

MELSEC A/Q Series

Programmable Logic Controllers

User's Manual

MC Series IP67 Input/Output Modules for Profibus/DP

**Operating Manual
MC Modules
Order No. 130472**

Version		Changes / Additions / Corrections
A	04/2000 pdp	User's Manual for MC Modules (I/O modules for PROFIBUS/DP with IP67 rating)
B	01/2001 pdp	Added Output Module MC-DPY16. Updated chapters 6, Configuration and 7, Parameterization to software MELSOFT GX Configurator-DP 4.00.

About this manual

The texts, illustrations, diagrams and examples in this manual are only intended as aids to help explain the functioning, operation, use and programming of the MC series I/O modules.

If you have any questions regarding the installation and operation of the equipment described in this manual, please do not hesitate to contact your sales office or one of your Mitsubishi distribution partners (see cover page).

You can also obtain information updates and answers to frequently asked questions from our Internet website and our MEL-FAX fax on demand server

(MEL-FAX: +49 (0) 21 02 / 486-485 or +49 (0) 21 02 / 486- 790).

No part of this manual may be reproduced, copied, stored in any kind of information retrieval system or distributed without the prior express written consent of MITSUBISHI ELECTRIC EUROPE B.V.

MITSUBISHI ELECTRIC EUROPE B.V. reserves the right to change the specifications of its products and/or the contents of this manual at any time and without prior notice.

© 01/2001

Safety Information

For qualified staff only

This manual is only intended for use by properly trained and qualified electrical technicians who are fully acquainted with automation technology safety standards. All work with the hardware described, including system design, installation, setup, maintenance, service and testing, may only be performed by trained electrical technicians with approved qualifications who are fully acquainted with the applicable automation technology safety standards and regulations. Any operations or modifications of the hardware and/or software of our products not specifically described in this manual may only be performed by authorised Mitsubishi staff.

Proper use of the products

The MC modules are only intended for the specific applications explicitly described in this manual. Please take care to observe all the installation and operating parameters specified in the manual. The design, manufacturing, testing and documentation of these products have all been carried out in strict accordance with the relevant safety standards. Under normal circumstances the products described here do not constitute a potential source of injury to persons or property provided that you precisely observe the instructions and safety information provided for proper system design, installation and operation. However, unqualified modification of the hardware or software or failure to observe the warnings on the product and in this manual can result in serious personal injury and/or damage to property. Never use any peripheral or expansion equipment with the MC modules other than that specifically approved and recommended by Mitsubishi Electric.

Any other use or application of the products is deemed to be improper.

Relevant safety regulations

All safety and accident prevention regulations relevant to your specific application must be observed in the system design, installation, setup, maintenance, servicing and testing of these products.

The regulations listed below are particularly important. This list does not claim to be complete; however, you are responsible for knowing and applying the regulations applicable to you.

- VDE Standards
 - VDE 0100 (regulations for electrical installations with rated voltages up to 1000 V)
 - VDE 0105 (operation of electrical installations)
 - VDE 0113 (electrical systems with electronic equipment)
 - VDE 0160 (configuration of electrical systems and electrical equipment)
 - VDE 0550/0551 (regulations for transformers)
 - VDE 0700 (safety of electrical appliances for household use and similar applications)
 - VDE 0860 (safety regulations for mains-powered electronic appliances and their accessories for household use and similar applications)
- Fire safety regulations
- Accident prevention regulations
 - VBG No. 4 (electrical systems and equipment)

Safety warnings in this manual

In this manual special warnings that are important for the proper and safe use of the products are clearly identified as follows:



DANGER:

Personnel health and injury warnings. Failure to observe the precautions described here can result in serious health and injury hazards.



CAUTION:

Equipment and property damage warnings. Failure to observe the precautions described here can result in serious damage to the equipment or other property.

General safety information and precautions

The following safety precautions are intended as a general guideline for using the MC system together with other equipment. These precautions must always be observed in the design, installation and operation of all control systems.



DANGER:

- *Observe all safety and accident prevention regulations applicable to your specific application. Installation, wiring and opening of the assemblies, components and devices may only be performed with all power supplies disconnected.*
- *Assemblies, components and devices must always be installed in a shockproof housing fitted with a proper cover and protective equipment.*
- *Devices with a permanent connection to the mains power supply must be integrated in the building installations with an all-pole disconnection switch and a suitable fuse. The device must be connected to the protective earth.*
- *Check power cables and lines connected to the equipment regularly for breaks and insulation damage. If cable damage is found, immediately disconnect the equipment and the cables from the power supply and replace the defective cabling.*
- *Before using the equipment for the first time check that the power supply rating matches that of the local mains power.*
- *Voltage fluctuations and deviations in the power supply must not exceed the specifications of the modules. Otherwise malfunction and hazardous conditions on the electrical componentry may result.*
- *For the 24 V power supply a secure electrical isolation of the low voltage has to be ensured. Only power supply units complying with either IEC 364-4-41 or HD 384.04.41 (VDE 0100 part 410) may be used.*
- *You are responsible for taking the necessary precautions to ensure that programs interrupted by brownouts and power failures can be restarted properly and safely. In particular, you must ensure that dangerous conditions cannot occur under any circumstances, even for brief periods. If necessary you must make provision for forcing an EMERGENCY OFF condition to prevent such conditions.*
- *EMERGENCY OFF facilities pursuant to EN 60204/IEC 204 VDE 0113 must remain fully operative at all times and in all control system operating modes. The EMERGENCY OFF facility reset function must be designed so that it cannot cause an uncontrolled or undefined restart.*
- *You must also implement hardware and software safety precautions to prevent the possibility of undefined control system states caused by signal line cable or core breaks.*
- *Connection cables and signal lines have to be wired in a way avoiding inductive or capacitive interference that may disturb the automation functions.*
- *Automation facilities and their controls have to be installed in a way protected against accidental actuation.*
- *Anywhere in the automation installation or plant where occurring malfunctions may cause injury to persons or damage to property, additional external precautions have to be taken or safety equipment has to be installed that ensures a safe and secure operating condition even in the case of a failure (e.g. independent limit value switches, mechanical lockings etc.).*

Typographic Conventions

Important information

Notes containing important information are clearly identified as follows:

NOTE

| Note text

Numbering in figures and illustrations

Reference numbers in figures and illustrations are shown with white numbers in a black circle and the corresponding explanations shown beneath the illustrations are identified with the same numbers, like this:

① ② ③ ④

Procedures

In some cases the setup, operation, maintenance and other instructions are explained with numbered procedures. The individual steps of these procedures are numbered in ascending order with black numbers in a white circle, and they must be performed in the exact order shown:

① Text

② Text

③ Text

Footnotes in tables

Footnote characters in tables are printed in superscript and the corresponding footnotes shown beneath the table are identified by the same characters, also in superscript.

If a table contains more than one footnote, they are all listed below the table and numbered in ascending order with black numbers in a white circle, like this:

① Text

② Text

③ Text

Contents

1	Introduction	
1.1	Introduction	1-1
2	Basics	
2.1	Features of the MC series	2-1
3	System Configuration	
3.1	PROFIBUS/DP	3-1
3.2	Data transfers	3-3
3.2.1	Buffer memory allocation in standard operation mode	3-3
3.2.2	Buffer memory allocation in enhanced operation mode	3-5
3.2.3	PROFIBUS/DP protocol frame	3-6
3.2.4	Data bytes	3-6
3.2.5	Configuration bytes	3-7
3.2.6	Parameter bytes	3-7
3.2.7	Diagnostic bytes	3-7
4	Description of the MC Modules	
4.1	Precautions	4-1
4.2	Digital input module MC-DPX8	4-2
4.2.1	Operating items	4-2
4.2.2	Terminal assignment of the plug-in unit for the power supply	4-3
4.2.3	Terminal assignment of the plug-in unit for the PROFIBUS/DP connection	4-4
4.2.4	Pin assignment of the M12 circular connectors for the sensors of the MC-DPX8 module	4-5
4.3	Digital input module MC-DPX16	4-6
4.3.1	Operating items	4-6
4.3.2	Terminal assignment of the plug-in unit for the power supply	4-7
4.3.3	Terminal assignment of the plug-in unit for the PROFIBUS/DP connection	4-8
4.3.4	Pin assignment of the M12 circular connectors for the sensors of the MC-DPX16 module	4-9

4.4	Digital output module MC-DPY8.	4-10
4.4.1	Operating items.	4-10
4.4.2	Terminal assignment of the plug-in unit for the power supply.	4-11
4.4.3	Terminal assignment of the plug-in unit for the PROFIBUS/DP connection	4-12
4.4.4	Pin assignment of the M12 circular connectors for the actors of the MC-DPY8 module	4-13
4.5	Digital output module MC-DPY16.	4-14
4.5.1	Operating items.	4-14
4.5.2	Terminal assignment of the plug-in unit for the power supply.	4-15
4.5.3	Terminal assignment of the plug-in unit for the PROFIBUS/DP connection	4-16
4.5.4	Pin assignment of the M12 circular connectors for the actors of the MC-DPY16 module	4-17
4.6	Digital input/output module MC-DPX8Y4	4-18
4.6.1	Operating items.	4-18
4.6.2	Terminal assignment of the plug-in unit for the power supply.	4-19
4.6.3	Terminal assignment of the plug-in unit for the PROFIBUS/DP connection	4-20
4.6.4	Pin assignment of the M12 circular connectors for the sensors and actors of the MC-DPX8Y4 module	4-21

5 Installation

5.1	Safety precautions	5-1
5.2	Ambient Conditions	5-1
5.3	Installation of the MC modules	5-1
5.4	Wiring	5-2
5.4.1	General instructions	5-2
5.4.2	Cable preparation	5-4
5.4.3	Connecting the power supply	5-4
5.4.4	PROFIBUS/DP connection	5-5
5.4.5	Connecting sensors and actors.	5-6

6 Configuration

6.1	Station number	6-1
6.2	Configuration with MELSOFT GX Configurator-DP	6-2

7	Parameterization	
7.1	Parameter bytes for all MC modules	7-1
7.2	Parameterization with MELSOFT GX Configurator-DP	7-3
8	Maintenance and Inspection	
8.1	Daily inspection	8-1
8.2	Periodic inspection	8-1
9	Troubleshooting	
9.1	Basic troubleshooting	9-1
9.2	Toubleshooting via LEDs	9-2
9.3	Troubleshooting via PROFIBUS/DP	9-3
9.3.1	Group diagnostic byte	9-3
9.3.2	Channel diagnostic byte	9-3
10	Specifications	
10.1	General operating conditions	10-1
10.2	PROFIBUS/DP interface	10-1
10.3	Specifications of the MC modules	10-2
10.3.1	Digital input module MC-DPX8	10-2
10.3.2	Digital input module MC-DPX16	10-3
10.3.3	Digital output module MC-DPY8	10-4
10.3.4	Digital output module MC-DPY16	10-5
10.3.5	Digital input/output module MC-DPX8Y4	10-6
10.3.6	Characteristic curve areas IEC 1131-2, type 2	10-7
11	Appendix	
11.1	Overview of the MC modules and accessories	A-1
11.2	Dimensions	A-2
11.3	Index	A-3

1 Introduction

1.1 Introduction

This manual describes the MC modules (input/output modules according to IP67 for PROFIBUS/DP).

The MC-DP modules perform as slave modules across a bus system according to PROFIBUS/DP DIN 19 254. It can be operated at any transfer rate from 9.6 kBaud to 12 MBaud. The MC-DP modules process digital inputs and outputs. Due to the high protection rating IP67 the modules can be mounted directly within a plant or on a machine. For indicating inputs and outputs the MC modules provide labelling fields. These labelling fields enable the user to label the inputs or outputs individually.

Across the PROFIBUS/DP the MC modules can be accessed via the master modules AJ71PB92D, A1SJ71PB92D, and QJ71PB92D, and they can be configured and parameterized via the configuration software MELSOFT GX Configurator-DP. Of course, the MC modules can as well be operated with third party PROFIBUS/DP master devices.

NOTE

For further details on parameterization and configuration, refer to the MELSOFT GX Configurator-DP software manual.

2 Basics

2.1 Features of the MC series

The MC series includes the following modules:

- **Digital input modules**

- MC-DPX8
- MC-DPX16

- **Digital output module**

- MC-DPY8
- MC-DPY16

- **Digital input/output module**

- MC-DPX8Y4

Mounting

Due to the high protection rating IP67 the MC modules can be mounted directly on any mounting panel or machine. For this purpose the modules provide two mounting holes.

Connecting the MC modules

The MC module provides the opportunity to connect the power supply for the bus circuits and the power supply for the sensors and actors separately.

The PROFIBUS/DP cable is connected to the MC module via a plug-in unit. This plug-in unit includes an integrated switch that activates or deactivates the outgoing bus line. When the bus line is deactivated, a terminating resistor is automatically activated.

The sensors and actors can be connected directly to M12 circular connectors.

Parameterizing and configuring

Across the PROFIBUS/DP all settings are made by means of the parameterization software MELSOFT GX Configurator-DP.

3 System Configuration

3.1 PROFIBUS/DP

In the following the main characteristics of the PROFIBUS/DP network are described.

Data exchange

The open architecture of the PROFIBUS/DP network provides a powerful and fast data exchange with the different slave devices, as there are:

- Remote digital I/Os
- Remote intelligence (FX0N, FX2N)
- Frequency inverters (FR-A 240, FR-A 540, and FR-E 500)
- Operator terminals (MAC)
- MT series (modular input/output system)
- MC series (input/output modules according to IP67)

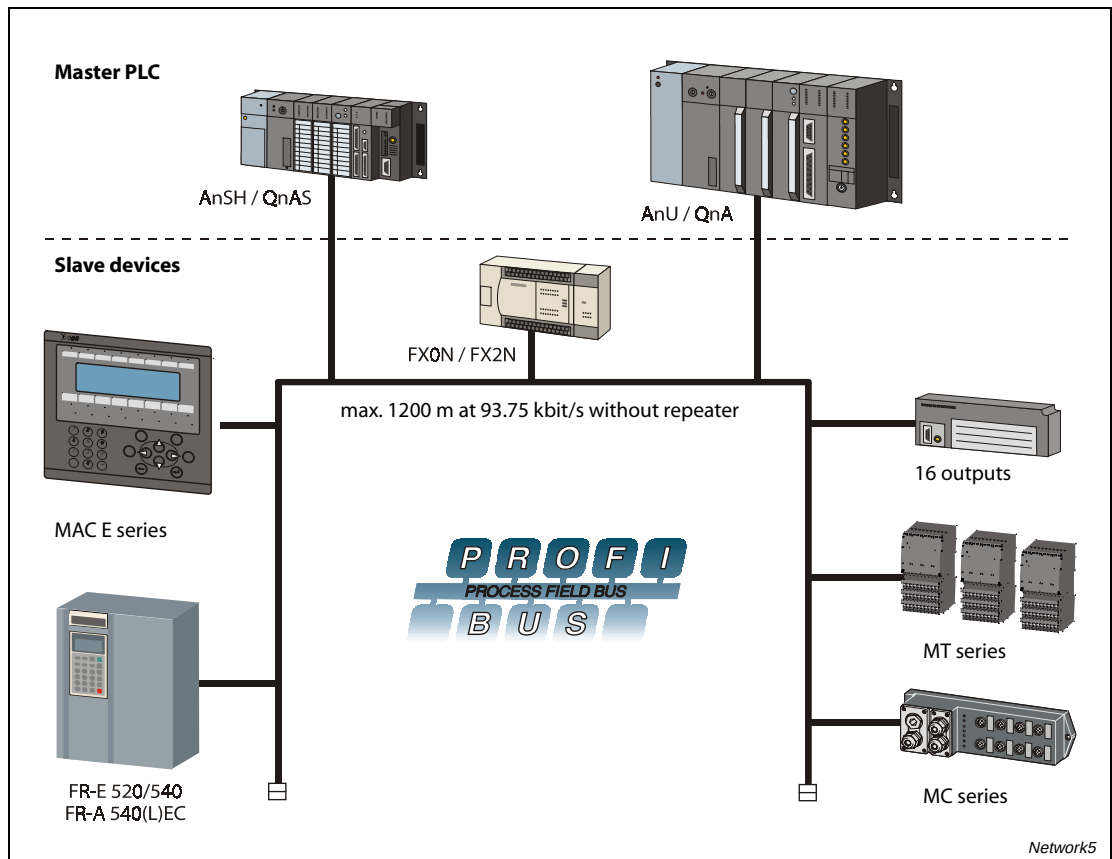


Fig. 3-1: System configuration PROFIBUS/DP

Structure

The maximum coverage of a bus segment is 1200 m (at a maximum of 93.75 kbit/s). Up to 3 repeaters are allowed. Thus the maximum distance between 2 stations is 4800 m.

Cable types

To reduce costs PROFIBUS/DP uses RS485 technology based upon simple twisted-pair cabling. The following cables can be used for example: UNITRONIC-BUSLD by LAPPKABEL or DUE 4451 by ALCATEL.

The following table contains the specifications for the PROFIBUS/DP network for the PROFIBUS/DP master modules AJ71PB92D and A1SJ71PB92D:

Item		Master module AJ71PB92D	Master module A1SJ71PB92D
Communication protocol		EN 50170/ DIN 19245-T3	EN 50170/ DIN 19245-T3
Cabling		Shielded twisted pair 24 AWG = 0.22 mm ² , impedance: 100 - 130 Ω; Shielded twisted pair 22 AWG = 0.34 mm ² , impedance: 135 - 165 Ω	Shielded twisted pair 24 AWG = 0.22 mm ² , impedance: 100 - 130 Ω; Shielded twisted pair 22 AWG = 0.34 mm ² , impedance: 135 - 165 Ω
Interface		RS485	RS485
Data transfer rate	Distance		
	1200 m	9.6/ 19.2/ 93.75 kbit/s	9.6/ 19.2/ 93.75 kbit/s
	1000 m	187.5 kbit/s	187.5 kbit/s
	400 m	500 kbit/s	500 kbit/s
	200 m	1500 kbit/s	1500 kbit/s (200 m) 12000/6000/3000 kbit/s (100 m)
Max. total distance		4800 m (3 repeaters)	4800 m (3 repeaters)
Slave units per master		60	60
Stations per segment		32	32
Repeaters per network		3	3
Accessories		ProfiConT: PROFIBUS 9-pin D-SUB plug connector for up to 12 MBaud	ProfiConT: PROFIBUS 9-pin D-SUB plug connector for up to 12 MBaud

Tab. 3-1: Specifications of the PROFIBUS/DP master modules of the MELSEC A series

The PROFIBUS/DP cable is connected to the MC module via a plug-in unit with screw terminals. This plug-in unit includes an integrated switch that enables or disables the outgoing PROFIBUS/DP line. When the bus line is disabled, a terminating resistor is automatically activated.

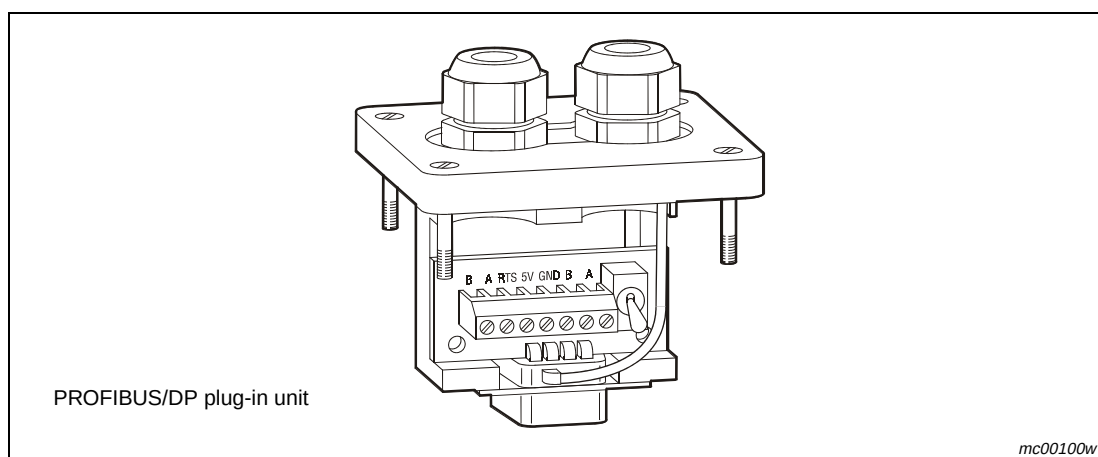


Fig. 3-2: PROFIBUS/DP connection

The table below shows the terminal assignment of the plug-in unit for connecting the PROFIBUS/DP:

Terminal	Assignment
B	PROFIBUS line red
A	PROFIBUS line green
RTS	for hand-held terminal
5V	for hand-held terminal
0V	for hand-held terminal
B	PROFIBUS line red
A	PROFIBUS line green

Tab. 3-2:

Terminal assignment

PROFIBUS/DP plug-in unit

NOTE

If the device is allocated at the beginning or the end of the bus segment, the integrated switch must be set to "TERM ON" in order to enable the terminating resistor.

The PROFIBUS/DP master modules A1SJ71PB92D and AJ71PB92D provide integrated, switchable terminating resistors.

3.2 Data transfers

The PROFIBUS/DP master modules AJ71PB92D and A1SJ71PB92D can exchange data with the slave devices of up to 244 send bytes and 244 receive bytes; i. e. up to 488 bytes can be exchanged with a slave per network cycle.

The number of send bytes and receive bytes depends on the operation modes of the master modules.

In standard operation mode 32 send bytes and 32 receive bytes can be exchanged with the slaves per network cycle.

In enhanced operation mode the optimized buffer memory management allows to exchange 244 send bytes and 244 receive bytes per network cycle.

3.2.1 Buffer memory allocation in standard operation mode

In standard operation mode the PROFIBUS/DP master modules AJ71PB92D and A1SJ71PB92D provide a buffer memory for 32 send bytes and 32 receive bytes for each of the 60 stations (maximum) that can be connected.

The so called send bytes are bytes to be sent to the MC modules.

The receive bytes are bytes to be sent from the MC modules to the master. These bytes are data bytes that contain user data like digital inputs, analog values etc.

In standard operation mode the send bytes and receive bytes are written to a of 32-bytes buffer memory area separated for one station. If one station does not require this number of bytes, the remaining bytes remain unused.

The following figure shows the buffer memory allocation for one station in standard operation mode.

