not transferred to the PLC directly on input.

7.4.1   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 on the operating unit.

All descriptions on editing data records provided in this Chapter 7.4.1 relates purely to the use of the recipe view. Information on editing data records in recipe screens is provided in Chapter 7.4.2.

Display

Figure 7-6 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.
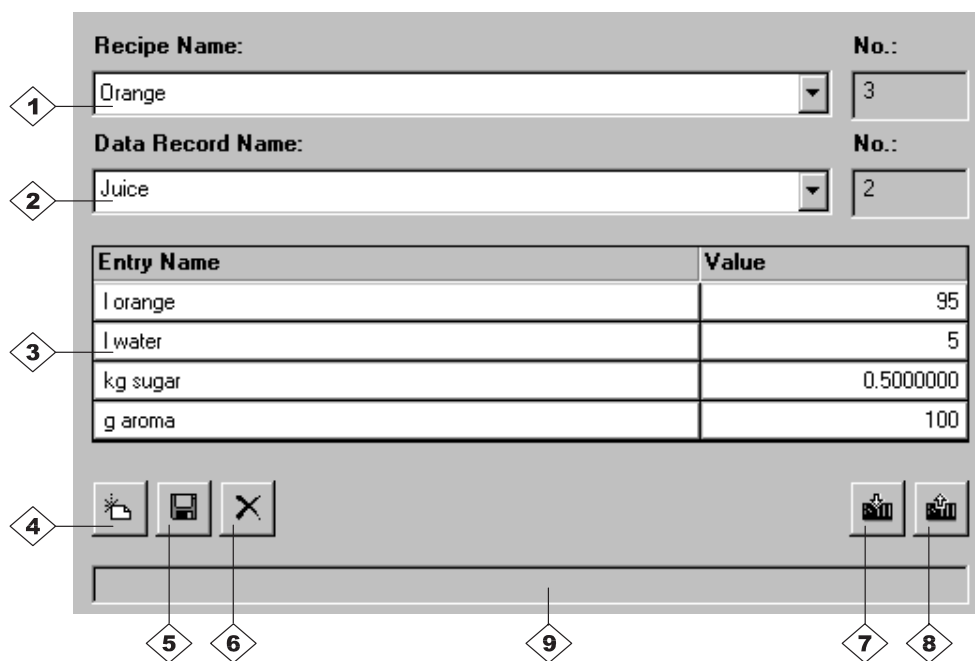
Figure 7-6   Layout of the recipe view (example)

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: CTRL ␣ / CTRL
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: CTRL ENTER / CTRL ↵
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: CTRL INS DEL / CTRL Delete
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: CTRL ▲ / CTRL ↑

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`.

Other buttons

The following buttons are only visible when they have been correspondingly configured by means of an attribute in the recipe view:

	Synchronize This button is used to synchronize the data in a recipe view with the associated tag. Modified values are written in the corresponding tags in the table of a recipe view. Finally, all the values are read from the tags to table, which is updated accordingly. This ensures consistency between the recipe view and tags. The button is only enabled for use in the case or recipes with synchronized tags. Key combinations: [CTRL] [=]
	Save data record as After pressing this button, a dialog appears in which to select an existing data record name and modify it. After confirming the dialog, the current values are stored under the new name. Key combinations: [CTRL] [*]

Note

- If the two options *Synchronize Tags* and *Tags Offline* are activated in the configuration, 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.

Notes 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.

Parameters which can be changed for recipe functions

- **Return values**

  It is possible to configure the optional *Return values* parameter for various recipe functions. This parameter enables a message to be issued concerning the status of a function. Functions can be processed in succession using *Change value*.

  Values

  2: Function in progress
  4: Function completed without errors
  12: Function completed with errors

- **Status message**

  It is possible to configure the *Status message* parameter for various recipe functions. This parameter defines whether a corresponding system message should appear when a function has been completed.

  Values

  1: After importing the data records, a status message is issued.
  0: No status message

Displaying data records

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

Step		Action
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 7-10). • 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 7-10). • 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		Action
1	Select recipe	• Select the required recipe as described in *Displaying data records* Step 1 on Page 7-14.
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 7-10). • 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 7-10).
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.

