

SPS Module MTS-P01.2 and MTS-P02.2

Project Planning Manual

SYSTEM200

- Title** SPS Module MTS-P01.2 and MTS-P02.2
- Type of Documentation** Project Planning Manual
- Document Typecode** DOK-CONTRL-MTS-P0*.2**-PR01-EN-P
- Internal File Reference**
 - DOKU/28604201
 - Drawing number: 120-0400-B321-01
- Purpose of Documentation** This documentation describes ...
 - the configuration, installing, commisioning of the SPS-Module MTS-P01.2 and MT-P02.2

Record of Revisions

Description	Release Date	Notes
DOK-CONTRL-MTS-P0*.2**-PR01-EN-P	03/2000	First edition

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Published by Rexroth Indramat GmbH
 Bgm.-Dr.-Nebel-Str. 2 • D-97816 Lohr a. Main
 Telephone 09352/40-0 • Tx 689421 • Fax 09352/40-4885
<http://www.rexroth.com/indramat>
 Dept. ECS1 (RW)

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1 INDRAMAT SPCs MTS-P01.2 and MTS-P02.2

1.1 Brief Description

The MTS-P01.2 and MTS-P02.2 SPC assemblies are efficient SPC controls in ISA-bus plug-in card format, intended for being fitted in a BTV20/30 or in a commercially available industrial PC. The MTS-P02.2 is equipped with a hardware which, contrary to the MTS-P01.2, shows a performance increased by a factor of 2 to 2.5 (depending on the program structure).

An MTS-P consists of a basic unit with ISA-BUS (the actual SPC) and an active PC/104 interface as well as various PC/104 plug-on modules, such as field bus connections, serial interfaces, and I/O modules. The serial COM user interface (RS232), which is operated via the SPC user program, is provided for connection of a printer, a read-write memory, or an operating and visualization device, e.g. INDRAMAT BTV04/05. Multimode operation of the interface (RS232/RS422/RS485) is configured using an SPC function block.

In addition, the MTS-P01.2 and the MTS-P02.2 are provided with a BT (**B**edien**T**erminal = operator terminal) bus, which can be used to operate up to 4 operator terminals (BTM15/16, BTA20, etc.). This can be achieved using cable lengths of up to 50 m (between the interbus connection and the last user).

The MTS-P0*.2 is provided with 16 TTL inputs and 16 TTL outputs. These can, for instance, be used to directly connect the machine function keys and key switches of the BTV20.

The MTS-P assembly can be operated as a standalone SPC or, in connection with an MTC-P, as a slave SPC. The firmware of the SPC, which is stored in a Flash EPROM, serves to distinguish between master and slave operation.

Communication with decentralized I/O units or operating units is established by means of field-bus connections (which can be plugged on as an option) and/or serial interfaces. These optional connections and interfaces are designed as PC/104 modules. At present, the following connections and interfaces are available:

- INTERBUS master connection
- PROFIBUS master connection
- PROFIBUS slave connection
- Serial interfaces (2 x RS232 and 2 x RS422/485)

Up to 4 PC/104 modules can be operated on an MTS-P01.2 or MTS-P02.2.

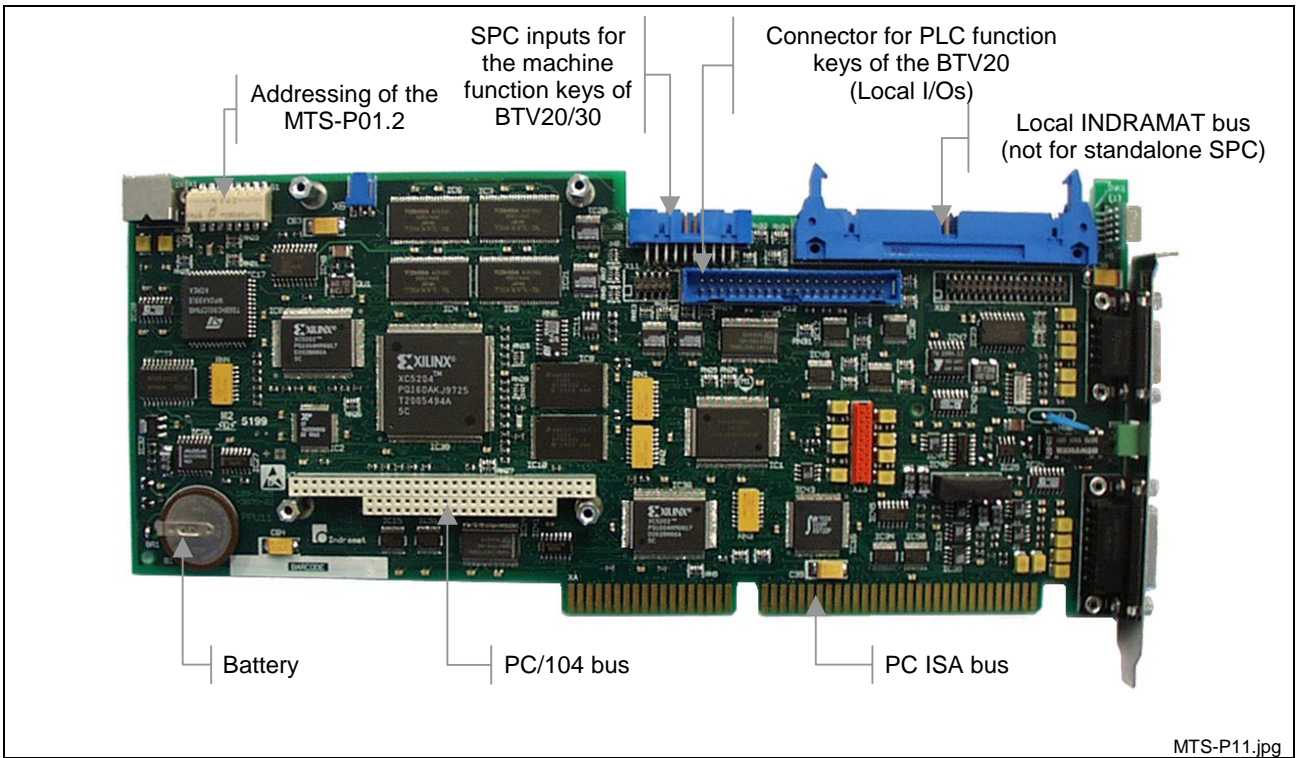


Fig. 1-1: MTS-P01.2

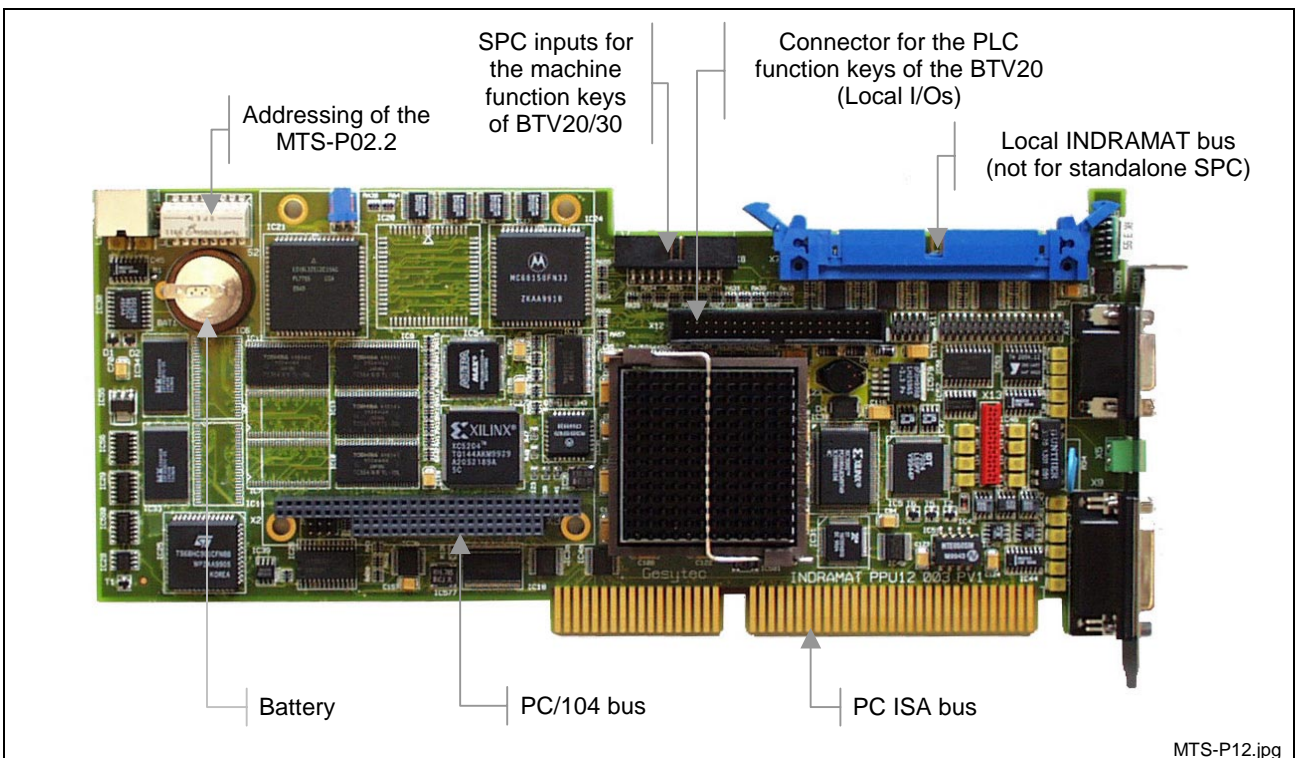


Fig. 1-2: MTS-P02.2

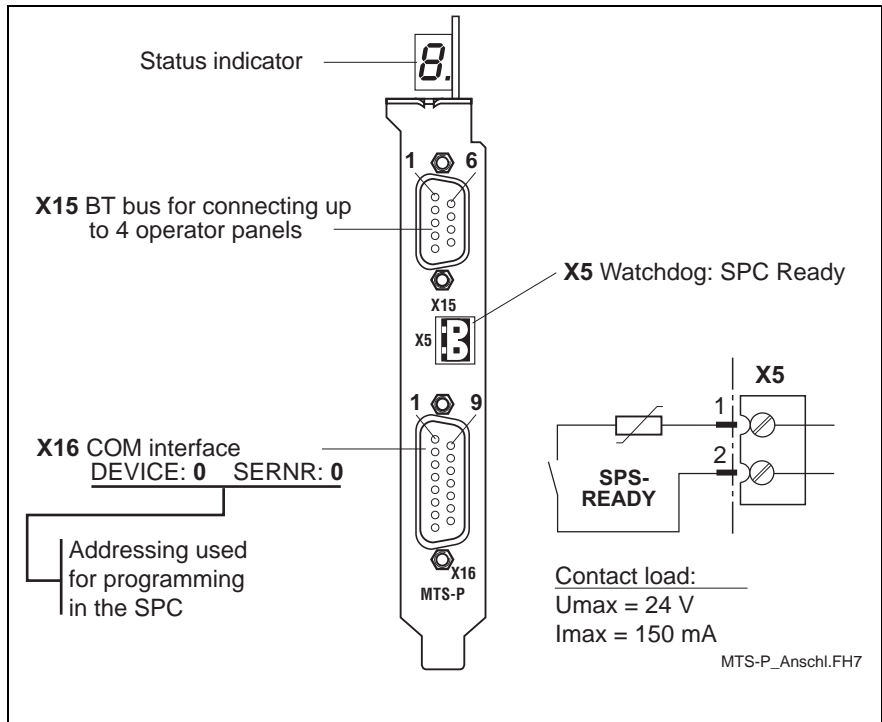


Fig. 1-3: Front view of MTS-P01.2 and MTS-P02.2

2 Important Instructions on Use

2.1 Intended Use

Introductions

The products by Rexroth Indramat are developed and manufactured according to the latest state of technology. Before they are delivered, all of these products are checked for operational reliability.

The products may be used only as intended. Any use of the products other than that intended may result in situations causing damage to property or personal injury.

Note: Rexroth Indramat, as the manufacturer of the products, will not assume any warranty, liability or payment of damages in case of damage resulting from a non-intended use of the products. If he fails to use the products as intended, the user will be solely responsible for any resulting risks.

Before using the products by Rexroth Indramat, the following requirements must be met to ensure that the products are used as intended:

- Any person handling one of our products in any manner must read and understand the corresponding safety regulations and the intended use.
- If the products concerned are hardware products, they must be left in their original state, i.e. they may not be modified in their structure. Software products may not be decompiled; their source codes may not be altered.
- Damaged or defective products may not be installed or put into operation.
- It must be ensured that the products are installed according to the regulations specified in this documentation.