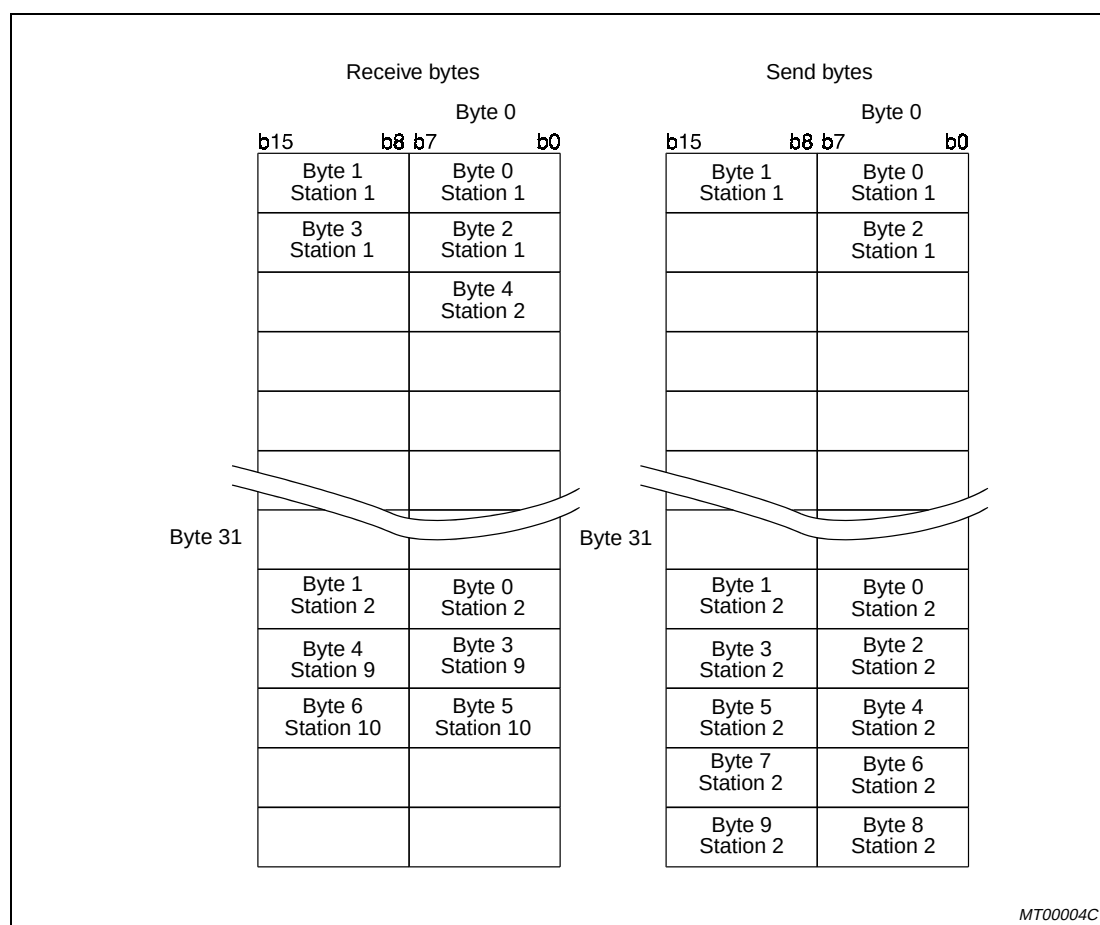


Fig. 3-3: Buffer memory allocation (standard operation mode)

3.2.2 Buffer memory allocation in enhanced operation mode

The new PROFIBUS/DP master modules support the enhanced operation mode. In enhanced operation mode up to 244 send bytes and receive bytes can be exchanged with a maximum of 7 stations that can be connected. In standard operation mode the bytes of one station are written only to the area of the receive and send buffer which has been reserved for this station. The registers not required for the send bytes and receive bytes of this station remain unused in standard mode. In enhanced mode the data of the send bytes and receive bytes of all connected stations is successively written to the next free low byte of the next free register of the send and receive buffer. By this the enhanced operation mode provides a more efficient use of the entire send and receive buffer memory of the master modules. The figure below shows the buffer memory allocation in enhanced operation mode by a sample configuration:

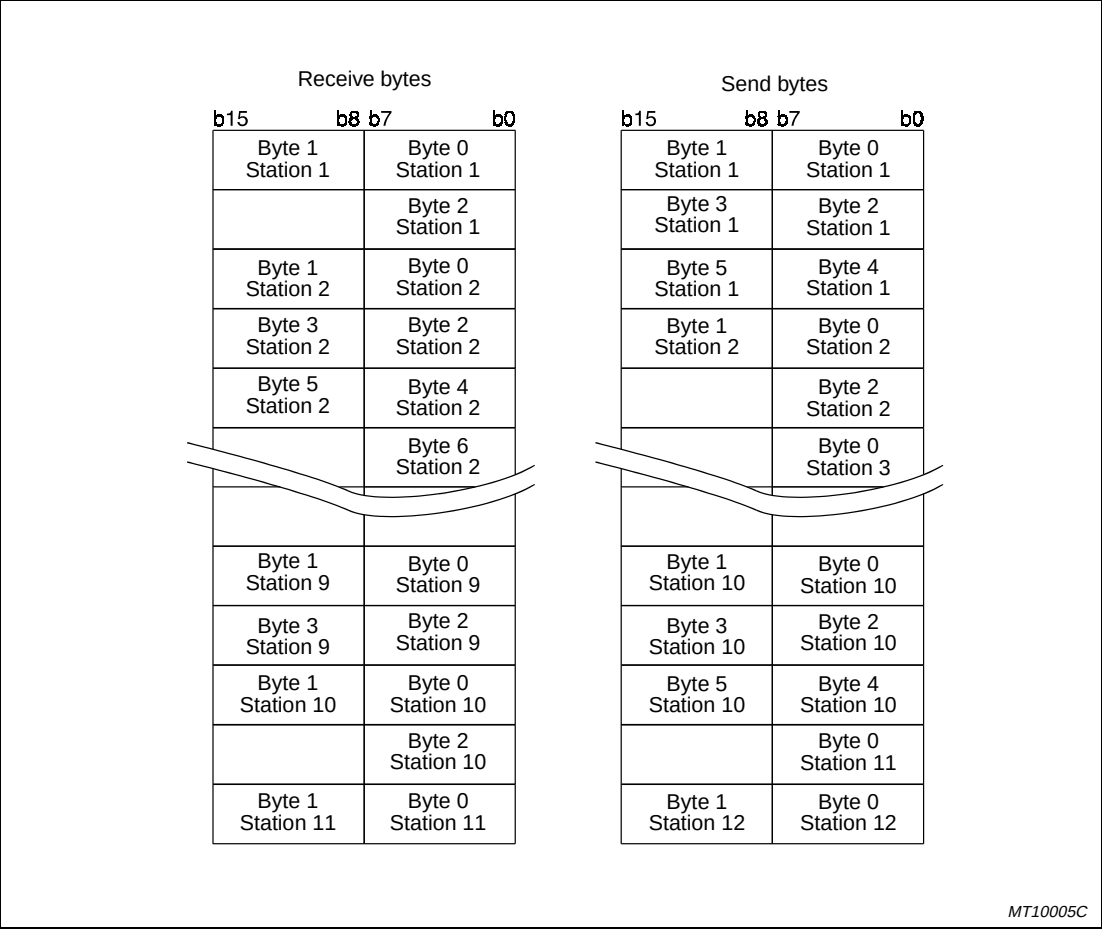


Fig. 3-4: Buffer memory allocation (enhanced operation mode)

3.2.3 PROFIBUS/DP protocol frame

The structure of the protocol frame depends on its information type (data bytes, configuration bytes, parameter bytes, diagnostic bytes).

The protocol frame consists of the so-called header following the PNO guideline and the actual information bytes containing the corresponding information of the modules.

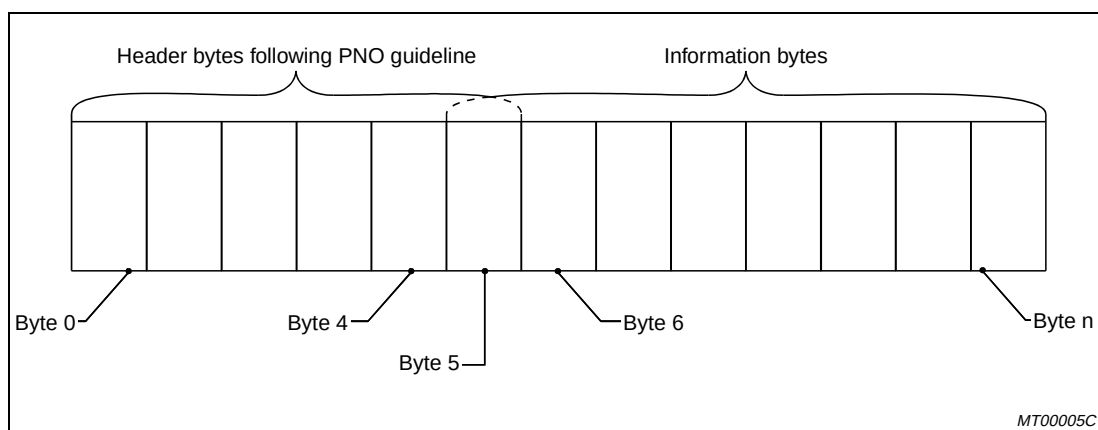


Fig. 3-5: PROFIBUS/DP protocol frame

The number of header bytes (5 or 6) depends on the type of protocol frame (data bytes, configuration bytes, parameter bytes, diagnostic bytes).

3.2.4 Data bytes

The data bytes contain the information of the digital inputs and outputs. Each digital input or output uses one bit. As described in section 3.2.2, the master buffer memory contains up to 244 receive bytes and 244 send bytes. This means that the number of MC modules that can be managed by the buffer memory is limited. Additionally, the number of MC modules, which can be installed, depends on the used PROFIBUS/DP master module.

PROFIBUS/DP master module A1SJ71PB92D or AJ71PB92D

The table below gives an overview of the maximum number of MC-DP slaves that can be connected to an A1SJ71PB92D or AJ71PB92 PROFIBUS/DP master module:

Module	Technology	Input bytes	Output bytes	Max. number of modules	Total of input bytes	Total of output bytes
MC-DPX8	Digital input module, 8 inputs	1	—	16	16	—
MC-DPX16	Digital input module, 16 inputs	2	—	16	32	—
MC-DPY8	Digital output module, 8 outputs	—	1	16	—	16
MC-DPX8Y4	Digital input/output module, 8 inputs, 4 outputs	2	1	16	32	16

Tab. 3-3: Assignment of the number of data bytes

3.2.5 Configuration bytes

The configuration protocol frame transmits the configuration of the remote I/O system to the PROFIBUS/DP master module. To the digital I/O MC modules particular hexadecimal values are assigned that are transmitted as configuration bytes in a protocol frame. The configuration is described in detail in chapter 6 "Configuration".

3.2.6 Parameter bytes

The digital input/output MC modules are parameterized by means of a parameterization frame conveying information concerning error messages, troubleshooting, etc. The structure of parameterization frames and parameter bytes is described in chapter 7 "Parameterization".

3.2.7 Diagnostic bytes

To evaluate errors of the MC modules, the MC modules send diagnostic bytes to the master. These diagnostic bytes contain information on the type and location (output) of the error. The structure of the diagnostic bytes is described in chapter 9 "Troubleshooting".

4 Description of the MC Modules

4.1 Precautions



CAUTION:

Do not expose the MC module to mechanical loads or strong shocks, since the housing, the connection plug-in units etc. are made of plastics.

Do not remove the printed circuit boards from the MC module.

When installing the MC module, ensure that no wires or metal chips get into the housing.

Tighten the fixing screws of the terminal block to a torque of 0.4 Nm.

4.2 Digital input module MC-DPX8

4.2.1 Operating items

The digital input module MC-DPX8 provides 8 digital inputs.

The following figure shows the operating items and accessories of the MC-DPX8 module:

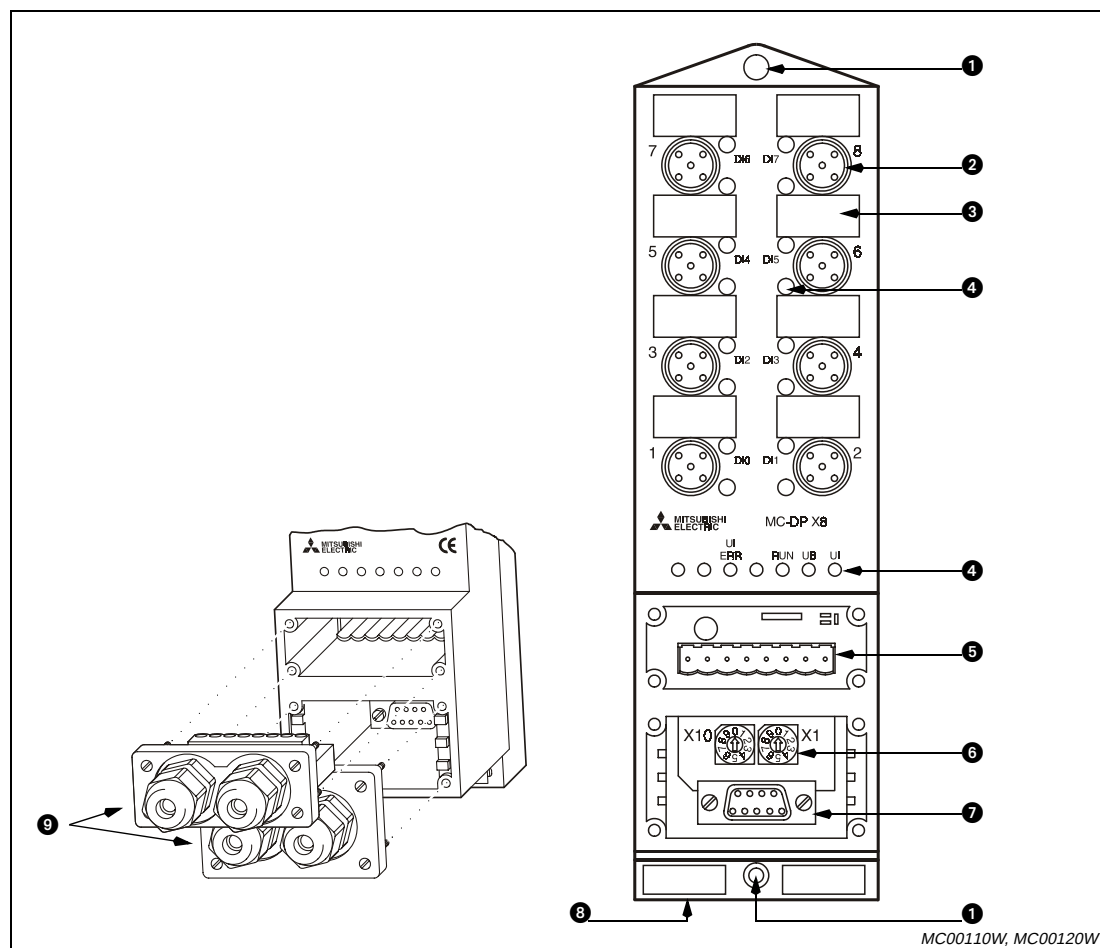


Fig. 4-1: Digital input module MC-DPX8

Position	Item	Description
①	Mounting hole	For direct mounting in a plant, on a machine etc.
②	M12 circular connector	Inputs for direct connection of sensors
③	Labelling fields with cover	For labelling the inputs, module etc.
④	LEDs	For indicating the operating status and the status of the inputs
⑤	Power supply connector	For connecting the plug-in unit for the power supply
⑥	Address switch	For setting the station number
⑦	D-SUB connector	For connecting the plug-in unit for the PROFIBUS/DP connection
⑧	PE terminal	For connecting the protective earth (below the labelling field)
⑨	Plug-in units	For connecting the power supply and PROFIBUS/DP

Tab. 4-1: Operating items MC-DPX8

4.2.2 Terminal assignment of the plug-in unit for the power supply

The following figure shows the terminal assignment of the plug-in unit:

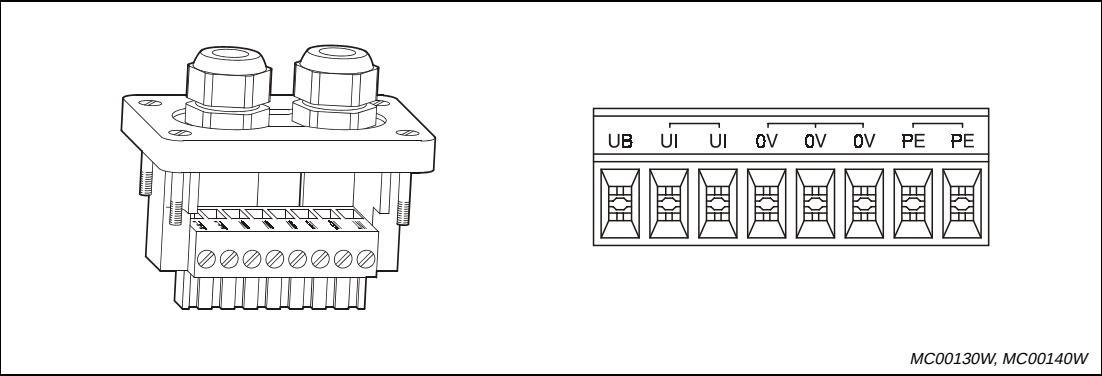


Fig. 4-2: Plug-in unit with terminal block for the power supply

Terminal	Assignment
UB	Power supply for bus circuits (24 V DC)
UI	Power supply for sensors (24 V DC)
0V	Ground for sensors and bus circuits
PE	Protective earth

Tab. 4-2:
Terminal assignment
Plug-in unit for power supply

Connection patterns for the power supply

Connection pattern A:

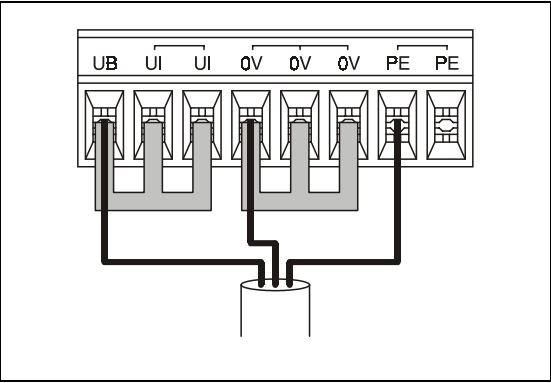


Fig. 4-3:
Common power supply for the bus circuits and the sensors

MC00150W

Connection pattern B:

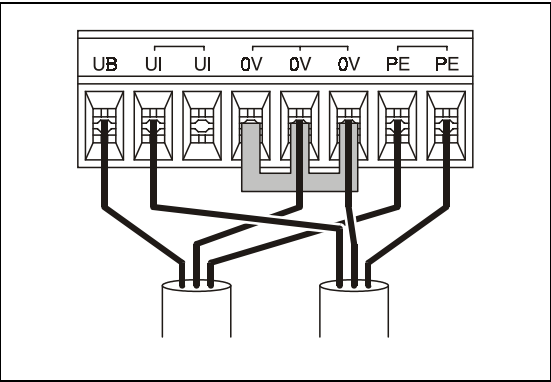


Fig. 4-4:
Separate power supply for the bus circuits and the sensors

MC00160W

Connection pattern C:

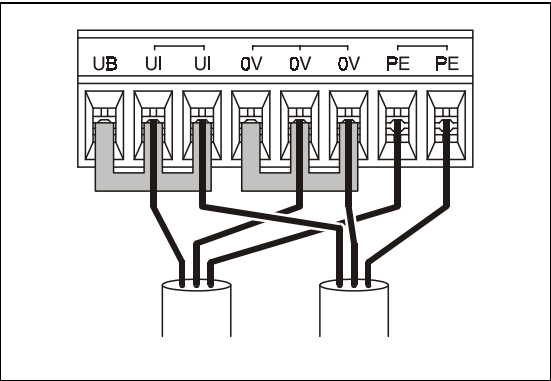


Fig. 4-5:
Common power supply for the bus circuits and the sensors. Power supply forwarded.

MC00170W

4.2.3 Terminal assignment of the plug-in unit for the PROFIBUS/DP connection

The following figure shows the terminal assignment of the plug-in unit:

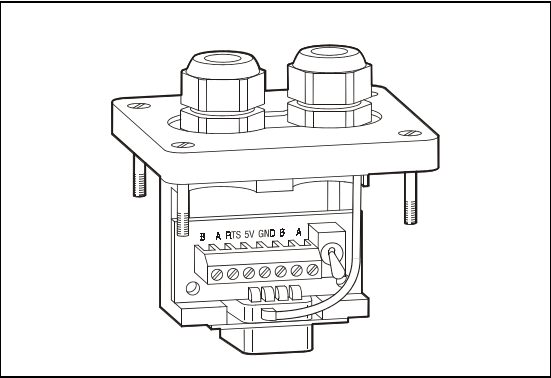


Fig. 4-6:
Plug-in unit for PROFIBUS/DP connection

MC00100W

Terminal	Assignment
B	PROFIBUS/DP line red
A	PROFIBUS/DP line green
RTS	Hand-held terminal (optional)
5V	Hand-held terminal (optional)
0V	Hand-held terminal (optional)
B	PROFIBUS/DP line red
A	PROFIBUS/DP line green

Tab. 4-3:
Terminal assignment
PROFIBUS/DP plug-in unit

4.2.4 Pin assignment of the M12 circular connectors for the sensors of the MC-DPX8 module

The sensors can be connected directly to the M12 circular connectors. The following figure shows the pin assignment of the M12 circular connectors:

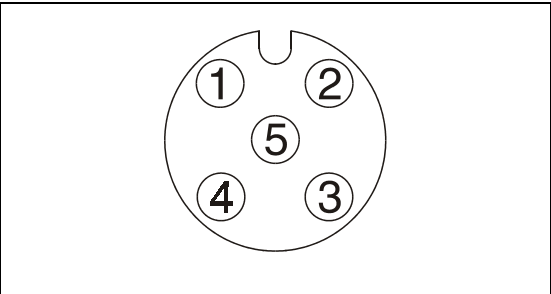


Fig. 4-7:
Pin assignment M12 circular connectors

MC00180W

M12 circular connector	Pin	Assignment
1–8 Digital inputs	1	+24 V
	2	not assigned
	3	0 V
	4	DI0 to DI7
	5	PE

NOTE

Screw M12 blind plugs on unused M12 connectors.

4.3 Digital input module MC-DPX16

4.3.1 Operating items

The MC-DPX16 module provides 16 digital inputs.

