

SIEMENS

SIMATIC HMI

OEM PP32, OEM PP32/OP17 Push Button Panels

Equipment Manual

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6AV3991-1XB00-0AB0

Release 08/98

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 highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:



Warning

indicates that death, severe personal injury or substantial property damage **can** result if proper precautions are not taken.



Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken.

Note

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

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

Correct Usage

Note the following:



Warning

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

Startup must not take place until it is established that the machine, which is to accommodate this component, is in conformity with the guideline 89/392/EEC.

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Siemens AG,
Bereich Automatisierungstechnik,
Bedienen und Beobachten
Postfach 4848, D-90327 Nuernberg

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We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

Technical data subject to change.
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Preface

Purpose

This equipment manual is designed to provide operators, installation personnel, planners and system maintenance technicians with information concerning the functionality, operation and technical configuration of Push Button Panels.

Organization of the manual

The *equipment manual for the Push Button Panels OEM PP32 and OEM PP32/OP17* is divided into the following sections:

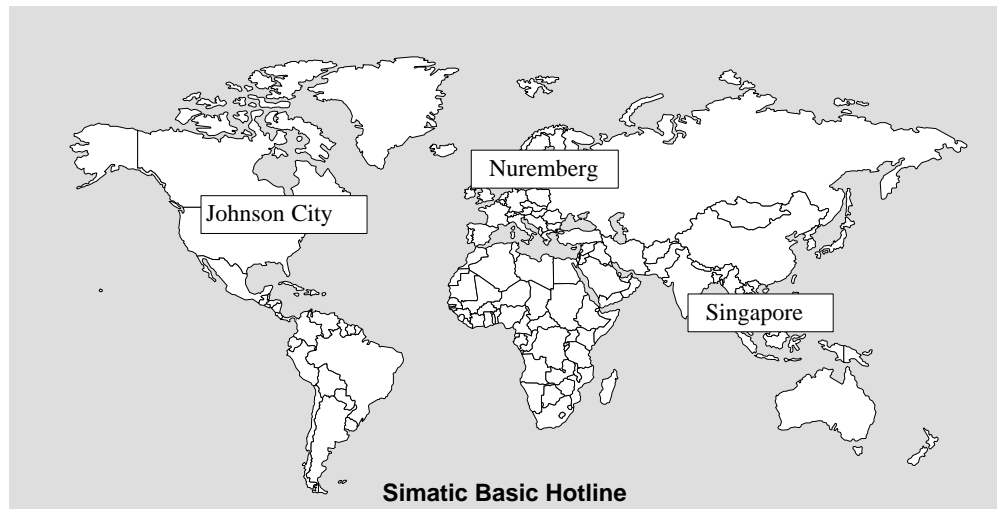
Chapters	Content
1	General description of the Push Button Panels
2	Step-by-step instructions on how to configure a Push Button Panel
3	Detailed information on the interrelationship between the Push Button Panel and PLC
4	Mechanical and electrical installation of the Push Button Panels
5 - 6	Unit description of the various Push Button Panel versions
7	Information on labelling
8	Information on spare parts
Appendices	Technical data, system messages, hardware test

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E-mail: simatic.support@nbgm.siemens.de

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For calling up the mailbox, you should use a modem with up to V.34 (28.8 kBaud) capability and set the parameters as follows: 8, N, 1, ANSI, or connect via ISDN (x.75, 64 kBit).

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Product Description

1

Use of Push Button Panels

The Push Button Panels can be used to display the operating statuses of a machine or system and to control processes.

Until now, keys and lamps had to be individually mounted, wired and tested for this purpose. This was also a time-consuming process. In contrast to this, installation of Push Button Panels requires only a rectangular cut-out and a bus connection (DP or MPI). The standard configuration ensures that the panel is ready to operate immediately after all the connections have been made. This results in considerable advantages in respect of time compared to conventional connections.

The Push Button Panels provide a large variety of features which can be used without the necessity of PLC programs:

- Short-stroke keys with surface illumination according to the LED colors
- Additional 24 V digital inputs and outputs
- All short-stroke keys and digital 24 V inputs can also be individually configured as switches
- Integrated lamp and key test
- Central release input to lock all operating actions
- Integrated flash timing
- Color-coding for LEDs, such as red, green, orange
- Pulse extension for short-stroke keys and digital 24 V inputs can be specified via parameters
- Perforated cut-outs for 22.5 mm standard optional elements, such as key-operated switch and emergency shutdown switch

Features of customized variants

Using customized Push Button Panels, it is possible to:

- follow individual operation philosophies,
- equip a machine or system with a Push Button Panel optimized for specific demands,
- provide customers with individual solutions and set you apart from other competitors.

Customized Push Button Panels are adapted to individual requirements. They are built up from proven standard components, such as PP7, PP17 and TD/OP technology, or are variants of them. Standard components are used as far as possible for customer-specific solutions, so that functions, configuration and connection possibilities comply to the standard equipment.

Customized Push Button Panels provide the following advantages:

- Compact operating panels through integration of SIMATIC OP or TD in a front panel together with the Push Button Panel
 - OP17 (with PP32/OP17)

The OP17 is integrated in the same housing as the Push Button Panel. However, it is not connected to the Push Button Panel. The OP17 must be configured using ProTool and integrated in the MPI or PROFIBUS network as described in the standard documentation.
- Consistency with standard Push Button Panels with regard to
 - electronics,
 - function,
 - configuration,
 - bus connection.
- Further variations complying to customer requirements are possible on request, e. g.:
 - installation of additional elements complying to company standards/norms,
 - rotary knobs (handwheel, continuous potentiometer) for fast, intuitive modification of set values,
 - numeric displays,
 - modular adaptations to the typical application specification,
 - customized keyboard.

Our customized products comply to the requirements defined for SIMATIC HMI standard products with regard to technology and quality as well as product maintenance and further development.

Installation possibilities

The Push Button Panels have been conceived for installation in cabinets and can be implemented in all situations where keys, switches and lamps are required.

The high degree of protection (IP65 on the front side) and the fact they are maintenance-free make the Push Button Panels suitable for use even in rough industrial environments.

Connection types

The Push Button Panels can be operated using the following connections:

- via MPI to a SIMATIC S7-200
- via MPI to a SIMATIC S7-300
- via MPI to a SIMATIC S7-400
- via PROFIBUS-DP to a SIMATIC S5
- via PROFIBUS-DP to a SIMATIC S7
- via PROFIBUS-DP as standard slave on a DP master of a different manufacturer; possibly with restrictions in respect of configuring the Push Button Panel.

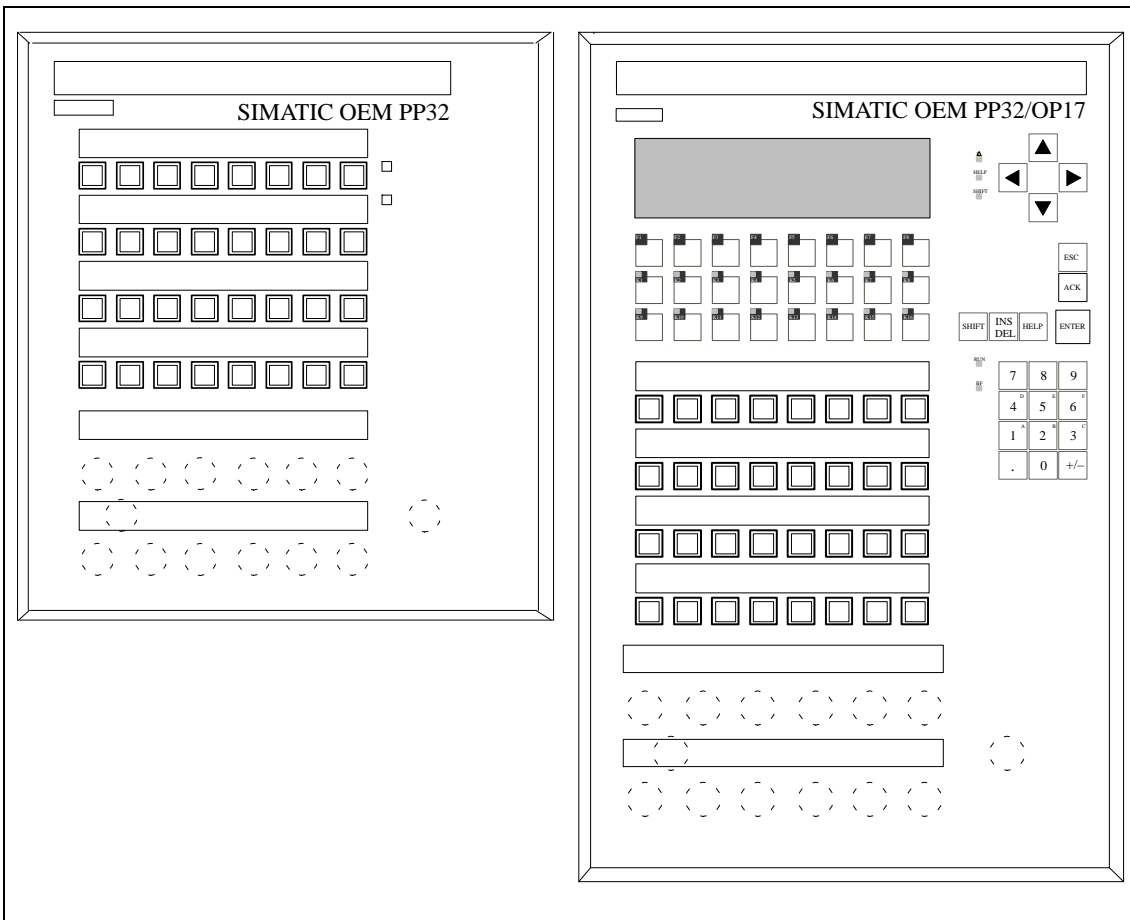
Unit configuration

Parameters in the Push Button Panels are predefined and the unit is thus immediately ready to operate. Various options can also be activated by adjusting certain parameters. Each key, LED, digital input and output can be individually adapted according to specific requirements.

No special configuration software is necessary for the Push Button Panel. All adjustment of the settings is carried out either directly on the Push Button Panel or by means of the PLC configuration software.

All adjustments to settings carried out on the Push Button Panel are stored in its memory module. In cases where the unit electronics or the entire unit are replaced, the interface need not be reconfigured. Only the old memory module needs to be transferred to the new unit.

1.1 Push Button Panel Overview



Hardware		OEM PP32	OEM PP32/OP17
Short-stroke keys, surface illumination	Number of short-stroke keys	32	
Inputs/Outputs	Number of digital inputs	16	
	Number of digital outputs	16	
Installable operating elements	Number of 22.5 mm elements which can be integrated	12+1 (SHUTDOWN right) 8+2 (SHUTDOWN left)	
Release input	Lock operation of the Push Button Panel	✓	
Interfaces	PLC connection	MPI or Profibus DP	

Hardware		OEM PP32	OEM PP32/OP17
Communication	SIMATIC S5 – PROFIBUS-DP		✓
	SIMATIC S7/M7 – MPI – PROFIBUS-DP		✓ ✓
Data transmission	Baud rate	Max. 12 MBaud	
Integrated standard unit		–	OP17

1.2 Operating and Display Elements

The following diagram illustrates the assignment of the operating elements of the OEM PP32/OP17. This equipment manual describes the elements of the PP32. Refer to the corresponding manual for information on the elements of the OP17.

