SIEMENS

SIMATIC HMI

SICALIS PMC 7 Operator Panel

Equipment Manual

6AV7691-1AA00-0AB0

Release 07/99

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.

Qualified Personnel

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

Faultless and safe operation of the product presupposes proper transportation, proper storage, erection and installation as well as careful operation and maintenance.

Trademarks

SIMATIC®, ProTool/Lite®, ProTool® and ProTool/Pro® are registered trademarks of Siemens AG.

Some of the other designations used in these documents are also registered trademarks; the owner's rights may be violated if they are used be third parties for their own purposes.

Impressum

Editor and Publisher: A&D PT1.

Siemens AG
Automation & Drives
SIMATIC Human Machine Interface
A&D PT1
Postfach 4848, D-90327 Nuernberg

Preface

This Manual

The *SICALIS PMC 7 Operator Panel* manual is part of the SIMATIC HMI documentation. It provides information for operators, mechanics, project engineers and maintenance personnel about the operator panel's installation, functionality, operation and technical structure.

Where to find what

This manual is subdivided into the following chapters:

Chapter	Content
1	Application areas, installation options and controls
2	Installation, electrical installation, software installation, system configuration
3	Device dimensions, connections.
Appendix	• Technical data • Interface and terminal assignment • Developer version • Key layout, key codes • ESD guidelines • Project engineering documents

History

Release	Comments
07/99	First issue of the equipment manual

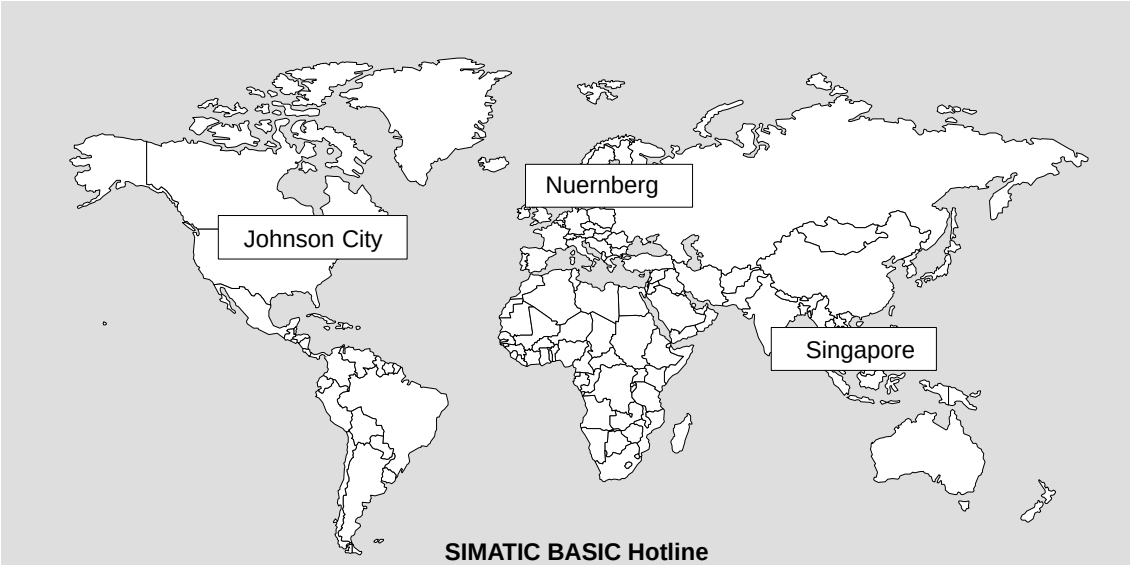
Abbreviations

The abbreviations used in this manual are explained below:

AC	Alternating Current
CPI	Control Panel Interface
CPU	Central Processing Unit
DC	Direct Current
EMC	Electromagnetic Compatibility
LCD	Liquid Crystal Display
MOP	Main Operator Panel
MPI	Multipoint Interface
MTBF	Mean Time Between Failures
PC	Personal computer
PLC	Programmable Logic Control
PU	Programming unit
RAM	Random Access Memory
SELV	Safety Extra Low Voltage
Taco	Keyboard controller
TFT	Thin-film transistor
UOP	Unit Operator Panel
WinAC	Windows Automation Center

SIMATIC Customer Support Hotline

Available worldwide around the clock:



Nuernberg		**Johnson City**		**Singapore**	
SIMATIC BASIC Hotline		**SIMATIC BASIC Hotline**		**SIMATIC BASIC Hotline**	
Local time:	Mo - Fr 8:00 to 18:00	Local time:	Mo - Fr 8:00 to 17:00	Local time:	Mo - Fr 8:30 to 17:30
Tel.:	+49 (911) 895-7000	Tel.:	+1 423 461-2522	Tel.:	+65 740-7000
Fax:	+49 (911) 895-7002	Fax:	+1 423 461-2231	Fax:	+65 740-7001
E-mail:	simatic.support@ nbgm.siemens.de	E-mail:	simatic.hotline@ sea.siemens.com	E-mail:	simatic@ singnet.com.sg

SIMATIC Premium Hotline

(chargeable, SIMATIC Card required)

Times:	Mo - Fr 0:00 to 24:00
Tel.:	+49 (911) 895-7777
Fax:	+49 (911) 895-7001

SIMATIC Customer Online Services

SIMATIC Customer Support offers you comprehensive additional information about SIMATIC products through its Online Services as follows:

- Up-to-date general information is provided
  - on the internet at http://www.ad.siemens.de/simatic
  - via **Fax-Polling** under 08765-93 02 77 95 00
- Up-to-date product information and downloads for practical use can be found
  - on the internet at http://www.ad.siemens.de/support/html -00/
  - on the **Bulletin Board System** (BBS) in Nuernberg (*SIMATIC Customer Support Mailbox*) under +49 (911) 895-7100

    To access the Mailbox, use a modem with up to 28.8 kBaud (V.34). Set the parameters as follows: 8, N, 1, ANSI, or dial in via ISDN (x.75, 64 kBit).

Contents

Appendix

Introduction 1

Application Area

The SICALIS PMC 7 Operator Panel is a universal operator panel, which can be used for controlling and monitoring production and transport systems, in particular in the automobile industry. Typical uses are applications in the chassis, body-in-white and transfer areas plus applications for single machines.

The operator panel is designed to provide ergonomic support for operation, monitoring and diagnosis. With its 12'' TFT display, it enables a detailed and thus particularly meaningful diagnosis of the system.

With its high safety standard (front IP65) and the robustness of the SIMATIC PC BI45, the SICALIS PMC 7 Operator Panel is particularly well suited for extreme industrial environments and use on location direct at the machine.

Thanks to its compact design and high-performance hardware, the operator panel satisfies all the requirements for operation direct at the machine.

Utilizing a PC with its associated interfaces (e.g. 5 slots) enables the user to bring the so-called PC world into this difficult environment.

Installation Options

The SICALIS PMC 7 Operator Panel can be utilized as a separate unit or built into a switchgear cabinet. No additional fastener holes are required to mount it with the screw-type clamps.

Device Variants

The SICALIS PMC 7 Operator Panel is available in two versions. Both versions have the same hardware and software. They only differ in which additional controls are included:

® MOP (Main Operator Panel)

® UOP (Unit Operator Panel)

Information regarding which controls are included with each variant can be found in the table 3-1 on page 3-4.

Connection Possibilities

The SICALIS PMC 7 Operator Panel can be connected to an external PLC via the PROFIBUS-DP. Optionally, you can also integrate WinAC in the operator panel. With the WinAC (Windows Automation Center) software, you can use the operator panel as a programmable logic control for your process control application.

Using PROFIBUS-DP, the following PLCs can be linked to the SICALIS PMC 7 Operator Panel:

- SIMATIC S7
- SIMATIC WinAC
- SINUMERIK NC 840D

Operational Design

The operator panel's keyboard controller passes the data for all the pressed keys to the integrated PC. The key code can be parameterized (see page C-2).

When a movement or function key is depressed, the event will be passed as a key code to the application. Additionally, when a movement or operation key is depressed this will be sent to the connected PLC in accord with the key's definition. Output bits, which the PLC sends, will be passed on to the controls.

To use the operator panel, a customer-specific application SICALIS PMC 7 is necessary. This application is not included in the scope of the delivered package.

Caution

Never press more than two keys at the same time!

If more than two keys (movement keys) are pressed simultaneously, the so-called "ghost key effect" will result. Since the membrane keyboard cannot be decoupled by individual diodes, the system will, in this case, detect virtual keys and set the corresponding bits in the PLC.

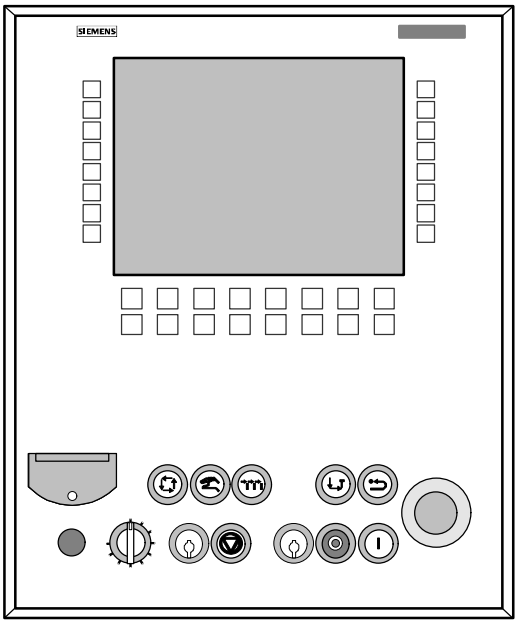
Further Information

- You will find the technical data for the operator panel in this manual's appendix A.
- For information regarding the integrated SIMATIC PC BI45, see the Technical Description *PC BI45/FI45 PII*, Order No. C79000-G7000-C794.
- Information regarding the PROFIBUS Interface Module IM 182 can be found in the *IM 182 User Description*, Order No. 6ES7182-0AA00-8AA0.

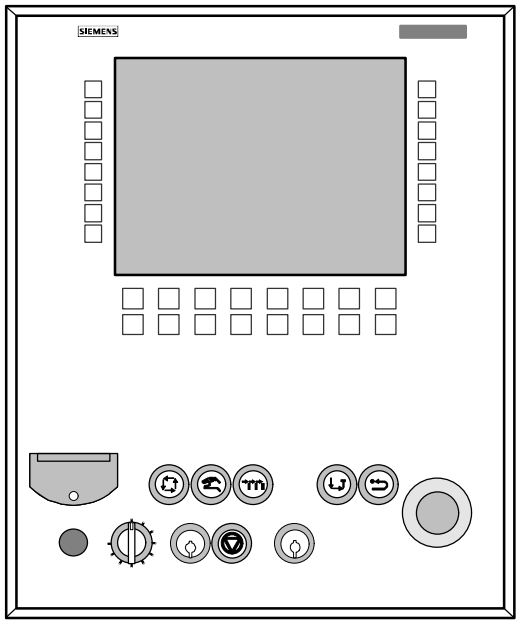
An Overview of the SICALIS PMC 7 Operator Panel

The table provides an overview of the performance characteristics of the operator panel.

HBF Variant



EBF Variant



Characteristic	Description	
Processor	Type	Pentium II
	Clock frequency	333 MHz
Memory and disk storage	Main memory	64 MByte RAM
	Hard disk	3.2 GB
	Floppy disk drive	3.5” (1.44 MByte)
	CD-ROM	20x EIDE, 650 MByte
Software	Operating system	Microsoft® Windows® NT 4.0 (English) with Service Pack 3
Connections[1)]	PLC	PROFIBUS DP standard slave based on IM 182 [3)] MPI: ® On front panel [2)] ® On rear panel
	Enabling switch	Connection on front panel
	Keyboard [2) 4)]	PS/2
	Mouse [2)]	PS/2
	Printer	LPT1, parallel interface

Characteristic	Description		
Display	Type	SVGA TFT-LCD (active matrix display)	
	Active screen diagonal	12.1”	
	Resolution (pixels)	800 × 600	
	Service life (MTBF)	approx. 50,000 h	
	Backlighting	2 CCFL tubes	
	Service life (MTBF)	approx. 30,000 h	
Sealed membrane keyboard	Movement keys	16	
	Function keys	16	
Control elements	30 mm elements, recessed design	**MOP**	**UOP**
	Ⓡ Rotary switch, 10steps	1	1
	Ⓡ Key-operated switch/button	1/1	1/1
	Ⓡ Illuminated pushbutton	6	5
	Ⓡ Pushbuttons	2	1
	Ⓡ Emergency Stop	1	1
Compatible PLCs	Ⓡ SIMATIC S7	✓	
	Ⓡ SINUMERIK NC 840D	✓	
	Ⓡ SIMATIC WinAC	✓	
Data transfer	Max. baud rate	12 MBaud	
Integrated PC	SIMATIC Industrial PC	BI45	
Control Panel Interface	Digital inputs / outputs	32/32	
Options [3]	SIMATIC WinAC	✓	

1) More related information can be found, beginning on page 3-3.
2) Only for commissioning and service
3) Not included in the scope of the delivered package
4) Do not use the connection on the side of the SIMATIC PC BI45, rather the connection on the back of the operator panel, since otherwise system malfunctions may occur.

Installation

2

In This Chapter

This chapter provides information about

the installation of the operator panel (page 2-2)

the electrical connections with

– the voltage supply (page 2-5)

– the PLC (page 2-6)

– peripherals (page 2-7)

the installation of the SICALIS PMC 7 device (page 2-9)

2.1 Mechanical Installation

Installation Site and Conditions

The SICALIS PMC 7 Operator Panel is suitable for installation in racks and in the front panels of cabinets and control desks. Before installing the operator panel, a suitable opening must be cut in the front panel. Additional fastener holes are not required.

Information regarding the mounting depth and the cutout can be found on page 3-2.

Safety Standard

The IP65 safety standard can only be ensured for the front panel, when the gasket for the front plate of the operator panel sits flawlessly.

Caution

Whenever the device is not installed, make certain that is only layed on its back.

Before startup, let the device first reach room temperature. In case of condensation, the device must first be absolutely dry before the device is switched on.