The following figure shows the operating items and accessories of the MC-DPX16 module:

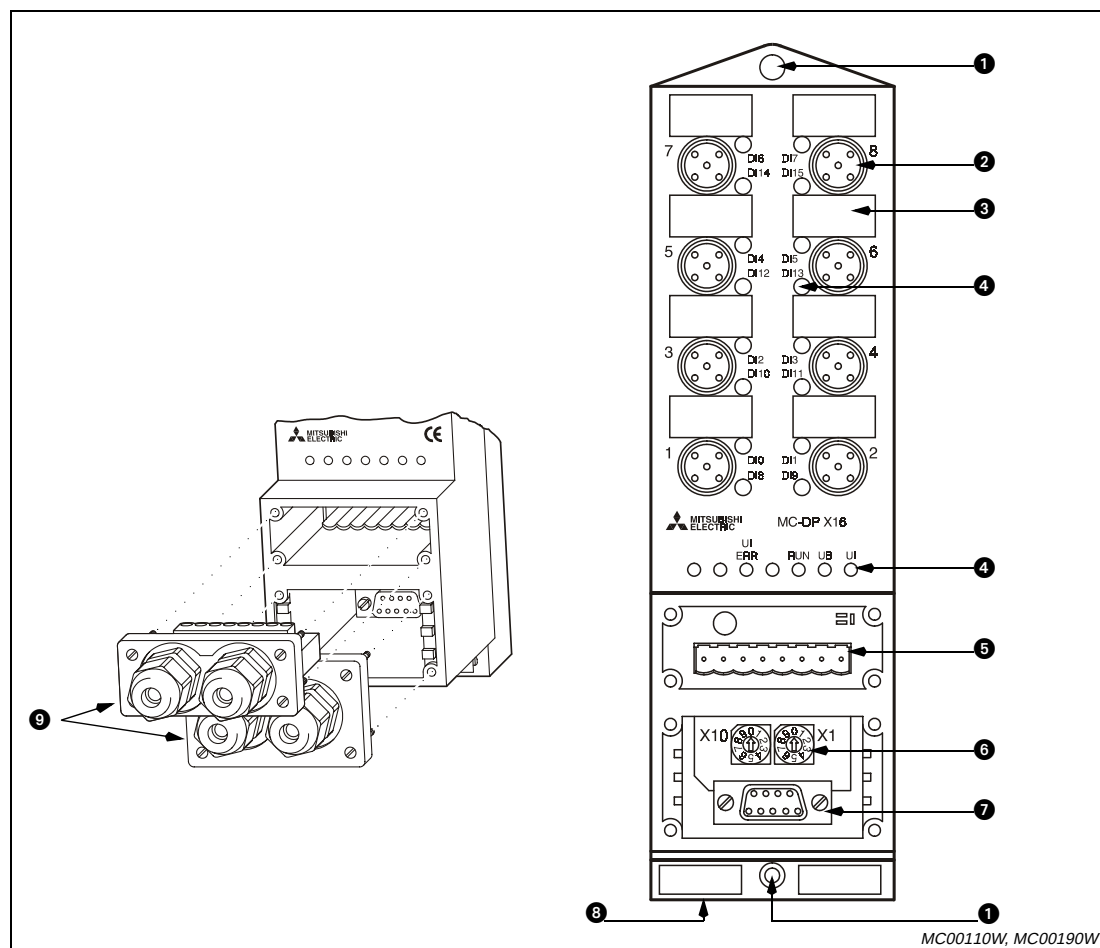


Fig. 4-8: Digital input module MC-DPX16

Position	Item	Description
①	Mounting hole	For direct mounting in a plant, on a machine etc.
②	M12 circular connector	Inputs for direct connection of sensors
③	Labelling fields with cover	For labelling the inputs, module etc.
④	LEDs	For indicating the operating status and the status of the inputs
⑤	Power supply connector	For connecting the plug-in unit for the power supply
⑥	Address switch	For setting of the station number
⑦	D-SUB connector	For connecting the plug-in unit for the PROFIBUS/DP connection
⑧	PE terminal	For connecting the protective earth (below the labelling field)
⑨	Plug-in units	For connecting the power supply and PROFIBUS/DP

Tab. 4-4: Operating items MC-DPX16

4.3.2 Terminal assignment of the plug-in unit for the power supply

The following figure shows the terminal assignment of the plug-in unit:

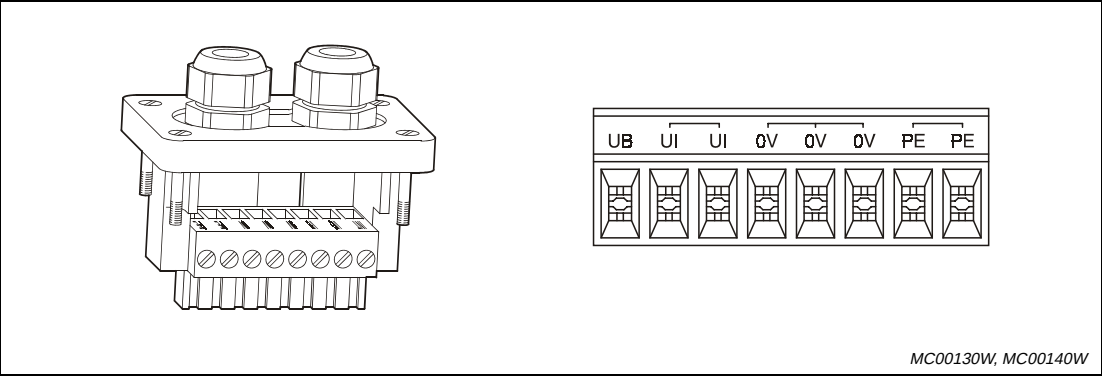


Fig. 4-9: Plug-in unit with terminal block for the power supply

Terminal	Assignment
UB	Power supply for bus circuits (24 V DC)
UI	Power supply for sensors (24 V DC)
0V	Ground for sensors and bus circuits
PE	Protective earth

Tab. 4-5:
Terminal assignment
Plug-in unit for power supply

Connection patterns for the power supply

Connection pattern A:

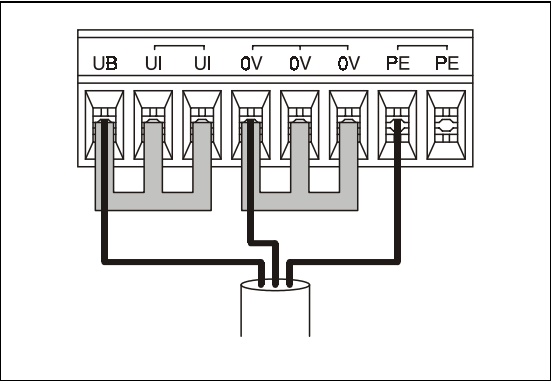


Fig. 4-10:
Common power supply for the bus circuits and the sensors

MC00150W

Connection pattern B:

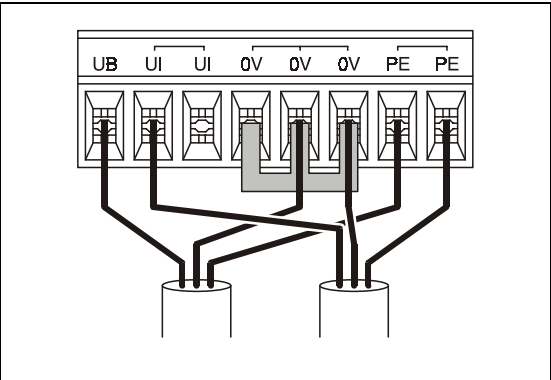


Fig. 4-11:
Separate power supply for the bus circuits and the sensors

MC00160W

Connection pattern C:

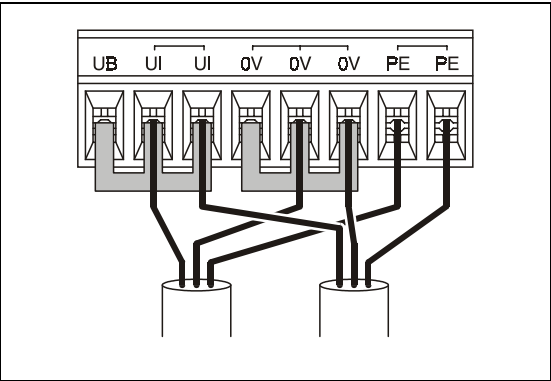


Fig. 4-12:
Common power supply for the bus circuits and the sensors. Power supply forwarded.

MC00170W

4.3.3 Terminal assignment of the plug-in unit for the PROFIBUS/DP connection

The following figure shows the terminal assignment of the plug-in unit:

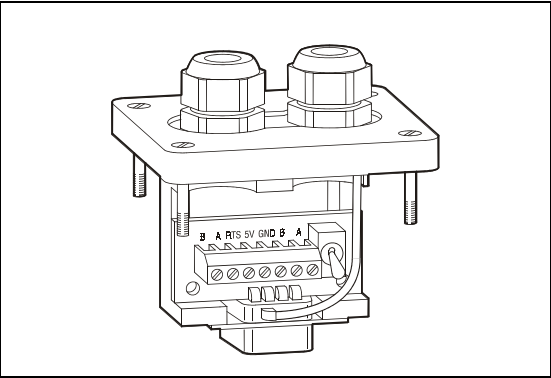


Fig. 4-13:
Plug-in unit for PROFIBUS/DP connection

MC00100W

Terminal	Assignment
B	PROFIBUS/DP line red
A	PROFIBUS/DP line green
RTS	Hand-held terminal (optional)
5V	Hand-held terminal (optional)
0V	Hand-held terminal (optional)
B	PROFIBUS/DP line red
A	PROFIBUS/DP line green

Tab. 4-6:
Terminal assignment
PROFIBUS/DP plug-in unit

4.3.4 Pin assignment of the M12 circular connectors for the sensors of the MC-DPX16 module

The sensors can be connected directly to the M12 circular connectors. Y-connectors can be connected to the circular connectors 1 to 8.

The following figure shows the pin assignment of the M12 circular connectors:

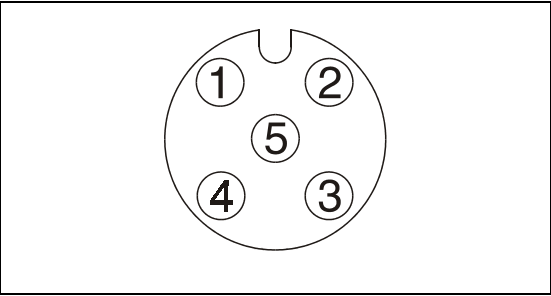


Fig. 4-14:
Pin assignment M12 circular connectors

MC00180W

M12 circular connector	Pin	Assignment
1–8 Digital inputs	1	+24 V
	2	DI8 to DI15
	3	0 V
	4	DI0 to DI7
	5	PE

NOTE | Screw M12 blind plugs on unused M12 connectors.

4.4 Digital output module MC-DPY8

4.4.1 Operating items

The MC-DPY8 module provides 8 digital outputs.

The following figure shows the operating items and accessories of the MC-DPY8 module:

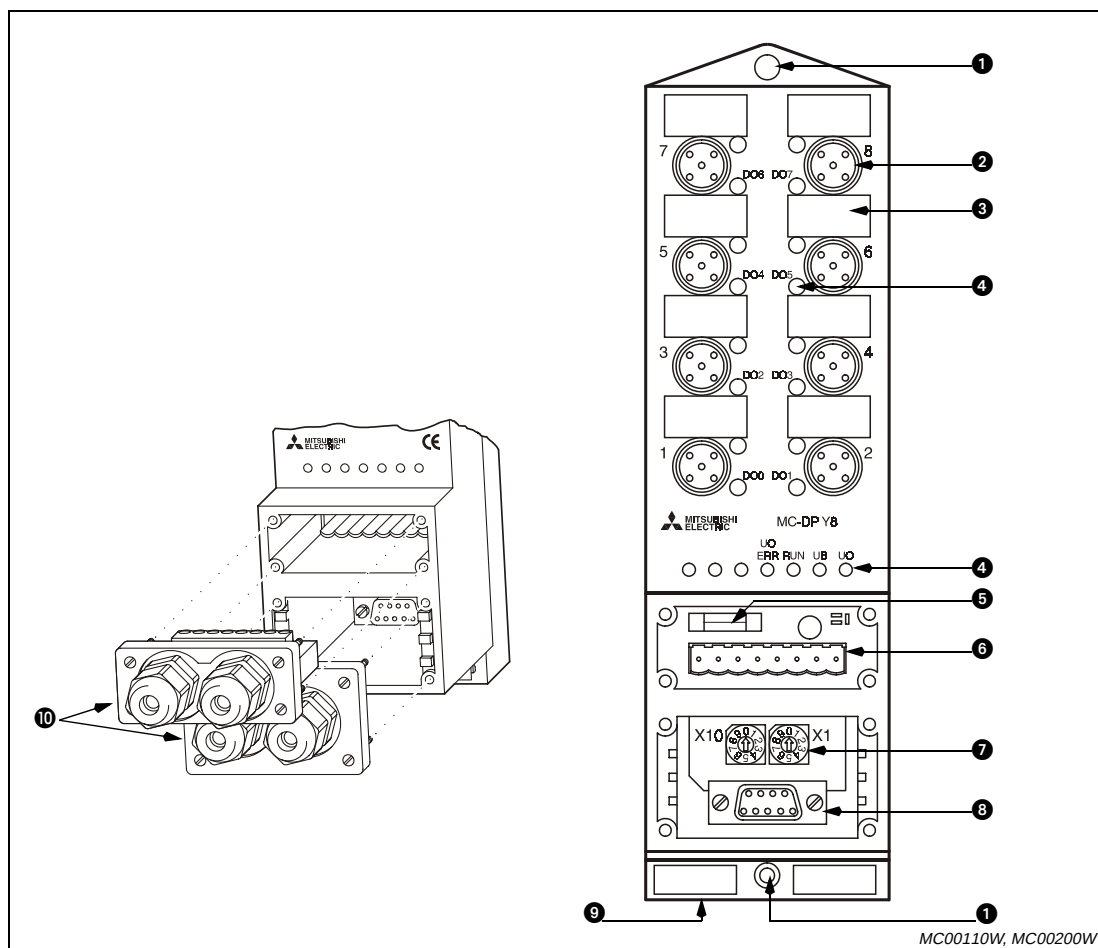


Fig. 4-15: Digital output module MC-DPY8

Position	Item	Description
①	Mounting hole	For direct mounting in a plant, on a machine etc.
②	M12 circular connector	Outputs for direct connection of actors
③	Labelling fields with cover	For labelling the outputs, module etc.
④	LEDs	For indicating the operating status and the status of the outputs
⑤	Fuse	For protection during short-circuit or overload (output modules only)
⑥	Power supply connector	For connecting the plug-in unit for the power supply
⑦	Address switch	For setting of the station number
⑧	D-SUB connector	For connecting the plug-in unit for the PROFIBUS/DP connection
⑨	PE terminal	For connecting the protective earth (below the labelling field)
⑩	Plug-in units	For connecting the power supply and PROFIBUS/DP

Tab. 4-7: Operating items MC-DPY8

4.4.2 Terminal assignment of the plug-in unit for the power supply

The following figure shows the terminal assignment of the plug-in unit:

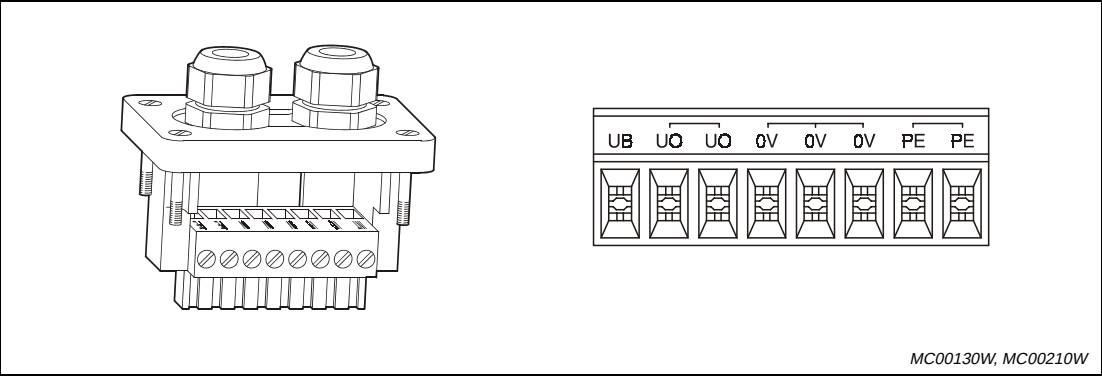


Fig. 4-16: Plug-in unit with terminal block for the power supply

Terminal	Assignment
UB	Power supply for bus circuits (24 V DC)
UO	Power supply for actors (24 V DC)
0V	Ground for sensors and bus circuits
PE	Protective earth

Tab. 4-8:
Terminal assignment
Plug-in unit for power supply

Connection patterns for the power supply

Connection pattern A:

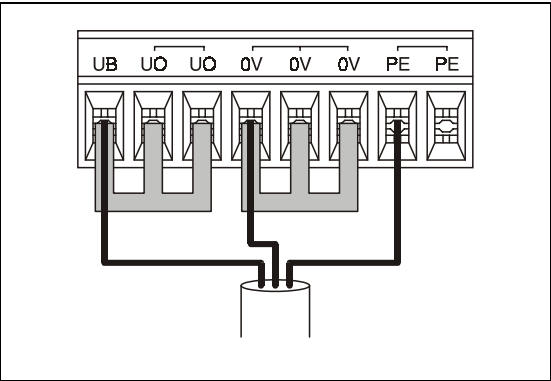


Fig. 4-17:
Common power supply for the bus circuits and the actors

MC00220W

Connection pattern B:

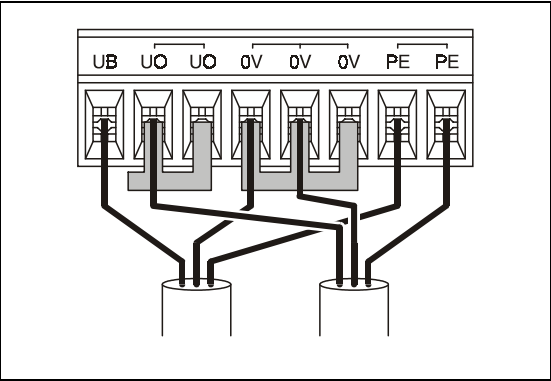


Fig. 4-18:
Separate power supply for the bus circuits and the actors

MC00230W

Connection pattern C:

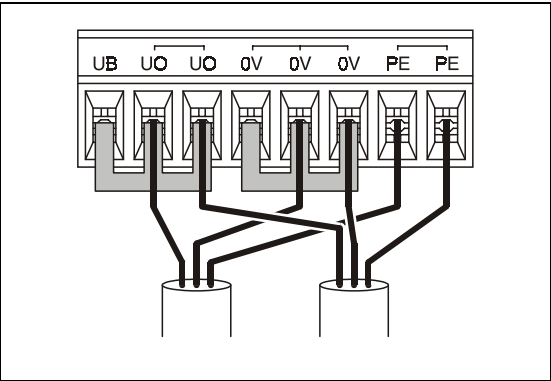


Fig. 4-19:
Common power supply for the bus circuits and the actors. Power supply forwarded.

MC00240W

4.4.3 Terminal assignment of the plug-in unit for the PROFIBUS/DP connection

The following figure shows the terminal assignment of the plug-in unit:

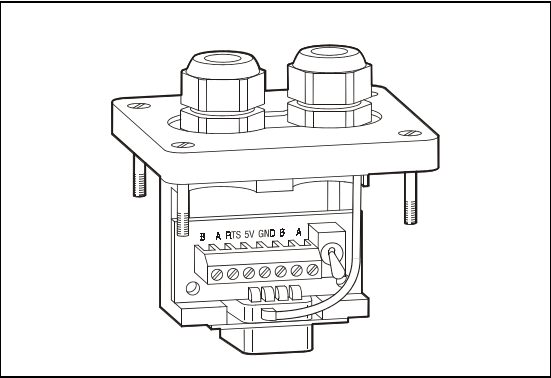


Fig. 4-20:
Plug-in unit for the PROFIBUS/DP connection

MC00100W

Terminal	Assignment
B	PROFIBUS/DP line red
A	PROFIBUS/DP line green
RTS	Hand-held terminal (optional)
5V	Hand-held terminal (optional)
0V	Hand-held terminal (optional)
B	PROFIBUS/DP line red
A	PROFIBUS/DP line green

Tab. 4-9:
Terminal assignment
PROFIBUS/DP plug-in unit

4.4.4 Pin assignment of the M12 circular connectors for the actors of the MC-DPY8 module

The actors can be connected directly to the M12 circular connectors. Y-connectors can be connected to the circular connectors 1, 3, 5, and 7.

The following figure shows the pin assignment of the M12 circular connectors:

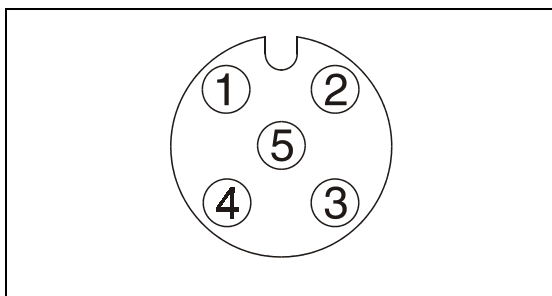


Fig. 4-21:
Pin assignment M12 circular connectors

MC00180W

M12 circular connectors	Pin	Assignment
1, 3, 5, 7 (version 1.0) Digital outputs	1	not assigned
	2	not assigned
	3	0 V
	4	DO0, DO2, DO4, DO6
	5	PE
1, 3, 5, 7 (from version 1.1) Digital outputs	1	not assigned
	2	DO1, DO3, DO5, DO7
	3	0 V
	4	DO0, DO2, DO4, DO6
	5	PE
2, 4, 6, 8 Digital outputs	1	not assigned
	2	not assigned
	3	0 V
	4	DO1, DO3, DO5, DO7
	5	PE

NOTE

Screw M12 blind plugs on unused M12 connectors.

4.5 Digital output module MC-DPY16

4.5.1 Operating items

The MC-DPY16 module provides 16 digital outputs.

The following figure shows the operating items and accessories of the MC-DPY16 module:

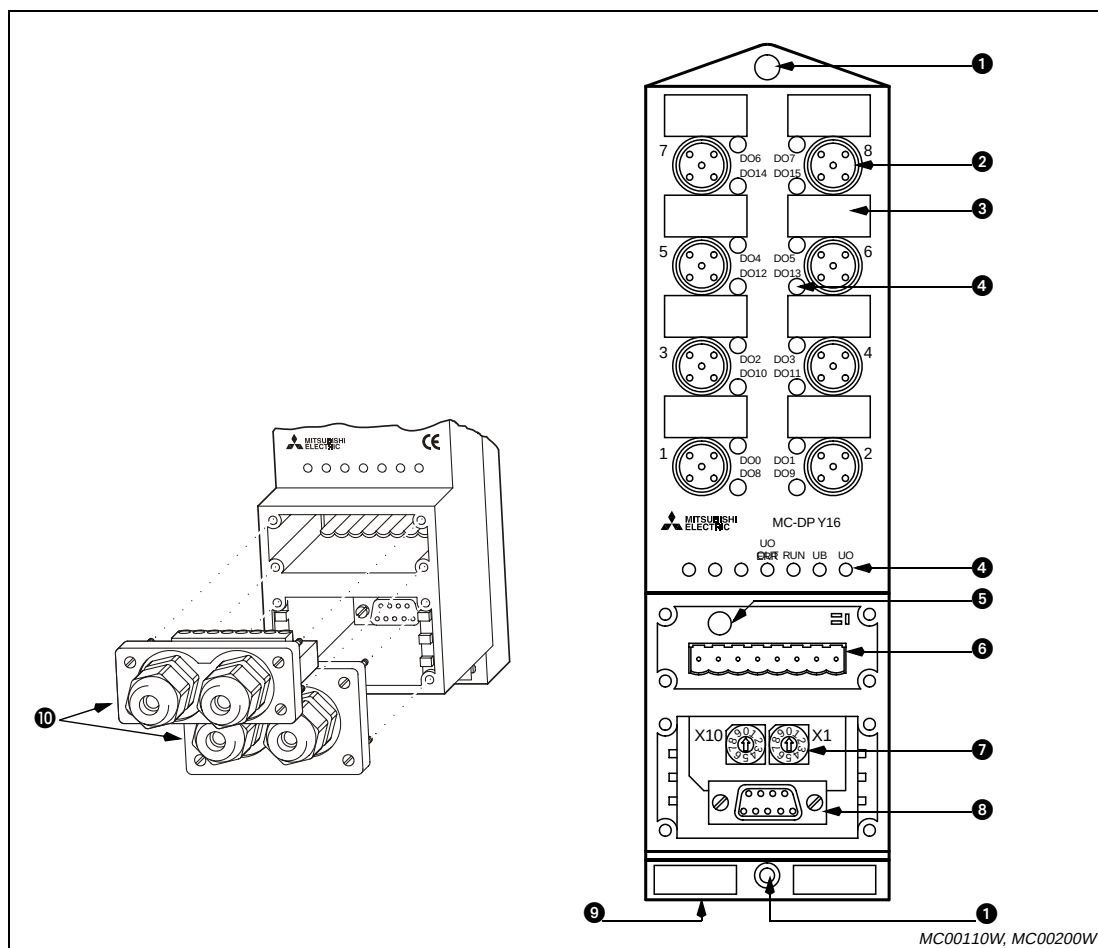


Fig. 4-22: Digital output module MC-DPY16

Position	Item	Description
①	Mounting hole	For direct mounting in a plant, on a machine etc.
②	M12 circular connector	Outputs for direct connection of actors
③	Labelling fields with cover	For labelling the outputs, module etc.
④	LEDs	For indicating the operating status and the status of the outputs
⑤	Fuse	For protection during short-circuit or overload (output modules only)
⑥	Power supply connector	For connecting the plug-in unit for the power supply
⑦	Address switch	For setting of the station number
⑧	D-SUB connector	For connecting the plug-in unit for the PROFIBUS/DP connection
⑨	PE terminal	For connecting the protective earth (below the labelling field)
⑩	Plug-in units	For connecting the power supply and PROFIBUS/DP

Tab. 4-10: Operating items MC-DPY16

4.5.2 Terminal assignment of the plug-in unit for the power supply

The following figure shows the terminal assignment of the plug-in unit:

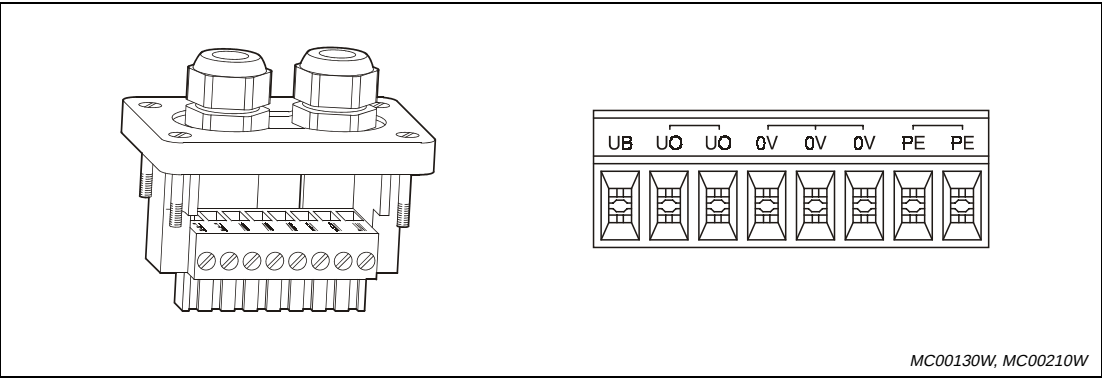


Fig. 4-23: Plug-in unit with terminal block for the power supply

Terminal	Assignment
UB	Power supply for bus circuits (24 V DC)
UO	Power supply for actors (24 V DC)
0V	Ground for sensors and bus circuits
PE	Protective earth

Tab. 4-11:
Terminal assignment
Plug-in unit for power supply

Connection patterns for the power supply

Connection pattern A:

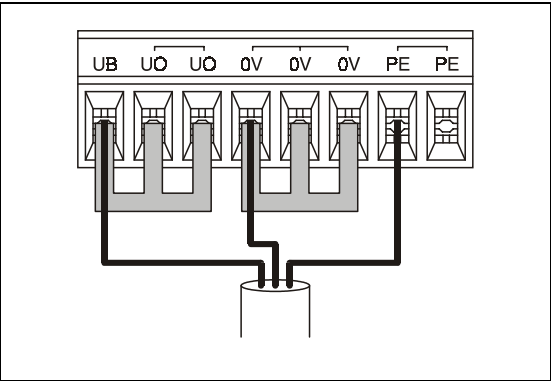


Fig. 4-24:
Common power supply for the bus circuits and the actors

MC00220W

Connection pattern B:

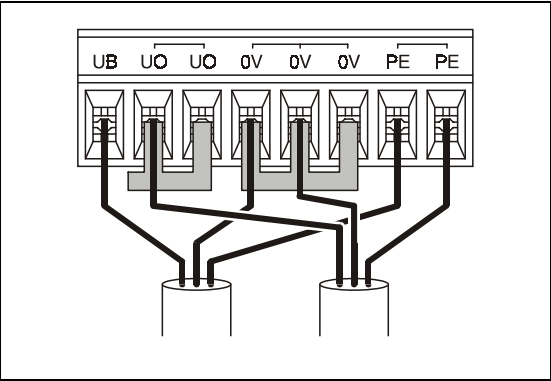


Fig. 4-25:
Separate power supply for the bus circuits and the actors

MC00230W

Connection pattern C:

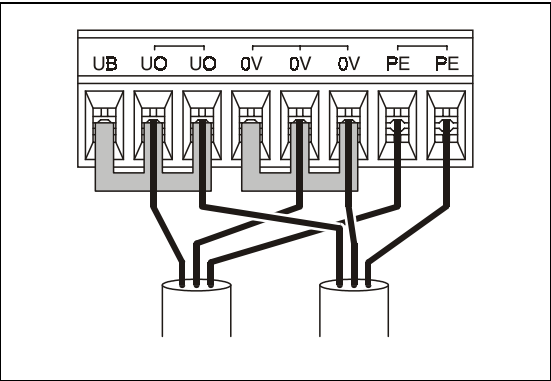


Fig. 4-26:
Common power supply for the bus circuits and the actors. Power supply forwarded.

MC00240W

4.5.3 Terminal assignment of the plug-in unit for the PROFIBUS/DP connection

The following figure shows the terminal assignment of the plug-in unit:

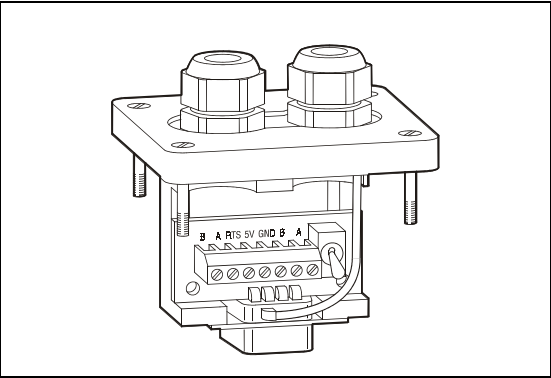


Fig. 4-27:
Plug-in unit for the PROFIBUS/DP connection

MC00100W

Terminal	Assignment
B	PROFIBUS/DP line red
A	PROFIBUS/DP line green
RTS	Hand-held terminal (optional)
5V	Hand-held terminal (optional)
0V	Hand-held terminal (optional)
B	PROFIBUS/DP line red
A	PROFIBUS/DP line green

Tab. 4-12:
Terminal assignment
PROFIBUS/DP plug-in unit

4.5.4 Pin assignment of the M12 circular connectors for the actors of the MC-DPY16 module

The actors can be connected directly to the M12 circular connectors. Y-connectors can be connected to the circular connectors 1 to 8.

The following figure shows the pin assignment of the M12 circular connectors:

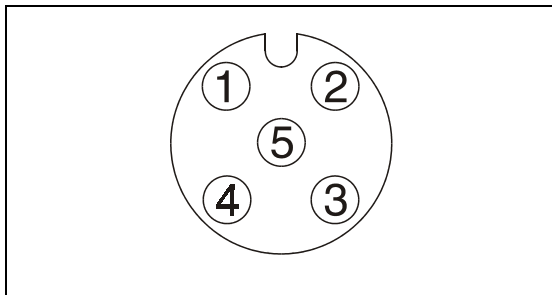


Fig. 4-28:
Pin assignment M12 circular connectors

MC00180W

M12 circular connector	Pin	Assignment
1–8 Digital outputs	1	+24 V
	2	DO8 to DO15
	3	0 V
	4	DO0 to DO7
	5	PE

NOTE

Screw M12 blind plugs on unused M12 connectors.

4.6 Digital input/output module MC-DPX8Y4

4.6.1 Operating items

The MC-DPX8Y4 module provides 8 digital inputs and 4 digital outputs.

The following figure shows the operating items and accessories of the MC-DPX8Y4 module:

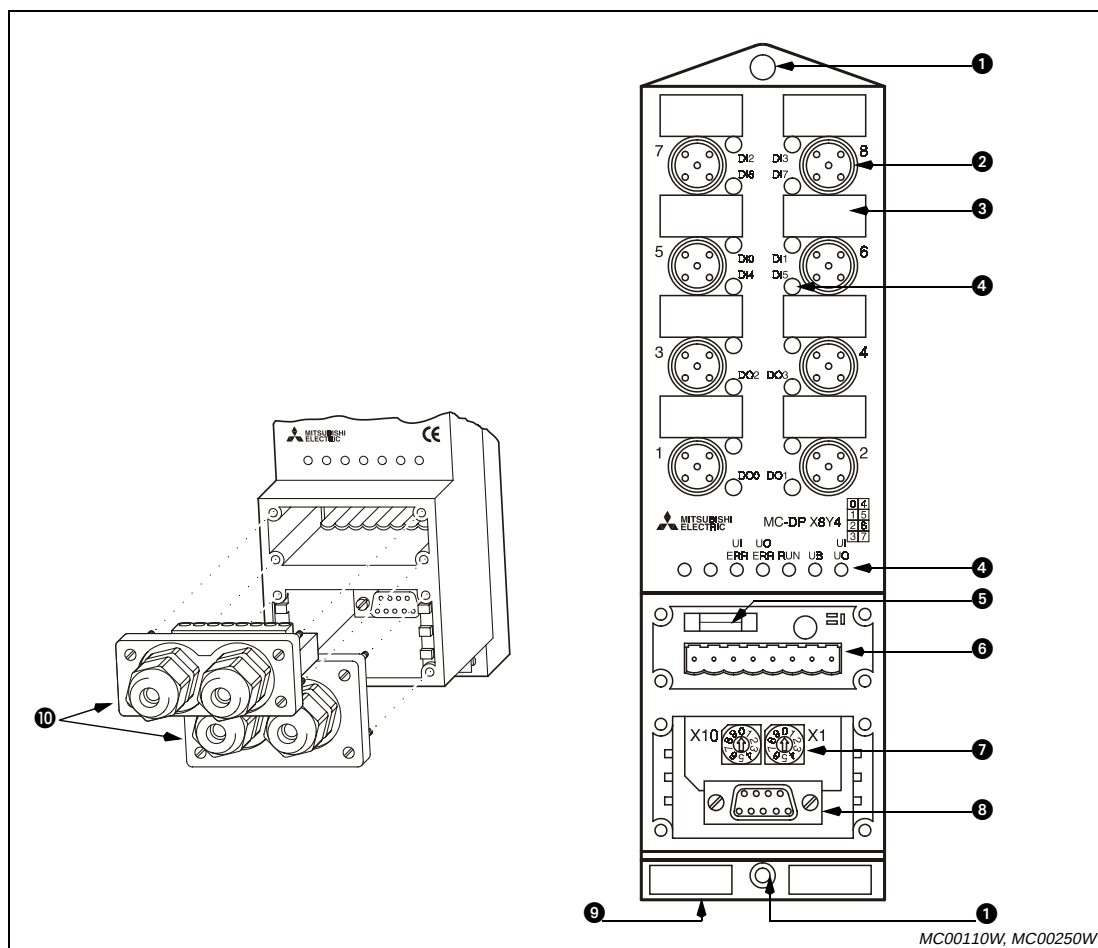


Fig. 4-29: Digital input/output module MC-DPX8Y4

Position	Item	Description
①	Mounting holes	For direct mounting in a plant, on a machine etc.
②	M12 circular connector	Inputs/outputs for direct connection of sensors/actors
③	Labelling fields with cover	For labelling the inputs, module etc.
④	LEDs	For indicating the operating status and the status of the inputs/outputs
⑤	Fuse	For protection during short-circuit or overload (output modules only)
⑥	Power supply connector	For connecting the plug-in unit for the power supply
⑦	Address switch	For setting the station number
⑧	D-SUB connector	For connecting the plug-in unit for the PROFIBUS/DP connection
⑨	PE terminal	For connecting the protective earth (below the labelling field)
⑩	Plug-in units	For connecting the power supply and PROFIBUS/DP

Tab. 4-13: Operating items MC-DPX8Y4

4.6.2 Terminal assignment of the plug-in unit for the power supply

The following figure shows the terminal assignment of the plug-in unit:

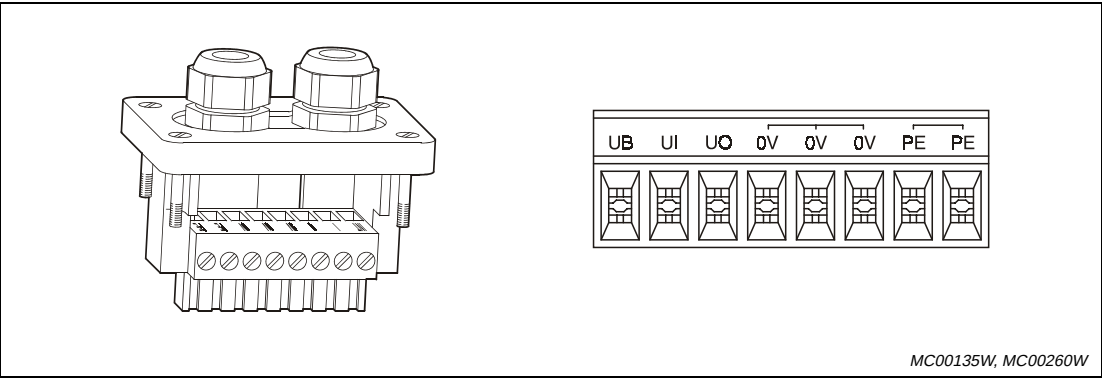


Fig. 4-30: Plug-in unit with terminal block for the power supply

Terminal	Assignment
UB	Power supply for bus circuits (24 V DC)
UI	Power supply for sensors (24 V DC)
UO	Power supply for actors (24 V DC)
0V	Ground for sensors and bus circuits
PE	Protective earth

Tab. 4-14:
Terminal assignment
Plug-in unit for power supply

Connection patterns for the power supply

Connection pattern A:

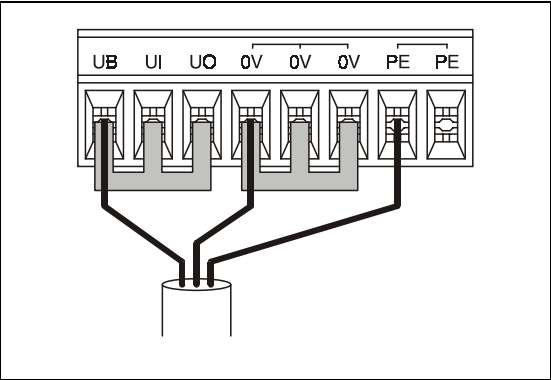


Fig. 4-31:
Common power supply for the bus circuits,
sensors, and the actors

MC00270W

Connection pattern B:

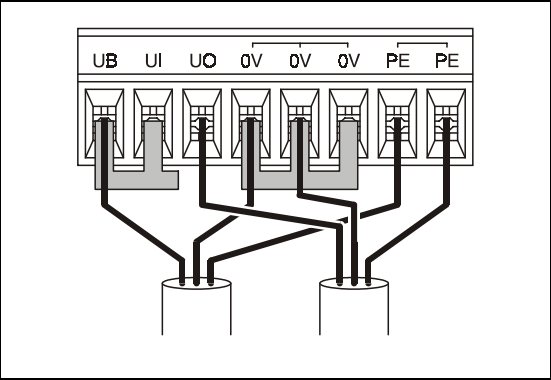


Fig. 4-32:
Separate power supply for the bus circuits,
sensors, and the actors

MC00280W

Connection pattern C:

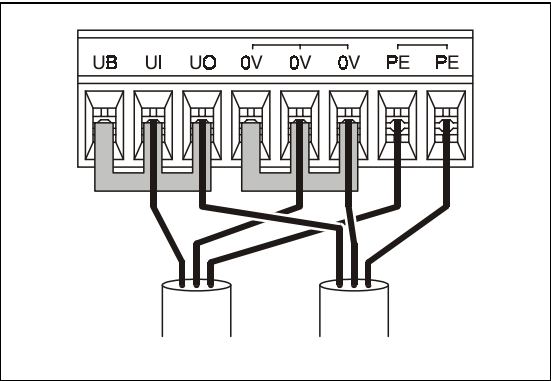


Fig. 4-33:
Common power supply for the bus circuits, sensors, and actors. Power supply forwarded.

MC00290W

4.6.3 Terminal assignment of the plug-in unit for the PROFIBUS/DP connection

The following figure shows the terminal assignment of the plug-in unit:

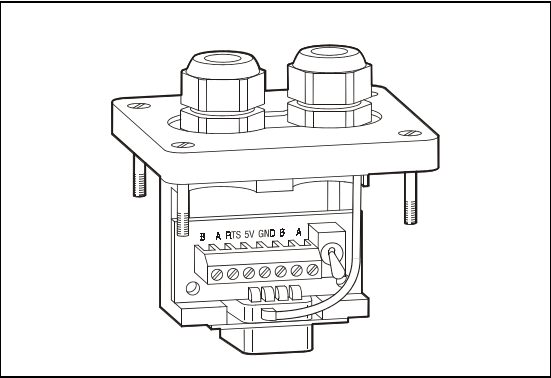


Fig. 4-34:
Plug-in unit for PROFIBUS/DP connection

MC00100W

Terminal	Assignment
B	PROFIBUS/DP line red
A	PROFIBUS/DP line green
RTS	Hand-held terminal (optional)
5V	Hand-held terminal (optional)
0V	Hand-held terminal (optional)
B	PROFIBUS/DP line red
A	PROFIBUS/DP line green

Tab. 4-15:
Terminal assignment
PROFIBUS/DP plug-in unit

4.6.4 Pin assignment of the M12 circular connectors for the sensors and actors of the MC-DPX8Y4 module

The sensors and actors can be connected directly to the M12 circular connectors. Y-connectors can be connected to the circular connectors 1, 3, and 5 to 8.

The following figure shows the pin assignment of the M12 circular connectors:

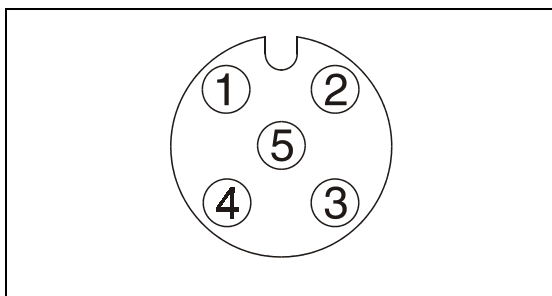


Fig. 4-35:
Pin assignment M12 circular connectors

MC00180W

M12 circular connector	Pin	Assignment
5–8 Digital inputs	1	+24 V
	2	DI4 to DI7
	3	0 V
	4	DI0 to DI3
	5	PE
1, 3 (version 1.0) Digital outputs	1	not assigned
	2	not assigned
	3	0 V
	4	DO0, DO2
	5	PE
1, 3 (from version 1.1) Digital outputs	1	not assigned
	2	DO1, DO3
	3	0 V
	4	DO0, DO2
	5	PE
2, 4 Digital outputs	1	not assigned
	2	not assigned
	3	0 V
	4	DO1, DO3
	5	PE

NOTE

Screw M12 blind plugs on unused M12 connectors.

5 Installation

5.1 Safety precautions

Observe the safety precautions in the first part of this manual (p. I to III).

5.2 Ambient Conditions

Only expose the MC modules to the following ambient conditions:



CAUTION:

The operating temperature must be between 0 and +55 °C.

The storage temperature must be between -20 and +70 °C.

5.3 Installation of the MC modules



CAUTION:

Before installing or removing an MC module switch off the power supply.

The MC module can be mounted directly on a mounting panel or machine. For this purpose the MC module provides two mounting holes.

To prevent tensions from being generated in the housing, make sure that the mounting surface is even when mounting the MC module.

To fix the module, two screws with a diameter of 4 mm and two retaining washers are required.

5.4 Wiring

5.4.1 General instructions

Power supply

- If the voltage fluctuation is higher than the defined value, a constant-voltage transformer has to be installed.

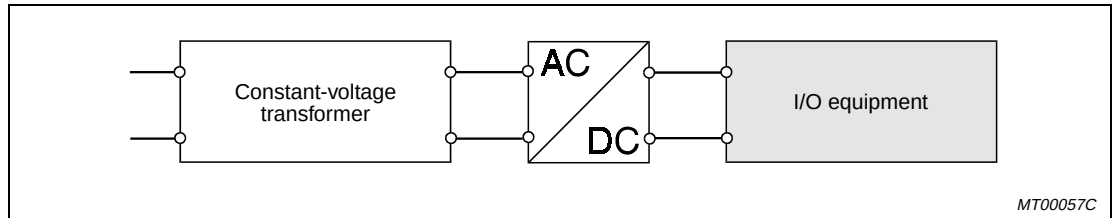


Fig. 5-1: Connection of a constant-voltage transformer

- Use a power supply unit which does not generate any noise across the wires, the controllers, and ground. If excessive noise is generated, connect an isolating transformer.

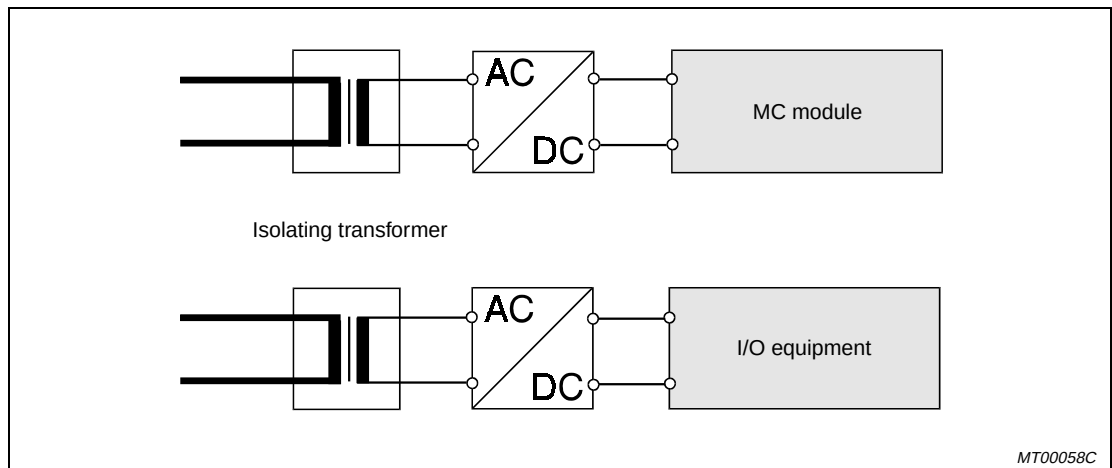


Fig. 5-2: Connection of an isolating transformer

- To minimize the voltage drop, use direct voltage wires with a maximum cross section (2.5 mm^2) for the DC 24 V supply.
- Do not bundle the main supply cables and the DC 24 V cables with the main circuit cables or with the I/O signal lines (high voltages, high currents). Additionally, it is not allowed to lay these cables closely together to the cables mentioned above. If possible, there must be a minimum distance of 100 mm between the cables.

Wiring the external equipment with the inputs and outputs

- Input and output lines must always be laid separately.
- Lay the I/O signal lines with a minimum distance of 100 mm to high-voltage and high-current main circuit wires.
- If the minimum distance of 100 mm between the I/O signal lines and the high-voltage and high-current wires cannot be kept, use shielded cables. Ground the shielding at the MC module's side.

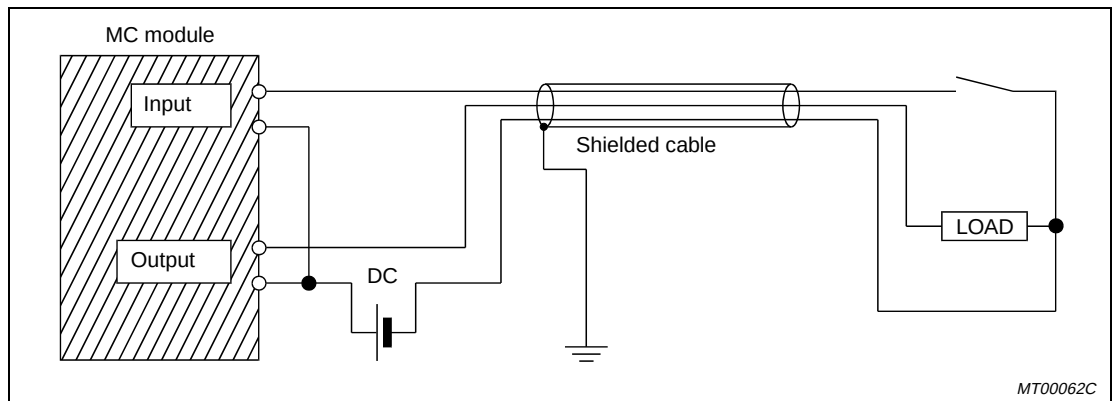


Fig. 5-3: Wiring and grounding the I/O signal line

- If wiring is done by means of a piping, ground the piping.
- Lay the DC 24 V I/O cables separately from the AC cables.

