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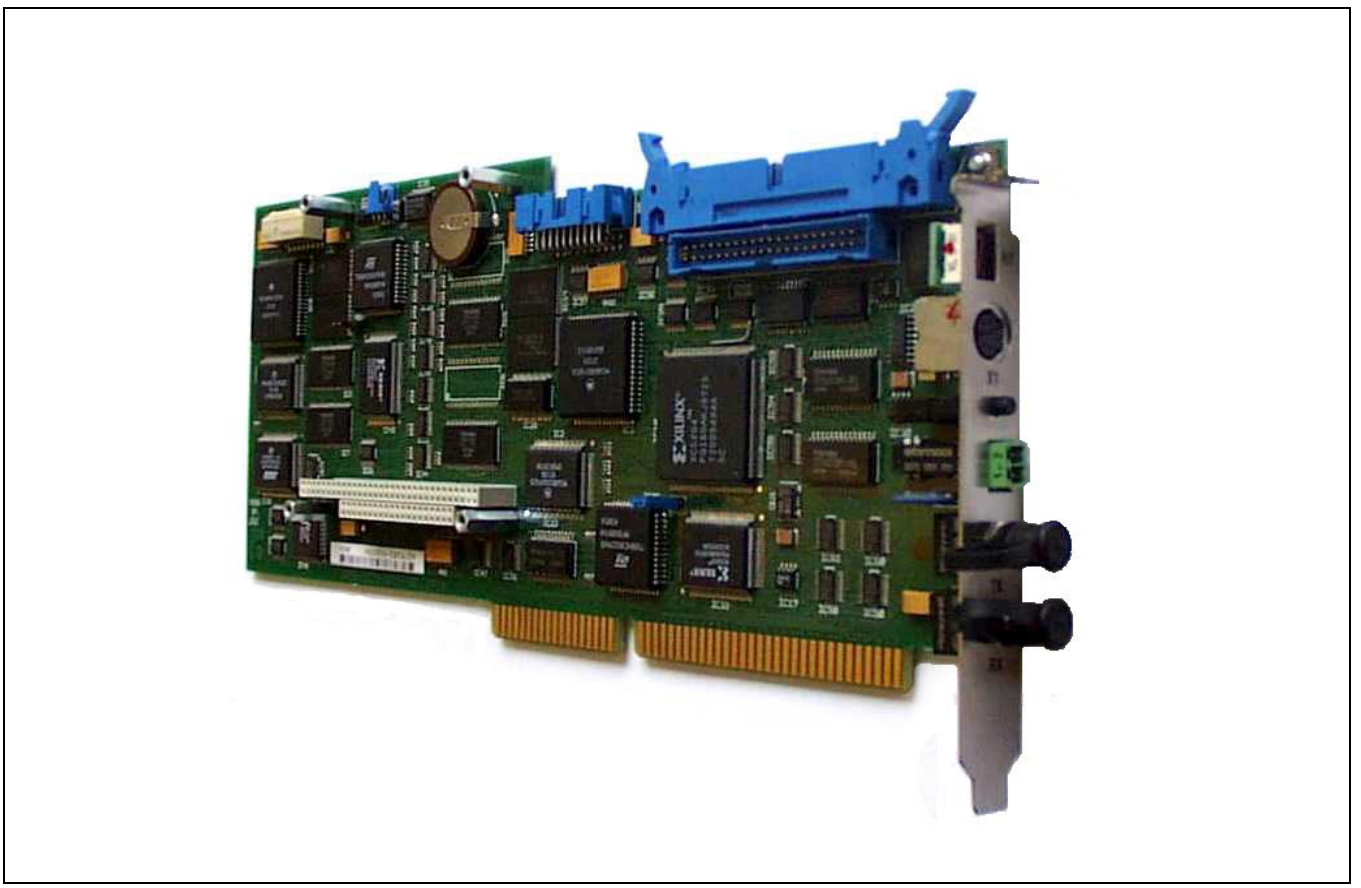

MTC200
CNC Module
MTC-P01.2

Configuration

DOK-MTC200-MTC-P01.2**-PRJ1-EN-P

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Indramat

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- describing and commissioning the MTC-P01.2 module

Configuration control

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Contents

1 System Presentation

1.1 Brief Description

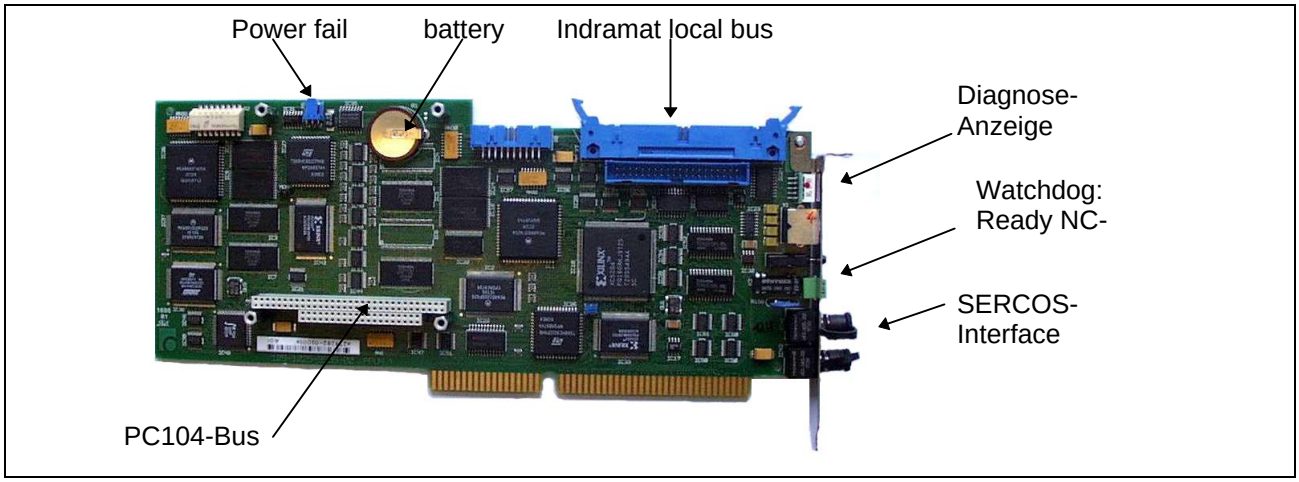

Fig. 1-1: MTC-P01.2 - module

The MTC-P01.2 is a powerful CNC controller in the ISA bus module format that can be installed in an industry PC. It is a component of the MTC200 product family.

The MTC-P01.2 consists of a base unit that contains the CNC processor system and an integrated axis processor to which a maximum of 8 drives can be connected via a SERCOS fiber optics interface.

Plugging additional (up to 3) axis modules into the unit permits a maximum of 32 drives (that may be distributed among 7 processes) to be controlled. Here too, communication with the drives is performed via the SERCOS fiber optics interface so that a total of four fiber optics loops is used for this purpose.

Together with the MTS-P01.1 SPS controller, this unit provides a compact and flexible solution of a classic machine tool controller.

A maximum of three CNC control systems (8 axes each) can be integrated into the BTV20 or BTV30 custom display terminal that is planned to be used for the MTC200 control system.

