SIEMENS

SIMATIC HMI

**Touch Panel TP 170A, TP 170B
Operator Panel OP 170B**

Equipment Manual

Order No.: 6AV6591-1DC11-2AB0

Release 12/01

A5E00136801

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 iden-tify 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.

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Impressum

Editor and Publisher: A&D PT1 D1

For your notes

Preface

This manual

The TP 170A, TP 170B, OP 170B equipment manual is part of the SIMATIC HMI documentation. It provides operation, installation, configuration and maintenance personnel with information concerning installation, functionality, operation and technical design of the SIMATIC operating units TP 170A, TP 170B and OP 170B.

Organization of the manual

The manual is organized into the following chapters:

Chapter	Contents
1 - 2	Overview of the features and functional scope of the unit
3 - 6	Commissioning and operation
7	TP 170B and OP 170B recipes
8	System settings
9 - 12	Mechanical and electrical installation, unit description, retrofitting of options as well as maintenance and upkeep.
13	Information on updating the operating system
Appendix	• Technical Data • Interface Assignments • HMI System Messages • ESD Guidelines

Conventions

The following conventions are used throughout this manual:

`Motor off`	Text in the operating unit display is presented in this typewriter font.
`Tag`	Symbolic names representing tag values on the screen are presented in this italic typewriter font.
Screens	Functions available for selection are presented in this italic font.
ESC	The names of keys and buttons are displayed in a different font.

History

The various releases of this manual correspond to the following versions of the ProTool CS configuration software:

Edition	Comment	ProTool Version
12/99	First release of the TP 170A equipment manual	From V5.2
07/00	Extensions to the TP 170B and OP 170B devices	From V5.2 + SP2
12/01	New ProTool software, more screen objects	From V 6.0

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- MP 270B®

- MP 370®

- ProAgent®

- ProTool®

- ProTool/Lite®

- ProTool/Pro®

- SIMATIC®

- SIMATIC HMI®

- SIMATIC Multi Panel®

- SIMATIC Multifunctional Platform®

- WinCC®

- WinCC Add-on®

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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
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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
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
CCFL	Cold Cathode Fluorescence Lamp
CF	Compact Flash
CPU	Central Processing Unit
CSV	Comma Separated Values
DP	Decentralized Periphery
DRAM	Dynamic Random Access Memory
DSN	Data Source Name
ESD	Electrostatically Sensitive Device
EMC	Electromagnetic Compatibility
HMI	Human Machine Interface
IF	Interface

LCD	Liquid Crystal Display
LED	Light Emitting Diode
MP	Multi Panel
MPI	Multipoint Interface (SIMATIC S7)
OP	Operator Panel
PC	Personal Computer
PCL	Printer Control Language
PU	Programming Unit
PPI	Point to Point Interface (SIMATIC S7)
RAM	Random Access Memory
SELV	Safety Extra Low Voltage
AM	Alarm Message
PLC	Programmable Logic Controller
SRAM	Static Random Access Memory
STN	Super Twisted Nematic
TCP/IP	Transmission Control Protocol/Internet Protocol
TFT	Thin Film Transistor
TTL	Transistor-Transistor Logic
TP	Touch Panel
UPS	Uninterruptible Power Supply (USV)

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
Getting Started Quick Reference Manual	Beginners	These documents provide a step by step guide to the configuration of • a screen with various objects, • changing screens, • a message. This documentation is available for • text-based displays, • graphics displays, • touch panels, • Windows-based systems.
ProTool Configuring Windows-based Systems User's Guide	Configuration planners	Provides the following information for working with the configuration software: • principles of the configuration, • detailed description of objects and functions which can be configured, • examples.
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.
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 style="text-align: right; font-size: 3em;">**1**</div>

Low-end units

The 170A and TP 170B touch panels and OP 170B operator panel represent products in the series of low-end operating units.

These units are based on the innovative standard Microsoft Windows CE operating system. They complete the SIMATIC HMI product range in the low-end sector. The TP 170A is the lowest price initial unit on offer which can operate with all SIMATIC S7 CPUs. The TP 170B and OP 170B also fulfill more sophisticated functional requirements.

This product series enables self-created graphics, digital photos and scanned pictures to be integrated in a project. Bars and trend diagrams can still be used to graphically display temperature progressions, for example.
The units are equipped with an interface for MPI and PROFIBUS-DP. This interface is also used for downloading configurations. The unit memories are designed for small to medium-size configurations.

Here is a short selection of common features:

- Automatic transfer detection for downloading configurations
- Password protection
- Input/Output fields to display and modify process parameters
- Configurable buttons and function keys (OP 170B) to control input/output and data bits
- State view for configuring warning indicators (alarm lamps)
- Bars to display dynamic values graphically
- Standard library for graphics and buttons can be used under ProTool CS
- Graphics can be configured to label buttons or as format-filling background screens
- Fixed text for labeling buttons, process screens or process values in any character size

Additional features for TP 170B and OP 170B:

- Print functions
- Trends
- Scheduler
- Alarm messages
- Recipe management
- Backing up recipe data and configurations on optional memory cards (CF card)

A complete overview of the functional range of the units is provided in Chapter 2.

Area of use

The operating units enable operating statuses, current process values and faults concerning a connected PLC to be graphically displayed and the relevant machine or system to be easily monitored and operated.

The units have been conceived for easy machine operation and monitoring. They provide a realistic graphical representation of the machine or system to be monitored. They can be used, for example, in machine and apparatus construction sectors, in the printing and packing industries, in the automobile and electrical industries and in the chemical and pharmaceutical industries.

The high degree of protection (IP65 front side) and non-implementation of hard disks and fans ensure the operating units are also suitable for use in rough industrial environments, directly on site on the respective machine.

Installation locations for the units include:

- Panels
- Consoles

The units can be used to:

- control and monitor the process by means of the menu system. Setpoint values or control element settings, for instance, can be modified by entering values, activating configured function keys or buttons;
- display processes, machines and systems on full-graphic, dynamic screens;
- display and edit messages and, for example, process tags in output fields, and to visualize bars or status display;
- intervene directly in the running process by input.

Note

Observe the applicable safety regulations.

Configuration using ProTool CS

Note

The units can be configured, as required, using the configuration software ProTool/Pro CS, ProTool or ProTool/Lite. Throughout this manual, the term **ProTool CS** (CS: Configuration System) is used to represent all three software variants.

Graphics, texts and operating and display elements which need to be represented on the operating units must first be created on a configuration computer (PC or PU) using the SIMATIC ProTool CS configuration software. The configuration computer must be connected to the operating unit in order to download the configuration to the operating unit (refer to "Configuration phase" in Figure 1-1). The connection can be via a serial connection or an MPI/PROFIBUS-DP network.

Once the project has been successfully downloaded, connect the operating unit to the PLC. The operating unit can then communicate with the PLC and respond according to the information configured for running the program in the PLC (refer to "Process control phase" in Figure 1-1).
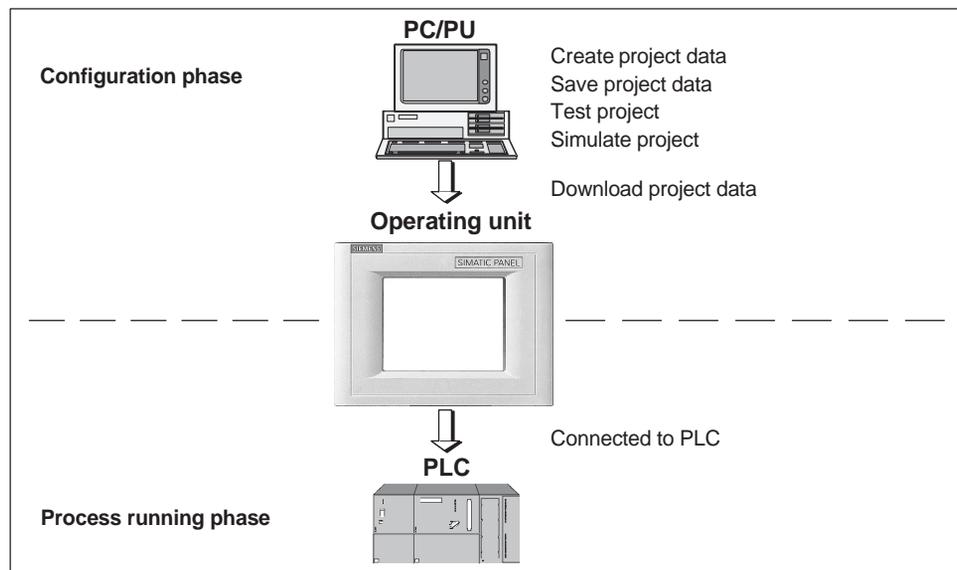
Figure 1-1   Configuration and process running phase

Overview of units (valid from ProTool Version V6.0)

	TP 170A, TP 170B		OP 170B

		TP 170A	TP 170B	OP 170B
Processor	Type	32 bit RISC		
Configuration memory	Capacity (max.)	320 kByte	768 kByte	
Software	Operating system	Microsoft Windows CE		
Ser. interface 1	Standard HMI interfaces for connection to PLC, PC/PU and printer	$1 \times$ RS 232 (9-pin) $1 \times$ RS 422/RS 485		
	S7 connection	MPI/PROFIBUS-DP		
	Max. baud rate	1.5 MB	12 MB	
Ser. interface 2		–	RS 232	
Display	Active screen area (W $\times$ H) in mm	116 x 87		
	Resolution (pixels)	320×240		
	Colors	4 Blue Mode	4 Blue Mode or 16 colors	4 Blue Mode
Operating elements	Touch screen	$\times$ (resistive analog)		–
	Matrix keyboard	–		$\times$
	Function keys with configurable functions	–		24 (18 with one-color LED)
	Those usable as softkeys	–		14
	Labeling the function keys	–		with labeling strips
Special features	• External memory extension: – Slot for CF card	–		$\times$

Further information

Detailed information on the technical data of the operating units is provided in Appendix A of this manual.

Detailed descriptions of the creation of projects for the operating unit and configuration software functions are provided in the *ProTool Configuring Windows-based Systems* User's Guide and in the online help for ProTool CS.

Connection of the operating units to the PLC is described in the *Communication for Windows-based Systems* User's Guide.

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

Functionality

2

The following table summarizes the range of functions provided by the operating unit. The values specified are the maximum values which can be managed by the units. The defined values are limited by the size of the configuration memory.

Function		TP 170A	TP 170B	OP 170B
Event messages	Number	1000	2000[1]	
	Display	Message view	Message line, message window/ message page, message display	
	View all queued messages	Message view	Message page/Message display	
	Message length per line	70 characters (font-dependent)		
	Process values in message text	8		
	Edit messages	–	×	
Alarm messages	Number	–	2000[1]	
	Display	–	Message window/ message page/ message display	Message line/message window/ message page/message display
	Type of display	–	First/last, selectable	
	View all queued messages	–	In message page/ message display	
	Message length per line	–	70 characters (font-dependent)	
	Process values in message text	–	8	
	Acknowledge individual alarm messages	–	×	
	Acknowledge several alarm messages simultaneously (group acknowledgement)	–	16 acknowledgment groups	
	Edit messages	–	×	

1) Total number for event and alarm messages

Function		TP 170 A	TP 170 B	OP 170 B
ALARM_S	Display S7 messages	–	×	
Message logging	Output to printer	–	×	
Volatile message buffer	Message buffer capacity	–	128 message events	
	View event/alarm messages	–/–	×/×	
	Delete	–	×	
	Print	–	×	
	Message events queued simultaneously (max.)	16	64	
Message acquisition	Time of occurrence	Date and time		
	Message events	Arrived, Departed	Arrived, departed, acknowledged	
Screens	Number	50	100	
	Fields per screen	20	50	
	Tags per screen	20	50	
	Complex elements per screen	5		
	View	×	×	×
	Print (hardcopy)	–	×	×
	Screen objects			
	• Text	×	×	×
	• Graphics	×	×	×
	• 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	–	×	×
	• Hidden button	–	×	×
	• Trend view	–	×	×
	• Bar	×	×	×
	• Message view	–	×	×

Function		TP 170 A	TP 170 B	OP 170 B
Screens	• Single message display	×	×	×
	• Password list	–	×	×
	• Recipe display	–	×	×
	Operator guidance			
	• Help text	–	×	×
	• Dynamic attributes	–	×	×
	• Call/Hide objects	–	×	×
	• Icons for softkeys	–	–	×
	• TAB sequence	–	–	×
	• LEDs in function keys	–	–	×
	Fixed window	–	×	×
Tags	Number	500	1000	
Limit value monitoring	Inputs/outputs	×	×	×
Conversion functions	Inputs/outputs	–	×	×
Help text	Lines/characters	–	7/35 (font-dependent)	7/35 (font-dependent)
	For messages	–	×	×
	For screens	–	×	×
	For screen objects			
	• Input field	–	×	×
	• Selection field	–	×	×
	• Button	–	–	×
	• Status button	–	–	×
	• Switches	–	–	×
	• Hidden button	–	–	×
Trends	Number	–	50	
Graphic objects	Number	200	500	
Text elements	Number	1000	2000	
Print functions	Hardcopy of screen content	–	×	×
	Direct message logging	–	×	×
Password protection	Number of passwords	1	50	
	Password level	2 (0 or 1)	10 (0..9)	

Function		TP 170 A	TP 170 B	OP 170 B
Recipes	Number	–	20	
	Data records per recipe	–	50[2]	
	Entries per recipe	–	60	
Online languages	Number of languages	1	5	
Screen settings	Contrast	×	×	×
	Touch calibration	×	×	–
Scheduler	Trigger functions cylically or once	–	×	×
Connections[3]	Number	1	4	
Communication	**SIMATIC S5** • AS511 [4] • PROFIBUS-DP	× –	× ×	× ×
	SIMATIC S7-200	×	×	×
	SIMATIC S7-300/400	×	×	×
	SIMATIC 505 • NITP • PROFIBUS-DP	× –	× ×	× ×
	SIMOTION	–	×	×
	Connection to PLCs from other manufacturers			
	Allen Bradley (PLC-5, SLC 500) • DF1 • DH+ • DH485	× – ×	× × ×	× × ×
	LG (Lucky Goldstar) • GLOFA GM	×	×	×
	Modicon • Modbus	×	×	×
	Mitsubishi FX / Mitsubishi Protocol 4	×	×	×
	GE Fanuc	×	×	×
	Omron Hostlink/Multilink	×	×	×
	Telemecanique TSX • Adjust • Uni-Telway	– ×	× ×	× ×

2) Limited by storage medium

3) With SIMATIC S7

4) Only via converter cable

Commissioning

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3

</div>

In this chapter

This chapter provides information on:

- starting up the operating unit for the first time (Page 3-3)
- restarting the operating unit (Page 3-4)
- options for download mode (Page 3-7)
- testing the project on the operating unit (Page 3-11)
- uploading the project from the TP 170B and OP 170B (Page 3-13)
- backup/restore the internal Flash memory using the TP 170B and OP 170B (Page 3-16)

Notice

In the case of the initial start-up, please observe the safety notes concerning reverse poling protection on Page 9-6.

Notice

High frequency radiation, e.g. from mobile telephones, can cause exceptional operating situations.

Caution

Always terminate the runtime software before switching off the voltage supply in order to prevent loss of data.

To terminate the runtime software, press the operating element assigned the *Exit_runtime* function in the configuration. Wait until the operating unit start menu, Loader, appears (Figure 3-1, Page 3-6) and then switch off the power supply.

Further information

Further information on operating the units is provided in the following chapters:

*   General Operation:
    TP 170A, TP 170B: Chapter 4.1
    OP 170B: Chapter 4.2
*   Operating Special Screen Objects:
    TP 170A: Chapter 5
    TP 170B, OP 170B: Chapter 6

3.1   Initial Startup

Action

When the operating unit is started up for the first time, no configuration has been loaded on it. In order to download the necessary project data and the runtime software from the configuration computer to the operating units, proceed as follows, observing the sequence.

Step	Action
1	Connect the operating unit via the IF1A or IF2 (serial) interface[1] or IF1B (MPI) interface to the configuration computer according to the required type of transfer using a standard cable. Default setting: Serial connection
2	Switch on the power supply for the operating unit.
3	When the unit is started up, it automatically switches from the start menu to download mode. Switch to the start menu (Loader) by pressing the `Cancel` button and, from there, activated the Windows Control Panel (TP 170B and OP 170B) or the *Transfer Settings* window (TP 170A).
4	Check the settings defined for the interface (serial or MPI) in the Transfer Settings window and adapt them as necessary (refer to Chapter 3.4). Default setting: Serial connection
5	Close the Control Panel or the *Transfer Settings* window and activate download mode.
6	Start downloading the configuration on the configuration computer. Further settings necessary on the configuration computer for the download operation are provided in the *ProTool Configuring Windows-based Systems* User's Guide. The configuration computer checks the connection to the operating unit. If the connection is not available or defective, the corresponding error message appears. If downloading from the configuration computer is terminated as a result of a compatibility conflict, the operating unit's operating system must be replaced (refer to Chapter 13). If the connection is correct, the project data is downloaded to the operating unit. Following successful downloading, the operating unit restarts and displays the start screen of the projects that has just been loaded.

1) TP 170 A: IF1A
    TP 170 B, OP 170 B: IF2

3.2 Recommissioning

Purpose

During recommissioning, a project already loaded on the operating unit is replaced by another. In this case, the project data is downloaded from the configuration computer to the operating unit.

The following options are available to switch the operating unit to download mode:

- Start downloading manually during the operating unit start-up phase

- Start downloading automatically while the operating unit is in operation

- Start downloading via a correspondingly configured operating element while the operating unit is in operation (refer to Page 8-6).

3.2.1 Start downloading manually

Start downloading manually during the start-up phase of the operating unit:

Step	Action
1	Connect the operating unit via the IF1A or IF2 (serial) interface[1] or IF1B (MPI) interface to the configuration computer according to the required transfer settings using a standard cable.
2	Switch on the power supply for the operating unit.
3	Switch to the start menu (Loader) by pressing the `Cancel` button and, from there, activated the Windows Control Panel (TP 170B and OP 170B) or the *Transfer Settings* window (TP 170A).
4	Check the settings defined for the interface (serial or MPI) in the Transfer Settings window and adapt them as necessary.
5	Close the Control Panel or the *Transfer Settings* window and activate download mode.
5	Start downloading the project on the configuration computer.
	The configuration computer checks the connection to the operating unit. If the connection is not available or defective, the configuration computer issues the corresponding error message.
	If downloading from the configuration computer is terminated as a result of a compatibility conflict, the operating unit's operating system must be replaced (refer to Chapter 13).
	If the connection is correct, the new configuration is downloaded to the operating unit. Following successful transfer of data, the configuration is started and the unit displays the start screen of the configuration that has just been loaded.

1) TP 170 A: IF1A
TP 170 B, OP 170 B: IF2

3.2.2 Start downloading automatically during normal operation

Download settings

The operating unit can be switched automatically to download mode from normal operation as soon as downloading is started on the connected configuration computer. This option is particularly recommended for the test phase involving a new configuration project because the data is transferred without having to intervene on the operating unit.

A condition for this is that, with regard to the operating unit, the required transfer connection is set in the *Transfer Settings* window and the corresponding *Remote Control* function is activated (TP 170A: Figure 3-3, TP 170B and OP 170B: Figure 3-4).

A detailed description of the possible download settings is provided on Page 3-7.

Close modal dialogs

If the *Remote Control* option is active, the runtime is automatically shut down and the operating unit switched to download mode. If dialogs are still open, the runtime cannot be shut down when downloading has been started on the operating unit.

In such cases, close the dialog or interrupt downloading on the configuration computer.

Recommendation

Following the start-up phase, switch the automatic download option off to prevent inadvertently switching the operating unit to download mode in a system which is running, which would cause the runtime to shut down. To do this, deactivate the *Remote Control* option in the operating unit Transfer Settings window (Figure 3-3 or Figure 3-4).

3.3   Operating Unit Start Menu

During the start-up phase, the start menu (Loader) depicted below appears. When the runtime has ended, the following appears:

- **TP 170A**
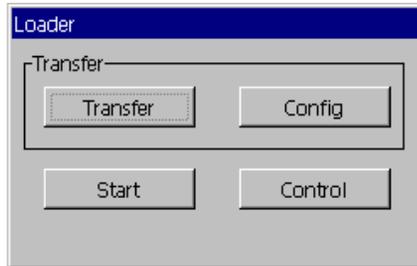
Figure 3-1   TP 170A start menu

Press the *Transfer* button to switch the operating unit to download mode.

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

Press the *Config* button to call in the Transfer Settings menu in which to define the options for download mode (refer to Figure 3-3 on Page 3-7).

Press the *Control* button to access a menu in which to define various settings, such as screen settings.

- **TP 170B / OP 170B**
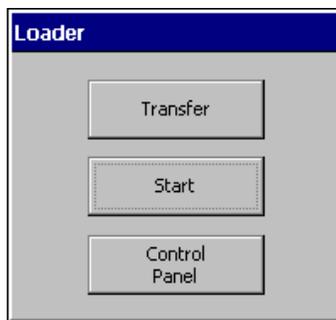
Figure 3-2   TP 170B/OP 170B start menu (Loader)

Press the *Transfer* button to switch the operating unit to download mode.

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

Press the *Control Panel* button to access the Windows CE Control Panel (see Figure 8-2 on Page 8-7) in which various settings can be defined. The settings for the download mode options can be defined here, for example.

It is possible to protect the Start menu from unauthorized access by assigning a password. If the password is subsequently not entered, only the *Transfer* and *Start* buttons are available. This prevents incorrect operation and increases system or machine security since settings cannot be modified.

3.4 Options for Download Mode

Overview

The following options can be set for download mode:

- Download mode can be restricted to a specific connection type so that downloading can only occur either via a serial connection or an MPI connection
- Automatic switching to download mode from normal operation when data transfer is initiated from the connected configuration computer

Note

Modifications must not be carried out when the runtime is in operation or the unit is in download mode.

Download mode settings on the TP 170A

Access the configuration menu for defining the transfer settings by pressing the *Config* button in the start menu.
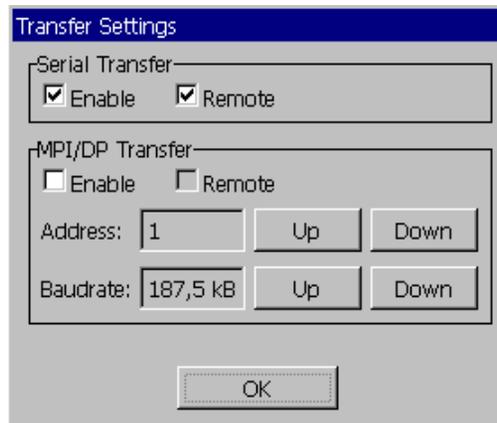

Figure 3-3   TP 170A transfer settings menu

Select the required transfer channels and activate the respective *Remote* option. In addition to the serial transfer channel, a second channel can also be selected to download data from the configuration computer to the operating unit.

The *MPI/DP Transfer* section displays both bus parameters, *MPI Address* and *Baudrate*. These parameters are valid for the project currently loaded on the operating unit.

Press the *OK* button to confirm the settings currently defined for the download options. The Transfer Settings menu is closed and the start menu appears.

Download mode settings on the TP 170B/OP 170B

Access the configuration menu for defining the transfer settings by pressing the *Control Panel* button in the start menu. The Windows CE Control Panel is opened. Select the *Transfer* option.

Figure 3-4   Transfer settings configuration menu, *Channel* tab control,
                 TP 170B and OP 170B

The *Channel* tab control in the Transfer Settings menu can be used to activate the required transfer channel and the respective *Remote Control* option. In addition to the serial transfer channel, a second channel can also be selected to download data from the configuration computer to the operating unit.

Press the *Advanced* button to define the *Address* bus parameter setting and *Transmission Rate* and *Highest Station* network parameter settings for downloading via MPI or PROFIBUS-DP. These parameters are valid for the configuration currently loaded on the operating unit.

In addition to the setting options for download mode, the *Directories* tab control can be used to specify the following paths (refer to Figure 3-5):
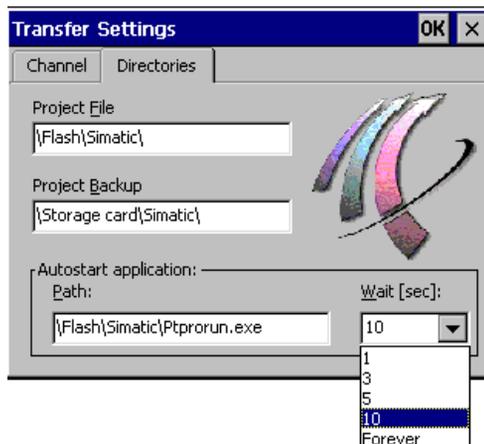
Figure 3-5   Transfer settings configuration menu with *Directories* tab control

- *Project File*
  The predefined storage location for the project file can be changed here. The internal Flash memory or external Flash cards can be set for the operating units. During the next downloading process, the configuration is stored in the storage location specified.