Fields of Use and Application

The MTS-P01.2 and the MTS-P02.2 by Rexroth Indramat are intended to be installed in an industrial PC, preferably a BTV20/30 by Rexroth Indramat, with ISA bus. The MTS-P, which is designed as a “plug-in SPC”, is intended for the following fields of application.

- Standalone SPC
- Matching control for the MTC200
- Matching control for the MTA200

Note: The MTS-P may only be used with the accessories and attached parts specified in this documentation. Components which are not explicitly mentioned may neither be attached nor connected. The same applies to cables and lines.

The unit may be operated only with the explicitly specified component configurations and combinations and only with the software and firmware specified in the appropriate functional description.

Before being put into operation, each MTS-P must be programmed such that the SPC executes the application-specific functions.

The MTS-P01.2 and the MTS-P02.2 have been developed for use in industrial PCs, such as the BTV20/30.

Configurations with various field busses and serial interfaces are available for the application-specific use of the MTS-P.

Typical fields of application of the MTS-P01.2 and the MTS-P02.2 are as follows:

- Handling and mounting systems
- Packaging and food machines
- Printing and paper processing machines
- Machine tools

The MTS-P may only be operated under the mounting and installation conditions specified in this documentation, in the position of use described, and under the ambient conditions specified (temperature, protection category, humidity, EMC, and the like).

2.2 Non-Intended Use

“Non-intended use” is interpreted as the use of the MTS-P01.2 and the MTS-P02.2 outside of the fields of application specified or under operating conditions and technical data other than those described and specified in this documentation.

The MTS-P may not be used if

- it is subjected to operating conditions which fail to meet the ambient conditions specified, e.g. operation under water, under extreme temperature variations or under extreme maximum temperatures is forbidden.
- the applications intended have not explicitly approved by Rexroth Indramat. Please be sure to observe the statements in the general safety instructions!

3 Technical Data

3.1 General Notes

Humidity:	75 %, non-condensing (operation) 95 %, non-condensing (transport) DIN 40 040 Class F
Air pressure:	from 860 to 1080 hPa, 1500 m (operation) from 660 to 1080 hPa, 3500 m (transport)
Ambient temperature during operation:	from 0 to 50 °C, DIN 40 040 Class KV
Storage temperature:	from -20 °C to +70 °C
Dimensions (W x H x D)	22 mm x 145 mm x 295 mm
Weight:	approx. 0.3 kg

3.2 Supply Voltage

Nominal value:	+5 V	+12 V	-12 V
Permissible ripple content:	50 mV	120 mV	120 mV
Permissible voltage range:	+4.875	+11.4 V+12.6 V	-12.6 V.....-11.4 V
Max. power consumption (+5V): (MTS-P01.2) (MTS-P02.2)	0.6 A (+ supply voltage for PC/104 modules of up to max. 2.5 A) 1.8 A (+ supply voltage for PC/104 modules of up to max. 2.5 A)		

3.3 EMC

RFI emissions according to EN 55022	Class A (industrial environment)	Data only in connection with BTV20/30
Immunity according to IEC 1000-4-2 (ESD)	Assessment criterion B	
Immunity according to IEC 1000-4-4 (burst)	Assessment criterion B	

3.4 Interfaces

General serial interface (COM)	RS232/RS422/RS485 (D-SUB, 15 pins, female connector)
BT bus	Indramat BT bus (D-SUB, 9 pins, female connector)
Optional interfaces	INTERBUS (D-SUB, 9 pins, female connector) PROFIBUS-DP (D-SUB, 9 pins, female connector) 2 x RS232 and 2 x RS422/485 (D-SUB, 9 pins, male connector)

4 Communication

Communication with the Computer

With the computer (CPU), data is exchanged via the standard ISA bus of the industrial PC, which is also used to deliver the voltage supply for the MTS-P0*.2 assembly.

Communication with the NC Control

An MTS-P0*.2 exchanges data with the NC assembly belonging to the system (MTC-P01.2) via the Rexroth INDRAMAT local bus. The local bus is realized via a ribbon cable (50 pins) of the NC control.

The MTS-P0*.2 exchanges data with the NC CPU of the MTA control system via the NC bus in the BTV20.2A, which is designed as ISA bus.

4.2 SPC Inputs for the Machine Function Keys (X8)

If the MTS-P0*.2 is used in Rexroth INDRAMAT industrial PCs of type BTV20/30, the machine function keys are directly wired onto the SPC assembly (X8). The machine function keys to the right are addressed in the SPC as follows.

To address the keys symbolically, the symbolic identifier of type MFK_R must first be defined in the declaration at address A#iMFK_R (e.g. MKR).

Key	Absolute addresses	Symbolic addresses
R1	%I0.1481.0	MKR.R1
R2	%I0.1481.1	MKR.R2
.	.	.
.	.	.
.	.	.
R8	%I0.1481.7	MKR.R8

Fig. 4-4: Addressing of the machine function keys to the right of the BTV20/30

The machine function keys to the left of the BTV20 must be addressed as follows.

Key	Absolute addresses	Symbolic addresses
L1	%I0.1480.0	MKL.L1
L2	%I0.1480.1	MKL.L2
.	.	.
.	.	.
.	.	.
L8	%I0.1480.7	MKL.L8

Fig. 4-5: Addressing of the machine function keys to the left of the BTV20

4.3 Connection of the BTV20 PLC Funktion Keys (X12)

The MTS-P0*.2 is provided with 16 inputs and 16 outputs with TTL level. This allows direct connection of the machine operating keys of the BTV20 (including key switch).

Addressing

The PLC function keys, the lamps, the key switch, and the displays of the BTV20 are addressed by assigning a logic user number to the inputs and outputs in the SPC I/O configurator.

This results, for instance, in the following addresses:

- 10 = logic user number of the inputs
- 11 = logic user number of the outputs

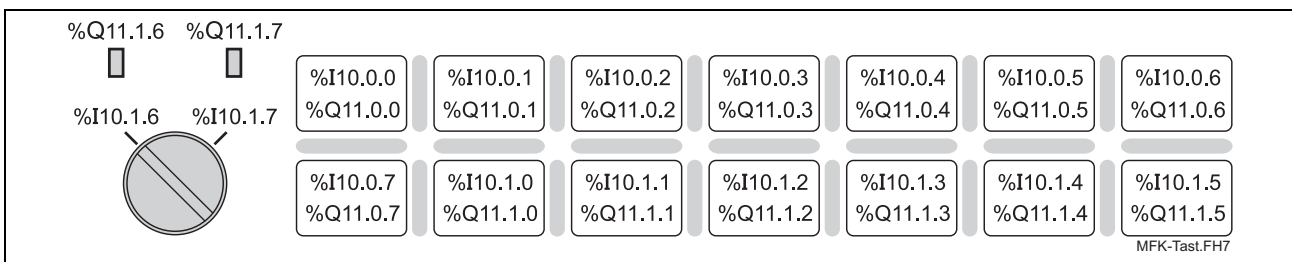


Fig. 4-6: Input and output addresses of the PLC function keys in the BTV20

4.4 SPC Ready (X5)

The SPC ready contact is a relay contact which is closed via a hardware watchdog. It is permanently triggered by the running SPC program. In case of an error (hardware error, firmware error, system error, etc.), the contact is mandatorily opened. The SPC ready contact can, for instance, be wired in the emergency-stop chain of the machine.

4.5 COM Interface (X16)

As a standard, the multimode COM user interface is delivered as an RS232 interface. The parameters for RS422/RS485 operation are set by programming the **OPEN_COM** standard SPC function block and by assigning the **COM** FB input correspondingly. More detailed information can be found in the SPC programming instructions (DOK-CONTRL-SPS*PRO*V18-ANW1-DE-P).

4.6 BT Bus (X15)

The BT bus can be used to connect up to four operator terminals of type BTM15/16 or BTA20. The maximum length of the BT bus may be up to **50 m** (from the connection point to the last user). This applies both to the connection of only one device and to the connection of the permissible maximum number of 4 devices. It is **not** possible to quickly access the I/O data of the operator terminals from the SPC (e.g. %IBP*.*). Data is exclusively exchanged via the core image storage.

The address assignments required for programming can be found in the respective documents of the devices to be connected.

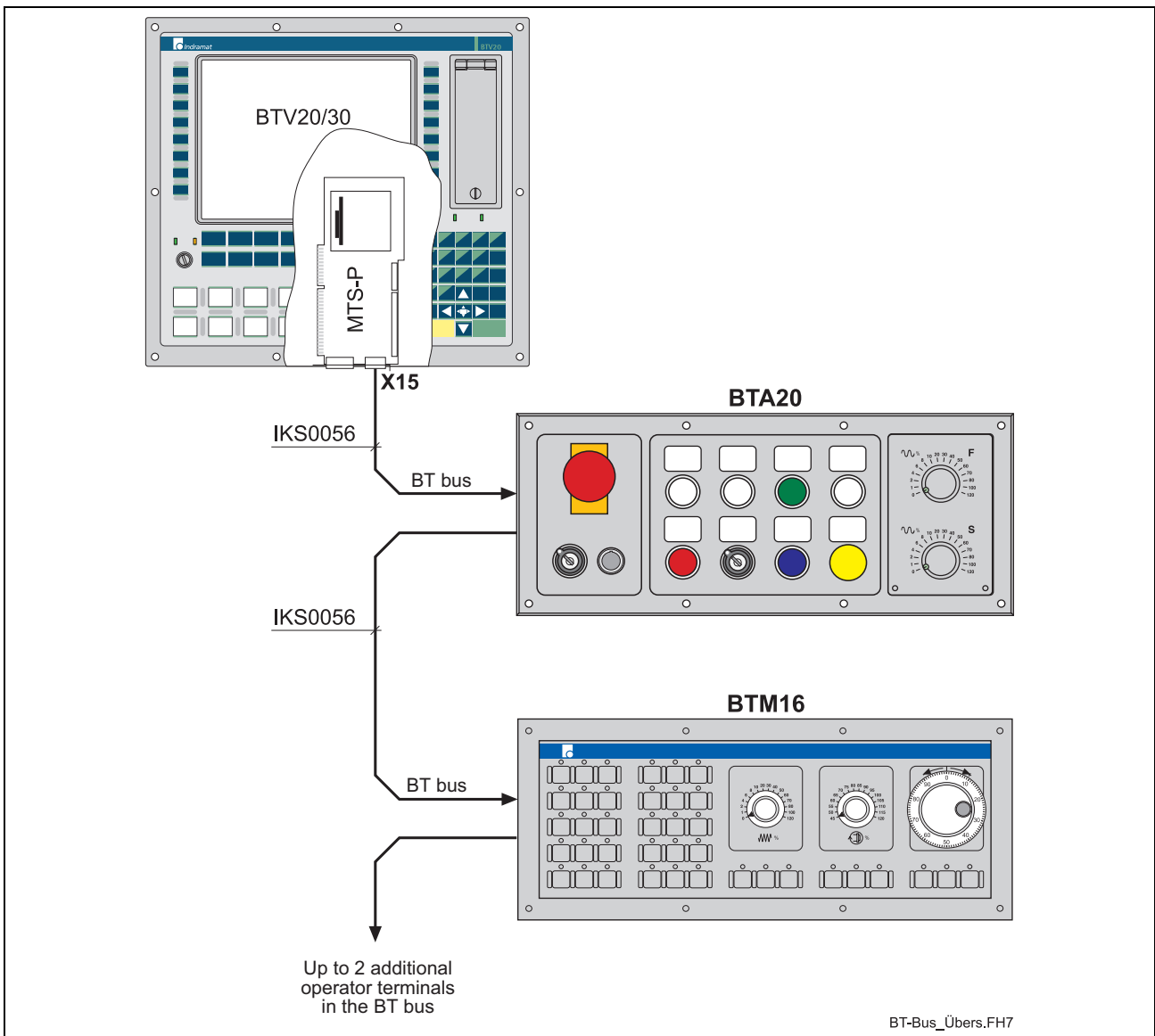


Fig. 4-7: BT bus overview

Addressing

The BT bus is addressed by assigning a logic user number in the I/O editor of the SPC programming interface. Each input core image storage as well as each output core image storage is assigned its own logic address.

Each of the two core image storages has a size of 128 bytes, which are available for the operating devices connected. The number of bytes assigned in the core image storage depends on the operating device (see Fig. 4-8)

Type of device	Storage assignment in the input/output core image
BTM15	Depending on the configuration 2 bytes for digital I/Os (always assigned) 2 additional bytes for each module (except handwheel) 4 additional bytes for handwheel module
BTM16	14 bytes
BTA20	6 bytes

Fig. 4-8: Storage requirements of operating devices

Depending on the physical order of the operating devices connected to the BT bus, the addresses of the devices are assigned in the input and output core image storage without any gaps, according to the storage requirements of the operating devices. The example (Fig. 4-9) illustrates the principle of the storage assignment of the BT bus.