Storage location for new data records

The storage location for the new data records can be configured to any path in the network.

Copying data records

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

Step		Action
1	Select recipe and data record	• Select the required recipe and the data record to be copied as described in *Displaying data records*, Steps 1 and 2 on Page 7-14.
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 7-10). • 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.

Copying data records after selecting a data record name

Proceed as follows to copy an existing data record after selecting the data record name:

Step		Action
1	Select recipe and data record	• Select the required recipe and the data record to be copied as described in *Displaying data records*, Steps 1 and 2 on Page 7-14.aus
2	Change values	• Modify the values necessary.
3	Save data record as 🖫	• **Press the key depicted on the left.** A dialog opens containing a data record name selection field which can be edited. The selection field contains the name of the data record selected. Select the required data record name and edit it. After confirming with *OK*, a new data record is created under the name specified with the current values based on the previously selected data record. The newly created data record is displayed in the recipe view.

Changing data records

Proceed as follows to change existing data records:

Step		Action
1	Select recipe and data record	• Select the required recipe and the data record to be copied as described in *Displaying data records*, Steps 1 and 2 on Page 7-14.
2	Change values	• Change the setpoint value in the table (Position 3 in the figure on Page 7-10). 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.**

Notice

If large-scale modifications have been carried out in recipes in ProTool 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 of all the recipes (refer to Page 7-23).

• Delete the data records with the prefix PTRCP_ by deleting the path for the downloaded recipes using the Explorer.

 (Note: After the data records have been deleted, the relevant data must be re-entered).

• Import the data records using the function *Import_Data_Records*.

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

Renaming data records

Proceed as follows to rename existing data records:

Step		Action
1	Select recipe and data record	• Select the required recipe and the data record to be copied as described in *Displaying data records*, Steps 1 and 2 on Page 7-14.
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 7-10). • 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 modified data record is written on the data medium.** **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		Action
1	Select recipe and data record	• Select the required recipe and the data record to be modified as described in *Displaying data records*, Steps 1 and on Page 7-14.
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.

Note

It is possible to configure the *Delete_Data_Records* function to directly delete individual recipes, all data records in a recipe or all recipes. To delete data records using this function, it is not necessary to configure a recipe view.

It is still possible to configure the *Delete_Data_Record_From_Display* function with which the currently displayed data record will be deleted.

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		Action
1	Select recipe	• Select the required recipe as described in *Displaying data records,* Step 1 on Page 7-14.
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		Action
1	Select recipe and data record	• Select the required recipe and the data record to be downloaded as described in *Displaying data records*, Steps 1 and 2 on Page 7-14.
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 from the PLC is not possible because, in cases where synchronization with the PLC is configured, for example, the data mailbox is currently locked.

Note

If an attempt is made to download a data record from the operating unit to the PLC and the system messages *290040* (error code 1066) and *290027* are received in succession, it is possible that the data mailbox has not been set up correctly in the PLC.

Synchronizing a data record

Proceed as follows to synchronize the data in a recipe view with the associated tag:

Step		Action
1	Select recipe and data record	• Select the required recipe and the data record to be copied as described in *Displaying data records*, Steps 1 and 2 on Page 7-14.
2	Synchronize data record	• Press the key depicted on the left. Modified values in the recipe view are written in the corresponding tags. Finally, all the values are read from the tags to table, which is updated accordingly. This ensures consistency between the recipe view and tags.

7.4.2 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 7-10) 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 7.4.1. 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.:

  for recipe views

  – *Load_Data_Record*

  – *Save_Data_Record_from_Display_as*

  – *Save_Data_Record_from_Display*

  – *Delete_Data_Record_from Display*

  – *Synchronize_Data_Record_in_Display*

  – *Data_Record_Display_to_PLC*

  – *Data_Record_PLC_to_Display*

  for recipe screens

  – *Load_Data_Record*

  – *Save_Date_Record*

  – *Delete_Data_Record*

  – *Data_Record_PLC_to_Tags*

  – *Data_Record_Tags_to_PLC*

  – *Recipe_Tags_Online_Offline*

  for downloading data records between data medium and PLC

  – *Data_Record_DAT_to_PLC*

  – *Data_Record_PLC_to_DAT*

  for exporting and importing data records

  – *Export_Data_Records*

  – *Import_Data_Records*

  Further functions for recipes:
  – *Delete_Data_Record_Memory*
  – *Convert_Data_Record_Number_to_Name*

More functions and PLC jobs, which are linked to the downloading of data records, are described on Page 7-22.