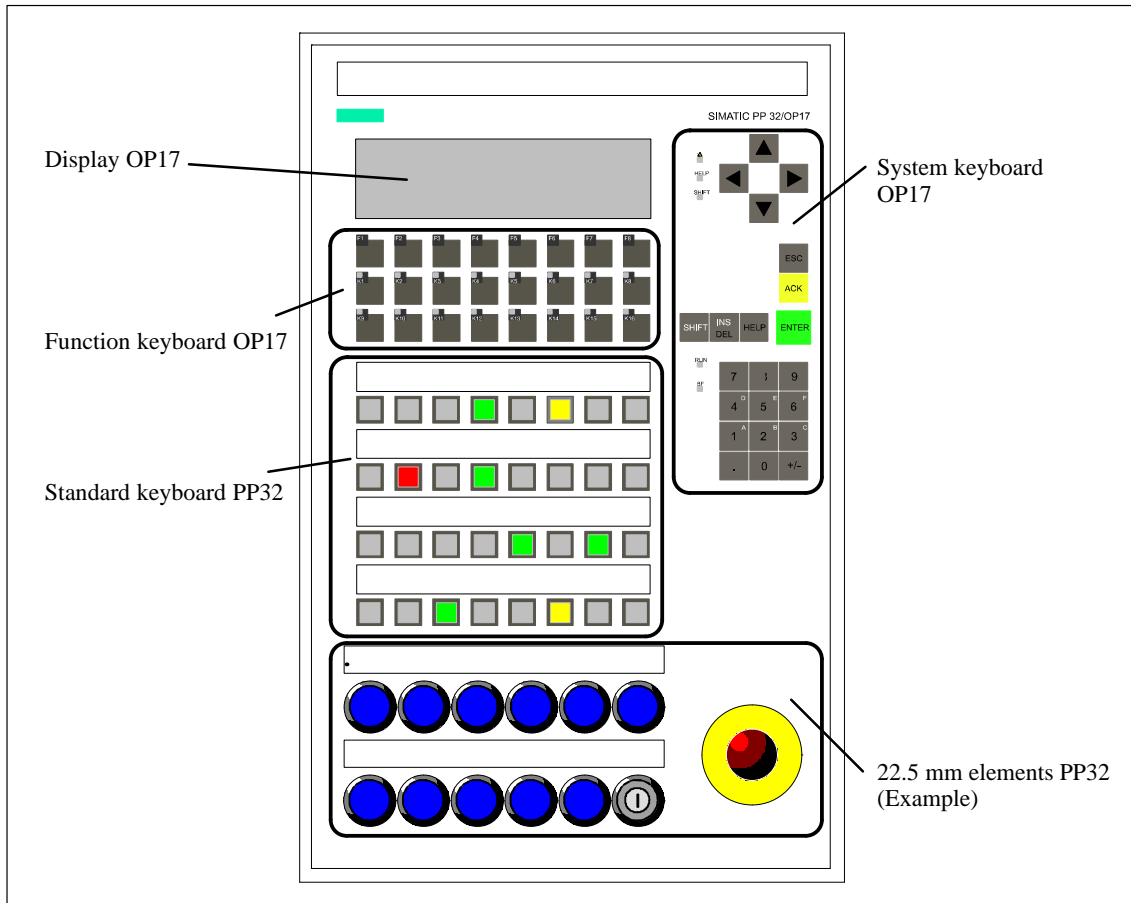


Figure 1-1 Front view, OEM PP32/OP17

Standard operating and display elements

The Push Button Panels are all equipped with a keyboard containing short-stroke keys. The individual keys can be configured in respect of their function as either switches or keys.

Function momentary–contact switch:

The corresponding bit in the PLC is set as long as the key is pressed.

Function switches:

Pressing the key sets the corresponding bit, pressing again resets it.

Two LEDs are integrated in the keys and are used to display the bit status of the connected PLC. The LEDs can indicate four different statuses, one of which can be defined via parameters.

Operating concept

All the operating elements of the Push Button Panels are linked to bits in the PLC. The keys on the Push Button Panel can be used to influence the bits in the PLC and thus control the affect of processes. At the same time, the LEDs indicate the bit status of the PLC and, thus, the operating status of the process being monitored.

When several keys are pressed simultaneously, it is detected by the Push Button Panel and the bits are set in the PLC. After restarting the system following a power failure, all the bits are set to 0.

Digital inputs and outputs

Additional 22.5 mm elements can be connected using the digital inputs and outputs. Non-connected digital inputs are automatically set to 0.

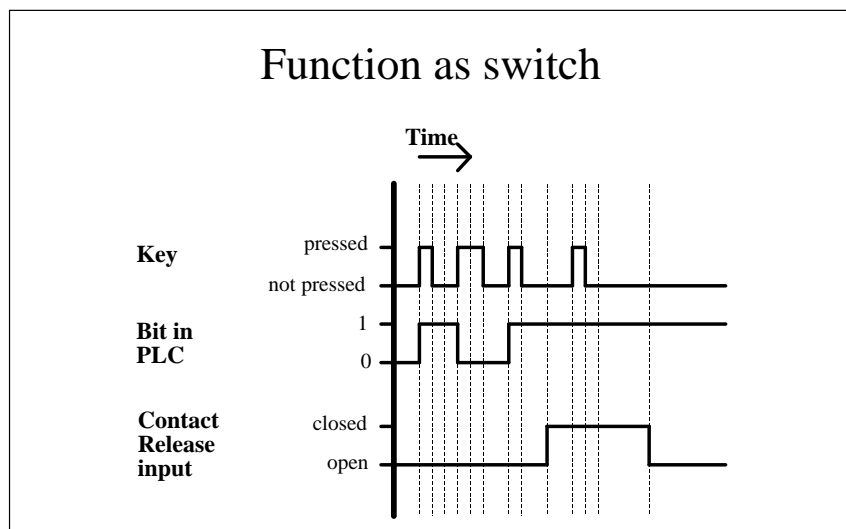
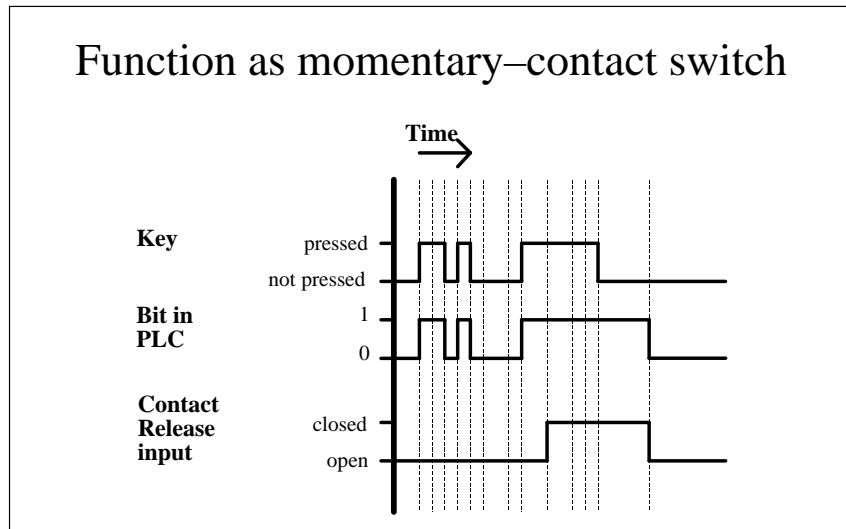
Release input

The release input serves to lock the Push Button Panel. A key-operated switch can be connected here, for example. The release input permits switching between normal operation (open contact) and monitoring mode (closed contact). In normal operation, all the functions on the Push Button Panel are available for use, whereas in monitoring mode, the following restrictions are valid

- the inputs are locked, no signal exchanges are reported to the PLC,
- the last status of all the keys is maintained by the PLC until normal operation returns.

Pulse diagrams

The following pulse diagrams elucidate the relationship between the actions initiated on the Push Button Panel and changing bit status in the PLC:



Lamp/Key test

The Lamp/Key test serves to test the functional capability of all the keys and lamps on the Push Button Panel. The Lamp/Key test can be activated by the following measures in normal operation:

- By pressing the key assigned to the Lamp/Key test function by the corresponding parameter.
- By setting the two LED bits of the key assigned to the Lamp/Key test function according to the configuration. The bits must be set in the PLC using a relevant program.

The Lamp/Key test function is assigned to Key 1 (top right) in the pre-adjusted system settings.

On activating the Lamp/Key test, the unit switches to the corresponding operating mode. In this case

- the BF LED flashes,
- the LEDs integrated in the Push Button Panel keyboard are activated,
- all the Push Button Panel digital outputs are set to 1.

After pressing any key when in operating mode Lamp/Key test,

- the LED/lamps go out for the period in which the key is pressed,
- all the Push Button Panel digital outputs are set to 0.

This is valid for the period in which the key is pressed. All the keys and digital inputs can be tested in this way.

In order that no unwanted signals are transmitted to the PLC during the Lamp/Key test, the following restrictions are valid in respect of Push Button Panel operation:

- the inputs are locked, no signal exchanges are reported to the PLC,
- the last status of all the keys is maintained by the PLC until normal operation returns.

The last key operation reported to the PLC is the pressing of the Lamp/Key test button.

To terminate the Lamp/Key test,

- release the corresponding key, or
- reset the corresponding bits in the PLC

The unit returns to normal operation and the restrictions regarding the Push Button Panel operation are released.

2

Starting Up the Push Button Panel

The following section provides help regarding the configuration possibilities of the Push Button Panel. Connection type MPI is pre-selected in the system settings.

MPI connection

The system settings for the MPI connection are:

MPI address:	3
Baud rate:	187.5 Kbaud
Data area type:	Marker byte
Memory word:	100
Configuring data block:	0
PLC address:	2
PLC type:	300 (S7-300)
Highest station address:	126
Number of MPI masters:	1

The following table provides an overview of the possibilities for modifying the defined system settings:

Intention	Procedure	Chapters
Modify MPI address	Set MPI address on Push Button Panel	2.1
Change baud rate	Change baud rate on Push Button Panel	2.1
Change data area type	Change data area type on Push Button Panel	2.1
Configure Push Button Panel properties which deviate from pre-adjusted system settings	Set up configuring data block in the PLC	2.3.1
	Set parameter	2.3
	Set the number of the configuring data block on the Push Button Panel	2.1

PROFIBUS-DP connection

The system settings for the PROFIBUS-DP connections are:

DP slave address: 3
Baud rate: 1500 Kbaud

The following table provides an overview of the possibilities for modifying the defined system settings:

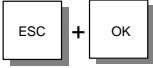






Intention	Procedure	Chapters
Set connection type DP	Set connection type DP on the Push Button Panel	2.1
Change DP slave address	Change the DP slave address on the Push Button Panel	2.1
Change baud rate	Change baud rate on Push Button Panel	2.1
Configure Push Button Panel properties which deviate from pre-adjusted system settings	Set parameter in the configuration software	2.3

2.1 Configure Interface to PLC on the Push Button Panel

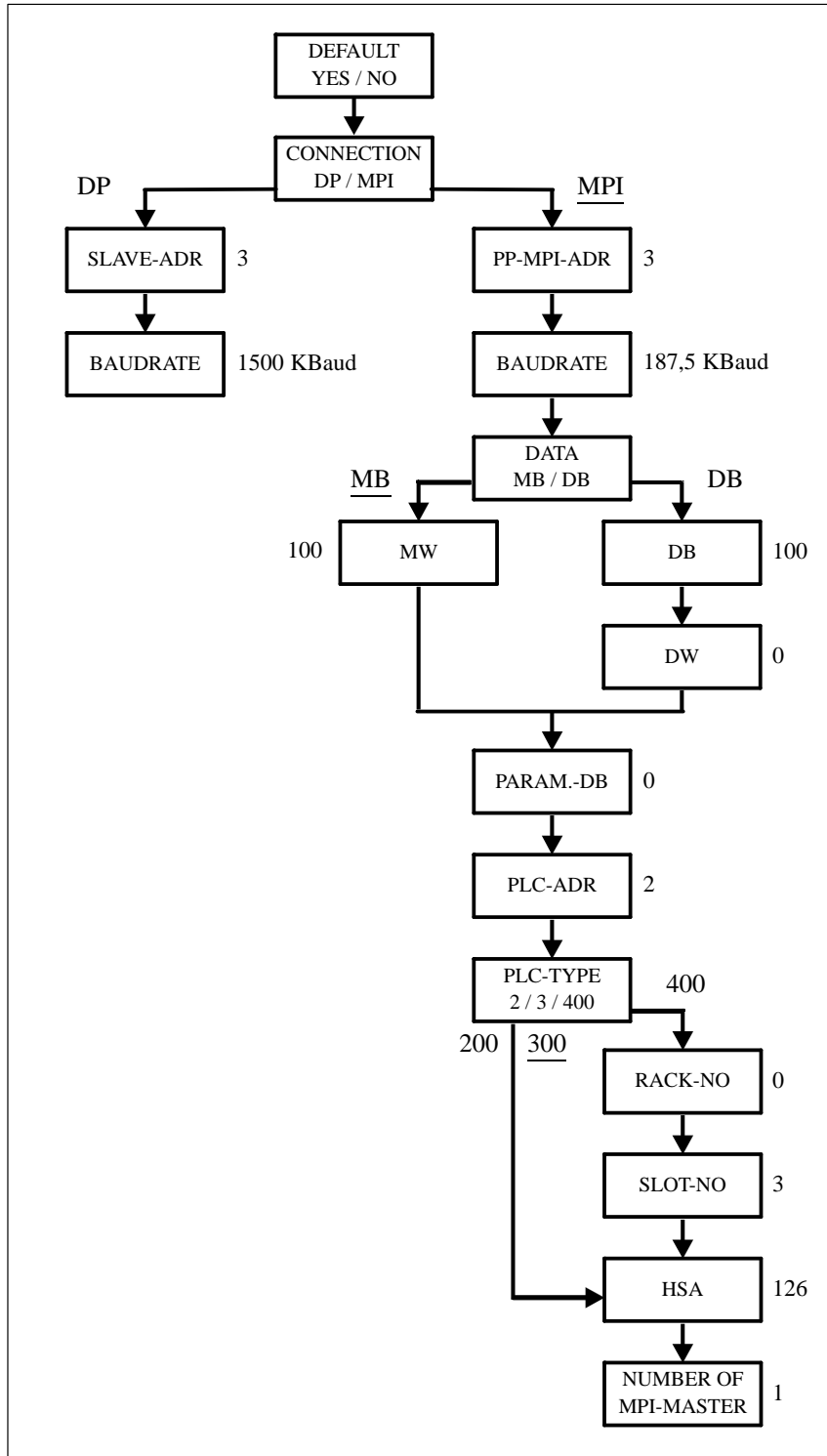
Calling in and operating configuration mode

The settings of the interface to the PLC are menu-controlled and can be defined via the rear side display of the Push Button Panel. The so-called configuration mode is provided for this.