- *Project Backup*
  The predefined storage location for the source file of your configuration can be changed here. This file can be used for restoring (uploading) the configuration. External Flash cards can be set for the operating unit.

  Information on uploading is provided on Page 3-13.

- *Autostart application*

  Path

  This defines the storage location for the ProTool runtime software. This is the application with which the configuration runs under Windows CE.

  Wait

  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 runtime software is available, the unit automatically switches to download mode.

Notice

Do not change the default settings in the fields, except *Wait*, when working with ProTool. Otherwise, the operating unit can no longer start the configuration.

Press the *OK* button or Enter key to confirm the settings currently defined for the download options. In the case of the OP 170B, ensure that no button has been selected. The Transfer Settings menu is closed and the Windows CE Control Panel is displayed.

Press the *X* button or *ESC* key to close the Transfer Settings menu and call in the Windows CE Control Panel. Any modifications made to the settings are rejected.

General information on download mode

⚠ **Warning**

When the option *Remote Control* is active, ensure that the operating unit is not inadvertently switched to download mode from the configuration computer when in normal operation.

Notice

Deactivate the *Remote Control* option if the serial transfer channel has been selected and a serial printer is connected to the operating unit. Otherwise, printing is not possible.

Notice

In the case of the TP 170A, *Remote Transfer* is not possible if serial transfer is activated.

Notice

If no transfer channel has been enabled using the *Enable Channel* option, it is not possible to download a configuration from the configuration computer to the operating unit.

Note

The bus parameters for the **MPI transfer** (e.g. MPI address, baud rate, etc.) are read out of the configuration currently loaded on the operating unit.

The settings for MPI transfer can be modified. To do this, stop the runtime, modify the settings and switch to download mode. When the runtime is subsequently started, the bus parameters are overwritten by values from the configuration.

⚠

Warning

In the case of Profibus-DP, modifications here may only be made for start up purposes.

For each modification of the settings for Profibus-DP, the operating units only set one corresponding set of standard bus parameters. In unfavorable conditions, this can lead to faults on the DP bus.

In order to calculate the bus parameters exactly, the entire bus topology must be known.

Correct definition of the bus parameters for runtime is automatically ensured by the integrated operation of ProTool in STEP 7.

3.5   Test the Configuration

Conditions

In order to switch the operating unit between the operating modes *OFFLINE* and *ONLINE*, the function *Change_mode* must be linked to an operating element in the project.

Note
During the test phase, it is recommended to enable switching to download mode from normal operation. Further information on this is provided on Page 3-5.

⚠ **Warning**

After the test phase, do not forget to deactivate the *Remote Control* option to prevent inadvertently switching to download mode from the configuration computer when in normal operation.

Testing on the configuration computer

The material supplied with ProTool contains a simulation program which can be used to test the configuration on the configuration computer without the necessity of connecting a PLC or operating unit. Detailed information on this is provided in the *ProTool Configuring Windows-based Systems* User's Guide and in the online help to ProTool CS.

The simulation program can be started using the corresponding button in the toolbar in ProTool

or via *File → Test → Start Simulator*.

Testing without a PLC connected (OFFLINE mode)

After setting the unit to *OFFLINE* mode, the individual functions of the configuration can be tested on the operating unit without them being affected by the PLC. PLC tags are not updated in OFFLINE mode.

Step	Action
1	Switch the operating unit to operating mode *OFFLINE* (refer to Page 8-6).
2	Check all the configured screens in respect of correct representation.
3	Check the screen hierarchy.
4	Check the input fields.
5	Test the function keys.

Testing with a PLC connected (ONLINE mode)

When a PLC is connected, it is possible to test the communication between the operating unit and PLC in ONLINE mode. This includes checking that the correct data areas have been configured.

Step	Action
1	Connect the operating unit to the PLC.
2	Test all the items in the projects for which communication with the PLC is necessary e.g.: • messages • print functions • automatic message logging • selecting screens etc.

3.6   Uploading (TP 170B and OP 170B)

Purpose

During downloading, only the run-capable configuration (*.fwd) which has been generated is normally downloaded on the operating unit. If the original source file is to be used for further development of the configuration or for fault analysis, it must remain on the configuration computer.

Not only the generated configuration can be stored on the TP 170B and OP 170B units but also the source file, so that the configuration can be retrieved (uploaded) from the operating unit later, if necessary.

Advantage

After uploading a configuration back onto the unit, it can be analyzed and modified even if the original cannot be accessed or the source file on it for the configuration is no longer available.

Conditions

The following conditions must be fulfilled in order to retrieve the source file from the run-capable project file:

- CF card with sufficient memory space,

- Downloading of the current project file from the configuration computer to the operating unit must be performed using the option *Upload*. This option can be activated in ProTool CS via *File → Download → Preferences*.

What happens during download/upload?

In the case of downloading including transfer of the source file, the configuration is compressed from the source format (*.pdb) and downloaded to the operating unit as a *.pdz file. After uploading, the file is decompressed in the ProTool CS configuration software.

Following uploading, the configuration must be given a new name on the configuration computer.

Note

- The uploaded, decompressed source file can only be opened with a ProTool CS whose version number is greater or equal to that of the configuration software with which the project was created.

- ProTool CS cannot check whether the source file on the operating unit matches the configuration actually run on it. If downloading is performed at any time without the *Upload* option being activated, it is possible that old project data is on the operating unit which no longer matches the current project.

Instructions

Uploading a project from the operating unit:

Step	Action
1	Select the menu option *File → Upload → Preferences* in ProTool CS on the configuration computer.
2	Use the *Upload* dialog to select the required connection type between the operating unit and configuration computer and to set the relevant connection parameters.
3	Click on *OK*.
4	Switch the operating unit to download mode according to the setting in the Transfer Settings configuration menu.
5	Start the uploading function using the *Upload → Start* in ProTool.
6	Enter a new name or select an existing configuration to be overwritten and click *Save*. The configuration retrieved is saved and automatically opened in ProTool CS.

3.7   ProSave Service Tool

The *ProSave* tool is supplied together with ProTool. All the functions are provided which are necessary for the transfer of data between the configuration computer and operating unit:

- Data backup using Backup/Restore (Page 3-16)

- Installation and deinstallation of drivers, options and add-ons, i.e. applications and drivers independent of ProTool (for TP 170B and OP 170B only)

- License transfer (Page 3-21) (for TP 170B and OP 170B only)

Note

The *ProSave* tool can only be implemented from ProTool Version V6.0.

Integrated operation

ProSave is part of the material supplied with ProTool and can be automatically loaded on the configuration computer with the ProTool installation. The entire function range of ProSave is available within ProTool. In integrated operation, the ProSave dialogs are called from the project. In this way, all the necessary specifications (e.g. target device and download settings) are assumed from the project.

Stand-alone operation

ProSave can also be installed as a stand-alone application. In this case, the settings concerning the device and downloading must be defined in the ProSave user interface and match the operating unit settings.

3.8   Backup/Restore the Internal Flash Memory

Purpose

The functions *Backup* and *Restore* provide the following options:

* creating a copy of the entire configuration on a memory card
* creating a copy of the entire configuration on PC (ProSave)
* copying selected objects, such as recipes and passwords, on PC (ProSave).
* restoring the stored elements in the case of a fault
* updating the operating unit regardless of where it is in use without the need of a configuration computer

---
Notice

If the restore process is interrupted due to a power failure, the operating system is deleted. In this case, the operating system must be reloaded (refer to Chapter 13).

Note

If a message appears during the restore process indicating a compatibility conflict has occurred, the operating system must be reloaded. Ensure that the same version of the operating system is loaded as was installed when the backup was created.

Note

Close all applications before starting the backup or restore process.

Note

Licenses on the TP 170B and OP 170B are not stored with the backup data.

Each restore initiated on the TP 170B and OP 170B deletes all the licenses on it permanently. Therefore, save this data beforehand.

3.8.1   Backup/Restore on memory card (TP 170B and OP 170B)

During a backup process, the operating system, application and data are copied from the internal Flash memory to an external storage medium.

In the case of a restore process, the content of a Flash memory stored on an external storage medium is reloaded into the internal Flash memory. Prior to this, the operating unit's internal Flash memory is completely cleared following confirmation.

Backup on CF card

Proceed as follows to create a backup copy of the internal Flash memory:

Step	Action
1	Deactivate the write protection on the memory card, if set.
2	Insert the memory card in the slot (TP 170B: Figure 9-2 on Page 9-9, OP 170B: Figure 9-3 on Page 9-11).
3	Call in the Windows CE Control Panel (refer to Page 3-6) and, from there, select the *Backup/Restore* option depicted on the right.
4	Start the Backup process by using the Backup button.
5	Confirm the deletion of any existing backup files beforehand.
6	When the data has been completely downloaded, the operating unit issues a message.
7	Remove the memory card from the operating unit.
8	Activate the write protection on the memory card, if available.
9	Label the memory card, e.g. with the date and version of the configuration saved, and keep it in a safe place.

Restore from CF card

Proceed as follows to restore the content of the internal Flash memory:

Step	Action
1	Activate the write protection on the memory card, if available.
2	Insert the memory card in the slot (TP 170B: Figure 9-2 on Page 9-9, OP 170B: Figure 9-3 on Page 9-11).
3	Call in the Windows Control Panel and select the *Backup/Restore* option.
4	Start the restore process by clicking on the Restore button.
5	Confirm that the internal Flash memory.
6	After confirmation, the operating system is reloaded and the operating unit is automatically restarted. Finally, the remaining data is downloaded.
7	When the data has been completely downloaded, the operating unit issues a message.

Step	Action
8	Remove the memory card.
9	Restart the operating unit.

3.8.2 Backup/Restore using ProSave

In order to save the entire configuration, or even specific parts such as recipes and passwords, on a PC use the *ProSave* service tool. The advantage of *ProSave* is that the Backup/Restore can be performed via the following transfer channels without ProTool:

- Serial
- MPI / PROFIBUS-DP

During a backup process, the operating system, application and data are copied from the internal Flash memory to a PC.

In the case of a restore process, the content of a Flash memory stored on the PC is reloaded into the internal Flash memory on the operating unit. Prior to this, the operating unit's internal Flash memory is completely cleared.

Backup using stand-alone ProSave

Creating a backup using ProSave as a stand-alone application:

Step	Action
1	Start *ProSave* on the PC using the Windows Start menu.
2	Use the *General* tab register to select the required device type and connection type with corresponding connection parameters.
3	Use the *Backup* tab control to select the data to be saved (*Recipes*, *Passwords* or *Complete Backup*).
4	Select the path in which the backup file (*.psb) should be saved.
5	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
6	Start the Backup process by using the Start backup button.
7	A progress indicator appears during the data transfer. When the transfer is successfully completed, a message appears briefly.

Backup using ProSave integrated in ProTool

Creating a backup using ProSave integrated in ProTool:

Step	Action
1	In *ProTool*, select *File → Download → Preferences* and use the *Set download* window to define the connection type with the corresponding connection parameters.
2	Open the *Backup* window in *ProTool* by selecting the menu items *File → Download → Backup*.
3	Select the data to be saved (*Recipes*, *Passwords* or *Complete Backup*).
4	Select the path in which the backup file (*.psb) should be saved.
5	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
6	Start the Backup process by using the Start backup button.
7	A progress indicator appears during the data transfer. When the transfer is successfully completed, a message appears briefly.

Restore using stand-alone ProSave

Proceed as follows to restore the content of the internal Flash memory:

Step	Action
1	Start *ProSave* on the PC using the Windows Start menu.
2	Use the *General* tab register to select the required device type and connection type with corresponding connection parameters.
3	Use the *Restore* tab register to select the path in which the file to be restored is located.
4	The *Archive Description* displays the unit concerned and the type of backup data contained in the file.
5	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
6	Start the restore process by clicking on the Start restore button.
7	A progress indicator appears during the data transfer. When the transfer is successfully completed, a message appears briefly.

Restore using ProSave integrated in ProTool

Proceed as follows to restore the content of the internal Flash memory:

Step	Action
1	In *ProTool*, select *File → Download → Preferences* and use the *Transfer Settings* window to define the connection type with the corresponding connection parameters.
2	Open the *Restore* window in *ProTool* by selecting the menu items *File → Download → Restore*.
3	The *Archive Description* displays the unit concerned and the type of backup data contained in the file.
4	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
5	Start the restore process by clicking on the Start restore button.
6	A progress indicator appears during the data transfer. When the transfer is successfully completed, a message appears briefly.

3.9 License Transfer (Authorization) using ProSave (TP 170B and OP 170B)

To protect the software, licenses supplied on a Siemens disk can be transferred to the operating unit via a PC and enabled.

License transfer using stand-alone ProSave

License transfer to the operating unit:

Step	Action
1	Start *ProSave* on the PC using the Windows Start menu.
2	Use the *General* tab register to select the required device type and connection type with corresponding connection parameters.
3	Select the *Authorize* tab control.
4	Select the disk drive containing the license disk.
5	The licenses available on the disk are displayed under *Selection*.
6	Select the required license.
7	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
8	Press the button depicted to transfer them to the operating unit. The selection appears in the *Installed authorizations:* field. `>>`

Deinstalling licenses from the operating unit:

Step	Action
1	Start *ProSave* on the PC using the Windows Start menu.
2	Use the *General* tab register to select the required device type and connection type with corresponding connection parameters.
3	Select the *Authorize* tab control.
4	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
5	Press the Device Status button to display all the licenses installed on the operating unit. These appear in the *Installed authorizations:* field.
6	Select the license to be deinstalled.
7	Press the button depicted to deinstall it from the operating unit. The selected licenses appear under *Selection*. `<<`

License transfer using ProSave integrated in ProTool

License transfer to the operating unit:

Step	Action
1	In *ProTool*, select *File → Download → Preferences* and use the *Set download* window to define the connection type with the corresponding connection parameters.
2	Open the *Authorize* window in *ProTool* by selecting the menu items *File → Download → Authorize*.
3	Select the disk drive containing the license disk.
4	The licenses available on the disk are displayed under *Selection*.
5	Select the required license.
6	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
7	Press the button depicted to transfer them to the operating unit. The selection appears in the *Installed authorizations:* field. `>>`

Deinstalling licenses from the operating unit:

Step	Action
1	In *ProTool*, select *File → Download → Preferences* and use the *Set download* window to define the connection type with the corresponding connection parameters.
2	Open the *Authorization* window in *ProTool* by selecting the menu items *File → Download → Authorize*.
3	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
4	Press the Device Status button to display all the licenses installed on the operating unit. These appear in the *Installed authorizations:* field.
5	Select the license to be deinstalled.
6	Press the button depicted to deinstall it from the operating unit. The selected license appears under *Selection*. `<<`

Note

Uploading licenses can only be executed to a disk which contained or still contains the same license.

3.10 Loading Applications with ProSave (TP 170B and OP 170B)

Applications (e.g. drivers) specially developed for the operating unit can be installed on the operating unit using *ProSave*.

Load applications using stand-alone ProSave

Loading applications on the operating unit:

Step	Action
1	Start *ProSave* on the PC using the Windows Start menu.
2	Use the *General* tab register to select the required device type and connection type with corresponding connection parameters.
3	Select the *Options* tab control.
4	Use *Selection* to select the path containing the required application.
5	The corresponding application is displayed under *Available options:*. Select the required application.
6	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
7	Press the button depicted to transfer them to the operating unit. The selection appears in the *Installed options:* field. `>>`

Deinstalling an application from the operating unit:

Step	Action
1	Start *ProSave* on the PC using the Windows Start menu.
2	Use the *General* tab register to select the required device type and connection type with corresponding connection parameters.
3	Select the *Options* tab control.
4	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
5	Press the Device Status button to display all the applications installed on the operating unit. These appear in the *Installed options:* field.
6	Select the application to be deinstalled.
7	Press the button depicted to deinstall it from the operating unit. The selected application appears under *Available options:*. `<<`

Load applications using ProSave integrated in ProTool

Loading applications on the operating unit:

Step	Action
1	In *ProTool*, select *File → Download → Preferences* and use the *Set download* window to define the connection type with the corresponding connection parameters.
2	Open the *Options* window in *ProTool* by selecting the menu items *File → Download → Options*.
3	Use *Selection* to select the path containing the required application.
4	The corresponding application is displayed under *Available options:*. Select the required application.
5	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
6	Press the button depicted to transfer them to the operating unit. The selection appears in the *Installed options:* field. `>>`

Deinstalling an application from the operating unit:

Step	Action
1	In *ProTool*, select *File → Download → Preferences* and use the *Set download* window to define the connection type with the corresponding connection parameters.
2	Open the *Options* window in *ProTool* by selecting the menu items *File → Download → Options*.
3	Configure the operating unit according to the required transfer channel and switch to download mode (Ch. 3.1 and Ch. 3.2).
4	Press the Device Status button to display all the licenses installed on the operating unit. These appear in the *Installed options:* field.
5	Select the application to be deinstalled.
6	Press the button depicted to deinstall it from the operating unit. The selected application appears under *Available options:*. `<<`

Operation 4

In this chapter

The OP 170B is operated via an integrated membrane keyboard, the TP 170A and TP 170B via buttons or a screen keyboard.

This chapter provides information on the general operating procedures of the

- TP 170A and TP 170B (Page 4-1)
- OP 170B (Page 4-8)

4.1 Operating the TP 170A and TP 170B Touch Panels

Overview

The screen is used to observe the operating status of the machine or system being monitored and, at the same time, to intervene directly in the process running simply by touching the buttons and input fields displayed.

4.1.1 Operating touch elements

Definition

Touch elements are contact-sensitive operating elements provided on the touch panel screens, such as buttons, input fields and message windows. Their operation is basically no different from pressing conventional keys. Touch elements are operated by touching them, e.g. with a finger.

⚠ **Caution**

Be sure to touch only **one** touch panel screen element. Never touch more than one touch element at a time. Otherwise, an action may be unintentionally initiated.

Note

Never use pointed or sharp instruments to operate the touch panels to prevent damage to the plastic surface of the touch screen.

Direct keys on the TP 170B

In the case of a DP connection, buttons can be configured as direct keys in order to achieve fast keyboard operation. Fast key operation is a condition for Jogging mode (Inching mode), for example.

PROFIBUS direct keys set bits in the I/O area of a SIMATIC S7 directly from the TP 170B.

Operation acknowledgement

As soon as the touch panel detects an element has been touched, it responds by displaying a visual acknowledgement. An acknowledgment is independent of communication with the PLC. It is not an indication of the required action actually having been executed.

The type of visual acknowledgement is dependent on the operating element touched:

- **Buttons**

    In the case of 3D-effect configurations, visual representation is distinguished according to the statuses *touched* and *untouched*. The way in which the selected field appears on the screen can be configured (line widths 1 - 10 for the focus and the color of the frame). Examples of representation are illustrated below by means of the Status button.:

    Touched   Untouched
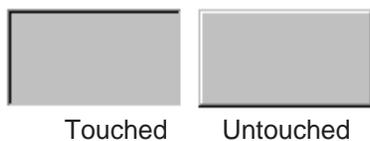
- **Hidden buttons (TP 170B only)**

    The focus for hidden buttons does not appear following selection (value for the focus line width is *0*, default setting). If the value for the focus width is changed, the dotted outline of the button changes to a line when touched. The outlines remain visible until the focus is moved to another operating element.

- **Input fields**

    After touching an input field, the screen keyboard appears as the operation acknowledgement.

Operating screen objects using buttons

Screen objects which are assigned pre-defined buttons can also be operated by buttons outside the screen object. A condition for this is that each function has been linked to the respective button in the configuration.

These functions are complied in ProTool CS within the *Keyboard action for screen objects*.

4.1.2   Enter numeric values

Numeric screen keyboard

In order to enter numeric and hexadecimal values, the touch panel automatically displays a numeric screen keyboard directly after touching an input field on the touch screen. Keys on the keyboard which are available for operation are highlighted as 3D keys, those not available are simply displayed as areas. After completing the input, the screen keyboard is automatically hidden.

Note

Keys cannot be operated if they have been used to operate a decimal field beforehand.

All keys continue to be operable when they have been used to operate a hexadecimal field.

Figure 4-1 illustrates an example of the screen keyboard for entering numeric values. The keys A to F for entering hexadecimal values are inoperable in this example.

The Help key (TP 170B) is only active when a help text has been configured for that particular input field.

Min:0   Max: 100

A	1	2	3	ESC
B	4	5	6	BSP
C	7	8	9	+ / −
D	E	F	0	,
←	→	Help	↵	
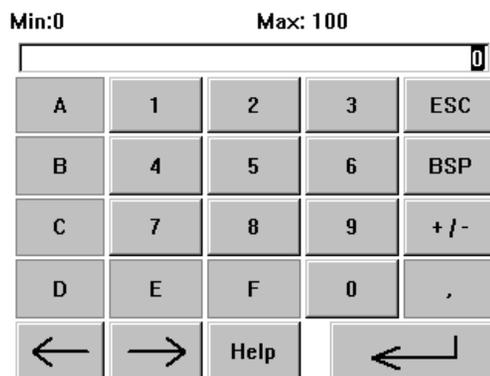
Figure 4-1   Screen keyboard for numeric values

The *BSP* key corresponds to the Backspace key.

Action

Numeric and hexadecimal values are entered character by character using the buttons provided on the screen keyboard. Invalid characters are rejected and an error message appears. Confirm the value entered by pressing the Enter key or cancel the input by pressing ESC. The screen keyboard is closed in both cases.

Note

Limit values can be configured for numeric input fields. In this case, values entered are only accepted when they lie within the limits configured. 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

When the keyboard is displayed, the lower and upper limit values are indicated, when configured.

Note

If the full screen keyboard is open, the PLC job 51 *Changing Screen* has no function.

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4.1.3   Enter alphanumeric values

Alphanumeric screen keyboard

In order to enter a character string, the touch panel automatically displays a full screen alphanumeric keyboard directly after touching an input field on the touch screen. After completing the input, the screen keyboard is automatically hidden.

Keyboard levels

The full screen keyboard has an alphanumeric layout providing normal and Shift levels. Toggle between the two levels by pressing the SHIFT key.

The Help key (TP 170B) is only active when a help text has been configured for that particular input field.

An example of the keyboard's normal level is illustrated:
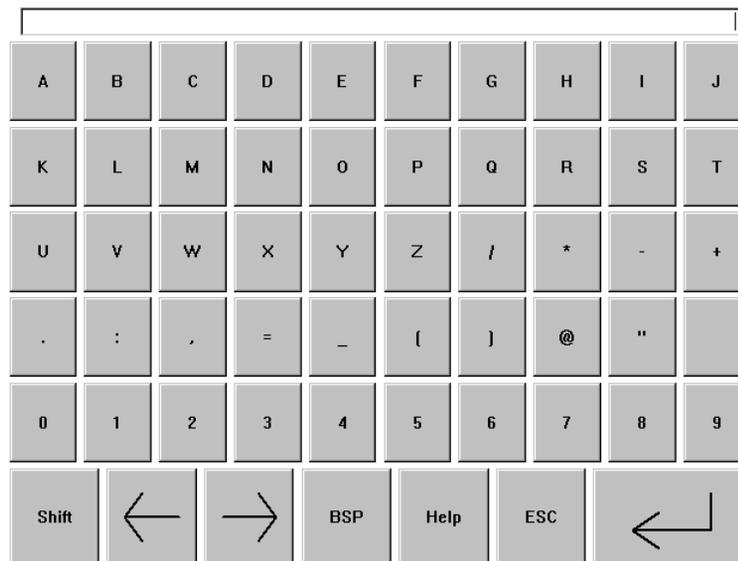
Figure 4-2   Screen keyboard for alphanumeric values, normal level

Note

The *BSP* key corresponds to the Backspace key.

A summary of the key functions is provided in Table 4-1 on Page 4-11.

Action

Alphanumeric values are entered character by character using the buttons provided on the full screen keyboard. Confirm the value entered by pressing the Enter key or cancel the input by pressing ESC. The screen keyboard is closed in both cases.

Note

If the full screen keyboard is open, the PLC job 51 *Select Screen* has no function.