Note

It is possible to read in data or data records from the PLC. To do this, functions such as *Data_Records_PLC_to_Tags* or *Data_Records_Tags_to_PLC* and parameters such as *Recipe number/name* and *Data record number/name* are available in which to assign specific names.

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	Action
1	Trigger reading of the selected data record from the storage medium: • **With recipe view** It is automatically loaded on selecting the data record. Select the required data record as described in *Displaying data records* in Steps 1 and 2 on Page 7-14. • **Without recipe view** Activate the operating element linked with the *Load_Data_Record* function. The function parameters must have been set accordingly beforehand.
2	The data of the data record is written to the tags.
3	Edit the tags using the configured input/output fields.
4	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	Action
1	If data records are edited offline in the configuration, switch to offline mode at this point by using the *Recipe_Tags_Online_Offline* function.
2	Trigger reading of the selected data record from the storage medium: • **With recipe view** It is automatically loaded on selecting the data record. Select the required data record as described in *Displaying data records* in Steps 1 and 2 on Page 7-14. • **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 and thus also to the PLC.

Step	Action
4	Edit the tags using the configured input/output fields. This will simultaneously change the values in the PLC as well.
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_Data_Record*. The function parameters must have been set accordingly beforehand.

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.

7.4.3   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 either 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 the internal Flash memory, the memory card or any network path. Both the recipe and data record must be specified as parameters in which the values should be written.

The following functions enable data records to be transferred to the PLC which are currently being displayed in the recipe view on the operating unit.

• *Data_Record_PLC_to_Display*

• *Data_Record_Display_to_PLC*

The values from the data record tags are written directly to the addresses in the PLC

Parameters which can be changed for recipe functions

- **Return values**

  It is possible to configure the optional *Return values* parameter for various recipe functions. This parameter enables a message to be issued concerning the status of a function. Functions can be processed in succession using *Change value*.

  Values

  2: Function in progress
  4: Function completed without errors
  12: Function completed with errors

- **Status message**

  It is possible to configure the *Status message* parameter for various recipe functions. This parameter defines whether a corresponding system message should appear when a function has been completed.

  Values

  1: After importing the data records, a status message is issued.
  0: No status message

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.

7.4.4 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 7-6 (Page 7-10) 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 of a recipe or all recipes

When appropriately configured, all the data records in a recipe or all recipes can be imported/exported together. The CSV file for the example on Page 7-2 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 7-7). After importing the modified file, the new data records can be used on the operating unit.

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

If all the recipes are exported, a CSV file is created for each recipe.

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 import it back on the operating unit:

Step		Action
1	Export data record	• Press the operating element linked with the *Export_Data_Records* function (e.g. function key or button).
		Either all the data records, only the data record of a recipe defined in the configuration or all the recipes on the data medium are exported, according to the configuration.
		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 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.

Notice

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.

These settings can be modified from the Windows Start menu using: *Settings → Control Panel → Regional Settings* on the *Numbers* tab control.

The operating unit is supplied with the German language options set.

7.4.5   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.

Note

Export the data record after changing the recipe structure and check the exported values. In this case, observe the note on Page 7-16.

HMI System Messages

A

In this chapter

This chapter contains a selection of important HMI 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.

HMI system message parameters

The HMI 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 of the runtime software. These parameters are issued according to the text "Error code:".

Notice

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

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.	Check the printer settings and cable connections. If a fault occurs repeatedly, contact the hotline.
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.