1.2 Versions

The MTC-P01.2 is available in two different versions:

- As MTC-P01.2 for the connection of 8 through 32 drives,
- or as MTC-P01.2 (export version) for the connection of 8 through 32 drives out of which a maximum of only four axes can interpolate with each other.

1.3 Communication

Drive communication

Communication with the drives takes place via the SERCOS interface using fiber optics. Up to 8 drives can be connected to a fiber optics loop.. The maximum configuration requires four fiber optics loops that are able to control up to 32 drives.

Computer communication

Communication with the industry PC is performed internally via the standard ISA bus. The power supply of the MTC-P01.2 module is also routed via this bus.

SPS communication

Communication with the SPS (MTS-P01.1 module) takes place via the Indramat local bus.

Both modules must be interconnected via a 50-way ribbon cable for this purpose.

1.4 Installation

The MTC-P01.2 module is installed in a free ISA slot. It must be fixed there so that it cannot work loose due to shock or vibration. With the BTV20/30, a bracket is used for this purpose to which the MTC-P01.2 is attached and which holds it.

Before the MTC-P01.2 module can be installed in the PC, commissioning requires some settings to be made that will be explained in the following chapters.

Note: Depending on the expansion by additional axis modules, the MTC-P01.2 module occupies **1-4** slots on the ISA bus.

1.5 Rechargeable Battery

User data may be lost if an MTC-P01.2 module is stored for more than 6 month without being used.

Affected data

- Machine parameters
- Machine data
- Tool data
- NC program packages
- NC cycle packages
- Zero offsets
- Variables, events, D corrections

Battery charging time

The battery is recharged when the MTC-P module is recommissioned. The following charging times are required for a **discharged** battery.

Charging time:	1 h	->	approximately 100 h backup time
fully charged:	50 h	->	ca. 5000h backup time