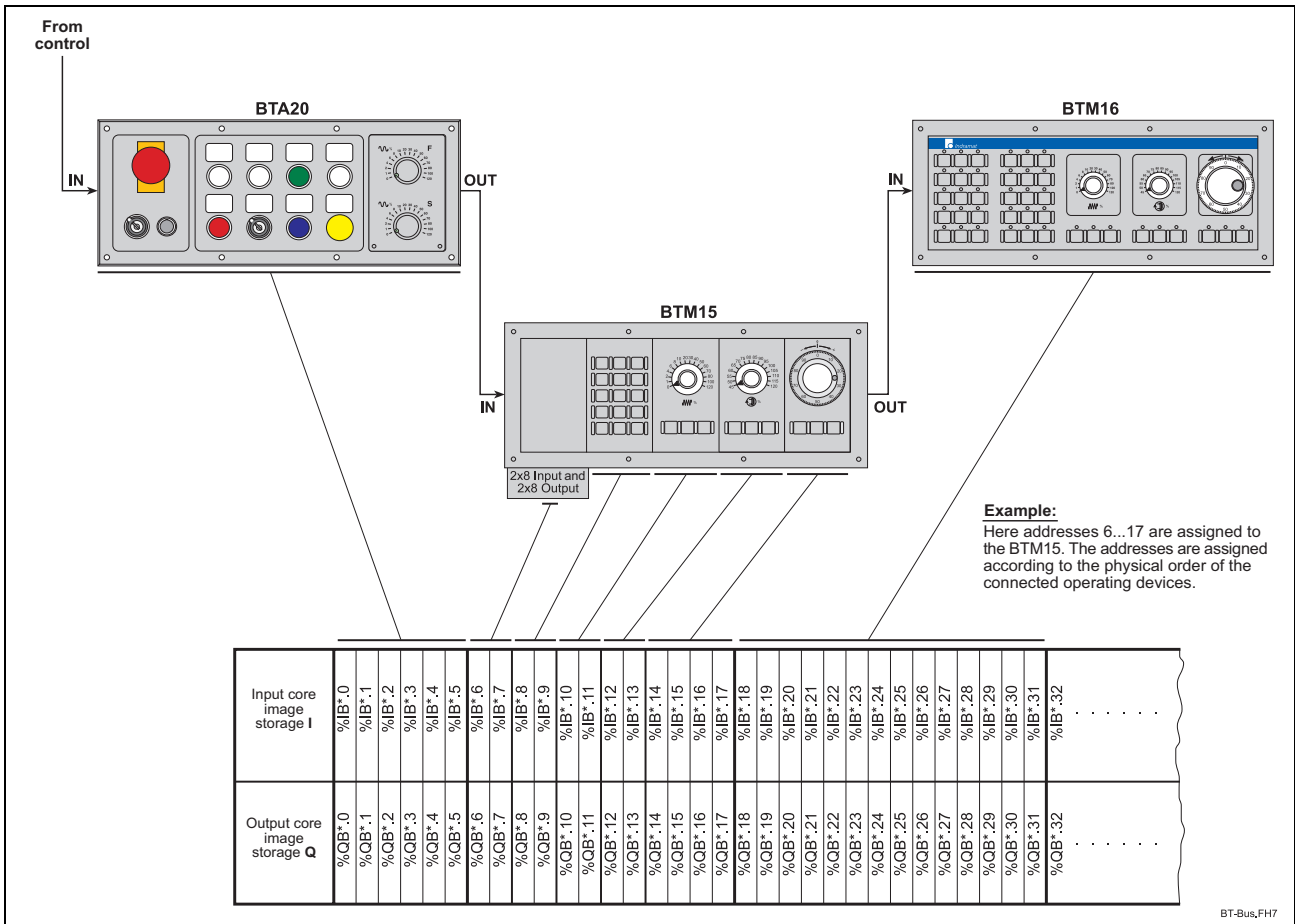


Fig. 4-9: Storage assignment of BT bus

5 Startup

5.1 Mounting

Plug the MTS-P assembly in an unoccupied ISA-BUS slot of your industrial PC. If possible, fix the assembly using the delivered holder, to prevent the card from loosening by shock or vibrations. In the Rexroth INDRAMAT BTV20/30 devices, this is realized by means of a transverse rail to which the assemblies including holder are screwed and retained. The holder is an integral part of the configured MTS-P0*.2 assemblies.

Before the MTS-P assembly can be plugged in the PC, some presettings must be made for startup, which will be explained in the following chapters.

Note: Depending on the configuration, i.e. on additional PC/104 modules, an MTS-P assembly can require up to **5** slots in an industrial PC (e.g. BTV20/30).

5.2 Setting of Addresses

General Notes

Before the MTS-P assembly can be plugged in a Rexroth INDRAMAT BTV20/30 or in an industrial PC, the addresses must be set. This is achieved by means of the DIP switch represented in Fig. 5-10, depending on the type of control (master/slave). If a slave SPC is used, only the last line in the table is applicable.

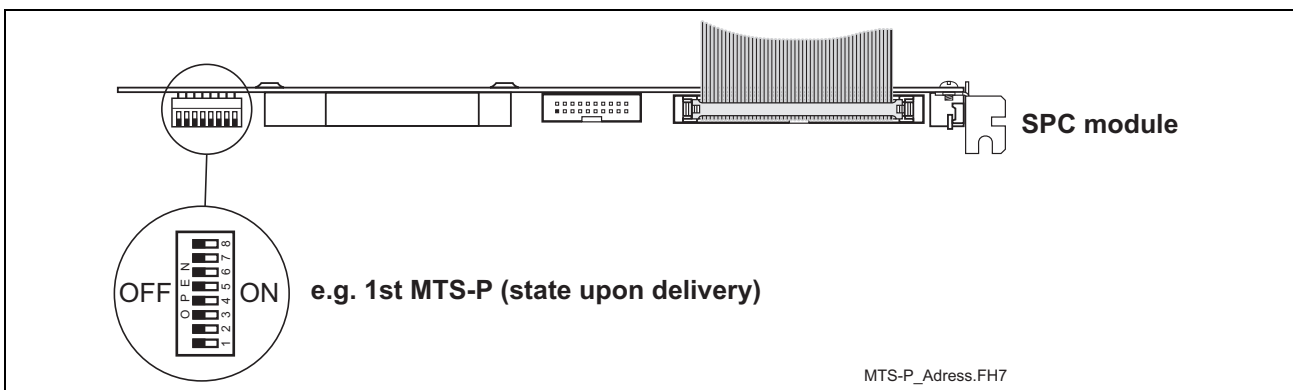


Fig. 5-10: Position of the addressing switch

MTS-P0*.2	1	2	3	4	5	6	7	8	I/O address (hex)
1 st master (default)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	\$31C
2 nd master (default)	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	\$318
3 rd aster (default)	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	\$314
4 th master (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
Matching control MTC200	ON	ON	ON	ON	OFF	OFF	OFF	OFF	\$200

Fig. 5-11: DIP switch configuration of the MTS-P0*.2 assemblies

Note: It is absolutely necessary that DIP switch 8 (boot lockout) is set to the **OFF** (OPEN) position, since otherwise the MTS-P0*.2 would not be operable.

5.3 Battery

If an MTS assembly is not operated or is stored for more than **6 months**, user-specific SPC data may get lost.

Data involved The following data is involved:

- SPC user program
- Remanent data

Charging of the battery

The battery is charged during startup of an MTS-P assembly. If the battery is **completely discharged**, the following charging times are applicable:

Charging time: 1 h -> approx. 100 h buffer time

Charging time: 50 h -> approx. 5000 h buffer time (battery fully charged)

Under normal operating conditions, the battery life is 7 to 10 years. Permanent charging of the battery does not affect its life (continuous control operation).

5.4 Status Information and Error Diagnosis

Indication of Operating States

A diagnosis of the MTS-P0*.2 assembly can be made using the seven-segment display H1. The various states are displayed via the one-digit error codes shown below.

Code	Description
-	Power-Fail signal triggered (the control must be reset)
<i>b</i>	Ready for operation (SPC is running)
<i>0.</i>	Startup state (reset test)
<i>F.</i>	Firmware in the Flash EPROM not valid
<i>J.</i>	Boot lockout for firmware activated
<i>5</i>	System stack overflow
<i>P.</i>	Local bus not connected

Fig. 5-12: Operating states of the MTS-P0*.2

Note: If any other one-digit code (followed by a full stop) is displayed, the customer service must be notified **immediately**.

Indication of Errors

Error states are indicated by **three-digit** error codes on the successively flashing seven-segment display. The error codes represented correspond to the system error messages of the user interface BOF/GBO.

Code	Description
<i>007</i>	Software version error
<i>008</i>	Self-test unsuccessful
<i>052</i>	SPC program not valid
<i>055</i>	Max. cycle time of the SPC exceeded
<i>071</i>	Operating voltage of the SPC too low
<i>081</i>	Time exceeded 2-ms implementation
<i>082</i>	INTERBUS failure
<i>083</i>	INTERBUS storage overflow
<i>084</i>	INTERBUS configuration error
<i>085</i>	INTERBUS bus error
<i>086</i>	INTERBUS hardware / firmware error
<i>087</i>	INTERBUS module error of peripheral bus
<i>088</i>	INTERBUS not ready
<i>089</i>	INTERBUS general error of generation 4

Fig. 5-13: Error codes of the MTS-P0*.2

5.5 Interface Assignment

The assignments of the interfaces of the MTS-P assemblies are shown in the tables below.

PIN	Signal name	PIN	Signal name
1	NC	2	Transmit Data (RS232)
3	Receive Data (RS232)	4	RS485+ or RxD+ (RS422)
5	RS485- or RxD- (RS422)	6	NC
7	GND	8	NC
9	TxD+ (RS422)	10	GND
11	TxD- (RS422)	12	+5V
13	Request To Send (modem)	14	Clear To Send (modem)
15	NC		

Fig. 5-14: Pin assignment of the COM interface X16

PIN	Signal name	PIN	Signal name
1	Data Out +	2	Data In +
2	GND	4	NC
5	+5V	6	Data Out -
7	Data In -	8	NC
9	Assignment detection		

Fig. 5-15: Pin assignment of the BT bus X15

PIN	Function
X1.1 – X1.4	Supply voltage V _{CC}
X1.5 – X1.20	Input (0...15)
X1.21 – X1.36	Output (0...15)
X1.37 – X1.40	GND

Fig. 5-16: Pin assignment of the 40-pin I/O connector X12

PIN	Signal name	PIN	Signal name
1	+5VDC	2	+5VDC
3	S0	4	S1
5	S2	6	S3
7	S4	8	S5
9	S6	10	S7
11	S8	12	S9
13	S10	14	S11
15	S12	16	S13
17	S14	18	S15
19	GND	20	GND

