Operating Manual
Hardware

Advant Controller 31
Intelligent Decentralized
Automation System

Communication module
07 MK 92 R1161

RUN

COM4

COM3

LED
☐ 1
☐ 2
☐ 3
☐ 4

X1				
1	2	3	4	5
NC	NC	NC	NC	NC

		X2						
6	7	8	9	10	11	12	13	14
				COM5				
NC	NC	NC	PGND	TxD	RxD	RTS	CTS	SGND

ABB   **07 MK 92**

☐ RUN
☐ ERR
☐ Supply

Advant Controller 31
Serial Communication Processor

DC–IN 2.5W				
24V		0V		
L+	L+	M	M	PE
15	16	17	18	19
X3				

			COM6				
NC	NC	NC	PGND	TxD	RxD	RTS	CTS	SGND
20	21	22	23	24	25	26	27	28
			X4				

ABB STOTZ-KONTAKT

ABB

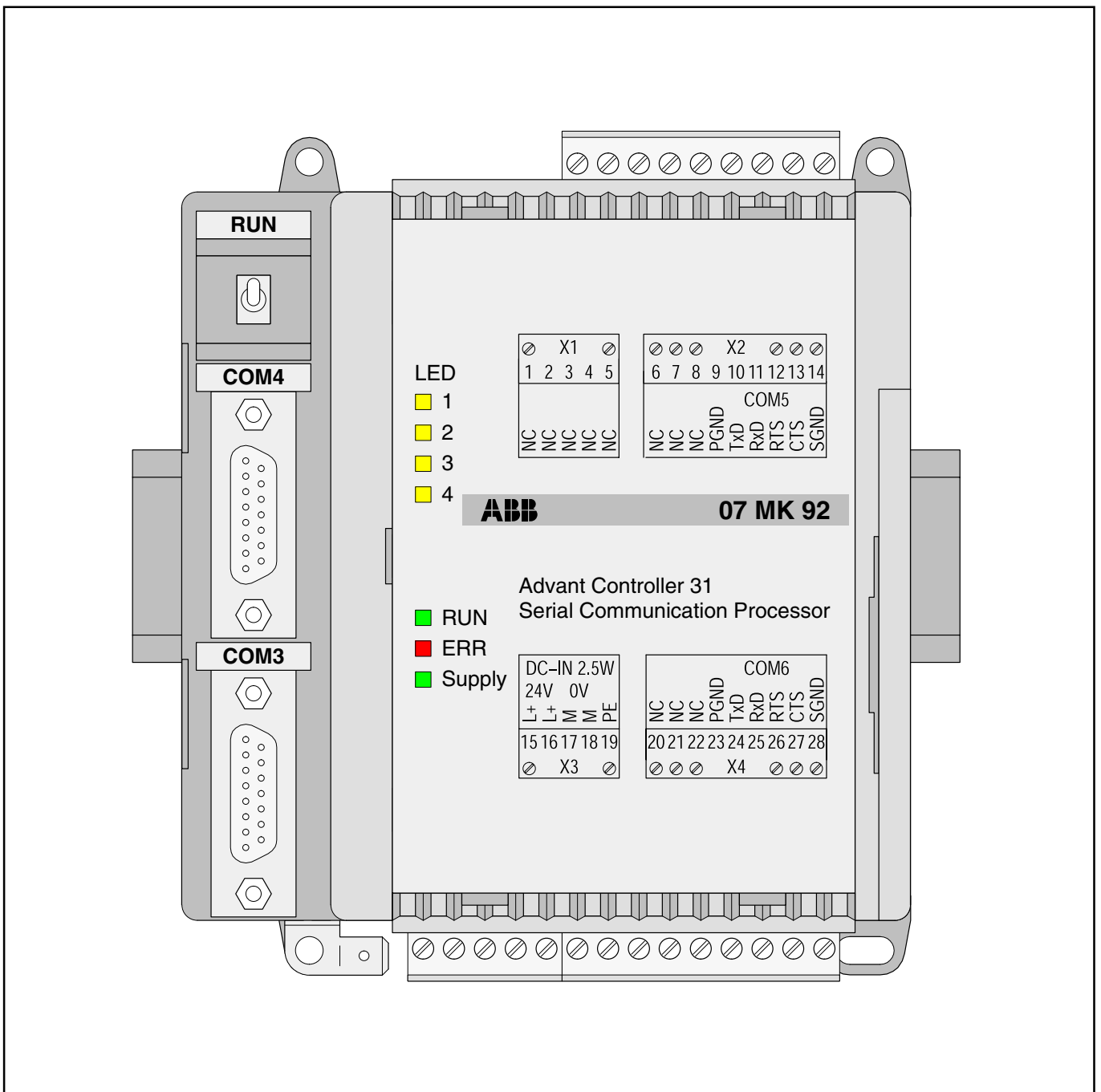## 7.2 Communication module 07 MK 92 R1161 (no longer available)
Connecting external units
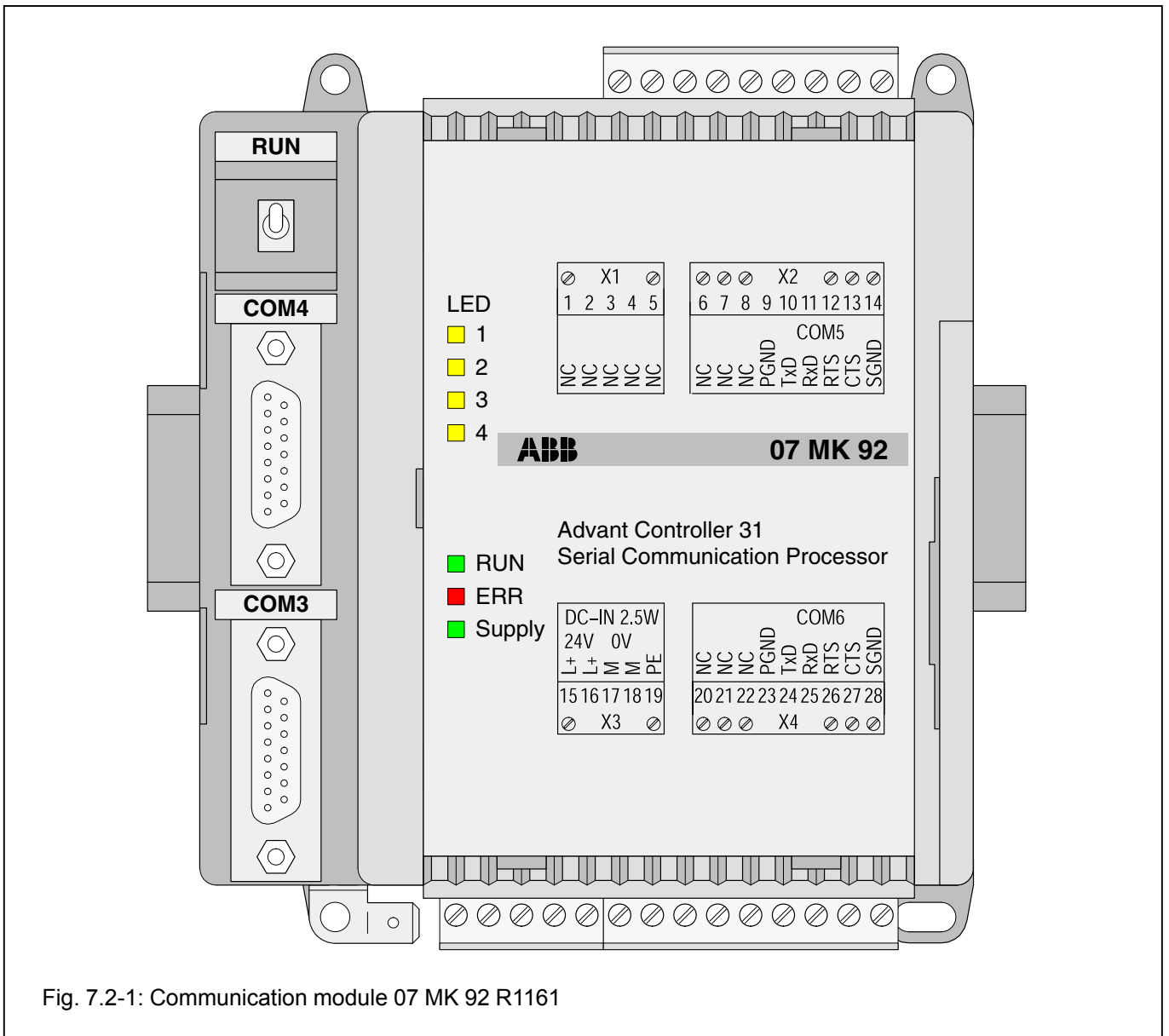
Fig. 7.2-1: Communication module 07 MK 92 R1161