2 Dimensions

2.1 Side View

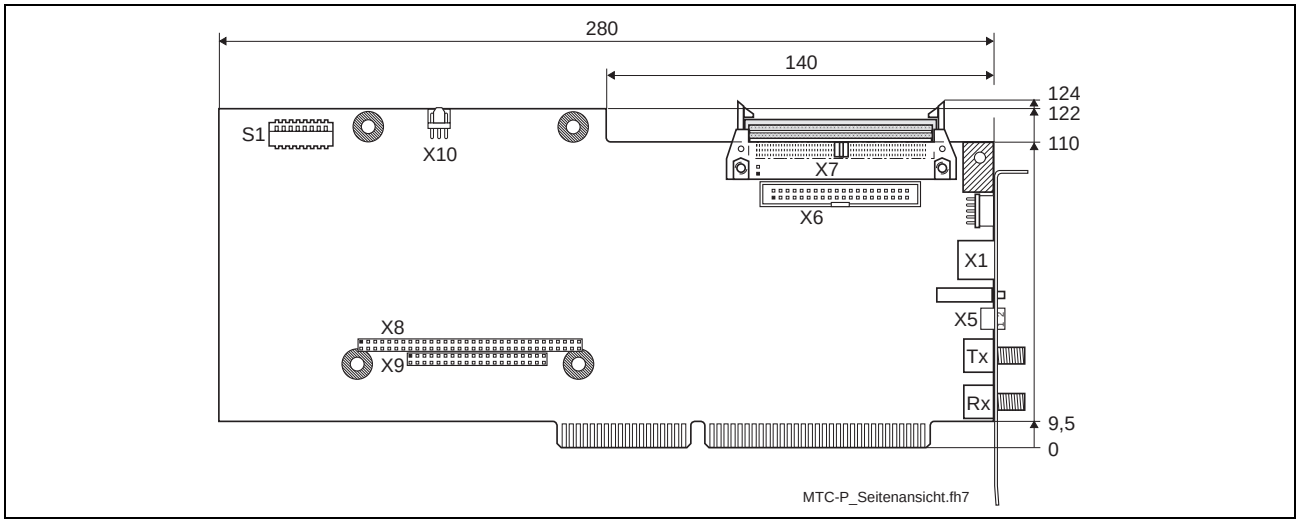

Fig. 2-2: MTC-P01.2 dimensions: Side view

2.2 Top View

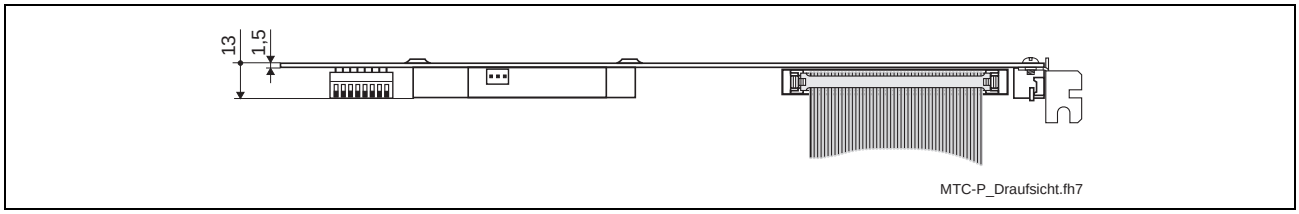

Fig. 2-3: MTC-P01.2 dimensions: Top view

2.3 Front View

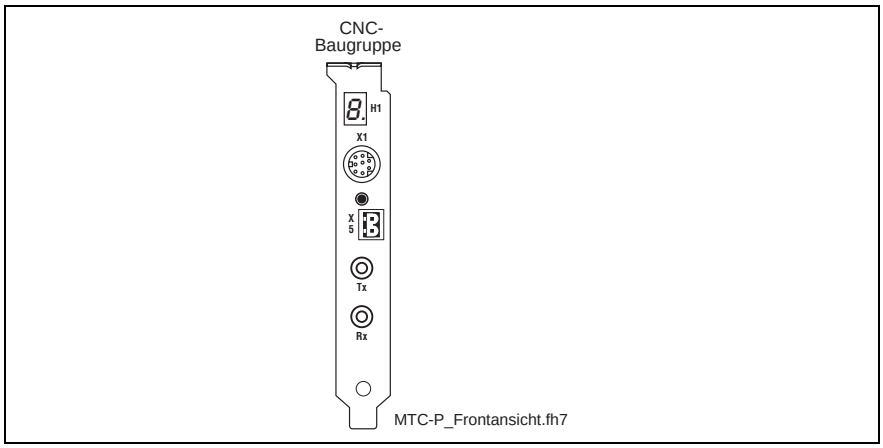

Fig. 2-4: MTC-P01.2 dimensions: Front view

2.4 Side View: Maximum Configuration

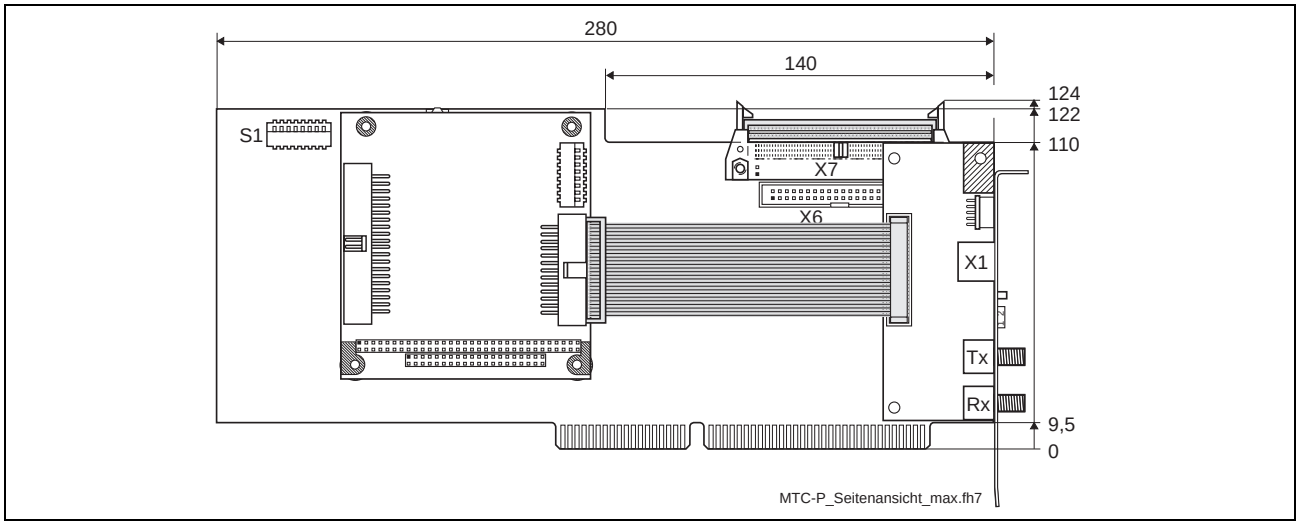

Fig. 2-5: Dimensions of MTC-P01.2 with axis processor modules: Side view

2.5 Top View: Maximum Configuration

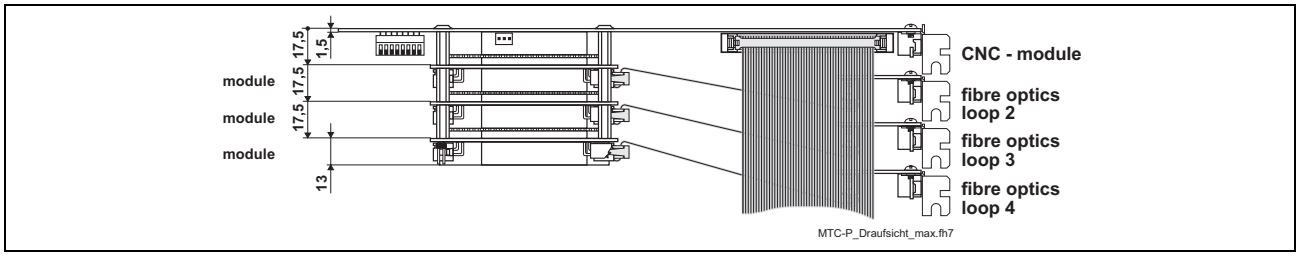

Fig. 2-6: Dimensions of MTC-P01.2 with axis processor modules: Top view

2.6 Front View: Maximum Configuration

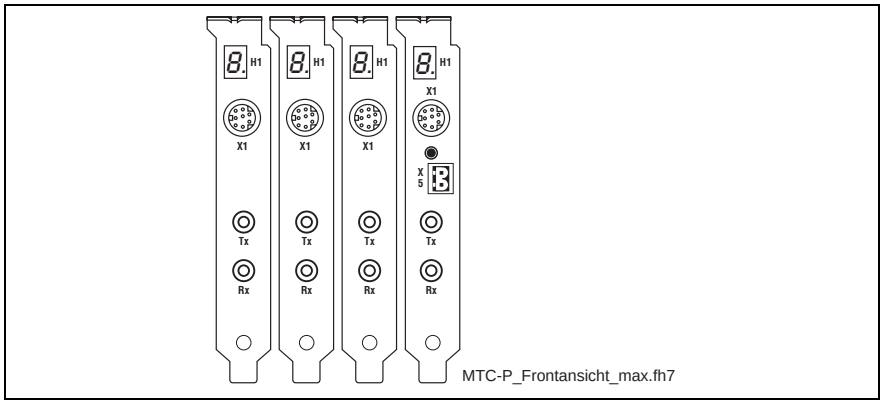

Fig. 2-7: Dimensions of MTC-P01.2 with axis processor modules: Front view

3 Addressing

3.1 General

The addresses must be set before the module is installed in the industry PC. This is done using the DIP switch that is shown in Fig. 3-8. The table shown in Fig. 3-9 must be employed to select a free address if additional MTC-P modules are used.

3.2 MTC-P01.2 Module

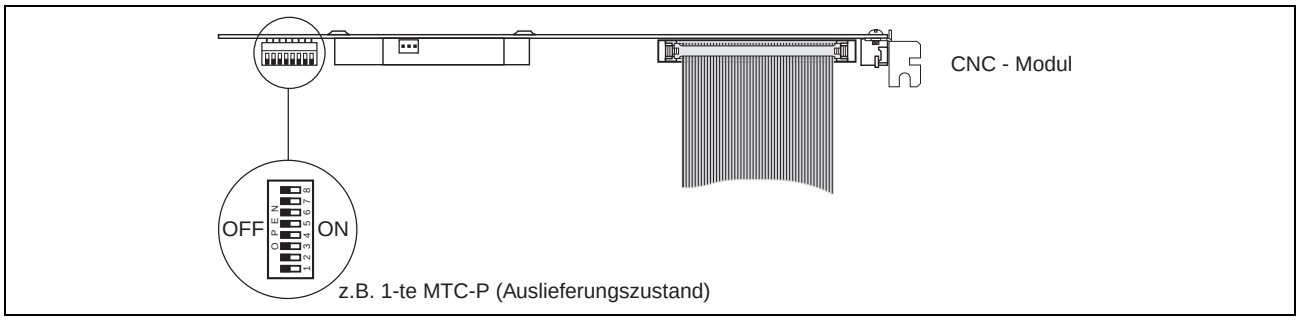

Fig. 3-8: Location of the DIP switch on the MTC-P01.2 module

DIP switch configuration table

MTC-P01.2	1	2	3	4	5	6	7	8	I/O address (hex)
1st (default)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	$31C
2nd (default)	**ON**	OFF	OFF	OFF	OFF	OFF	OFF	OFF	$318
3rd (default)	OFF	**ON**	OFF	OFF	OFF	OFF	OFF	OFF	$314
4th (default)	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	OFF	$310
	OFF	OFF	**ON**	OFF	OFF	OFF	OFF	OFF	$30C
	ON	OFF	**ON**	OFF	OFF	OFF	OFF	OFF	$308
	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	$304
	ON	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	$300
	OFF	OFF	OFF	**ON**	OFF	OFF	OFF	OFF	$21C
	ON	OFF	OFF	**ON**	OFF	OFF	OFF	OFF	$218
	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF	$214
	ON	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF	$210
	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF	$20C
	ON	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF	$208
	OFF	**ON**	**ON**	**ON**	OFF	OFF	OFF	OFF	$204
	ON	**ON**	**ON**	**ON**	OFF	OFF	OFF	OFF	$200

Fig. 3-9: DIP switch configuration of the MTC-P01.2 module

Note: DIP switch 8 (boot lock) must be in „OPEN“ (OFF) position. Otherwise the MTC-P01.2 is not operational.

Starting at the output I/O address, four consecutive bytes are occupied.