4.1.4   Calling in help text on the TP 170B

Purpose

Help texts consist of additional information and operating instructions provided by the configuration planner concerning messages, screens and input fields. Help text, concerning an input field for example, may provide information on permissible value ranges (refer to Figure 4-3) or, in the case of an alarm message, information related to the cause and its elimination.
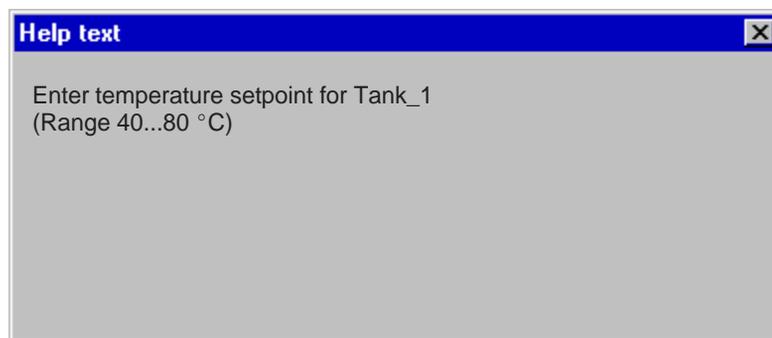
Figure 4-3   Help text for an input field (example)

Action

- **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 in the project, for example, touch that button to call in the help text configured for the current screen.

4.2 Operating the OP 170B Keyboard Unit

Overview

The operating status of the machine or system to be monitored can be observed in the OP 170B screen and the running process directly influenced by using the integrated membrane keyboard.

This chapter provides information on the general operating procedures for the OP 170B.

Information regarding operation for special screen objects is provided in Chapter 6.

4.2.1 Integrated keyboard

Keypads

The OP 170B keyboard consists of two functional blocks (Figure 4-4):

- Function keys/Soft keys (keys K1 to K10 and F1 to F14)
- System keys
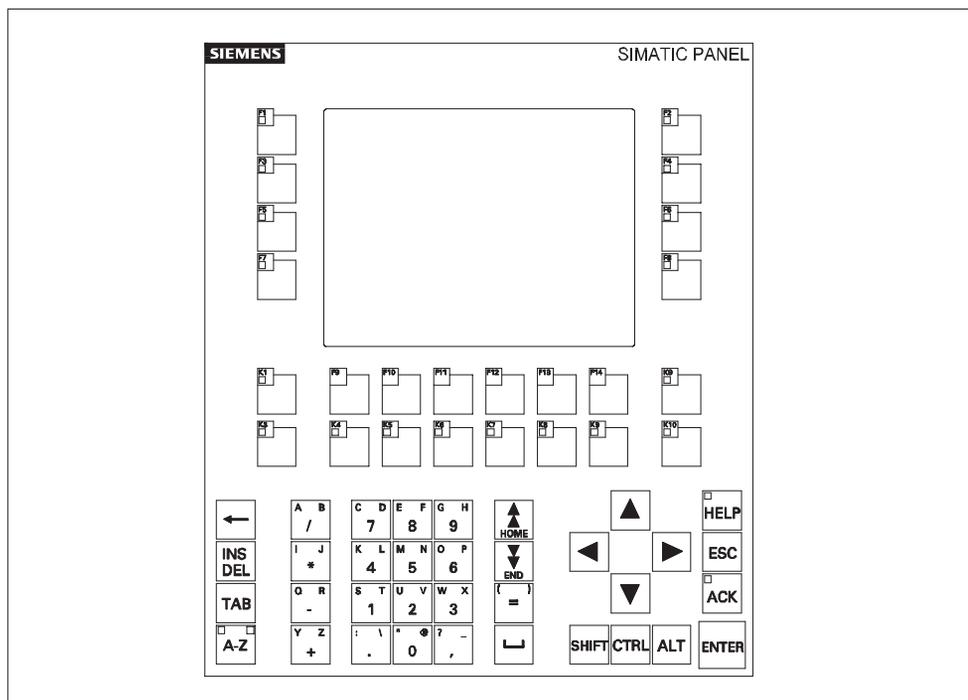
Figure 4-4 Assignment of the OP 170B keypads

4.2.2   Function keys/Softkeys

Function keys with global function assignment

A function key with **global** function assignment always triggers the same action on the OP 170B or in the PLC regardless of the screen currently open (global significance on the OP 170B). These actions could include:

- Open screen
- Display current alarm messages
- Print screen (hardcopy)

All F and K keys can be assigned globally significant functions.

Function keys with local function assignment (softkeys)

A function key with **local** function assignment (softkey) can trigger different actions on the OP 170B or in the PLC according to the screen currently open (local significance of current screen). An icon can be configured for each softkey which can then be positioned at the edge of the screen.

All the function keys located directly at the edge of the screen can be assigned locally significant functions during configuration. In the case of the OP 170B, this relates to the keys F1 to F14.

⚠️ **Caution**

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

4.2.3   System keys

Control keys

The following control keys serve superordinated editing and control functions:

Backspace ——— ← ——— HELP ——— Display help text

Insert/Delete ——— INS DEL ——— ESC ——— Escape (Terminate)

Tabulator ——— TAB ——— ACK ——— Acknowledge

Shift (numeric/alphanumeric) ——— A-Z   SHIFT CTRL ALT   ENTER ——— Confirm entry

——— Alt key

——— Ctrl key

——— Shift (upper/lower case)
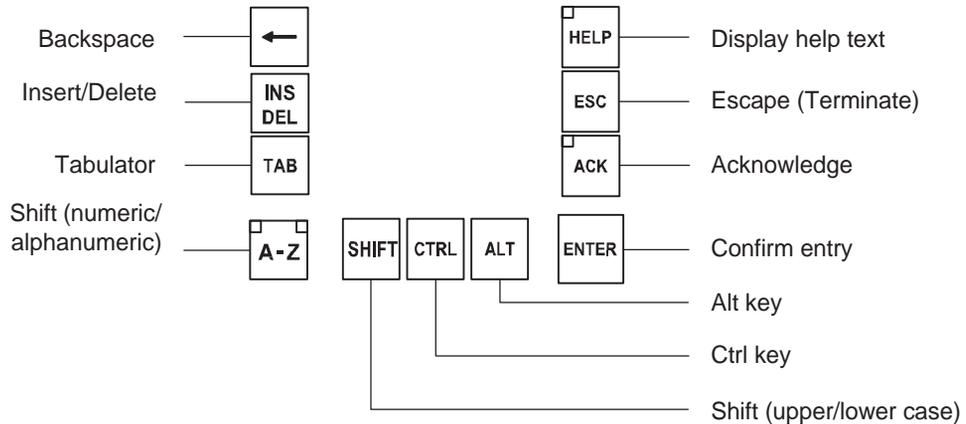
Figure 4-5   Control keys

The system keys ACK, ESC, HELP and ENTER can also be assigned functions.

Note

A two-key operation is possible for the OP 170B , i.e. two keys can be pressed thus triggering two functions (refer to *Communication for Windows-based Systems User's Guide*).

Cursor keys

The cursor keys (Figure 4-6) are used to move the text cursor and to navigate in screens and screen objects. The functions of the keys corresponds to the cursor keys on a standard PC keyboard.
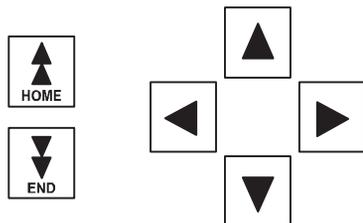
Figure 4-6   Cursor keys

The Home and End keys can also be assigned functions.

System key function overview

Table 4-1   Functions of the system keys

Key	Function	Purpose
A-Z	**Shift**	Switches the assignment of the input keys from numeric to alphanumeric input. • **No LED lights up**: Numeric assignment is active. Press the key once to switch to alphanumeric assignment. • **An LED lights up**: The left or right alphanumeric assignment is active. Each time the key is pressed switches through left, right and off.
INS DEL	**Delete character**	• Deletes an individual characters. Delete character in numeric keyboard assignment. To insert characters, use the **Shift** key to switch to alphanumeric assignment.
ESC	**Cancel**	• Deletes the character of a value entered and resets the original value. • Closes the active window.
ACK	**Acknowledge**	Acknowledges the currently displayed alarm message or all messages in an acknowledgment group (group acknowledgement). The LED lights up as long as unacknowledged alarm messages are queued.
HELP	**Display help text**	Opens a window with help text in respect of the selected object (message, input field). The LED indicates if help text exists for the selected object.
ENTER	**Acknowledge**	• Accepts and ends the input. • Opens a selection field for symbolic input. • Triggers the function on the selected button.
TAB	**Tabulator**	Moves to the next screen object available for selection in the configured tabulation sequence.
←	**Delete character**	Deletes the character to the left of the cursor.
▲ ◄ ► ▼	**Move cursor**	• Move to the next screen object available for selection to the right, left, above or below the current screen object. • Navigation in the screen object.
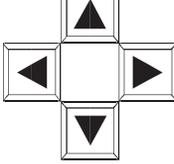
Table 4-1   Functions of the system keys, continued

Key	Function	Purpose
CTRL	**General control function**	Only use in combination with other keys, navigation in trend views (Page 6-34).
SHIFT	**Shift (upper/lower case)**	Only use in combination with other keys, e.g. shift to capital letters.
ALT	**General control function**	Only for use with key combinations, e.g. open selection field (Page 4-12).
HOME	**Scroll back**	Scroll one page back.
END	**Scroll forward**	Scroll one page forward.

4.2.4   Key combinations

General operation

Table 4-2   Key combinations

Key combination	Function
Navigation	
SHIFT TAB	Moves to the previous screen object available for selection in the configured tabulation sequence.
SHIFT ▲ ◄ ► ▼	Positions the cursor within a screen object, e.g. in an input field.
SHIFT HOME	Skip to the start, e.g. of a selection list.
SHIFT END	Skip to the end, e.g. of a selection list.
ALT ▼	Opens a selection field.
Screen settings	
A-Z ►	Increase the screen contrast.
A-Z ◄	Reduce the screen contrast.

Table 4-2   Key combinations, continued

Key combination	Function
During the start-up phase	
ESC ▲ ESC	Switches the OP 170B to download mode. As long as no data transfer is taking place, it is possible to exit from download mode.
Other functions	
CTRL ENTER	Accepts the selected value in the selection field without closing it.
CTRL TAB	• Changes the active window. • Switches between basic area and window.
CTRL A	Mark all
ALT ENTER	Display the properties of the marked element
TAB	Move to next field
SHIFT TAB	Move to previous field
▶	Opens the next tab control [1]
◀	Opens the previous tab control [1]
ESC	Close the dialog without saving.

[1] When the name of the tab control has the focus

Operating screen objects using function keys

Screen objects assigned to buttons, e.g. message display, trend view representation or recipe view, can also operated by means of function keys or softkeys. A condition for this is that each relevant function has been linked to a function key or softkey in the project.

These functions are complied in ProTool CS within the *Keyboard action for screen objects*.

4.2.5 Entering values

Marking

On selecting an input field, the entire field content is marked by changing color. After pressing a key (except a cursor key), the field content is deleted and the new input displayed.

After selecting a field, press the SHIFT key and a cursor key simultaneously to clear the marking on the field contents and enable the cursor to be moved freely within the field.

Note

To enter the hexadecimal characters A...F, switch the input keys to alphanumeric assignment.

Note

Limit values can be configured for numeric input fields. In this case, values entered are only accepted when they lie within the limits configured. 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.

4.3   Calling in Help Text on the OP 170B

Purpose

Help texts consist of additional information and operating instructions provided by the configuration planner concerning messages, screens and operable screen objects. Help text, concerning an input field for example, may provide information on permissible value ranges (refer to Figure 4-7) or, in the case of an alarm message, information related to the cause and its elimination.
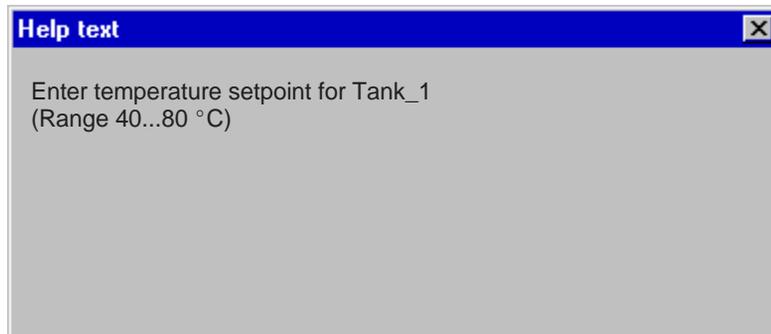
Figure 4-7   Help text for an input field (example)

Note

If the PLC job *51 Select screen* is triggered when a help window is open, the new screen is selected and the help window is closed.

Action

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

Step			Action
1	Select input field	▶ (e.g.)	The input field is marked.
2	Call in the help text	HELP	The LED in the key lights up, indicating that help text is available. Press the key to call in the help text.
			The configured help text is displayed in the language currently set on the OP 170B.
			If help text is also configured for the current picture, it is displayed after pressing the key again.
3	Close help window	ESC	The help window is closed.

TP 170A Screen Objects

5

In this chapter

This chapter provides general information on screens and operating predefined screen objects on the TP 170A.

Information on the general operation procedures for the TP 170A is provided in Chapter 4.1.

5.1 Operating Screens

What is a screen?

Screens visualize the progress of processes and display specified process values. A screen contains logically related process data which the operating unit can both display and modify by operating the individual values.

Screens display the current process status in the form of numeric values, bar graphs or trend curves for example. Dynamic screen objects enable, for instance, the current position of a production process to be tracked on the operating unit.

Screen partitions

A screen is basically composed of static and dynamic sections. The terms "static" and "dynamic" do not refer to the possibility of dynamically positioning screen partitions but to the connection to the PLC.

Static partitions, e.g. text and graphics, are not updated by the PLC. Dynamic partitions, e.g. input and output fields, trend curves and bars, are linked to the PLC and display current values constantly read in from the PLC memory. Their connection to the PLC is established by means of tags.

A summary of all the screen objects which the operating unit may contain is provided on Page 5-4.

Select screen

The operating unit can be used to view, edit and print screens. The relevant screen must have been selected beforehand. It is possible to select a screen by pressing a button which has been assigned to that particular screen in the configuration.

Note on configuration

Press the key with which the screen should be selected. Select the *Select_screen* function and enter a name for the screen under the *Screen Name* parameter. In the *Field Number* box, enter the Tab key sequence number of the field in which cursor should be located following a change of screens. As soon as the key is subsequently pressed, the function is triggered and the content of the *Screen Name* and *Field Number* parameters evaluated. The corresponding screen is displayed on the operating unit.

5.2   Logging On and Off

Purpose

Operable screen objects, such as input fields and buttons, can be assigned passwords during configuration to prevent them being modified by unauthorized personnel. Important parameters and settings can then only be modified by authorized personnel.

Information on the *Password List* screen object is provided on Page 6-35.

Login

In order to access password protected operating elements, it is necessary to log in on the operating unit. In this case, the function *Logon_User* must be linked with an input field, for example, in the configuration. It is then possible to access all password protected operating elements up to the point of logging off from the operating unit.

When correspondingly configured, it is also possible to log on via an input field for confidential password entry. The character string entered is represented by placeholders (*).

Logoff

In order to rule out operation by unauthorized personnel, the login should not remain active on the operating unit for too long a period of time. The following options are available with which to log off from the operating unit:

- **Configured logout time expires**

    If the operating unit is not operated by the user within the configured period (logout time), he is automatically logged off from the operating unit.

- **Log off**

    If the configuration links the function *Logoff_User* with an operating element, the element can be used log off from the operating unit.

    Note
    It is possible to log off by entering an incorrect password.

5.3 Overview of Screen Objects

A summary of the various screen objects which a TP 170A configuration may contain is provided in the following table.

Table 5-1 Screen objects configurable for the TP 170A

Screen object	Use/Description
Text	Text is used during configuration to label operating and display elements, for example. Text can be configured over several lines and cannot be altered on the operating unit.
Graphics	Graphics can be used in the configuration, e.g. to represent a system or as an illustrative symbol for configured display and operating elements.
Output field	The output field displays the current value in numeric or alphanumeric form.
Input field	Enter a value in the input field. The values can be in numeric or alphanumeric form. Entries which lie outside the specified value range are rejected according to the limit values which have been configured. The input can be protected by means of a password.
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 (alarm lamps)	The state views can be used to configure a warning display or indicate the status of a unit which cannot be viewed from the operating unit (e.g. a motor). The response of the state view can be configured.
Bar	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. Bars are often used to represent fill levels or workpiece numbers. Direction, scaling and labeling the axis can be configured as required. In order to identify limit values, limit value lines can be called in.
Single message display	Special filter criteria for displaying pending messages are configured in the message view. Notes on operation are provided on Page 5-10.

5.4 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.

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. It is only possible to enter ASCII characters. They are dependent on the language selected.

- **Input field for date and time**

  to enter the calendar date and 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

Proceed as follows to operate an input field:

- Touch the input field on the TP 170A touch screen. The screen keyboard automatically appears.
- Enter the required value.
- Confirm the entry

| ENTER |

or

- Discard the entry.

| ESC |

5.5 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 CS which are displayed on the Status button during runtime.

Figure 5-1 illustrates an example of a *switch* type Status button when pressed (left) and not pressed (right).

Figure 5-1   The two statuses relate to the Status button when the Switch option is set

Operation

Touch the Status button on the operating unit.

Note

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.

5.6   Bar Graphs

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 5-2 depicts the various 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
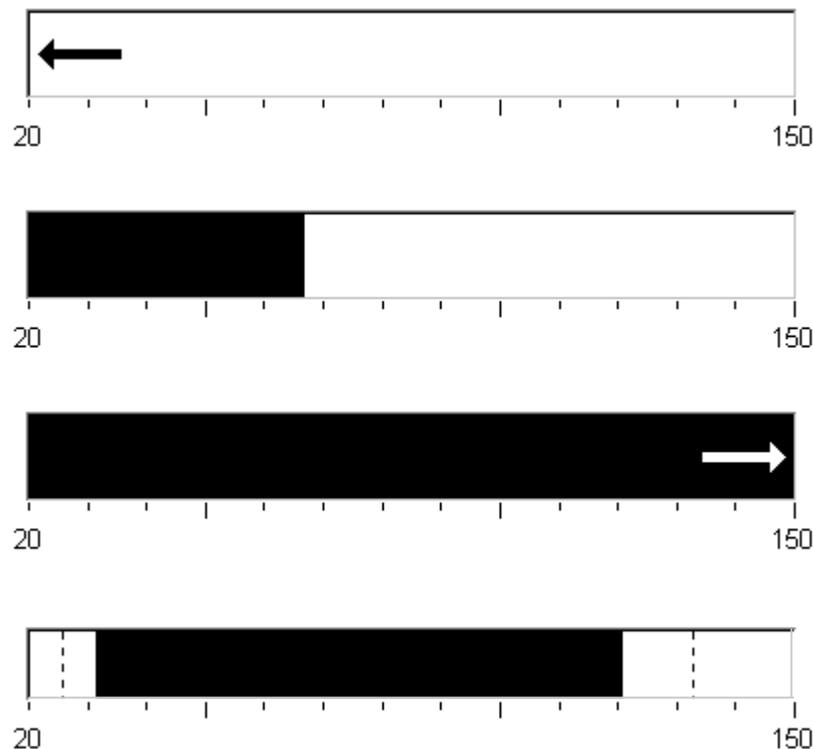
Figure 5-2   Different bar states

5.7   Messages

Message categories

Messages which appear on the operating unit indicate events and statuses related to the control process and operating unit itself. A message can contain text and tags.

The TP 170A can display event and system messages:

* **Event messages**
  indicate a status in the process, for example, `Motor ON`.
  Event messages are configured. They are triggered when a bit is set in the PLC.

* **HMI System Messages**
  are triggered by the operating unit. They are not configured.
  System messages indicate, for example, incorrect operations or communication faults. A selection of important system messages is provided in Appendix C.

Message events (not system messages)

These messages are triggered according to events. Message events on the TP 170A include:

* **Message arrival**
  A message which has been triggered is considered as having arrived. As soon as message is triggered, it is displayed in the operating unit message view and is then considered as queued.

* **Message departure**
  A message is considered as having departed when its configured time period has expired or the event causing the message is no longer present. As soon as a message has departed it is deleted from the message view.

Message view

The TP 170A displays messages which have arrived in the message view. If several messages are stored in the operating unit buffer simultaneously, the oldest message in the buffer is overwritten in the case of a message buffer overflow.

Specific views of the messages to be displayed are defined in the message view. Various filter criteria is available for this in the configuration software.

The following can be configured

* Message categories (event and system messages)
* Number of columns
* Number of lines per message
* Sorting (oldest or latest message at the top)
* Maximum number of visible messages

Structure

The figure illustrates an example of a message display with the configured columns