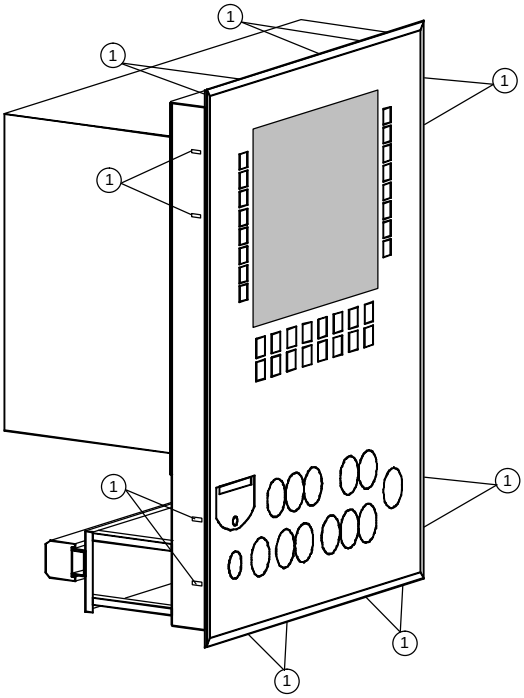
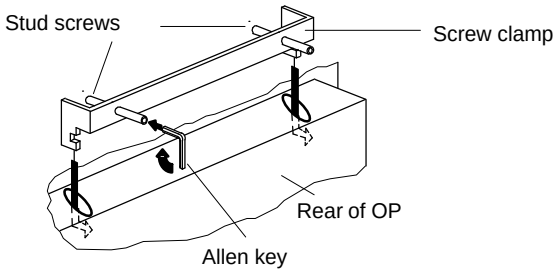
To prevent the operator panel from overheating during operation,

– the inclination from perpendicular should not exceed max. ±25®,
– the device may not be exposed to direct sunlight,
– the ventilation slits in the case may not be blocked when the unit is installed.

After the cabinet is open, parts of the system will be accessible, which could be under power and thus present a risk of electrical shock.

The device was tested before shipping. If it, nonetheless, malfunctions, please include a precise description of the fault when you return the device.

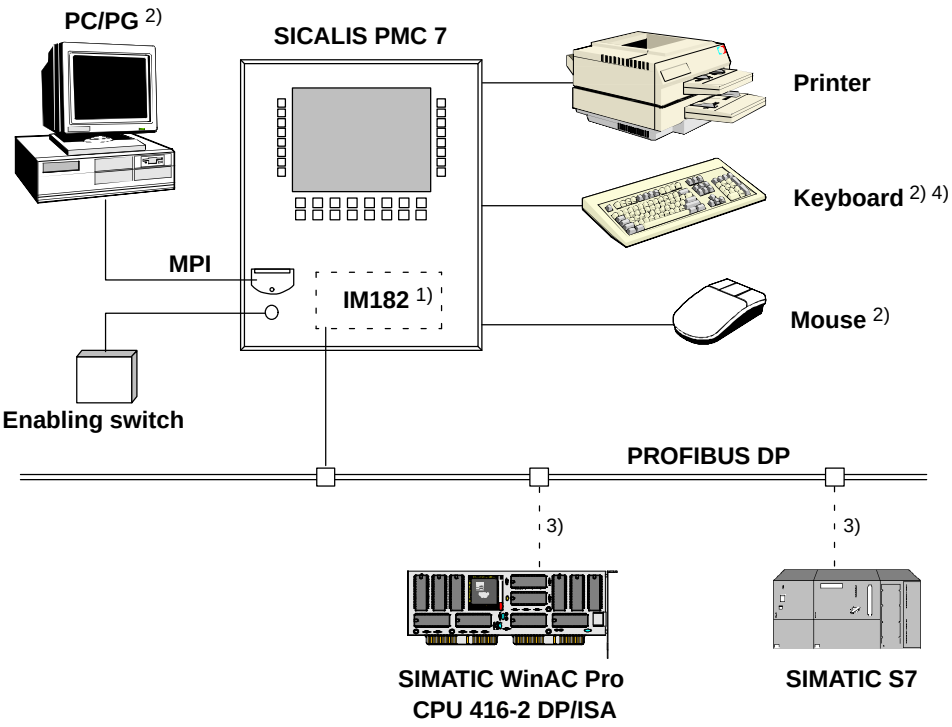
Installation in a Front Panel

Step	Procedure
1	From the front, place the operator panel into the prepared opening. Take suitable measures to prevent the operator panel from falling out of the front panel while it has not been firmly fixed in position.
2	Insert the 8 screw clamps into the corresponding slots in the operator panel case. The position of the clamps is shown in the illustration (item 1). 
3	From the back of the front panel, use an Allen key to tighten the screw clamps to fix the operator panel firmly. Make certain that the gasket is properly seated to seal the operator panel to the front panel. 

2.2 Electrical Installation

Configuration Possibilities

Figure 2-1 shows the main possibilities for configuring the SICALIS PMC 7 Operator Panel. Standard cables are available for making the connections (see catalogs ST70 and ST80).



1) Not included in the scope of the delivered package
2) Only for commissioning and service
3) Selection depending on the machine requirements
4) Do not use the connection on the side of the SIMATIC PC BI45, rather the connection on the back of the operator panel, since otherwise system malfunctions may occur.

Figure 2-1 Configuration Overview

You will find the pin assignment of the interface connectors in Appendix B of this manual.

An EMC Compatible Assembly

To provide immunity to interference and thus ensure trouble-free operation, the design and assembly of the PLC's hardware must satisfy EMC considerations. Furthermore, both it and the connecting cables must be properly shielded. The installation guidelines for achieving interference-free operation of your PLC also apply when installing the operator panel.

Caution

All signal links must use shielded wiring only.

All connectors must be secured by screws or catches.

Signal cables may not share a cable duct with power cables.

Siemens AG assumes no liability for malfunctions or damages that result from cables assembled by the customer or made by other companies!

2.2.1 Connecting the Voltage Supply

The wires with the supply voltages for the operator panel are connected to the terminal strip on the back of the device. Information regarding the assignment of the terminals can be found in Appendix B.

The SICALIS PMC 7 Operator Panel requires the following supply voltages:

Mains voltage: 230 V AC (for SIMATIC PC BI45)

Low voltage: 24 V DC (not electrically isolated, see page 2-6)

For information regarding the required supply voltage, please see the Technical Data in Appendix A.

Mains Voltage

The mains voltage (230 V AC) must be connected in compliance with the relevant recommendations (e.g. EN 60950 3.2 and 3.3) and/or local rules and regulations.

Please observe the following safety instructions:

Warning

It is mandatory that the system is connected to ground.

The electrical installation must include a fuse and an easily accessible, all-pole switch to fully disconnect the device from all power.

Before beginning the installation or performing maintenance work, the device must be switched off and secured against an accidental power on.

When connecting the device, make certain that the mains leads in the device are appropriately clamped to prevent short-circuits caused by torn wires.

The wires used to connect the device must have a cross-sectional area of at least 1.5 mm^2.

Low Voltage

Caution

With the external 24 V supply, make certain that the low voltage is electrically isolated from the mains. Only use power supplies that are manufactured in accordance with IEC 364-4-41 or HD 384.04.41 (VDE 0100, Part 410)!

The supply voltage may only lie within the specified voltage range. If it is not, the possibility of functional failure on the part of the unit can not be excluded.

Note

The external 24 V supply is not electrically isolated. The 0 V line is connected to the protective earth (PE).

After the 24 V supply is switched off, the device must be booted again.

2.2.2 Connecting the PLC

Connection Possibilities

Using PROFIBUS-DP, the following PLCs can be linked to the SICALIS PMC 7 Operator Panel:

SIMATIC S7

SIMATIC WinAC

SINUMERIK NC 840D

Prerequisites

For the operator panel to support communication with the PLC, you must first retrofit the PROFIBUS Interface Module, IM 182. This module is not a standard part of the operator panel package. With the IM 182 interface module, you can connect the operator panel as a standard slave on a PROFIBUS-DP network. You must also install the associated driver software.

You will also need the IM 182 interface module for the internal communication between the operator panel and SIMATIC WinAC.

2.2.3 Connecting Peripherals

Front Panel: MPI Connection

On the front of the operator panel there is an MPI connection (X14, see page B-1) for commissioning and service purposes. With this connector, you can temporarily connect e.g. a programming device without needing to open the cabinet.

The MPI jack is protected by a hinged plastic cover, which guarantees that the front panel satisfies the requirements of the IP65 safety standard.

Prerequisites for usage:
The MPI connection on the front of the operator panel is wired 1:1 with the 9-pin Sub-D connector on the back of operator panel (item 3 in the table on page 3-6). This must be connected to the PLC to enable use of the MPI connection on the front.

Enabling Switch

You can connect an enabling switch to the 17-pin front connector (X13, see page B-2). The signal lines are fed to the terminal strip on the back of the operator panel.

An enabling switch ist a hand operated remote control, with which you can operate the operator panel e.g. when working in the hazardous areas on machines and in plants.

Note

When connecting devices to the 17-pin connector on the front, their cables must be shielded and these shields must be electrically connected to the plug.

Connecting to a SIMATIC PC BI45

You can also connect other peripherals to the integrated SIMATIC PC BI45 (for the connections see page 3-5), e.g.

Printer

Keyboard [1) 2)]

Mouse [1)]

Screen

1) Only for commissioning and service
2) Do not use the connection on the side of the SIMATIC PC BI45, rather the connection on the back of the operator panel, since otherwise system malfunctions may occur.

The drivers for the printer and separate screen are not installed in the standard version of the operator panel and must be installed later when required.

For Further Information

Information regarding the connection of peripherals to the SIMATIC PC BI45 can be found in the Technical Description *PC BI45/FI45 PII*, Order No. C79000-G7000-C794.

2.3 Installing SICALIS PMC 7

Installation Steps

The installation of the operator panel is comprised of the following steps:

1. Install Windows NT 4.0 Service Pack 3 (page 2-9)
2. Install the SICALIS PMC 7 runtime software (page 2-11)
3. Install the PROFIBUS IM 182 interface module and driver software (page 2-14)
4. Install user application (page 2-15)

Note

Before the installation, connect a PS/2-compatible keyboard and mouse to the operator panel.

The description of the dialogs assumes a working knowledge of Windows.

2.3.1 Installing Windows NT 4.0 Service Pack 3

Setup

When the device switched on the first time, it runs Windows NT with Service Pack 1 and guides you through the setup. The following dialogs are displayed in VGA mode.

1. The window with *Software License Agreement* appears. Click on the I Agree button to indicate your acceptance of the conditions.
2. Click on Next to close the *Windows NT Workstation Setup* welcome window.
3. In the *Registration* dialog, enter the Product ID from the Certificate of Authenticity. Click on Next. You will find the certificate with the Product ID in the included *Windows NT* software package.
4. In the *Administrator Account* field, login as *Administrator* with the password `simatico` and then confirm this. Click on Next. In the later operation, you will only need to enter the password once. After the installation is completed, the system will perform the logon automatically during startup.
5. Acknowledge the `Ready` messageby clicking on Next. Windows NT Workstation with Service Pack 3 will now be automatically configured on your computer. Afterwards, start the system again with `Restart Computer`.

Windows NT Settings

When starting up the second time, the system will identify itself as Windows NT Workstation 4.0 with Service Pack 3.

1. In the *Logon Information* dialog logon as *Administrator* with the password `simatico` and confirm with OK.
2. Read the `README.TXT` file. The file contains the most up-to-date information about SIMATIC PC. Afterwards, close the MS-DOS window.
3. Close the *Welcome* dialog by clicking on Close.
4. Next the display driver will be automatically installed. In the *Control Panel* under *Adapter Type* select: *Chips Video Accelerator* from *Chips and Technologies*. You can also make these changes manually (see point 8.)

   Note

   Please do not interrupt the process while the display driver is automatically installed.

5. The system will automatically restart.
6. After the third startup in VGA mode, the system will report at logon that `The system could not log you on ...` Acknowledge with OK and logon as described in point 1. with the password `simatico`.
7. Watch the further automatic configuration of the display. At the end confirm with Yes that the test image has been displayed properly.
8. Under *Display Properties*, check that the *Display Type* is set correctly. To do so, open the Control Panel via the Start menu.

   Manual Installation of the Display Driver:

   Under *Adapter Type* select: *Chips Video Accelerator* from *Chips and Technologies*.. Select *Change* and then in the directory `C:\Display` the file `oemsetup.inf`. Further information can be found in the Windows NT documentation.
9. Once the correct display type has been selected and the associated driver installed, you can now select a resolution of *800 x 600 pixels* (SVGA) with *65535 colors*. Test the new settings and confirm with OK. If necessary, restart the system.

Additional Settings

We recommend that you also make the following settings in the Control Panel under *System*:

Shorten the time for automatically starting the system

In *System Properties* under *Startup/Shutdown* set the field `Show List for 30 s` to 3 s. This accelerates the startup of the system.

Recovery

You can save memory space by making the following settings:

– activate the function *Write an event to the system log*

– deactivate the function *Write debugging information to ...*

Now start the system again.