Grounding

- Each MC module provides a PE terminal, that must be connected lowly resistive to the protective earth:

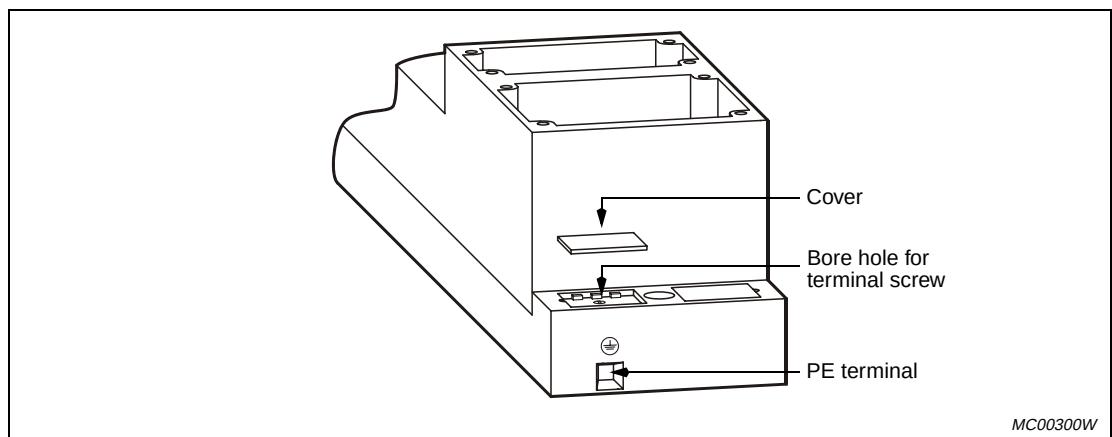


Fig. 5-4: PE connection terminal below the labelling field

Shielding

For the communication of a MELSEC system with peripheral devices, shielded data lines have to be used. The shielding should be made of twisted copper. The density of the twisted copper determines the effectiveness of the shielding. When laying the data cables, observe the bending instructions of the cable manufacturer. Otherwise the shielding might fan out. For longer cable distances, connect the shielding every 20 m to ground.

Digital signal transmission

To ensure an error free digital signal transmission, follow the specifications of the interface concerning transfer rate and transfer distance.

5.4.2 Cable preparation

The connection cables for the power supply and the PROFIBUS/DP connection have to be prepared as follows:

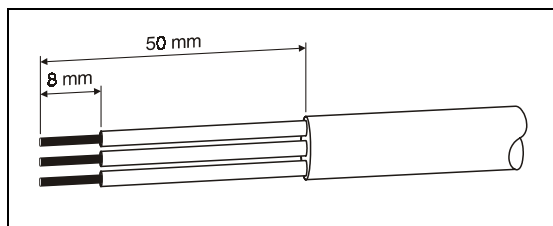


Fig. 5-5:
Cable preparation
power supply

MC00310W

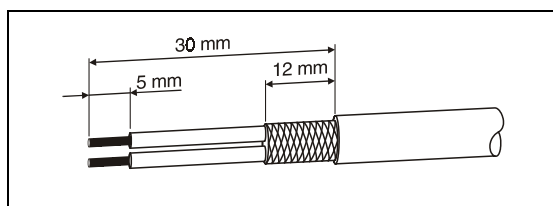


Fig. 5-6:
Cable preparation
PROFIBUS/DP cable

MC00320W

5.4.3 Connecting the power supply

The MC module provides the opportunity to connect the power supply for the bus circuits and the power supply for the sensors and actors separately. Both circuits share a common reference potential (ground). Additionally, the power supply can be forwarded. For the terminal assignment and connection patterns, refer to chapter 4, "Description of the MC Modules".

The PE terminal must be connected lowly resistive to the protective earth (see fig. 5-4).

Connecting the power supply:

- ① Remove the screws from the plug-in unit and remove the plug-in unit.
- ② Strip the insulation and prepare the cable (see section 5.4.2)
- ③ Screw down the PG9 screw fitting on the plug-in unit. Close unused fittings with sealing caps.
- ④ Lead the cable through the PG9 screw fitting.
- ⑤ Connect the cable to the terminal (for an easier connection the terminal can be removed at the side from the plug-in unit).
- ⑥ Tighten the PG9 screw fitting.
- ⑦ Plug in the plug-in unit and fasten the screws.
- ⑧ Connect the protective earth lowly resistive to the PE terminal of the housing (see fig. 5-4).

5.4.4 PROFIBUS/DP connection

The PROFIBUS/DP cable is connected to the MC module via a plug-in unit. This plug-in unit includes an integrated T-junction with terminating resistors. These terminating resistors can be enabled or disabled by a switch. The terminal assignment of the terminal block for the PROFIBUS/DP connection is described in chapter 4, "Description of the MC Modules".

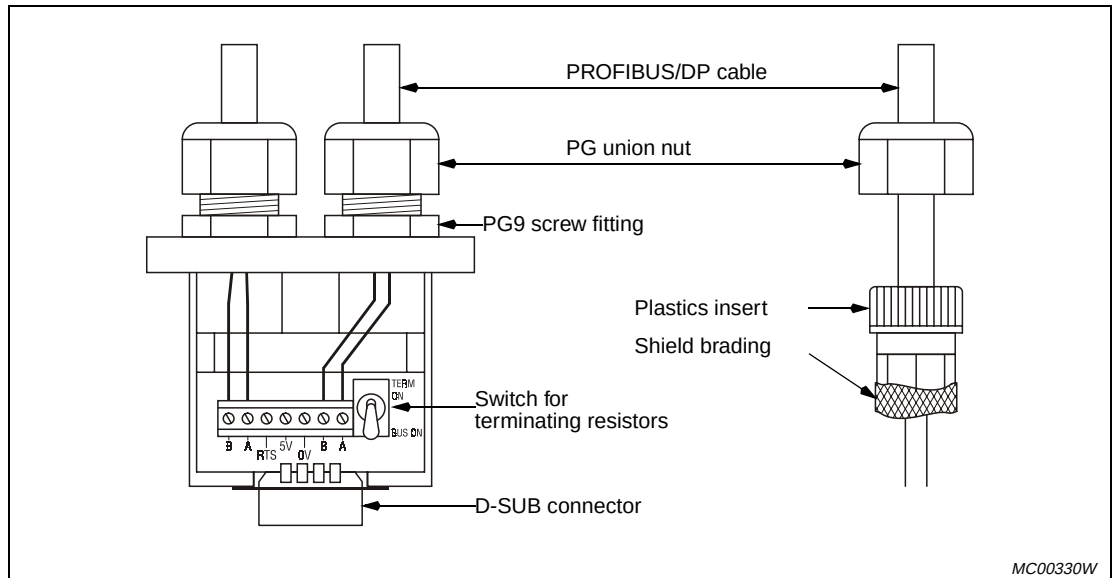


Fig. 5-7: PROFIBUS/DP connection

Connecting the PROFIBUS/DP cable to the MC module:

- ① Remove the screws from the plug-in unit and remove the plug-in unit.
- ② Strip the insulation and prepare the PROFIBUS/DP cable (see section 5.4.2).
- ③ Screw down the PG9 screw fitting down on the plug-in unit. Close unused fittings with sealing caps.
- ④ Put the PG union nut and the plastics insert over the PROFIBUS/DP cable.
- ⑤ Put the shield braiding over the plastics insert.
- ⑥ Lead the cable including the plastics insert through the PG9 screw fitting.
- ⑦ Connect the cable to the terminal block (A: green, B: red).
- ⑧ Tighten the PG9 screw fitting.
- ⑨ Enable the terminating resistors, if the MC module is the first or last one in the bus segment.
- ⑩ Set the station number (see chapter 6, "Configuration").
- ⑪ Plug in the plug-in unit and fasten the screws.

NOTE

Only use metal PG9 screw fittings with shield connection.
The terminals RTS, 0V, and 5V are intended for a hand-held terminal.

5.4.5 Connecting sensors and actors

The sensors and actors can be connected directly to the M12 circular connectors.

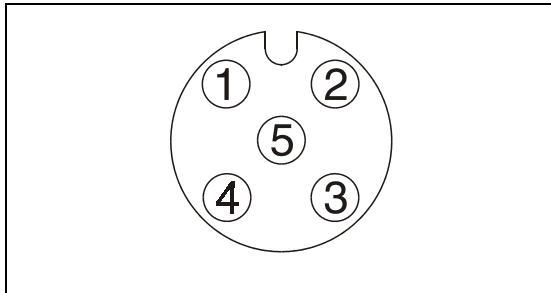


Fig. 5-8:
M12 circular connector

MC00180W

Refer to chapter 4, "Description of the MC Modules" for the pin assignment of the M12 circular connectors.

NOTE

Screw M12 blind plugs on unused M12 connectors.

6 Configuration

The configuration specifies the installed system components of the MC series via the PROFIBUS/DP to the according master. The configuration procedures by means of the software MELSOFT GX Configurator-DP and the setting of the station number are described below.

6.1 Station number

The station number is set by two rotary switches. The switches are located below the plug-in unit for the PROFIBUS/DP connection. The station number is set directly via both address setting switches as decimal value (X10 = digit of tens, X1 = digit of ones).

The station numbers 1 to 99 are valid.

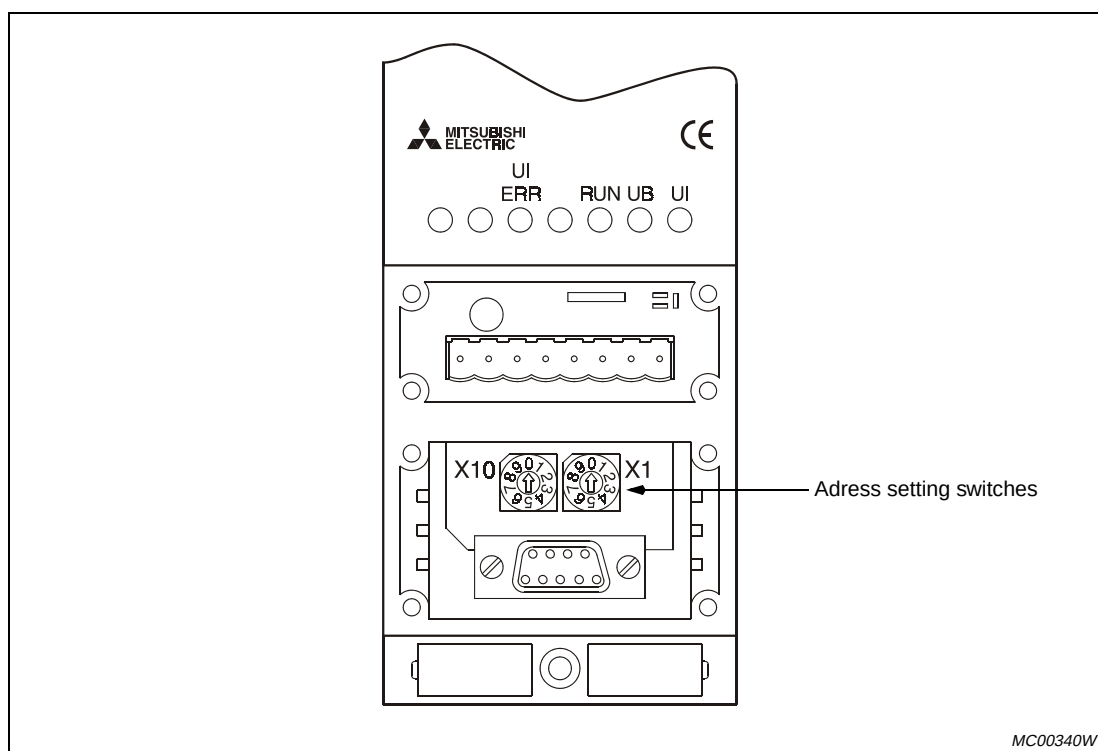


Fig. 6-1: Address setting switches

NOTE

The MC module only adopts the station number of the MC module when the power supply is applied.

For this reason you have to switch OFF the power supply for a moment after you have changed the station number, so that the new station number will be adopted.

6.2 Configuration with MELSOFT GX Configurator-DP

The software MELSOFT GX Configurator-DP is designed to configure and parameterize the PROFIBUS/DP masters A(1S)J71PB92D and QJ71PB92D. For configuring the master via the PROFIBUS/DP, take the steps below in the described order.

- ① After MELSOFT GX Configurator-DP has been started, the configuration begins with the menu item "File/New". The following screen appears:

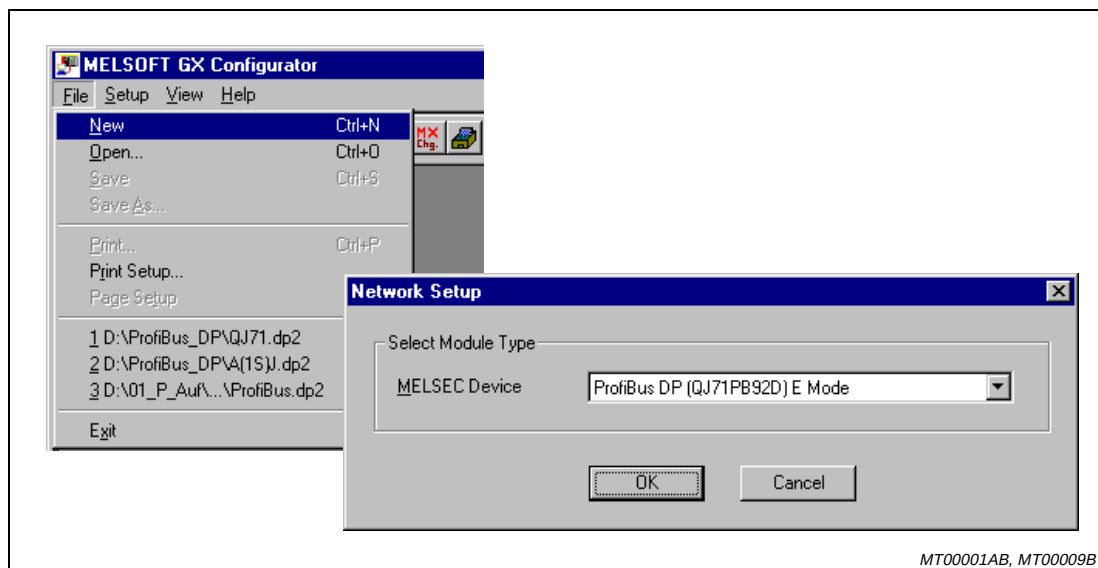


Fig. 6-2: Network Setup

- ② After the master QJ71PB92D has been selected in the desired operating mode (E Mode using 244 send /receive bytes or 0 Mode using 32 send/receive bytes) the graphical network editor appears.

- ③ Install the GSD file of the MC series as follows:
- (a) Press button "Device Database".
 - (b) Select the "Slave Device Group" "I/O".

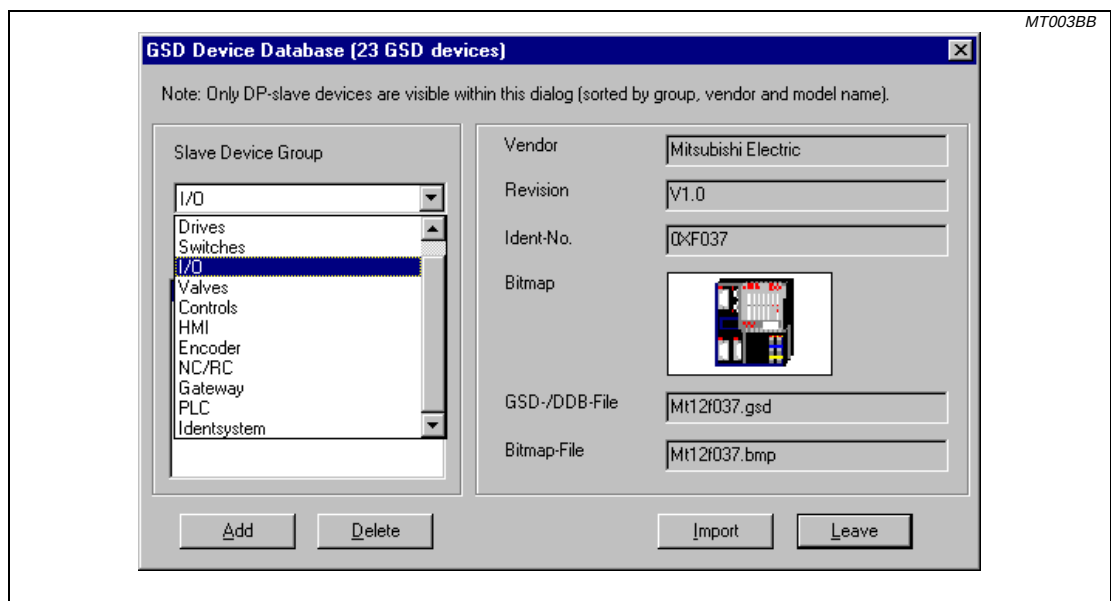


Fig. 6-3: Device Database

- (c) Press button "Add".
- (d) Specify the path that contains the file "melc3001.gsd" (e.g. disk in drive A:). Confirm with "Open".
- (e) Confirmation of copying the GSD data to the database. Confirm with "OK".

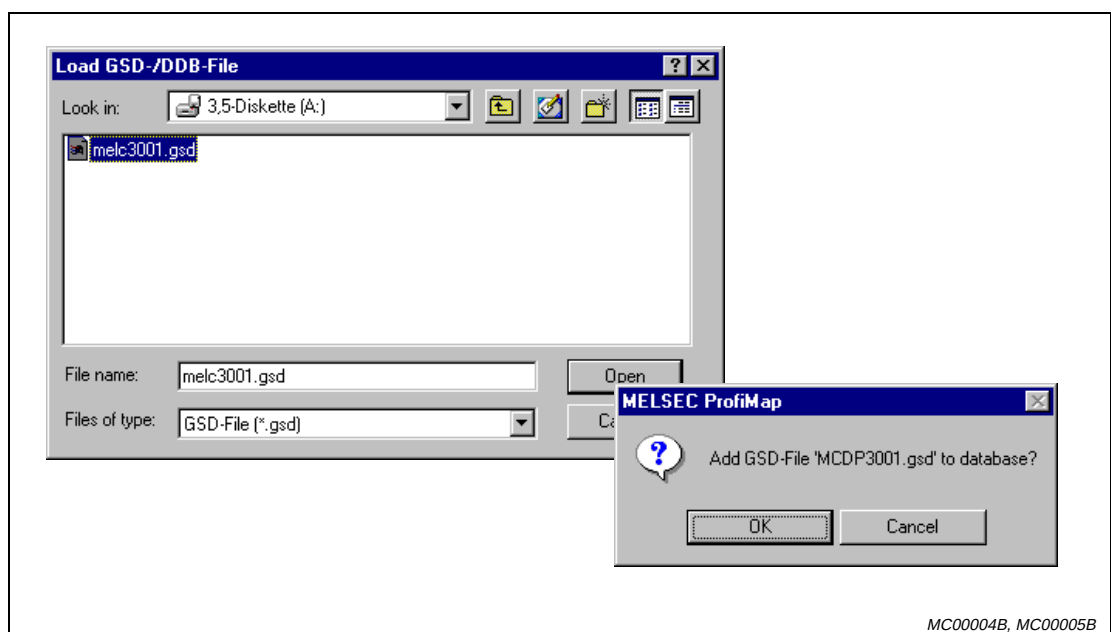


Fig. 6-4: Loading the GSD file data

- (f) Specify the path that contains the BMP file "Mc_devin.bmp" (e.g. disk in drive A:). Confirm with "Open".

(Then optional BMP files for the functions "Diag" and "SF" are requested. The current version of MELSOFT GX Configurator-DP does not support these functions. Close the according dialog boxes with "Cancel".)

- (g) The BMP file content will be included into the database.

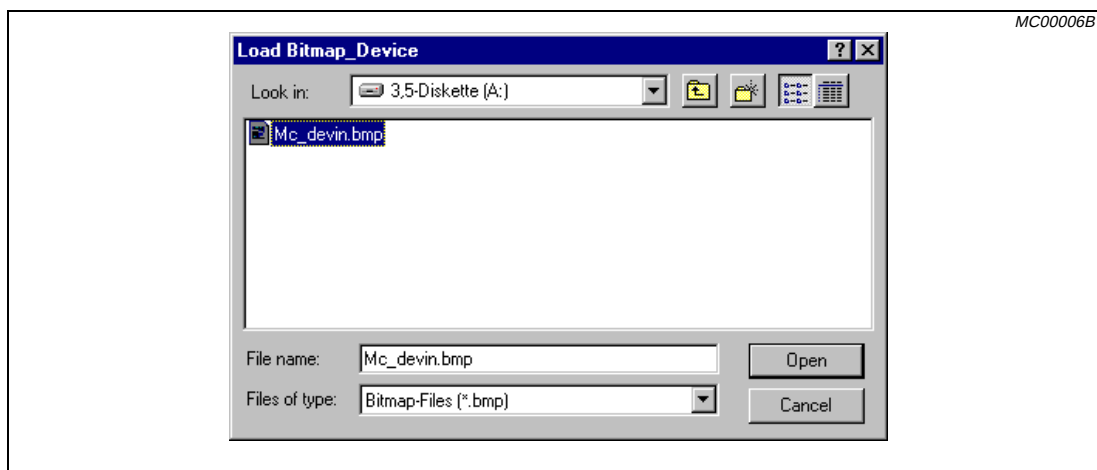


Fig. 6-5: Loading the BMP file

- (h) A new entry "MC-DP" appears in the "Available Slave Systems" list box. Leave the dialog with "Leave".

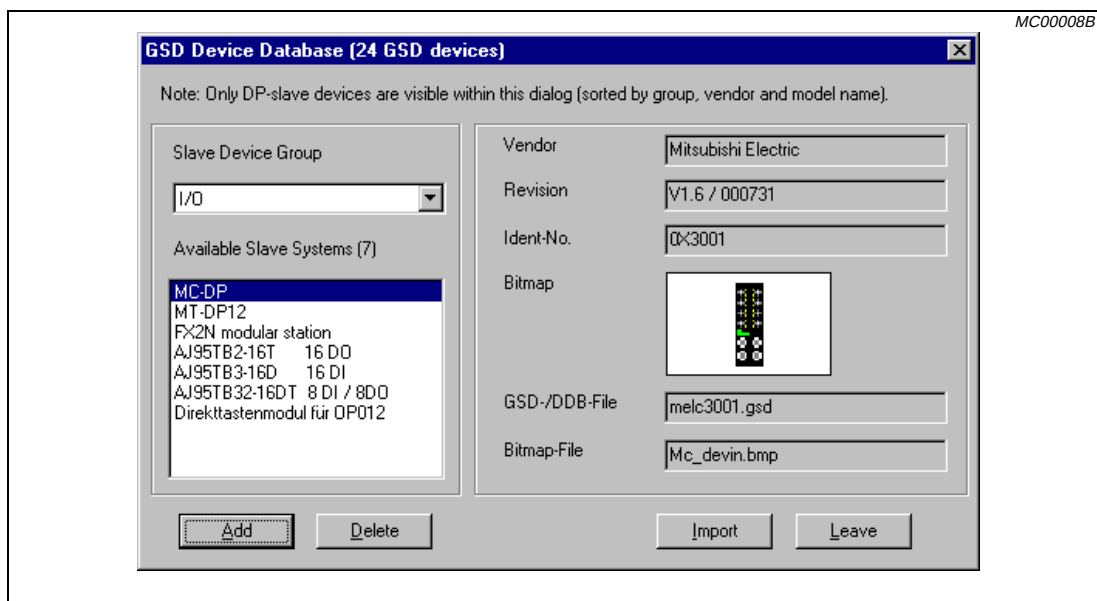


Fig. 6-6: New entry of the MC series

NOTE

These procedures are required only once to load the specifications of the MC modules into the MELSOFT GX Configurator-DP configuration software.