- 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
```

TP 170B and OP 170B Screen Objects   6

In this chapter

Operation of the visualization processes on the operating unit is dependent on the configuration created with the ProTool CS configuration software. This chapter provides general information on screens and operating predefined screen objects on the TP 170B touch panel and OP 170B keyboard unit.

Information on the general operation procedures for the TP 170B touch panel is provided in Chapter 4.1. Information on the general operating procedures of the OP 170B keyboard unit provided in Chapter 4.2.

6.1   Operating Screens

What is a screen?

Screens visualize the progress of processes and display specified process values. A screen contains logically related process data which the operating unit can both display and modify by operating the individual values.

Screens display the current process status in the form of numeric values, bar graphs or trend curves for example. Dynamic screen objects enable, for instance, the current position of a production process to be tracked on the operating unit.

Screen partitions

A screen is basically composed of static and dynamic sections. The terms "static" and "dynamic" do not refer to the possibility of dynamically positioning screen partitions but to the connection to the PLC.

Static partitions, e.g. text and graphics, are not updated by the PLC. Dynamic partitions, e.g. input and output fields, trend curves and bars, are linked to the PLC and display current values constantly read in from the PLC memory. Their connection to the PLC is established by means of tags.

A summary of all the screen objects which the operating unit may contain is provided in Chapter 6.3.

Fixed window

The fixed window is an area at the top of the screen. The height of the fixed window can be configured. Since the content of the fixed window is independent of the screen currently displayed, it is especially suited for displaying important process magnitudes or date and time.

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.

OP 170B icons

Icons are graphics of a fixed size located at the bottom and sides of the screen. They are defined during configuration and clearly indicate the screen-specific functions of the softkeys in graphic form.

After pressing the respective softkey, the function symbolized by the icon is activated either on the OP 170B or the PLC.

Message indicator

The message indicator is a configurable graphical symbol which is displayed on the screen when at least one alarm message is present or needs to be acknowledged on 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.

In the case of the TP 170B, the message indicator can be operated.

Operating the message indicator on the TP 170B
The response of the message indicator is dependent on whether or not alarm messages are present on the TP 170B which still have to be acknowledged at the moment the indicator is touched.

- **Alarm messages to be acknowledged** (message indicator flashing):
  The alarm message window is opened after operating the message indicator (Page 6-24).

- **Alarm messages to be acknowledged** (static message indicator):
  The alarm message page is opened after operating the message indicator (Page 6-26).

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

  In the case of keyboard units, the messages must be acknowledged by pressing the ACK button.

Message window

System messages

The operating unit displays internal operating statuses in the system message window. System messages indicate, for example, incorrect operations or communication faults. A summary of some of the most important system messages and explanations on how to eliminate the causes are provided in Appendix C of this manual.

- **OP 170B**:
  Press the ESC key.

- **TP 170B**:
  Press the button illustrated.

Event Messages

The operating unit uses the event message window to display operating statuses and faults concerning the machine or system connected to the PLC. The position of the window can be configured.

Alarm Messages

The operating unit uses the alarm message window to display faults concerning the machine or system connected to the PLC. The position of the window can be configured.

- **OP 170B**:
  Press the ACK key.

- **TP 170B**:
  Press the button illustrated.

More options for displaying messages are described on Page 6-20. Detailed information regarding the message window is provided on Page 6-24.

Select screen

The operating unit can be used to view, operate and print screens. The relevant screen must have been selected beforehand. There are several ways in which to select a screen:

- **Function key/Button**
  Pressing a function key or button opens the corresponding screen defined in the configuration.

- **Edit messages**
  When configured, pressing the Edit button calls in the message assigned to the screen in the message window or message display, for example.

Note on configuration

Press the key with which the screen should be selected. Select the *Select_screen* function and enter a name for the screen under the *Screen Name* parameter. In the *Field Number* box, enter the Tab key sequence number of the field in which cursor should be located following a change of screens. As soon as the key is subsequently pressed, the function is triggered and the content of the *Screen Name* and *Field Number* parameters evaluated. The corresponding screen is displayed on the operating unit.

6.2 Logging On and Off

Purpose

Operable screen objects, such as input fields and buttons, can be assigned passwords during configuration to prevent them being modified by unauthorized personnel. Important parameters and settings can then only be modified by authorized personnel.

Information on the *Password List* screen object is provided on Page 6-35.

Login

In order to access password protected operating elements, it is necessary to log in on the operating unit. In this case, the function *Logon_User* must be linked with an input field, for example, in the configuration. It is then possible to access all password protected operating elements up to the point of logging off from the operating unit.

When correspondingly configured, it is also possible to log on via an input field for confidential password entry. The character string entered is represented by placeholders (*).

If an element is operated which is protected by a password, the login window automatically appears.

Logoff

In order to rule out operation by unauthorized personnel, the login should not remain active on the operating unit for too long a period of time. The following options are available with which to log off from the operating unit:

- **Configured logout time expires**

  If the operating unit is not operated by the user within the configured period (logout time), he is automatically logged off from the operating unit.

- **Log out of the operating unit**

  If the configuration links the function *Logoff_User* with an operating element, the element can be used log off from the operating unit.

  Note
  It is possible to log off by entering an incorrect password.

6.3   Overview of Screen Objects

A summary of the various screen objects which a TP 170B or OP 170B configuration may contain is provided in the following table.

Table 6-1   TP 170B and OP 170B screen objects

Screen object	Use/Description
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.
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.
Output field	An output field displays current values from the PLC in numeric or alphanumeric form.
Input field (refer to Page 6-8)	The input field is used to enter values which are then transferred to the PLC. The values can be in numeric or alphanumeric form. Entries which lie outside the specified value range are rejected according to the limit values which have been configured.
	The input can be protected by means of a password.

Table 6-1   TP 170B and OP 170B screen objects, continued

Screen object	Use/Description
Symbolic output field	A symbolic output field displays current values from the PLC as plain text. **Example:** Instead of the values `0` and `1` the symbolic output field displays the texts `Motor OFF` and `Motor ON`.
Selection field (refer to Page 6-10)	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`.
Date/Time (refer to Page 6-12)	This screen object is used to display and enter the calendar date and time. The way the date and time are displayed depends on the language set on the operating unit.
Graphic display	The graphic display enables the dynamic positioning of graphics from external graphic programs in the project.
Graphics 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 graphics list displays graphical representations for open and closed valves.
Graphic box (refer to Page 6-14)	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 (refer to Page 6-15)	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.

Table 6-1   TP 170B and OP 170B screen objects, continued

Screen object	Use/Description
Status button (refer to Page 6-17)	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 view can be used to configure a warning display or indicate the status of a unit which cannot be viewed from the operating unit (e.g. a motor). The response of the state view can be configured.
Switch (refer to Page 6-19)	A switch serves to enter and display a binary status. It can only be switched on or off.
Invisible button (refer to Page 6-15)	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.
Bar (refer to Page 6-31)	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.
Trend view (refer to Page 6-32)	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 view.
Message view (refer to Page 6-28)	Special filter criteria are configured in the message view for displaying the volatile message buffer and/or message archive.
Single message view (refer to Page 6-30)	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.
Password list (refer to Page 6-35)	The password list can be used to display, enter and modify passwords on the operating unit.
Recipe view (refer to Page 7-10)	A recipe view can be used to create, save and transfer data records on the operating unit.

6.4   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.

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. It is only possible to enter ASCII characters. They
    are dependent on the language selected.

*   **Input field for date and time**

    to enter the calendar date and 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

Proceed as follows to operate an input field:

- **OP 170B** :
  - Select the input field required. The field content changes color when the field is accessed.   ▶ (e.g.)
  - Position the cursor using the Cursor keys with the Shift key pressed and enter the required value.
  - Confirm the entry   ENTER

    or
  - Discard the entry.   ESC

- **TP 170B** :
  - Touch the input field on the TP 170B touch screen. The screen keyboard automatically appears.
  - Enter the required value.
  - Confirm the entry   ENTER

    or
  - Discard the entry   ESC

6.5   Selection Field

Purpose

Values are entered in a selection field not character-by-character but are selected from a list provided (Figure 6-1).
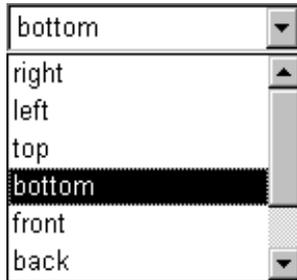
Figure 6-1   Selection field in opened state (example)

Operation on the OP 170B

Proceed as follows to operate a selection field on the OP 170B:

Step		Action	
1	Select the selection field	▶ (e.g.)	The selection field is marked.
2	Open selection list	ENTER	The selection list opens up.
3	Select entry	▲ , ▼	Moves cursor line by line.
4	Apply selection or Cancel selection	ENTER ESC	The selected entry becomes valid. The selection field is closed. The original value is reapplied. The selection field is closed.

Note

After pressing an alphanumeric key, the first list entry which begins with that letter appears.

Operation on the TP 170B

Touch the selection field on the TP 170B 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.

If the touch screen is touched outside the pulled down selection list, the list is closed and the entry with the focus appears in the selection field.

Caution

When released, the focussed list entry is immediately accepted. Therefore, continue to press the screen with your finger while sliding it to the required entry.

6.6　　Date/Time

Purpose

The screen object *Date/Time* displays the calendar date and time. The values 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 6-2　　Examples of language-dependent formats for Date/Time

Language	Example		Time
	Date		**Time**
	long	short	
German	Samstag, 7. November 1998	07.11.98	12:59:32
English (USA)	Saturday, November 7, 1998	11/7/98	12:59:32 PM
French	samedi 7 novembre 1998	07/11/98	12:59:32
Italian	sabato 7 novembre 1998	07/11/98	12.59.32
Spanish (traditional)	sábado 7 de novembre de 1998	7/11/98	12:59:32

The format set for Date and Time can be modified using the *Regional Settings* option in the Windows CE Control Panel. To do so, select the icon depicted on the right. Information on opening the Windows CE Control Panels is provided on Page 8-7.

Notice

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

Notice

If the operating unit does not support the language specified in the configuration, the display of Date and Time will assume the format of the language currently set in the *Regional Settings* option under *Format*.

Synchronizing date/time with the PLC

The date and time in the operating unit and PLC can be synchronized if this feature is configured in the project and PLC program. To do this, the PLC jobs **14** (*Set Time*) and **15** (*Set Date*) are provided. Use PLC jobs **40** and **41** to transfer the date and time from the operating unit to the PLC.

Further information on this is available in the Communication for Windows-based Systems user's guide.

6.7 Graphic Box

Purpose

The graphic box is an input field for symbolic values. A graphic can be selected by selecting an entry in the graphic list.

Operation on the OP 170B

Proceed as follows to operate a graphic box on the OP 170B:

Step			Action
1	Select graphic box	▶ (e.g.)	The graphic box is marked.
2	Open the graphic selection list	ENTER	The graphic selection list opens up.
3	Select entry	▲ , ▼ ◀ , ▶	Moves cursor line by line.
4	Apply selection	ENTER	The selected entry becomes valid.
	or		
	Cancel selection	ESC	The original value is reapplied.
5	Exit the graphic box	TAB	The graphic box is closed.

Operation on the TP 170B

Touch the graphic box on the TP 170B touch screen. Selection mode is activated. Scroll through the graphic selection list using the scroll bar (vertical or horizontal). Click on the required graphic to select it. The graphic is transferred.

By clicking outside the graphic frame, the graphic selection is rejected.

6.8   Buttons

Purpose

A button is a virtual key located on the operating unit screen. Functions which have been assigned to buttons can be triggered, for example, by the following, configurable events:

* Clicking
* Pressing
* Releasing

Display

* **Labeling**
  Buttons can be labeled statically or dynamically. In the case of dynamic labeling, the text or graphic on the button changes during runtime according to the value of a configured tag.

* **Operation acknowledgement**
  As soon as the operating element detects a valid operation, it responds with a visual acknowledgement. The acknowledgement, however, does not infer that the required action is actually being executed.

Figure 6-2 illustrates examples of buttons which are pressed (right) and not pressed (left).
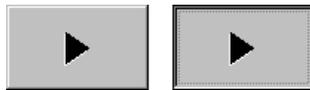
Figure 6-2   Example of a button

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 on the operating unit, its contour becomes visible and remains so as long as the button is selected. The contour enables the user to detect the operable area of the button. The contour is defined by the configuration.

Operation

Proceed as follows to operate a button:

- **OP 170B**:
  - Select the required button, e.g. using a cursor key.
  - Press either the Enter key or the Spacebar.

  ▶ (e.g.)

  ENTER   or   { ⎵ }

- **TP 170B**:

  Touch the button on the touch screen.

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 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. 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.

6.9 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 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

Proceed as follows to operate a Status button:

*   **OP 170B**:
    –   Select the Status button e.g. using a cursor key.
    –   Press either the Enter key or the Spacebar.

▶ (e.g.)

ENTER   or   ⎵
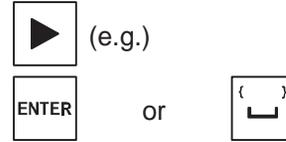
*   **TP 170B**:
    Touch the Status button on the touch screen.

Note

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.

6.10   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:

* Change of status
* Switch on
* Switch off

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

Display

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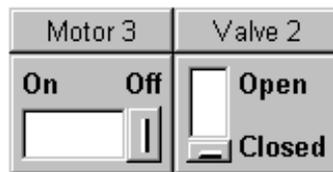
Figure 6-4   Switches with different orientation

Operation

Proceed as follows to operate a switch:

* **OP 170B**:
  – Select the required button e.g. using a cursor key.
  – Press either the Enter key or the Spacebar.

* **TP 170B**:
  Slide the sliding lever to the required position or double-click on the object. The switch moves to the new position.

6.11 Messages

Message categories

Messages on the operating unit indicate events and statuses related to control processes. The operating unit 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. A selection of important system messages is provided in Appendix C.

- **SIMATIC diagnostic events**
  provide information on the status of the SIMATIC S7 and SIMOTION. They are not configured in the ProTool CS configuration software. Refer to the S7 manual for the error number indicated on the operating unit to determine the cause of the error.

Acknowledging alarm messages

Alarm messages must be acknowledged due to their importance. This can be done manually on the operating unit or automatically by the PLC. The message indicator depicted continues to be flash as long as unacknowledged alarm messages are still present on the operating unit when this feature has been configured.

In order to acknowledge alarm messages on the OP 170B manually, press the key depicted on the right. The message must not have been selected. The LED integrated in the key lights up when unacknowledged messages are present.

If several messages are displayed at the same time and the user acknowledges alarm messages, the acknowledgement acts in hierarchical sequence on the various message displays:

1. Message display with focus

2. Alarm window

3. Message line

4. Message display in basic screen

When configuring messages, it is possible to define whether the operator must acknowledge each message individually or whether the acknowledgement is valid for a group of messages (group acknowledgement). The use of group acknowledgement in respect of messages is particularly useful when they relate to the same cause, e.g. the messages for the first-up fault and the follow-up faults.

Buffering messages

All message events (arrived, departed, acknowledged) are stored in an internal volatile buffer.

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 6-24)
- Message window (refer to Page 6-24)
- Message page (refer to Page 6-26)
- Message buffer (refer to Page 6-27)
- Message view
  - Message display with full functionality (refer to Page 6-28)
  - Single message display with restricted functionality (refer to Page 6-30)

Deleting messages

All message events concerning event and alarm messages are automatically stored in the message buffer. There are two methods of deleting message events from the message buffer:

- **Automatic deletion on buffer overflow**
  When the message buffer is no longer capable of accepting new message events, the operating unit automatically deletes a number of message events until the configured remaining buffer capacity is reached. In this case, the oldest message events are deleted first.

- **Deletion by operating the operating unit**
  In order that messages can be deleted manually from the message buffer, the function *Delete_message_buffer* must be defined in the configuration e.g. linked to a button or function key. In this way, the following message categories can be selected for deletion according to the configuration:
  - All messages
  - Alarm messages
  - Event messages
  - HMI system messages
  - SIMATIC diagnostic events

Print messages

When correspondingly configured, event messages can be printed out directly when the message events *Arrived* and *Departed* occur, and also alarm messages when the event *Acknowledged* occurs. System messages are not logged.

Information on setting printer parameters is provided in Chapter 8-13.

6.11.1   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*, *departed*, *acknowledged*), the PLC also stores 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. The display of ALARM_S messages can only be configured when a SIMATIC S7 PLC is used and the ProTool CS configuration software has been integrated in STEP 7.

During the configuration, it is useful to define the time of occurrence of a message in 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 e.g. *Connect_Disconnect_PLC.*

6.11.2   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.

6.11.3   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.

Alarm messages

If one of the display modes *Window/Window*, *Window/Line* or *Window/Off* is configured, the message window for alarm messages opens automatically as soon as an alarm message arrives. Figure 6-5 illustrates an example.
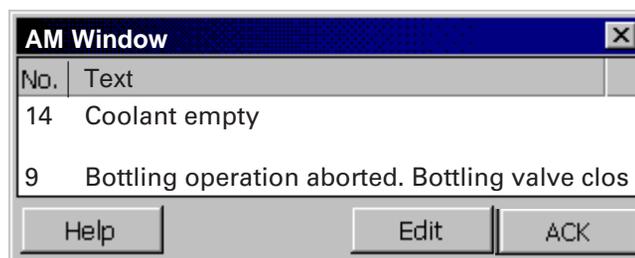
Figure 6-5   Alarm window (example of TP 170 B)

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 unacknowledged alarm messages.

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 ⊠.

6.11.4   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 have access to the message page for event messages and/or alarm messages, the following functions must have been configured:

* for event messages: *Display_event_message_page*
* for alarm messages: *Display_alarm_message_page*

Figure 6-6 illustrates an example of the message page for alarm messages.
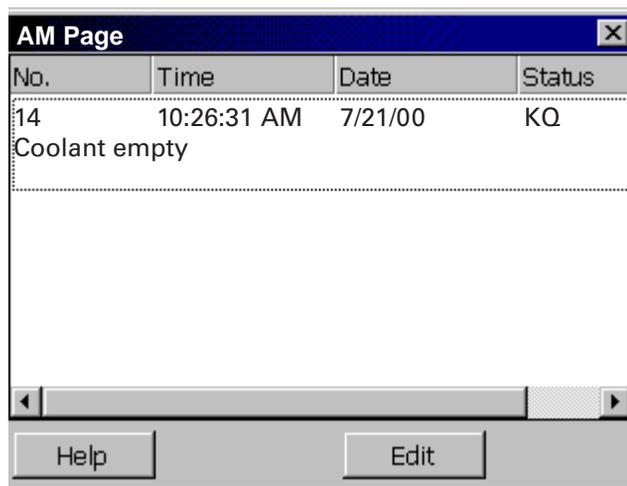
Figure 6-6   Alarm message page (example of TP 170 B)

Information on the significance of the buttons is provided on Page 6-24.

In the case of the TP 170B, the queued alarm messages can also be selected via the message indicator.

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

6.11.5   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. Open message buffers are constantly updated.

Structure

In order to have access to the message buffer for event messages and/or alarm messages, the following functions must have been configured:

*   for event messages: *Delete_event_message_buffer*

*   for alarm messages: *Delete_alarm_message_buffer*

Figure 6-7 illustrates an example alarm message buffer.
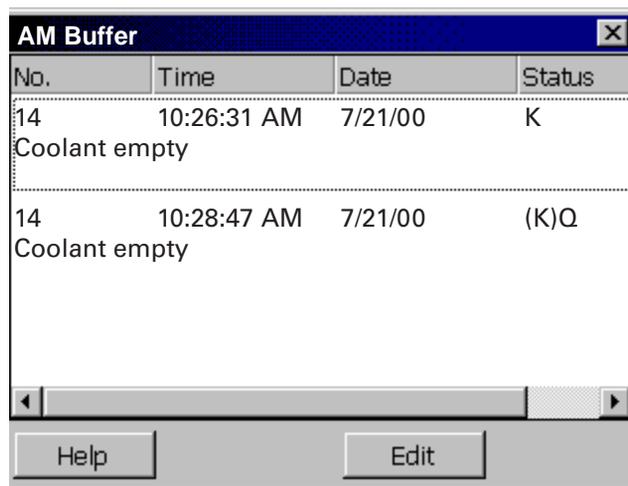
Figure 6-7   Alarm message buffer (example of TP 170B)

Information on the significance of the buttons is provided on Page 6-24.

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.

The column width can be modified by means of touch operation. The OP 170B can be adapted by pressing `Ctrl` and `+`.

6.11.6   Message display

Purpose

Certain views are defined in the message indicator for messages which are queued or still to be acknowledged or for message events in the message buffer. 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

Figure 6-8 illustrates an example of a message display. This display can also be used to acknowledge alarm messages.

	No.	Time	Date	Status	Text
!	8	10:26:3...	7/21/00	K	
$	140001	10:24:3...	7/21/00	K	Connection discon
$	140004	10:24:3...	7/21/00	K	Incorrect access p

| Help | | Edit | ACK |

Figure 6-8   Message display (example of the TP 170 B)

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 messages** Use this button to acknowledge unacknowledged alarm messages.

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.

6.11.7   Single message display

Purpose

A single message display provides a subset of the functionality of a message display (Page 6-28). 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 display 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
```

6.12 Bar Graphs

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 6-9 depicts the various 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
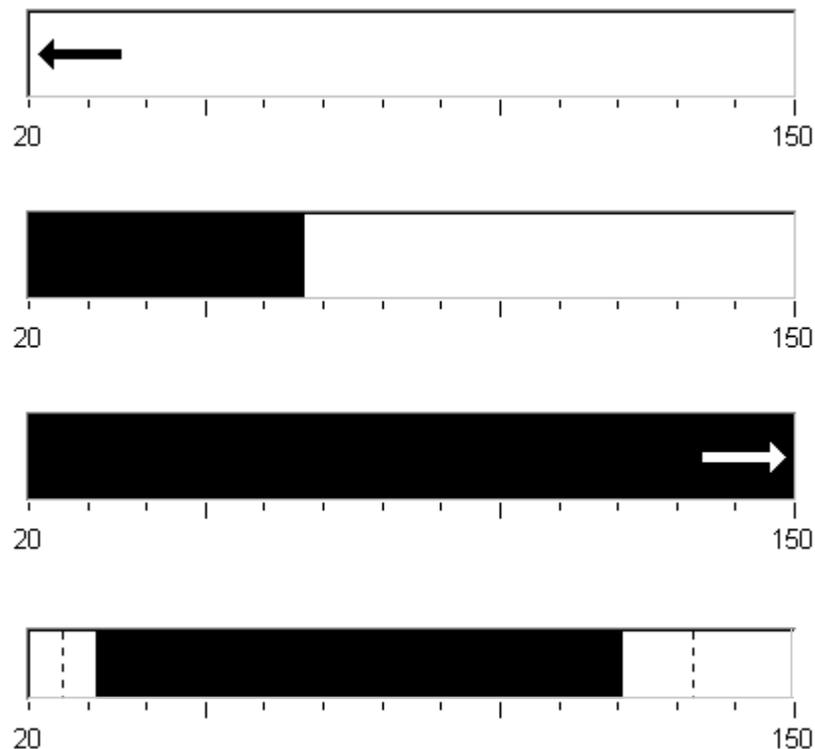
Figure 6-9   Different bar states

6.13   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.

Configurable properties

A number of different trends can be displayed simultaneously in the trend view. The following properties are among those which can be configured for a trend graphic:

* **Trend Type**: *Trend curve*

* **Triggering**: *Clock trigger*

* **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 display.

* **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 *readline* 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 (default: Off). The color of the read line can be configured in the *Color* tab control.

If the *Display Value 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 by touching the screen or via the keyboard (Ctrl + Alt + Cursor Right/Left). 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 6-10 illustrates an example of a trend view with a trend curve and configured buttons to navigate in the trend, read line and related value table.

Trend	Tag connection	Value	X value
CURVE_1	VAR_1	60	29
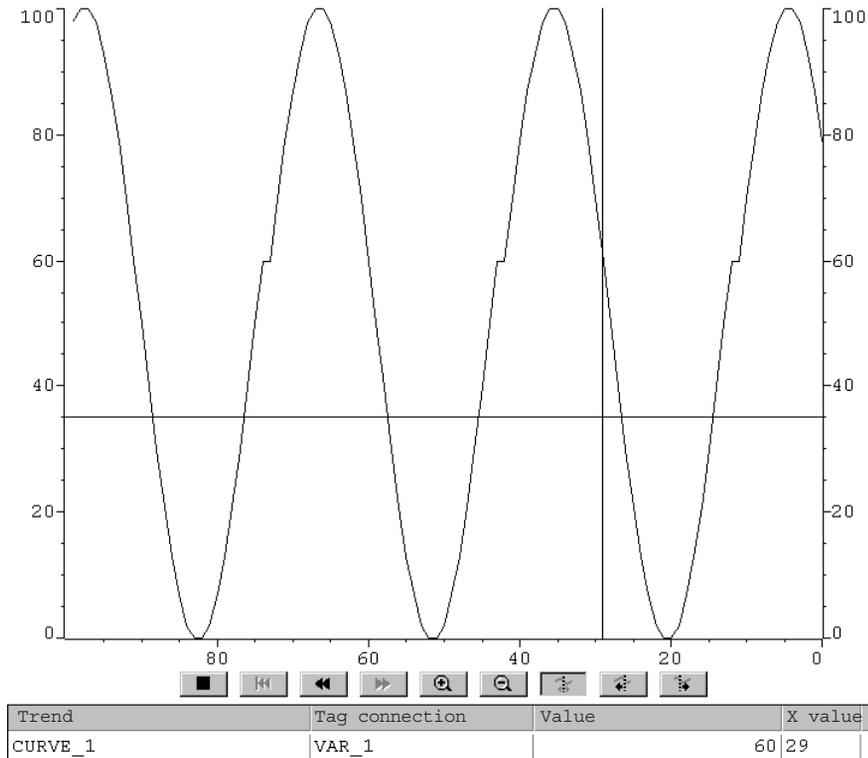
Figure 6-10   Operable trend view with read line (example)

Navigation using buttons or function keys

When correspondingly configured, the following functions may be assigned to buttons, for example, to navigate in the trend view:

Function	Function
Start_stop_trend_display	Interrupts the current updating process for the trend view until the button is pressed again.
Trend_display_back_to_beginning	Scrolls back to the start of the trend recording.
Trend_display_scroll forward, Trend_display_scroll_back	Shifts the trend section half a window width to the left/right.
Trend_display_extend, Trend_display_compress	Expands/compresses the trend view horizontally.
Trend_view_read_mark_on_off	Switches the read line on or off.
Trend_view_read_mark_forward	Moves the read line to the right.
Trend_view_read_mark_backward	Moves the read line to the left.

Navigation using the system keys (OP 170B)

If it is possible to navigate through the project via a keyboard, use the following key combinations to navigate in the trend view:

Keys		Function
CTRL ENTER	Back to start	Scrolls back to the start of the trend recording.
SHIFT ◀	Scroll back	Scroll one screen width back.
SHIFT ▶	Scroll forward	Scroll one screen width forward.
CTRL Y Z +	Zoom section	Expands the trend view horizontally.
CTRL Q R −	Reduce section	Compresses the size of the trend view horizontally.
CTRL ALT ▶	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.

Notice

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

6.14　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.

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. When a password is assigned to an individual user or to a whole user group, the permission to execute functions at a specific level is assigned simultaneously. 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.

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 on via an input field for confidential password entry. The character string entered is represented by placeholders (*).

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 expires**
>   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**
>   The current password level can be reset to `0` by entering an incorrect password.

6.14.1   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 6-11 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 6-11   Example of a password list

View password list

Only those passwords are displayed which have a password level equal to or lower than that with which the user is currently logged in. 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 identical passwords to different users. It is possible, however, to assign the same password level to different users without any restrictions.

Deleting a password

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

6.14.2   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 list need not be re-entered on each operating unit, it can be created on unit 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 *Import_Export_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.

Note

- 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 in the internal Flash memory.

Action

Proceed as follows to export or import the password list:

1. Insert the CF card.

2. Deactivate the write protection on the CF card.

3. Operate the element linked to the *Export_Import* function.

4. Wait for the message indicating that the import or export has ended.

5. Remove the CF card.

If a fault occurs during the process, a fault message appears.