2.3.2 Installing The SICALIS PMC 7 Runtime Software

Driver Versions

Two versions of the keyboard driver are available:

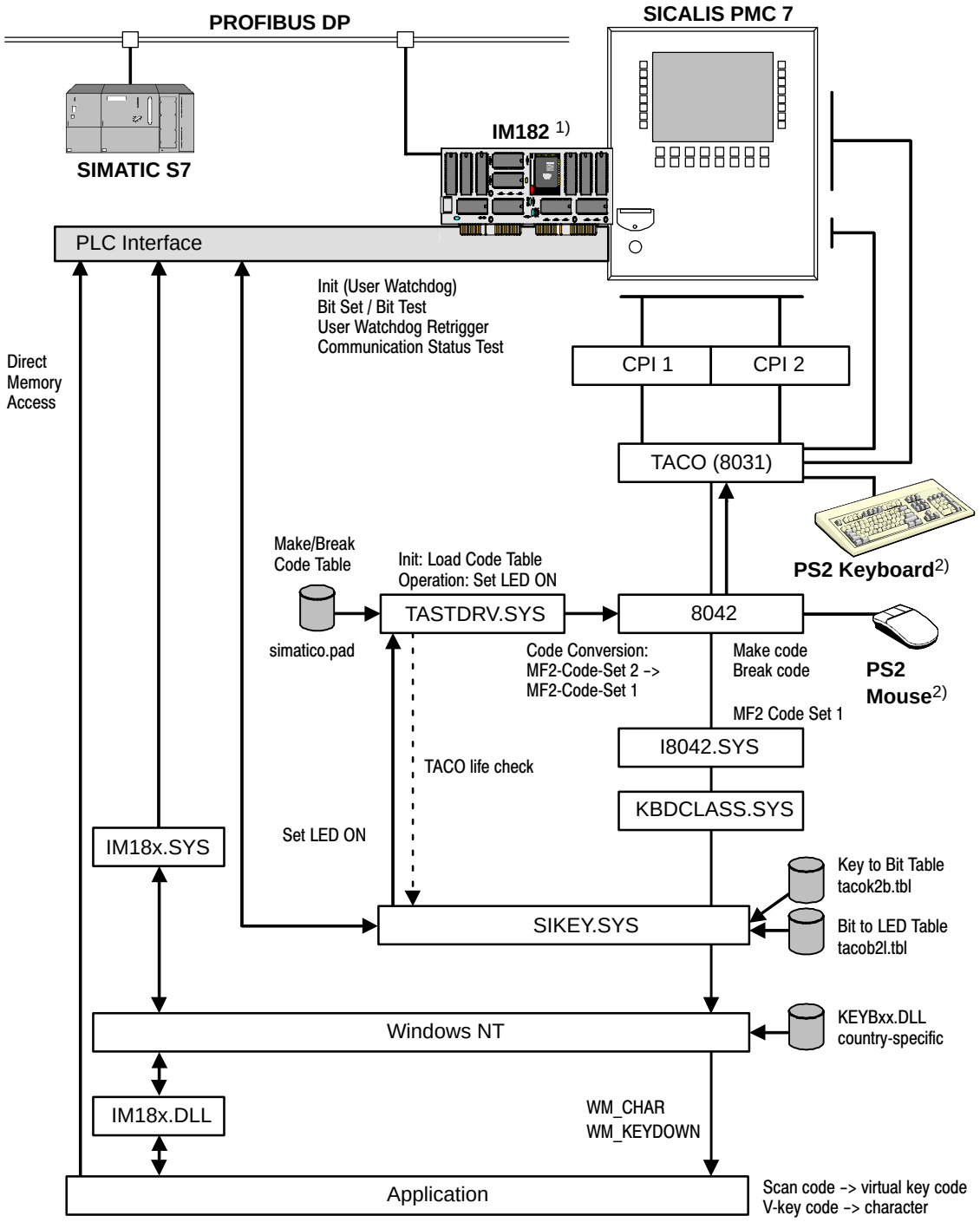
Runtime Version

The Runtime version is the standard package that is included with the operator panel. It contains all the drivers that are necessary to ensure the smooth operation of the program.

Developer Version

The Developer Version contains additional tools that permit modifying the factory default key assignment to suit the user's specific needs. This version is not included in the standard package with the operator panel. Information regarding the Developer Version can be found in Appendix C.

Figure 2-2 shows the structure of the software.



1) Not included in the scope of the delivered package
2) Only for commissioning and service

Figure 2-2 Software Structure

The Runtime Version Installation Files

The installation diskette contains the following files:

Table 2-1 The Runtime Version Installation Files

File	Function
`Install.bat`	Batch file to install the required drivers and tables
`KbdTaco.dll`	Mapping table for key codes, which are not used by the standard keyboards
`KbdTaco.reg`	Registry file for the mapping table `KbdTaco.dll`
`readme.txt`	Text file with general information
`SiKey.reg`	Registry entry for the driver software `SiKey.sys`
`SiKey.sys`	Driver software
`Simatico.pad`	Key assignment file
`TacoB2l.tbl`	Binary table: Assignment of Bit –> LED (LED = lamp control)
`TacoK2b.tbl`	Binary table: Assignment of Key –> Bit
`TastDrv.reg`	Registry entry for the keyboard driver `TastDrv.sys`
`TastDrv.sys`	Keyboard driver

Procedure

Place the Runtime Installation diskette in drive A and start the `Install.bat` batch file. The required files will be copied into the following directory: `C:\winnt\system32\drivers\...`.

Runtime Version Configuration

The default entries in the registry file will be used to configure the driver `SiKey.sys` during the installation. Table 2-2 shows the standard default settings.

If you want to change the entries in the registry file, run the Windows NT utility `regedit.exe`. Further information can be found in the Windows NT online Help.

Note

Do not modify these entries unless your are well acquainted with the structure of the registry file. Faulty entries will cause problems with the operating system.

Table 2-2 Entries in the Registry

Parameter	Explanation	Registry Path	Default
SPC3BusPollTime	The PROFIBUS polling time and monitoring the IM182 operational status [ms]	HKEY_LOCAL_MACHINE\SYSTEM\ CurrentControlSet\Services\Sikey\ Parameters	100 1)
PLC3UserWatchdogTime	Poll time Taco-Lifecheck and triggering the PLC3 users watchdog timers [ms]	HKEY_LOCAL_MACHINE\SYSTEM\ CurrentControlSet\Services\Sikey\ Parameters	100 2)
PLC3UserWatchdogValue	The default preset value assigned to user watchdog timer by driver. Can be overwritten by user's application.	HKEY_LOCAL_MACHINE\SYSTEM\ CurrentControlSet\Services\Sikey\ Parameters	1000 3)
BaseMemoryAddr	Address of the IM182 card. Entry made during the installation of the IM18x.SYS driver.	HKEY_LOCAL_MACHINE\SYSTEM\ CurrentControlSet\Services\IM18X\ Parameters	D8000h

1) Values less than 10 ms are unsuitable for the system.
2) This preset value corresponds to the parameter "PLC3UserWatchdogValue" and is dependent on the system configuration.
3) The value is dependent on the bus configuration.

2.3.3 Installing the IM 182 and driver software

Installation

Shut Windows NT down and switch the device off. When installing the IM182 card, follow the instructions in the equipment manual BI45. Select the IM182 settings in accordance with the application's requirements.

For further information please see the IM182 user description
(Order No. 6ES7 182-0AA00-8AA0).

Installation

Install the IM182 driver after the system has restarted. Place the diskette in drive A and start the `Install.cmd` file. Follow the instructions in the `read.me` file. For further information, please see the user description
(Order No. 6ES7 195-2AC00-0XA0).

Afterwards, restart the computer.

Note

There is a bug-fix for the IM182 driver. Please use the fixed version of IM18x.sys – Version 1.1 from April 08, 1999.
The contact person at A&D SE E is Mr. Mittelberger, Tel. +49 911 750 2072, Fax: +49 911 750 2100.

Use only cards that have been released for SICALIS PMC7. After installing the card and hardware driver reinstall Windows NT Service Pack 3. You will find this in the directory ”NT4_SP3” on drive C: of your system.

After this the device is ready for the installation of the user application.

2.3.4 Installing the User Application

Install the application software in accordance with the installation instructions.

Device Description

3

In This Chapter

This chapter provides information about:

- The dimensions (page 3-2),
- The controls and connections on the front panel (page 3-3),
- Connections on the back (page 3-5),

3.1 Dimensions

Device Dimensions

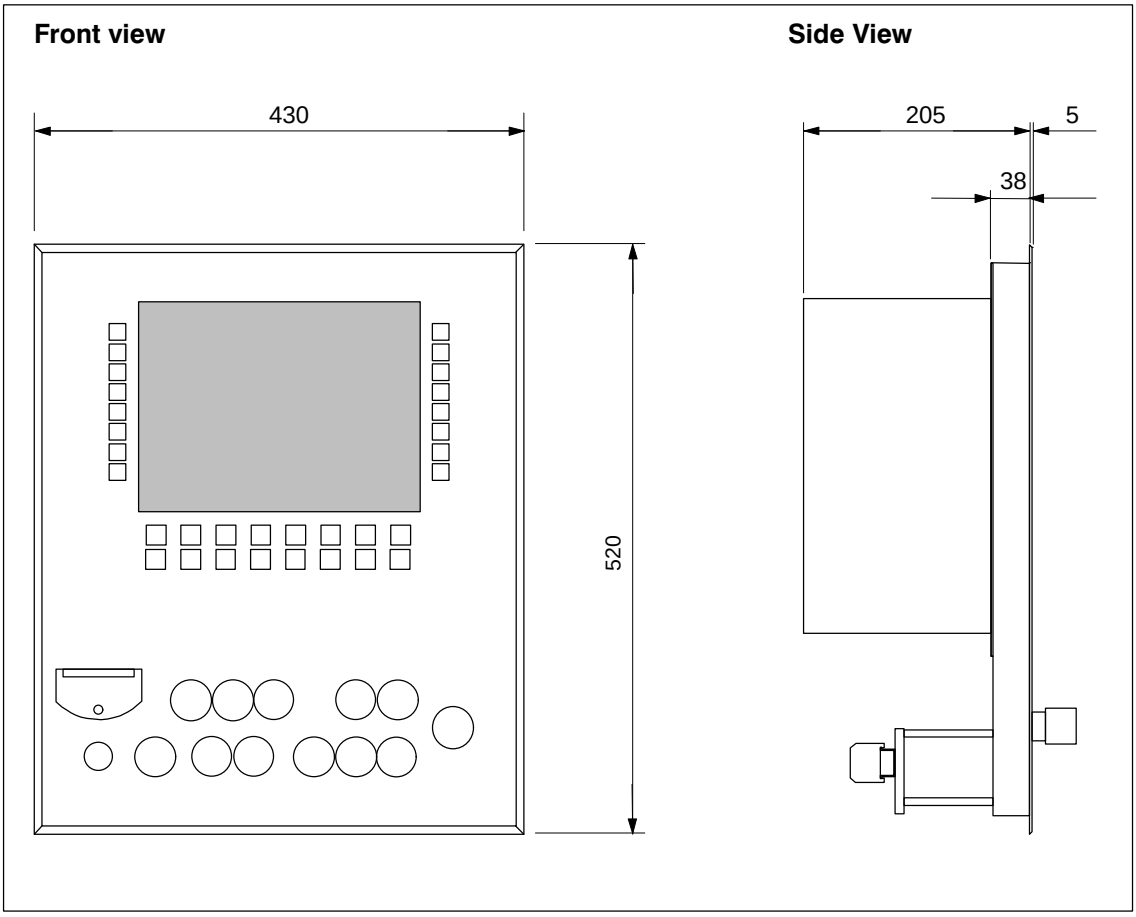


Figure 3-1 The Dimensions of the Operator Panel

Cutout

To install the operator panel in a front panel, you must cutout an opening (WxH) of $408^{+0,8}$ mm x $498^{+0,8}$ mm.

3.2 The Controls and Connections on the Front Panel

The Layout

On the operator panel screen, you can observe the operational state of the monitored machine or unit and, via the keyboard, directly intervene in the process.

Figure 3-2 shows the layout of the controls and connections on the front of the Main Operator Panel.

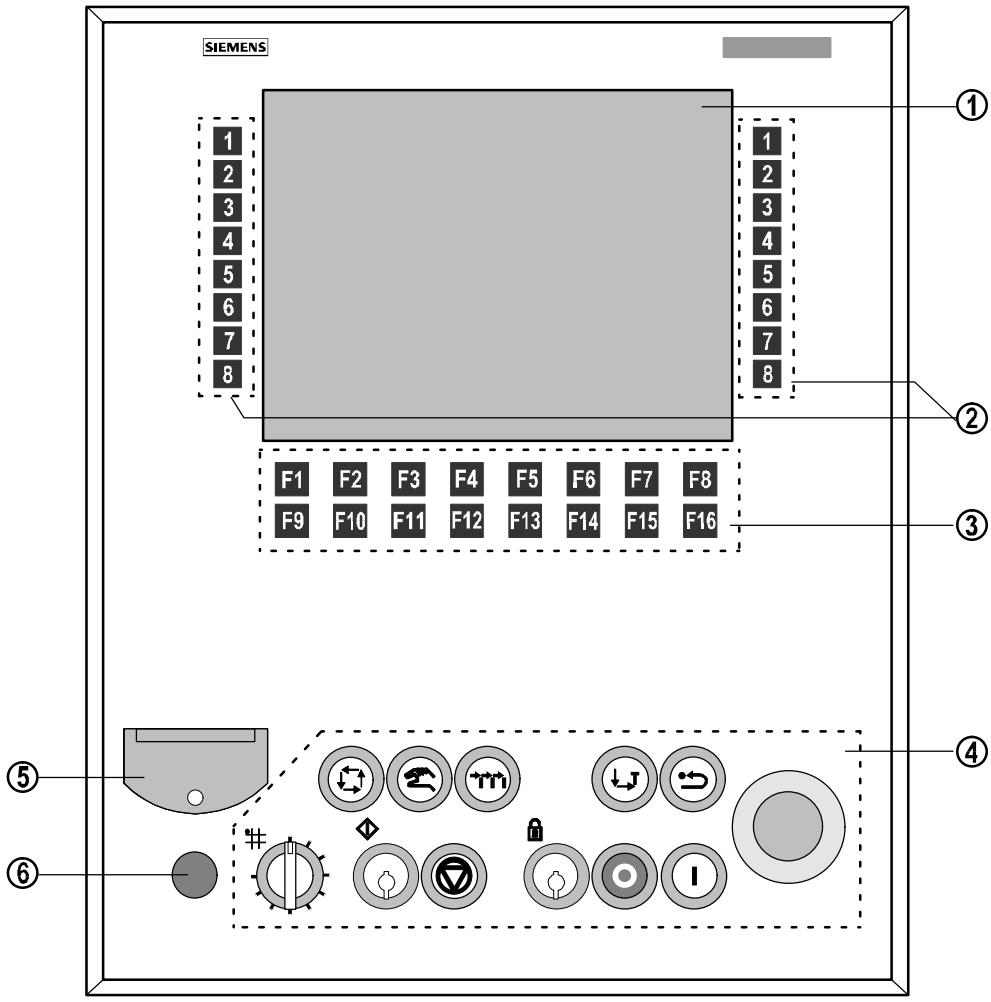
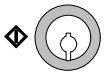
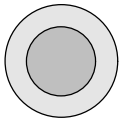


Figure 3-2 Layout of the Controls and Connections (Example: Main Operator Panel)