Fig. 5-17: Pin assignment for the machine function keys X8

6 INTERBUS Master Connection

6.1 Brief Description

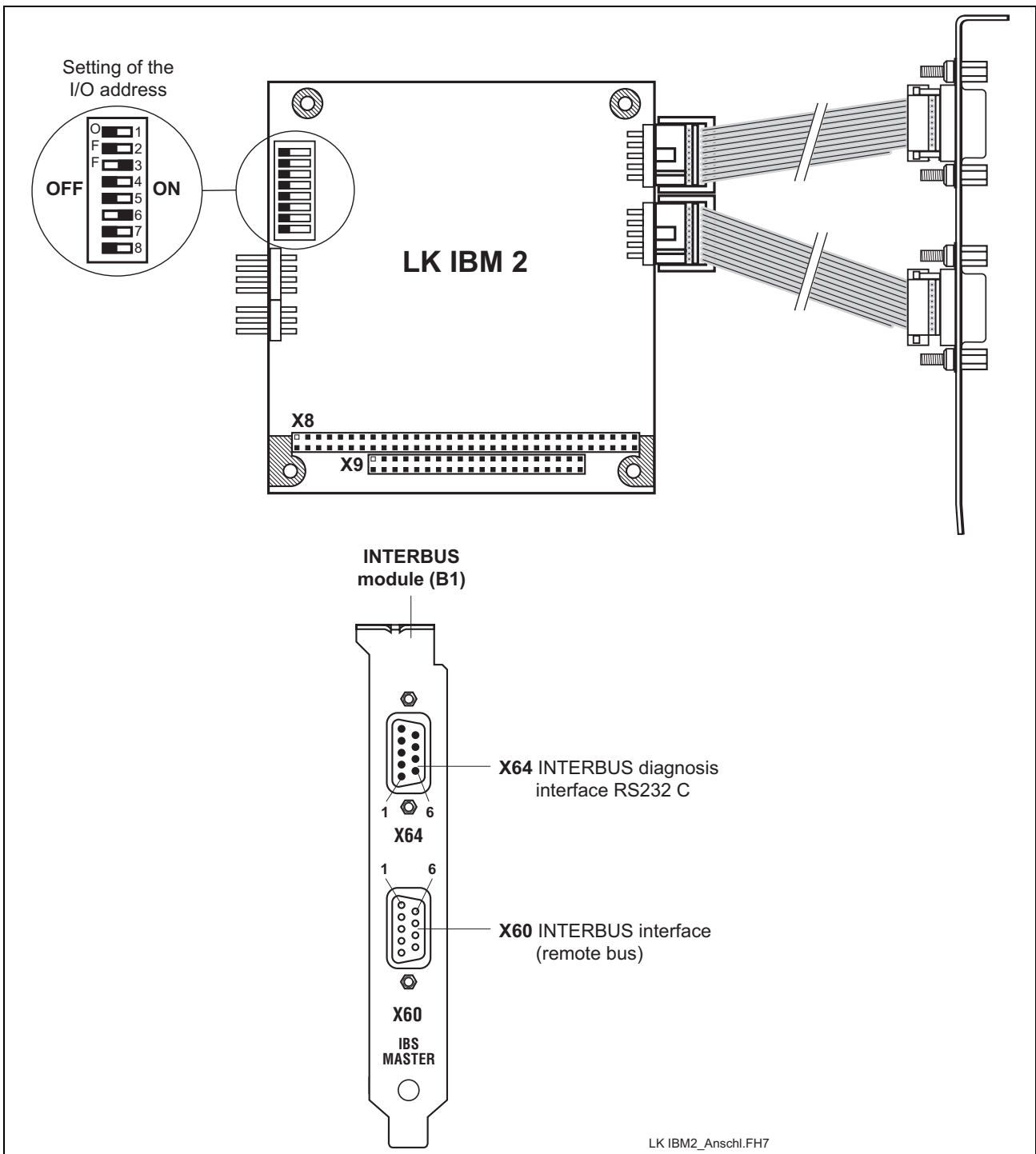


Fig. 6-1: P.C.B. IBM2

The printed circuit board IBM 2 is an INTERBUS master connection of the 4th generation in PC104 format. It can be used for the connection of simple sensors and actuators as well as of intelligent field devices via the INTERBUS. The INTERBUS permits bridging of distances of up to 12.8 km (from the connection point to the last connected remote bus user), divided in segments of up to 400 m.

The P.C.B. IBM 2 possesses the following features:

- INTERBUS protocol (DIN E 19 258),
- up to 256 bus segments,
- up to 16 user levels,
- up to 512 users per configuration,
- up to 4096 inputs and 4096 outputs per configuration (512 bytes),
- up to 32 INTERBUS loop users per bus segment,
- CMD G4 support.

The INTERBUS is configured and parameterized directly by means of the I/O configurator integrated in the SPC programming interface.

In addition to the integrated INTERBUS diagnosis, it is also possible to use the IBS CMD SWT G4 (Phoenix Contact) software via the diagnosis interface.

Note: It is not possible to configure the INTERBUS using the IBS CMD SWT G4 software.

6.2 Setting of the I/O Address

The setting of the DIP switch S1 must be as follows (default setting), so that the P.C.B. IBM 2 can be addressed via the PC/104 bus:

1	2	3	4	5	6	7	8	Address
OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	120 _h

Fig. 6-2: Setting of DIP switch S1

6.3 Interface Assignment

Pin	Signal name	Pin	Signal name
1	NC	2	$\overline{\text{TxD}}$ - Transmit Data
3	$\overline{\text{RxD}}$ - Receive Data	4	NC
5	SGND - Ground	6	NC
7	RTS - Ready To Send	8	CTS - Clear To Send
9	NC		

Fig. 6-3: Pin assignment of the INTERBUS diagnosis interface X64 (RS232 C)

Pin	Signal name	Pin	Signal name
1	DO	2	DI
3	COM	4	GND
5	+5V	6	$\overline{\text{D}\overline{\text{O}}}$
7	$\overline{\text{D}\overline{\text{I}}}$	8	Vcc
9	RBST		

Fig. 6-4: Pin assignment of the INTERBUS interface X60 (remote bus)

7 PROFIBUS-DP Connection

7.1 Brief Description of Master and Slave Connection

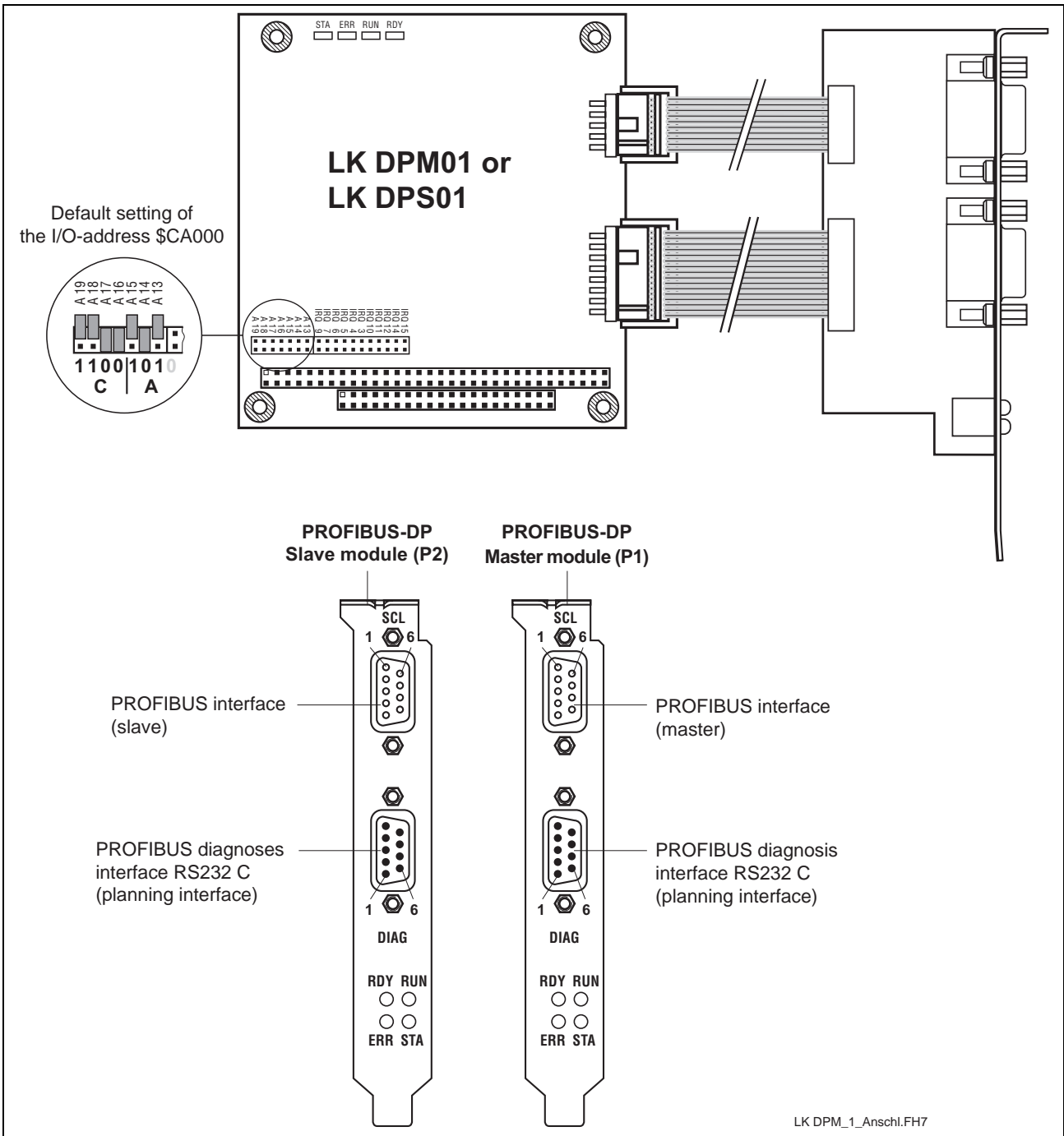


Fig. 7-5: Profibus connections

The P.C.B.s DPM01 (master) and DPS01 (slave) are intelligent PROFIBUS-DP connections in PC104 format. They are used to process the protocols of the data transfer between the SPC and the decentralized Profibus input and output units. The built-in microprocessor allows automatic execution of the entire data transfer, thus relieving the SPC of real-time tasks.

Data exchange between the SPC and the P.C.B.s DPM01 and DPS01 is implemented via an 8-kbyte dual-port memory (DPM). The DPM is a

memory which can be simultaneously accessed by the SPC and the microprocessor of the P.C.B.s DPM01 and DPS01.

The PROFIBUS-DP master connection P.C.B. DPM01 permits connection of up to 32 PROFIBUS-DP users within one bus segment. If several bus segments are connected to each other via a repeater, a maximum of 125 slaves can be operated with maximum configuration. Each repeater in use reduces the maximum number of slaves within one segment, with the repeater as a passive user being not assigned any user address.

In the process image, a maximum of 368 I/O bytes can be made available to the DP slave. Here, max. 244 bytes may be I or O. 512 I/O bytes each in the process image are available to the DP master. In relation to the set data transfer rate, link lengths of up to 1200 m can be realized between the PROFIBUS-DP users. With a data transfer rate of 1.5 Mbaud, the link lengths are reduced to max. 200 m, with a rate of 12 Mbaud to max. 100 m.

Note: In order to ensure proper functioning of the PROFIBUS interface, only cables meeting the PROFIBUS specification RS485 (cable type A) may be used.

7.2 Setting the I/O Addresses

The bus address is set using the jumpers of plugboard J2. The address line is specified next to each jumper.

Depending on the expansion slot, the addresses must be set as follows (X = jumper fitted):

Slot	Address	A19	A18	A17	A16	A15	A14	A13
1	\$CA000			X	X		X	
2	\$CC000			X	X			X

Fig. 7-6: Setting of the I/O address

7.3 Status and Diagnosis Information

After having been switched on, the P.C.B.s DPM01 and DPS01 perform a self-test. After the initialization phase of this test (2 to 3 seconds), the two LEDs *ERR* and *STA* turn dark, and the yellow *RDY* LED emits light if the test is completed successfully. If not, the *RDY* LED starts flashing, and processing of the program is stopped. The further meanings of the indicators during the initialization phase are listed below.

RDY	Yellow LED	Ready
	On:	DPM01 or DPS01 ready for operation
	Flashes in cycles:	Bootstrap loader active
	Flashes irregularly:	Hardware or system error
	Off:	Hardware defective

RUN	Green LED	RUN (communication)
	On:	Communication is running
	Flashes in cycles:	Ready for communication
	Flashes irregularly:	Wrong configuration
	Off:	No communication
ERR	Red LED	Error
	On:	Error of the communication interface
	Off:	Communication interface OK
STA	Yellow LED	Status
	On:	Data exchange with slaves active (master)
		Data exchange with master active (slave)
	Off:	No data exchange

7.4 Technical Data

Supply	
Operating voltage:	+5 VDC, $\pm 5\%$ / 650 mA
Interface data	
Communication interface:	PROFIBUS-DP, max. 12 Mbaud, potential-free
Diagnosis interface:	RS 232C, 9600 baud
Operating conditions	
Operating temperature:	0 °C to +55 °C
Storage temperature:	-25 °C to +70 °C
Air humidity:	max. 75%, non-condensing

7.5 Interface Assignment

The assignments of the interfaces of the Profibus connections are as follows:

PIN	Signal name	PIN	Signal name
1	NC	2	RxD - Receive Data
3	TxD - Transmit Data	4	DTR - Data Terminal Ready
5	GND - Operating ground	6	NC
7	RTS - Ready To Send	8	CTS - Clear To Send
9	NC		

Fig. 7-7: Pin assignment of the diagnosis interface RS232C (X74, X79)

PIN	Signal name	PIN	Signal name
1	RGND - Reference ground	2	NC
3	RxD/TxD-P - Send/receive	4	NC
5	DGND - Reference potential	6	VP - Supply voltage plus
7	NC	8	RxD/TxD-N - Send/receive
9	NC		

Fig. 7-8: Pin assignment of the PROFIBUS interface (X70, X75)

8 Serial Interfaces

8.1 Brief Description

The P.C.B. SIO 04-B provides the SPC user program with up to four serial interfaces (RS232 and RS422/485) for general use. Operation of the serial interfaces is interrupt-controlled via the SPC firmware.

The send and receive data of each interface are made available in buffers of 256 bytes length each. Using these buffers, the SPC user program indirectly communicates with the interfaces via available function blocks.