3.3 Axis Processor Modules

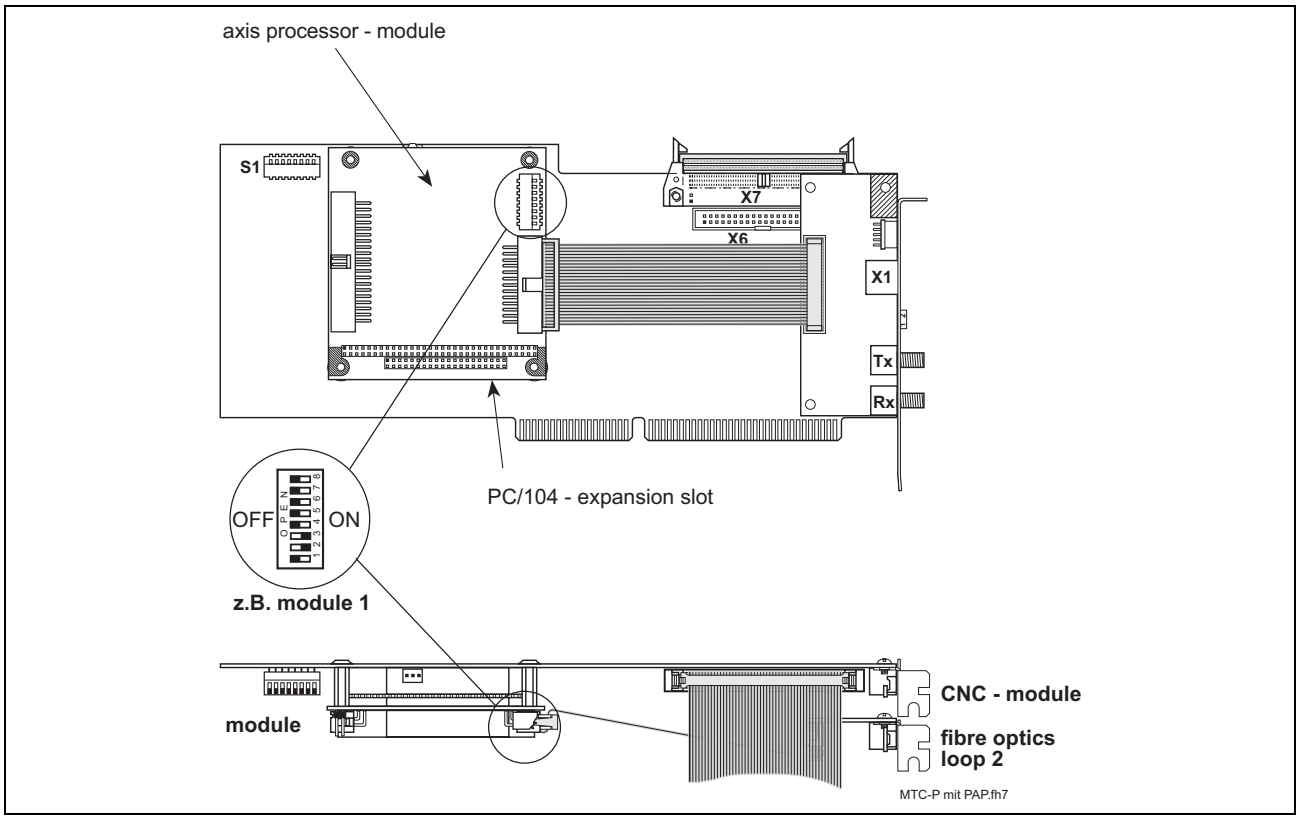

Fig. 3-10: Location of the DIP switch on the axis processor module

DIP switch configuration table

Axis processor	1	2	3	4	5	6	7	8
Module 1	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF
Module 2	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF
Module 3	OFF	**ON**	OFF	OFF	OFF	OFF	OFF	OFF

Fig. 3-11: DIP switch configuration of the axis processor module

4 Power Fail Function

4.1 General

The MTC-P01.2 module features a power fail connection. The processor of the MTC-P01.2 unit interprets this signal in order to be able to save relevant data for a restart in the event of a power failure.

Note: Check the power fail function with the existing power supply unit. Many power supply units merely feature a power good function.