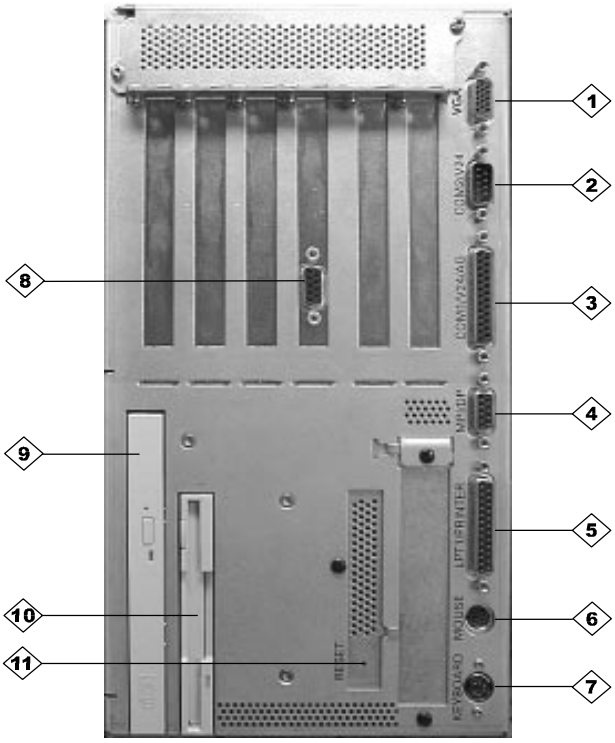
Table 3-1 The Controls and Connections

No.	Meaning
①	12'' color screen
②	2 × 8 movement keys (membrane keyboard) to execute defined movements in the application's "movement pictures".
③	Two softkey strips (membrane keyboard). The keys F1 to F16 correspond to the function keys on a PC keyboard.
④	Controls to operate the machine. When a key is depressed, the connected PLC will be informed immediately via the PROFIBUS-DP.  Automatic operation  Manual operation  Single-Step operation  Stop at end of clock  Initial state  Immediate Stop  Plant OFF (not for UOP variant)  Plant ON (not for UOP variant)  Key-operated pushbutton: Start  Key-operated switch: Special Functions  Rotary switch, 10 steps – MOP: Zone selection (1 – 10) – UOP: Override (10 % – 100 %)  EMERGENCY STOP
⑤	MPI connector with hinged cover (for commissioning and service) [1)]
⑥	Connection for enabling switch

1) Required for usage:
The 9-pin Sub-D connector on the back of the operator panel (item 3, Table 3-3) must be connected to the PLC.

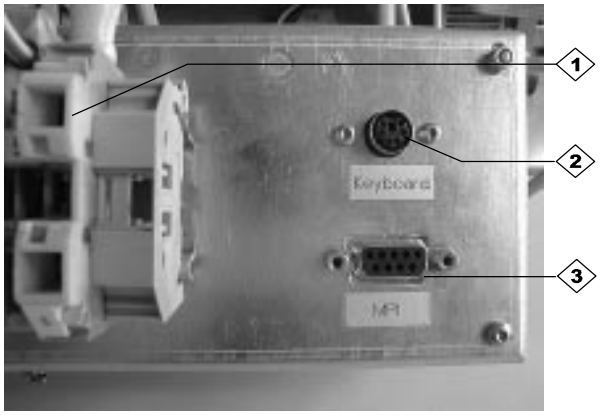
3.3 Rear View with Connections

Table 3-2 Rear View of the SIMATIC PC BI45 with Connections



No.	Usage/Description
1	VGA monitor connector, 15-pin Sub-D connector 3 rows (female)
2	COM2, serial interface (RS232), 9-pin Sub-D connector (male)
3	COM1, serial interface (RS232), 25-pin Sub-D connector (female)
4	MPI/PROFIBUS-DP interface, 9-pin Sub-D connector (female)
5	LPT1, parallel printer interface, 25-pin Sub-D connector (female)
6	Connector for PS/2 mouse (only for start up and service)
7	Connector for external keyboard Do not use this connection together with the operator panel, otherwise the system will malfunction. Instead, use the connector on the back of the operator panel (item 2, Table 3-3).
8	PROFIBUS-DP interface (IM182), 9-pin Sub-D connector (female). Not included in the scope of the standard package
9	CD-ROM drive
10	Floppy disk drive 3,5'' (1,44 MByte)
11	Reset switch

Table 3-3 Connections on the Back of the Operator Panel



No.	Usage/Description
1	Terminal strip (for the assignment see Table B-4)
2	Connector for PS/2 keyboard (only for start up and service)
3	MPI/PROFIBUS-DP, 9-pin Sub-D connector (female)

Technical Data

A

In This Chapter

In this chapter you will find the following technical data for the SICALIS PMC 7 Operator Panel:

- Casing
- Processor
- Memory
- Interfaces
- Software
- Display
- Keyboard
- Power supply
- Ambient conditions
- Interference immunity
- Interference emission

Housing	
External dimensions (W x H x D)	430 mm x 520 mm x 210 mm
Installation cutout (W x H)	$408^{+0.8}$ mm x $498^{+0.8}$ mm
Installation depth	205 mm
Protection class	Protection Class 1 in accord with VDE 0106 T1: 1982 (IEC 536)
Safety rules	IEC 950/09.91 corresponds to EN 60950
Safety standard	
Ⓡ Front	IP65
Ⓡ Back	IP20
Weight	Approx. 22 kg

Processor	
Type	Pentium II
Clock frequency	333 MHz

Memory and disk storage	
DRAM	64 MByte, upgradeable
Mass storage	
Ⓡ Hard disk	≧ 3.2 GB
Ⓡ Floppy disk drive	3.5” (1.44 MByte)
Ⓡ CD-ROM	20x EIDE, 650 MByte

Interfaces	
PLC	Ⓡ PROFIBUS DP standard slave based on IM 182 [1)] Ⓡ MPI: – On front panel [2)] – On rear panel
Enabling switch, front	17-pin
Peripherals	Ⓡ Keyboard [2) 3)] (PS/2) Ⓡ Mouse [2)] (PS/2) Ⓡ Printer (LPT1)

1) Not included in the scope of the delivered package
2) Only for commissioning and service
3) See the notes regarding connection on page 3-5 (Table 3-2, item 7)

Software	
Operating system	MS Windows® NT 4.0 (English) with Service Pack 3
Keyboard driver	Ⓡ Runtime version (standard) Ⓡ Developer version (upon request)

Display	
LCD type	TFT (active matrix display)
Active screen diagonal	12.1''
Resolution (pixels) horizontal x vertical	800 x 600
Graphic Mode	Super VGA
Service life (MTBF)	Approx. 50,000 h
Backlighting Service life (MTBF) [4]	2 CCFL tubes Approx. 30,000 h

[4] The tubes used for the backlighting of the display are parts subject to wear and are therefore not covered by the terms of the guarantee. Depending on the operating temperature, they have a service life of around 30,000 hours. In unfavorable operating conditions, we recommend that the tubes are replaced after that period. The tubes are available as spare parts. If one tube fails it is advisable to replace both at the same time in order to ensure even illumination.

Control elements		
Sealed Membrane Keyboard		
Ⓡ Movement keys	16 (2 x 8)	
Ⓡ Function keys with programmable functions	16	
30 mm elements, recessed design	MOP	UOP
Ⓡ Rotary switch, 10steps	1	1
Ⓡ Key-operated switch/button	1/1	1/1
Ⓡ Illuminated pushbutton	6	5
Ⓡ Pushbuttons	2	1
Ⓡ Emergency Stop	1	1

Power Supply	
Ⓡ Alternating Current (for SIMATIC PC BI45)	switchable between Ⓡ 115 V AC (93...132 V AC) Ⓡ 230 V AC (187..264 V AC)
– Frequency	50 Hz (47...63 Hz)
– Maximum power consumption	220 W
Ⓡ Direct Current [5]	
– Rate Voltage	+24 V DC
– Permissible range	+18.0...+30.0 V DC
– Max. permissible transients	35 V (500 ms)
– Time between two transients	50 s min.
– Current consumption	
Typically	Approx. 1 A
Maximum continuous current	Approx. 1.5 A
– Switch-on surge I^2t	Approx. 0.7 A^2s
– Circuit breaker, internal	electronic

[5] Not electrically isolated (see notes on page 2-6).

Ambient Conditions	
Installation position with FDD	Max. 25˚ inclination to front or rear
Max. permissible ambient temperature	
Ⓡ During operation	+4...+45 ˚C
Ⓡ Transport, storage	–20...+60 ˚C
Relative humidity	
During operation	20... 80%, no condensation
Transport, storage	10%...90%, no condensation
Exposure to shock	
During operation	5 g/ 11 ms
Transport, storage	25 g/ 6 ms
Vibration	
During operation	0.035 mm (10 – 58 Hz) 0.5 g (58 – 500 Hz)
Transport, storage	3.5 mm (5 – 8.5 Hz) 1 g (8.5 – 500 Hz)
max. differential pressure (front, rear)	2 hPa
Air pressure	
During operation	706...1030 hPa
Transport, storage	581...1030 hPa

Conformity of the product described with the requirements of Directive 89/336 EEC is certified by compliance with the following standards:

Immunity to Interference	
Static discharge (contact discharge/air discharge)	EN 61000-4-2 6 kV/8 kV
HF radiation	EN 61000-4-3 10 V/m, 80% AM, 1 kHz
Pulse modulation	ENV 50204 900 MHz ±5 MHz 10 $V/m_{eff.}$, 50% ED, 200 Hz
HF current	EN 61000-4-6 150 kHz – 80 MHz 10 V, 80% AM, 1 kHz
Burst interference Mains supply lines Supply lines Process data lines Signal lines	EN 61000-4-4 2 kV 2 kV 2 kV 1 kV

Interference Emission	
Radio interference suppression in accord with EN 55011	Class A

Interfaces and Terminals – Assignments

B

In this chapter

This chapter provides information about the interface pin assignments and the terminal strip connections for the SICALIS PMC 7 Operator Panel.

Information regarding the interface pin assignments of the integrated SIMATIC PC can be found in the Technical Description *PC BI45/FI45 PII*, Order No. C79000-G7000-C794.

B.1 Connectors

MPI/PROFIBUS-DP (X14 and X15)

Table B-1 shows the pin assignment of the two 9-pin Sub-D connectors used for the MPI connections X14 (front) and X15 (back).

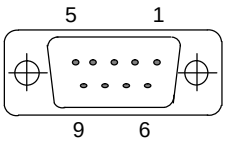


Table B-1 Pin Assignment of the 9-pin Sub-D Connector (Female)

Pin	Name
1	–
2	–
3	Data B
4	–
5	GND (voltage-free)
6	+5 V (electrically isolated)
7	–
8	Data A
9	–

PS2 Keyboard (X16)

Table B-2 shows the pin assignment of the 6-pin PS/2 connector for an external keyboard. The connector is located on the back above the MPI connection.

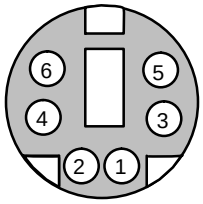


Table B-2 Pin Assignment of the 6-pin PS/2 Keyboard Connector (Female)

Pin	Name	Input/Output
1	Keyboard data	Input/Output
2	Mouse data	Input/Output
3	0 V	–
4	5 V power supply	Output
5	Keyboard clock	Input/Output
6	Mouse clock	Input/Output

Enabling Switch (X13)

Table B-3 shows the pin assignment of the 17-pin connector used for the enabling switch on the front of the operator panel.

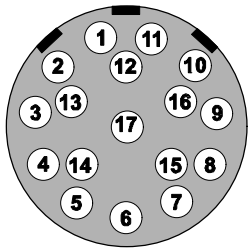


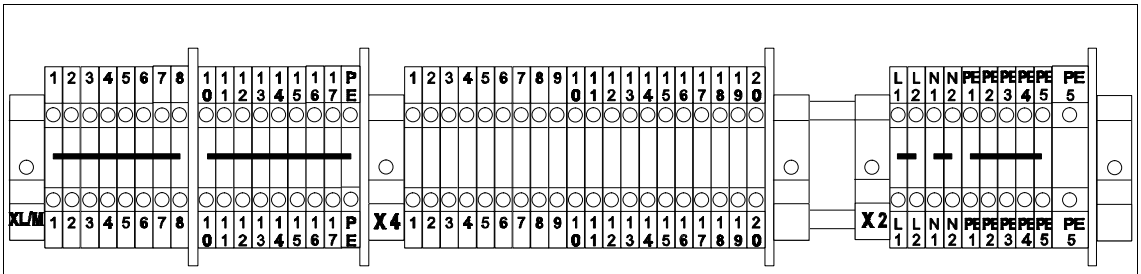
Table B-3 Pin Assignment of the 17-pin Connector (female) for the Enabling Switch

Pin	Name
1	+24 V
2	0 V
3	CPI 2, Input 2
4	CPI 2, Input 3
5	CPI 1, Output 10
6	CPI 1, Output 11
7	–
8	CPI 2, Input 4
9	–
10	Terminal Strip X4, Terminal 7
11	Terminal Strip X4, Terminal 8
12	Terminal Strip X4, Terminal 9
13	Terminal Strip X4, Terminal 10
14	Terminal Strip X4, Terminal 11
15	Terminal Strip X4, Terminal 12
16	–
17	GND

B.2 Terminal Strips

Table B-4 shows the assignment of the terminal strips on the back of the operator panel.