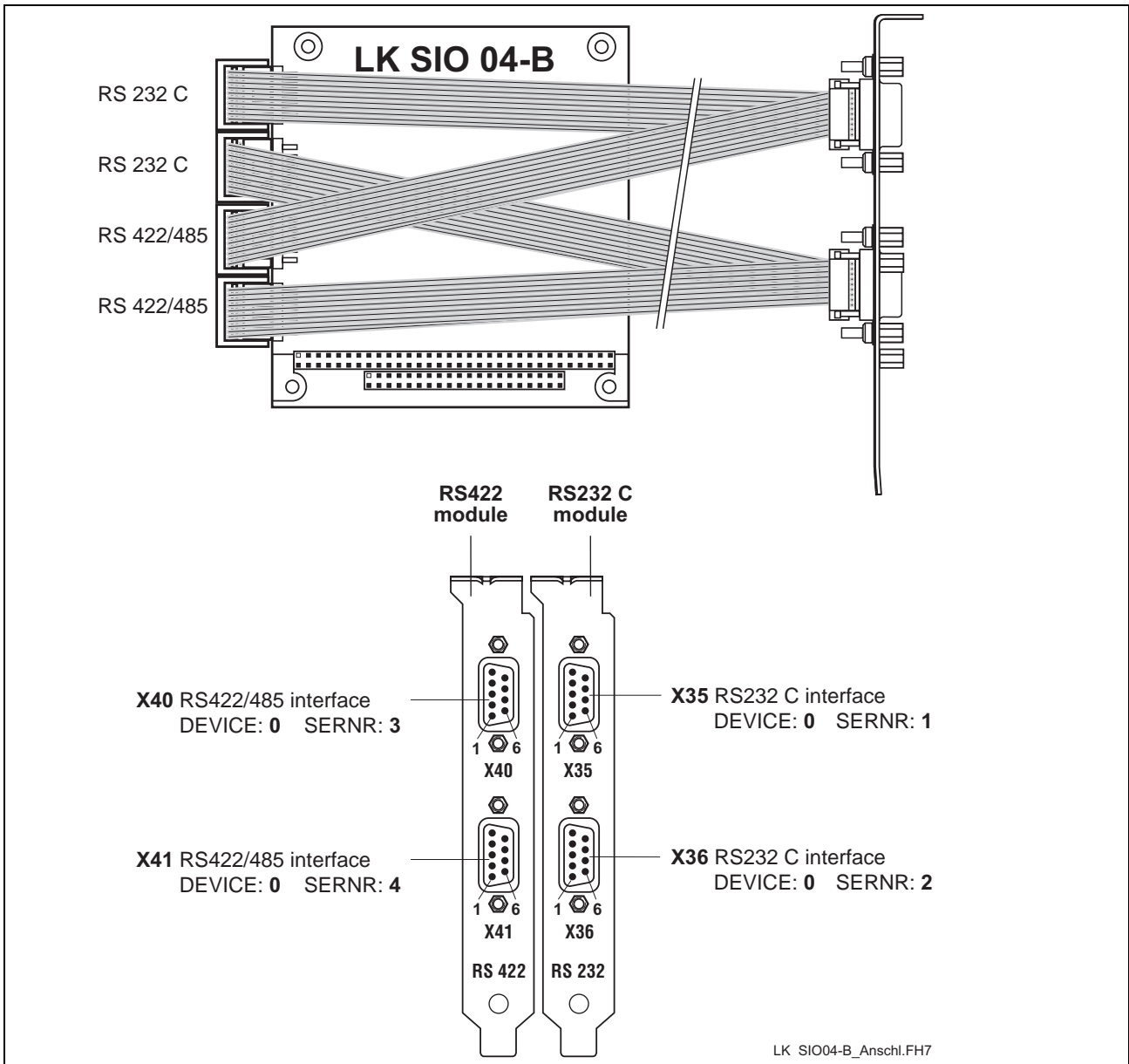


Fig. 8-9: P.C.B. SIO 04-B

8.2 Address and Interrupt Settings

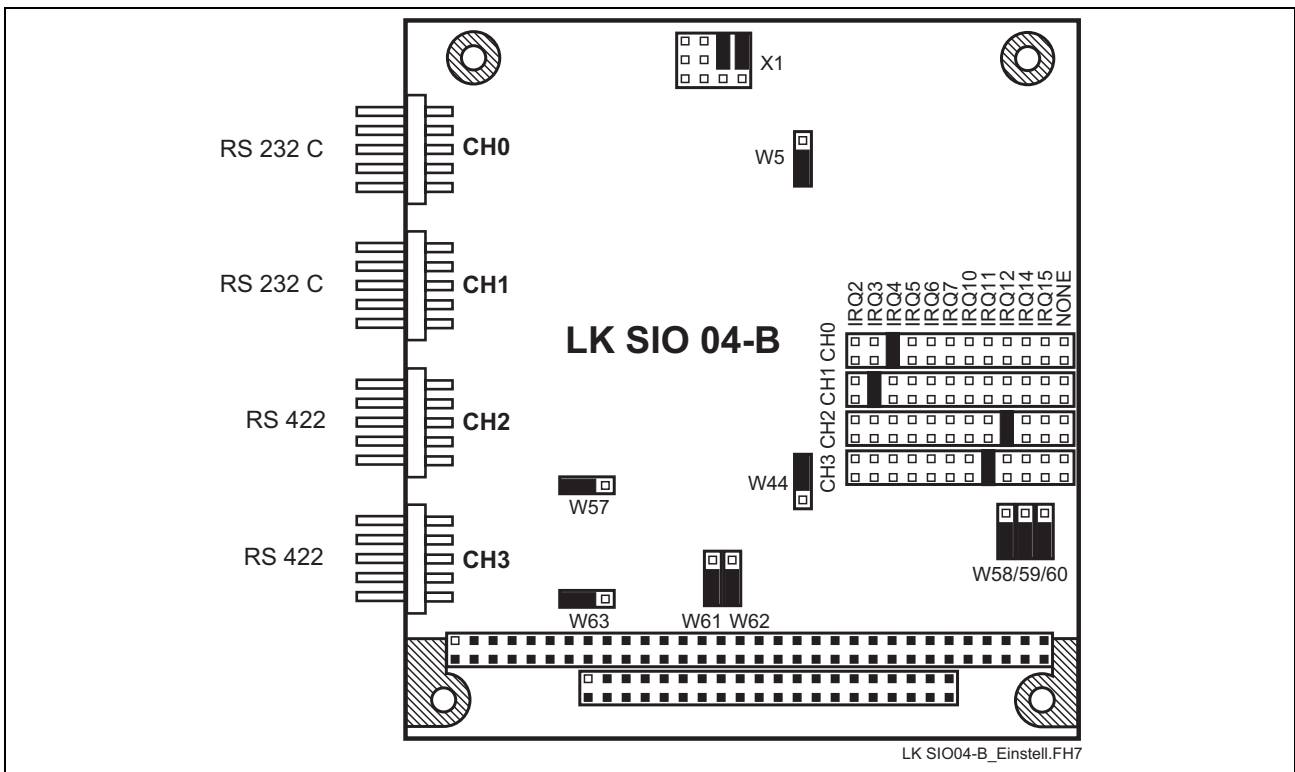


Fig. 8-10: Jumper settings on the P.C.B. SIO 04-B

8.3 Function Blocks

Using the following function blocks, the SPC program permits access to the serial interface.

Name	Description
OPEN_COM	Parameterizing and opening a serial interface
CLOSE_COM	Closing a serial interface
RD_BYTE	Reading a byte from the serial interface
WR_BYTE	Writing a byte to the serial interface
RD_STRING	Reading a string from the serial interface
WR_STRING	Writing a string to the serial interface
BTXX	Communication module for the operating and visualization devices BTV04/05 and BTC06
MODBUS	Communication module for the MODBUS protocol

Fig. 8-11: Function blocks for interface handling

The COM data type, which describes the serial interface in more detail (e.g. DEVICE, SERNR, BAUDRATE, etc.), is required for parameterizing the blocks. For a more detailed description of the function blocks see the "Instruction Set" documentation.

8.4 Technical Data

Supply	
Supply voltage:	4.5 to 5.5 VDC
Power consumption:	max. 250 mA
Interface data	
Input capacity:	max. 15 pF
Input leakage current:	max. 5 μ A
Output capacity:	min. 150 pF
Output current (switching actively 0):	min. 12 mA

8.5 Interface Assignment

The assignments of the serial interfaces are as follows:

PIN	Signal name	PIN	Signal name
1	DCD / Data Carrier Detect	2	RxD / Receive Data
3	TxD / Transmit Data	4	DTR / Data Terminal Ready
5	SGND / Ground	6	DSR / Data Set Ready
7	RTS / Ready To Send	8	CTS / Clear To Send
9	RI / Ring Indicator		

Fig. 8-12: Pin assignment of RS 232C X35, X36

PIN	Signal name	PIN	Signal name
1	GND / Frame Ground	2	NC
3	TxD A (-) / Transmit Data	4	RxD A (-) / Receive Data
5	SGND / Signal Gound	6	RxD B (+) / Receive Data
7	RTS / Ready To Send	8	CTS / Clear To Send
9	TxD B (+) / Transmit Data		

Fig. 8-13: Pin assignment of RS422/485 X40, X41

9 Connection of HMI Control Panels

9.1 Applications with the BTV04/05/06

As required, the HMI control panels BTV04/05/06 are connected via the serial interfaces X16 and X40/41, which permit RS422 or RS485 operation. Only **one** HMI control panel can be connected to an RS422 interface (see Fig. 9-1).

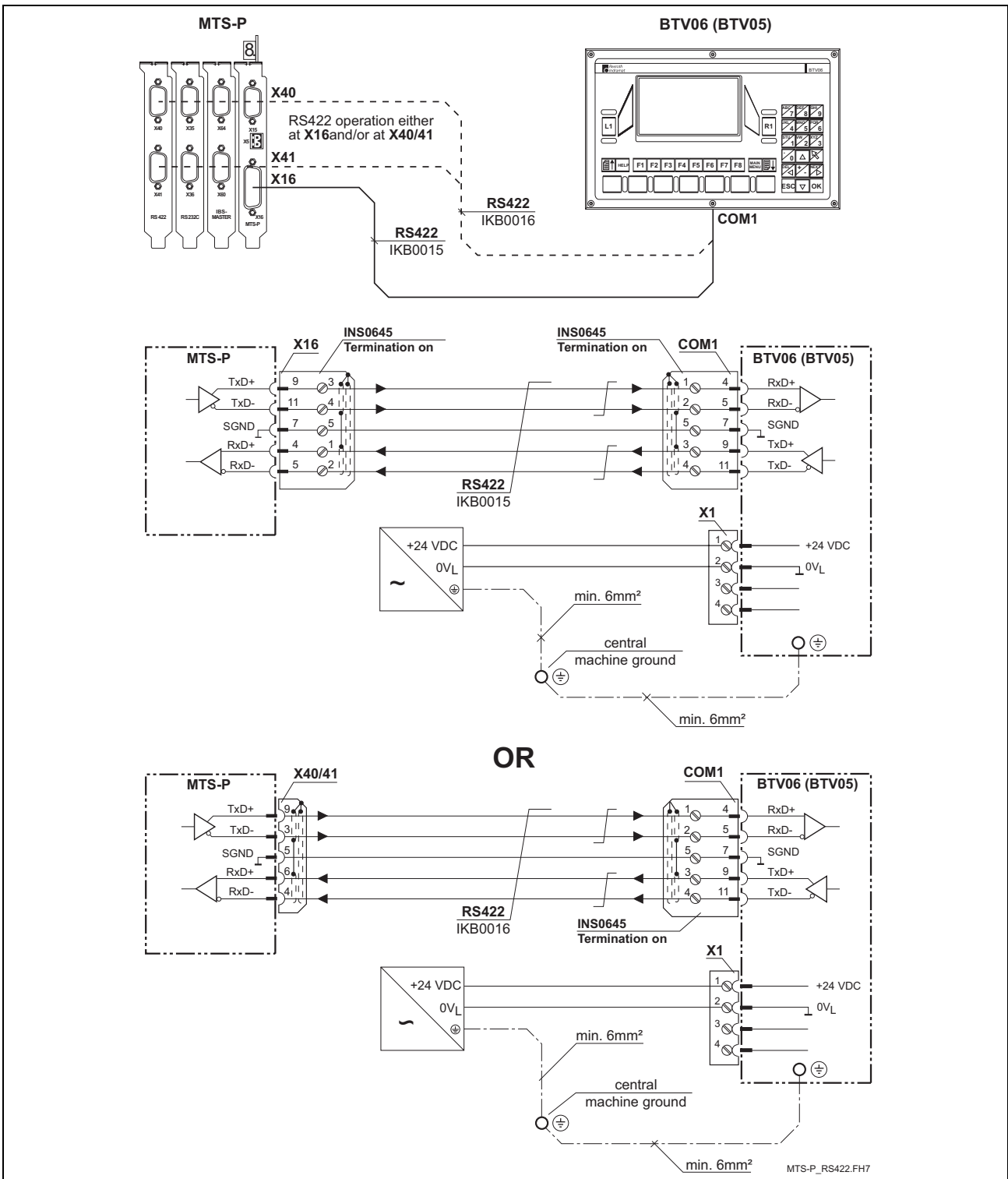


Fig. 9-1: MTS-P with HMI control panels via an RS422 interface

During RS485 operation, 2 control panels can be connected in cascade per interface (see Fig. 9-2). Hence, a maximum of 6 HMI control panels can be connected during RS485 operation.