All the parameters concerning the interface to the PLC are stored in the Push Button Panel memory module. In cases where the unit electronics or the entire unit are replaced, the interface need not be reconfigured. Only the old memory module needs to be transferred to the new unit.

Key	Description
	If this key combination is pressed while the unit is starting up (directly after switching on), the unit enters configuration mode.
	In configuration mode, this key serves to store a modification in the current menu level and skip forward to the next menu level. The key has no function in the bottom menu level.
	In configuration mode, this key serves to skip back to the superordinated menu level. The key has no function in the top menu level. Caution: Any modifications carried out to the settings in the current menu level are not stored.
	In configuration mode, this key serves to skip forward to the next menu level. The key has no function in the bottom menu level. Caution: Any modifications carried out to the settings in the current menu level are not stored.
	In configuration mode, this key serves to scroll upwards through the alternatives within a menu level.
	In configuration mode, this key serves to scroll downwards through the alternatives within a menu level.
	This key serves to exit from configuration mode. The current settings are stored. The key can be operated in any menu level.

The following menu structure is displayed in configuration mode (the numeric values and underlined alternatives indicate the predefined system settings):



Refer to the following table for the significance of the various menu items:

Name	Explanation
DEFAULT	Used to select whether all the parameters should be reset to the predefined system settings values.
CONNECTION DP / MPI	Used to select the system connection type. Either MPI or PROFIBUS-DP.
SLAVE-ADR	Defines the slave address of the Push Button Panel in the PROFIBUS-DP system.
PP-MPI-ADR	Defines the MPI address of the Push Button Panel.
BAUDRATE	Defines the baud rate for data transmission using connection type MPI or PROFIBUS-DP in Kbaud.
DATA MB / DB	Used to select whether the data area for the Push Button Panel is created as a Memory Byte (MB) or Data Block (DB).
MW	Defines the number of the first, reserved memory word for the Push Button Panel.
DB	Defines the number of the data block in which the data area for the Push Button Panel is reserved.
DW	Defines the number of the first, reserved data word for the Push Button Panel in the data block.
PARAM.-DB	Defines the number of the configuring data block.
PLC-ADR	Defines the address of the PLC to which the Push Button Panel is connected.
PLC-TYPE 2 / 3 / 400	Used to select the type of PLC to which the Push Button Panel is connected.
RACK-NO	Defines the number of the rack in which the PLC is installed.
SLOT-NO	Defines the number of the slot within the rack.
HSA	Defines the highest station address within the MPI system. The highest station address must correspond to the setting in the MPI network.
NUMBER OF MPI-MASTER	Defines the number of the MPI master in the system.

2.2 Define Configuration in PLC

2.2.1 MPI Connection

If connection type MPI is used for the Push Button Panel, no hardware configuration is necessary. Only the MPI address needs to be set on the Push Button Panel.

Interrelated memory areas must be set up in the PLC for the keys, LEDs and digital inputs and outputs. The following table indicates the length of the memory areas to be set up for the various unit versions.

Memory area	OEM PP32	OEM PP32/OP17
Keys	4 Bytes	
Digital inputs	2 Bytes	
LEDs	8 Bytes	
Digital outputs	4 Bytes	
Total	18 Bytes	

In order to modify system settings, a data block must be created in the PLC which contains the configuration data for the Push Button Panel. The structure of this data block parameter is illustrated in Chapter 2.3.1. The number of the configuring data block must be specified when configuring the Push Button Panel.

2.2.2 PROFIBUS-DP Connection

When connection type PROFIBUS-DP is used, the Push Button Panel must be installed in the PROFIBUS configuration software as a slave in the network. In the case of SIMATIC S5, the configuration software used is COM-PROFIBUS, and SIMATIC S7 connection to the network is performed via HW-CONFIG. The configuration software defines the following:

- station address,
- separate starting addresses for the I/O areas used,
- and the configuration of the buttons and LEDs.

Ensure that the same station address is specified that is set on the Push Button Panel.

The special GSD files transfer information concerning the Push Button Panel to the configuration software COM-PROFIBUS (SIMATIC S5) and HW-CONFIG (SIMATIC S7). Older versions of the configuration software do not contain these GSD files. For this reason, a disk is enclosed with the manual which contains the current GSD files for the Push Button Panel.

Please refer to the following table for the GSD files to be used with your Push Button Panel.

Push Button Panel	Procedure
OEM PP32	Use the GSD files from Push Button Panel PP17-II.
OEM PP32/OP17	Use the GSD files from Push Button Panel PP17-II.

The following procedure is recommended in respect of the GSD files:

Step					
1	Check whether your system is already provided with the special GSD file required for your Push Button Panel. To do this, call in the configuration software COM-PROFIBUS (SIMATIC S5) or HW-CONFIG (SIMATIC S7).				
	<table border="1"> <tr> <td>COM-PROFIBUS (SIMATIC S5)</td> <td>Check whether an entry exists in the hardware family <i>SIMATIC</i> or <i>SIMATIC PP</i> for your Push Button Panel.</td> </tr> <tr> <td>HW-CONFIG (SIMATIC S7)</td> <td>Check whether an entry exists in the hardware catalog under <i>PROFIBUS-DP/ ADDITIONAL FIELD DEVICES/ SIMATIC</i> for your Push Button Panel.</td> </tr> </table>	COM-PROFIBUS (SIMATIC S5)	Check whether an entry exists in the hardware family <i>SIMATIC</i> or <i>SIMATIC PP</i> for your Push Button Panel.	HW-CONFIG (SIMATIC S7)	Check whether an entry exists in the hardware catalog under <i>PROFIBUS-DP/ ADDITIONAL FIELD DEVICES/ SIMATIC</i> for your Push Button Panel.
	COM-PROFIBUS (SIMATIC S5)	Check whether an entry exists in the hardware family <i>SIMATIC</i> or <i>SIMATIC PP</i> for your Push Button Panel.			
	HW-CONFIG (SIMATIC S7)	Check whether an entry exists in the hardware catalog under <i>PROFIBUS-DP/ ADDITIONAL FIELD DEVICES/ SIMATIC</i> for your Push Button Panel.			
If the corresponding entry already exists, the system already contains the GSD files. In this case, skip the points 2 and 3 of these instructions.					
2	If the respective entry is not available in COM-PROFIBUS (SIMATIC S5) or HW-CONFIG (SIMATIC S7), the GSD files relevant to your Push Button Panel must be loaded in the system. The GSD files for the Push Button Panels are contained on the disk enclosed with this manual.				

Step		
	COM-PROFIBUS (SIMATIC S5)	Copy: 1. all the files from directory GSD on the disk to subdirectory GSD in the COM-PROFIBUS installation, and 2. all the files from directory BITMAPS on the disk to subdirectory BITMAPS in the COM-PROFIBUS installation.
	HW-CONFIG (SIMATIC S7)	Copy: 1. all the files from directory GSD on the disk to the path S7DATA/GSD in the STEP 7 installation, and 2. all the files from directory BITMAPS on the disk to the path S7DATA/NSBMP in the STEP 7 installation.
3	Update the GSD files available in the system.	
	COM-PROFIBUS (SIMATIC S5)	Select the command <i>Update DDB Files</i> from the menu <i>File</i> .
	HW-CONFIG (SIMATIC S7)	Select the command <i>Update DDB Files</i> from the menu <i>Options</i> .

After the GSD files have been correctly integrated in the system, the Push Button Panel can be used in your configuration.

2.3 Configuring Keys/LEDs

The switches and keys need only be configured when a configuration deviating from the predefined system settings is required.

The following parameters can be adjusted for the Push Button Panel:

Parameter	Description
Pulse extension	The signal pulse regarding all operations initiated by pressing buttons on the PLC is extended in order to ensure reliable switch/key polling by the PLC even when pressed very briefly.
	The extension of the signal pulse results from: Pulse = Entered value x 20 ms
	Value range: 0 to 50
	System default setting: No pulse extension
Lamp/Key test	A key on the keyboard is assigned for activating the Lamp test. The parameter indicates the number of the key which is assigned the Lamp test function. The keys are numbered from right to left, in rows, beginning at the top right moving down. The value 0 deactivates the Lamp test.
	Value range: 0 to total number of keys
	System default setting: Lamp test assigned to Key 1 (top right)
Function keys	It is possible to define whether a key on the keyboard should function as a key or switch.
	Function momentary–contact switch: The corresponding bit in the PLC is set as long as the key is pressed.
	Function switch: Pressing the key sets the corresponding bit, pressing again resets it.
	The way in which each key functions is defined by a single bit. The keys are numbered from right to left, in rows, beginning at the top right moving down, so that the first bit in the configuration is designated for the key at the top right and the last bit for the key at the bottom left.
	Bit = 0: Function momentary–contact switch
Bit = 1: Function switch	
	System default setting: All the keys are configured as keys.

Parameter	Description																								
Function of digital inputs	<p>Analog to the functionality of the keys on the keyboard, the functioning of the digital inputs is defined here. The digital inputs on the rear side of the Push Button Panel are counted from top to bottom. Here, too, the way each input functions is defined by a single bit.</p> <p>System default setting: All digital inputs are configured as momentary-contact switch.</p>																								
LED mode	<p>Two control bits are reserved in successive bytes for configuring the mode of an LED. The diagram below clarifies the position of the control bits in a memory byte or data block.</p> <div style="text-align: center;"> </div> <p>Two successive configuration bits in one configuring data block define the way in which the status of the control bits are displayed. The following table illustrates the effects of the various combinations of configuration bits on the LED display:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Configuration bits</th> <th>Control bits</th> <th>LED</th> </tr> </thead> <tbody> <tr> <td>xx</td> <td>00</td> <td>off</td> </tr> <tr> <td>xx</td> <td>01</td> <td>lights green</td> </tr> <tr> <td>xx</td> <td>10</td> <td>lights red</td> </tr> <tr> <td>00</td> <td>11</td> <td>flashes green</td> </tr> <tr> <td>01</td> <td>11</td> <td>lights orange</td> </tr> <tr> <td>10</td> <td>11</td> <td>flashes red</td> </tr> <tr> <td>11</td> <td>11</td> <td>flashes orange</td> </tr> </tbody> </table> <p>System default setting: Configuration bits = 00</p>	Configuration bits	Control bits	LED	xx	00	off	xx	01	lights green	xx	10	lights red	00	11	flashes green	01	11	lights orange	10	11	flashes red	11	11	flashes orange
Configuration bits	Control bits	LED																							
xx	00	off																							
xx	01	lights green																							
xx	10	lights red																							
00	11	flashes green																							
01	11	lights orange																							
10	11	flashes red																							
11	11	flashes orange																							
Function of digital outputs	<p>The following table describes the effects of various combinations of control bits on the behaviour of the digital outputs:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Control bits</th> <th>Behaviour of digital outputs</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>No signal</td> </tr> <tr> <td>01</td> <td>Continuous signal</td> </tr> <tr> <td>10</td> <td>Signal in clock pulse 2 Hz</td> </tr> <tr> <td>11</td> <td>Signal in clock pulse 0.5 Hz</td> </tr> </tbody> </table>	Control bits	Behaviour of digital outputs	00	No signal	01	Continuous signal	10	Signal in clock pulse 2 Hz	11	Signal in clock pulse 0.5 Hz														
Control bits	Behaviour of digital outputs																								
00	No signal																								
01	Continuous signal																								
10	Signal in clock pulse 2 Hz																								
11	Signal in clock pulse 0.5 Hz																								

2.3.1 Configuring Keys/LEDs When Using MPI Connection

The structure of this configuring data block is depicted in the following table. In order to simplify the creation of such a data block, library elements for STEP 7 are available. These are contained in directory UDT on the disk enclosed with this manual.