Table B-4 Assignment of the Terminal Strips



No.	Usage/Description
	Terminal Strip XL/M
1	+24 V DC external supply –> CPI 1, input 1
2	+24 V DC –> CPI 1, output 1
3	+24 V DC –> CPI 2, input 1
4	+24 V DC –> CPI 2, output 1
5	+24 V DC –> Illuminated pushbutton “Automatic Operation”, terminal 13
6	+24 V DC –> Enabling switch, pin 1
7	+24 V DC
8	+24 V DC
10	0 V DC external supply –> CPI 1, input 18
11	0 V DC –> CPI 1, output 18
12	0 V DC –> CPI 2, input 18
13	0 V DC –> CPI 2, output 18
14	0 V DC –> Indicator lamp “Automatic Operation”, terminal x1
15	0 V DC –> Terminal Strip X4, terminal 6
16	0 V DC –> Enabling switch, pin 2
17	0 V DC
PE	0 V DC –> PE

Table B-4 Assignment of the Terminal Strips, continued

No.	Usage/Description
Terminal Strip X4	
1	“EMERGENCY STOP” switch, terminal 22
2	“EMERGENCY STOP” switch, terminal 21
3	“EMERGENCY STOP” switch, terminal 32
4	“EMERGENCY STOP” switch, terminal 31
5	–
6	Terminal Strip XL/M, terminal 15
7	Enabling switch, pin 10
8	Enabling switch, pin 11
9	Enabling switch, pin 12
10	Enabling switch, pin 13
11	Enabling switch, pin 14
12	Enabling switch, pin 15
13	–
14	–
15	–
16	–
17	–
18	–
19	–
20	–
Terminal Strip X2	
L1	230 V AC external supply (hot) –> SIMATIC PC BI45, mains connection
L2	230 V AC (hot)
N1	230 V AC external supply (neutral) –> SIMATIC PC BI45, mains connection
N2	230 V AC (neutral)
PE1	Protective earth external supply –> SIMATIC PC BI45, mains connection
PE2	Protective earth –> enabling switch, Pin 17 (1.5 mm^2)
PE3	Protective earth –> ground for terminal strip rail (1.5 mm^2)
PE4	Protective earth –> ground for the hinged plate (1.5 mm^2)
PE5	Protective earth –> ground for front of housing (1.5 mm^2)
PE6	External functional ground –> ground for SIMATIC PC BI45 (6 mm^2)

Caution

- On the terminal strips XL/M and X4, connect only SELV voltages (safety extra-low voltage).
- To connect lines with a cross-section of up to 0.74 mm^2, use wire end ferrules.

B.3 Control Panel Interface

Purpose

The standard SICALIS PMC 7 Operator Panel is equipped with two CPI modules (CPI = Control Panel Interface). Together the two modules provide 32 digital inputs/outputs. Fundamentally, a CPI module permits rapid key operation without communication-related delays (key delay < 100 ms).

However, the digital inputs and outputs are not electrically isolated from the operator panel.

The Bus Terminal Strip Assignment

Each CPI module is equipped with a bus terminal strip with 36 terminals to connect the I/O leads and the external voltage supply. By default, the voltage supply is already connected.

Figure B-1 shows the position of the bus terminals.

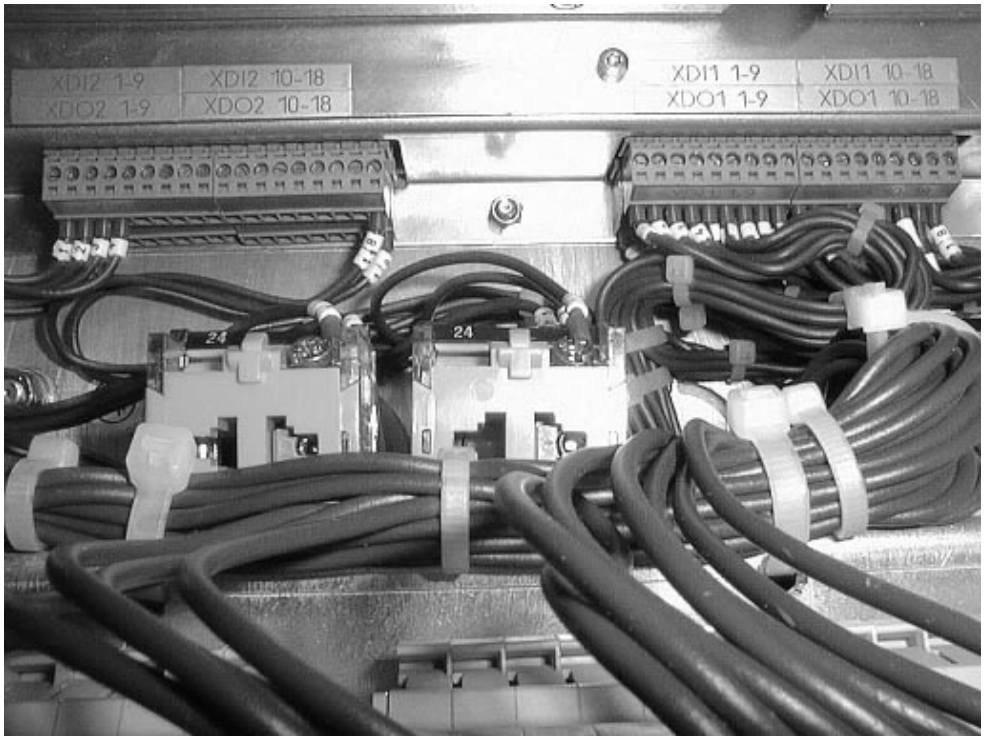


Figure B-1 CPI Bus Terminals

Developer Version

C

Purpose

The Developer Version of the keyboard driver contains – in comparison to the Runtime Version included in the standard package (see page 2-13) – some additional tools, which enable you to modify the standard key assignment to suit customer-specific requirements.

The Developer Version is included in the standard operator panel package.

Installation Files for the Developer Version

The installation files for the Developer Version are delivered on a separate diskette. This is not a standard part of the operator panel package. The diskette contains the files listed in Table C-1.

Table C-1 Installation Files for the Developer Version

File	Function
`Bit2Led.def`	Source file for the converter Bit2Led.exe
`Bit2Led.exe`	Converter: Assignment of Bit –> LED (LED = lamp control)
`BitLed.bat`	Batch file to start the converter `Bit2Led.exe`
`DefPad.EXE`	Converter for key codes
`Install.bat`	Batch file to install the required drivers and tables
`KbdTaco.dll`	Mapping table for key codes, which are not used by the standard keyboards
`KbdTaco.reg`	Registry file for the mapping table `KbdTaco.dll`
`Key2Bit.def`	Source file for the converter Key2Bit.exe
`Key2Bit.exe`	Converter: Assignment of Key –> Bit
`KeyBit.bat`	Batch file to start the converter `Key2Bit.exe`
`readme.txt`	Text file with general information
`SiKey.reg`	Registry entry for the driver software `SiKey.sys`
`SiKey.sys`	Driver software
`Simatico.def`	Source file for the converter DefPad.exe
`simatico.pad`	Key assignment file
`tacoB2l.tbl`	Binary table: Assignment of Bit –> LED (LED = lamp control)
`tacoK2b.tbl`	Binary table: Assignment of Key –> Bit
`TastDrv.reg`	Registry entry for the keyboard driver `TastDrv.sys`
`TASTDRV.SYS`	Keyboard driver

C.1 Change Keyboard Layout

Prerequisites

You can change the standard keyboard layout – the assignment of one or more of the operator panel's keys and switches – to suit the specific requirements for the machine. To do so, you must first install the Developer Version, which is not part of the standard operator panel package.

In Appendix D, you will find tables with the standard (default) key codes for all the control elements.

Assigning Key Codes

To generate the `Simatico.pad` definition file for the key codes, use the converter `DefPad.exe`. This program takes the ASCII source file, `Simatico.def`, and compiles the definition file, `Simatico.pad`.

The illustration below presents the flow of the compilation process.

Binary Tables

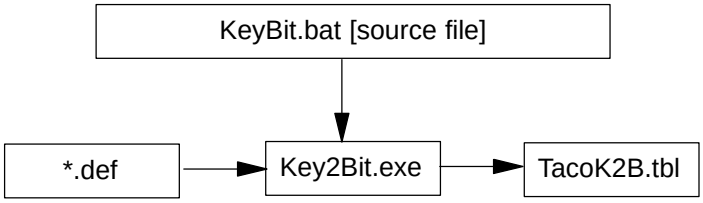
The keyboard driver requires binary tables to allocate the key codes to a bit action (Table `TacoK2B.tbl`) and from a bit to a lamp driver (Table `TacoB2L.tbl`). These tables must be in the Windows NT directory, `\System32\Drivers`, so that the keyboard driver can read them at system startup.

Assignment Key –> Bit

The batch file, `KeyBit.bat`, is used to create the binary table for assigning a PLC bit to the activation of a key (movement key). This batch file converts a source file in ASCII format into the binary table, `TacoK2B.tbl`.

Call:	KeyBit.bat source file	
Action:	SET:	The bit will be set
	RESET:	The bit will be reset

The illustration below presents the flow of the compilation process.



The batch file, `KeyBit.bat`, calls the converter program, `Key2Bit.exe`, and passes the name of the source file (*.def) to it. The converter program, `Key2Bit.exe`, compiles the binary table, `TacoK2B.tbl`, from this source.

Source File Format:

Below, you will find three lines from the sample source file, `Key2Bit.def`. This file is included a sample in the Developer Version (see page C-1).

KEY 3: 6C / F0 6C, MAKE BREAK; ## 00.SET / 00.RESET ##	Bit 0 will be set when the key is depressed and when the key is released the bit will be reset
KEY 3: 6C / F0 6C, MAKE BREAK; ## 01.SET ##	Bit 1 will be set when the key is depressed but when the key is released the bit will remain unchanged
KEY 3: 6C / F0 6C, MAKE BREAK; ## / 02.SET ##	Bit 2 will not change when the key is depressed but when the key is released the bit will be set

MAKE: Key code, which is valid when the key is depressed
BREAK: Key code, which is valid when the key is released

If pressing or releasing a key should trigger an action in the PLC, the line for the respective key, as shown in the example above, must be extended with the following character string:

```
; ## bit number.action [/ bit number.action] ##
```

The bit number must be given in hexadecimal.

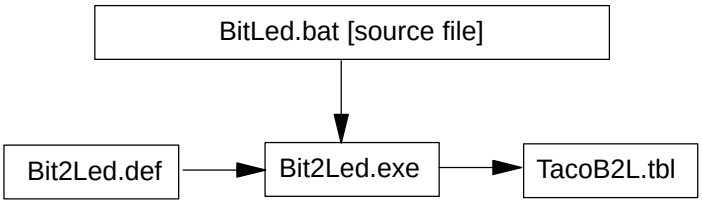
Assignment of Bit –> LED (LED = lamp control)

The batch file, `BitLed.bat`, is used to create the binary table for assigning a PLC bit to the control of a lamp (LED). This batch file takes the ASCII source file, `2Bit2Led.def`, and compiles the binary table, `2TacoB2L.tbl`.

Call: BitLed.bat source file

Action: ON: The lamp lights when the bit is set

The illustration below presents the flow of the compilation process.



The batch file, `BitLed.bat`, calls the converter program, `Bit2Led.exe`, and passes the name of the source file (Bit2Led.def) to it.2 The converter program, `Bit2Led.exe`, compiles the binary table, `TacoB2L.tbl`, from this source.

Source File Format:

Below, you will find a line from the source file. The source file may only have one assignment per line:

Bit number	LED number (lamp number)	Action when bit is set
01	0 A	ON

Bit number and LED number (= lamp number) are to be given in hexadecimal.

When the bit is cleared, the action will be set to *OFF* (Lamp OFF).

Restrictions in the selection of the code

- The 8042 keyboard controller and the Windows NT keyboard driver:

  In the selection of the MAKE and BREAK codes, the following restrictions must be noted:

  – The key codes must lie between 1h and 7Fh.

  – The prefix F0h causes the keyboard controller to set Bit No. 7 when handling the next Byte. Windows NT interprets this as the release of a key.

  – The prefixes E0h and E1h are also permissible.

- Key Code Recognition by the Driver File, `SiKey.sys`:

  The following restrict only applies when the codes used should also trigger a bit action:

  If a code consists of both a key (e.g. F1) and a combination code (e.g. ALT), the combination code may not begin with the same sequence as the short code. In this case, the key codes should be extended with codes, which Windows NT does not recognize.

  Example:

  The key code for releasing key F1 is BBh, for releasing the Shift key AAh. Releasing the key combination Shift-F1 thus send the combination code BBh AAh.

  The keyboard driver interprets the code BBh as indicating that the key F1 has been released. Thus the system will never recognize that the key combination Shift-F1 was released.

  Solution: Extend the code for the F1 key e.g. by the code E1h 01h.

Compiling a Keyboard Mapping Table

The keyboard mapping table is required, when keyboard controller does not use standard MAKE/BREAK codes and an application expects virtual key codes from these keys.

The keyboard mapping table is a 32-bit Windows DLL. The table is created by compiling and linking a C file. To do so, you will need a MS C 32-Bit compiler and Windows NT DDK for Windows NT 4.0.

Keyboard Mapping Table Installation

After compiling, copy the file, KbdTaco.dll, into the Windows NT directory `\System32`.

In the Start menu, activate the keyboard mapping table from `\Settings\Control Panel\Keyboard`. On the *Input Locales* panel, click on the *Properties* button and select the Keyboard Layout, *TacoKeyboard*.

C.2 Key Numbers

Figure C-1 shows the key numbers for the MOP variant of the operator panel.