- ④ To operate the MC module, the configuration of the MC system has to be acknowledged by the master module. Right-click on the network connection line to open the context menu and select "Insert DP-Slave".

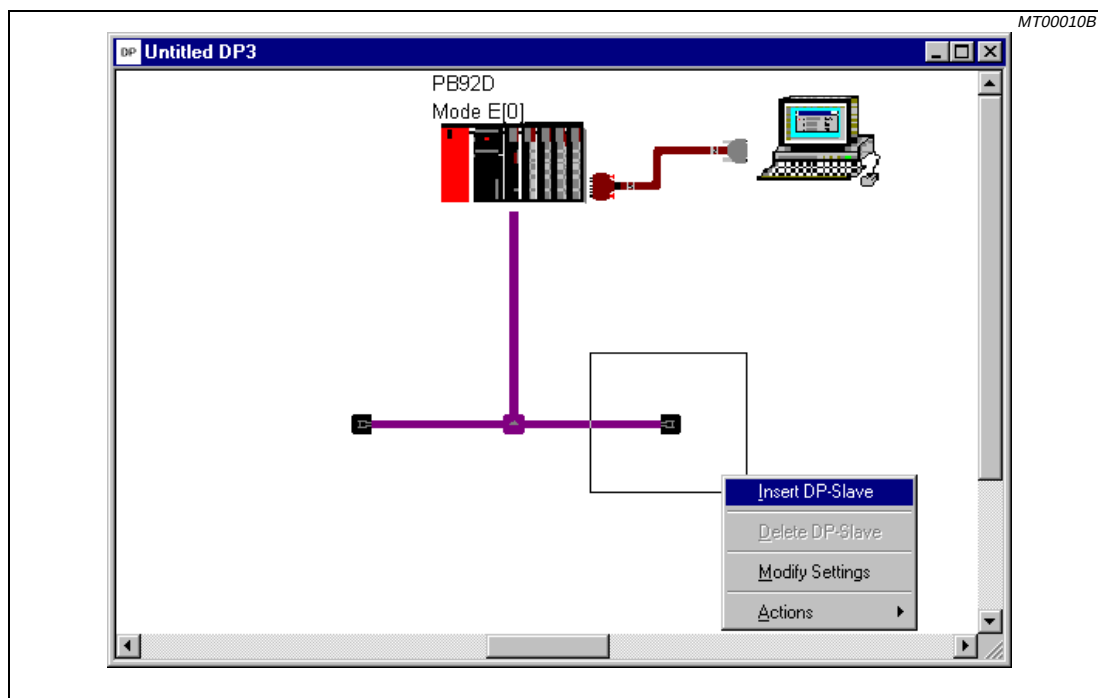


Fig. 6-7: Inserting the MC series

- ⑤ Select "I/O" for the "Slave Device Group". This group contains the MC modules. From the "Available Slave Systems" select the "MC DP" modules and confirm with "OK".

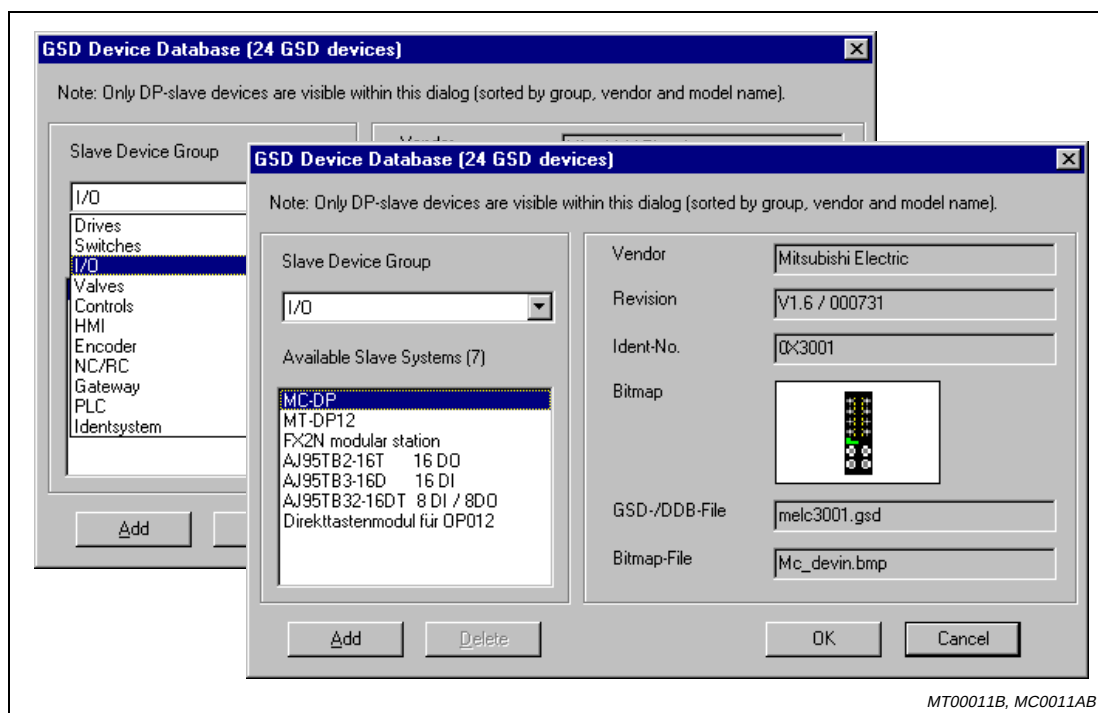


Fig. 6-8: Selecting the MC modules

- ⑥ For documentation purposes you can enter a name for your MC module into the "Name" field.

Enter the station number you specified via the address setting switches of your basic MC module for the "FDL address". Specify the hardware configuration of the MC system by pressing the "Select Modules" button.

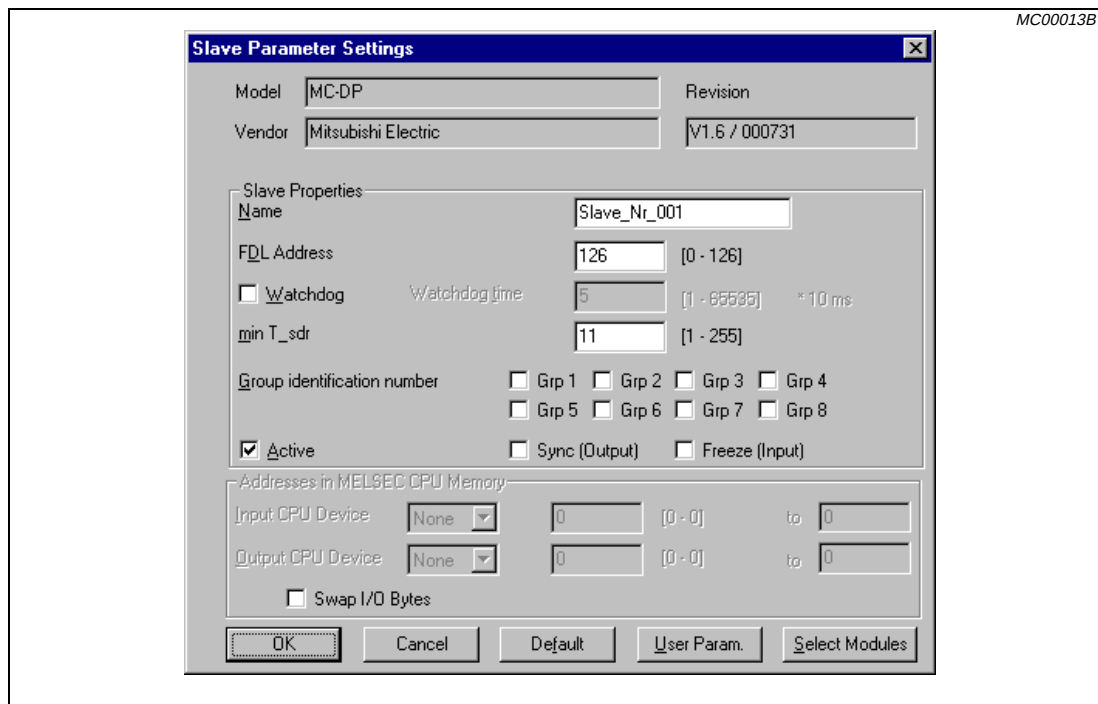


Fig. 6-9: Specifying the station number

- ⑦ The left window lists the available MC modules. Select the desired MC module with a left-click and confirm with the "Add" button. By this, the selected MC module is added to the list of installed modules.

For completing the configuration confirm and close the window with "OK". Via the entry "Addresses in MELSEC CPU Memory" you can specify the PLC device that stores the user data.

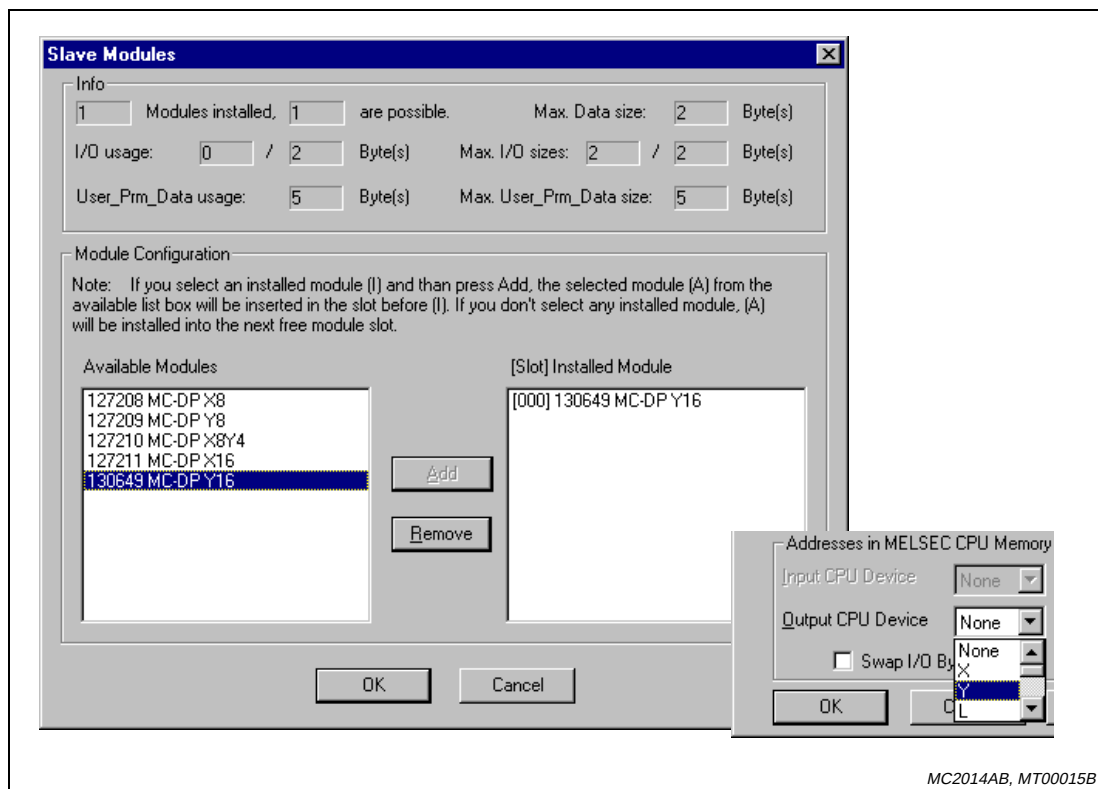


Fig. 6-10: Configuration

Close the "Slave Parameter Settings" window with "OK". The graphical network editor appears displaying the connection between the MC module and the PROFIBUS-DP.

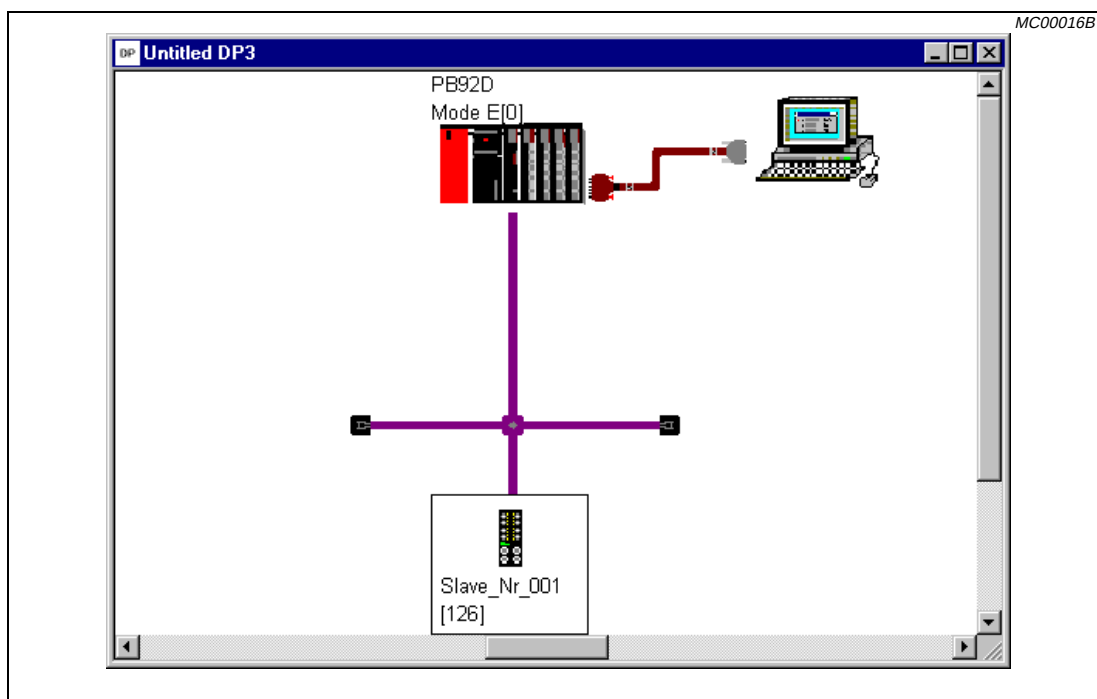


Fig. 6-11: Displaying the MC module in the graphical network editor

NOTE

For an exact timing of the MC module on the PROFIBUS/DP, the "Min. slave interval" has to be set to at least $10 \times 100 \mu\text{s}$. For this take the following steps (see fig. 6-12):

- ① Double-click on the master symbol to open the "Master Settings" dialog.
- ② Set the "Min. slave interval" to 10.
- ③ Close the window with "OK".

The PROFIBUS/DP master QJ71PB92D can be configured only through the CPU port of the CPU module. In the "Master Settings" click the "Select NW" button to select and define a CPU port network connection for communications with the PROFIBUS/DP master (for details refer to the MELSOFT GX Configurator-DP manual).

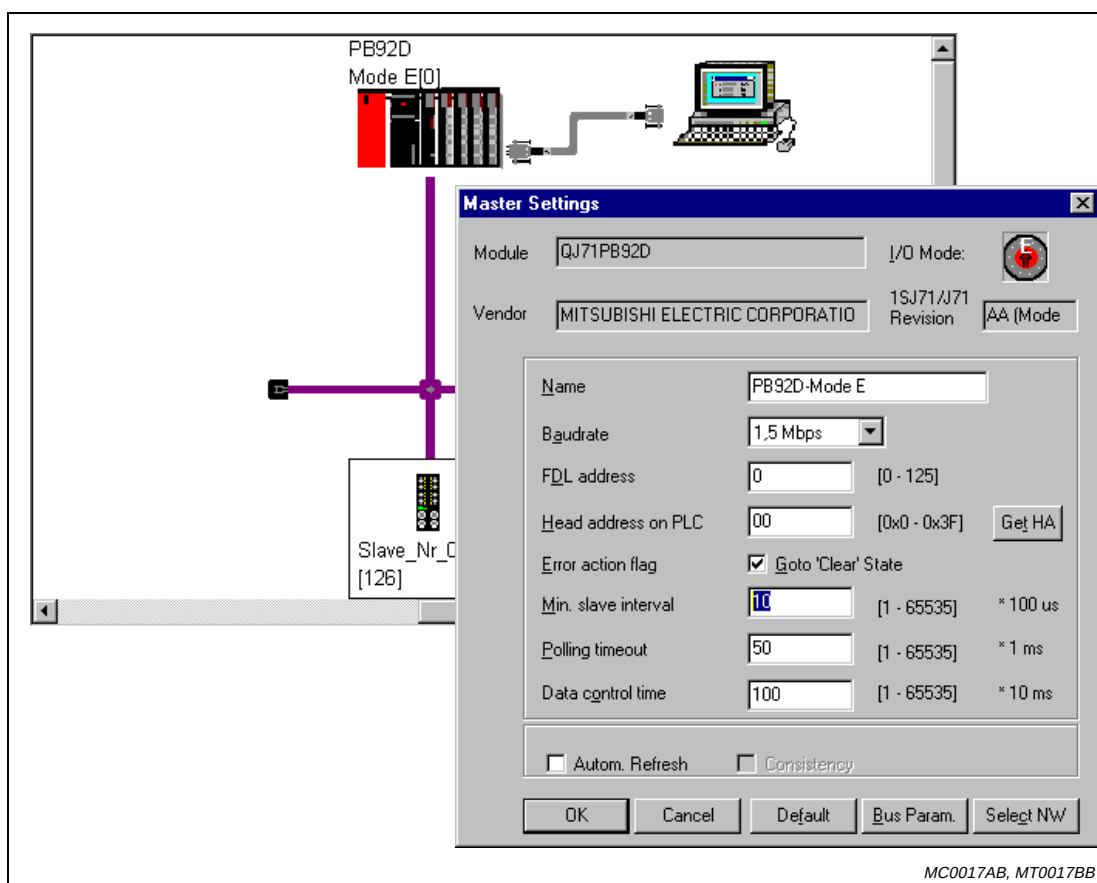


Fig. 6-12: Setting the "Min. slave interval"

- ⑧ Now you can transfer the network configuration to the PROFIBUS/DP master. To do so right-click on the graphical network editor to open the context menu and select "Write to PB92D".

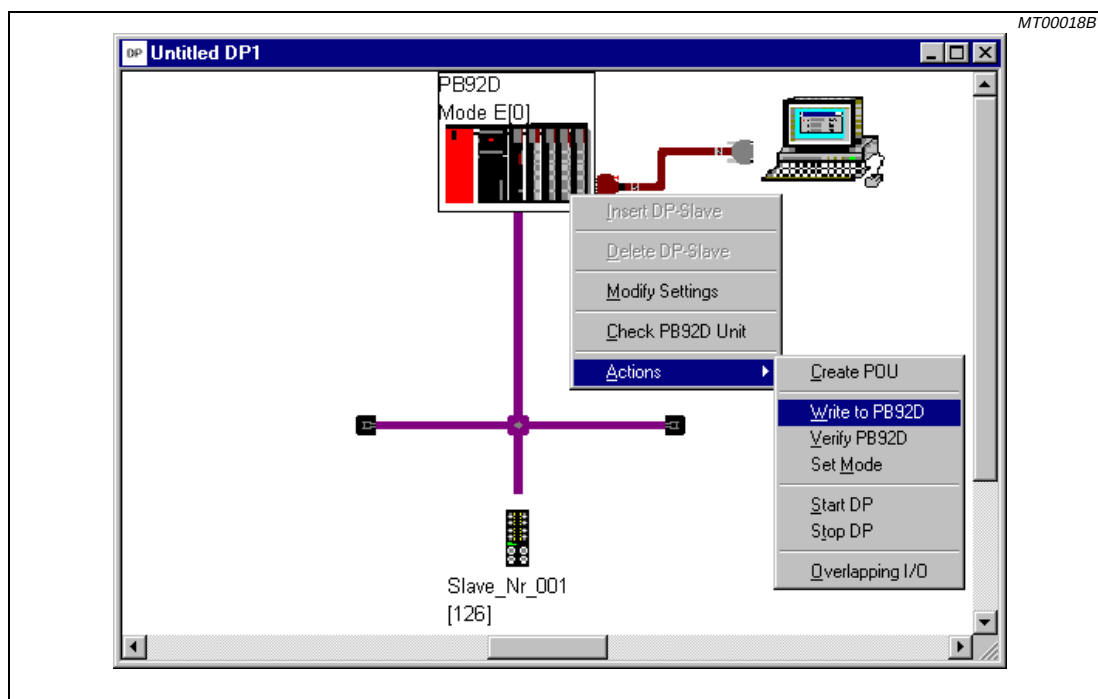


Fig. 6-13: Writing the configuration data

NOTE

Refer to the MELSOFT GX Configurator-DP manual for further details.

7 Parameterization

7.1 Parameter bytes for all MC modules

The following table shows the meaning of the parameter bytes:

Byte	Function	Bit position							
		b7	b6	b5	b4	b3	b2	b1	b0
0	User_Def_PRM1	0	0	0	0	EN Sammel Dia	WD Base	0	0
1	Mask for Diaport1								
2	Mask for Diaport2	0	0	0	0	0	0	0	0
3	User_Def_PRM2	0	0	0	0	0	0	0	0
4	User_Def_PRM3	0	0	0	0	0	0	0	0

Tab. 7-1: Parameter bytes

Byte 0: User_Def_PRM1

Bit 0,1,4,5,6,7:

These bits are reserved and must be set to 0.

Bit 2:

The WD_Base-Bit specifies the time base for the watchdog:

- 0 = Time base 10 ms (status after reset)
- 1 = Time base 1 ms

Bit 3:

The EN_Sammel_Dia-Bit enables the group diagnostic mode:

- 0 = A group diagnostic error will always be returned.
- 1 = A group diagnostic error will only be returned, if an additional channel diagnostic error has occurred.

For input modules EN_Sammel_Dia = 0 must be parameterized.

Byte 1: Mask for Diaport1

This byte contains mask bits for the channel diagnostic byte. The mask bits are assigned to the respective bit positions of the channel diagnostic byte. A "1" at the respective bit position masks the diagnostics, i. e. these bits are masked out. After a reset all masks are cleared.

For input modules the mask byte must be parameterized 00hex.

Byte 2, 3, 4: Mask for Diaport2, User_Def_PRM2, User_Def_PRM3

These mask bytes are not used by the MC modules and must be parameterized 00hex.

Example:

- WD_Base = 1ms
- A group diagnostic error will only be returned, if an additional channel diagnostic error has occurred.
- No short-circuit monitoring for the outputs 1, 2, 6, 8.

Byte	(Enter in format KH)
0	0C A3 00 00 00
10	
20	

Tab. 7-2: Example for a DP slave parameterizing frame

7.2 Parameterization with MELSOFT GX Configurator-DP

When initializing the PROFIBUS/DP network, the master sends the stored slave configuration to the according slave. If the configuration sent corresponds with the slave configuration, the slave returns a positive confirmation. Then, the master sends initial values for the measuring range, troubleshooting etc. as parameterization frame ("User Parameters") to the slave.

The MELSOFT GX Configurator-DP software automatically determines the length of the parameterization frame. To parameterize the MC modules via the PROFIBUS/DP take the following steps:

- ① Configure and load the device file (*.GSD) and the bitmap file (*.BMP) (refer to section 6-2).
The graphical network editor will be displayed (see figure below).