	Entry for OEM PP32	Entry for OEM PP32/OP17
Byte 0		0
Byte 1		0
Byte 2		P
Byte 3		P
Byte 4		1
Byte 5		7
Byte 6		4
Byte 7		8
Byte 8		2
Byte 9		4
Byte 10		0
Byte 11		0
Byte 12		Pulse extension
Byte 13		Lamp test key
Byte 14		Function: key 1-8
Byte 15		Function: key 9-16
Byte 16		Function: of key 17-24
Byte 17		Function: key 25-32
Byte 18		Function: digital input 1-8
Byte 19		Function: digital input 9-16
Byte 20		Mode: LED 1-4
Byte 21		Mode: LED 5-8
Byte 22		Mode: LED 9-12
Byte 23		Mode: LED 13-16
Byte 24		Mode: LED 17-20
Byte 25		Mode: LED 21-24
Byte 26		Mode: LED 25-28
Byte 27		Mode: LED 29-32

2.3.2 Configuring Keys/LEDs When Using PROFIBUS-DP Connection

After having loaded the GSD files in the system, as described in Chapter 2.2, the configuration software COM-PROFIBUS (SIMATIC S5) or HW-CONFIG (SIMATIC S7) can be used to define all the settings for the Push Button Panel.

COM-PROFIBUS Call in dialog box *Slave properties* by double clicking on the PP symbol. When it appears, click on button *Configure*.

HW-CONFIG Select property page *Configure* in dialog box *Object properties*.

2.4 Coordinating the Push Button Panel and PLC

Introduction

In the case of connection type MPI, so-called control and acknowledgment bits are provided for the coordination between the Push Button Panel and PLC. They are used for the following functions:

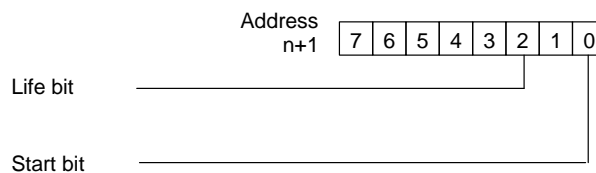
- Detection of Push Button Panel startup by the S7 program
- Analysis of Push Button Panel life bit by the S7 program
- Polling error information in the S7 program

The control and acknowledgment bits are set in the first and second byte of the configuring data block. In order to use the above mentioned functions, a configuring data block must be created, as described in Chapter 2.3.1.

The first byte is reserved.

Description Byte n+1

The figure below illustrates the structure of byte n+1. The individual bits are described underneath the figure.



Bit 0 **Start bit:** 1 = Push Button Panel has started up
The bit is set by the Push Button Panel on completion of startup. You can reset the bit via the S7 program and thus detect if the OP is restarted.

Bit 2 **Life bit :**
The life bit is set from 0 to 1 by the Push Button Panel. You can cyclically reset the bit via the S7 program to detect whether the connection to the Push Button Panel still exists.

Control Bit Assignment

This chapter explains the relationship between the control bits and the keys and LEDs assigned to them on the Push Button Panels.

The following figures clarify the numeration of keys, LEDs and digital inputs/ outputs on the Push Button Panel, and their links to bits in the PLC.

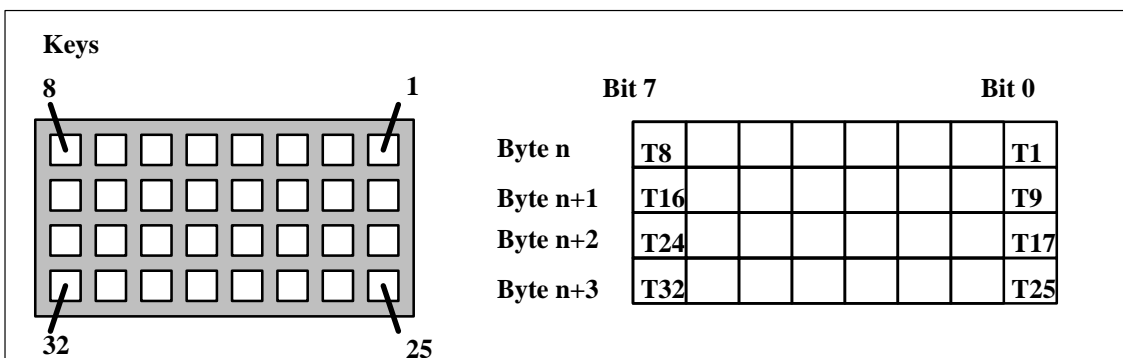


Figure 3-1 Numeration of keys on the Push Button Panel

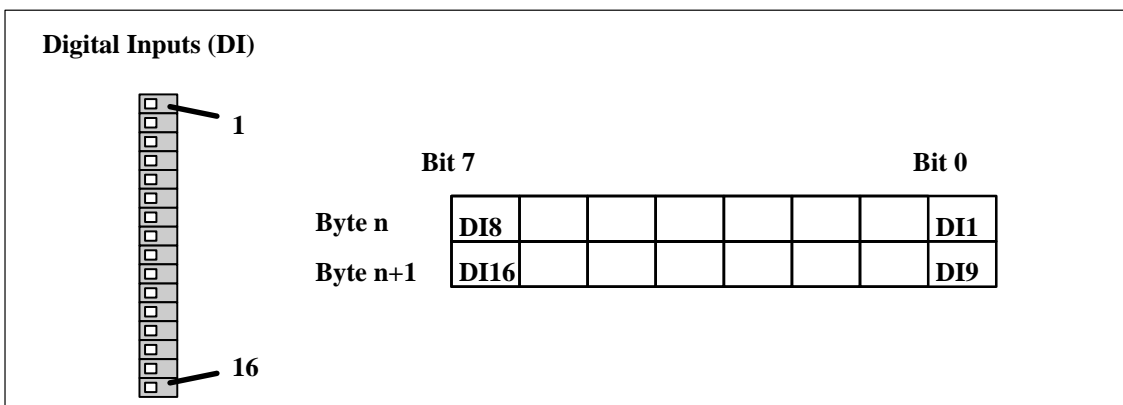


Figure 3-2 Numeration of the digital inputs on the Push Button Panel

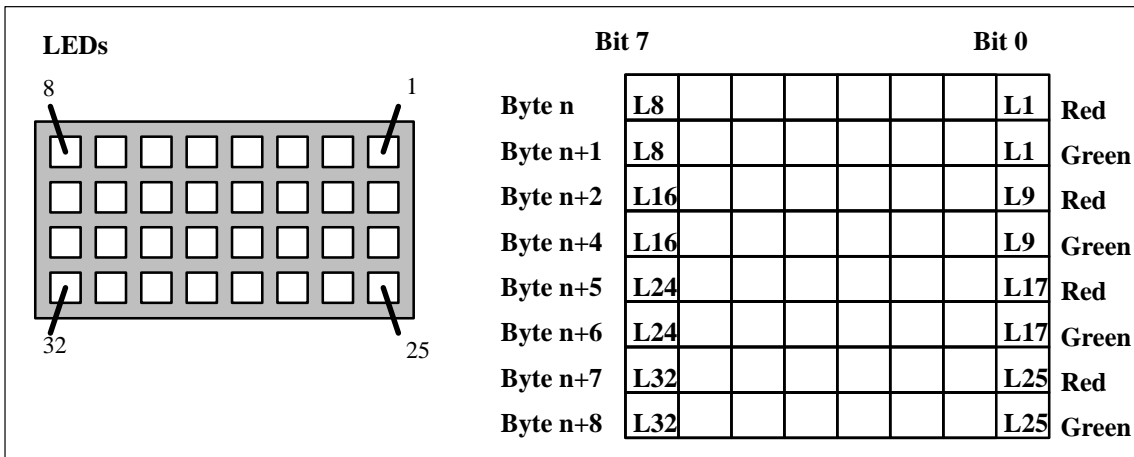


Figure 3-3 Numeration of the LEDs on the Push Button Panel

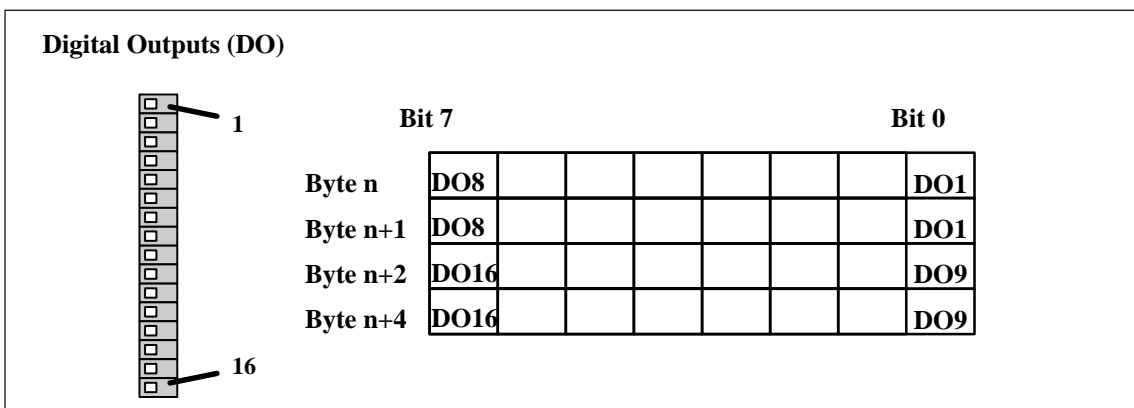


Figure 3-4 Numeration of the digital outputs on the Push Button Panel

The following table indicates the data area for keys, LEDs, digital inputs and digital outputs of the Push Button Panel in the PLC:

Data area	OEM PP32	OEM PP32/OP17
Keys	4 Bytes	
Digital inputs	2 Bytes	
LEDs	8 Bytes	
Digital outputs	4 Bytes	
Total	18 Bytes	

A data area for the entire length must be set up, even when the full functional capacity of the unit is not used.

The following figure illustrates the structure of the data block or marker byte in the PLC to which the Push Button Panel is assigned in an example of an MPI connection. It is important to note that two control bits are assigned to each LED and each output, and the bits are distributed on successive bytes. The combination of these bits determines the appearance of the LED or display element.

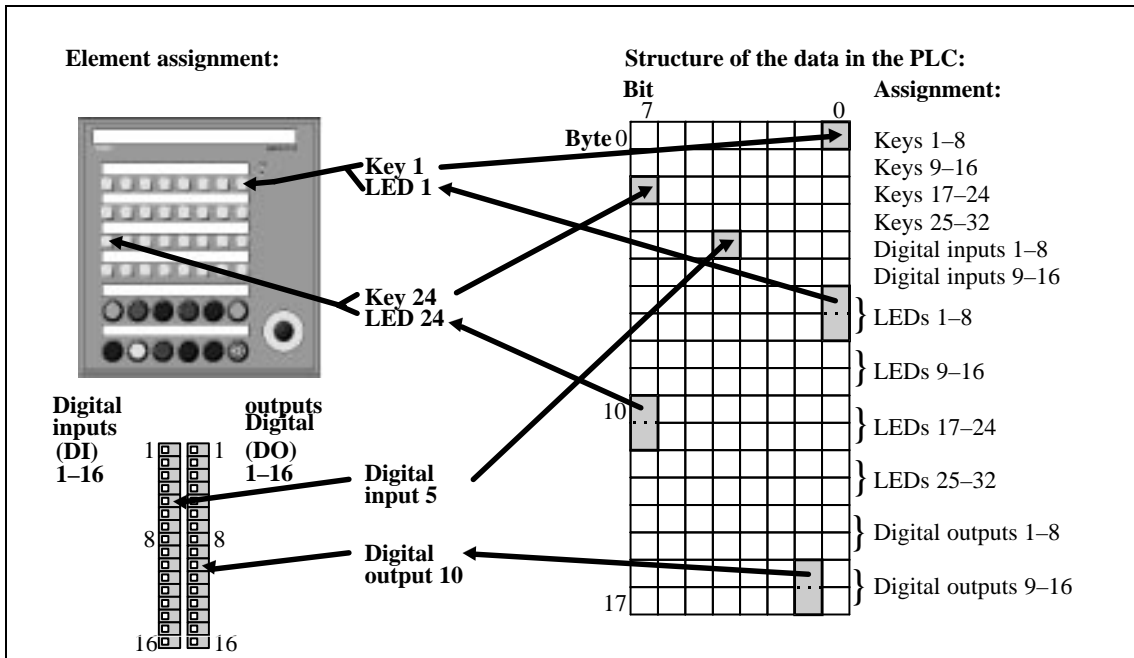


Figure 3-5 Control bits for OEM PP32 and OEM PP32/OP17

When a PROFIBUS-DP connection is used, the data blocks represented in Figure 3-5 can be assigned separate starting addresses corresponding to the inputs/outputs.