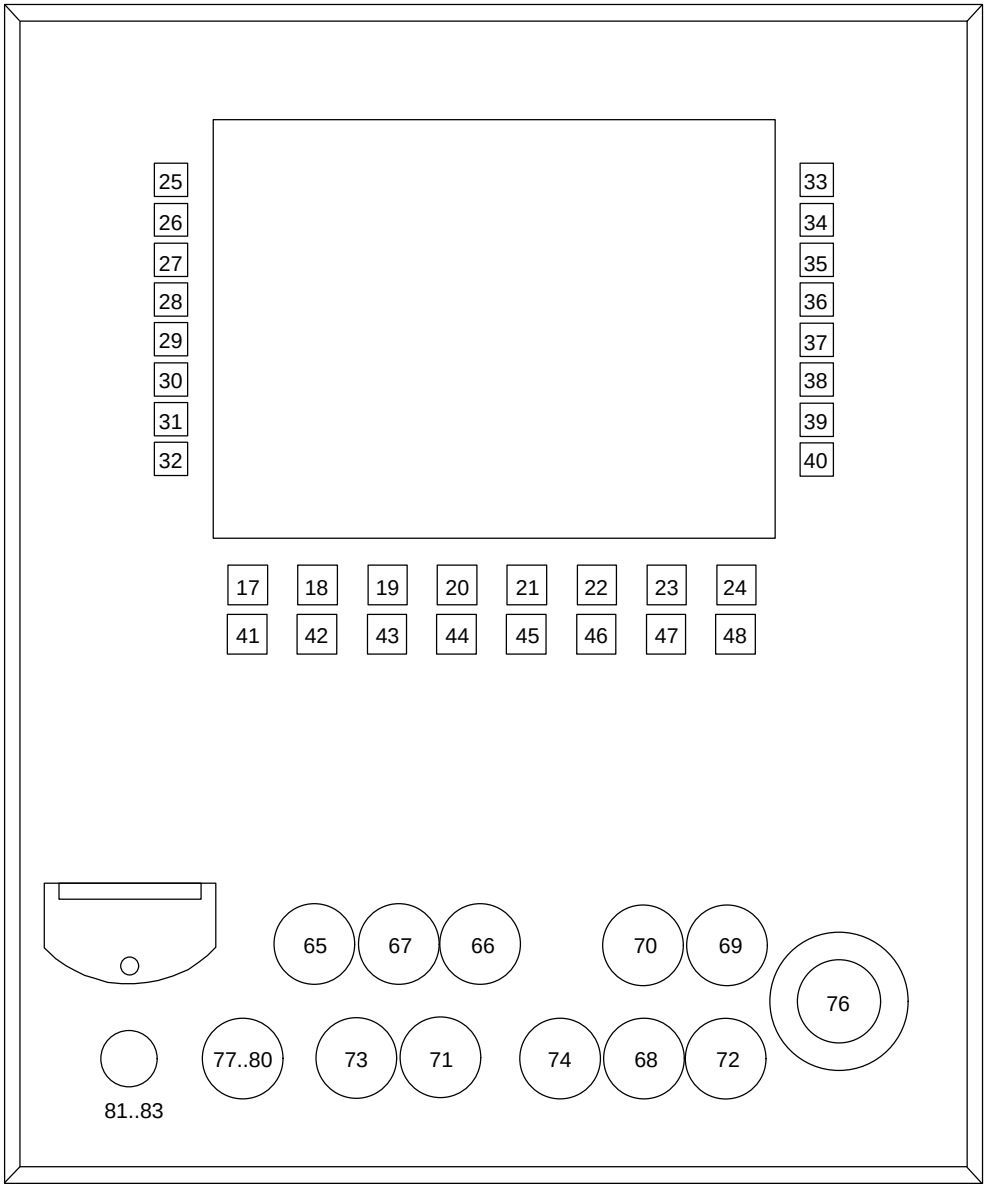


Figure C-1 Numbering of the Keys (MOP Variant)

Key Layout and Key Codes

D

In this chapter

In this chapter, you will find the factory settings for the key layout and key codes in tabular form for the standard operator panel. The empty tables at the end can be used to make a record of your own individual key assignments.

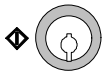
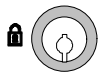
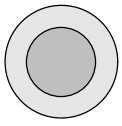
Information regarding the numbering of the keys can be found on page C-6.

Make Code and Break Code

Make	The key code that is transmitted when the key is pressed.
Break	The key code that is transmitted when the key is released.

Key	Make Code	Break Code	Comments
Movement keys, left			
1	14 05	F0 05 F0 14	(Key 25)
2	14 06	F0 06 F0 14	(Key 26)
3	14 04	F0 04 F0 14	(Key 27)
4	14 0C	F0 0C F0 14	(Key 28)
5	14 03	F0 03 F0 14	(Key 29)
6	14 0B	F0 0B F0 14	(Key 30)
7	14 02	F0 02 F0 14	(Key 31)
8	14 0 A	F0 0A F0 14	(Key 32)
Movement keys, right			
1	12 05	F0 05 F0 12	(Key 33)
2	12 06	F0 06 F0 12	(Key 34)
3	12 04	F0 04 F0 12	(Key 35)
4	12 0C	F0 0C F0 12	(Key 36)
5	12 03	F0 03 F0 12	(Key 37)
6	12 0B	F0 0B F0 12	(Key 38)
7	12 02	F0 02 F0 12	(Key 39)
8	12 0 A	F0 0A F0 12	(Key 40)

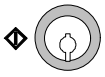
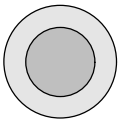
Key	Make Code	Break Code	Comments
Function keys			
F1	05	F0 05	(Key 17)
F2	06	F0 06	(Key 18)
F3	04	F0 04	(Key 19)
F4	0C	F0 0C	(Key 20)
F5	03	F0 03	(Key 21)
F6	0B	F0 0B	(Key 22)
F7	02	F0 02	(Key 23)
F8	0 A	F0 0A	(Key 24)
F9	01	F0 01	(Key 41)
F10	12 09	F0 09 F0 12	(Key 42)
F11	14 01	F0 01 F0 14	(Key 43)
F12	14 09	F0 09 F0 14	(Key 44)
F13	14 78	F0 78 F0 14	(Key 45)
F14	14 07	F0 07 F0 14	(Key 46)
F15	09	F0 09	(Key 47)
F16	12 01	F0 01 F0 12	(Key 48)

Key	Make Code	Break Code	Comments
Controls to operate the machine			
	E1 30	E1 F0 30	Automatic Operation (Key 65)
	E1 32	E1 F0 32	Manual Operation (Key 67)
	E1 31	E1 F0 31	Single-Step Operation (Key 66)
	E1 35	E1 F0 35	Stop at end of clock (Key 70)
	E1 34	E1 F0 34	Initial state (Key 69)
	E1 36	E1 F0 36	Stop Immediately (Key 71)
	E1 33	E1 F0 33	Plant OFF (not for UOP variant) (Key 68)
	E1 37	E1 F0 37	Plant ON (not for UOP variant) (Key 72)
	E1 3C	E1 F0 3C	Zone selection weight 1 (Key 77)
	E1 3D	E1 F0 3D	Zone selection weight 2 (Key 78)
	E1 3E	E1 F0 3E	Zone selection weight 4 (Key 79)
	E1 3F	E1 F0 3F	Zone selection weight 8 (Key 80)
	E1 38	E1 F0 38	Key-operated switch (Key 73)
	11 5D	F0 5D F0 11	Key-operated switch (Key 74)
	E1 3B	E1 F0 3B	EMERGENCY STOP (Key 76)

Empty Tables for Individual Key Assigments

Key	Make Code	Break Code	Comments
Movement keys, left			
1			
2			
3			
4			
5			
6			
7			
8			
Movement keys, right			
1			
2			
3			
4			
5			
6			
7			
8			

Key	Make Code	Break Code	Comments
Function keys			
F1			
F2			
F3			
F4			
F5			
F6			
F7			
F8			
F9			
F10			
F11			
F12			
F13			
F14			
F15			
F16			

Key	Make Code	Break Code	Comments
Controls to operate the machine			
			Automatic operation
			Manual operation
			Single-step operation
			Stop at end of clock
			Initial state
			Immediate stop
			Plant OFF (not for UOP variant)
			Plant ON (not for UOP variant)
			Zone selection weight 1
			Zone selection weight 2
			Zone selection weight 4
			Zone selection weight 8
			Key-operated switch
			Key-operated switch
			Emergency Stop

ESD-Guidelines

E

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 Elektrostatisch Gefährdeten Bauelemente/ Baugruppen: ”EGB”

The more frequent international name is:

”ESD” (Electrostatic Sensitive Device)

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.

Project Planning Documents

F

In this chapter

In this chapter, you will find the following project planning documents for the both types of operator panel (MOP and UOP):

F.1 Partial List of Parts

F.1.1 Partial List of Parts for Main Operator Panel (MOP)

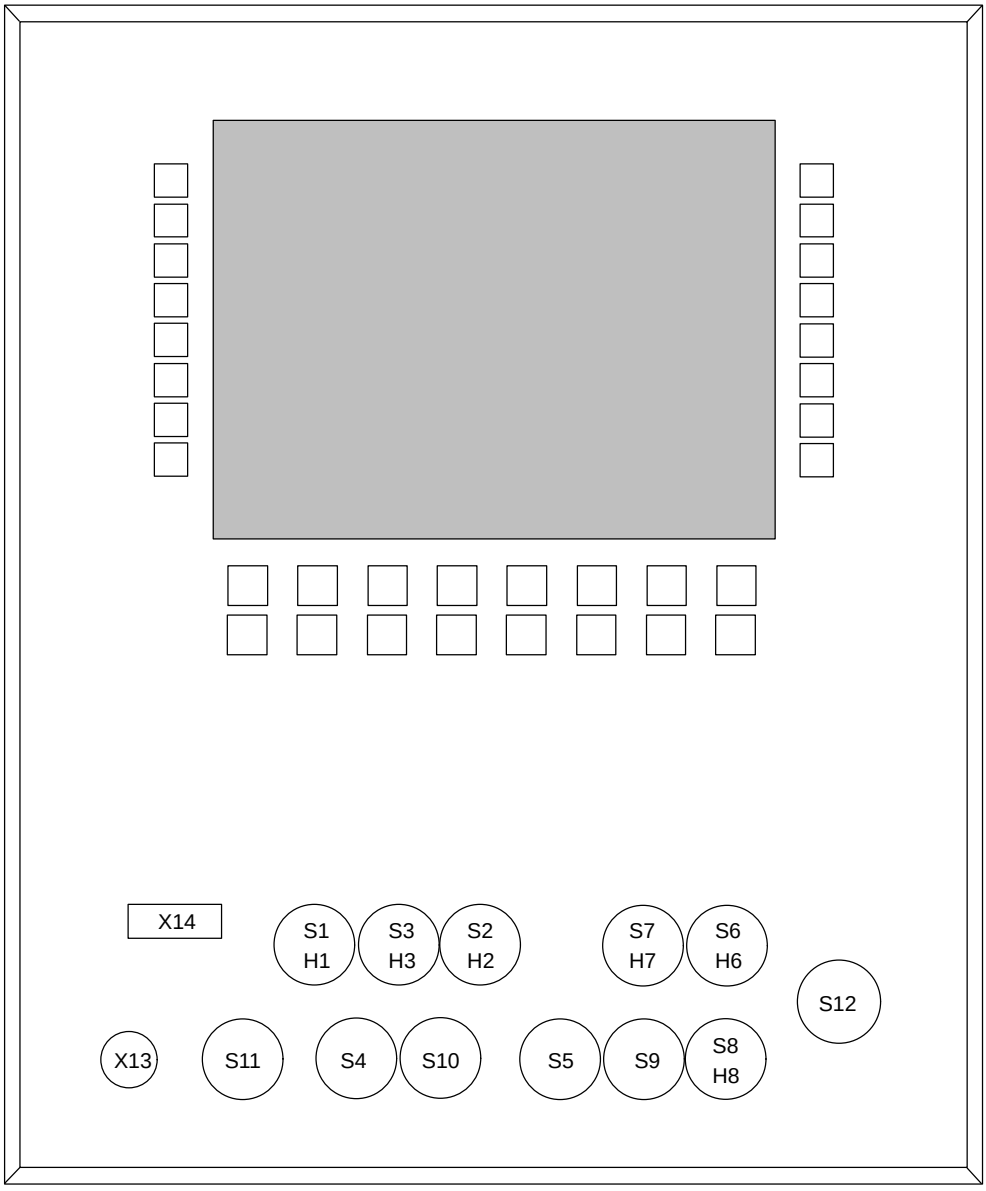
Pos.	Mat. No.	Order Number	Quantity	Name	Description
1			1		Rail for terminal strip, l = 320 mm
310		704.032.718	1	S1	Illuminated pushbutton “AUTOMATIC”, clear lens, 1 make contact
310				H1	Indicator lamp “AUTOMATIC”
310		704.032.718		S2	Illuminated pushbutton “Single-Step”, clear lens, 1 make contact
310				H2	Indicator lamp “Single-Step”
310		704.032.718		S3	Illuminated pushbutton “MANUAL”, clear lens, 1 make contact
310				H3	Indicator lamp “MANUAL”
370		14–141.022.K		S4	Key-operated pushbutton “START OPERATING MODE”, 1 make contact
390		14–235.022.K		S5	Key-operated switch “SPECIAL FUNCTIONS”, 1 make contact
320		704.032.518		S6	Illuminated pushbutton “INITIAL STATE”, green lens, 1 make contact
320				H6	Indicator lamp “INITIAL STATE”
310		704.032.718		S7	Illuminated pushbutton “STOP AT END OF CLOCK”, clear lens, 1 make contact
310				H7	Indicator lamp “STOP AT END OF CLOCK”
310		704.032.718		S8	Illuminated pushbutton “PLANT ON”, clear lens, 1 make contact
310				H8	Indicator lamp “PLANT ON”
460		704.012.218		S9	Pushbutton “PLANT OFF”, red lens, 1 make contact
350		704.012.418		S10	Pushbutton “STOP IMMEDIATELY”, yellow lens, 1 make contact
420		704.8A.550		S11	Cam switch “UNITS / FEED”
430		704.064.2		S12	Mushroom-head pushbutton switch “EMERGENCY STOP”, 3 break contacts
070				X13	Connector “ENABLING SWITCH”
				X14	Connector “MPI-SS”
250			38	XL/M, 2, 4	Terminals
270	402 09 547		2	X2.N	N terminals
260	402 09 523		5	X2.PE	PE terminals, 2.6 mm^2
7	402 09 465		1	X2.PE	PE terminal, 6 mm^2
280	402 14 809		4		Terminal separators
290	402 00 124		5		Terminal end pieces
500			1	W1	Cable BI box – Display data
490			1	W2	Cable BI box – Inverter / TACO
510			1	W3	Ribbon cable for MPI interface
530			1	W4	Cable CPI – TACO
			1	W5	Cable CPI – CPI
520			1	W6	Cable TACO – external PS2 interface
	250 7 982				Wire H05V-K 0.5, blue
	403 81 050				Ferrules 0.5/14 or.
2		6ES7647–1AC00–0CX1	1	BI45	BI45 box

F.1.2 Partial List of Parts for Unit Operator Panel (UOP)