4.2 Connection Diagram

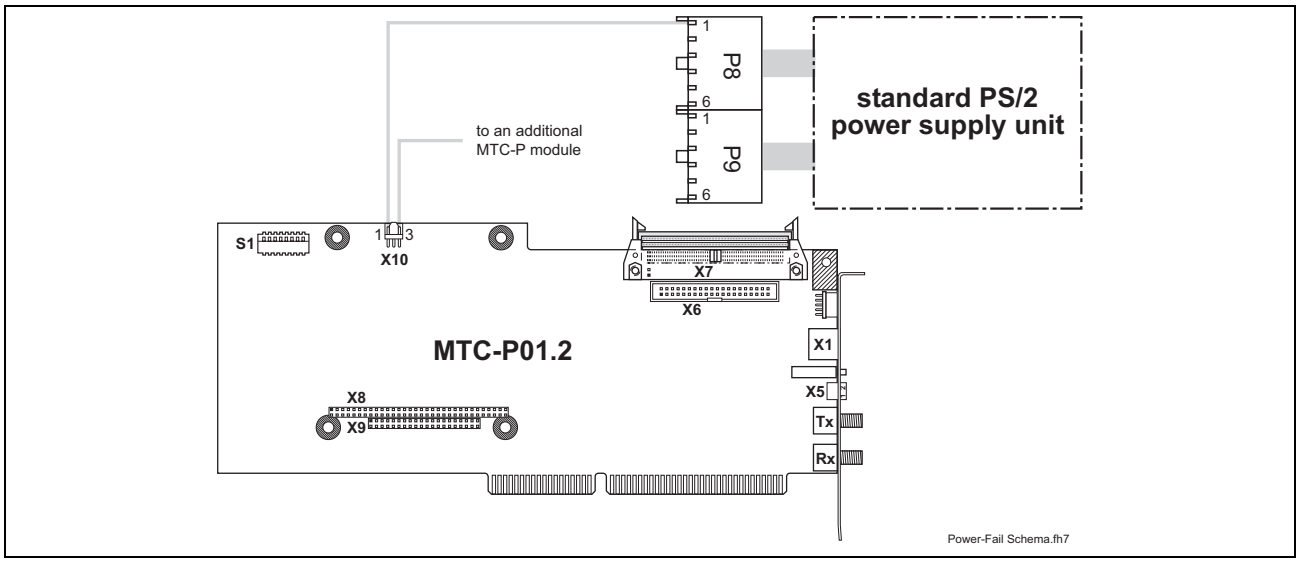

Fig. 4-12: Power fail connection diagram

4.3 Interconnecting Several MTC-P Modules

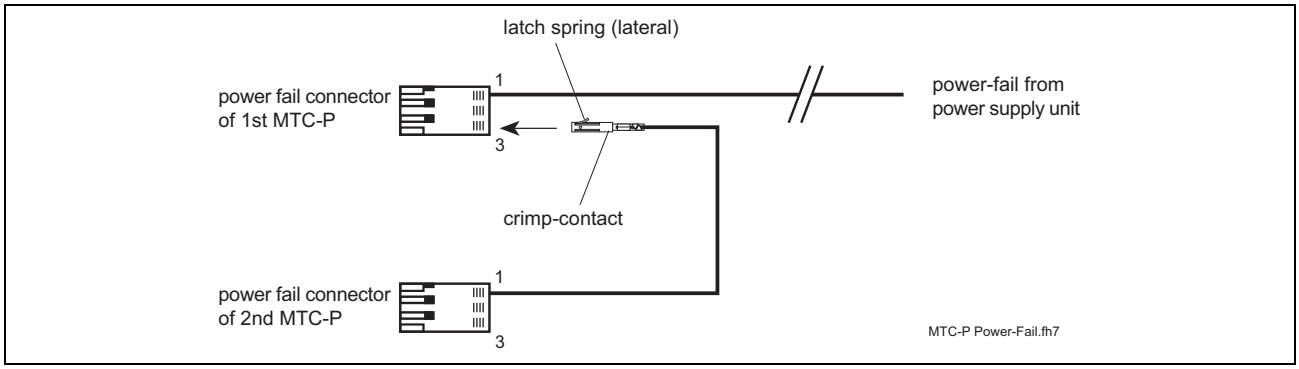

Fig. 4-13: Power fail connection to additional MTC-P units

4.4 Wiring Diagram

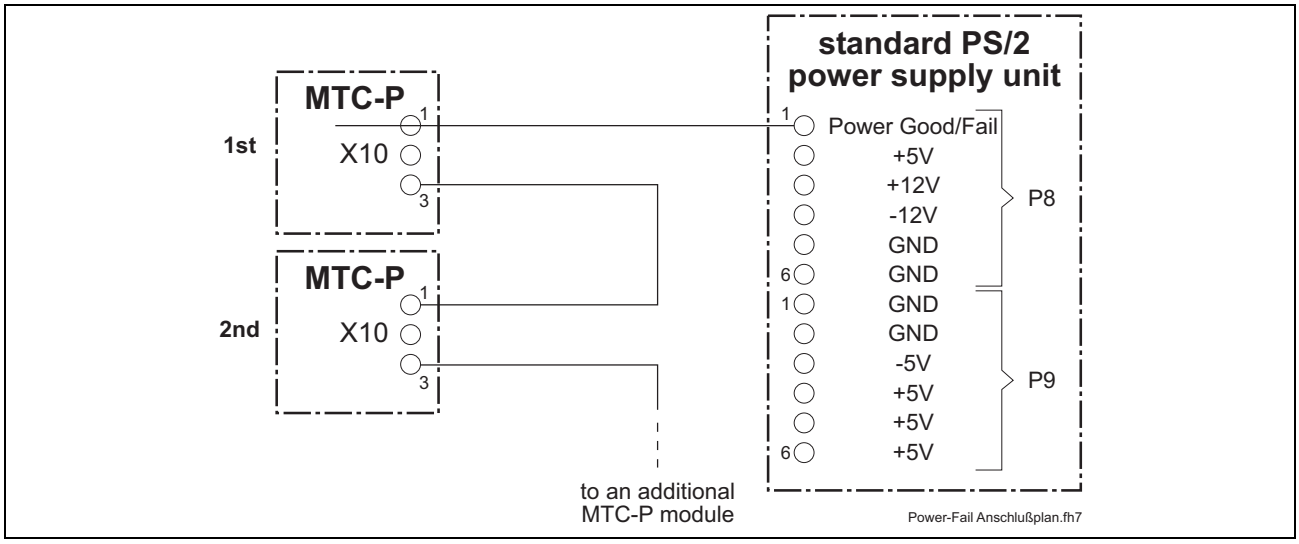

Fig. 4-14: Power fail connection diagram

4.5 Timing Diagram

The timing diagram specifies the time interval in which the power fail signal must become active in order to be able to securely save all data.

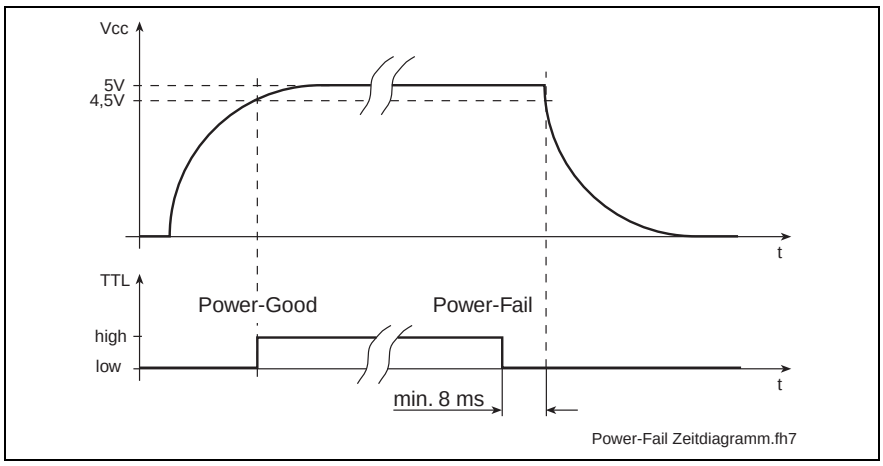

Fig. 4-15: Power fail timing diagram

5 Electrical Connections

5.1 Connector Locations

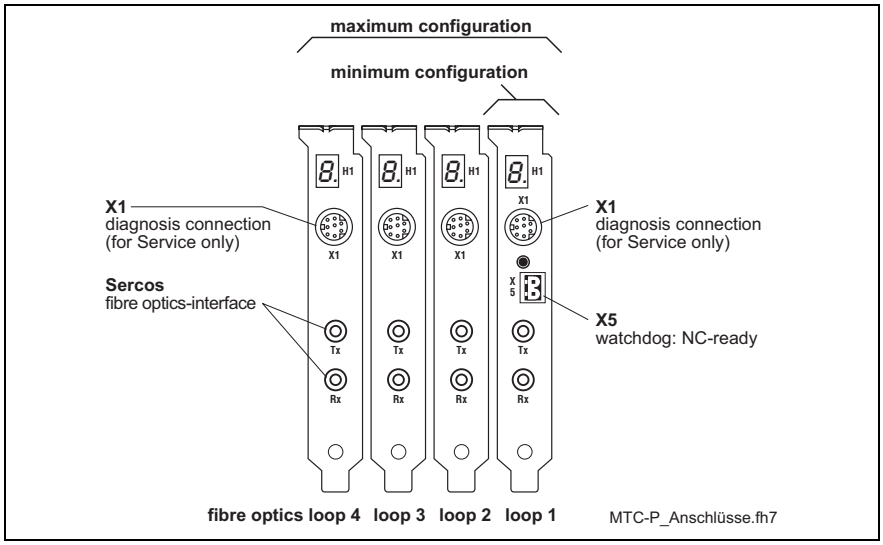

Fig. 5-16: Connector locations

Note: Connectors may only be removed or inserted after the power has been switched off.

5.2 X1 Connector

Diagnosis connection that is only to be used for service purposes.

5.3 X5 Connector

The 'NC Ready' contact (watchdog).

Interconnection within an emergency-off chain.