TP 170B and OP 170B 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.
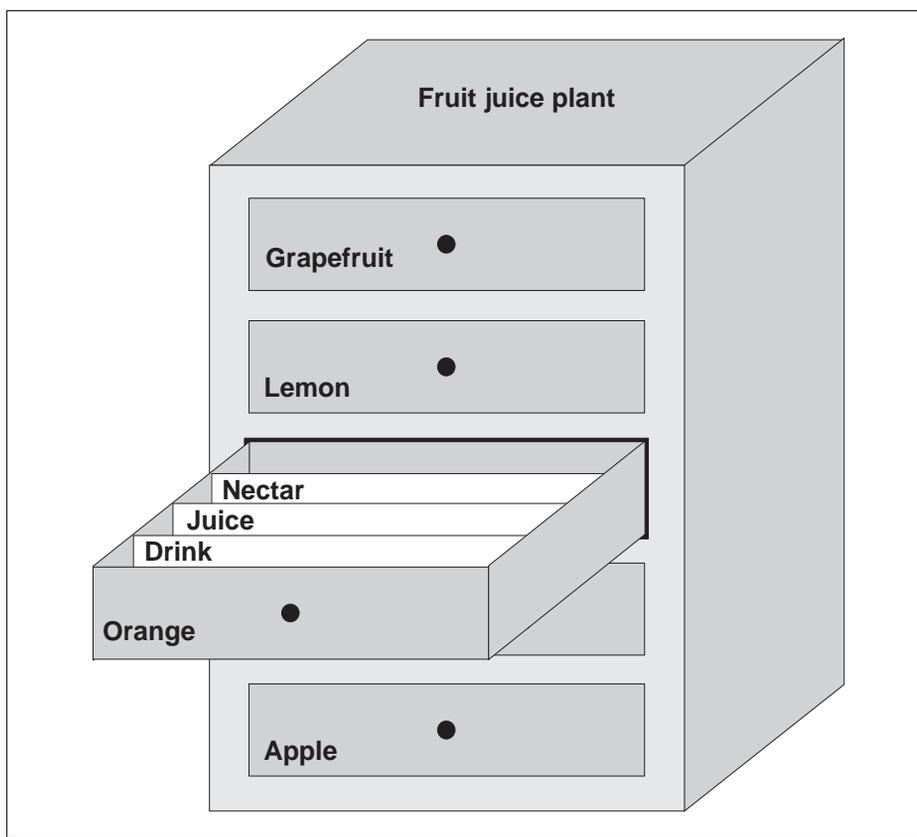
Figure 7-1   Recipe and Data Record, using a filing cabinet as an analogy

- **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 recipes define the data structure in ProTool 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 represent the ingredients and also appear 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.
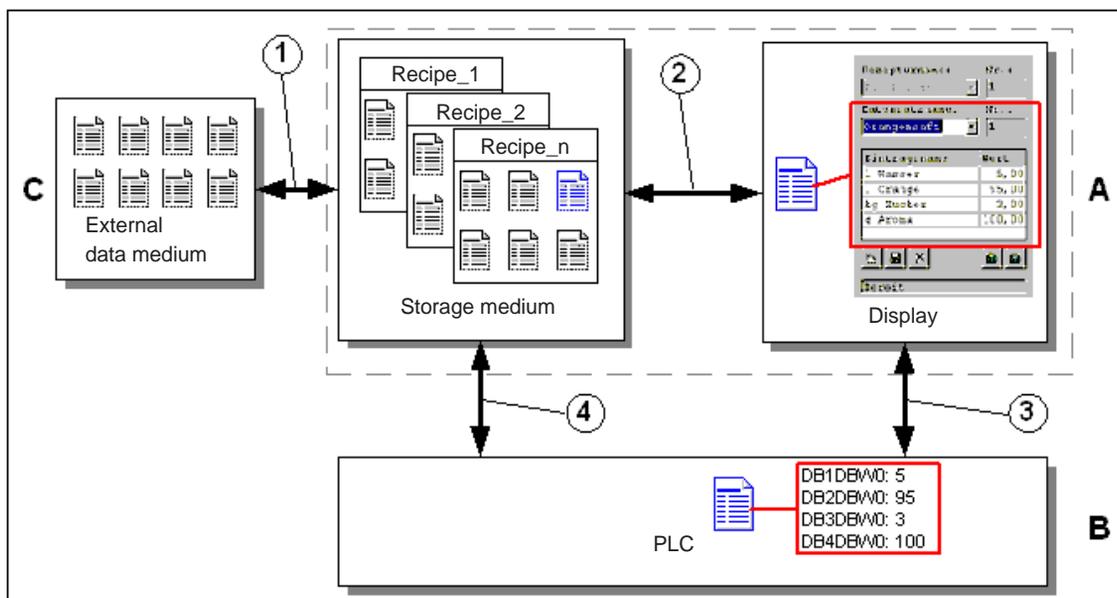
Figure 7-2   Data flow for recipes

The operating unit (A) stores the recipe data records on a storage medium, e.g. Flash. 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).
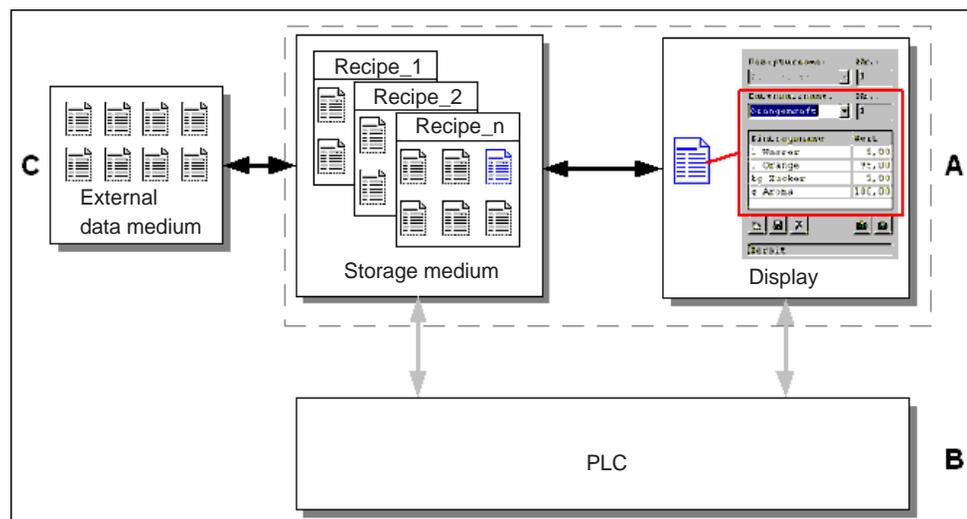
Figure 7-3   Process

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: 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.
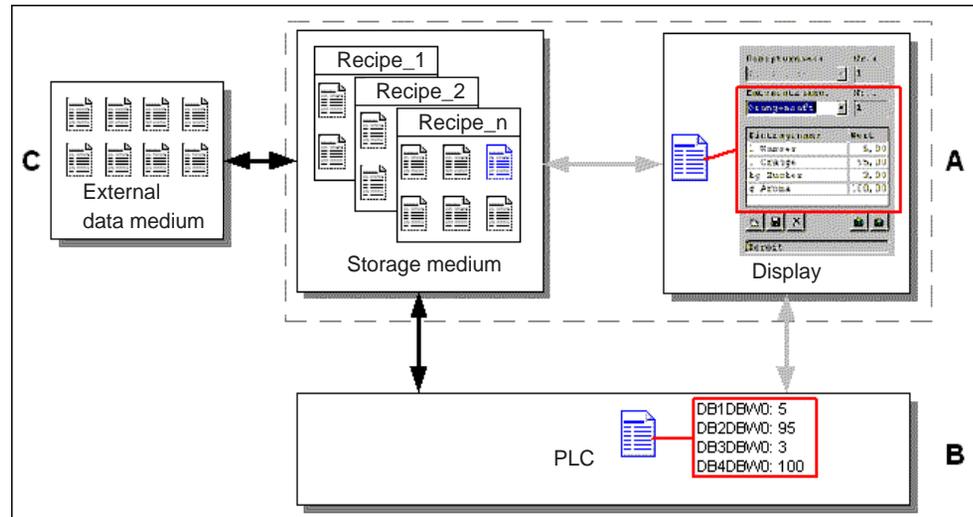
Figure 7-4   Process

Production can be controlled via PLC jobs which automatically transfer the production data records to the PLC.

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 assigned 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 CS:

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

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

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

   The data storage location for data records can be configured. The following settings are possible:

   – Internal Flash
   – Memory card (CF card)

Caution

Cyclical writing access is not permitted for the internal Flash memory because it reduces the service life of the Flash memory and thus the service life of the unit. Use an external memory card instead.

---

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 a recipe is provided in the online help to the ProTool 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.

Elements	Number
Number of recipes	100
Data records per recipe	200 (limited by storage medium)
Entries per recipe	200

Memory requirements for data records

The memory requirements per recipe (in kByte) is calculated from the three summands D1 + D2 + D3.

The following applies:

D1 = [(no. of entries x 9 + tag name total length) + 4] : 1024
D2 = [(no. of data records x 12) + 4] : 1024
D3 = [no. of data records x (data record length + N) + 4] : 1024

D1, D2 and D3 are rounded up to the next whole number.

A data record length is the sum of all the tag lengths configured for the data record in bytes. For example, a tag of the type *FLOAT* has a length of 4 byte.

The tag name total length is the sum of the length of all the tag names which are used in the entries.

The following applies for N:

Data record name < 13 characters: N = 12
Data record name > 12 characters: N = 40

Notice

The internal Flash memory has a maximum storage capacity of 32 kByte.

Note:
In the interest of optimizing the service life of the unit and achieving a better performance, use an external memory card to store data records.

7.4   Editing Data Records

In this chapter

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

- Layout of the recipe view (Page 7-10)
- Displaying data records (Page 7-13)
- Creating new data records (Page 7-13)
- Copying data records (Page 7-14)
- Modifying data records (Page 7-15)
- Copying data records by selecting a data record name (Page 7-15)
- Renaming data records (Page 7-16)
- Deleting data records (Page 7-16)
- Reading data records from the PLC (Page 7-17)
- Downloading data records to the PLC (Page 7-17)
- Synchronizing a data record (Page 7-18)
- Editing data records in recipe screens (Page 7-18)
- Functions and PLC jobs (Page 7-21)
- Exporting/Importing data records (Page 7-22)
- Exporting, editing and importing data records (Page 7-24)
- Reaction to changing the recipe structure (Page 7-26)

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.

  Normally, they are used to process data records with smaller recipes offline. 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 7-18) 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 from Page 7-18.

Display

Figure 7-5 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.
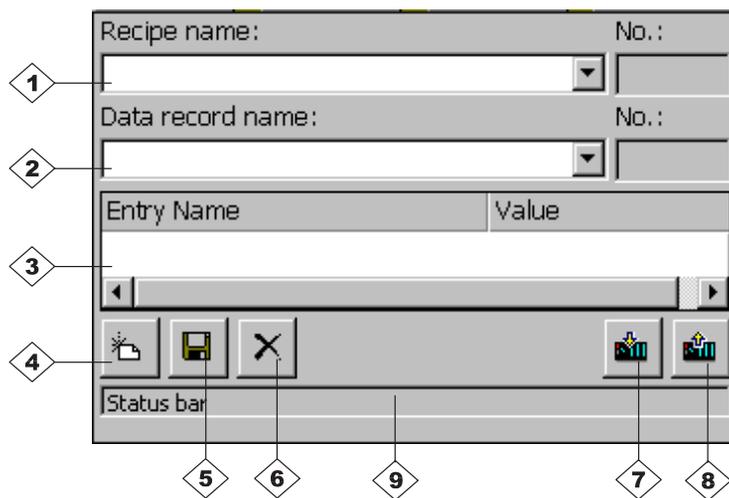
Figure 7-5   Layout of the recipe view (example)

Significance of the operating and display elements

No.	Function
①	**Select recipe** If the corresponding function is enabled in ProTool 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. They 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 ⎵
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 defined in ProTool CS. The data record is stored under the currently defined name and number. Key combinations: CTRL ENTER
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
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 ▲

...

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] [▼]
⟨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. All the values are then written from the tags to the recipe view and updated in the table. 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 project, the values from the table are applied when values in the tables and screens are changed simultaneously.
- If the data record currently being edited in the recipe view is changed in the background (e.g. by means of a PLC job), the recipe view is not automatically updated.

Notes on operation using the recipe views

- **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.
  – Move the text cursor to the position to be changed using the cursor keys.
  – Insert the modifications.
  – Confirm the changes, e.g. by pressing the Enter key.

Displaying data records

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

Step		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 7-13.
2	Create data record	• Press the key depicted on the left. The data record name must then be entered. The smallest possible number is suggested as the number for the data record. The entries in the table are assigned the configured start values.

Step		Action
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 data storage location for the new data record can be configured. The following settings are possible:

• Internal Flash memory
• Memory card (CF card)

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 7-13.
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 7-13.
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 7-13.
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 7-22).
- delete the data records using the function *Delete_Data_Record_Memory*.
- 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 7-13.
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 7-13.
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_View* 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 7-13.
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 7-13.
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.

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 7-13.
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 in recipe screens is provided from Page 7-10. 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 7-21.

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 7-13. • **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 7-13. • **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_Date_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 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 7-5 (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 7-6). After importing the modified file, the new data records can be used on the operating unit.

Figure 7-6   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). Depending on the configuration, either all the data records are exported to the data medium or only the data record defined in the project. The data records are exported in the file which was configured in the parameter *File Name* in the function *Export_Data_Records*. • Copy the CSV file onto a changeable data medium.
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 all the modifications on the memory card (CF card). • Copy the CSV file back to the original directory.
3	Import data records	• Activate the operating element linked with the *Import_Data_Records* function. The data records are copied in the data storage area configured for the recipe.

Note

If data records should be exported and the CSV files edited on a different Windows system using a spreadsheet program (e.g. MicrosoftⓇ Excel), ensure that the decimal separator and list separator are identical on the two different systems.

These settings can be modified from the Windows Start menu using: *Settings* → *Control Panel* → *Language* on the *Numbers* tab control (refer to Page 8-13).

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.

⚠️ **Warning**

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. Please observe the related safety notes provided on Page 7-16.

System Settings

<div style="text-align: right; font-size: 3em; font-weight: bold">8</div>

This chapter provides information on the following general settings which can be modified on the operating unit online:

Overview, TP 170A

- Operating mode (Page 8-2)
- Language (Page 8-2)
- Date/Time (Page 8-2)
- Screen contrast and calibration (Page 8-3)
- Screen saver response time (Page 8-4)

Overview, TP 170B and OP 170B

- Language (Page 8-5)
- Operating mode (Page 8-6)
- Settings on Windows CE Control Panel (from Page 8-7)
  - Date/Time
  - Screen contrast and calibration
  - Screen saver response time
  - Registration
  - Language setting
  - Printer

8.1   TP 170A Settings

8.1.1   Set operating mode

Conditions for changing operating modes

In order to switch between the operating modes described below, the function *Change mode* must be linked to an operating element in the project.

Operating modes

It is possible to switch between various operating modes on the operating unit according to the configuration:

Offline mode
In this mode, there is no logical connection between the operating mode and PLC. The operating unit can be operated but data cannot be downloaded.

Online mode
When using this mode, processes can be operated and visualized without restriction. There is a logical connection between the operating unit and PLC or the operating unit attempts to establish one.
Online mode is the predefined operating mode each time the operating unit is started up.

Download mode
This operating mode is used to transfer a configuration from the configuration computer to the operating unit. Further information on download mode is provided in Chapter 3.4.

8.1.2   Change language

Use the *Control Settings* window to select between the German and English operating system language (Page 8-4).

8.1.3   Set date/time

The date and time can be set using the *Date/Time PLC* area pointers. The operating unit reads the date and time from the corresponding data area in the defined acquisition cycle in order to synchronize the system time with the PLC. The date and time must be stored on the PLC in *S7_DATE_AND_TIME* format.

8.1.4   Screen settings

Purpose

In order to be able to optimize reading from the screen according to varying light conditions and viewing angles, the following settings can be modified:

- **Set contrast**
  to compensate for varying lighting conditions when viewing from different angles

- **Calibrate screen**
  in order to compensate for the parallel axis, which is dependent on the installation position and angle of observation, and any operating errors which may occur as a result.

- **Set screen saver response time**
  refer to Page 8-4

There are two ways to modify both the contrast and calibration settings:

- during the initialization phase of the operating unit

- during normal operation

Change screen settings in the initialization phase

Step	Action
1	Switch on the power supply for the operating unit.
2	During the initialization phase, the menu illustrated in Figure 3-3 on Page 3-7 appears briefly. Touch the *Control* button to call in the Control Settings menu illustrated in Figure 8-1.
3	Touch the *Contrast +* and *Contrast –* buttons to change the contrast setting of the screen. **Note:** Touch the buttons sufficiently long enough to detect contrast changes.
4	Touch the *Calibrate* button with a touch pen in order to calibrate the screen. Five calibration crosses appear in succession on the screen. Follow the instructions provided on the screen and touch the respective calibration cross.
5	**Apply calibration**: Touch any point of the screen after the calibration process for the new calibration data to take effect. **Reject calibration**: Wait 30 seconds, until the seconds counter displayed has reached zero, before rejecting the new calibration data. If calibration is not performed correctly, the new values are not accepted.
6	Touch the *OK* button to close the Control Settings menu. The start menu then appears.

Figure 8-1   TP 170A Control Settings menu

Change screen settings during operation

The screen settings can also be changed while the system is actually running. A condition for this is that the following functions are linked to operating elements in the actual project:

- *Change contrast*
- *Touch calibration*

Save settings

The operating unit saves the current screen settings, backed up against a power failure, and sets them automatically when the system is switched on again.

8.1.5   Set screen saver response time

The TP 170A has its own screen saver which is activated when the touch panel is not operated for a specified length of time. The screen saver is inactive by default.

In order to set the screen saver response time, use the *Up* and *Down* buttons in the TP 170A Control Settings menu (Figure 8-1).

The screen saver is deactivated when system messages arrive. When the defined time has elapsed, it is reactivated.

On entering the value 0, the screen saver is deactivated permanently.

8.2   Settings for TP 170B and OP 170B

8.2.1   Set language

Language-dependent objects

When downloading the project from the configuration computer, up to five languages can be loaded on the operating unit. 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 other languages.

The following are language-dependent, for example

- Messages

- Screens

- Text lists

- Help texts

- Date/Time

- Static texts

Condition

In order to change languages on the operating unit while it is in operation, the following conditions must be fulfilled:

- The selected language must have been loaded on the operating unit. The project languages available during runtime are defined in ProTool CS under *System → Language Assignment: OP Languages*.

- The *Language* function must be assigned to an operating element, e.g. a function key or button.

Each time the unit is started up, all language dependent texts are displayed in the language last activated, which is at the top of the configured languages list.

Change language

Immediately after activating the function, all the language-dependent objects are displayed in the new language.

Two different types of language change can be configured:

1. Each time the function is activated, the operating unit switches one language further, cyclically.

2. After activating the function, the language can be explicitly selected.

Note

The language is only saved when the runtime is ended.

8.2.2   Setting an operating mode

Conditions for changing operating modes

In order to switch between the operating modes described below, the function *Change mode* must be linked to an operating element in the project.

Operating modes

It is possible to switch between various operating modes on the operating unit according to the configuration:

Offline mode
In this mode, there is no logical connection between the operating mode and PLC. The operating unit can be operated but data cannot be downloaded.

Online mode
When using this mode, processes can be operated and visualized without restriction. There is a logical connection between the operating unit and PLC or the operating unit attempts to establish one.
Online mode is the predefined operating mode each time the operating unit is started up.

Download mode
This operating mode is used to transfer a configuration from the configuration computer to the operating unit. Further information on download mode is provided in Chapter 3.4.

8.2.3   Settings in Windows CE Control Panel

The Windows CE Control Panel

The following settings can be defined for the system using the Windows CE Control Panel:

- Date/Time
- Device properties (e.g. contrast and calibration of touch screens)
- Language settings
- Screen saver
- Screen keyboard
- Printer
- Backup/Restore
- Transfer (download)

Open Control Panel

Various settings can be defined after pressing the *Control Panel* button in the start menu. It may be necessary to enter a password.

The following possibilities are available with which to open the Control Panel (Figure 8-2):

- **During the start-up phase**:
  Use the *Control Panel* button in the Start menu to open the Windows CE Control Panel containing the various options.

- **In normal operation**:
  If configured, use the operating element assigned to the *Start_Control_Panel* function.
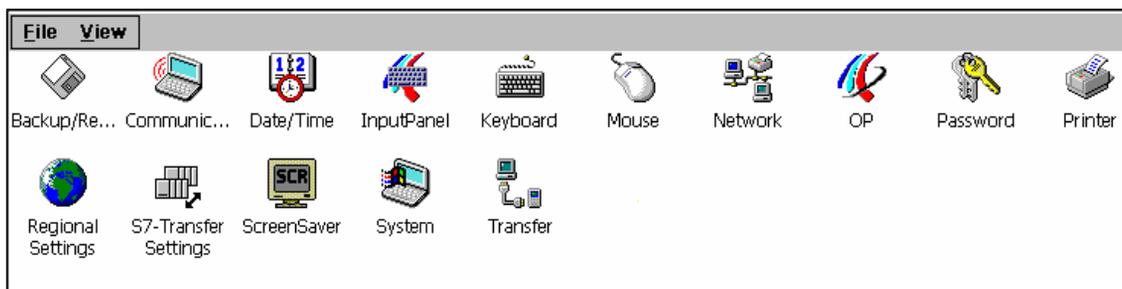
Figure 8-2   Windows CE Control Panel with options

Change language settings

⚠ **Caution**

Stop the runtime software before modifying the system settings otherwise the changes, e.g. B. for downloading, do not take effect.

Proceed as follows to change settings in the Windows CE Control Panel:

Step	Action
1	**Exit_runtime** Stop the runtime software before starting to change any system settings.
2	**Open Control Panel** Open the Control Panel as described on Page 8-7.
3	**Change language settings** Change the settings for the system in the Control Panel.
4	**Close Control Panel** Close the Control Panel. **TP 170B:** Press the button illustrated. ☒ **OP 170B:** Press the `Alt` key and use the cursor keys to select the menu item *Close*. Confirm the selection by pressing the `Enter` key.
5	**Restart runtime** Start the runtime software via the Start menu.

8.2.4 Device properties

Purpose

The *OP properties* option provides the following setting options.

- Set contrast,
- Calibrate touch screen (for TP 170B),
- Display device data,
- Backup non-resistant data.

Touch Panel TP 170A, TP 170B, Operator Panel OP 170B Equipment Manual
6AV6591-1DC11-2AB0
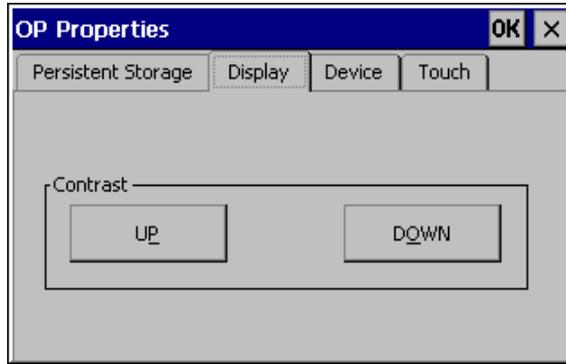
Set contrast

Figure 8-3   *OP Properties* option, *Display* tab control

Step	Action
1	Open the *Display* tab control (Figure 8-3) in the *OP Properties* option.
2	Use the *Contrast up* and *Contrast down* buttons to adjust the screen contrast.
3	Close the Properties menu on the TP 170B by means of the *OK* button and on the OP 170B with the `Enter` button.

In the case of units with STN displays, the screen contrast can be changed using the following key combinations:

    Increases the contrast

    Reduces the contrast

Note

Wait at least 10 seconds after changing the settings before switching the unit off. Otherwise, the changes will not be saved.

Calibrate touch screen (TP 170B only)

Recalibrate the Windows CE unit screen if your input is not correctly executed.

Press the *Recalibrate* button to start the recalibration function.

Figure 8-4   *OP Properties* option, *Touch* tab control

Purpose

Depending on the installation position and viewing angle, it is possible that a more or less strong parallax may occur when operating the TP 170B. In order to prevent operating errors occurring as a result, the screen can be calibrated during the start-up phase and normal operation.