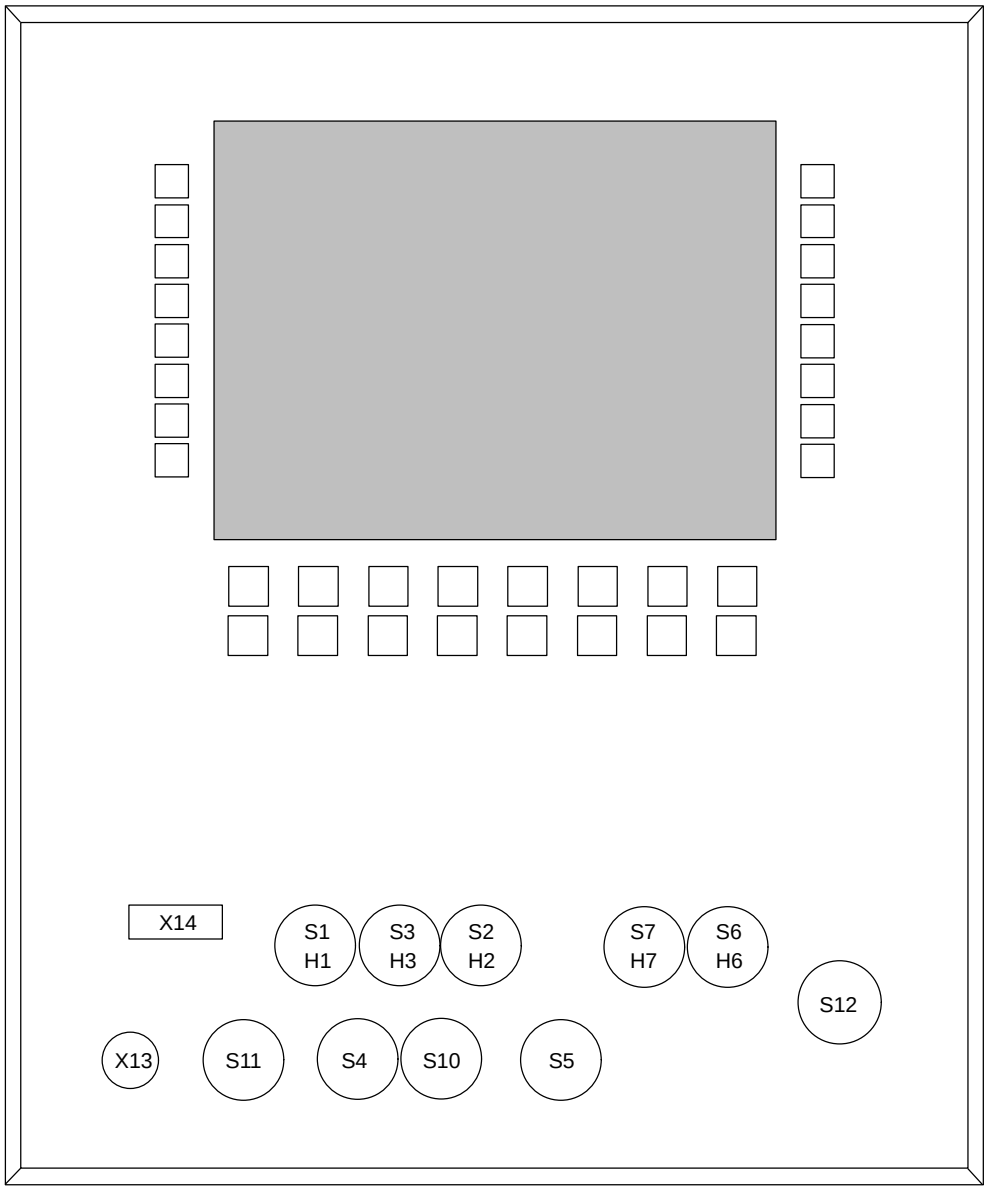
Pos.	Mat. No.	Order Number	Quan-tity	Name	Description
1			1		Rail for terminal strip, l = 320 mm
310		704.032.718	1	S1	Illuminated pushbutton “AUTOMATIC”, clear lens, 1 make contact
310				H1	Indicator lamp “AUTOMATIC”
310		704.032.718		S2	Illuminated pushbutton “Single-Step”, clear lens, 1 make contact
310				H2	Indicator lamp “Single-Step”
310		704.032.718		S3	Illuminated pushbutton “MANUAL”, clear lens, 1 make contact
310				H3	Indicator lamp “MANUAL”
370		14–141.022.K		S4	Key-operated pushbutton “START OPERATING MODE”, 1 make contact
390		14–235.022.K		S5	Key-operated switch “SPECIAL FUNCTIONS”, 1 make contact
320		704.032.518		S6	Illuminated pushbutton “INITIAL STATE”, green lens, 1 make contact
320				H6	Indicator lamp “INITIAL STATE”
310		704.032.718		S7	Illuminated pushbutton “STOP AT END OF CLOCK”, clear lens, 1 make contact
310				H7	Indicator lamp “STOP AT END OF CLOCK”
350		704.012.418		S10	Pushbutton “STOP IMMEDIATELY”, yellow lens, 1 make contact
420		704.8A.550		S11	Cam switch “UNITS / FEED”
430		704.064.2		S12	Mushroom-head pushbutton switch “EMERGENCY STOP”, 3 break contacts
070				X13	Connector “ENABLING SWITCH”
				X14	Connector “MPI-SS”
250			38	XL/M, 2, 4	Terminals
270	402 09 547		2	X2.N	N terminals
260	402 09 523		5	X2.PE	PE terminals, 2.5 mm^2
7	402 09 465		1	X2.PE	PE terminal, 6 mm^2
280	402 14809		4		Terminal separators
290	402 00 124		5		Terminal end pieces
500			1	W1	Cable BI box – Display data
490			1	W2	Cable BI box – Inverter / TACO
510			1	W3	Ribbon cable for MPI interface
530			1	W4	Cable CPI – TACO
			1	W5	Cable CPI – CPI
520			1	W6	Cable TACO – external PS2 interface
	250 7 982				Wire H05V-K 0.5, blue
	403 81 050				Ferrules 0.5/14 or.
2		6ES7647-1AC00-0CX1	1	BI45	BI45 box

F.2 Layout – Front Panel

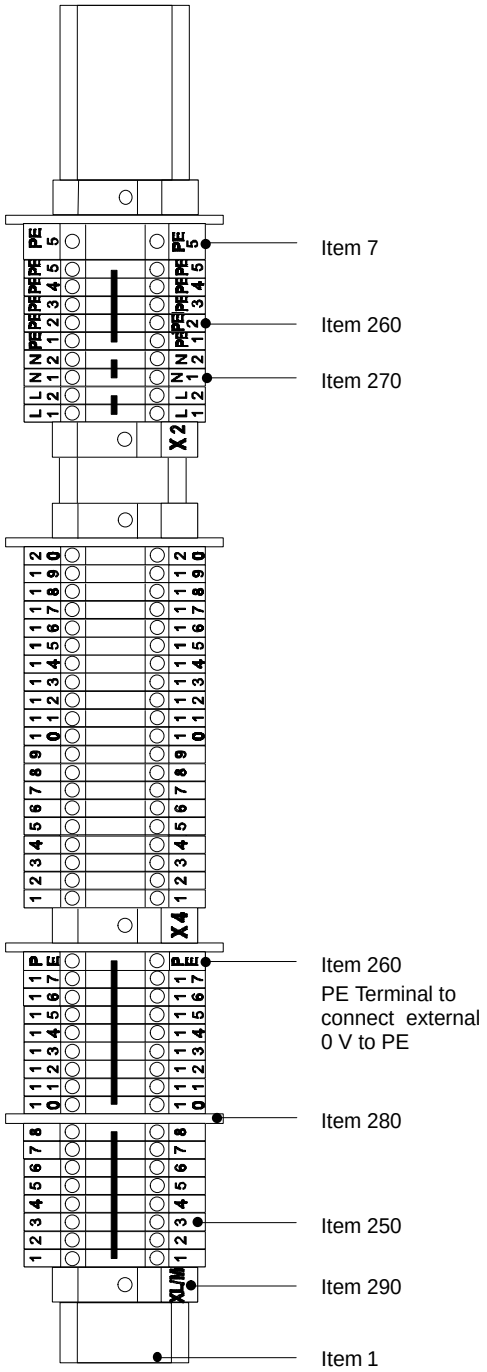
F.2.1 Layout for Main Operator Panel (MOP)



F.2.2 Layout for Unit Operator Panel (UOP)

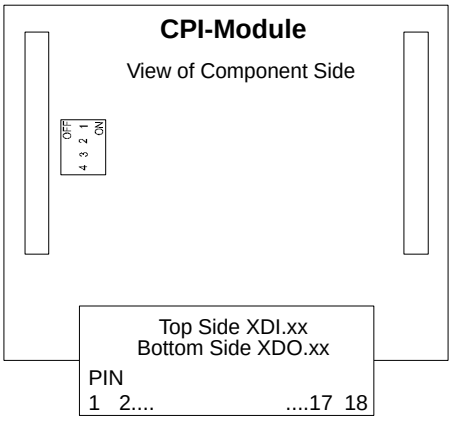


F.3 Layout for Terminal Strips (MOP and UOP)