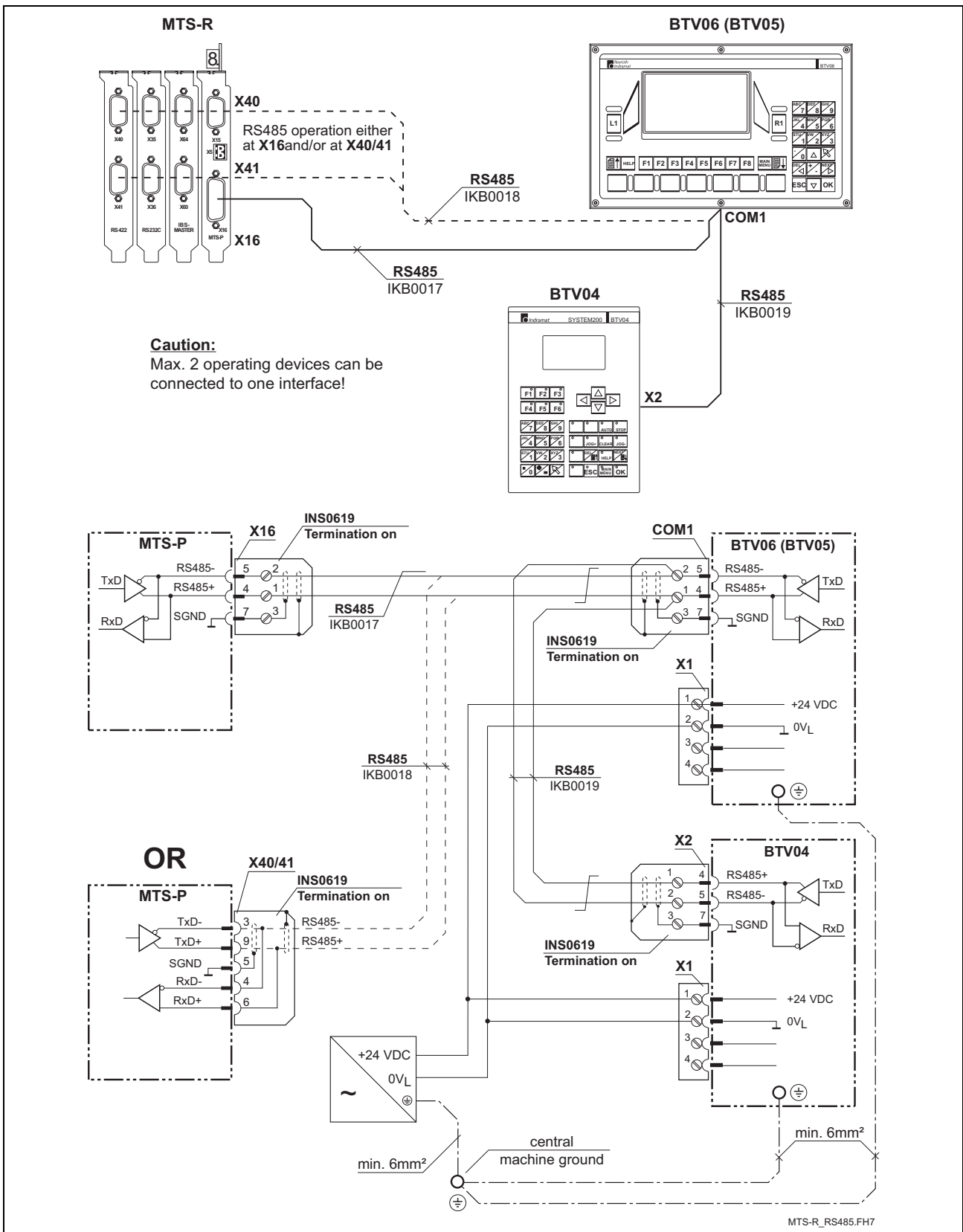


Fig. 9-2: MTS-P with HMI control panels via an RS485 interface

9.2 Applications with the BTC06

The hand-held terminals BTC06 are exclusively connected via the machine control panels BTA10 or BTA20. RS232 operation is converted to RS422 operation by means of the interface converter integrated in the BTA10/20 (see Fig. 9-3). RS422 operation with the BTC06 is also only possible via the BTA 10/20. Here, however, there is no interface conversion, but only an adaptation of the interface connectors to the BTC06 connector (see Fig. 9-4).