Step	Action
1	Open the *Touch* tab control (Figure 8-4, Page 8-10) in the *OP Properties* option.
2	Press the *Recalibrate* button to start the calibration process. Five calibration crosses appear in succession on the screen. Follow the instructions on the screen and touch each respective calibration cross as it appears with a touch pen.
3	**Apply calibration**: Touch any point of the screen after the calibration process for the new calibration data to take effect. **Reject calibration**: Wait 30 seconds, until the seconds counter displayed has reached zero, before rejecting the new calibration data. If calibration is not performed correctly, the new values are not accepted.
4	Touch the *OK* button to close the Properties menu.

Configured function

When the *Touch Calibration* function has been linked to an operating element in the configuration, the touch screen can be calibrated while in normal operation. The triggering operating element can be configured so that a password must be entered to enable the touch calibration process.

The calibration process is identical with steps described for the start-up phase 2 and 3.

Persistent storage of registrations
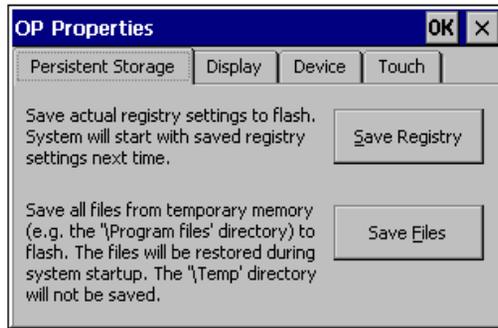
Figure 8-5   *OP Properties* option, *Persistent Storage* tab control

Step	Action
1	Open the *Persistent Storage* tab control (Figure 8-5, Page 8-11) in the *OP Properties* option.
2	Press the *OK* button to start the storage process.
	The current registration settings are stored in the Flash memory.
3	Press the *Save Files* button to start the copy the files in the RAM file system to the Flash memory.
	When the system is restarted, the files saved are restored in the file system.
4	When using the TP 170B touch panel, close the Settings menu using the *OK* button, and when using the OP 170B move the focus to the tab control heading and press the Enter key.

Display device data
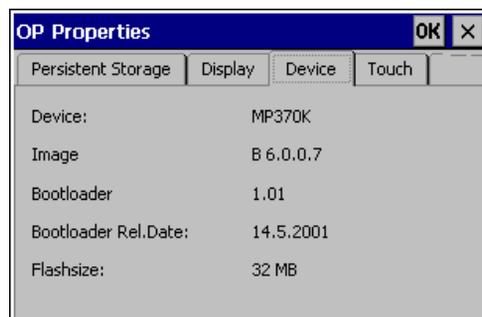
Figure 8-6   Option *OP*, *Device* tab control (Example)

Step	Action
1	Open the *Device* tab control (Figure 8-6) in the *OP Properties* option.
2	Various device data is displayed.
3	Close the menu on the TP 170B by means of the *OK* button and on the OP 170B with the Enter button.

8.2.5   Screensaver
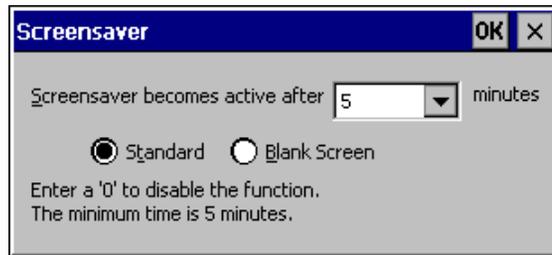
Figure 8-7   *Screensaver* option

It is possible to define a period of time (in minutes) for automatic activation of the screen saver on the operating unit. The screen saver settings are defined in the *Screensaver* option of the Windows CE Control Panels (refer to Page 8-7).

The screen saver is automatically activated if the operating unit is not operated within the defined period of time.

On entering the value 0, the screen saver is deactivated permanently. The screen saver is deactivated on pressing any key or touching the touch screen. The function assigned to that key is not triggered.

8.2.6   Screen keyboard

This is used to define the position of the screen keyboard when it appears on the operating unit. Proceed as follows:

Step	Action
1	Select the *Input Panel* option.
2	Move the screen keyboard to the required position.
3	Store the new settings by pressing the *Save* button.
4	Close the option by pressing the *Close Input Panel* button or the Enter key.

Note

The screen keyboard is only used for input using the Windows CE Control Panel.

8.2.7 Regional settings

Language-specific settings can be defined here, e.g.:

* Date and time format (refer to Page 6-12)

* Decimal separator and list separator (refer to Page 7-24)

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

Note

If the operating system does not support the language set on the operating unit, the language predefined for the operating system is used.

8.2.8 Set printer

A printer can be selected and set up using the *Printer* option. Some settings are only relevant for printing a hardcopy of the screen contents and have no influence on the message logging, e.g. color or quality of graphics printing.

Information on connecting printers is provided on Page 9-19.

Set printer

A printer can be selected and set up at this point. Some settings are only relevant for printing a hardcopy of the screen contents and have no influence on the message logging.

The setting possibilities available are dependent on the printer selected. The following can be selected, for example:

* **Printer**
  Select the printer from the list to which the operating unit is connected.

* **Port**
  Select the port and baud rate used by the operating unit to transfer data to the printer, e.g. `IF2: 9600`.

* **Paper size**
  Select the paper size used in the printer, e.g. `A4` or `Letter`.

* **Draft mode**
  Define the quality of the printout of graphics. If the option is activated, printout is performed in draft quality, if deactivated printout is in high quality.

* **Orientation**
  Define whether the page should be printed in `Portrait` or `Landscape` format.

Note

If a serial printer is connected, the following settings are necessary on the printer:

• RS 232, whereby only the RxD, TxD and GND signals are required (refer to Appendix B),
• 8 data bits,
• 1 stop bit,
• No parity,
• Baud rate between 9600 and 57600, printer-dependent.

Default settings

When the operating unit is supplied, the following default settings are defined:

• Printer: EPSON 9 matrix printer
• Port: IF2
• Baud rate: 9600 bit/s

Installation

9

In this chapter

This chapter provides information on:

- installation of the operating units (from Page 9-2)
- electrical connections to
    - the power supply (Page 9-6)
    - the configuration computer (Page 9-15)
    - the PLC (Page 9-16)
    - printers for TP 170B and OP 170B (Page 9-19)

9.1 Mechanical Installation

Installation location and conditions

The operating unit is designed for installation in the front panels of cabinets and consoles. Cut a mounting cut-out in the front panel in preparation for installation of the unit. The thickness of the front panel must not exceed 6 mm. No other holes need to be drilled for mounting.

Details regarding the installation depth and mounting cut-out are provided on:

- TP 170A: Page 10-2
- TP 170B: Page 10-3
- OP 170B: Page 10-5

Degree of protection

The operating unit must be installed in such a way that at least Protection Class IP54 is guaranteed. The IP65 degree of protection for the front panel can only be ensured when the seal on the front plate of the operating unit is fitted correctly. The degree of protection NEMA 4 can be achieved by implementing the optional protective cover. The protective cover also provides protection for the touch panels.

Notice

The IP65 degree of protection is only guaranteed when the thickness of the operating panel's installation support is at least 1.5 mm.

In order to use the protective cover, the metal plate of the installation support must have a maximum thickness of 3 mm.

Caution

- The unit must be brought to room temperature before it is commissioned. If condensation forms, do not switch the unit on until it is absolutely dry.
- To prevent the operating unit from overheating during operation,
  - the angle of inclination from vertical installation may not exceed a maximum of $\pm 35°$,
  - do not expose the operating unit to direct sunlight,
  - ensure that the ventilation slits in the housing remain free after installation.
- The minimum clearance must be maintained at the sides of the operating units for cable feed and air circulation.

Notice

The operating unit was function-tested before shipping. If a fault occurs nevertheless, please enclose a full account of the fault when returning the unit.

9.1.1   Installing the TP 170A or TP 170B

Installation in front panels

Step	Action
1	Working from the front, insert the operating unit in the mounting cut-out provided. Make sure the unit cannot drop out of the front panel before it has been secured.
2	Insert the hooks of the screw-type clamps enclosed in the corresponding recesses in the housing of the operating unit. The individual positions are indicated in the figure by means of arrows.
3	Use a screwdriver to tighten the operating unit from the rear in the front panel. **Note** • Make sure the seal is seated correctly against the front panel. • Do not overtighten the screws to avoid damage.

9.1.2   Installing the OP 170B

Before installation

If the labeling of the function keys needs to modified, the labeling strips can be replaced before installing the operating unit or when the unit is already installed. Information on this is provided on Page 10-6.

Installation in front panels

Step	Action
1	Working from the front, insert the operating unit in the mounting cut-out provided.
	Make sure the unit cannot drop out of the front panel before it has been secured.
2	Insert the hooks of the screw-type clamps enclosed in the corresponding recesses in the housing of the operating unit.
	The individual positions are indicated in the figure by means of arrows.
3	Use a screwdriver to tighten the operating unit from the rear in the front panel.
	Note
	• Make sure the seal is seated correctly against the front panel.
	• Do not overtighten the screws to avoid damage.

9.2 Electrical Installation

Electrical connections

The operating unit requires electrical connections

- to the power supply,
- to the configuration computer (PU or PC),
- to the PLC,
- to the printer (TP 170B and OP 170B).

An electrical connection to the PU/PC is only required for downloading the project data. Following the configuration and test phases, a serial printer can be connected to the operating unit instead of the configuration computer.

EMC compatible installation

A precondition for error-free operation is an EMC hardware design of the PLC and the use of interference-proof cables. The guidelines on interference-free design of the PLCs apply equally to installation of the operating unit.

Caution

- Only shielded cables are permitted for all signal connections.
- Screw or lock all plug connections.
- Do not install signal lines in the same cable ducts as power cables.
- Siemens AG refuses to accept liability for malfunctions and damage arising from use of self-made cables or cables from other manufacturers.

Grounding conductor connection

Connect the grounding conductor of the operating unit to the rack ground. Use the grounding screw provided and a conducting cable with a diameter of $\geqslant 2.5$ mm^2.

Reverse battery protection

Note

The operating unit is equipped with reverse poling protection.

Proceed as follows when commissioning the operating unit:

1. Connect the operating unit to the power supply.

2. Switch on the power supply.
   If the operating unit does not start up, the connections are probably reversed.
   Swap the connections over in this case.

3. When the operating unit has been powered up, connect the configuration computer or other periphery equipment to it.

Power supply

The power supply for the operating unit is connected at the 2-pin plug connector on the underside of the unit. Use the 2-pin terminal block supplied for this purpose. The terminal block is designed for cables with a cross-section not larger than 2.5 mm^2.

The figure illustrates a view of the underside of the unit.
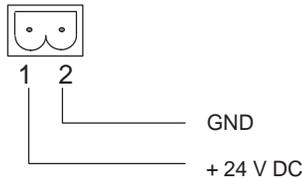
Please refer to the technical data in Appendix A for information on the power supply requirements.

Caution

- When using a 24 V supply, make sure that the extra-low voltage is isolated safely. Use only power supply units complying with IEC 364-4-41 or HD 384.04.41 (VDE 0100, Part 410).

- The supply voltage must be within the specified voltage range. Voltages outside this range can cause malfunctions.

Warning

Personal injury and equipment damage can occur. If the 24 VDC power supply for the TP 170A and TP 170B is not correctly applied, components in the automation system could be damaged and persons could be injured.

Only use safety extra-low voltage (SELV) for the 24 VDC supply voltage to the TP 170A and TP 170B.

Please refer to the technical data in Appendix A for information on the power supply requirements.

9.2.1   TP 170A

Connection elements

Figure 9-3 illustrates the arrangement of the connection elements on the interface plate on the underside of the TP 170A unit:
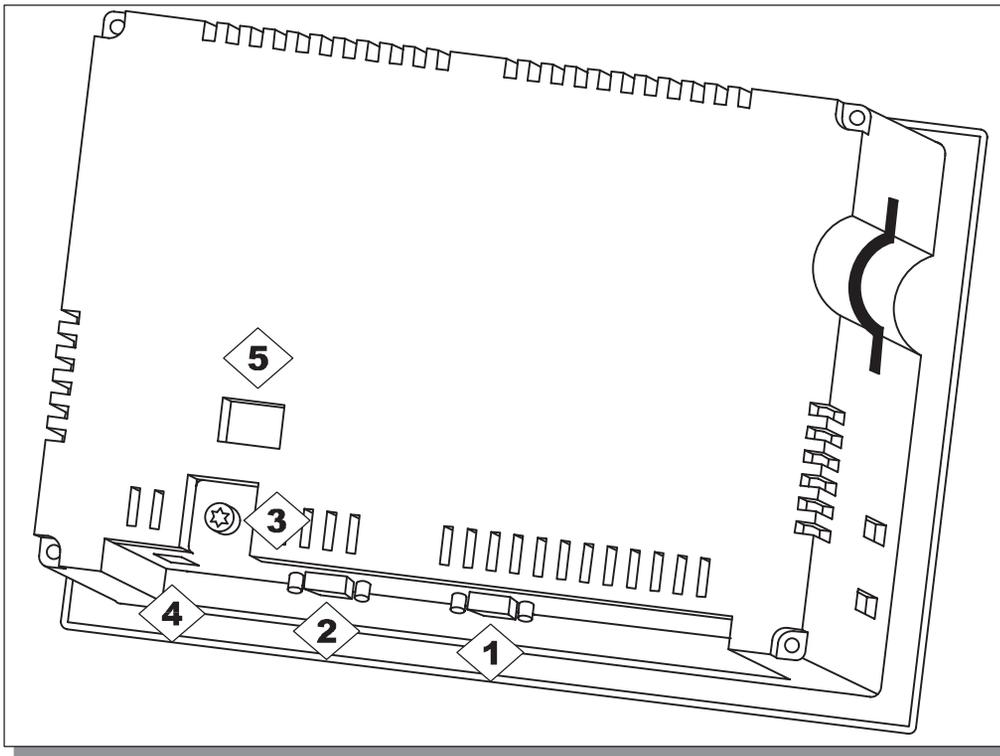
Figure 9-1   Arrangement of connection elements

No.	Name	Description/Use		
◇1	Interfaces [1]: • IF1 A	Level: RS232	Usage: PC, PU	
◇2	• IF1 B	RS422/RS485 (floating)	PLC, PC, PU	
◇3	Grounding connection	For connection to cabinet ground		
◇4	Power supply [2]	Connection for power supply (+24 V DC)		
◇5	Switch [3]	To configure interface IF1B		
[1] Connection pin assignment, see Appendix B. [2] Connection pin assignment, see Page 9-6. [3] Switch settings, see Page 9-18.				

Communication options

Device	Connection	Interface
Configuration computer (PC, PU)	• RS 232 • MPI • PROFIBUS-DP	IF1 A IF1 B IF1 B
SIMATIC S7	• MPI • PROFIBUS-DP	IF1 B IF1 B
LG (Lucky Goldstar)	• RS 232 • RS 422/RS 485	IF1 A IF1 B
SIMATIC S5	• AS511 (with adapter)	IF1 A
SIMATIC 505	• RS 232 • RS 422/RS 485	IF1 A IF1 B
Modicon (Modbus)	• RS 232	IF1 A
Other PLCs	• RS 232 • RS 422/RS 485	IF1 A IF1 B

9.2.2   TP 170B

Connection elements

Figure 9-3 illustrates the arrangement of the connection elements on the interface plate on the underside of the TP 170B:
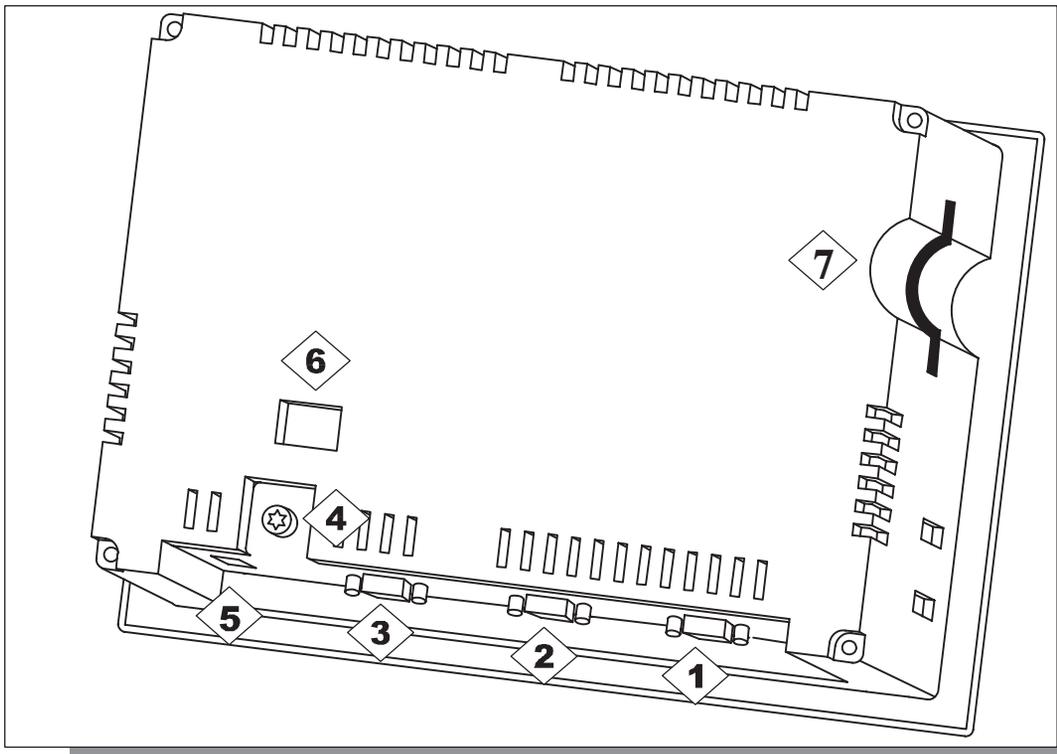
Figure 9-2   Arrangement of connection elements

No.	Name	Description/Use		
◇1◇	Interfaces [1]: • IF2	Level: RS 232	Usage: PC, PU, printer	
◇2◇	• IF1 A	RS 232	PLC	
◇3◇	• IF1 B	RS 485 (potential free)/ RS 422	PLC, PC, PU	
◇4◇	Grounding connection	For connection to cabinet ground		
◇5◇	Power supply [2]	Connection for power supply (+24 V DC)		
◇6◇	Switch [3]	To configure interface IF1B		

No.	Name	Description/Use
⟨7⟩	Slot	Memory card (CF card)

1) Connection pin assignment, see Appendix B.
2) Connection pin assignment, see Page 9-6.
3) Switch settings, see Page 9-18.

Communication options

Device	Connection	Interface
SIMATIC S5	• AS511 (with adapter)	IF1 A
	• PROFIBUS-DP	IF1 B
SIMATIC S7	• MPI	IF1 B
	• PROFIBUS-DP	IF1 B
SIMATIC 505	• RS 232	IF1 A
	• RS 422/RS 485	IF1 B
LG (Lucky Goldstar)	• RS 232	IF1 A
	• RS 422/RS 485	IF1 B
Modicon (Modbus)	• RS 232	IF1 A
Other PLCs	• RS 232	IF1 A
	• RS 422/RS 485	IF1 B
Configuration computer	• RS 232	IF2
	• RS 485	IF1 B
Printer		
• Local printer	• RS 232	IF2

9.2.3   OP 170B

Connection elements

Figure 9-3 illustrates the arrangement of the connection elements on the interface plate on the underside of the OP 170B unit:
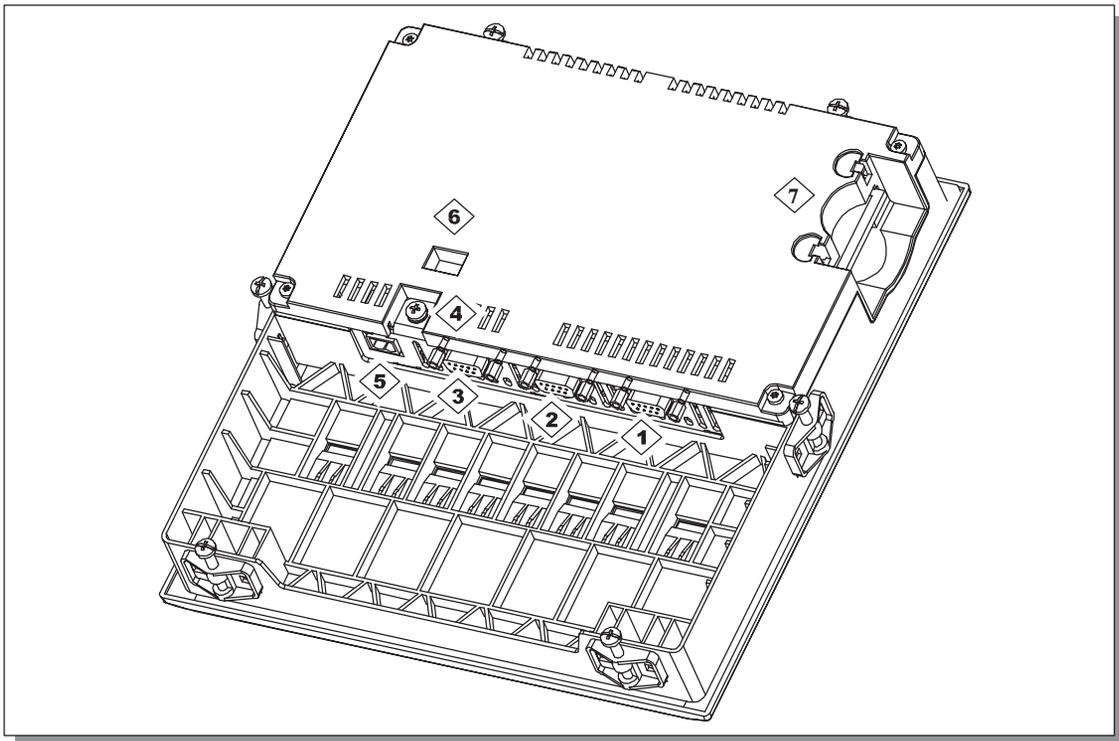
Figure 9-3   Arrangement of connection elements

No.	Name	Description/Use		
① ② ③	Interfaces [1]: • IF2 • IF1 A • IF1 B	Level: RS 232 RS 232 RS 485 (potential free)/ RS 422	Usage: PC, PU, printer PLC PLC, PC, PU	
④	Grounding connection	For connection to cabinet ground		
⑤	Power supply [2]	Connection for power supply (+24 V DC)		
⑥	Switch [3]	To configure interface IF1B		

No.	Name	Description/Use
⟨7⟩	Slot	Memory card (CF card)

[1] Connection pin assignment, see Appendix B.
[2] Connection pin assignment, see Page 9-6.
[3] Switch settings, see Page 9-18.

9.2.4   Communication options

Device	Connection	Interface
SIMATIC S5	• AS511 (with adapter) • PROFIBUS-DP	IF1 A IF1 B
SIMATIC S7	• MPI • PROFIBUS-DP	IF1 B IF1 B
SIMATIC 505	• RS 232 • RS 422/RS 485	IF1 A IF1 B
Lucky Goldstar	• RS 232 • RS 422/RS 485	IF1 A IF1 B
Modicon (Modbus)	• RS 232	IF1 A
Other PLCs	• RS 232 • RS 422/RS 485	IF1 A IF1 B
Configuration computer	• RS 232 • RS 485	IF2 IF1 B
Printer • Local printer	• RS 232	IF2

9.3 Equipotential

Potential differences

Differences of potential can occur in separate system sections which lead to high equipotential flows, e.g. when cable screening is applied on both sides and grounded at two different system parts.

The cause of potential differences may be due to different mains power feed sources.

⚠️ **Warning**

Cable screening is not designed for potential equalization. Only use lines provided for the purpose (e.g. with a 16 mm^2 cross-section). When setting up MPI/DP networks, ensure cables with a sufficient cross-section are used otherwise the interface hardware may be damaged or even destroyed.

Potential equalization lines

The potential differences must be reduced by the provision of potential equalization lines so that proper functioning of the electrical components installed is guaranteed.

When installing potential equalization lines, observe the following points:

- The efficiency of the potential equalization is greater the smaller the impedance of the potential equalization line is.

- If two system parts are connected by screened signal lines, whose screening is connected on both sides to the grounding/earthed conductor, the impedance of the additionally laid potential equalization lines may be maximally 10% of the screening impedance.

- The cross-section of a potential equalization line must be dimensioned for the maximum equalizing current which can flow. Experience has shown that potential equalization lines with a cross-section of 16 mm^2 suffice.

- Use potential equalization lines made of copper or galvanized steel. Connect the lines with the ground connection/ground conductor and protect from corrosion.