Installation

4

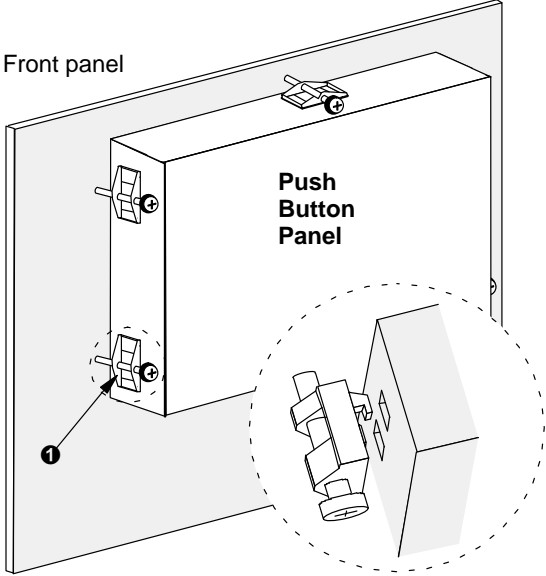
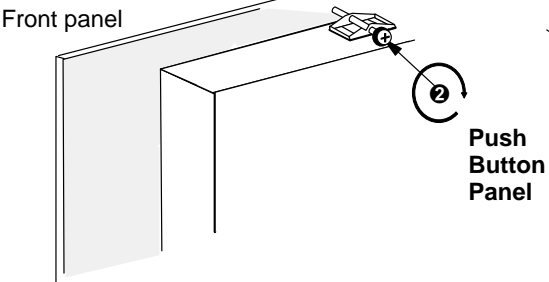
Degree of Protection



Caution

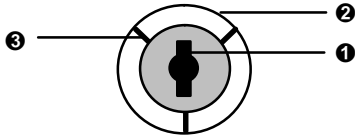
- The Push Button Panel must be brought to room temperature before it is commissioned. If condensation forms, do not switch the Push Button Panel on until it is absolutely dry.
 - To prevent the Push Button Panel overheating during operation, ensure the air vents in the housing are not covered following installation.
 - The Push Button Panel was function-tested before shipping. If a fault occurs however, please enclose a full account of the fault when returning the unit.
-

Mechanical installation of the Push Button Panel

Step	Action
1	Insert the Push Button Panel from the front in the mounting cut-out provided.
2	<p>Insert the retaining hooks of the five enclosed screw-type clamps ❶ in the corresponding openings in the Push Button Panel housing. Alternative openings are provided on the sides of the Push Button Panel to enable the installation of several units beside each other without leaving any gaps between them.</p> 
3	<p>Secure the Push Button Panel in the front panel ❷ from the rear using a screwdriver. Note:</p> <ul style="list-style-type: none"> – Do not overtighten the screws to avoid damage. 

Front panel thickness: max. 6 mm

Mechanical installation of 22.5 mm elements

Step	Action
1	Select the snap-out opening on the front of the Push Button Panel in which the 22.5 mm element is to be inserted.
2	Cut a slit in the foil on the front side of the Push Button Panel. The slit must be located directly above the elongated hole ❶ in the middle of the selected snap-out opening. Use a sharp knife to slit the foil. 
3	Cut the foil corresponding to outer circumference ❷ of the selected snap-out opening. The round piece of foil, in whose place the 22.5 mm element is to be inserted, is only connected to the remaining foil above the three metal bars ❸. Note: Ensure that the foil on the front side of the Push Button Panel is only cut in the area of the snap-out opening. In this way, the degree of protection of the front surface is retained after the 22.5 mm element has been installed.
4	Insert a screwdriver or similarly appropriate tool from the rear through the elongated hole ❶ in the middle of the selected snap-out hole. Use the screwdriver to lever the metal piece out where the 22.5 mm element is to be inserted.
5	Cut the foil corresponding to the opening which appears in the front section of the Push Button Panel.
6	Insert the 22.5 mm element in the opening in the front of the Push Button Panel.

EMC compatible design

The basis for interference-free operation is EMC hardware design of the PLC and the use of interference-proof cables. The guidelines on the interference-free design of the PLC apply equally to the installation of the Push Button Panel.



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.

Cable

All MPI and DP bus cables can be used.


Voltage supply



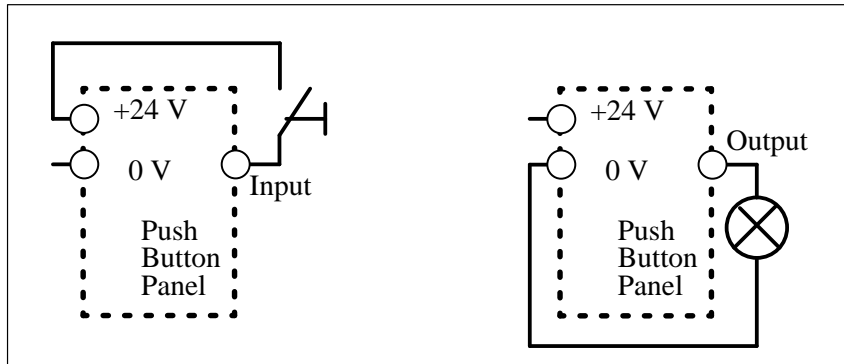
Caution

- When using a 24 V supply, ensure that the extra-low voltage is safely isolated.
 - The supply voltage must be within the specified voltage range. Voltages outside this range may cause malfunctions.
-

Grounding connection

Connect the grounding connection  of the Push Button Panel to the cabinet ground. To do this, use the grounding screw supplied with the Push Button Panel.

Connection of additional display and operating elements

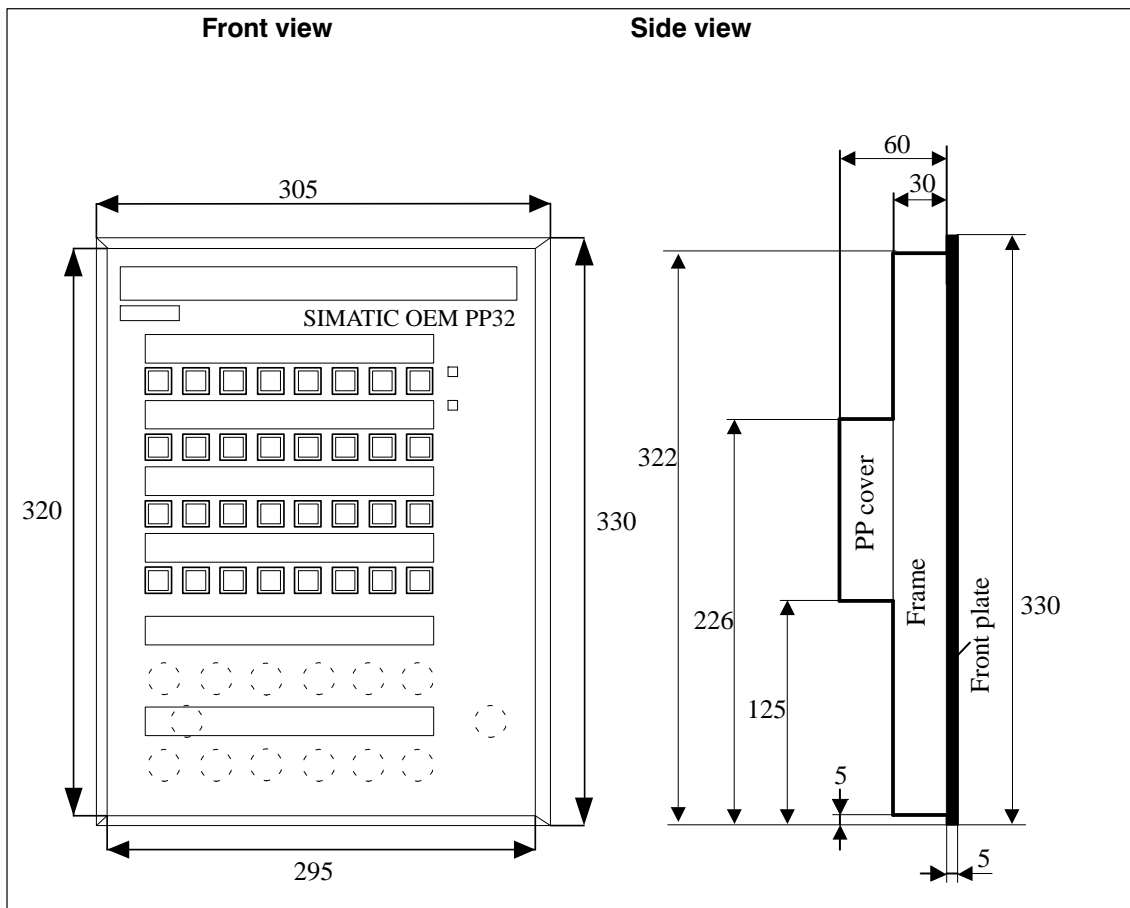


Warning

No safety-related functions may be realized using the Push Button Panel.

Unit Description OEM PP32

Unit dimensions



Mounting cut-out

The OEM PP32 requires a mounting cut-out (WxH) of 290 mm x 318,5 mm.

Note

The installation depth of the Push Button Panel is dependent on the type of connection cable to the PLC. It does not correspond to the outer dimensions of the unit. Ensure the cable has a sufficient bending radius.