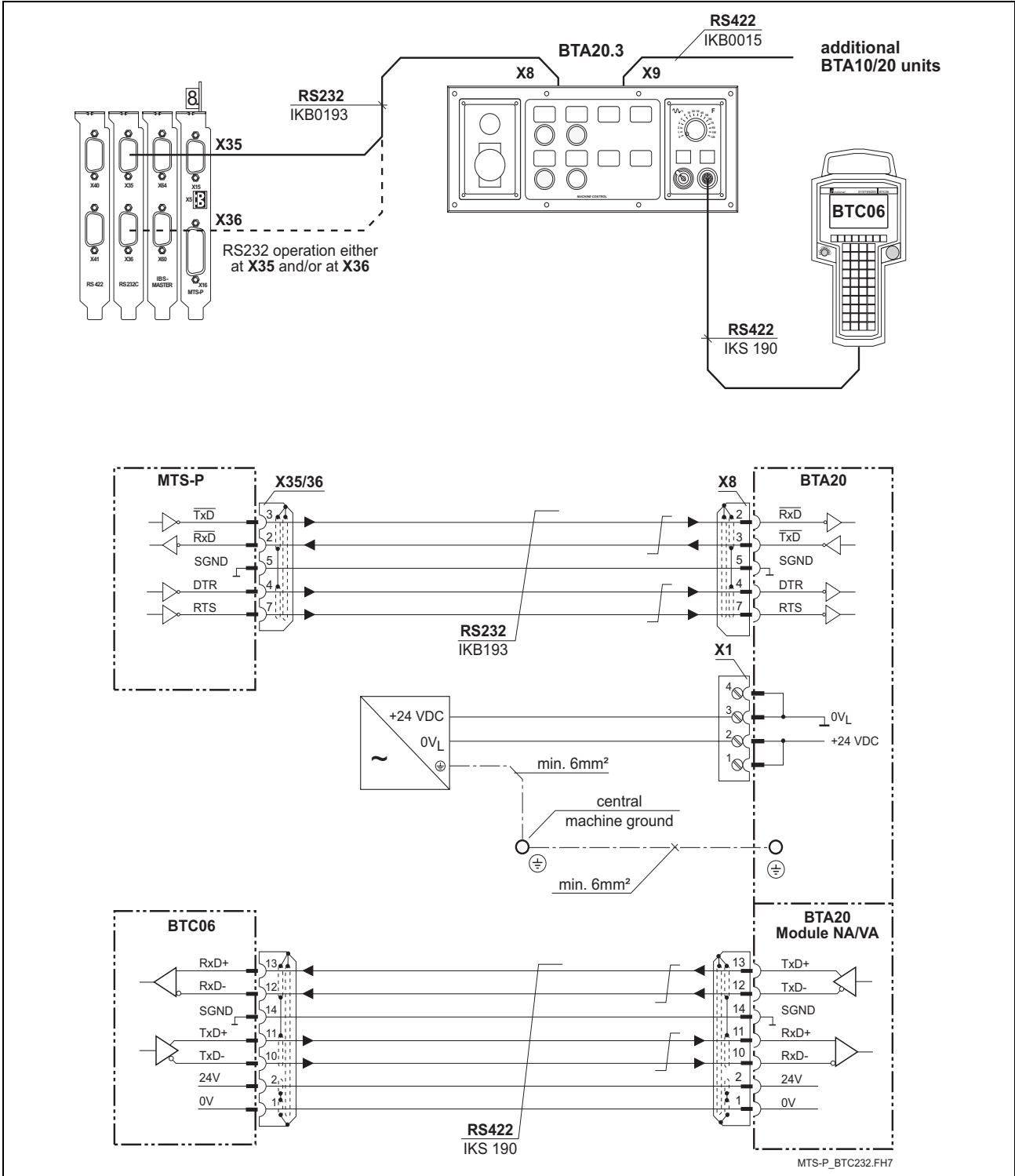


Fig. 9-3: MTS-P with BTC06 via an RS232 interface

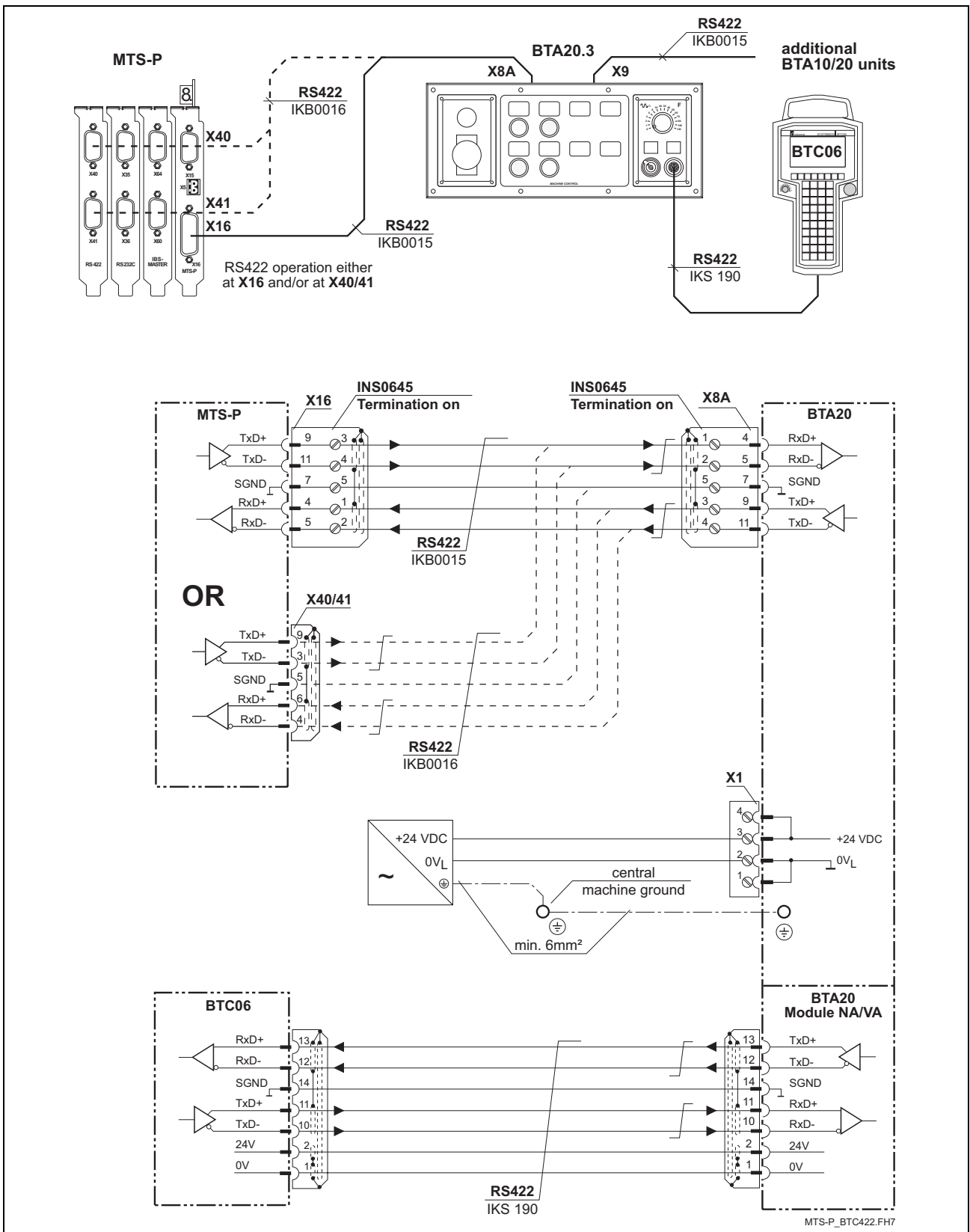


Fig. 9-4: MTS-P with BTC06 via an RS422 interface

10 Configurations

10.1 MTS-P0*.2-D2-B1-NN-NN-NN-FW

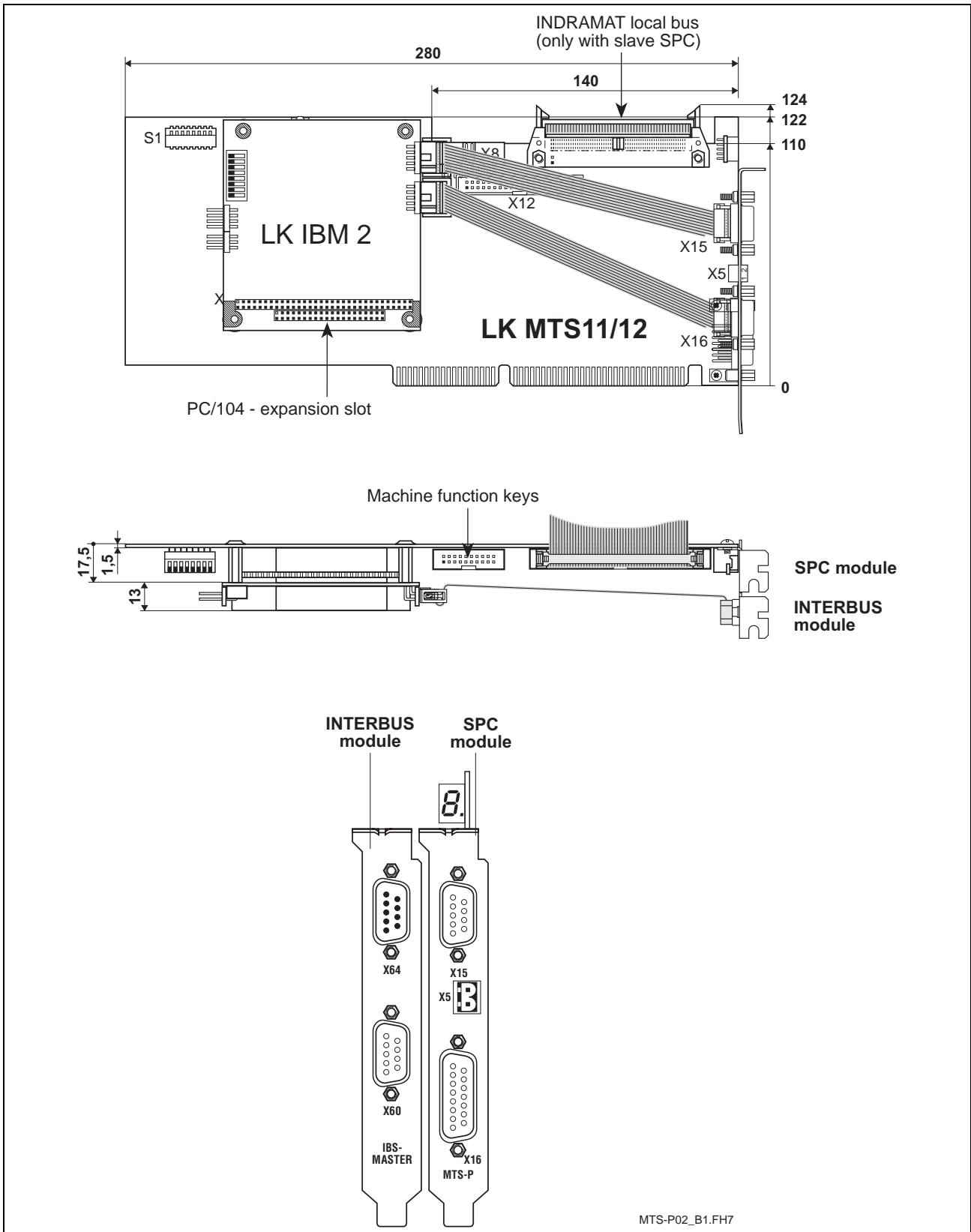


Fig. 10-1: Setup of the MTS-P0*.2-D2-B1-NN-NN-NN-FW configurations

10.2 MTS-P0*.2-D2-B1-S4-NN-NN-FW

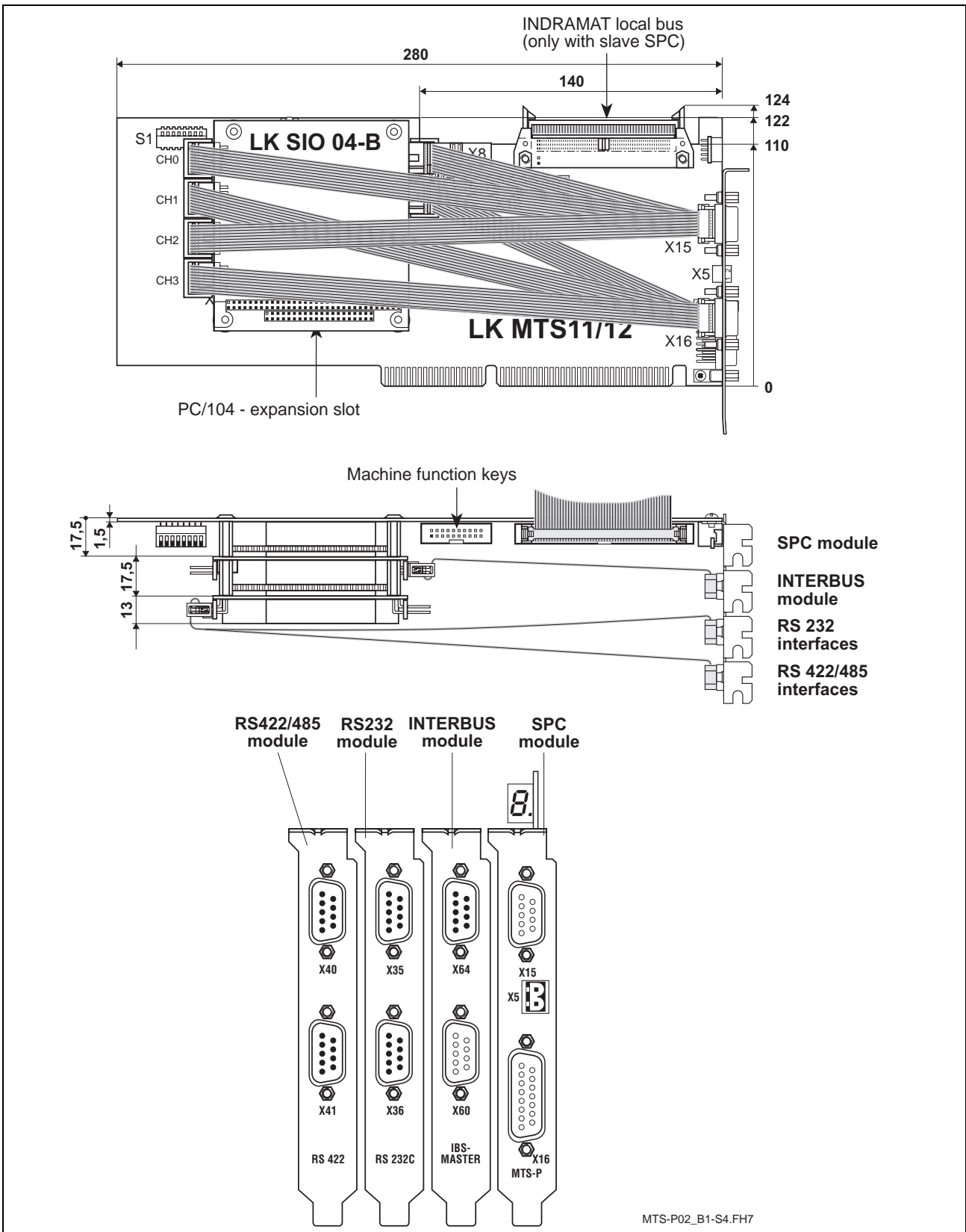


Fig. 10-2: Setup of the MTS-P0*.2-D2-B1-S4-NN-NN-FW configurations

10.3 MTS-P0*.2-D2-P1-NN-NN-NN-FW

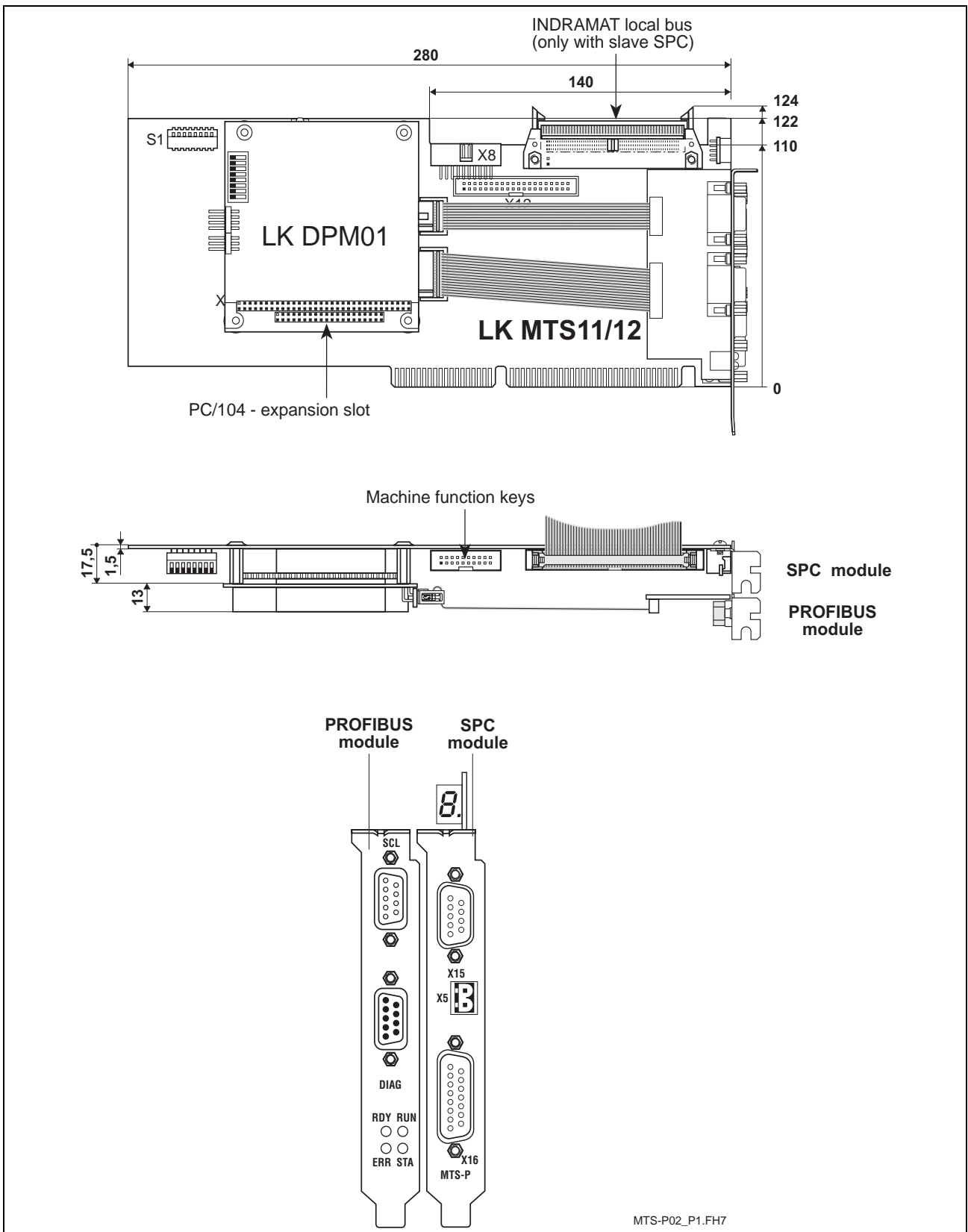


Fig. 10-3: Setup of the MTS-P0*.2-D2-P1-NN-NN-NN-FW configurations

10.4 MTS-P0*.2-D2-B1-P1-S4-NN-FW

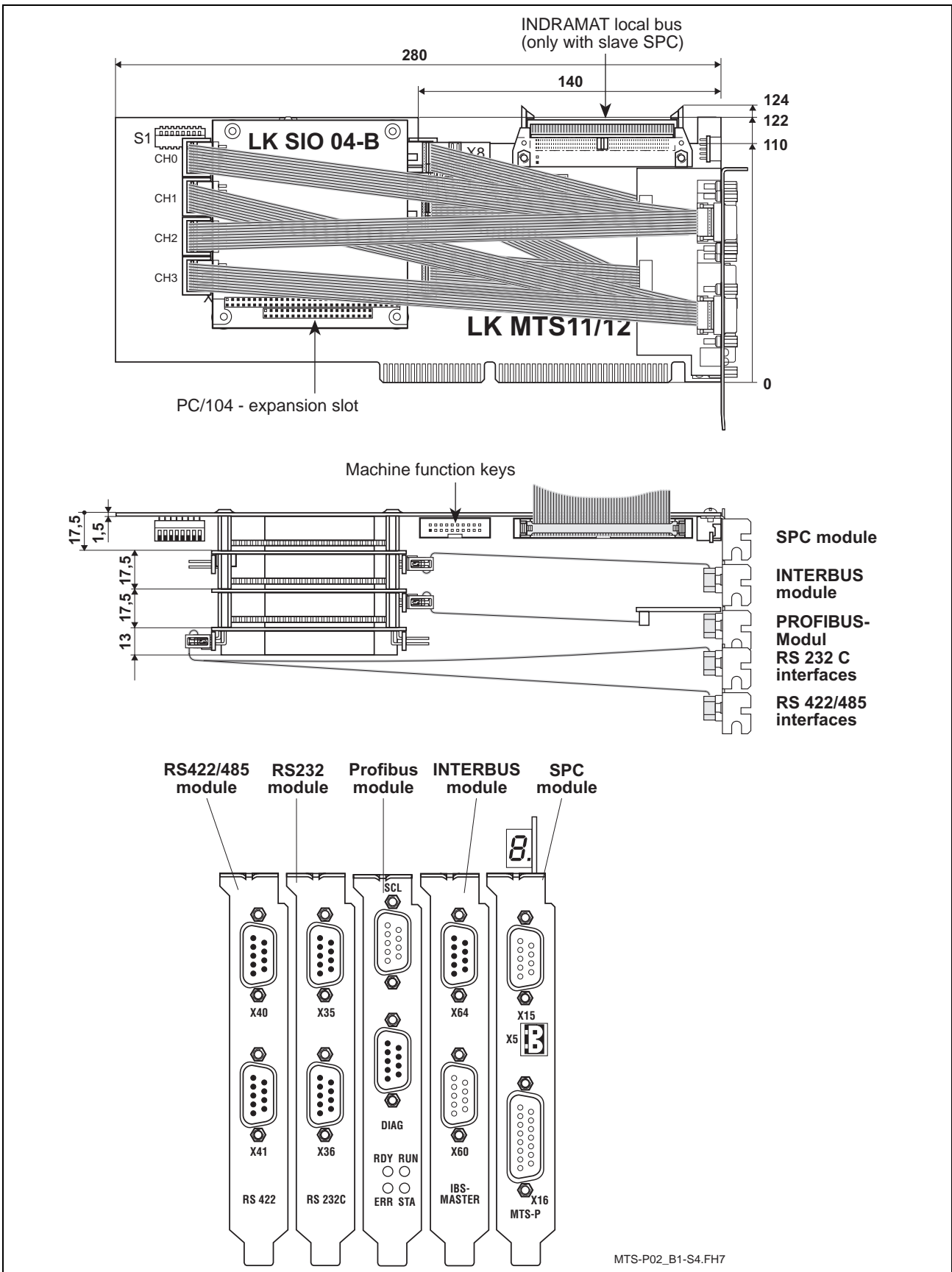
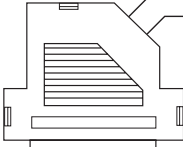
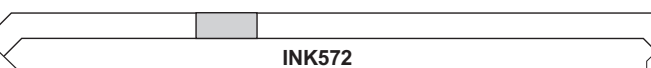
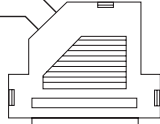
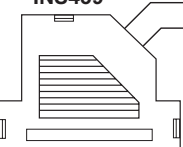
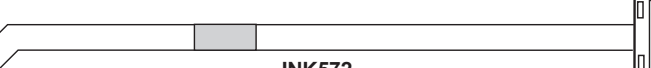
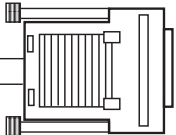
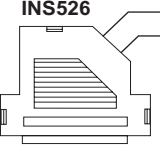
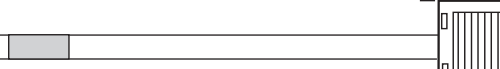
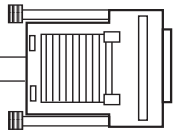
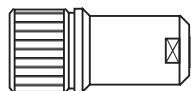

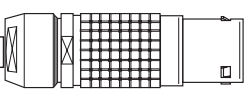
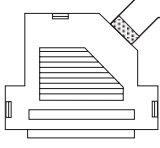
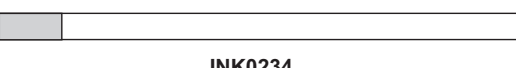
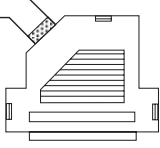
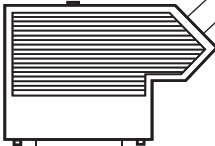
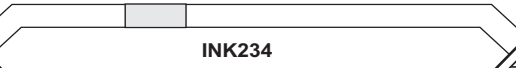
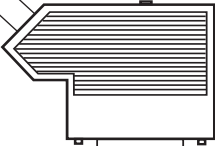
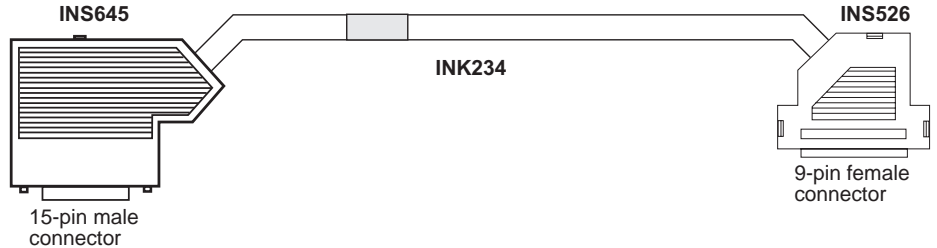
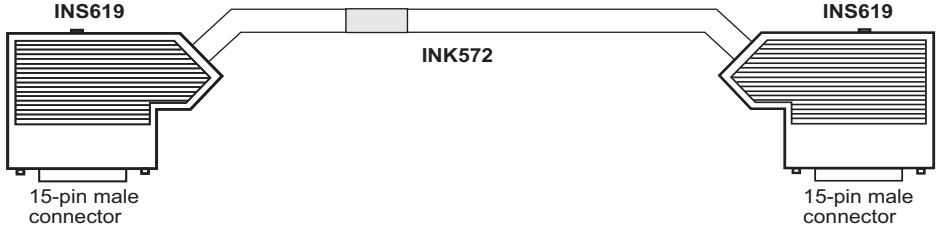
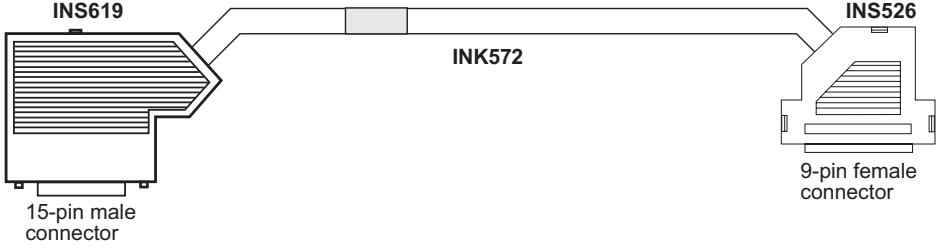
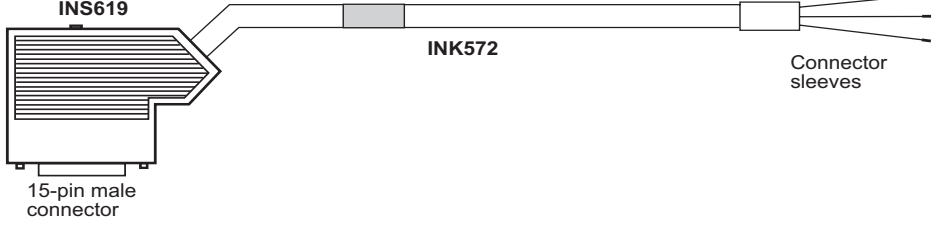
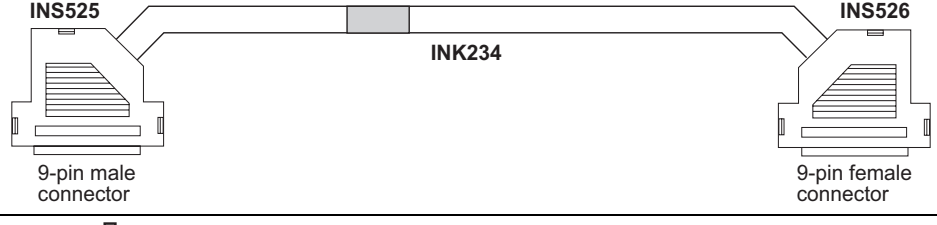
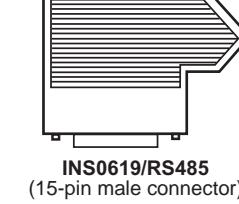
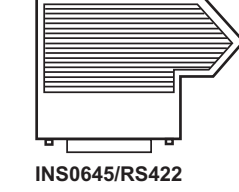
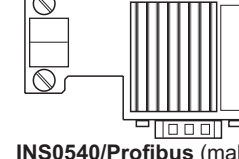


Fig. 10-4: Setup of the MTS-P0*.2-D2-B1-P1-S4-NN-FW configurations

11 Accessories

11.1 Selection List of Connectors and Ready-Made Cables

Ordering name of ready-made cables	Counter-connector on the device	INDRAMAT cable	Execution of cable end
IKB0005 MN: 278 141, 2 m MN: 278 144, 5 m MN: 278 142, 10 m MN: 278 143, 15 m (RS232, max. 15 m)	INS439  15-pin male connector	INK572 	INS526  9-pin female connector