- Lay the potential equalization lines so that the area between the potential equalization line and signal lines is small (refer to the following diagram).
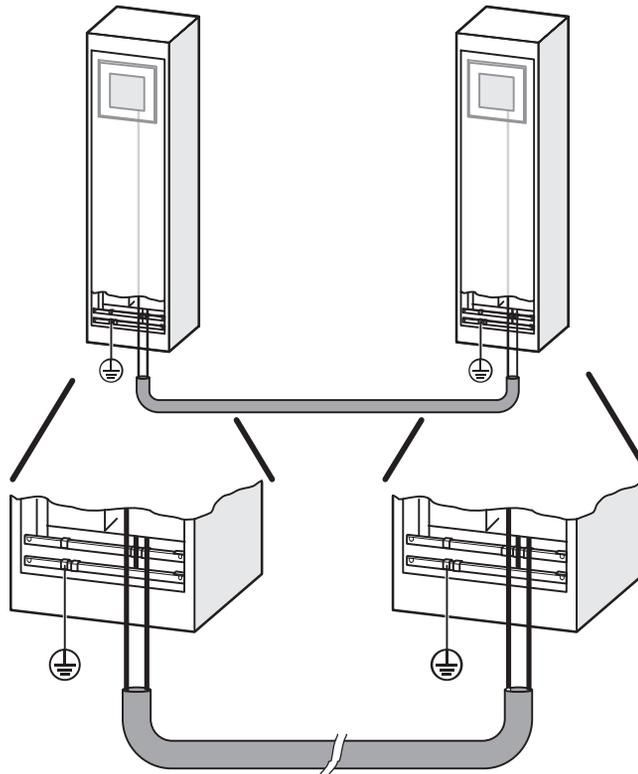
Figure 9-4   Equipotential

9.4   Connect Configuration Computer

Connection configuration

Figure 9-5 illustrates how to connect a configuration computer (PU or PC) to the operating unit for downloading project data. Standard cables are available for the connections shown (refer to the ST80 catalog).
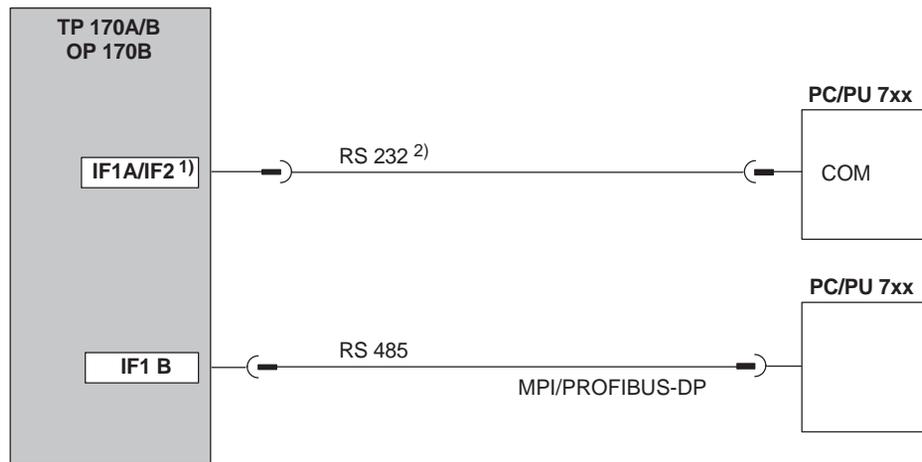
[1]   TP 170A: IF1A,
       TP 170B, OP 170B: IF2

[2]   Operating system update only via RS 232 (refer to Chapter 13)

Figure 9-5   Connection configuration diagram for configuration computer

9.5 Connect PLC

Connection configuration diagram for TP 170A

Figure 9-6 illustrates the basic connection possibilities between the TP 170A and PLC. Standard cables are available for the connections shown (refer to the ST80 catalog).
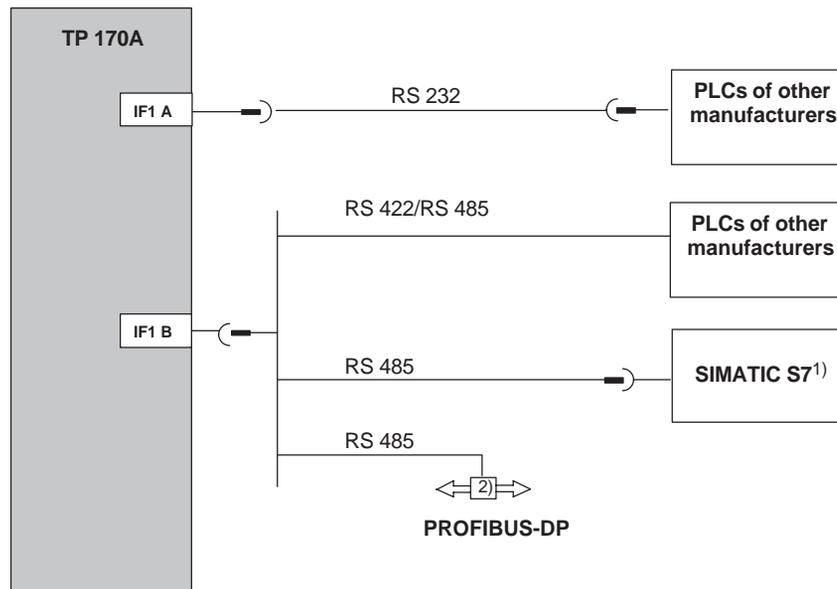
[1] Use only the approved cables for connection to the SIMATIC S7.
[2] Any PROFIBUS-DP bus terminal

Figure 9-6   Connection configuration for PLCs

Connection configuration diagram for TP 170B and OP 170B
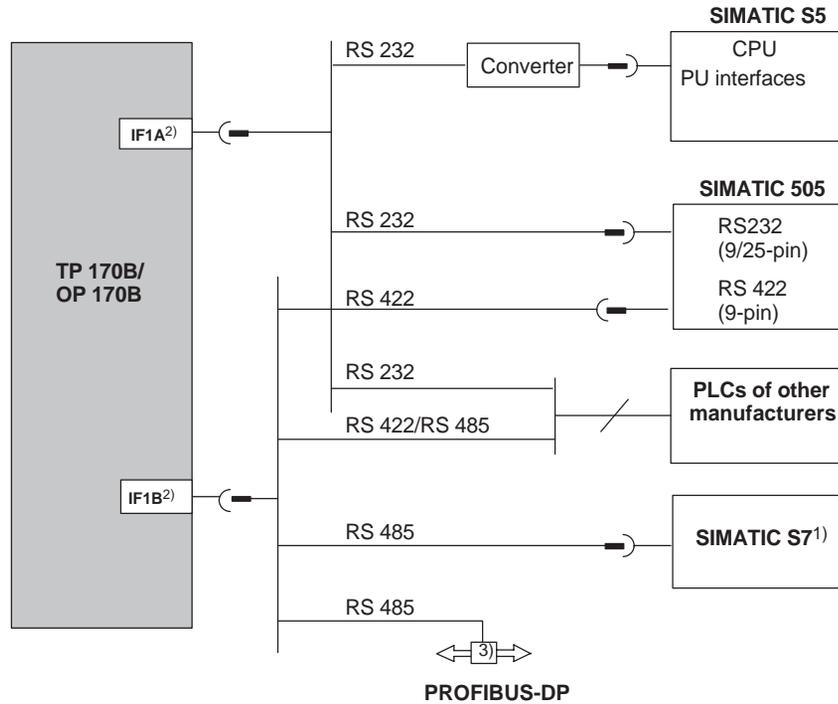
[1] Use only the approved cables for connection to the SIMATIC S7.

[2] To enable operation using the serial interface, connect either the IF1A (RS 232) or IF1B (RS 422/485), but not both. The 1F1B interface can be configured by means of the switch (Page 9-18).

[3] Any PROFIBUS-DP bus terminal

Figure 9-7   Connection configuration for PLCs

Configure interface IF1B

The IF1B interface can be configured via the switches on the rear side of the unit. In this case, the RTS signal is interchanged for RS 485 and the RS 422 receive data. By default, the RTS signal is not required by the communication peer.

The table shows the permissible switch settings.

Communication	Switch Setting

1) State on delivery

Compressing the internal program memory with SIMATIC S5

⚠️ **Caution**

With the SIMATIC S5, compression of the internal program memory on the PLC (PU "Compress" function, integrated FB COMPR) is not permitted when an operating unit is connected. Compression modifies the absolute addresses of the blocks in the program memory. Since the operating unit only reads the address list during startup, it does not detect any address modifications and subsequently accesses the wrong memory areas.

If compression is inevitable during running operations, the operating unit must be switched off before compressing.

9.6   Connecting a Printer to the TP 170B and OP 170B

Connection configuration

Figure 9-8 illustrates how to connect a serial printer to the TP 170B and OP 170B. The units can be used with the following standard printers:

- compatible with ESC/P, 9-pin ESC/P or ESC/P2 (EPSON)
  e.g. EPSON FX850, Brother 1250

- compatible with PCL3 (Hewlett Packard)
  HP LaserJet 5M
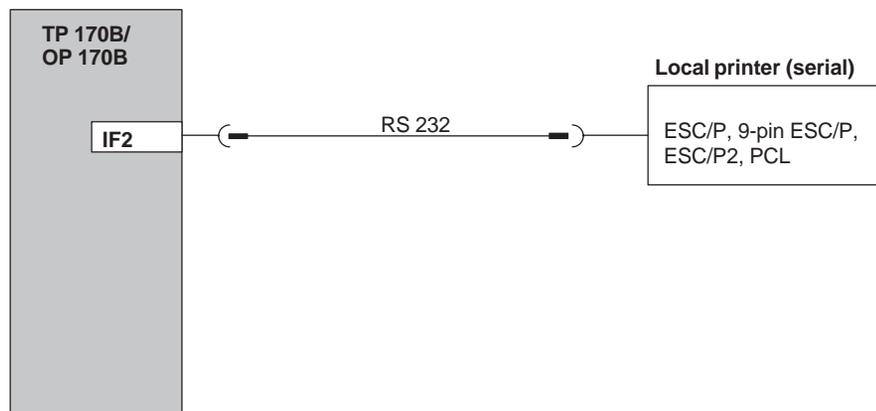
Figure 9-8   Printer connection configuration

Information on printer settings is provided on Page 8-13.

Note

- Only use a cable with braided metal screening grounded at each end for connecting the operating unit and printer.
- Deactivate in the Configuration menu (refer to Page 3-8) the option *Serial Transfer Remote Control* if a serial printer is to be connected to the operating unit via the IF2 interface.
- Some printers may require that the ASCII character set used in the configuration is defined on the printer as well.

Note

If a serial printer is connected, the following settings are necessary on the printer:

- RS 232, whereby only the RxD, TxD and GND signals are required
  (refer to Appendix B),
- 8 data bits,
- 1 stop bit,
- No parity,
- Baud rate between 9600 and 57600, printer-dependent.

Dimensions

<div align="right">

10

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In this chapter

This chapter provides information on:

- Dimensions of the TP 170A (Page 10-2),
- Dimensions of the TP 170B (Page 10-3),
- Dimensions of the OP 170B (Page 10-5).

10.1   TP 170A

Mounting cut-out

For installation in the front panel, the operating unit requires a mounting cut-out (WxH) of 198 $^{-1}$ mm x 142 $^{-1}$ mm. The front panel may not exceed a maximum thickness of 6 mm (max. 3 mm if the protective cover is used).

Unit dimensions

Front view   **Side view**

212   42   6

156   140

Plan view

196
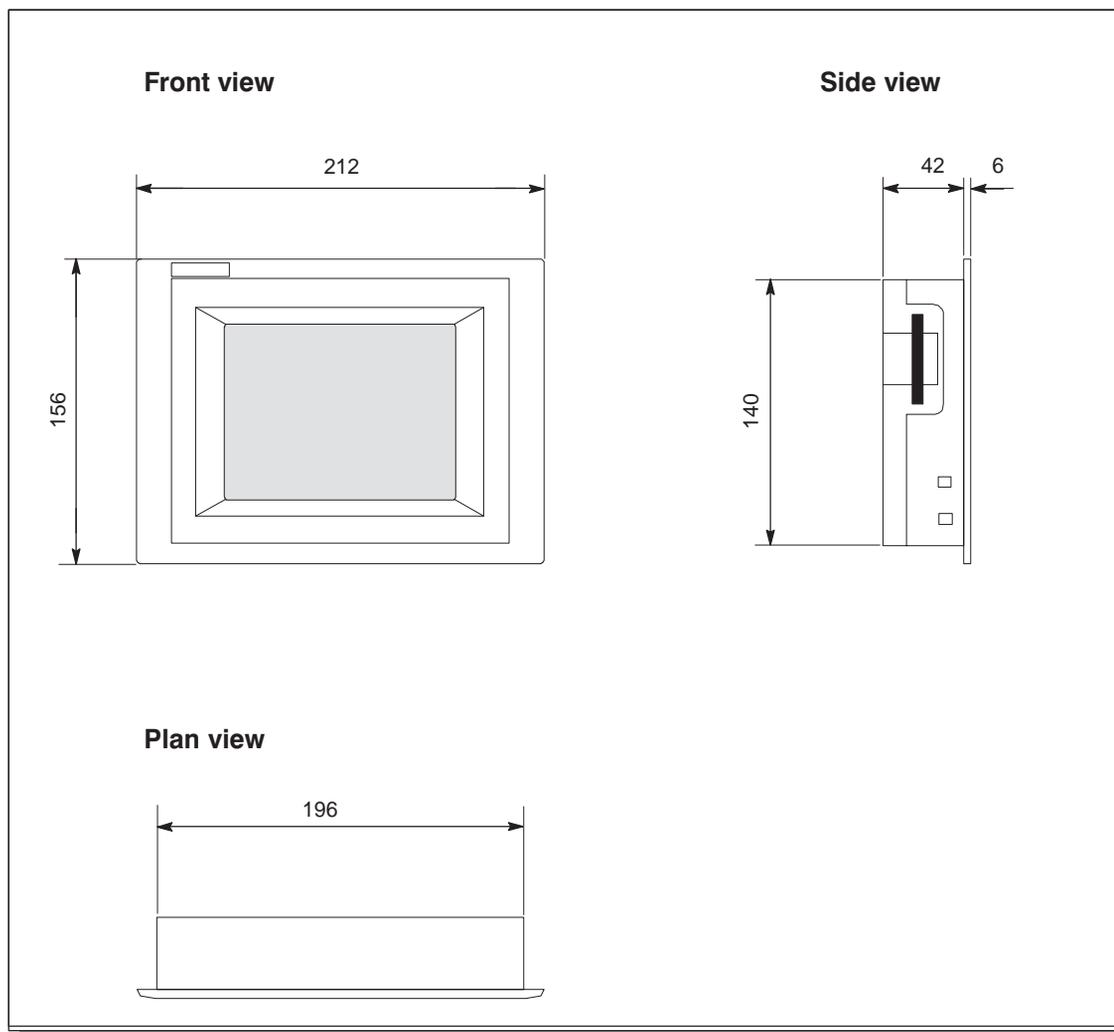
Figure 10-1   TP 170A dimensions

Notice

The following free space must be maintained following installation (front view):

50 mm above the unit, 50 mm below the unit, 15 mm to the right of the unit, 70 mm to the left of the unit.

10.2   TP 170B

Mounting cut-out

For installation in the front panel, the operating unit requires a mounting cut-out (WxH) of 198 $^{-1}$ mm x 142 $^{-1}$ mm. The front panel may not exceed a maximum thickness of 6 mm (max. 3 mm if the protective cover is used).
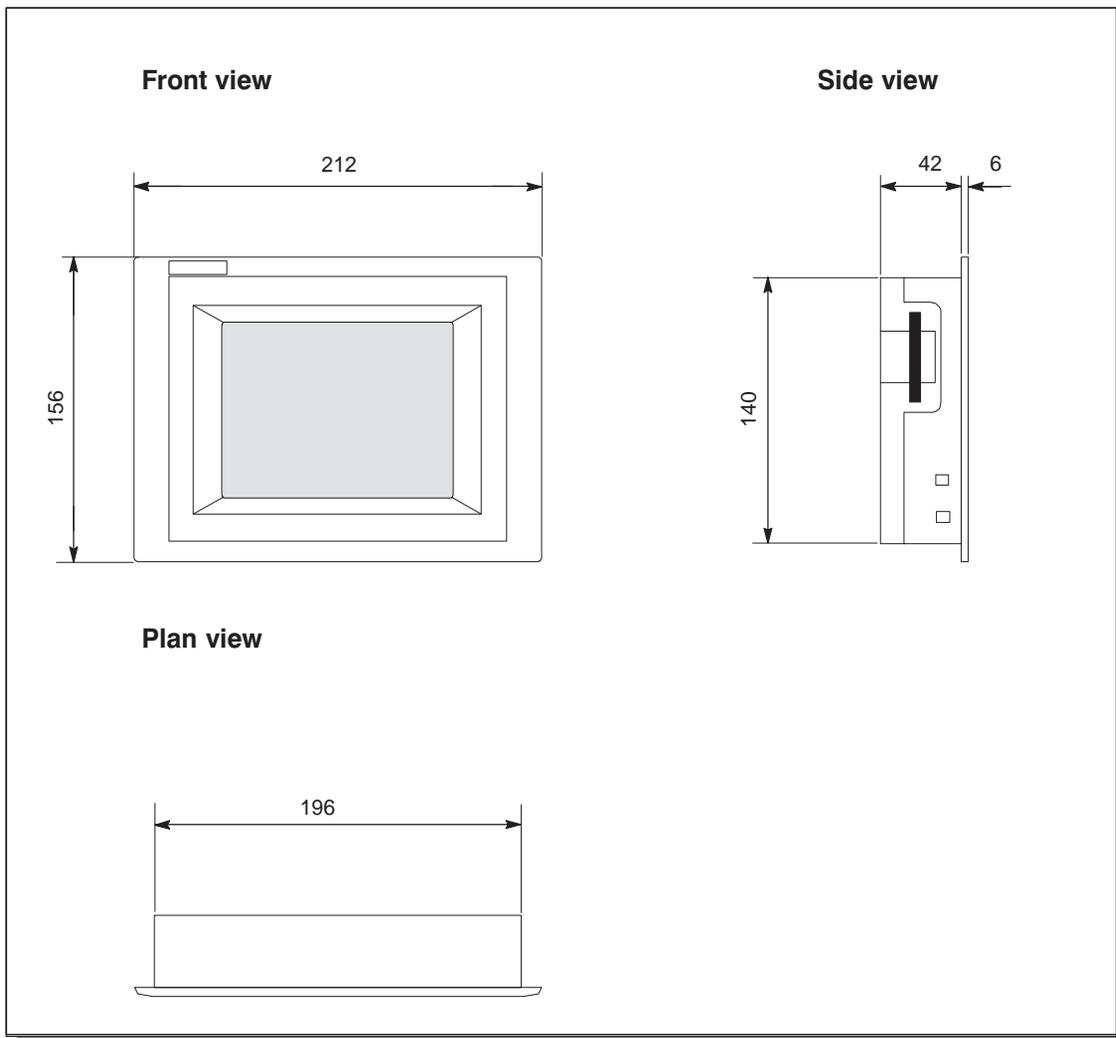
Unit dimensions

Figure 10-2   TP 170B dimensions

Notice

The following free space must be maintained following installation (front view):

50 mm above the unit, 50 mm below the unit, 15 mm to the right of the unit, 70 mm to the left of the unit.

10.3 OP 170B

Mounting cut-out

For installation in the front panel, the OP 170B requires a mounting cut-out (WxH) of 229 $^{-1}$ mm x 241 $^{-1}$ mm. The thickness of the front panel must not exceed 6 mm.

Unit dimensions
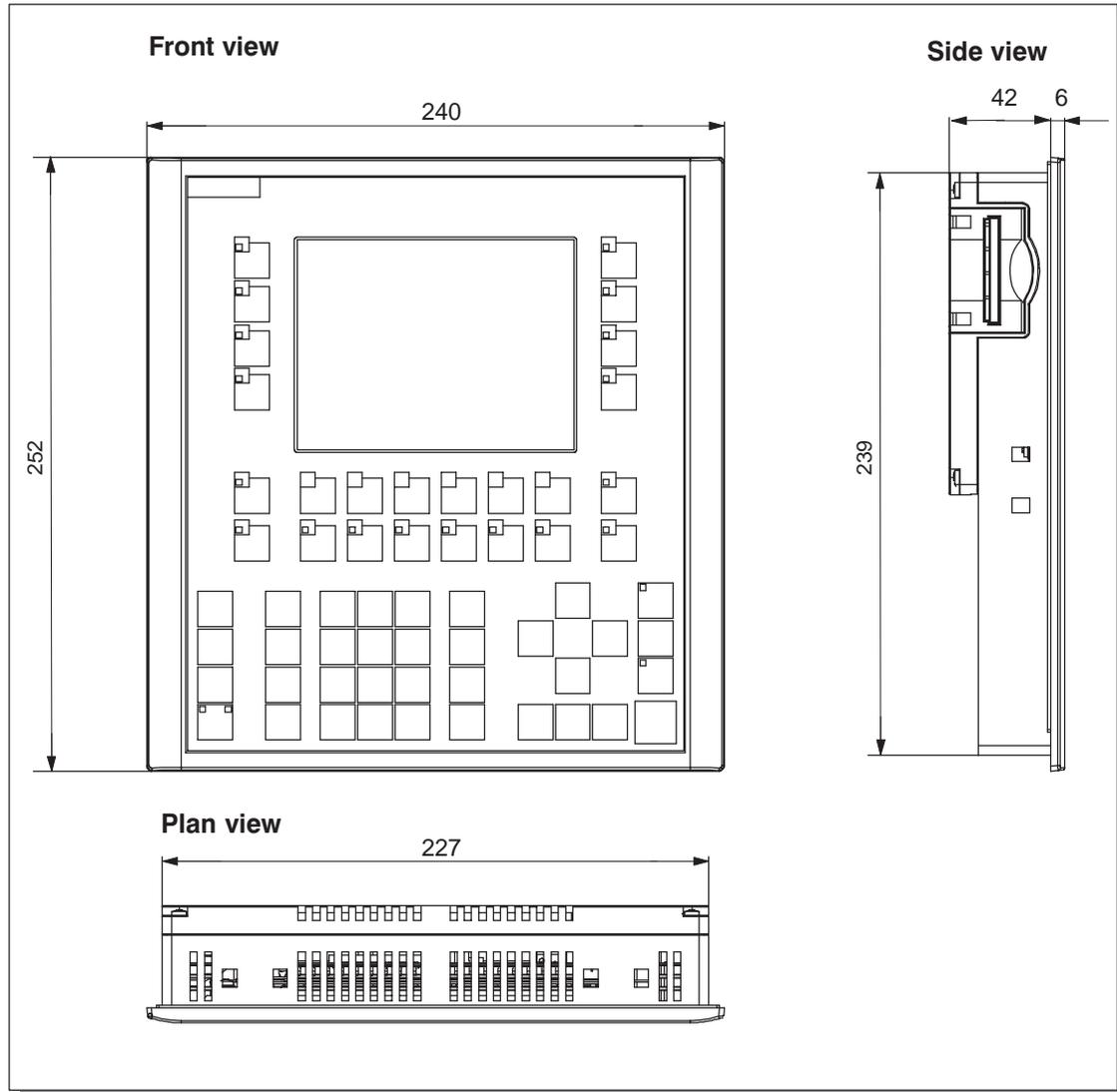
Figure 10-3   OP 170B dimensions

Notice

The following free space must be maintained following installation (front view):

50 mm above the unit, 15 mm below the unit, 15 mm to the right of the unit, 70 mm to the left of the unit.

10.3.1　Labeling OP 170B function keys

Labeling

The OP 170B function keys are labeled as follows on supply:

* **F1** to **F14** and

* **K1** to **K10**.

The function keys are labeled by means of 8 labeling strips which are inserted in the unit from the rear. These strips can be exchanged in order to label the OP 170B specifically for the system.