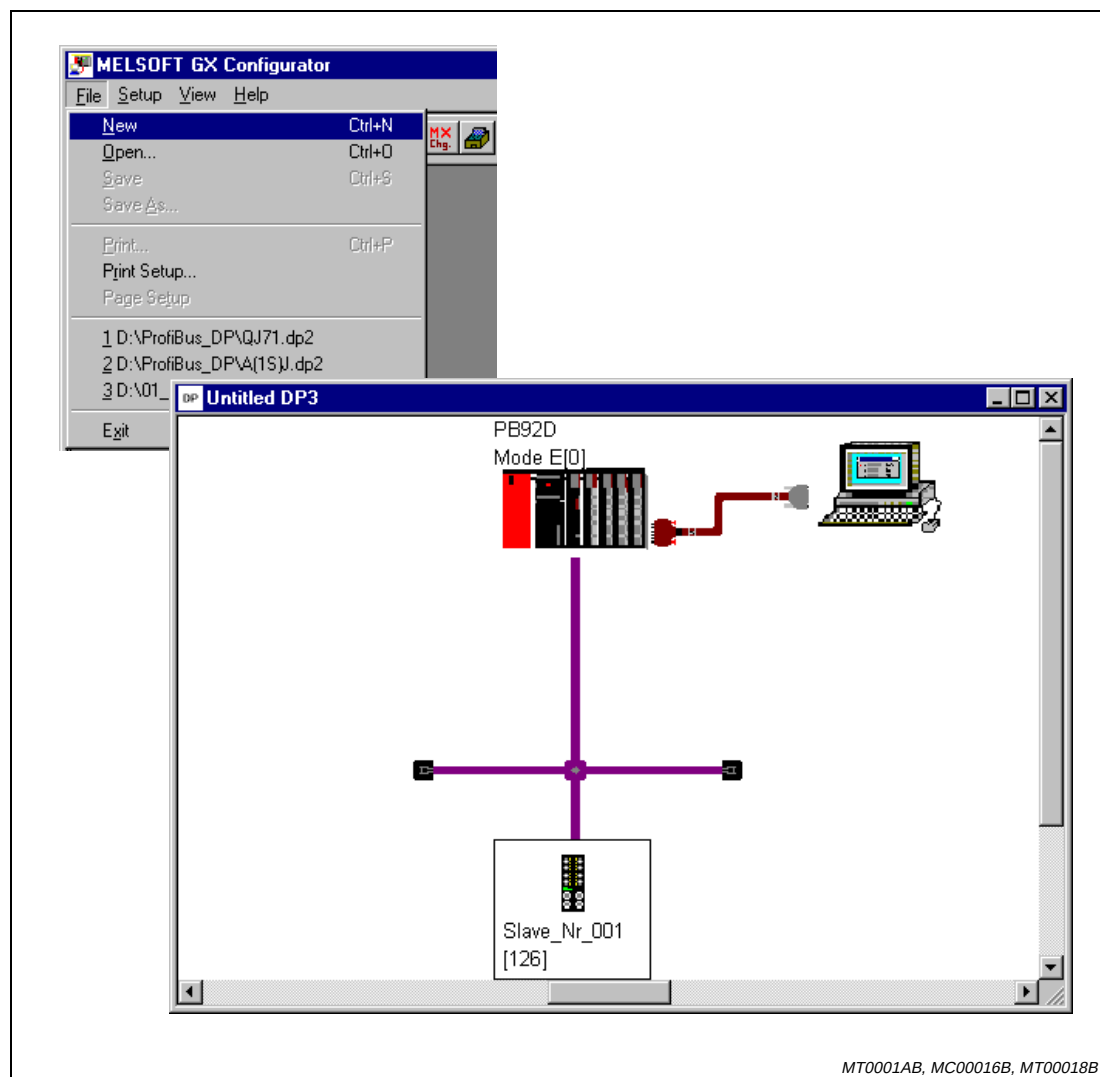


Fig. 6-14: Graphical network editor

- ② Then double-click on the MC slave to open the "Slave Parameter Settings".

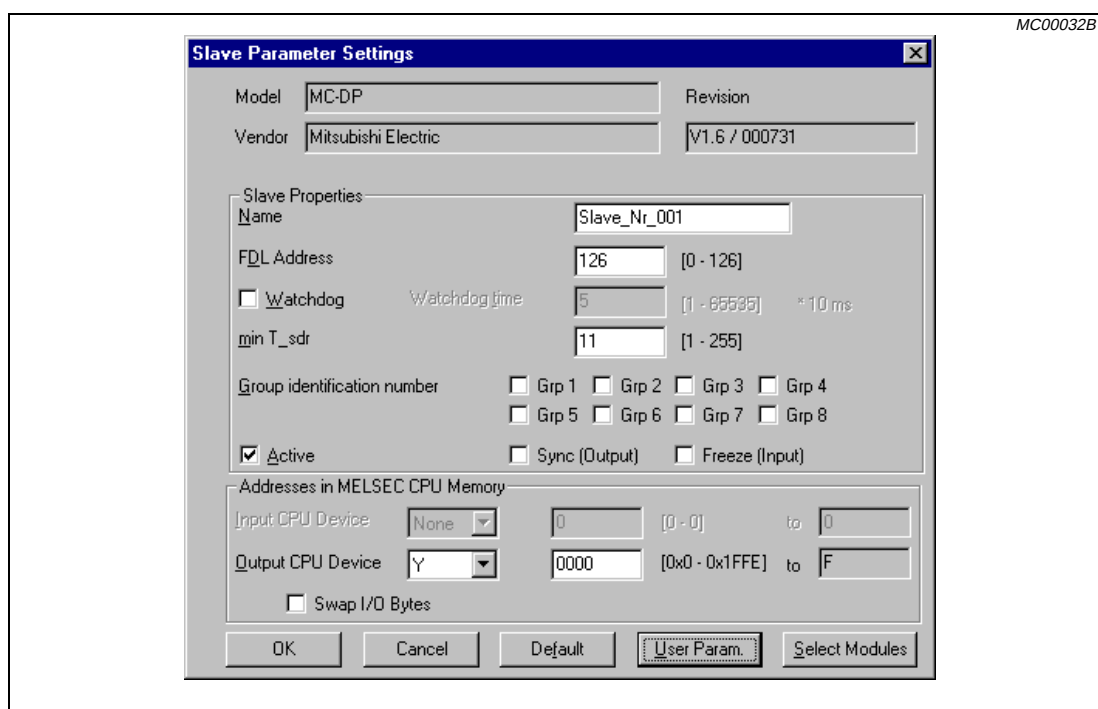


Fig. 6-15: "Slave Parameter Settings" dialog

- ③ Click on the "User Param" button. The "Extended User Parameters" dialog box opens (see figure below). In this dialog you can parameterize the configured slaves directly after you have selected them with the mouse. Left-click on the parameter to be edited. A drop-down list opens for the selecting the setting. The dialog can be opened as well via the keyboard (refer to the MELSOFT GX Configurator-DP Manual).

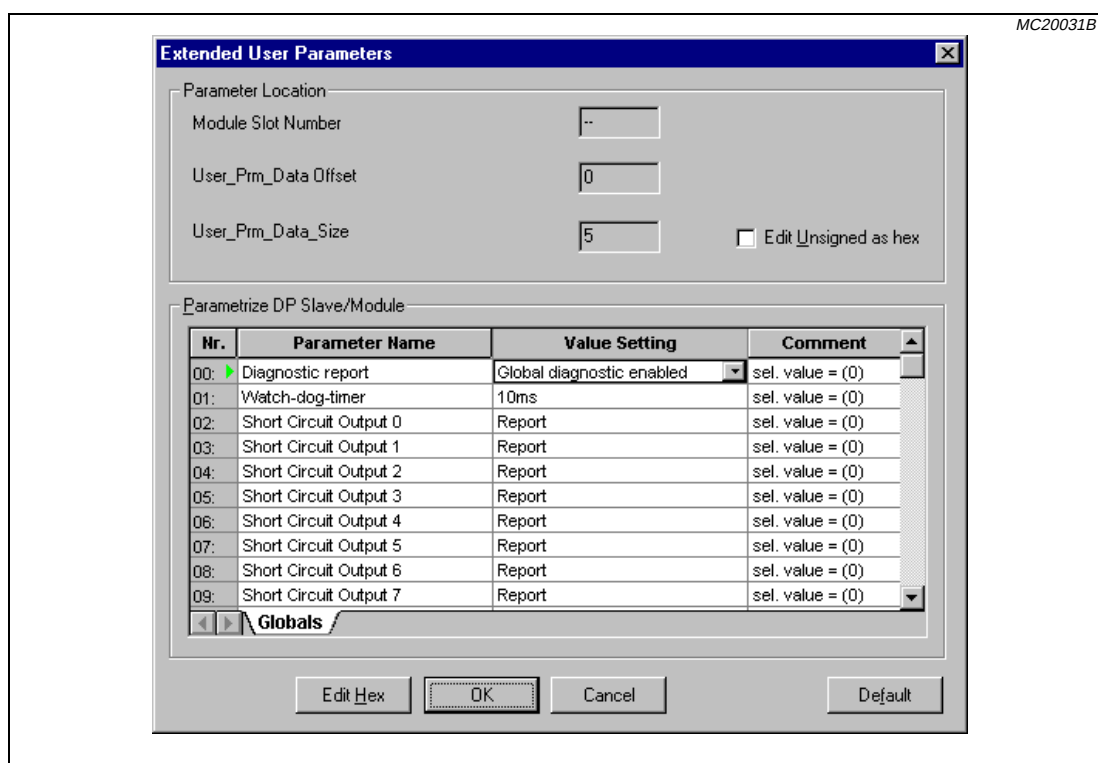


Fig. 6-16: Parameter entry and editing in clear

- ④ Click on the "Edit Hex" button to open the Hex Editor for the slave user parameters. In this grid of the Hex Editor the parameter data of the individual MC module has to be entered according to the description of the parameterization frame and the parameter bytes (see section 7.1). Enter the decimal values of the binary encoding of the set bits of the parameter byte in hexadecimal format. The table below shows the assignment of entries to the according parameter data. The entries begin with the 0th parameter byte.

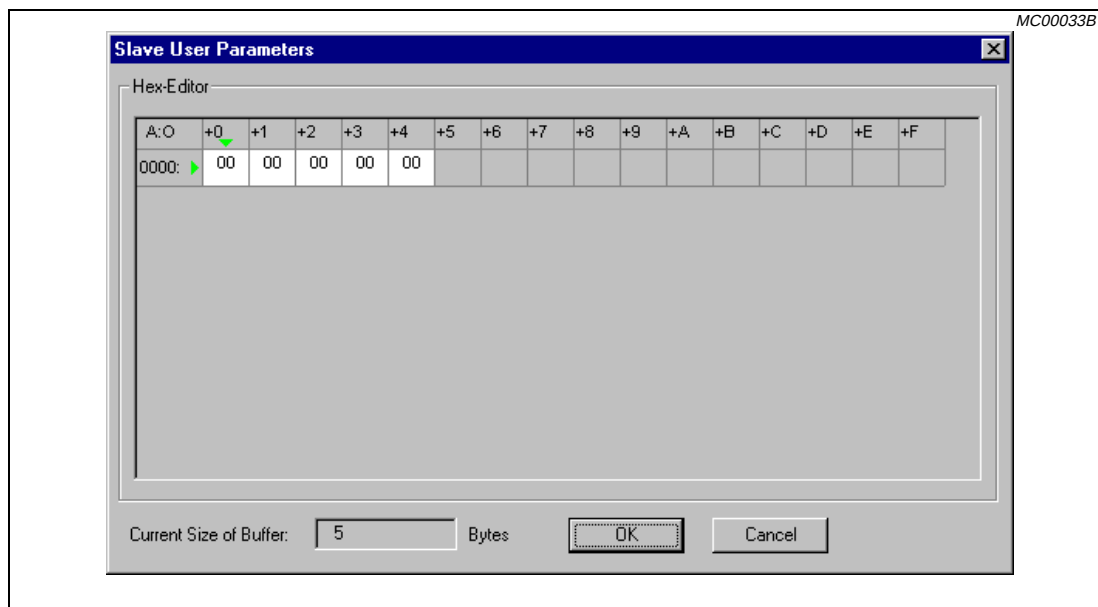


Fig. 6-17: "Slave User Parameters" dialog

Confirm the entries and close this dialog with "OK". Close all further dialogs with "OK" to return to the "Config Module" dialog.

Byte	MC module	Parameterization	Binary value b7 – b0	Decimal value	He- xadec. value	
00 (00H)		Global diagnostic activate Watch Dog Timer 10 ms	b4 = 0 b3 = 0	00000000	0	00H
01 (01H)	MC-DPX8 MC-DPX16 MC-DPY8 MC-DPY16 MC-DPX8Y4	Error channel 00 activate Error channel 01 activate Error channel 02 activate Error channel 03 activate Error channel 04 activate Error channel 05 activate Error channel 06 activate Error channel 07 activate	b0 = 0 b1 = 0 b2 = 0 b3 = 0 b4 = 0 b5 = 0 b6 = 0 b7 = 0	00000000	0	00H

Tab. 7-3: Description of the entries in the parameterizing matrix

- ⑤ Click on the "Write to AJ71" button to transfer the parameterization to the PROFIBUS/DP master.

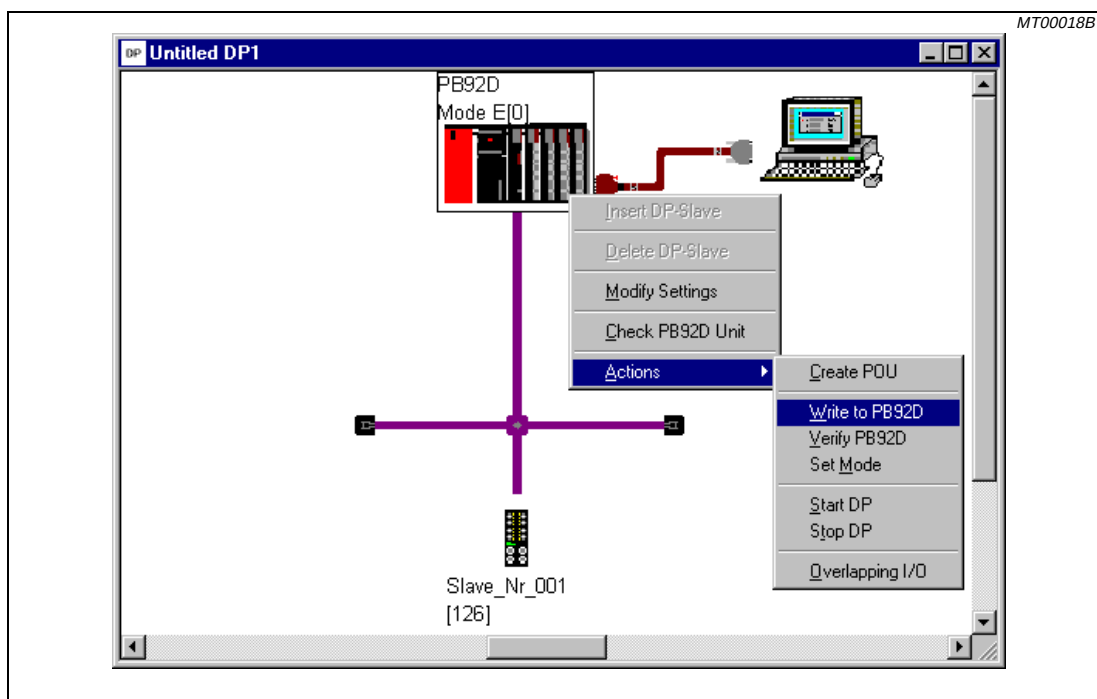


Fig. 6-18: Writing the parameterizing data

8 Maintenance and Inspection

This chapter describes daily and periodic maintenance and inspection procedures to maintain the MC modules in trouble-free and good condition.

8.1 Daily inspection

The table below gives an overview of inspections to be checked daily:

No.	Check item	Check point	Desired state	Corrective action
1	MC modules	Check for loose mounting screws.	Mounting screws of the MC modules must not be loose.	Retighten mounting screws.
2	Plug-in units	Check proper seating of the plug-in units.	The plug-in units must be installed properly.	Plug-in and secure plug-in units properly.

Tab. 8-1: Daily inspection

8.2 Periodic inspection

This section describes the inspection items to be checked every six to twelve months. Additionally, these items have to be checked when the system configuration or wiring has been changed.

No.	Check item		Checking method	Desired state	Corrective action
1	Ambient conditions	Ambient temperature	Check ambient temperature.	0 – 55 °C	If the MC modules are installed in a cabinet, the conditions inside the cabinet are relevant.
2	Power supply for the MC modules		Measure the power supply voltage across the connection terminals.	24 V: 18 – 30 V DC	Change input voltage or renew power supply.
3	Condition of MC modules	Loose seating of the MC modules	Check mounting of the MC modules.	The MC modules must be mounted properly.	Mount MC modules properly.
4	Condition of connections	Loose terminal screws	Check for loose terminal screws.	Terminal screws must not be loose.	Retighten terminal screws.
		Loose plug-in units	Visual check	Fixing screws must not be loose.	Retighten fixing screws of the plug-in units.

Tab. 8-2: Periodic inspection

9 Troubleshooting

This chapter describes various troubleshooting procedures, as well as corrective actions.

9.1 Basic troubleshooting

The system reliability does not depend only on reliable peripheral devices but also on short down-times in case of trouble. In the following the most important points for troubleshooting are listed.

Visual checks

- Is the power ON or OFF?
- Status of inputs and outputs?
- Condition of wiring (I/O lines, cables)?
- Status of LED indicators (UI ERR, UO ERR, RUN, UB, UI, UO, status LEDs for inputs/outputs)?

Trouble check

Observe any changes of the error during a short switching OFF and ON of the power supply.

9.2 Toubleshooting via LEDs

The MC module provides several LEDs supporting the troubleshooting. The status of the LEDs and corresponding diagnostic procedures are described in the following.

Key to LEDs

MC module	UI ERR	UO ERR	RUN	UB	UI/UO
MC-DPX8	red	—	green	green	green
	Short-circuit of sensor power supply		Bus RUN	Power 24-V bus circuits	Power 24-V sensors
MC-DPX16	red	—	green	green	green
	Short-circuit of sensor power supply		Bus RUN	Power 24-V bus circuits	Power 24-V sensors
MC-DPY8	—	red	green	green	green
		Short-circuit of outputs	Bus RUN	Power 24-V bus circuits	Power 24-V actors
MC-DPY16	—	red	green	green	green
		Short-circuit of outputs	Bus RUN	Power 24-V bus circuits	Power 24-V actors
MC-DPX8Y4	red	red	green	green	green
	Short-circuit of sensor power supply	Short-circuit of outputs	Bus RUN	Power 24-V bus circuits	Power sensors/actors

Tab. 9-1: Key to LED indicators

Meaning of the LEDs:

UI ERR: The power supply for the sensors is short-circuited.

UO ERR: One or more outputs are short-circuited or overloaded.

RUN: Data communication with the master is active.

UB: Power supply for the bus circuits is connected.

UI/UO: Power supply for sensors and actors is connected. Fuse is OK (output modules only).

9.3 Troubleshooting via PROFIBUS/DP

The troubleshooting via the PROFIBUS/DP is supported only by the master A1SJ71PB92D. For the troubleshooting the diagnostic frame written in the buffer memory has to be read out.

9.3.1 Group diagnostic byte

Each MC module provides a group diagnostic byte transferring status information on the MC module.

Group diagnostic byte

Bit position	Status information
b0	Undervoltage sensor-/actor power supply < 18 V
b1	Undervoltage bus circuits < 18 V
b2	Short-circuit output (group message)
b3	Short-circuit sensor power supply (group message)
b4	not assigned
b5	not assigned
b6	not assigned
b7	not assigned

Tab. 9-2: Group diagnostic byte

9.3.2 Channel diagnostic byte

Each MC output module additionally provides a channel diagnostic byte monitoring each output for a short-circuit or overload.

Channel diagnostic byte

Bit position	Status information		
	MC-DPY8	MC-DPY16	DP-X8Y4
b0	Short-circuit output 0	Short-circuit outputs 0 – 3	Short-circuit output 0
b1	Short-circuit output 1	Short-circuit outputs 4 – 7	Short-circuit output 1
b2	Short-circuit output 2	Short-circuit outputs 8 – B	Short-circuit output 2
b3	Short-circuit output 3	Short-circuit outputs C – F	Short-circuit output 3
b4	Short-circuit output 4	not assigned	not assigned
b5	Short-circuit output 5	not assigned	not assigned
b6	Short-circuit output 6	not assigned	not assigned
b7	Short-circuit output 7	not assigned	not assigned

Tab. 9-3: Channel diagnostic byte

NOTE

In case of a short-circuit of an output the output remains switched off until it is reset via the bus system.

10 Specifications

10.1 General operating conditions

Operating conditions		Specifications	
Ambient conditions			
Operating ambient temperature		0 °C to +55 °C	
Storage ambient temperature		−25 °C to +70 °C	
Protection rating acc. to IEC 529		IP 67	
Mechanical ambient conditions			
Vibration resistance acc. to DIN IEC 68 part 2-6		10 - 58 Hz	const. amplitude 0,35 mm
		58 - 150 Hz	const. acceleration 5 G
Shock resistance acc. to DIN IEC 68 Teil 2-27		Amplitude 30 G, duration 11 ms	
Electromagnetic compatibility			
ESD acc. to EN 61000-4-2		Air stroke	8 kV
		Contact stroke	4 kV
		Horizontal coupling plate	4 kV
		Vertical coupling plate	4 kV
HF field acc. to ENV 50140		Field strength 10 V/m, 80 to 1000 MHz (80% AM)	
Burst acc. to IEC 801 part 4		Power supply	2 kV
		Bus lines	2 kV
		Digital input/output lines	2 kV
Noise radiation acc. to EN 55 011		Class A, Group 1 (industrial range)	
Insulation DIN VDE 0160		Approved	

Tab. 10-1: General operating conditions

10.2 PROFIBUS/DP interface

Item	Description
Communication protocol	PROFIBUS/DP acc. to DIN 19245
Data transfer rates	9,6/19,2/93,75/187,5/500 kBaud/ 1,5/3/6/12 MBaud
Baud rate detection	Automatic
Operating modes	Sync mode and freeze mode supported
Address setting	Addresses 1 – 99 via BCD rotary switch
Ident number	3101H
Potential isolation	500 V between bus and internal circuits

Tab. 10-2: Specification of the PROFIBUS/DP interface

10.3 Specifications of the MC modules

10.3.1 Digital input module MC-DPX8

Item	MC-DPX8
Connections	
Power supply	Screw terminal in plug-in unit 1.5 mm ² , cable lead through PG9
Data line	Screw terminal in plug-in unit, cable lead through PG9
Inputs	8 x 5-pin M12 connector
Power supply	
Nominal voltage $U_{I/O}$, U_{INT}	24 V DC
Voltage range	18 – 30 V DC
Undervoltage detection	18 V $\pm 5\%$
Input current (without inputs)	≤ 80 mA
Power supply for sensors	Max. 100 mA per sensor
Short-circuit protection for sensors	PTC, $I_K \geq 1.6$ A
Wire size	Max. 1.5 mm ²
Polarity reversal protection for inputs and internal circuit supply	Yes
Inputs	
Number of inputs	8
Input delay	Approx. 1 ms
Input characteristics curve	IEC 1131-2, type 2
Other	
Dimensions in mm (LxWxH)	217.5 x 62.0 x 70.5
Mounting pitch	206.5 mm
Weight	Approx. 470 g

Tab. 10-3: Digital input module MC-DPX8

10.3.2 Digital input module MC-DPX16

Item	MC-DPX16
Connections	
Power supply	Screw terminal in plug-in unit 1.5 mm ² , cable lead through PG9
Data line	Screw terminal in plug-in unit, cable lead through PG9
Inputs	8 x 5-pin M12 connector
Power supply	
Nominal voltage $U_{I/O}$, U_{INT}	24 V DC
Voltage range	18 – 30 V DC
Undervoltage detection	18 V $\pm$ 5%
Input current (without inputs)	$\leq$ 80 mA
Power supply for sensors	Max. 50 mA per sensor
Short-circuit protection for sensors	PTC, $I_K \geq 1.6$ A
Wire size	Max. 1.5 mm ²
Polarity reversal protection for inputs and internal circuit supply	Yes
Inputs	
Number of inputs	16
Input delay	Approx. 1 ms
Input characteristics curve	IEC 1131-2, type 2
Other	
Dimensions in mm (LxWxH)	217.5 x 62.0 x 70.5
Mounting pitch	206.5 mm
Weight	Approx. 470 g