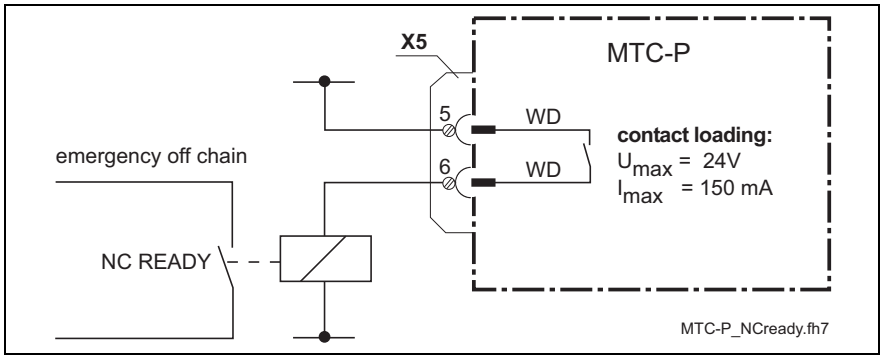

Fig. 5-17: Function of the 'NC Ready' contact

5.4 SERCOS Fiber Optics Loop

The MTC-P01.2 CNC controller permits drives to be used that are compatible with SERCOS interface. The connection between the controller (MTC-P01.2) and the digital drives (such as DIAX04) is established via fiber optics cables.

The employed topology is a loop structure according to SERCOS interface (IEC 1491). Up to 8 drives can be connected to a loop.

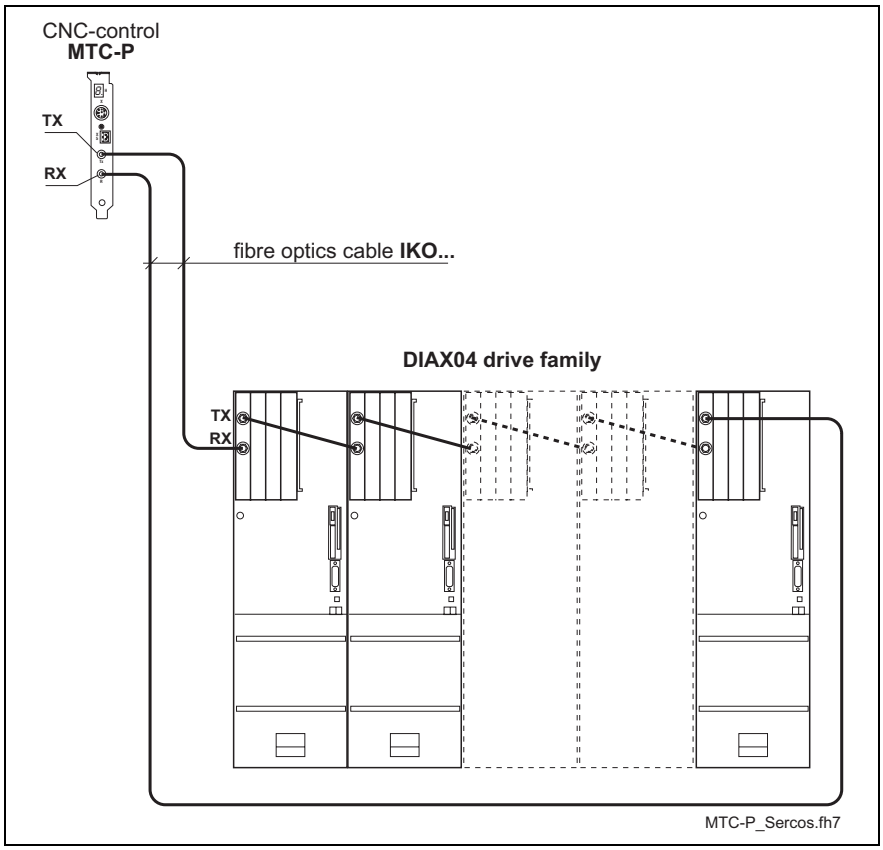

Fig. 5-18: SERCOS fiber optics loop

The loop begins and ends at the controller. The optical output of the controller (TX) is connected to the optical input of the first drive (RX). The output of the first drive is connected to the input of the next drive, etc.. The output of the last drive is connected with the controller input.

Drive address

Each drive has its unique drive address. This address can be selected independently of the position in the fiber optics loop. Rotary switches at the drive are used for setting the drive address.

6 SERCOS Interface

6.1 Specifications of the Fiber Optics Interface

TX Transmitter Interface TX

Name	Mnemonic	Unit	Value
max. transmission power at optical Low level	PSmaxL	dBm/µW	-28.2/1.5
min. transmission power at High level	PSminH	dBm/µW	-7.5/180
max. transmission power at optical High level	PSmaxH	dBm/µW	-3.5/450
Transmitter diode wavelength:			
Peak wavelength	λp	nm	640...675 nm (0°C...55°C)
spectral bandwidth	λp	nm	< 30 nm (25°C)

Fig. 6-19: Specifications of the fiber optics transmitter

RX Receiver Interface RX

Name	Mnemonic	Unit	Value
Max. input power for optical Low level	PEmaxL	dBm/µW	-31.2/0.75
Min. input power for optical High level	PEminH	dBm/µW	-20/10
Max. input power for optical High level	PEmaxH	dBm/µW	-5/320
Max. attenuation of the transmission link	PSminH...PEminH	dB	12.5

Fig. 6-20: Specifications of the fiber optics receiver

6.2 Fiber Optics Cables

Configuration Notes

When fiber optics cables are configured it must be ensured that the maximum length of the transmission link must not be exceeded. Joints reduce the maximum length of the fiber optics links. Between transmitter and receiver, either only plastic fiber (IKO 982 or IKO 985) or only glass fiber (IKO0002) cables may be used. Changing from plastic to glass fiber or vice versa is not permitted at joints.

Handling the Fiber Optics Cables

'Storage When fiber optics cables are stored it must be ensured that the protective caps are screwed on and that the mechanical and thermal limit values are not exceed.

Laying and pulling When you lay or pull in fiber optics cables you must ensure that the installation stress will not damage the cables. This is particular important with respect to the maximum tensile force, the minimum bending radius and the maximum lateral pressure resistance.

Do not lay the fiber optics cables across sharp edges or on rough and uneven surfaces. Avoid twisting the fiber optics cable during installation. In its final position, the cable must always be free of stress.

Never pull at the connector when you pull in a glass fiber optics cable (IKO0002). With plastic fiber optics cables (IKO 982 and IKO 985) you can thread a pull rope through the lateral hole in the protective cap. The maximum tensile force of 100 N must not be exceeded.

Furthermore, you must comply with the requirements of DIN VDE 0899, part 4.

Transmitters and receivers

The transmitter and receiver connectors at the units must be closed with a protective cap when the fiber optics cables are not connected.

Connection

Never exceed the maximum tightening torque of **0,8 N** when you connect a fiber optics cable to a transmitter or receiver connector.

Note: Use a torque wrench (see accessories)

Fiber Optics Cable Types

While plastic fiber optics cables can be used for distances up to 40 m, glass fiber optics cables are suitable for distances up to 500 m.

There are three different types of fiber optics cables available.

Plastic fiber optics cable 2.2 mm

Plastic fiber optics cables of 2.2 mm diameter for the installation in a switchgear cabinet.