Rear view

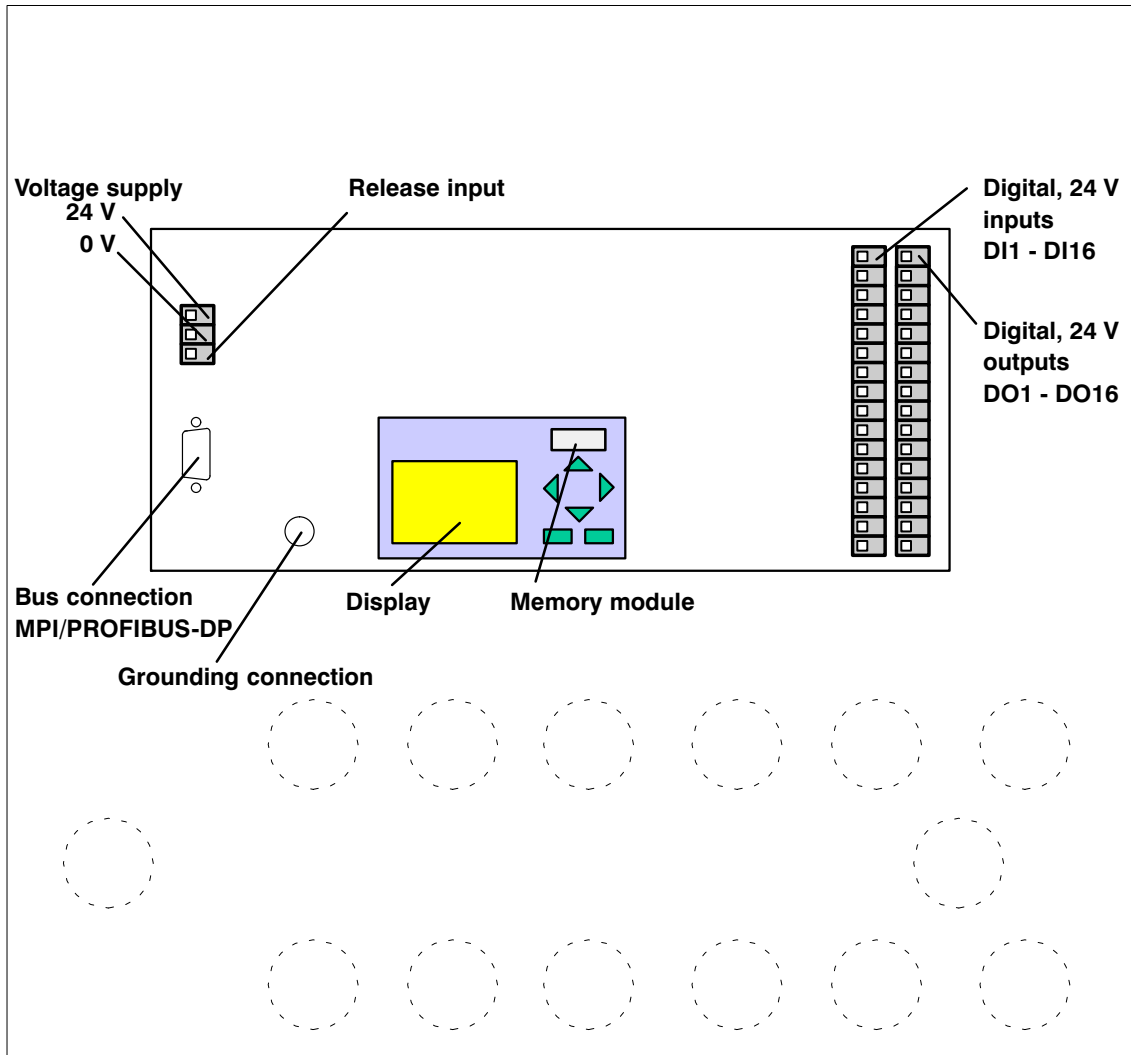
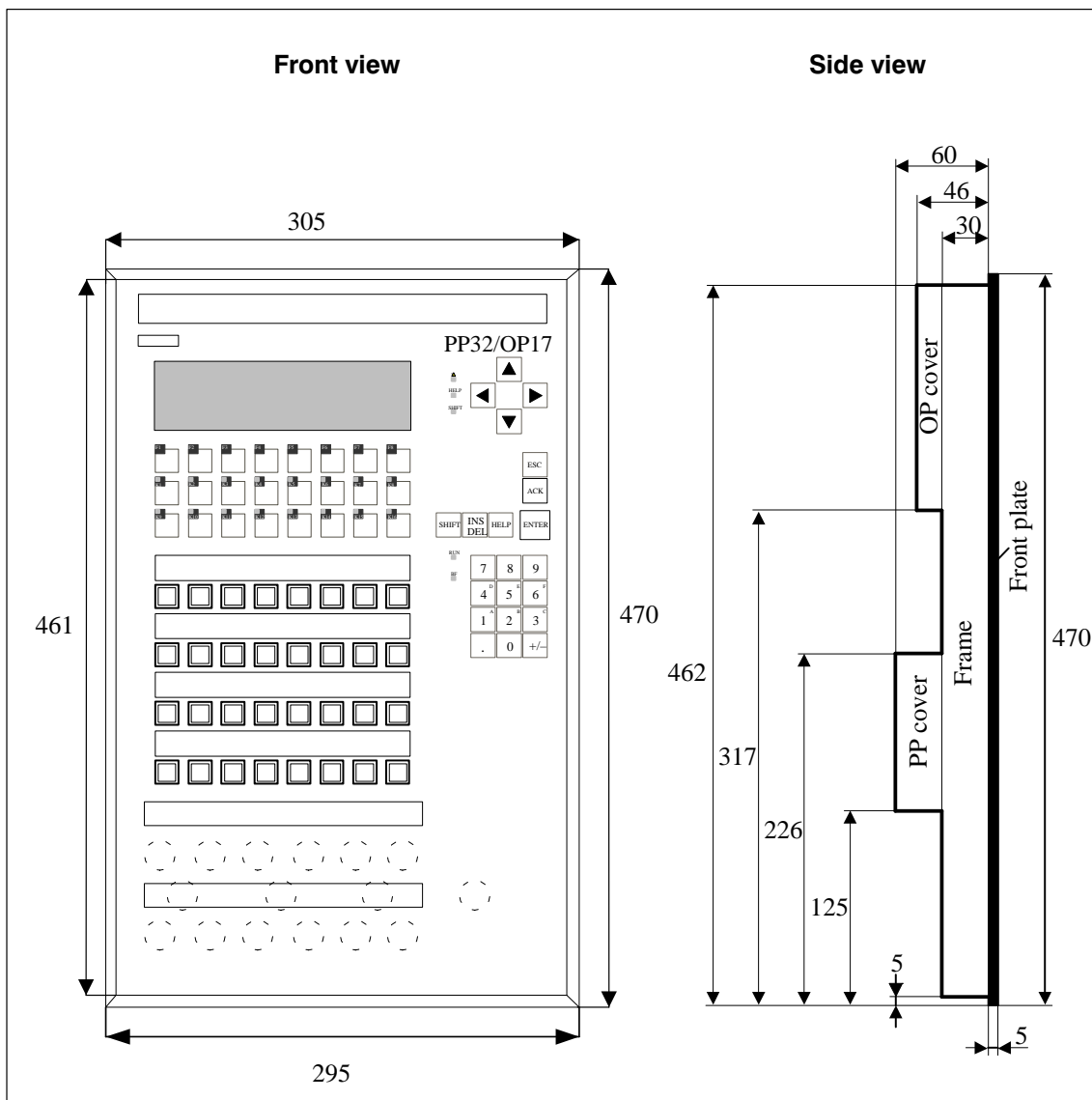


Figure 5-1 Assignment of elements on the rear side of the OEM PP32

Unit Description OEM PP32/OP17

Unit dimensions



Mounting cut-out

The OEM PP32/OP17 requires a mounting cut-out (WxH) of 290 x 458 (all specifications in mm).

Note

The installation depth of the Push Button Panel is dependent on the type of connection cable to the PLC. It does not correspond to the outer dimensions of the unit. Ensure the cable has a sufficient bending radius.

Rear view

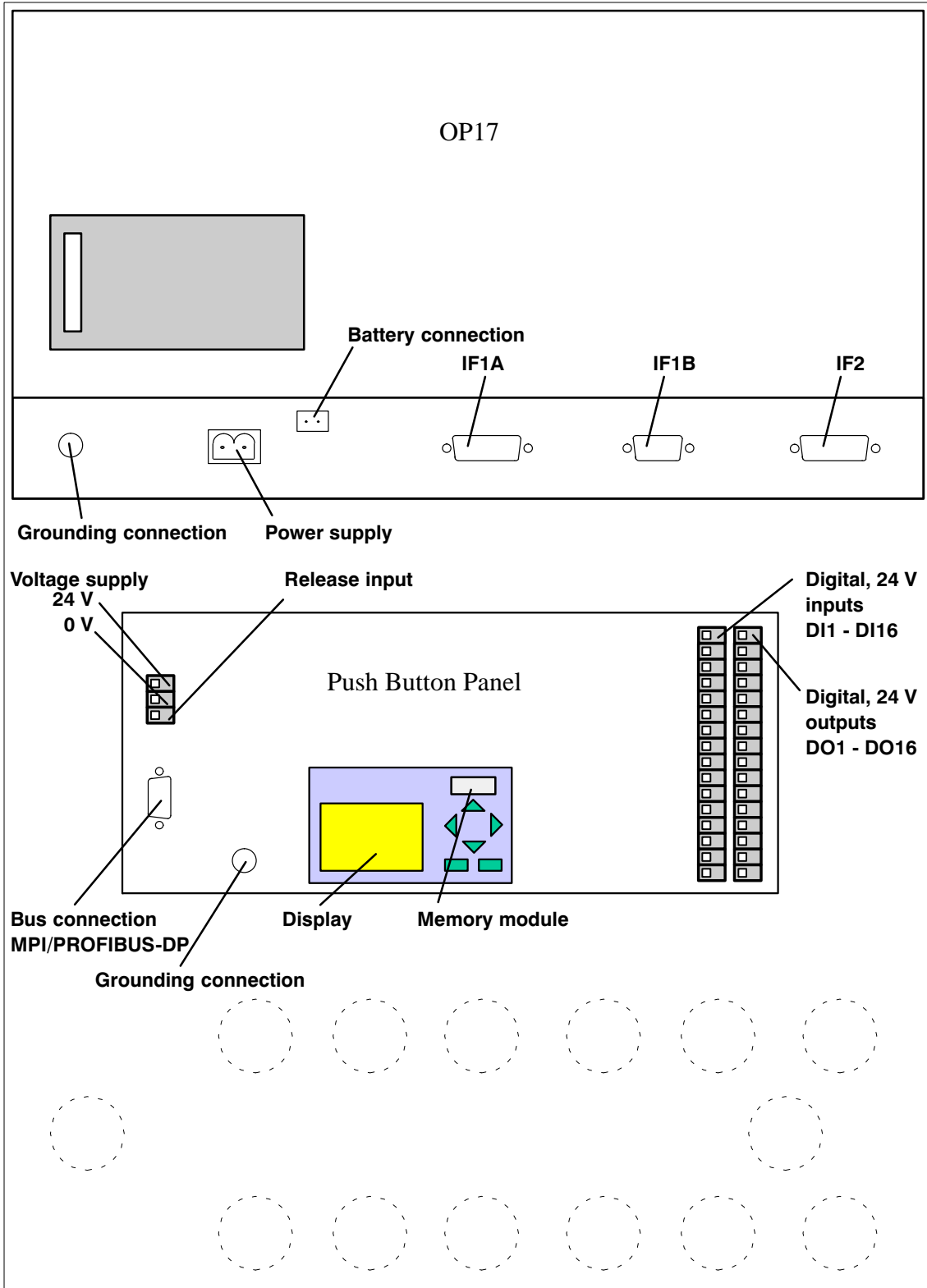


Figure 6-1 Assignment of elements on the rear side of the OEM PP32/OP17

Attach Labeling Strips

The function of all the keys on the Push Button Panel can be clearly indicated by attaching labeling strips. Standard commercial transparent foil or even normal paper, up to a thickness of 0.25 mm, can be used for this. The labeling strips must be inserted from the rear side of the unit in the openings provided behind the IP65 front panel. The Push Button Panel need not be opened to do this. If the worktop in which the Push Button Panel is less than 1 mm, the labeling strips can be inserted or replaced when in an assembled state. The foil or paper labeling strips can be produced by implementing a commercially available text program and printing out on a standard printer.

The disk supplied with this document contains a directory *SLIDES* in which the file *SLIDES.DOC* is stored. This is a text file in Word for Windows 6.0 format with which the labeling strips for the Push Button Panel can be printed in the correct size.

Labeling strip dimensions

The following table contains the dimensional specifications for producing the labeling strips:

Size	OEM PP32	OEM PP32/OP17
Labeling strip length	253.0 mm	
Labeling strip length	15.7 mm	

In order to ease insertion of the labeling strips, the corners can be rounded on the insertion side.

Refer to the following figure to determine the position of the inscriptions on the labeling strips. Please note that the diagrams are not true to scale (all specifications in mm).

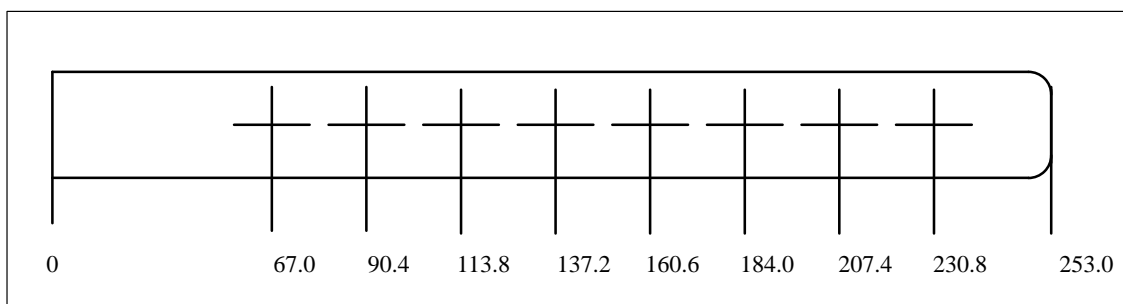


Figure 7-1 Text positions for keyboards OEM PP32 and OEM PP32/OP17

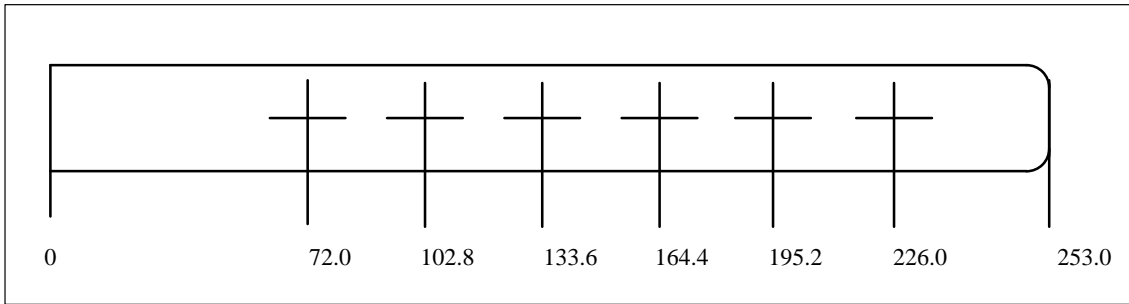


Figure 7-2 Text positions for 22.5 mm elements OEM PP32 and OEM PP32/OP17

Spare Parts

8

The memory module is available as a spare part for for all customized Push Button Panel variants.