Number	Effect/Cause	Remedy
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 are called in directly or indirectly 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.
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.	–

Number	Effect/Cause	Remedy
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.
70011	The system time could not be modified. The error message only appears in connection with area pointer Date/Time PLC. Possible causes: • an impermissible time was transferred in the PLC job, • the Windows NT user has no user rights to modify the system time. If the first parameter in the system message is displayed with the value *13*, the second parameter indicates the byte containing the incorrect value.	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. Possible causes: • 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.	–

Number	Effect/Cause	Remedy
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.
70017	Date/Time is not read from the area pointer because the address set in the PLC is either not available or has not been set up.	Change the address or set up the address in the PLC.
70018	Acknowledgement that the password list has been successfully imported.	–
70019	Acknowledgement that the password list has been successfully exported.	–
70020	Acknowledgement for activation of message recording.	–
70021	Acknowledgement for deactivation of message recording.	–
70022	Acknowledgement to starting the *Import Password List* action.	–
70023	Acknowledgement to starting the *Export Password List* action.	–
70027	Backing up the RAM file system has been started.	–
70028	Backing up of the RAM file system has been completed successfully. The files from the RAM have been copied in the Flash memory. Following a restart, these saved files will be copied back in the RAM file system.	–
70029	Backup of the RAM file system has failed. No backup copy of the RAM file system has been made.	Check the settings in the *OP Properties* dialog and save the RAM file system using the *Save Files* button in the *Persistent Storage* tab control.
70030	The parameters configured for the function are faulty. The connection to the new PLC was not established.	Compare the parameters configured for the function with the parameters configured for the PLC and correct them as necessary.
70031	The PLC configured in the function is not an S7 PLC. The connection to the new PLC was not established.	Compare the *S7 PLC name* parameter configured for the function with the parameters configured for the PLC and correct them as necessary.
80001	The archive specified is filled to the size defined (in percent) and must be stored elsewhere.	Store the file or table by executing a 'move' or 'copy' function.
80002	A line is missing in the specified archive.	–

Number	Effect/Cause	Remedy
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.
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_archive*. 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_archive*. 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.

Number	Effect/Cause	Remedy
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.
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.	–
80026	The message is issued after all the archives have been successfully initialized. Values are written in the archives from this moment on. Prior to this, no values are archived even though the runtime software is operating.	–
80027	The internal Flash memory has been specified as the memory location for an archive. This is not permissible. No values will be archived for this archive and the archive will not be created.	Configure "Storage Card" as the memory location or a network path.
80028	The message serves as a status acknowledgment that initialization of the archives is currently running. No values are archived until system message 80026 is issued.	–
80029	The number of archives specified in the message could not be initialized. Initialization of the archives has been completed. The faulty archives are not available for archiving jobs.	Evaluate the additional system message, related to this message, which is also issued. Check the configuration, the ODBC (Open Database Connectivity) and the specified drive.

Number	Effect/Cause	Remedy
80030	The structure of the table(s) available does not match the archiving structure expected. The archiving process is stopped for this archive.	Delete the existing tables manually, in advance.
80032	Archives can be configured with a function trigger. This is triggered as son as the archive is full. If runtime is started and the archive is already full, the trigger function will not be initiated. The archive specified no longer archives data since it is full.	Stop the runtime, delete the archive and restart the runtime again. Or: Configure a button in the runtime which contains the same actions as the function trigger and press it.
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 *Connect/Disconnect PLC*. The operating mode is now *offline*.	–
110004	The operating status of the PLC specified is changed by the function *Connect/Disconnect PLC*. The operating mode is now *online*.	–
110005	An attempt was made to use the function *Connect/Disconnect PLC* 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.
110006	The Colorado system has been extended by the addition of the *User Version* area pointer. If the user version is not correct, the runtime is stopped.	Check the user versions. Either the wrong version was entered in the PLC or configuration or the wrong configuration was started for the PLC user version.
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.

Number	Effect/Cause	Remedy
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.
130002	The action was not executed.	Close other applications. Delete files no longer required from the hard disk.
130003	No target data carrier is inserted. The process is stopped.	Check, for example, whether: • access has been made to the correct data carrier • the data carrier has been inserted
130004	The target data carrier is write-protected. The process is stopped.	Check whether access has been made to the correct data carrier. Remove the write protection.
130005	The file is write-protected. The process is stopped.	Check whether access has been made to the correct file. Modify the file attributes, if necessary.
130006	No access to file is possible. The process is stopped.	Check, for example, whether: • access has been made to the correct file • the file exists • a different action prevents simultaneous access to the file
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.

Number	Effect/Cause	Remedy
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.
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.