Contents

7.2.1   Brief description

The 07 MK 92 R1161 communication module is a freely programmable interface module with 4 serial interfaces.

The communication module allows external units to be connected to the Advant Controller 31 system via a serial interface.

The communications protocols and transmission types can be freely defined by the user.

Programming is performed on a PC with the programming and test software 907 MK 92.

The communication module is connected to AC31 basic units via the networking interface, e.g. 07 KR 91 R353, 07 KT 92 (index i onwards) 07 KT 93 or 07 KT 94.

The most important features of the communication module are:

- 4 serial interfaces:

    – 2 of them are serial interfaces, optionally configurable in accordance with EIA RS-232 or EIA RS-422 or EIA RS-485 (COM3, COM4)

    – 2 of them are interfaces in accordance with EIA RS-232 (COM5, COM6)

- Freely programmable with a comprehensive function library

- Communication with AC31 basic unit via library functions

- Configurable LEDs for diagnosis

- Programming and testing on a PC via COM3

Processing of the serial interfaces and the networking interface is provided for in an applications program.

Programming is in the standard language "C".

The exchange of data between the serial communication module and the AC31 basic unit is realized by function blocks in the basic unit.

7.2.2   Structure of the front panel elements

Fig. 7.2-2: Communication module 07 MK 92 R1161 with reference points (see below for explanation)
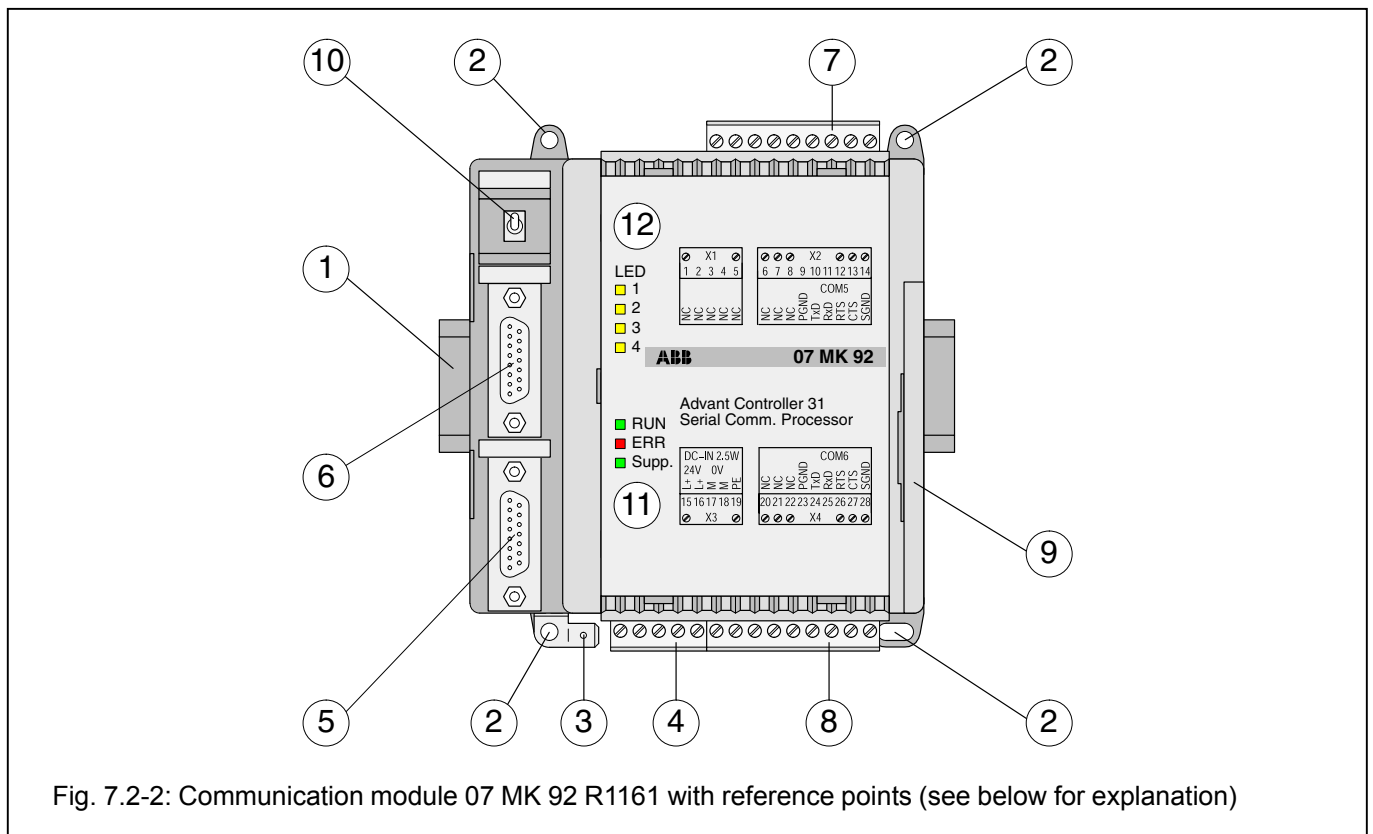
1 **Mounting the unit on a DIN rail**

2 **Mounting the unit with screws**

3 **6.3 mm Faston earthing terminal**