All the parameters concerning the interface to the PLC are stored in the Push Button Panel memory module. In cases where the unit electronics or the entire unit are replaced, the interface need not be reconfigured. Only the old memory module needs to be transferred to the new unit.

If the Push Button Panel memory module is defect, the message EEPROM ERR appears in the display in both normal operation and hardware test mode. In this case, the memory module must be replaced.

The complete customized units are not stocked in stores or supply works. Stocking must be carried out by the customer. Customers themselves must provide a stores for units required to prevent, or in the event of, a system shut-down.

With the exception of the OEM PP32 keyboard, no spare parts are available for supply. The OEM PP32 keyboard corresponds to the standard Push Button Panel PP17-II and can be ordered as such.

The supply works is available for repair work. Only the actual repair work is carried out. The customized spare parts must be provided by the customer together with the the customized unit for the repair.

A

Technical Data

A.1 General technical data

Housing	OEM PP32	OEM PP32/OP17
External dimensions W x H x D (mm)	305 x 330 x 65	305 x 470 x 65
Mounting cut-out W x H (mm)	290 x 318.5	290 x 459
Mounting depth (mm)		
<ul style="list-style-type: none"> without bus connector 	60	
<ul style="list-style-type: none"> with angled bus connector Order no.: GES 7972 - 0BB10-0 x 70 	85	
<ul style="list-style-type: none"> with non-angled bus connector Order no.: GGK 1500 - 0EA00 	140	
Degree of protection		
<ul style="list-style-type: none"> Front panel 	IP65	
<ul style="list-style-type: none"> Rear panel 	IP20	
Weight approx. (kg)	Approx. 3.0	Approx. 4.8

24 V voltage supply	OEM PP32	OEM PP32/OP17
Rated voltage (VDC)	+24	
Permissible range (VDC)	+18 to +30	
Typical power consumption at 24 V ¹⁾	0.4 A	OP17 part: 0.4 A PP32 part: 0.4 A
Starting current inrush I^2t	$30 \times 10^{-3} \text{ A}^2\text{s}$	OP17 part: $30 \times 10^{-3} \text{ A}^2\text{s}$ PP32 part: $30 \times 10^{-3} \text{ A}^2\text{s}$
Fuse type, internal	Electronic fuse	
Reverse battery protection	Yes	

¹⁾ Power consumption without load at digital outputs

Ambient conditions	OEM PP32	OEM PP32/OP17
Ambient temperature		
<ul style="list-style-type: none"> In operation 	0 to 55° C	
<ul style="list-style-type: none"> Shipping, storage 	-20 ... 70° C	
Relative humidity		
<ul style="list-style-type: none"> Operation 	v 95%, no condensation	
<ul style="list-style-type: none"> Shipping, storage 	v 95%	

Ambient conditions	OEM PP32	OEM PP32/OP17
Shock loading <ul style="list-style-type: none"> • Operation • Shipping, storage 		15 g/11 msec 25 g/6 msec
Vibration <ul style="list-style-type: none"> • Operation • Shipping, storage 		0.075 mm (10 Hz ... 58 Hz) 1 g (58 Hz ... 500 Hz) 3.5 mm (5 Hz ... 10 Hz) 1 g (10 Hz ... 500 Hz)
Max. pressure difference (front/rear sides)		2hPa
Barometric pressure <ul style="list-style-type: none"> • Operation • Shipping, storage 		706 to 1030 hPa 581 to 1030 hPa

The conformity of the product described with the regulations of Directive 89/336 EEC is proved by compliance with the following standards:

Interference immunity EN 50082-1	OEM PP32	OEM PP32/OP17
Static discharge (contact discharge)		EN 61000-4-2 Class 3
RF irradiation		EN 61000-4-3 Class 3
Pulse modulation		ENV 50204 (900 MHz ... 5 MHz)
RF conduction		ENV 50141 Class 3
Burst interference		ENV 61000-4-4 Class 3

Radio interference EN 50081-2	OEM PP32	OEM PP32/OP17
RFI suppression		EN 55011 Class A

A.2 Digital inputs and outputs

24 V digital inputs	OEM PP32	OEM PP32/OP17
Power supply <ul style="list-style-type: none"> • Rated value • Permissible range • Value at $t < 0.5$ s 		+ 24 V DC +18.0 ... +30.0 V 35 V
Connectable		Key, switch (inductive load not permissible)
Number of inputs		16
Potential isolation from internal circuitry		–
Input voltage <ul style="list-style-type: none"> • Rated value • with signal “0” • with signal “1” 		24 V DC 0 ... 5 V 15 ... 30 V

24 V digital inputs	OEM PP32	OEM PP32/OP17
Input current with signal "1"	Typ. 5 mA at 24 V	
Time delay of inputs	0.3 ms	
Bouncing time	v 10 ms	
Maximum cable length		
<ul style="list-style-type: none"> • with unshielded cables • with shielded cables 	<p style="text-align: center;">1 m</p> <p style="text-align: center;">> 1 m</p>	

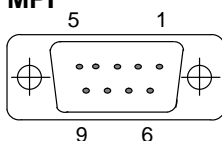
24 V Digital outputs	OEM PP32	OEM PP32/OP17
Number of outputs	16	
<ul style="list-style-type: none"> • in groups of • output DO1 to DO4 • output DO5 to DO8 • output DO9 to DO12 • output DO13 to DO16 	<p style="text-align: center;">4</p> <p style="text-align: center;">Group 1</p> <p style="text-align: center;">Group 2</p> <p style="text-align: center;">Group 3</p> <p style="text-align: center;">Group 4</p>	
Potential isolation	-	
Short circuit protection	Yes	
Permissible loads	<p style="text-align: center;">Resistive</p> <p style="text-align: center;">Lamps</p> <p style="text-align: center;">Inductive</p>	
Max. inductive power	200 mWs	
Output voltage		
<ul style="list-style-type: none"> • with signal "0" • with signal "1" 	<p style="text-align: center;">Max. 2 V (idling)</p> <p style="text-align: center;">Min. voltage supply -3 V</p>	
Output current		
<ul style="list-style-type: none"> • with signal "0" • with signal "1" 	<p style="text-align: center;">Max. 1 mA</p> <p style="text-align: center;">Max. 500 mA per group;</p> <p style="text-align: center;">1 output 200 mA</p> <p style="text-align: center;">and the others 100 mA</p>	
Switching frequency with		
<ul style="list-style-type: none"> • resistive load • lamp load • inductive load 	<p style="text-align: center;">Max. 100 Hz</p> <p style="text-align: center;">Max. 8 Hz</p> <p style="text-align: center;">Max. 0.5 Hz</p>	

24 V Digital outputs	OEM PP32	OEM PP32/OP17
Load current per group <ul style="list-style-type: none"> • aggregate current • on short circuit 	500mA Switch off all DI/DO	
Maximum cable length <ul style="list-style-type: none"> • with unshielded cables • with shielded cables 	1 m > 1 m	

Release input	OEM PP32	OEM PP32/OP17
Potential isolation from internal circuitry	-	
Input voltage <ul style="list-style-type: none"> • Rated value • release on entry • lock on entry 	24 V DC 0 ... 5 V 15 ... 30 V	
Input current with entry locked	Typ. 2 mA at 24 V	

A.3 Interface assignment

Bus connection PROFIBUS-DP MPI



Assignment of the 9-pin Sub-D socket:

Pin	Assignment
1	
2	
3	Data B
4	
5	GND (pot. free)
6	+5V (pot. free)
7	
8	Data A
9	

B

System Messages

Messages during unit start-up

The following message appears in the Push Button Panel display when the unit is starting up:

```
PPxx Vy.y  
START
```

When the start-up routine has been completed and communication with the PLC has begun, the following message appears in the Push Button Panel display:

```
PPxx Vy.y  
READY
```

These messages contain the following information:

xx Unit identification of the Push Button Panel: 7 or 17
y.y Version identification of the Push Button Panel

Error LED signals

The following table should help to determine the cause of Error LED signals:

Signal	Cause	Remedy
LED flashes (Normal operation)	The unit is in Lamp/Key test mode.	Terminate the Lamp test by <ul style="list-style-type: none">releasing the corresponding key, orresetting the corresponding bits in the PLC.
LED lights up (Hardware test mode)	Hardware test mode is displayed.	Restart the unit or terminate Hardware test mode via the menu.
LED lights up (Normal operation)	The unit has detected a communication or hardware error.	Note the error message in the display.






Display messages The following table should help to determine the cause of error messages which appear in the display:

Message	Cause	Remedy
Error message in Hardware Test mode	A defect in the Push Button Panel electronics has been detected.	Return the unit for repair.
EEPROM ERR	The memory module is faulty or not available.	Install a memory module. Replace the current memory module, if necessary.
EEPROM INV	The memory module contains invalid data.	Configure the interface on the Push Button Panel again.
NO PLC	Connection to the PLC cannot be established because <ul style="list-style-type: none"> • a bus cable is faulty, or • the interface configuration is incorrect. 	Check all cables and connections. Check the configuration of the interface on the Push Button Panel.
PP START (PROFIBUS-DP connection)	There is a connection fault.	Check the network configuration and the configuration of the interface on the Push Button Panel.
PP START (MPI connection)	Connection to the defined MPI address cannot be established.	Check the following settings in the Push Button Panel interface configuration: <ul style="list-style-type: none"> • BAUDRATE, • PLC-ADR, • RACK-NO and • SLOT-NO.
NO PAR. DB	The set configuring data block in the PLC is not available.	Create a configuring data block. In order to use the system default settings for keys and LEDs, set PARAM-DB in the Push Button Panel interface configuration to 0.
PARAM ERROR	The configuring data block defined in the PLC contains invalid data.	Check the structure of the configuring data block parameter.
DIAG-ERROR	There is a short circuit in one of the digital outputs.	Check the wiring of the digital outputs.

Hardware Test

Activating and operating Hardware Test mode

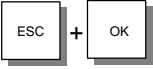


The hardware components of the Push Button Panel can be tested via a menu. The so-called Hardware Test mode mode is provided for this.

Key	Description
 + 	<p>If this key combination is pressed while the unit is starting up (directly after switching on), the unit enters Hardware Test mode. The message <code>Any key to enter display mode</code> appears in the display. Acknowledge it by pressing any key.</p>
	<p>In Hardware Test mode, this key serves the function in the current menu level. The results of the individual tests appear as they are completed:</p> <p>OK: A fault has occurred.</p> <p>ERROR: The functional unit tested is defective.</p>
	<p>In Hardware Test mode, this key serves to skip back to the superordinated menu level. The key has no function in the first menu level.</p>
	<p>In Hardware Test mode, this key serves to skip forward to the next menu level. The key has no function in the bottom menu level.</p>

Exit from Hardware Test mode by switching the unit off or executing the function `TEST END` in the bottom menu level.

Functions in Hardware Test mode

The following functions are available for selection after activating Hardware Test mode:

Function	Display	Comment
EPROM TEST	CHECK SUM xxxxx	Message concerning the valid checksum for the respective firmware version
DISPL TEST	Displays the code of the key pressed	Terminate the function with key combination 
KEYB. TEST	After pressing a key on the keyboard, the corresponding LED lights up orange	Terminate the function with key  or 
EEPROM TEST	EEPROM OK	
ASPC2-TEST	ASPC2 OK	
DIGIO-TEST	DI = xxxxx DO = xxxxx	xxxx = Status of the digital inputs and outputs as hexadecimal values
KEY-TEST	xx	Status of the release input
KEYB. ID	xxxxx	Keyboard identification: PP17-I: 2010 PP17-I: 4020
EXT MODUL	xxxx xxxxx xxxx xxxxx	Extension module identification
TEST END		Terminate Hardware Test mode

Siemens Worldwide

D

In this Appendix

In this appendix you will find a list of:

- All cities in the Federal Republic of Germany with Siemens Sales Offices and
- All European and non-European Siemens Companies and Representatives

Siemens Sales Offices in the Federal Republic of Germany

The following table lists all Siemens Sales Offices in the Federal Republic of Germany.