Number	Effect/Cause	Remedy
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.
140018	The consistency check was deactivated by Simotion Scout. Only one appropriate note appears.	Activate the consistency check with Simotion Scout again and load the configuration in the project once more.
140019	Simotion Scout loads a new project in the PLC. Connection to the PLC is interrupted.	Wait until the end of the reconfiguration.
140020	The version in the PLC and that in the configuration (FWD file) do not match. Connection to the PLC is interrupted.	• Load the current version in the PLC using Simotion Scout. • Generate the anew project using ProTool CS, end ProTool RT and start with the new configuration.
150000	No more data is read or written. Possible causes: • The cable is defective. • The PLC does not respond, is defective, etc. • Connection is established via 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.	–

Number	Effect/Cause	Remedy
160000	No more data is read or written. Possible causes: • The cable is defective. • The PLC does not respond, is defective, etc. • Connection is established via 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.
160013	The specified server was started as InProc Server. This has not been released and may possibly lead to incorrect behavior because the server is running in the same process area as the ProTool/Pro RT runtime software.	Configure the server as OutProc Server or Local Server.
160014	Only one OPC server project can be started on a PC/MP. An error message appears when an attempt is made to start a second project. The second project has no OPC server functionality and cannot be located as an OPC server from external sources.	Do not start a second project with OPC server functionality on the computer.
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*

Number	Effect/Cause	Remedy
170002 [1]	The S7 diagnostics buffer cannot be displayed because reading in the diagnostics buffer (SZL) was terminated due to an error.	–
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.
180002	The screen keyboard could not be activated. Possible causes: • The screen keyboard is not generally supported under Windows 95. • The file "TouchInputPC.exe" was not registered due to an incorrectly executed Setup.	If Windows 95 is not available: Install the runtime software again.
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.

Number	Effect/Cause	Remedy
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.
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	Possible causes: • 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. • Connection to the PLC has been interrupted.	Ensure that the value entered is within the value range of the PLC tags. 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.

Number	Effect/Cause	Remedy
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.
200002	Coordination is not carried out at the moment 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. Possible 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	Commands 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.

Number	Effect/Cause	Remedy
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.
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 at 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.

Number	Effect/Cause	Remedy
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).
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.
250003	No connection could be established to the PLC. The tags will not be updated.	Check the connection to the PLC. Check that the PLC is switched on and *online* is activated.
260000	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).
260001	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 enter a password with a sufficiently high level.
260003	The user has logged off from the system. If the password level is *0*, no user is logged on.	–
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.

Number	Effect/Cause	Remedy
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 an archive are displayed for which there is no data in the current project. Placeholders are issued for the messages.	Delete older archive files, if necessary.
270003	The service cannot be set up because too many devices was to set up this service. A maximum of four devices can execute this action.	Connect fewer operating units which want to use the service.
280000	Connection is re-established because the cause of the interruption has been eliminated.	–
280001	No more data is read or written. Possible causes: • The cable is defective. • The PLC does not respond, is defective, etc. • Connection is established via 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.	–
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

Number	Effect/Cause	Remedy
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.
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.

Number	Effect/Cause	Remedy
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 causes: 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.	–
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.	–

Number	Effect/Cause	Remedy
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 causes: 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 a file with the specified name already exists.	Overwrite the file cancel the process.
290033	Confirmation request before deleting data records.	–
290040	A data record error with error code %1 has occurred which cannot be described in more detail. The action was canceled. It might be that the data mailbox has not been installed correctly on the PLC.	Check that the data carrier, the data record, the data mailbox and, if necessary, the connection to the PLC. Trigger the action again after waiting a short period. If the error occurs again, please contact the Customer Support. Specify the error code displayed.
290041	A data record or file cannot be saved because the data medium is full.	Delete files no longer required.
290042	An attempt was made to execute several recipe actions simultaneously. The last action was not executed.	Trigger the action again after waiting a short period.
290043	Confirmation request before storing data records.	–