IKB0012/000,0 MN: 281 715 (RS232, max. 15 m)	INS439  15-pin male connector	INK572 	INS588  9-pin female connector
IKS0106/000,0 MN: 260 838 (RS232, max. 15 m)	INS526  9-pin female connector	INK572 	INS588  9-pin female connector
IKS0190 MN: 279 743, 3 m MN: 279 743, 5 m MN: 279 744, 10 m MN: 279 745, 15 m (RS422, max. 15 m)	INS0624/C 		INS0631/C 
IKB0193 MN: 282041 (RS232, max. 15 m)	INS0525/L01  9-pin male connector	INK0234 	INS0526/L01  9-pin female connector
IKB0015/000,0 MN: 282 870 (RS422, max. 400 m)	INS645  15-pin male connector	INK234 	INS645  15-pin male connector

<p>IKB0016/000,0 MN: 282 871 (RS422, max. 400 m)</p>	 <p>INS645 15-pin male connector</p> <p>INS526 9-pin female connector</p> <p>INK234</p>
<p>IKB0017/000,0 MN: 282 872 (RS485, max. 400 m)</p>	 <p>INS619 15-pin male connector</p> <p>INS619 15-pin male connector</p> <p>INK572</p>
<p>IKB0018/000,0 MN: 282 874 (RS485, max. 400 m)</p>	 <p>INS619 15-pin male connector</p> <p>INS526 9-pin female connector</p> <p>INK572</p>
<p>IKB0019/000,0 MN: 282 875 (RS485, max. 400 m)</p>	 <p>INS619 15-pin male connector</p> <p>Connector sleeves</p> <p>INK572</p>
<p>IKS0056/000,0 MN: 255 968 (INTERBUS, max. 400 m)</p>	 <p>INS525 9-pin male connector</p> <p>INS526 9-pin female connector</p> <p>INK234</p>
<p>INS0619/K01 MN: 279 583</p>	 <p>INS0619/RS485 (15-pin male connector)</p> <p>Y-connector for self-finishing with termination</p>
<p>INS0645/K01 MN: 282 040</p>	 <p>INS0645/RS422</p> <p>Connector for self-finishing with termination</p>
<p>INS0540/K01 MN: 279 538</p>	 <p>INS0540/Profibus (male)</p> <p>Profibus connector for self-finishing with termination</p>

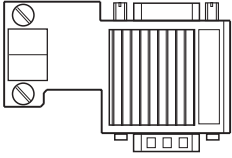
<p>INS0541/K01 MN: 279 539</p>	 <p>INS541/Profibus (male/female connector)</p>	<p>Profibus connector for self-finishing with termination (attachable)</p>
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Fig. 11-5: MTS-P accessories

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Fig. 10-4: Setup of the MTS-P0*.2-D2-B1-P1-S4-NN-FW configurations 10-4

Fig. 11-1: MTS-R accessories 11-3

13 Kundenbetreuungsstellen - Sales & Service Facilities

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