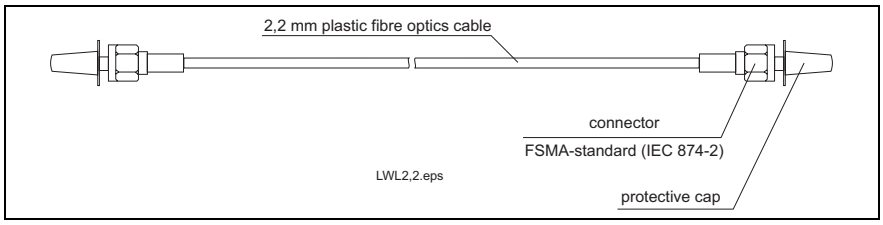

Fig. 6-21: 2.2 mm plastic fiber optics cable (IKO 982)

Plastic fiber optics cable 6 mm

Plastic fiber optics cable with reinforced sheath and a diameter of 6 mm for applications inside and outside of switchgear cabinets.

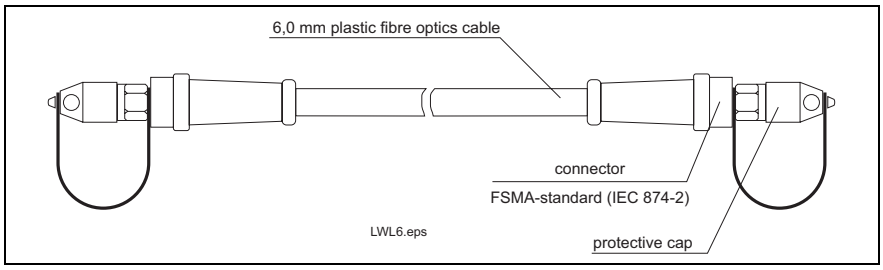

Fig. 6-22: 6 mm plastic fiber optics cable (IKO 985)

Glass fiber optics cable 3 mm

Glass fiber optics cable with reinforced sheath and a diameter of 3 mm for applications inside and outside of switchgear cabinets, and over long transmission distances.

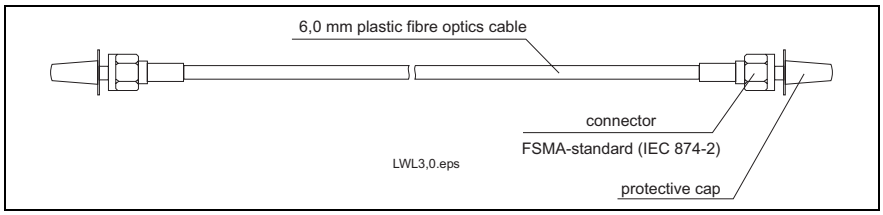

Fig. 6-23: 3 mm glass fiber optics cable (IKO0002)

Ordering information

Cable designation	Order number
2.2 mm plastic fiber optics cable	IKO 982/xx
6 mm plastic fiber optics cable	IKO 985/xx
3 mm glass fiber optics cable	IKO0002/xx

Fig. 6-24: Fiber optics cables (xx: length in meters)

Accessories

The following accessories are available:

Cabinet grommet

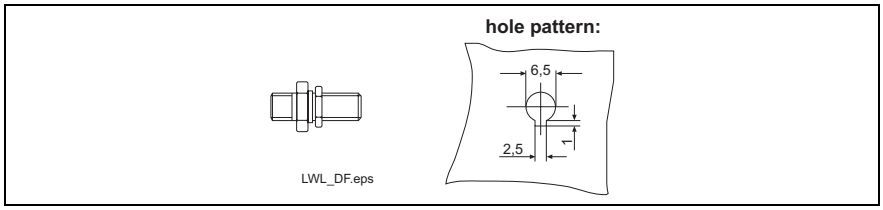

Fig. 6-25: Cabinet grommet

Socket wrench

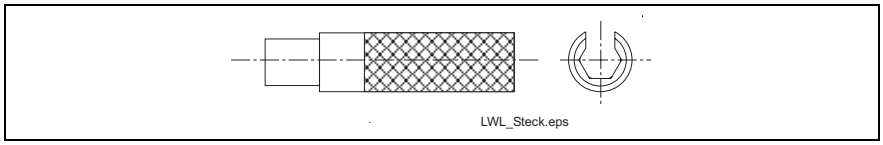

Fig. 6-26: Socket wrench for FSMA connectors

Torque wrench

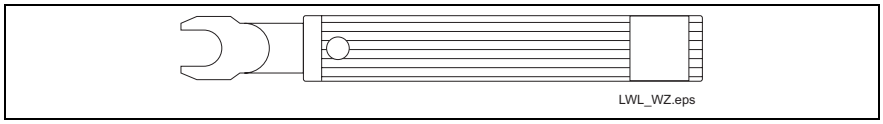

Fig. 6-27: Torque wrench for FSMA connectors

Designation	Order number
Fiber optics cable cabinet grommet	STECK-LWL DF
Socket wrench for FSMA connectors	WERKZEUG-STECKSCHLUESSEL LWL-FSMA
Torque wrench	WERKZEUG-DREHMOMENTSCHLUESSEL 74Z 0,8NM

Fig. 6-28: Accessories

Specifications of the fiber optics cables

	IKO 982	IKO 985	IKO0002
Outside sheath	Polyamide (PA)	Polyurethane (PUR)	Polyurethane (PUR)
Outside diameter	2.2 mm +/- 0.07 mm	6.0 mm +/- 0.2 mm	3.0 mm +/- 0.x mm
Bend radius	> 50 mm	> 80 mm	> 100 mm
Bend radius of pulled cables	---	> 100 mm	---
Tensile strength transient	150 N	150 N	330 N
Tensile strength, permanent	100 N	100 N	245 N
Lateral pressure resistance	450 N/cm	100 N/cm	1000 N/cm
Alternating bending stress	> 8000 cycles at +/-90°	> 100000 cycles +/-90°	> 10000 cycles +/- 90°
Temperature range Storage Operation	-40 °C...+85 °C - 20 °C...+70°C	-20 °C...+70 °C 0 °C...+70°C	-40 °C...+85 °C -40 °C...+85°C
Core diameter of optical fiber	1000 µm	1000 µm	400 µm
Specific optical attenuation	< 250 dB/km	< 250 dB/km	
Attenuation per connection	1.5 dB	1.5 dB	1.0 dB
Maximum cable length	40 m	40 m	500 m
Length reduction per additional connection	7.0 m	7.0 m	125 m

Fig. 6-29: Specifications of the fiber optics cables

6.3 General Safety Instructions

CAUTION

High-energy laser light

Blindness, eye injuries

⇒ Do not look into the light beam (transmitter output and/or end of the fiber optics cable)

VORSICHT

Improper handling or installation

The fiber optics components can be mechanically damaged.

⇒ Do not let fiber optics cables kink

⇒ Do not exceed the maximum torque when you tighten the fiber optics connectors.