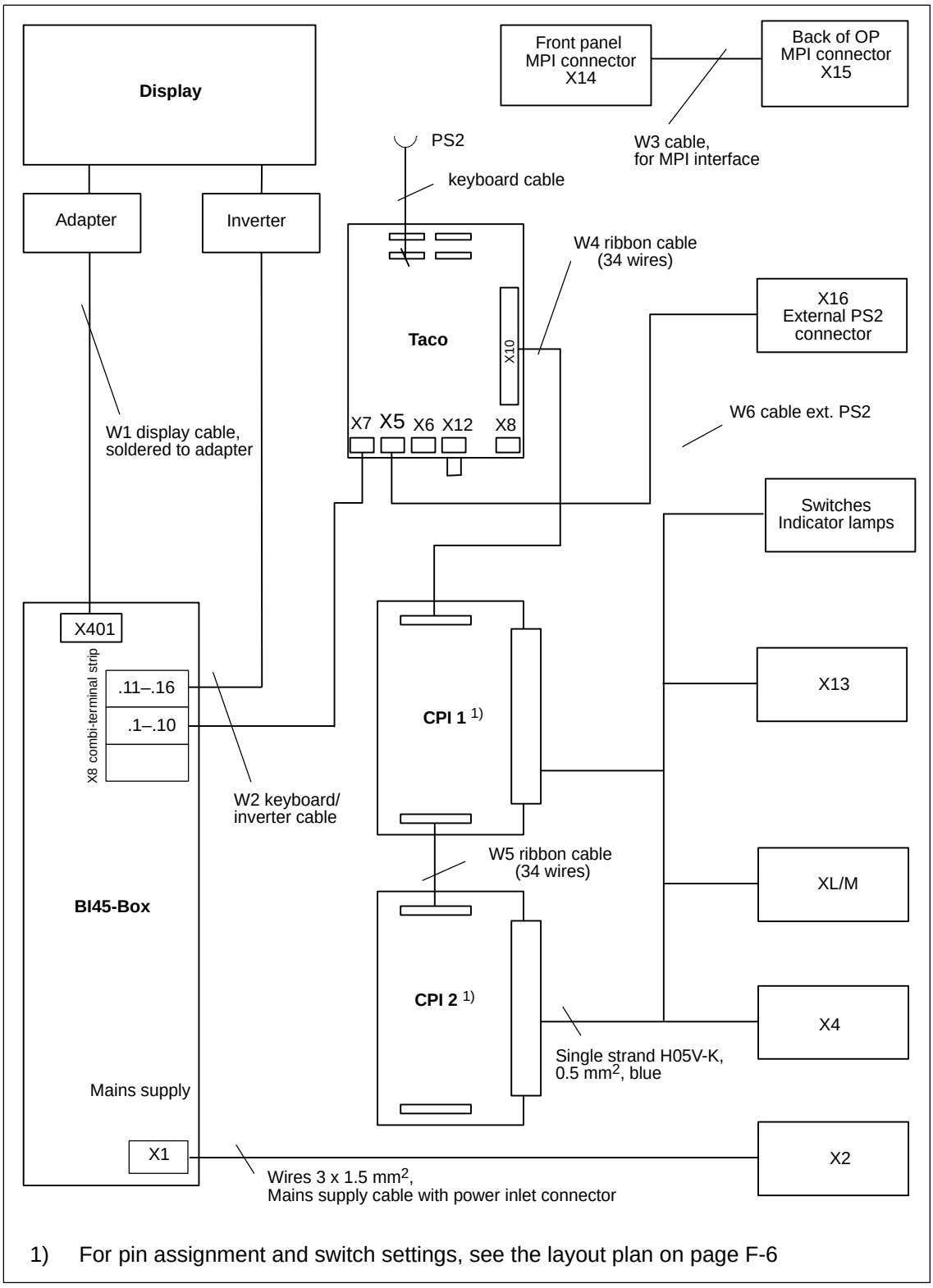


Switch setting CPI 1:
1 = OFF
2 = OFF
3 = OFF
4 = OFF

Scwitch setting CPI 2:
1 = ON
2 = ON
3 = ON
4 = ON



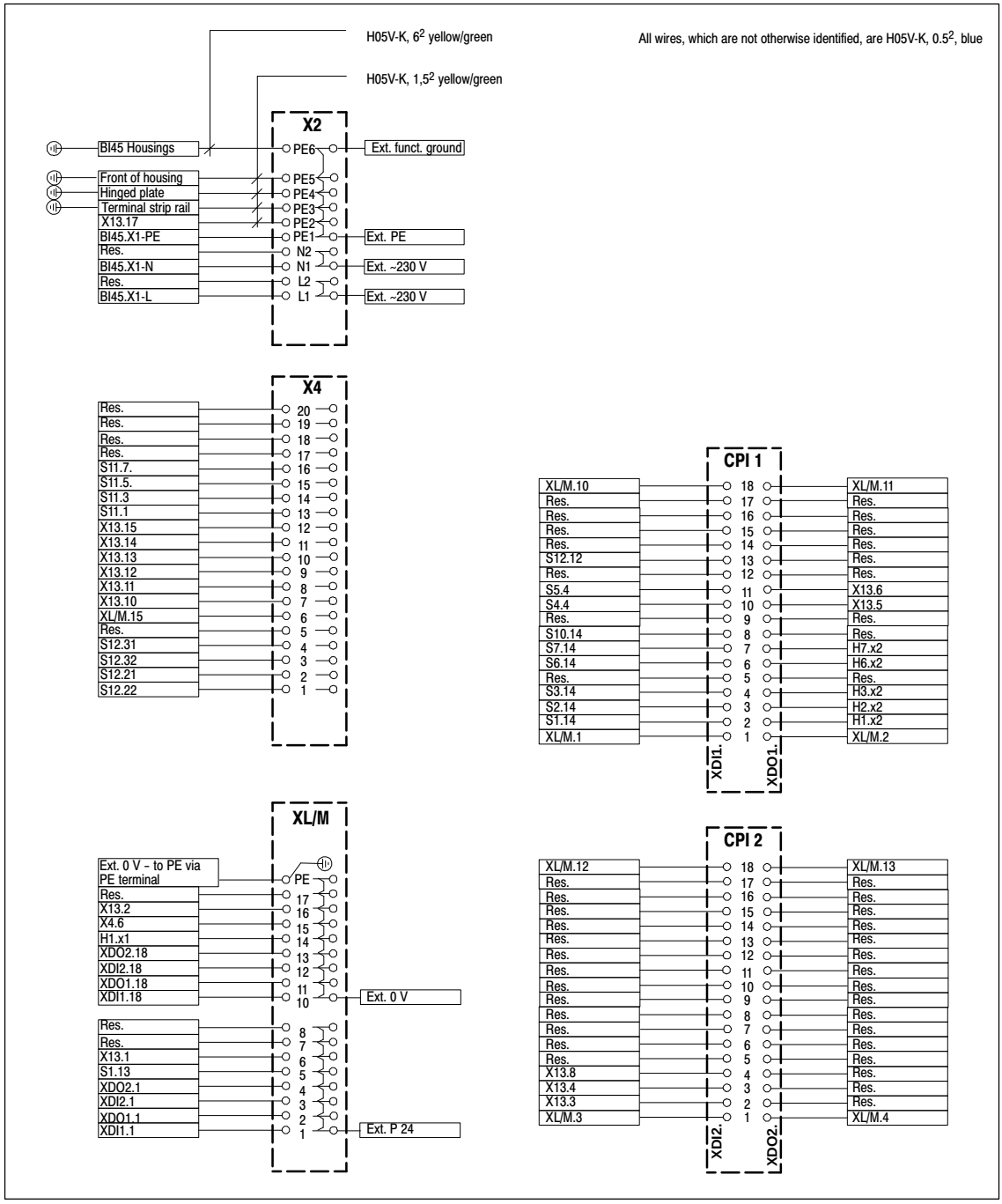
F.4 Cabling Overview (MOP and UOP)

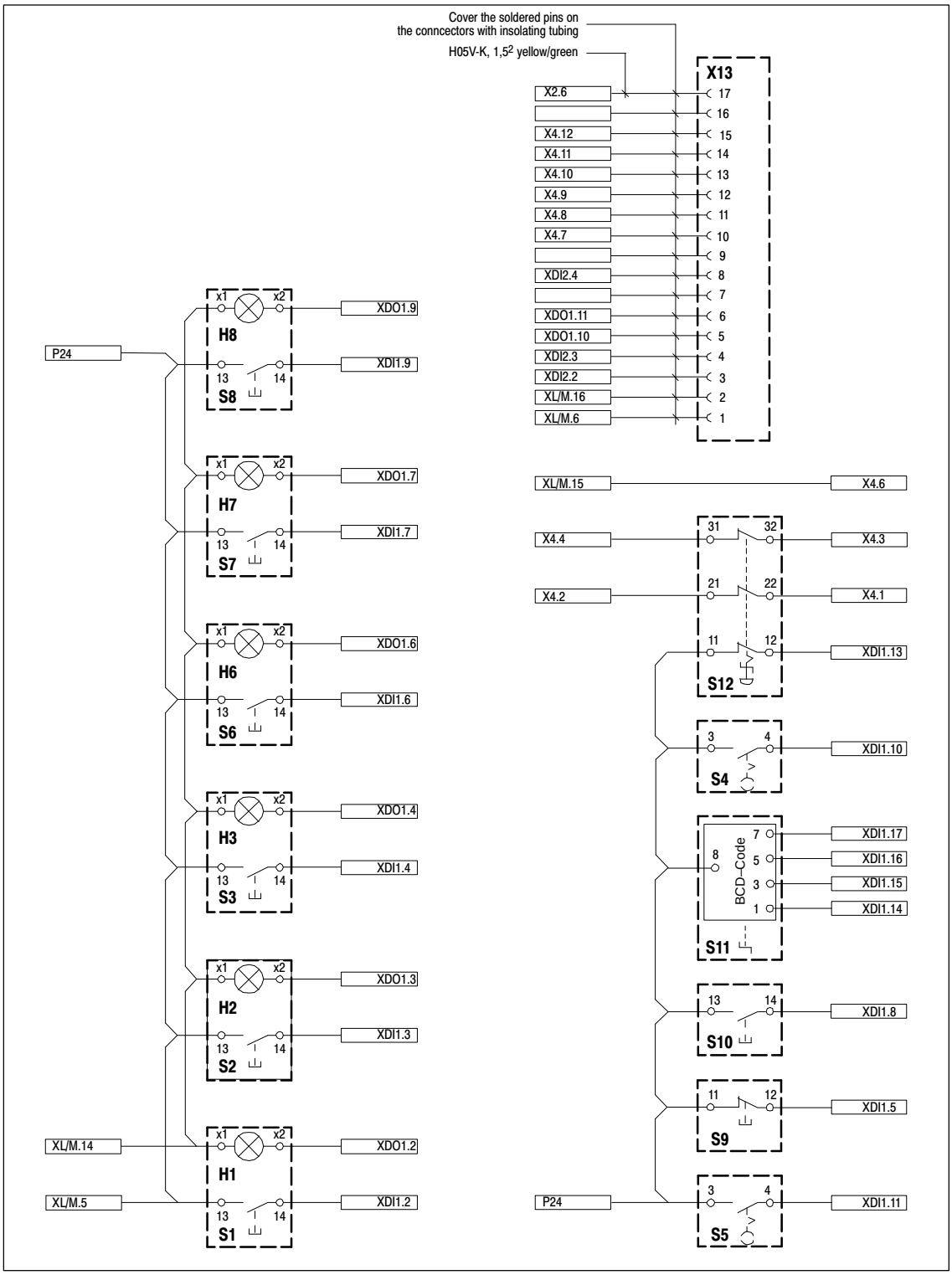


1) For pin assignment and switch settings, see the layout plan on page F-6

F.5 Wiring Diagrams

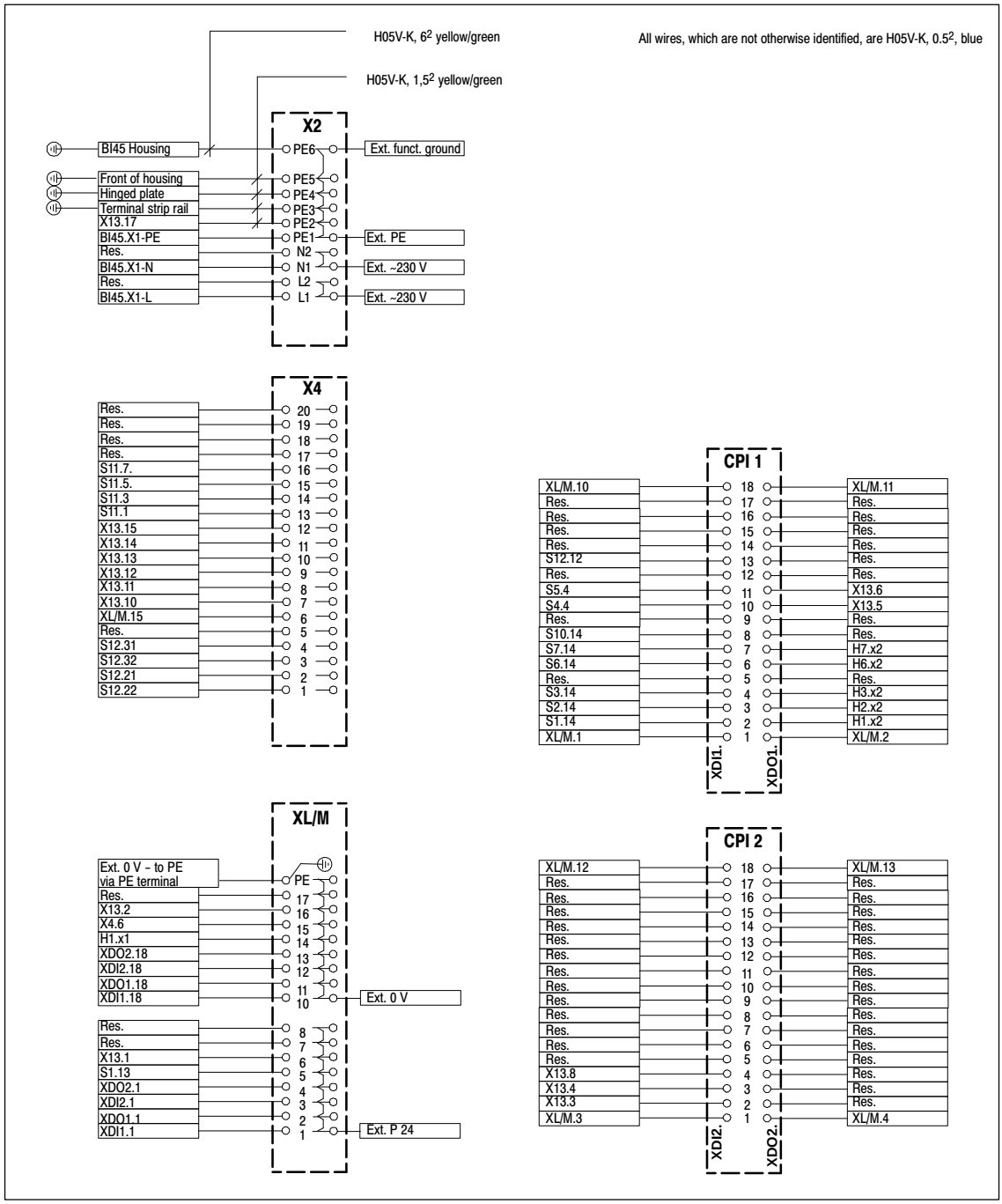
F.5.1 Wiring Diagram for Main Operator Panel (MOP)

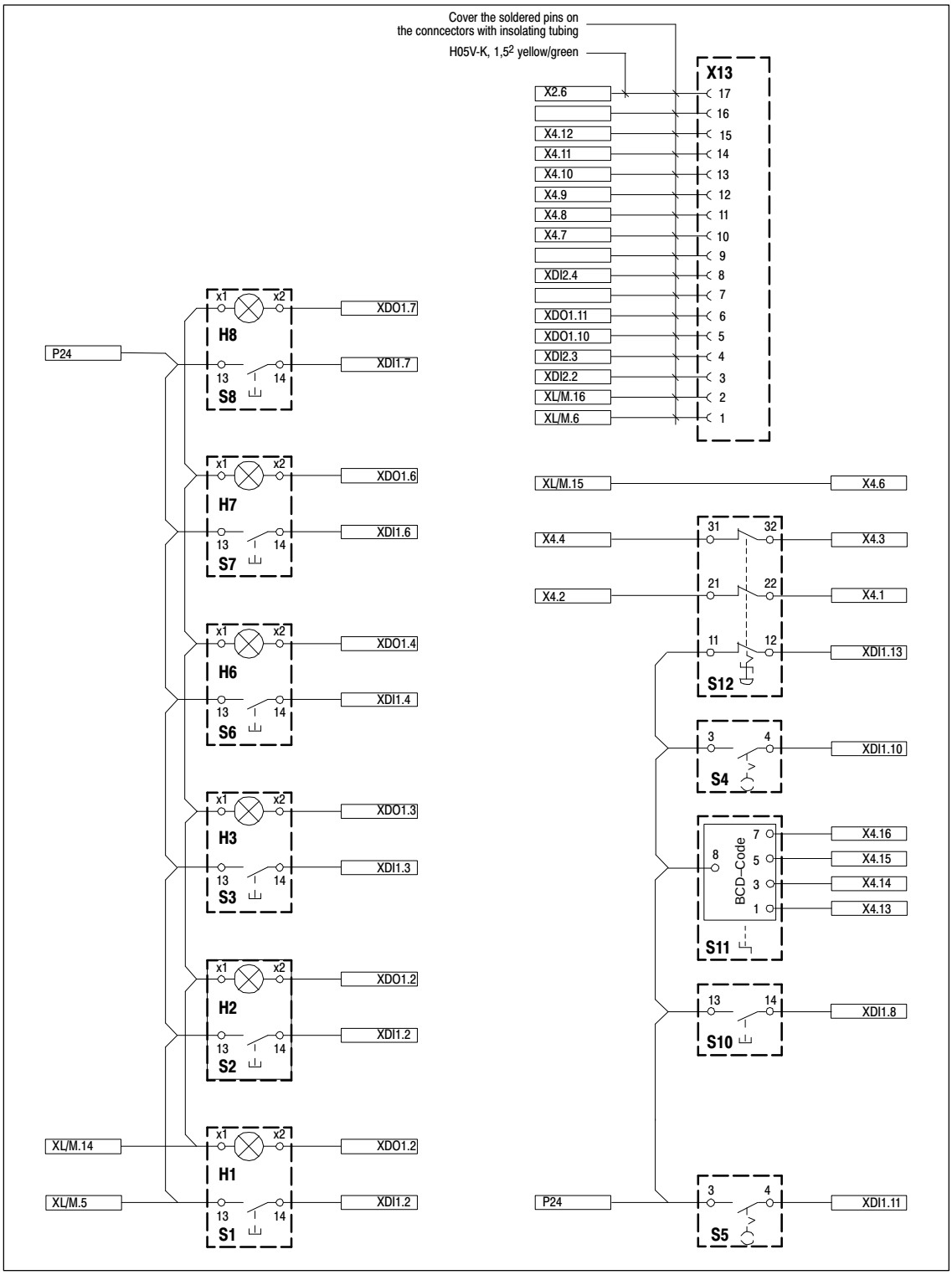




Wiring Diagram for Main Operator Panel (MOP), continued

F.5.2 Wiring Diagram for Unit Operator Panel (UOP)





Wiring Diagram for Unit Operator Panel (UOP), continued

Index

R

S

T

V

W