Number	Effect/Cause	Remedy
290044	The data store for the recipe has been destroyed and will be deleted.	–
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.
290057	The tags of the recipe specified have been switched from operating mode "offline" to "online". Each modification of a tag in this recipe is now immediately transferred to the PLC.	–
290058	The tags of the recipe specified were switched from operating mode "online" to "offline". Modifications to tags in this recipe are no longer immediately transferred to the PLC but must be transferred there explicitly by means of downloading a data record, if necessary.	–
290059	Acknowledgement that the specified data record has been stored successfully.	–
290060	Check-back message that the data record memory has been successfully erased.	–
290061	Check-back message, that erasing the data record memory was aborted with errors.	–
290068	Request to confirm whether all data records in the recipe should be deleted.	–
290069	Request to confirm whether all data records of all recipes should be deleted.	–
290070	The data record specified is not contained in the import file.	Check the source of the data record number or data record name (constant or tag value).

Number	Effect/Cause	Remedy
300000	Process monitoring (e.g. using PDiag or S7-Graph) has been incorrectly programmed: More messages are queued than specified in the technical data of the CPU. No further ALARM_S messages can be managed by the CPU and reported to operating systems.	Change the CPU configuration.
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.
320000	The movements have already been indicated by another device. The movements can no longer be served.	Select the movements on the other display units and select the movement screen on the required display unit.
320001	The network is too complex. The defective operands cannot be displayed.	Display the network in AWL.
320002	No diagnostics-capable alarm messages have been selected. The units related to the alarm messages could not be selected.	Select a diagnostics-capable alarm message in the message screen ZP_ALARM.
320003	No alarm messages exist in respect of the selected unit. No network can be displayed in the detail display.	Select the defective unit in the general view screen.
320004	The required signal statuses could not be read by the PLC. The defective operands cannot be established.	Check the consistency between the configuration on the display unit and the PLC program loaded.
320005	The project contains ProAgent partitions which are not installed. No ProAgent diagnostics can be performed.	In order to run the project, install the ProAgent option packet.
320014	The selected PLC cannot be evaluated for ProAgent. The message display configured with the *Evaluate_message_display_fault* function could not be found.	Check the parameters of the *Evaluate_message_display_fault* function.

[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 texts.

[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.

Glossary

A

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_S

Active alarm process through which the CPU transfers alarm messages to all users logged on in the network. ALARM_S messages are configured in STEP 7.

Alarm time

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

Analog display

An analog display indicates numerical values by means of a pointer instrument.

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.

B

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

Button

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

C

Clicking

Configurable **event** which can trigger a function assigned to a button, for example, when the button is pressed and released (clicked) within the contour of the button.

If the button is pressed using the mouse button or finger (when using touch panels) but moved outside the contour before releasing, the operating unit does not interpret the action as a *click* event.

Clock

> A screen object used to display the system time in numbers (digital) or as a clock with hands (analog).

Configuration

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

D

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**).

E

Events

> **Functions** are triggered when defined events are received, e.g. pressing or releasing a key or button. Events can be configured related 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.

F

Fixed window

> A fixed window at the top edge of the screen whose content is independent of the screen currently open. The fixed window can be used to display important process magnitudes or date and time, for example.

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.

G

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.

Graphic box

> A graphic can be selected by selecting an entry in the graphic list.

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.

H

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.

I

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**.

L

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.

M

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 display

> A screen object with configurable filter criteria for displaying the volatile **message buffer** or message archive.

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 configurable graphical symbol displayed on the operating unit when at least one alarm message has been queued.

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.

N

Normal operation

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

O

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.

P

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.

Passwort list

    A screen object used to enter passwords for different access right levels.

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).

ProSave

  A service tool which provides all the functions which are necessary for the transfer of data between the configuration computer and operating unit.

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.

Q

Queued message

  A queued message is a message detected as having been received by the operating unit (message event **Arrived**) but for which the message event **departed** has still not been received.

R

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.

Recipe view

  A screen object used to create, edit, save and download data records.

Release

  Configurable **event**, e.g. for a button, which triggers a function as soon as the pressed button is released.

  If the button is pressed using the mouse button or finger (when using touch panels) but moved outside, the function is triggered when the function is released.

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.

S

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.

Screen keyboard

> A virtual keyboard displayed on the operating unit screen. This enables values to
> be entered via the touch screen, for example, without the necessity of connecting a
> keyboard.