7 Diagnosis

7.1 Arrangement of the Diagnosis Displays

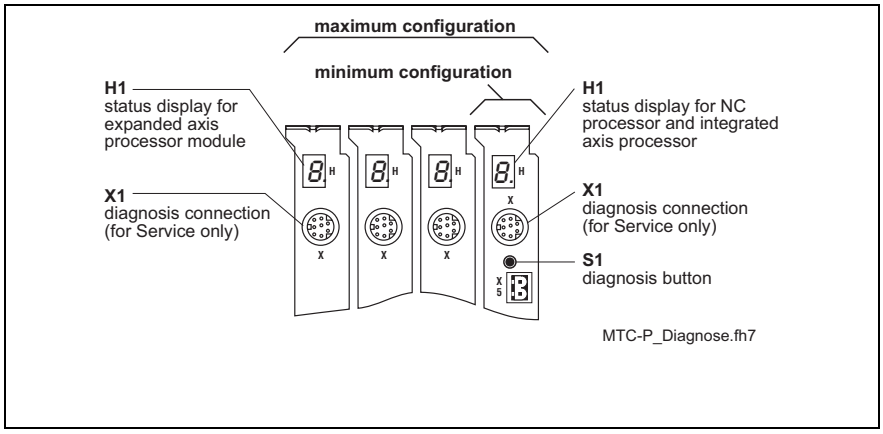

Fig. 7-30: Diagnosis displays

7.2 „H1" Diagnosis Display

The MTC-P01.2 controller is equipped with a diagnosis system that permits diagnoses of all operating states and malfunctions to be made.

Note: The H1 diagnosis display (a single-digit 7-segment display) is located on the controller's front panel.

7.3 „S1" Diagnosis Button“

The MTC-P01.2 controller is equipped with a diagnosis button. As long as this diagnosis button is pressed, the diagnosis of the integrated axis processor is activated instead of the CNC processor diagnosis.

Note: Any additionally installed axis processor modules are diagnosed by their own error and status displays (H1).

7.4 Meaning of the Status Display

Status codes

The diagnosis display shows the state of the controller.

The following states are displayed as a **single-digit** code. These codes are valid for the CNC module and for the integrated axis processor module.

Code	Meaning/brief description
b	Operational
0.	Power-on state (reset test)
F.	Firmware in Flash EPROM invalid
J.	Boot lock for firmware active

Fig. 7-31: Status codes

Note: Any other letter with a dot indicates an internal fault. Notify Indramat Service in this case.

Error codes

A **three-digit** decimal number that flashes in succession is used for diagnosing error states. The shown error codes correspond to the system error messages of the graphical user interface (GUI).

Code	Meaning/brief description
007	Software version error
008	Selftest failed
017	Invalid data memory in the CNC
019	CNC battery is low
023	Incomplete CNC parameter set
024	Invalid data memory in the CNC
028	Invalid parameter revision
029	Data memory is full
030	The controller supports a maximum of four axes
033	Error in the axis processor module initialization
034	Axis processor module - watchdog function
035	The axis processor cannot be addressed
036	Axis processor in slot ? is missing
049	Error during SPS initialization
050	The SPS processor cannot be addressed
051	SPS watchdog function
052	Invalid SPS program
055	Maximum SPS cycle time exceeded
071	SPS battery voltage is low
081	Time-out 2 ms implementation
082	Interbus malfunction
083	Interbus memory overflow
084	Interbus configuration error
085	Interbus bus error
086	Interbus hardware / firmware error
087	Interbus I/O bus module error
088	Interbus not yet ready
089	Interbus general generation 4 error

Fig. 7-32: Error codes

8 Type Code

8.1 MTC-P01.2

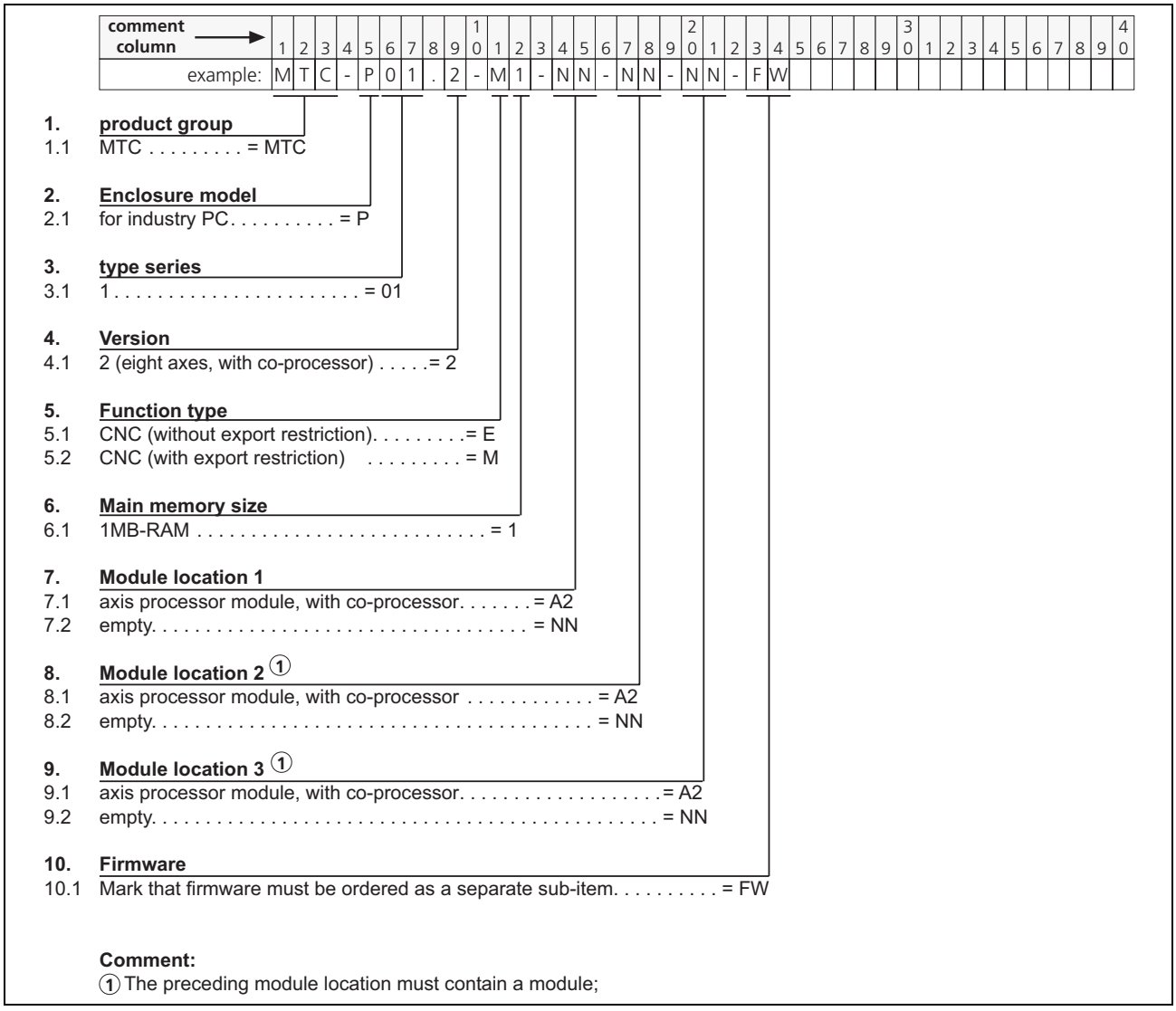

Fig. 8-33: Type code

9 Figures

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Sales & Service Facilities

Germany

Vertriebsgebiet Mitte Germany Centre ☒ V/S ☒ Service	Vertriebsgebiet Ost Germany East ☒ V/S ☒ Service	Vertriebsgebiet West Germany West ☒ V/S ☒ Service	Vertriebsgebiet Nord Germany North ☒ V/S ☐ Service
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