Exchange labeling strips

<table>
<tr><td>⚠</td><td>Warning
When the cabinet is opened, certain parts of the system that may conduct hazardous voltage are exposed.</td></tr>
</table>

Proceed as follows:

Step	Action
1	Place the unit down with the front plate at the bottom.
2	Remove the labeling strips already inserted.
3	Insert the newly labeled strips in the slots in the front plate with the inscription facing down. The individual positions are indicated in the figure by means of arrows. **Note**: Before inserting the strips, wait until the inscription is dry. A keyboard foil which is dirty on the inside cannot be cleaned and can only be replaced at the manufacturer's factory.
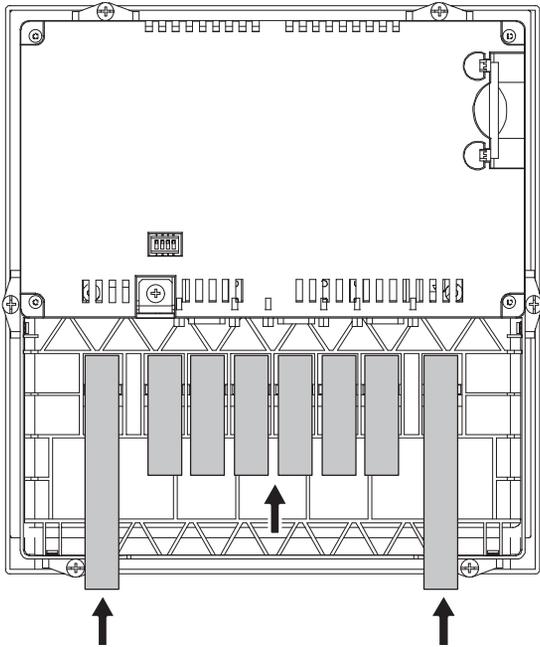
Create labeling strips

Only use transparent foil to create your own labeling strips so that the LEDs in the function keys remain visible. Label the foil either with a printer or a waterproof felt-tip pen. Cut the strips according to the specifications depicted in Figure 10-4.
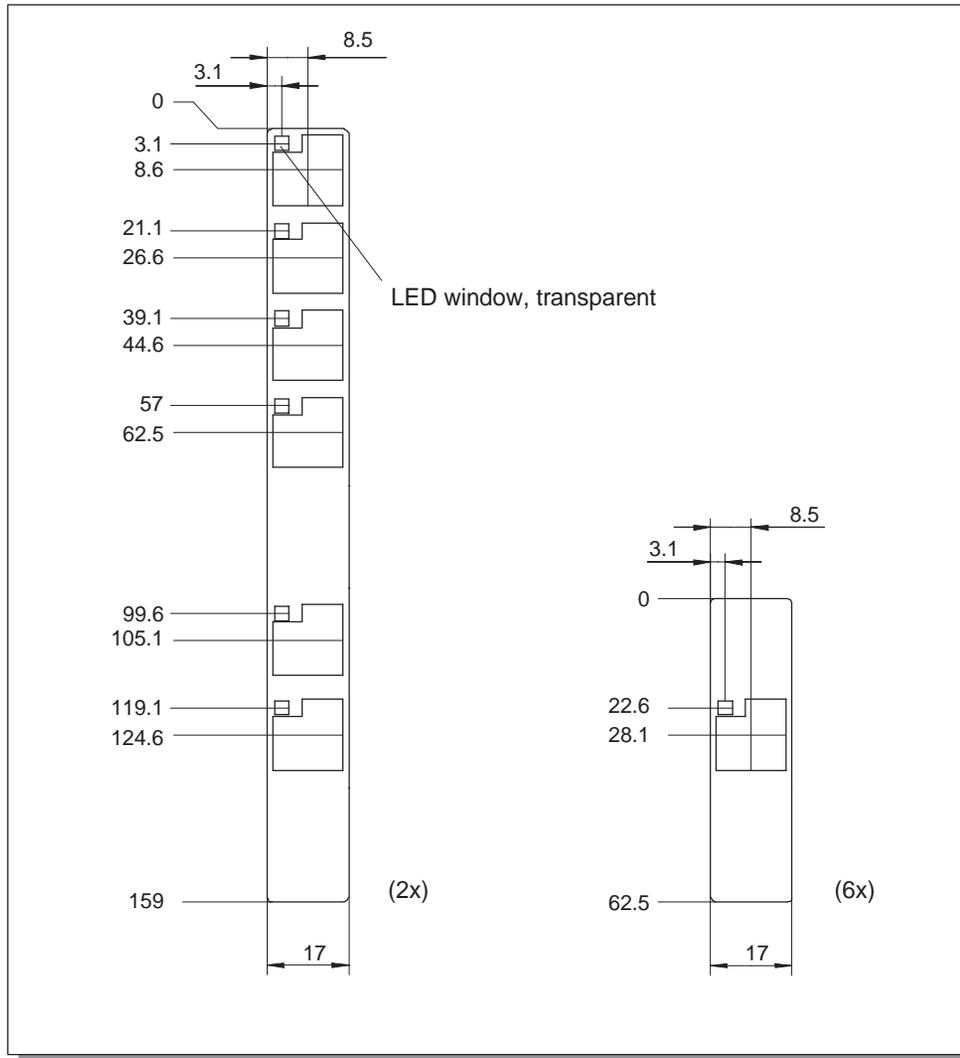
Figure 10-4   Labeling strip dimensions

File

The ProTool CS configuration software contains formatted patterns for labeling function keys individually for various SIMATIC operating units.

The patterns are stored on the Installation CD in `\UTILITY\SLIDE170.DOC` in Word™ format. This enables labeling strips to be created for the OP 170B according to the specific system without extensive design and printing operations.

TP 170B and OP 170B Memory Cards   **11**

Purpose

Changeable memory cards can be inserted in the expansion slot at the rear of the operating units TP 170B (Figure 11-1) and OP 170B (Figure 11-2).

The memory cards can be used, for example, to archive important process data or execute a backup/restore of the internal Flash memory (refer to Page 3-16).
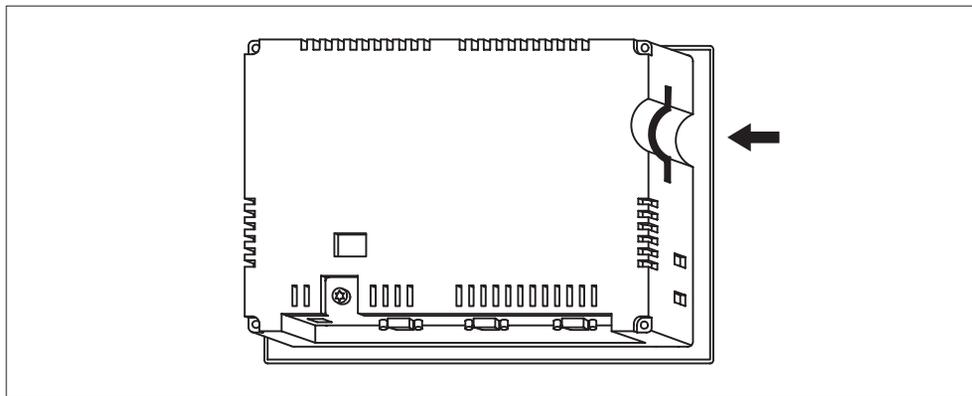
Figure 11-1   Location of the slot on the TP 170B
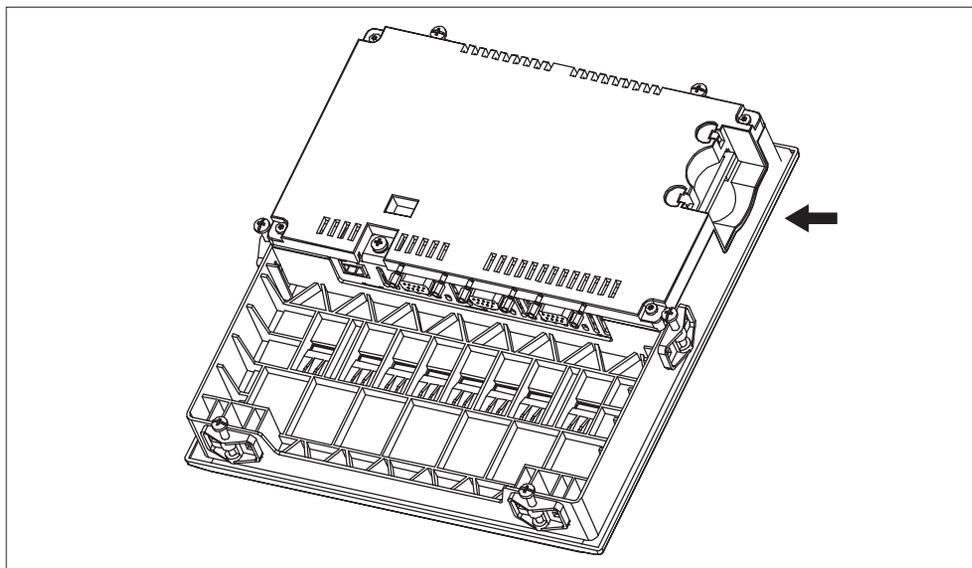
Figure 11-2   Location of the slot on the OP 170B

Cards supported

The operating unit supports the use of cards complying to Compact Flash Standard (CF). The interface supplies the card with 3.3 V.

If the power supply is interrupted inadvertently during normal operation, the operating unit checks the memory card after power is returned, repairing defect areas if necessary.

Note

The memory card can be inserted and removed with the operating unit switched on.

Remove memory card

Caution

Before removing a memory card, ensure that the operating unit does not access the card during the removal process.

To terminate the runtime software, press the operating element assigned the *Exit_runtime* function in the configuration. Wait until the operating unit Start menu (Figure 3-4, Page 3-8) is displayed.

Maintenance/Upkeep

12

Scope

The operating unit has been designed for low maintenance operation. Maintenance of the unit is limited to

- regular cleaning of the screen,
- regular cleaning of the keyboard overlay (OP 170B).

12.1   Clean Screen/Keyboard

12.1.1   General notes

Preparation

Clean the operating unit screen and keyboard foil of the OP 170B at regular intervals. Use a damp cloth.

⚠ **Caution**

Do not clean the unit while it is turned on. This ensures that functions are not inadvertently triggered on touching the keys or the touch screen.

Cleaning agents (TP 170A and TP 170B)

Only use water and washing-up liquid or a screen cleaning foam to dampen cleaning cloths. Do not spray the cleaning agents directly on the screen but on the cleaning cloth. Never use aggressive solvents or scouring powder.

12.1.2   Notes on the touch panel units TP 170A and TP 170B

Clean screen

If the *Clean Screen* function has been assigned to an operating element in the configuration, the screen can be cleaned while it is turned on. After the Clean Screen function has been started, all input via the touch screen is deactivated for a defined period of time. The remaining time is indicated by a bar graph.

Protective foil

A protective foil is available for the touch panels TP 170A and TP 170B (refer to Catalog ST80). The protective foil is not part of the material supplied with the units.

The self-adhesive foil prevents the screen being scratched and soiled. In addition, the matt surface of the foil reduces reflections.

The protective foil can be removed as necessary without leaving any adhesive residue on the screen.

Caution

Never use sharp or pointed tools to remove the protective foil, such as a knife for instance. This may cause damage to the touch screen.

Protective cover

A protective cover is available for the TP 170A and TP 170B touch panels. The protective cover protects the screen and unit frame from dirt, scratching, chemicals and reflection. This ensures the operating units can be implemented in hostile environments. The cover also guarantees the NEMA4 degree of protection is provided.

The protective cover is not adhered to the touch panel but clamped between the base and top frames, so that the operating unit has all-round protection.

Operating System Update

<div style="text-align: right">

13

</div>

Purpose

If there is a conflict between the configuration software version and current operating system on the operating unit, downloading of a configuration from the configuration computer to the operating unit is terminated and a compatibility conflict is indicated.

In this case, synchronize the operating unit operating system with the version of the SIMATIC ProTool CS configuration software.

Note

Updating the operating system causes all the existing data on the operating unit to be deleted.

Note

An operating system update is only possible using a serial cable.

Action

Proceed as follows in order to adapt the operating system on the operating unit to the configuration software version used:

Step	Action
1	Switch off the operating unit's power supply.
2	Connect interface IF1A or IF2 (serial)[1] on the operating unit to the to the serial interface on the configuration computer using a serial zero modem cable.
3	Start the *PTUpdate* utility program on the configuration computer. It is contained on the configuration software installation CD. It is located in the `\Images` directory, in subdirectory `\OP_TP170`.
4	Select menu item *File → Open* and open the image file (file extension `.img`) appropriate for the operating unit. The image file is located in the same directory as the *PTUpdate* utility program. The file name contains the character string `TP170A`, `TP170B` or `OP170B`. When the image file has been opened successfully, various information related to the version status appears on the screen.
5	Select the menu item *File → Settings*. Set the interface and applicable baud rate (max. 115200) on the designated interface for the download.
6	Start downloading with the menu option *File → Download*. When the corresponding request appears on the screen, switch the operating unit power supply off.

1) TP 170A: IF1A
   TP 170B, OP 170B: IF2

When downloading is performed successfully, there is no project data on the operating unit. The behavior of the operating unit when no project has been loaded is described in Chapter 3.1.

APPENDIX

Technical Data

A

In this Appendix

This Appendix contains the following technical data for the units TP 170A, TP 170B and OP 170B:

- Housing
- Processor
- Memory
- Software
- Display
- Keyboard (OP 170B)
- Power supply
- Ambient conditions
- Noise immunity and noise transmission
- Approvals

Housing	TP 170A	TP 170B	OP 170B
External dimensions W x H (mm)	212 x 156		240 x 252
Mounting cut-out W x H (mm)	198^{-1} x 142^{-1}		229^{-1} x 241^{-1}
Mounting depth	45 mm		
Degree of protection • Front panel • Rear panel	IP65/NEMA 12/ NEMA 4 with protective cover IP20		IP65/NEMA 4 IP20
Weight	Approx. 0.7 kg		Approx. 1 kg

Processor	TP 170A	TP 170B	OP 170B
Type	32 bit RISC		

Memory	TP 170A	TP 170B	OP 170B
Configuration memory	320 kByte	768 kByte	
Storage media • Slot for CF card	–	×	

Software	TP 170A	TP 170B	OP 170B
Operating system environment	MS Windows CE		

Display	TP 170A	TP 170B	OP 170B
Resolution (horizontal x vertical)	320 x 240		
Active screen area	116 x 87	116 x 87	116 x 87
Colors	4 Blue Mode	4 Blue Mode or 16 colors	4 Blue Mode
Back-lighting Half Brightness Life [1]	CCFL tube Approx. 50,000 h		

1) Time period after which the brightness of the lighting tube only achieves 50 % of its original value. The specified value is dependent on the operating temperature.

Keyboard	TP 170A	TP 170B	OP 170B
Type	Touch		Membrane keyboard
System keys with dedicated functions	–	–	35 (3 with LEDs)
Function keys with configurable functions	–	–	24 (18 with LEDs)
Those usable as softkeys			14

Power supply	TP 170A	TP 170B	OP 170B
Rated voltage	+ 24 V DC		
Permissible voltage range	+18.0...+30.0 V DC		
Max. permissible transients	35 V (500 msec)		
Time between two transients	50 sec minimum		
Power consumption	35 V (500 msec)	35 V (500 msec)	35 V (500 msec)
Typical			
• color	–	Approx. 0.29 A	–
• mono	Approx. 0.24 A	Approx. 0.25 A	Approx. 0.25 A
Max. constant current	Approx. 0.9 A	Approx. 0.9 A	Approx. 0.9 A
Switch-on current I^2t	Approx. 0.2 A^2s	Approx. 0.1 A^2s	Approx. 0.1 A^2s
Fuse, internal	Electronic		

Ambient conditions	TP 170A	TP 170B	OP 170B
Location	vertical		
Max. permissible angle of inclination without external ventilation	$\pm 35˚$		
Max. permissible ambient temperature	STN display		
• Operation			
– Vertical installation	0...+50 ˚C		
– Installation angled from the perpendicular to max. 35˚	0...+35 ˚C		
• Shipping, storage	–20...+60 ˚C		
Relative humidity			
Operation	20...90%, no condensation		
Shipping, storage	5...90%, no condensation		
Shock loading			
Operation	15 g/11 msec		
Shipping, storage	25 g/6 msec		

Ambient conditions	TP 170A	TP 170B	OP 170B
Vibration			
• Operation		0.035 mm (10 – 58 Hz)	
		1 g (58 – 500 Hz)	
• Shipping, storage		3.5 mm (5 – 8,5 Hz)	
		1 g (8.5 – 500 Hz)	
Barometric pressure			
• Operation		706 to 1030 hPa	
• Shipping, storage		581 to 1030 hPa	

Compliance of the named products with the regulations of Directive 89/336 EEC is verified by conformance with the following standards:

Noise immunity	TP 170A	TP 170B	OP 170B
Static discharge (contact discharge/air discharge)		EN 61000-4-2	
		6 kV/8 kV	
RF irradiation		EN 61000-4-3	
		10 V/m, 80% AM,	
		1 kHz	
Pulse modulation		EN 61000-4-3	
		900 MHz $\pm$ 5 MHz	
		10 V/m$_{eff.,}$50% ED, 200 Hz	
RF conduction		EN 61000-4-6	
		150 kHz – 80 MHz	
		10 V, 80% AM, 1 kHz	
Burst interference		EN 61000-4-4	
• Mains lines		2 kV	
• Supply lines		2 kV	
• Process data lines		2 kV	
• Signal lines		1 kV	

Radio interference	TP 170A	TP 170B	OP 170B
Radio interference level complying to EN 55011		Class A	

The following approvals have been applied for or already granted on supply.
Please refer to the rating plate on the rear of the unit for identification.

Approvals	
UL approval	UL Recognition Mark [1)] Underwriters Laboratories (UL) complying with Standard UL 508, File E 116536
UL approval	In accordance with the UL/CSA Approval Agreement
FM Approval	FM Approval Complying with Factory Mutual Approval Standard Class Number 3611 Hazardous (classified) Locations Class I, Division 2, Group A, B, C, D Class I, Zone2, Group IIC
	⚠ **Warning:** Personal injury and equipment damage can occur. Personal injury and equipment damage can occur in hazardous areas if a plug connection is disconnected from the operating unit while the system is running. In hazardous areas, always switch off the power supply to the operating unit before disconnecting plugs.
	⚠ **Warning:** **DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS LOCATION IS KNOWN TO BE NON-HAZARDOUS.**

1) The UL and CSA file numbers are dependent on the production site. The numbers specified here changes according to the change of production site.

B

Interface Assignment

IF1A
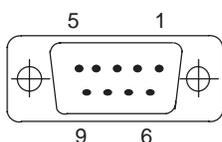
Table B-1   Assignment of the 9-pin Sub-D plug (pin)

Pin	RS 232
1	–
2	RxD
3	TxD
4	–
5	GND
6	–
7	RTS
8	CTS
9	–

IF2
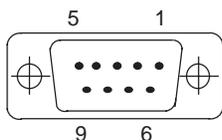
Table B-2   Assignment of the 9-pin Sub-D plug (pin)

Pin	RS 232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	–

IF1B
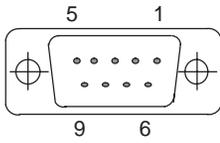
Table B-3   Assignment of the 9-pin Sub-D socket
(configuration via switch, see Page 9-18)

Pin	PROFIBUS-DP MPI	RS 422	RS 485
1	N. c.		
2	N. c.		
3	Data B	TxD (B)	Data B
4	–	RxD (B)	–
5	GND (floating) frei		
6	+5 V (floating) frei		
7	N. c.		
8	Data A	TxD (A)	Data A
9	–	RxD (A)	–

HMI System Messages

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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.

ESD Guidelines

D

What does ESD mean?

Virtually all present-day modules incorporate highly integrated MOS devices or components. For technological reasons, these electronic components are very sensitive to overvoltages and consequently therefore to electrostatic discharge:

These devices are referred to in German as <u>E</u>lektrostatisch <u>G</u>efährdeten <u>B</u>auelemente/ <u>B</u>augruppen: "EGB"

The more frequent international name is:

"ESD" (<u>E</u>lectrostatic <u>S</u>ensitive <u>D</u>evice)

The following symbol on plates on cabinets, mounting racks or packages draws attention to the use of electrostatic sensitive devices and thus to the contact sensitivity of the assemblies concerned:

ESDs may be destroyed by voltages and energies well below the perception threshold of persons. Voltages of this kind occur as soon as a device or an assembly is touched by a person who is not electrostatically discharged . Devices exposed to such overvoltages cannot immediately be detected as defective in the majority of cases since faulty behavior may occur only after a long period of operation.

Precautions against electrostatic discharge

Most plastics are capable of carrying high charges and it is therefore imperative that they be kept away from sensitive components.

When handling electrostatic sensitive devices, make sure that persons, workplaces and packages are properly grounded.

Handling ESD assemblies

A general rule is that assemblies should be touched only when this cannot be avoided owing to the work that has to performed on them. Under no circumstances should you handle printed-circuit boards by touching device pins or circuitry.

You should touch devices only if

- you are grounded by permanently wearing an ESD wrist strap or
- you are wearing ESD shoes or ESD shoe-grounding protection straps in conjunction with an ESD floor.

Before you touch an electronic assembly, your body must be discharged. The simplest way of doing this is to touch a conductive, grounded object immediately beforehand – for example, bare metal parts of a cabinet, water pipe etc.

Assemblies should not be brought into contact with charge-susceptible and highly insulating materials such as plastic films, insulating table tops and items of clothing etc. containing synthetic fibers.

Assemblies should be deposited only on conductive surfaces (tables with an ESD coating, conductive ESD cellular material, ESD bags, ESD shipping containers).

Do not place assemblies near visual display units, monitors or television sets (minimum distance to screen > 10 cm).

Measuring and modifying ESD assemblies

Perform measurements on ESD assemblies only when

- the measuring instrument is grounded – for example, by means of a protective conductor – or
- the measuring head has been briefly discharged before measurements are made with a potential-free measuring instrument – for example, by touching a bare metal control cabinet.

When soldering, use only grounded soldering irons.

Shipping ESD assemblies

Always store and ship assemblies and devices in conductive packing – for example, metallized plastic boxes and tin cans.

If packing is not conductive, assemblies must be conductively wrapped before they are packed. You can use, for example, conductive foam rubber, ESD bags, domestic aluminum foil or paper (never use plastic bags or foils).

With assemblies containing fitted batteries, make sure that the conductive packing does not come into contact with or short-circuit battery connectors. If necessary, cover the connectors beforehand with insulating tape or insulating material.

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 message procedure by which the CPU issued messages to all the registered network participants. ALARM_S messages are configured in STEP 7.

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 dimming the screen back-lighting.

Boot

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

Buttons

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

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.

Combo box

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

Configuration

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

D

Data record

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 message

A screen object with configurable filter criteria which is used to display the volatile **message buffer** or message archive.

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

Event

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

Event message

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

F

Fixed window

A configurable window which always appears at the top 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 accesses 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.

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**.

Invisible buttons

> Buttons which are only visible during configuration, not on the operating unit. If invisible 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.

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

A tag without a link 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 in the operating unit in which **message events** can be stored in chronological order as they arrive. Event messages and alarm messages are stored in separate message buffers.

Message departure

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

Message events

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

- Message arrival

- Message acknowledgement

- Message departure

Message indicator

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

Message logging

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

Message view

Screen object to display the volatile message buffer and/or message archive.

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.

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 defined **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.

Password list

A screen object for entering passwords related to different authorization levels.

PLC

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

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.

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

Full-graphic configuration software for configuring text displays, text–based and graphic operator panels as well as the Windows–based units TP170 A, TP170 B, OP170 B and MP270.

ProTool CS

General name for the three configuration software variants **ProTool/Pro CS**, **ProTool** and **ProTool/Lite**.

ProTool/Lite

Full-graphic configuration software for configuring text displays and text–based operator panels as well as the Windows–based units TP170 A.

ProTool/Pro CS

Full-graphic configuration software for configuring the entire SIMATIC HMI product range and Windows-based systems.

Q

Queued message

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

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

Screen object to create, edit, store 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.

Runtime software

The program visualization software SIMATIC ProTool/Pro RT with which the project created using ProTool 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 which appears on the operating unit screen. This enables values to be entered without a keyboard actually being connected, in the case of a touch panel for example.

Selection field

An input element which provides a list of predefined entries. One of the entries in the list can be selected on the operating unit.

SIMATIC HMI Symbol Library

Comprehensive library containing graphics from the areas of technology and production. Extends the ProTool library.

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 operating 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.

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 for entering and displaying a binary status. A switch can only be in the status on or off .

System message

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

T

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 curve graphic

> A screen object for displaying the continual progress of process data. Several different **trend curves** can be shown in the trend curve display simultaneously.

Trend view

> Trend curves are especially suited to displaying continual progress. Several trend curves can be shown in the trend view simultaneously, e.g. in the form of **trend curves** or **profile curves**.

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