Tab. 10-4: Digital input module MC-DPX16

10.3.3 Digital output module MC-DPY8

Item	MC-DPY8
Connections	
Power supply	Screw terminal in plug-in unit 1.5 mm ² , cable lead through PG9
Data line	Screw terminal in plug-in unit, cable lead through PG9
Inputs	8 x 5-pin M12 connector
Power supply	
Nominal voltage $U_{I/O}$, U_{INT}	24 V DC
Voltage range	18 – 30 V DC
Undervoltage detection	18 V $\pm$ 5%
Input current (without outputs)	$\leq$ 80 mA
Input current outputs	Max. 10 A at ambient temperature 0 °C – 55 °C
	Max. 16 A at ambient temperature 0 °C – 40 °C
Wire size	Max. 1.5 mm ²
Polarity reversal protection for internal circuits supply	Yes
Polarity reversal protection for outputs	By means of fuse 16 A and protective diode
Outputs	
Number of outputs	8
Output voltage	$\geq U_{I/O} - 0.1$ V
Switching current per output	2 A, 100% ED
Switching current all outputs	Max. 10 A at ambient temperature 0 °C – 55 °C
	Max. 16 A at ambient temperature 0 °C – 40 °C
Short-circuit and overload protection	Electronic (output remains switched off)
Short-circuit current per output	Typ. 7 A
Lamp load	Max. 10 W
Switched-off time on short-circuit	Approx. 150 μ s
Cutoff current for output signal 0	$\leq$ 10 μ A
Switching frequency	Max. 100 Hz for resistive load
	Max. 1 Hz for inductive load
Other	
Dimensions in mm (LxWxH)	217.5 x 62.0 x 70.5
Mounting pitch	206.5 mm
Weight	Approx. 470 g

Tab. 10-5: Digital output module MC-DPY8

10.3.4 Digital output module MC-DPY16

Item	MC-DPY16
Connections	
Power supply	Screw terminal in plug-in unit 1.5 mm ² , cable lead through PG9
Data line	Screw terminal in plug-in unit, cable lead through PG9
Inputs	8 x 5-pin M12 connector
Power supply	
Nominal voltage $U_{I/O}$, U_{INT}	24 V DC
Voltage range	18 – 30 V DC
Undervoltage detection	18 V $\pm$ 5%
Input current (without outputs)	$\leq$ 80 mA
Input current outputs	Max. 10 A at ambient temperature 0 °C – 55 °C
	Max. 16 A at ambient temperature 0 °C – 40 °C
Wire size	Max. 1.5 mm ²
Polarity reversal protection for internal circuits supply	Yes
Polarity reversal protection for outputs	No
Outputs	
Number of outputs	16
Output voltage	$\leq U_{I/O} - 0.1$ V
Switching current per output	1 A, 100% ED
Switching current all outputs	Max. 10 A at ambient temperature 0 °C – 55 °C
	Max. 16 A at ambient temperature 0 °C – 40 °C
Short-circuit and overload protection	Thermal overload protection of output driver (one output driver switches four outputs)
Short-circuit current per output	Max. 2 A
Lamp load	???
Switched-off time on short-circuit	Approx. 100 μ s
Cutoff current for output signal 0	$\leq$ 10 μ A
Switching frequency	Max. 100 Hz for resistive load
	Max. 1 Hz for inductive load
Other	
Dimensions in mm (LxWxH)	217.5 x 62.0 x 70.5
Mounting pitch	206.5 mm
Weight	Approx. 470 g

Tab. 10-6: Digital output module MC-DPY16

10.3.5 Digital input/output module MC-DPX8Y4

Item	MC-DPX8Y4
Connections	
Power supply	Screw terminal in plug-in unit 1.5 mm ² , cable lead through PG9
Data line	Screw terminal in plug-in unit, cable lead through PG9
Inputs	4 x 5-pin M12 connector
Inputs	4 x 5-pin M12 connector
Power supply	
Nominal voltage $U_{I/O}$, U_{INT}	24 V DC
Voltage range	18 – 30 V DC
Undervoltage detection	18 V $\pm$ 5%
Input current (without inputs/outputs)	$\leq$ 80 mA
Power supply for sensors	Max. 100 mA per sensor
Short-circuit protection for sensors	PTC, $I_K \geq 1.6$ A
Input current outputs	Max. 8 A
Wire cross section	Max. 1.5 mm ²
Polarity reversal protection for inputs and internal circuits supply	Yes
Polarity reversal protection for outputs	By fuse 16 A and protective diode
Inputs	
Number of inputs	8
Input delay	Approx. 1 ms
Input characteristics curve	IEC 1131-2, type 2
Outputs	
Number of outputs	4
Output voltage	$\geq U_{I/O} - 0.1$ V
Switching current per output	2 A, 100% ED
Switching current all outputs	Max. 8 A
Short-circuit and overload protection	Electronic (output remains switched off)
Short-circuit current per output	Typ. 7 A
Lamp load	Max. 10 W
Switched-off time on short-circuit	Approx. 150 μ s
Cutoff current for output signal 0	$\leq$ 10 μ A
Switching frequency	Max. 100 Hz for resistive load
	Max. 1 Hz for inductive load
Other	
Dimensions in mm (LxWxH)	217.5 x 62.0 x 70.5
Mounting pitch	206.5 mm
Weight	Approx. 470 g

Tab. 10-7: Digital input/output module MC-DPX8Y4

10.3.6 Characteristic curve areas IEC 1131-2, type 2

The following figure defines the input characteristic curve areas according to IEC standard.

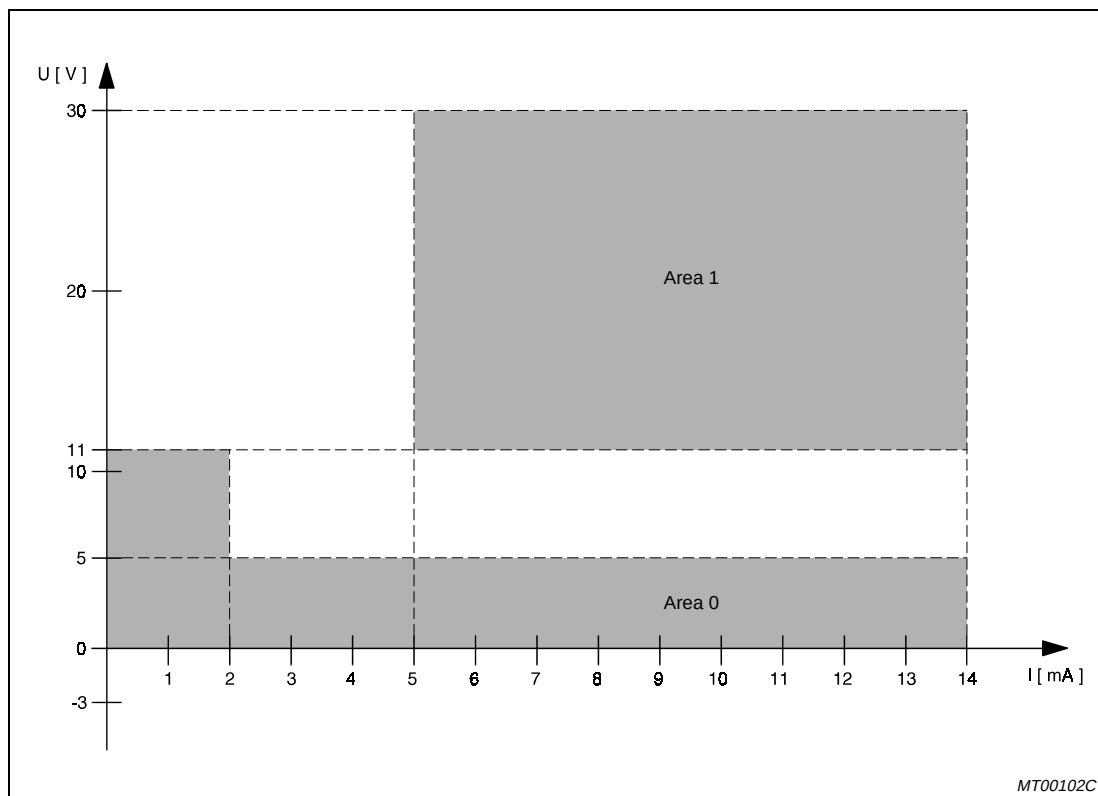


Fig. 10-1: Characteristic curve areas IEC 1131-2, type 2

A Appendix

A.1 Overview of the MC modules and accessories

Article	Item	Description
Digital input module	MC-DPX8	Digital input module with 8 inputs
	MC-DPX16	Digital input module with 16 inputs
Digital output module	MC-DPY8	Digital output module with 8 outputs
	MC-DPY16	Digital output module with 16 outputs
Digital input/output module	MC-DPX8Y4	Digital input/output module with 8 inputs and 4 outputs
Accessories	PG9 screw fitting	Polyamide black (2 pieces)
	PG9 screw fitting	Brass nickel plated (2 pieces)
	PG9 sealing cap	Polyamide black (2 pieces)
	M12 blind plugs	Black (4 pieces)
	PROFIBUS/DP data cable	Yard ware
	MELSOFT GX Configurator-DP	Configuration software

A.2 Dimensions

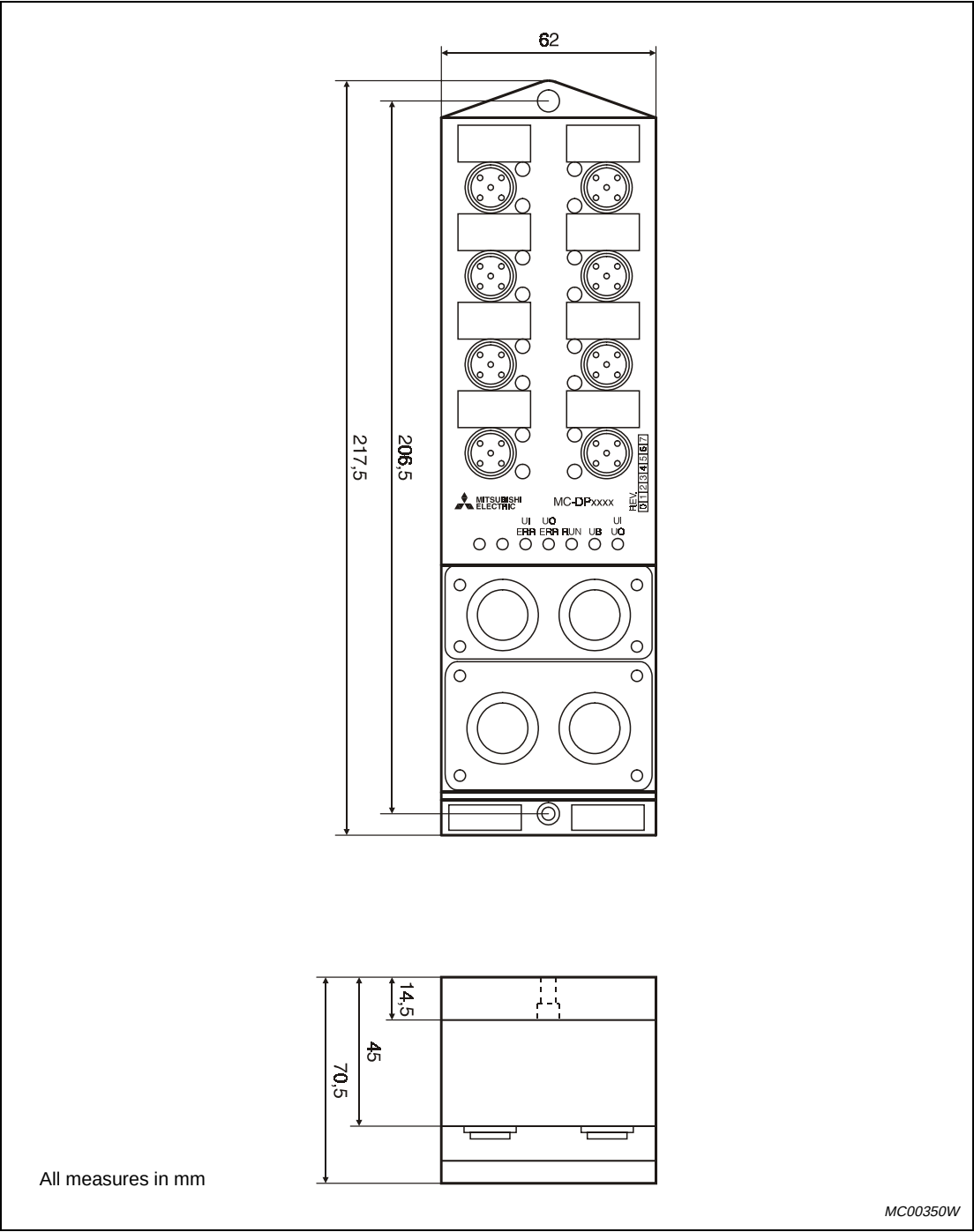


Fig. A-1: Dimensions of the MC modules

A.3 Index

A

A(1S)J71PB92D 1-1
 Accessories A-1
 Ambient conditions 5-1, 8-1

B

Buffer memory allocation. 3-3, 3-5

C

Cable preparation 5-4
 Cable types 3-2
 Channel diagnostics byte 9-3
 Characteristics curve areas 10-7
 Configuration 6-1
 Configuration bytes 3-7
 Connection 2-1
 Connection of sensors and actors 5-6

D

Data bytes 3-6
 Data transfers 3-3
 Diagnostics bytes 3-7
 Diagnostics frame 9-3
 Dimensions A-2

E

Enhanced operation mode 3-5

G

Grounding 5-3
 Group diagnostics byte 9-3
 GSD file 6-3

I

Inspection 8-1
 Installation 5-1

L

LEDs 9-2

M

Maintenance 8-1
 Master 1-1
 MC-DPX16 module 4-6
 MC-DPX8 module 4-2
 MC-DPX8Y4 module 4-18
 MC-DPY16 module 4-14
 MC-DPY8 module 4-10
 MELSOFT GX Configurator-DP 6-1, 6-2, 7-3
 Mounting 2-1

O

Operating items 4-2, 4-6, 4-10, 4-14, 4-18

P

Parameter bytes 3-7, 7-1
 Parameterizing matrix 7-5
 Pin assignment M12 connectors
 4-5, 4-9, 4-13, 4-17, 4-21
 Power supply 4-3, 4-7, 4-11, 4-15, 4-19, 5-2, 5-4
 Precaution 4-1
 PROFIBUS/DP 3-1
 PROFIBUS/DP connection
 4-4, 4-8, 4-12, 4-16, 4-20, 5-5
 PROFIBUS/DP protocol frame 3-6

S

Safety precautions 5-1
 Shielding 5-3
 Specifications 10-2
 Standard operation mode 3-3
 Station number 6-1
 System configuration 3-1

T

Troubleshooting 9-1

W

Wiring 5-2

HEADQUARTERS

MITSUBISHI ELECTRIC EUROPE B.V. **EUROPE**
German Branch
Gothaer Straße 8
D-40880 Ratingen
Phone: +49 (0) 21 02 / 486-0
Fax: +49 (0) 21 02 / 486-1 12
e mail: megfamail@meg.mee.com

MITSUBISHI ELECTRIC EUROPE B.V. **FRANCE**
French Branch
25, Boulevard des Bouvets
F-92741 Nanterre Cedex
Phone: +33 1 55 68 55 68
Fax: +33 1 49 01 07 25
e mail: factory.automation@fra.mee.com

MITSUBISHI ELECTRIC EUROPE B.V. **ITALY**
Italian Branch
Via Paracelso 12
I-20041 Agrate Brianza (MI)
Phone: +39 039 6053 1
Fax: +39 039 6053 312
e mail: factory.automation@it.mee.com

MITSUBISHI ELECTRIC EUROPE B.V. **SPAIN**
Spanish Branch
Carretera de Rubí 76-80
E-08190 Sant Cugat del Vallés
Phone: +34 9 3 / 565 3131
Fax: +34 9 3 / 589 2948
e mail: industrial@sp.mee.com

MITSUBISHI ELECTRIC EUROPE B.V. **UK**
UK Branch
Travellers Lane
GB-Hatfield Herts. AL10 8 XB
Phone: +44 (0) 1707 / 27 61 00
Fax: +44 (0) 1707 / 27 86 95

MITSUBISHI ELECTRIC CORPORATION **JAPAN**
Office Tower "Z" 14 F
8-12,1 chome, Harumi Chuo-Ku
Tokyo 104-6212
Phone: +81 3 / 622 160 60
Fax: +81 3 / 622 160 75

MITSUBISHI ELECTRIC AUTOMATION **USA**
500 Corporate Woods Parkway
Vernon Hills, IL 60061
Phone: +1 847 / 478 21 00
Fax: +1 847 / 478 22 83

EUROPEAN REPRESENTATIVES

GEVA GmbH **AUSTRIA**
Wiener Straße 89
A-2500 Baden
Phone: +43 (0) 2252 / 85 55 20
Fax: +43 (0) 2252 / 488 60
E mail: office@geva.co.at

Getronics b.v. **BELGIUM**
Control Systems
Pontbeeklaan 43
B-1731 Asse-Zellik
Phone: +32 (0) 2 / 4 67 17 51
Fax: +32 (0) 2 / 4 67 17 45
E mail: infoautomation@getronics.com

TELECON CO. **BULGARIA**
4, A. Ljapchev Blvd.
BG-1756 Sofia
Phone: +359 92 / 97 44 05 8
Fax: +359 92 / 97 44 06 1

INEA CR d.o.o. **CROATIA**
Drvinje 63
HR-10000 Zagreb
Phone: +385 (0)1/ 36 67 140
Fax: +385 (0)1/ 36 67 140

AutoCont **CZECHIA**
Control Systems s.r.o.
Nemocnicni 12
CZ-702 00 Ostrava 2
Phone: +420 (0) 69 / 615 21 11
Fax: +420 (0) 69 / 615 21 12
E mail: petr.pustovka@autocont.cz

louis poulsen **DENMARK**
Geminivej 32
DK-2670 Greve
Phone: +45 (0) 43 / 95 95 95
Fax: +45 (0) 43 / 95 95 91
E mail: lpia@lpmail.com

UTU Elektrotehnika AS **ESTONIA**
Pärnu mnt.160i
EE-11317 Tallinn
Phone: +372 6 / 51 72 80
Fax: +372 6 / 51 72 88
E mail: utu@utu.ee

Beijer Electronics OY **FINLAND**
Elannontie 5
FIN-01510 Vantaa
Phone: +358 (0) 9 / 615 20 11
Fax: +358 (0) 9 / 615 20 500
E mail: info@elc.beijer.fi

UTECO A.B.E.E. **GREECE**
5, Mavrogenous Str.
GR-18542 Piraeus
Phone: +30 10 / 42 10 050
Fax: +30 10 / 42 12 033
E mail: —

MITSUBISHI ELECTRIC EUROPE B.V. – Irish Branch **IRELAND**
Westgate Business Park
IRL-Dublin 24
Phone: +353 (0) 1 / 419 88 00
Fax: +353 (0) 1 / 419 88 90
E mail: sales.info@meuk.mee.com

POWEL SIA **LETLAND**
Lienes iela 28
LV-1009 Riga
Phone: +371 784 / 22 80
Fax: +371 784 / 22 81
E mail: utu@utu.lv

EUROPEAN REPRESENTATIVES

UTU POWEL UAB **LITHUANIA**
Savanoriu pr. 187
LT-2053 Vilnius
Phone: +370 23 22 980
Fax: +370 23 22 980
E-mail: utu@utu.lv

Getronics b.v. **NETHERLANDS**
Control Systems
Donauweg 2 B
NL-1043 AJ Amsterdam
Phone: +31 (0) 20 / 587 67 00
Fax: +31 (0) 20 / 587 68 39
E-mail: info.gia@getronics.com

Beijer Electronics AS **NORWAY**
Teglverksveien 1
N-3002 Drammen
Phone: +47 (0) 32 / 24 30 00
Fax: +47 (0) 32 / 84 85 77
E mail: info@elc.beijer.no

MPL Technology SP. z.o.o **POLAND**
ul. Sliczna 36
PL-31-444 Kraków
Phone: +48 (0) 12 / 632 28 85
Fax: +48 (0) 12 / 632 47 82
E-mail: krakow@mpl.pl

Sirius **ROMANIA**
Trading & Services srl
Bd. Lacul Tei nr. 1 B
RO-72301 Bucuresti 2
Phone: +40 (0) 1 / 201 7147
Fax: +40 (0) 1 / 201 7148
E-mail: sirius_t_s@fx.ro

ACP AUTOCOMP a.s. **SLOVAKIA**
Chalupkova 7
SK-81109 Bratislava
Phone: +421 7 52 92 22 54
Fax: +421 7 52 92 22 48
E mail: info@acp-autocomp.sk

INEA d.o.o. **SLOVENIA**
Ljubljanska 80
SI-1230 Domžale
Phone: +386 (0) 17 21 80 00
Fax: +386 (0) 17 24 16 72
E mail: inea@inea.si

Beijer Electronics AB **SWEDEN**
Box 426
S-20124 Malmö
Phone: +46 (0) 40 / 35 86 00
Fax: +46 (0) 40 / 93 23 02
E mail: info@beijer.se

ECONOTEC AG **SWITZERLAND**
Postfach 282
CH-8309 Nürensdorf
Phone: +41 (0) 1 / 838 48 11
Fax: +41 (0) 1 / 838 48 12
E mail: info@econotec.ch

GTS **TURKEY**
Darülaceze Cad. No. 43A KAT: 2
TR-80270 Okmeydani-Istanbul
Phone: +90 (0) 212 / 320 1640
Fax: +90 (0) 212 / 320 1649
E mail: gts@turk.net

MIDDLE EAST REPRESENTATIVE

TEXEL Electronics LTD. **ISRAEL**
Rehov Hamerkava 19
IL-42160 Netanya
Phone: +972 (0) 9 / 863 08 91
Fax: +972 (0) 9 / 885 24 30
e mail: texel_me@netvision.net.il

EURASIAN REPRESENTATIVES

AVTOMATIKA SEVER **RUSSIA**
Krapivnij Per. 5, Of. 402
RUS-194044 St Petersburg
Phone: +7 812 / 325 36 53
Fax: +7 812 11 83 239
E-mail: —

CONSYS **RUSSIA**
Promyshlennaya St. 42
RUS-198099 St Petersburg
Phone: +7 812 / 325 36 53
Fax: +7 812 / 325 36 53
E-mail: consys@consys.spb.ru

NPP Uralelektra **RUSSIA**
Sverdlova 11A
RUS-620027 Ekaterinburg
Phone: +7 34 32 / 53 27 45
Fax: +7 34 32 / 53 24 61
E-mail: elektra@etel.ru

STC Drive Technique **RUSSIA**
Poslannikov per., 9, str.1
RUS-107005 Moscow
Phone: +7 095 / 786 21 00
Fax: +7 095 / 786 21 01
E-mail: info@privod.ru

JV-CSC Automation **UKRAINE**
15, Marina Raskovoyi St.
U-02002 Kiev
Phone: +380 44 / 238 83 16
Fax: +380 44 / 238 83 17
E-mail: mkl@csc-a.kiev.ua

TEHNIKON **BELARUS**
Oktjabrskaya 16/5, Ap 704
BY-220030 Minsk
Phone: +375 (0)17/ 22 75 704
Fax: +375 (0)17/ 22 76 669
E-mail: tehnikon@belsonet.net

AFRICAN REPRESENTATIVE

Circuit Breaker Industries Ltd. **SOUTH AFRICA**
Private Bag 2016
ZAF-1600 Isando
Phone: +2711 928 2000
Fax: +2711 392 2354
e mail: cbi@cbi.co.za