Selection field

> An input element in which the possible user entries are predefined and displayed in
> a list for selection. An entry can be selected from the list using the operating unit.

Slider control

> A screen object to enter and issue numeric values in analog form.

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.

State view

>   The State view is a configurable display element. Depending on the configuration, it can signal a warning or the status of a unit which cannot be viewed from the operating unit.

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.

Switch

>   A screen object to enter and issue a binary status. A switch can only be switched on or off.

System message

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

T

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.

Trend view

A screen object to clearly display the continuous progression of process data. The trend view can be used to display several different **trends** simultaneously.

Index

A

Acknowledgement, alarm message, 6-20 , 6-25
Acknowledgment groups, alarm message, 2-1
Activate, event, 6-15
Activate multilanguage support, 5-4
Alarm message buffer, example, 6-23
Alarm message page, 6-22
Alarm messages, 2-1 , 3-8 , 6-19
    acknowledge, 6-20 , 6-25
ALARM_S, 3-9
Allen Bradley, 2-4 , 3-18
Alphanumeric input field , 6-16
Analog clock, 6-35
Analog display, 3-7 , 6-33
Application examples, Recipes, 7-4
Application scenarios, recipes, 7-3
Apply, Status/Force, 6-40
Archive, 2-2
    configuring, 3-13
Archive storage
    CSV file, 3-12
    Database, 3-12
Archives, 3-12
Archiving, 3-1
Area of use, 3-1
Area pointer, simulation, 5-14
Authorization, 1-2 , 4-1
    password protection, 6-36
AUTHORSW.EXE, 5-5
Autorun function, 5-5

B

Backing up the configuration, 5-3
Backup, 5-2
Backup copy of the configuration, SIMATIC
    operating unit, 5-2
Bar graph, 3-6 , 6-27
BIOS, OP 37/Pro, 5-10
Bit triggering, 6-28
Buffering, Messages, 3-8

Button, 3-5 , 6-11
    Apply (Status/Force), 6-40
    Message display, 6-25
    Messages, 6-20
    Status/Force, 6-39
    Update (Status/Force), 6-40
Buttons
    hidden, 6-11
    Trends, 6-29

C

C7 units, 4-2
Calendar dates, 6-34
Capacity, message buffer, 2-2
CD–ROM, 4-4
Change
    data record, 7-16
    language, 6-6
    recipe structure, 7-27
Change column sequence, Message display, 6-25
Change structure, recipe, 7-27
Check, Limit value, 6-16
Circle, 3-5
Clicking, event, 6-11 , 6-42
Client/Server, 2-4 , 3-18
Clipboard, 3-2
Clock, 6-35
Color change
    input field, 6-17
    Trend view, 6-28
Color changes, selection field, 6-18
Coloration, screen objects, 5-4
Column properties, Message display, 6-25
Commissioning, 5-1
    requirements, 4-1
Communication, 2-4 , 3-1 , 5-6
Communication processor, 5-9
Communications processor, 4-6
Compatibility, cursor control, 6-8
Components of ProTool/Pro, 4-1

Languages
    changing, 6-6
    number of, 2-3
Layout, recipe view, 7-10
LED, 6-5
LED control, 3-16
Length, message text
    alarm messages, 2-1
    event messages, 2-1
Level, Password, 6-36
Library , symbols, 6-41
License disk, 4-1 , 5-5
Limit monitoring, 2-3
Limit value check, 6-16
Limit values, Trend view, 6-28
Line, 3-5
Lines per message
    alarm messages, 2-1
    event messages, 2-1
List, passwords, 6-37
Load_Data_Record, function, 7-20
Local tags, 3-10
Log on, 6-7 , 6-36
Logging off, 6-37
Login, 6-36
Logoff, 6-37
Logoff_user, Function, 6-37
Lucky Goldstar, 2-4 , 3-18

M

Management, passwords, 6-37
Maximum value, bar graph, 6-27
Message acquisition, 2-2
Message archive, 3-8
Message buffer, 2-2 , 3-8 , 6-23
    capacity, 2-2
    print, 3-16
Message categories, 6-25
Message classes, 3-8
Message events, 2-2 , 3-8
Message indicator, 6-21
Message line, 3-8 , 6-19
Message logging, 2-2
Message page, 3-8 , 6-22
Message view, 3-6 , 3-8 , 6-24
    simple, 3-6 , 6-26
Message window, 3-8 , 6-19