Aachen	Kassel
Augsburg	Kempen/Allg.
Bayreuth	Kiel
Berlin	Laatzten
Bielefeld	Leipzig
Bonn	Lingen
Bremen	Magdeburg
Brunswick	Mainz
Chemnitz	Mannheim
Coblenz	Munich
Cologne	Münster/Westf.
Constance	Nuremberg
Darmstadt	Osnabrück
Dortmund	Regensburg
Dresden	Rostock
Duisburg	Saarbrücken
Düsseldorf	Siegen
Erfurt	Stuttgart
Essen	Ulm
Frankfurt am Main	Wetzlar
Freiburg	Wilhelmshaven
Hamburg	Wuppertal
Heilbronn	Würzburg
Karlsruhe	

European Companies and Representatives

The following table lists all European Siemens Companies and Representatives.

Austria	Finland
Siemens AG Österreich	Siemens Oy
<ul style="list-style-type: none"> • Bregenz • Graz • Innsbruck • Linz • Salzburg • Vienna 	<ul style="list-style-type: none"> • Espoo, Helsinki
Belgium	France
Siemens S.A.	Siemens S.A.
<ul style="list-style-type: none"> • Brussels • Liège 	<ul style="list-style-type: none"> • Haguenau • Lille, Seclin • Lyon, Caluire-et-Cuire • Marseille • Metz • Paris, Saint-Denis • Strasbourg • Toulouse
Siemens N. V.	
<ul style="list-style-type: none"> • Antwerp 	
Bosnia-Herzegovina	Great Britain
Generalexport Predstavništvo Sarajevo	Siemens plc
<ul style="list-style-type: none"> • Sarajevo 	<ul style="list-style-type: none"> • Birmingham, Walsall • Bristol, Clevedon • Congleton • Edinburgh • Glasgow • Leeds • Liverpool • London, Sunbury-on-Thames • Manchester • Newcastle
Bulgaria	
Siemens AG, Bulgaria Representative	
<ul style="list-style-type: none"> • Sofia 	
Croatia	Greece
Siemens d. o. o.	Siemens A.E.
<ul style="list-style-type: none"> • Zagreb 	<ul style="list-style-type: none"> • Athens, Amaroussio • Thessaloniki
Cyprus	Hungaria
GEVO Ltd.	Siemens Kft
or	<ul style="list-style-type: none"> • Budapest
Jolali Ltd.	
<ul style="list-style-type: none"> • Nicosia 	Iceland
Czech Republic	Smith & Norland H/F
Siemens AG	<ul style="list-style-type: none"> • Reykjavik
<ul style="list-style-type: none"> • Brno • Mladá Boleslav • Prague 	Ireland
Denmark	Siemens Ltd.
Siemens A/S	<ul style="list-style-type: none"> • Dublin
<ul style="list-style-type: none"> • Copenhagen, Ballerup 	

Italy	Romania
Siemens S.p.A. <ul style="list-style-type: none"> • Bari • Bologna • Brescia • Casoria • Florence • Genoa • Milan • Padua • Rome • Turin 	Siemens birou de consultatii tehnice <ul style="list-style-type: none"> • Bukarest
Luxemburg	Russia
Siemens S.A. <ul style="list-style-type: none"> • Luxemburg 	Siemens AG or Mosmatic <ul style="list-style-type: none"> • Moscow Siemens AG <ul style="list-style-type: none"> • Ekaterinburg
Malta	Slovak Republic
J. R. Darmanin & Co. Ltd. <ul style="list-style-type: none"> • Valletta 	Siemens AG <ul style="list-style-type: none"> • Bratislava
Netherlands	Slovenia
Siemens Nederland N.V. <ul style="list-style-type: none"> • The Hague • Rijswijk 	Siemens d. o. o. <ul style="list-style-type: none"> • Ljubljana
Norway	Spain
Siemens A/S <ul style="list-style-type: none"> • Bergen • Oslo • Stavanger • Trondheim 	Siemens S.A. <ul style="list-style-type: none"> • Barcelona • Bilbao • Gijón • Granada • La Coruña • Las Palmas de Gran Canaria • León • Madrid • Málaga • Murcia • Palma de Mallorca • Pamplona • Sevilla • Valencia • Valladolid • Vigo • Zaragoza
Poland	Sweden
Siemens GmbH <ul style="list-style-type: none"> • Gdansk-Letnica • Katowice • Warsaw 	Siemens AB <ul style="list-style-type: none"> • Göteborg • Jönköping • Malmö • Sundsvall • Upplands Väsby, Stockholm
Portugal	
Siemens S.A. <ul style="list-style-type: none"> • Albufeira • Coímbra • Lisbon, Amadora • Matosinhos • Porto 	

Switzerland	Turkey
Siemens-Albis AG <ul style="list-style-type: none"> • Basel • Bern • Zürich Siemens-Albis S.A. <ul style="list-style-type: none"> • Renens, Lausanne 	SIMKO <ul style="list-style-type: none"> • Adana • Ankara • Bursa • Istanbul • Izmir • Samsun
	Ukraine
	Siemens AG <ul style="list-style-type: none"> • Kiev

Non-European Companies and Representatives

The following table lists all non-European Siemens Companies and Representatives of Siemens AG.

Africa

The following table lists all Siemens Companies and Representatives of Siemens AG in Africa.

Algeria	Morocco
Siemens Bureau d'Alger <ul style="list-style-type: none"> • Alger 	SETEL Société Electrotechnique et de Télécommunications S.A. <ul style="list-style-type: none"> • Casablanca
Angola	Mozambique
TECNIDATA <ul style="list-style-type: none"> • Luanda 	Siemens Liaison Office <ul style="list-style-type: none"> • Maputo
Bophuthatswana	Namibia
Siemens Ltd. <ul style="list-style-type: none"> • Mafekeng 	Siemens (Pty.) Ltd. <ul style="list-style-type: none"> • Windhoek
Egypt	Nigeria
Siemens Technical Office <ul style="list-style-type: none"> • Cairo-Mohandessin Siemens Technical Office <ul style="list-style-type: none"> • Alexandria EGEMAC S.A.E. <ul style="list-style-type: none"> • Cairo-Mattaria 	Electro Technologies Nigeria Ltd. (ELTEC) <ul style="list-style-type: none"> • Lagos
Ethiopia	Rwanda
Addis Electrical Engineering Ltd. <ul style="list-style-type: none"> • Addis Abeba 	Etablissement Rwandais <ul style="list-style-type: none"> • Kigali
Ivory Coast	Sambia
Siemens AG <ul style="list-style-type: none"> • Abidjan 	Electrical Maintenance Lusaka Ltd. <ul style="list-style-type: none"> • Lusaka
Libya	Simbabwe
Siemens AG, Branch Libya <ul style="list-style-type: none"> • Tripoli 	Electro Technologies Corporation (Pvt.) Ltd. (ETC) <ul style="list-style-type: none"> • Harare

South Africa	Swaziland
Siemens Ltd. <ul style="list-style-type: none"> • Cape Town • Durban • Johannesburg • Middelburg • Newcastle • Port Elizabeth • Pretoria 	Siemens (Pty.) Ltd. <ul style="list-style-type: none"> • Mbabane
Sudan	Tanzania
National Electrical & Commercial Company (NECC) <ul style="list-style-type: none"> • Khartoum 	Tanzania Electrical Services Ltd. <ul style="list-style-type: none"> • Dar-es-Salaam
	Tunesia
	Sitelec S.A. <ul style="list-style-type: none"> • Tunis
	Zaire
	SOFAMATEL S.P.R.L. <ul style="list-style-type: none"> • Kinshasa

America

The following table lists all Siemens Companies and Representatives of Siemens AG in America.

Argentina	Canada
Siemens S.A. <ul style="list-style-type: none"> • Bahía Blanca • Buenos Aires • Córdoba • Mendoza • Rosario 	Siemens Electric Ltd. <ul style="list-style-type: none"> • Montreal, Québec • Toronto
Bolivia	Chile
Sociedad Comercial é Industrial Hansa Ltda. <ul style="list-style-type: none"> • La Paz 	INGELSAC <ul style="list-style-type: none"> • Santiago de Chile
Brazil	Colombia
Siemens S.A. <ul style="list-style-type: none"> • Belém • Belo Horizonte • Brasilia • Campinas • Curitiba • Fortaleza • Pôrto Alegre • Recife • Rio de Janeiro • Salvador de Bahia • São Paulo • Vitória 	Siemens S.A. <ul style="list-style-type: none"> • Barranquilla • Bogotá • Cali • Medellín
	Costa Rica
	Siemens S.A. <ul style="list-style-type: none"> • Panama • San José
	Cuba
	Representación Consult iva EUMEDA <ul style="list-style-type: none"> • La Habana
	Ecuador
	Siemens S.A. <ul style="list-style-type: none"> • Quito

El Salvador	Paraguay
Siemens S.A. • San Salvador	Rieder & Cia. S.A.C.I. • Asunción
Guatemala	Peru
Siemens S.A. • Ciudad de Guatemala	Siemsa • Lima
Honduras	United States of America
Representaciones Electroindustriales S de R.L. - Relectro • Tegucigalpa	Siemens Industrial Automation Inc. Automation Division • Alpharetta, GA Numeric Motion Control • Elk Grove Village, Illinois
Mexico	Uruguay
Siemens S.A. de CV • Culiacán • Gómez Palacio • Guadalajara • León • México, D.F. • Monterrey • Puebla	Conatel S.A. • Montevideo
Nicaragua	Venezuela
Siemens S.A. • Managua	Siemens S.A. • Caracas • Valencia

Asia

The following table lists all Siemens Companies and Representatives of Siemens AG in Asia.

Bahrain	India
Transitec Gulf • Manama	Siemens Limited • Ahmedabad • Bangalore • Bombay • Calcutta • Madras • New Delhi • Secúnderabad
Bangladesh	Indonesia
Siemens Bangladesh Ltd. • Dhaka	P.T. Siemens Indonesia, P.T. Siemens Dian-Grana Elekrika, Representative Siemens AG • Jakarta
Brunei	
• Brunei Darussalam	
Hong Kong	
Siemens Ltd. • Hong Kong	

Iraq	People's Republic of China
Samhiry Bros. Co. Limited or Siemens AG (Iraq Branch) • Baghdad	Siemens AG Representation • Beijing • Guangzhou • Shanghai
Iran	Philippine Islands
Siemens S.S.K. • Teheran	Maschinen & Technik Inc. (MATEC) • Manila
Japan	Qatar
Siemens K.K. • Tokyo	Trags Electrical Engineering and Air Conditioning Co. • Doha
Korea	Saudi Arabia
Siemens Ltd. • Changwon • Seoul • Ulsan	Arabia Electric Ltd. (Equipment) • Al-Khobar • Jeddah • Riyadh
Kuwait	Singapore
National & German Electrical and Electronic Services Co. (NGEECO) • Kuwait, Arabia	Siemens (Pte.) Ltd. • Singapore
Lebanon	Sri Lanka
Ets. F.A. Kettaneh S.A. • Beirut	Dimo Limited • Colombo
Malaysia	Syria
Siemens Electrical Engineering Sdn. Bhd. • Kuala Lumpur	Siemens AG, Branch (A.S.T.E.) • Damascus
Nepal	Taiwan
Amatya Enterprises (Pvt.) Ltd. • Kathmandu	Siemens Ltd., TELEUNION Engineering Ltd. or TAI Engineering Co., Ltd. • Taichung • Taipei
Oman	Thailand
Waleed Associates • Muscat	Berti Jucker Co. Ltd. • Bangkok
Pakistan	
Siemens Pakistan Engineering Co., Ltd. • Islamabad • Karachi • Lahore • Peshawar • Quetta	

United Arab Emirates	Vietnam
Electro Mechanical Co. or Siemens Resident Engineers • Abu Dhabi Scientechnic or Siemens Resident Engineers • Dubai	OAV Representative Office • Hanoi
	Yemen (Arab. Republic)
	Tihama Tractors & Engineering Co., Ltd. or Siemens Resident Engineers • Sanaa

Australia

The following table lists all Siemens Companies and Representatives of Siemens AG in Australia

Australia	New Zealand
Siemens Ltd. • Adelaide • Brisbane • Melbourne • Perth • Sydney	Siemens Ltd. • Auckland • Wellington

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