Messages, 3-8
    buffering, 3-8
    display, 3-8
    edit, 6-20 , 6-25
    print, 3-16
    simulation, 5-14
Minimum value, bar graph, 6-27
Mitsubishi, 2-4 , 3-18
Modbus, 3-18
Modicon, 2-4 , 3-18
Multi Panels, 4-2

N

Navigation, Trends, 6-29
New_Data_Record, function, 7-20
non–return pointer, 6-33
Number
    alarm messages, 2-1
    entries, 7-8
    event messages, 2-1
    languages, 2-3
    passwords, 2-3
    Recipes, 2-3
    recipes, 7-8
Numeric input field, 6-16

O

Objectives, 1-2
Objects in a projects, 3-3
Offline
    editing data records, 7-21
    tags, 7-7
Offset, Status/Force, 6-39
Omron, 3-18
Online, editing data records, 7-21
OP37/Pro
    Connectable PLCs, 4-5
    settings, 5-10
OPC, 2-4 , 3-18
Operand, Status/Force, 6-39
Operate, simulator, 5-17
Operating
    runtime software, 6-1
    screen objects, 6-9
Operating elements, recipe view, 7-11

Status button, 3-6 , 6-13
Status change, event, 6-13 , 6-15
Status message, Recipe functions, 7-13 , 7-23
Status value, 6-40
Status/Force, 2-3 , 3-7 , 6-39
Stop, Update trends, 6-29
Storage location
    data records, 7-7 , 7-14
    project file, 5-13
    runtime software, 5-13
Superuser, 6-36
Swap file, 4-4
Switch, 3-6 , 6-15
    Status button, 6-13
Symbol Library, 6-41
Symbol library, 6-41
Symbolic output field, 3-4
Synchronization, data records, 7-7
Synchronize, data record, 7-19
Synchronize_Data_Record_in_Display,
    Function, 7-20
System limits, 7-8
System messages, 3-8 , 6-20
System requirements, 4-3

T

Tabulator sequence, 6-2
Tags, 3-10
    initial value, 7-27
    offline, 7-7
    Simulate values, 5-16
    synchronizing, 7-7
    value simulation, 5-14
    VB script, 3-10
Target devices, 4-2
Task switching
    lock, 6-7
    Simulator, 5-15
Telemecanique, 2-4 , 3-18
Test, 3-2 , 5-6
Text, 3-4
Text Displays, 4-2
Text editor, 7-23
Text–based display units, 4-2
Time, 6-16 , 6-34
    simulation, 5-16
Time specification, Date/Time, 6-34 , 6-35
Time stamp, 6-22 , 6-23 , 6-34
Time zone, 6-8
    setting, 5-4
Time/Date, 3-5

Time_expired, event, 3-15
Tips on the recipe view, 7-13
Touch Panel, 4-2
Touch panels, 3-2 , 6-4
Transfer, 3-1
Trend type, 6-28
Trend view, 3-6 , 6-28
    uncertain status, 6-28
Trend_view_read_mark_forward, functions,
    6-28
Trend_view_read_mark_on_off, functions, 6-28
Triggering, Trends, 6-28

U

Unauthorized use, 6-36
Uncertain status, trend view, 6-28
Update
    Status/Force, 6-40
    Trends, 6-29
Use, Recipes, 7-3
Use_On_Screen_Keyboard_ON/OFF, function,
    6-4
User data length, 2-3 , 7-8

V

VB Script, 2-4 , 3-2
VB script, tags, 3-10
Vector graphics, 3-5
View, Password list, 6-37
Virtual key, 6-11

W

WinAC, 2-4 , 3-17
Windows, 1-1
    configuring, 5-3
    install, 5-3
Windows–based systems, 1-2 , 4-2
Writing, data records to PLC, 7-18

Z

Zoom
    trend view, 6-29 , 6-30
Zoom area, enlarge/reduce (trend view), 6-30
Zoom in, trend view, 6-29
Zoom out
    trend view, 6-28 , 6-29