4 **24 V DC supply voltage**

5 **Configurable serial interface COM3**

6 **Configurable serial interface COM4**

7 **Serial interface COM5**

8 **Serial interface COM6**

9 **Networking interface for the Advant Controller 31 basic unit**

10 **Switch for RUN/STOP operation**
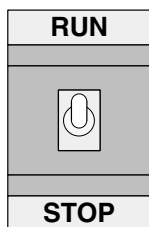
The RUN/STOP switch controls the processing of the user application.

STOP –> RUN

If the switch is switched from STOP to RUN, the user application is loaded into the main memory and processing of the application program is started.

The status of the application program is indicated by the LED RUN: The LED RUN lights up while the program is being processed. If an error occurred during loading (e.g. program not present), the LED RUN remains OFF.

RUN –> STOP

If the switch is switched from RUN to STOP, the program processing is aborted. The LED RUN goes out.

11 **LED displays for system messages**

12 **LED displays freely configurable**

yellow	LED1	
yellow	LED2	
yellow	LED3	
yellow	LED4	
green	RUN	Application program is running
red	ERR	Fatal or serious error
green	Supply	Supply voltage present

Refer to Section 7.2.4 Diagnosis for further information

7.2.3 Electrical connection

7.2.3.1 Application example for connecting the inputs and outputs

The following illustration shows an application example with the 07 KT 97 which utilizes various possibilities for connecting inputs and outputs. Attention must be paid to the following in detail:

- The earthing measures

- Connection of the 07 MK 92 communication module

- Looping through the supply voltage (24 V DC) from the 07 KT 97 to the 07 MK 92

- Earthing the switch-gear cabinet mains socket

- Handling serial interfaces
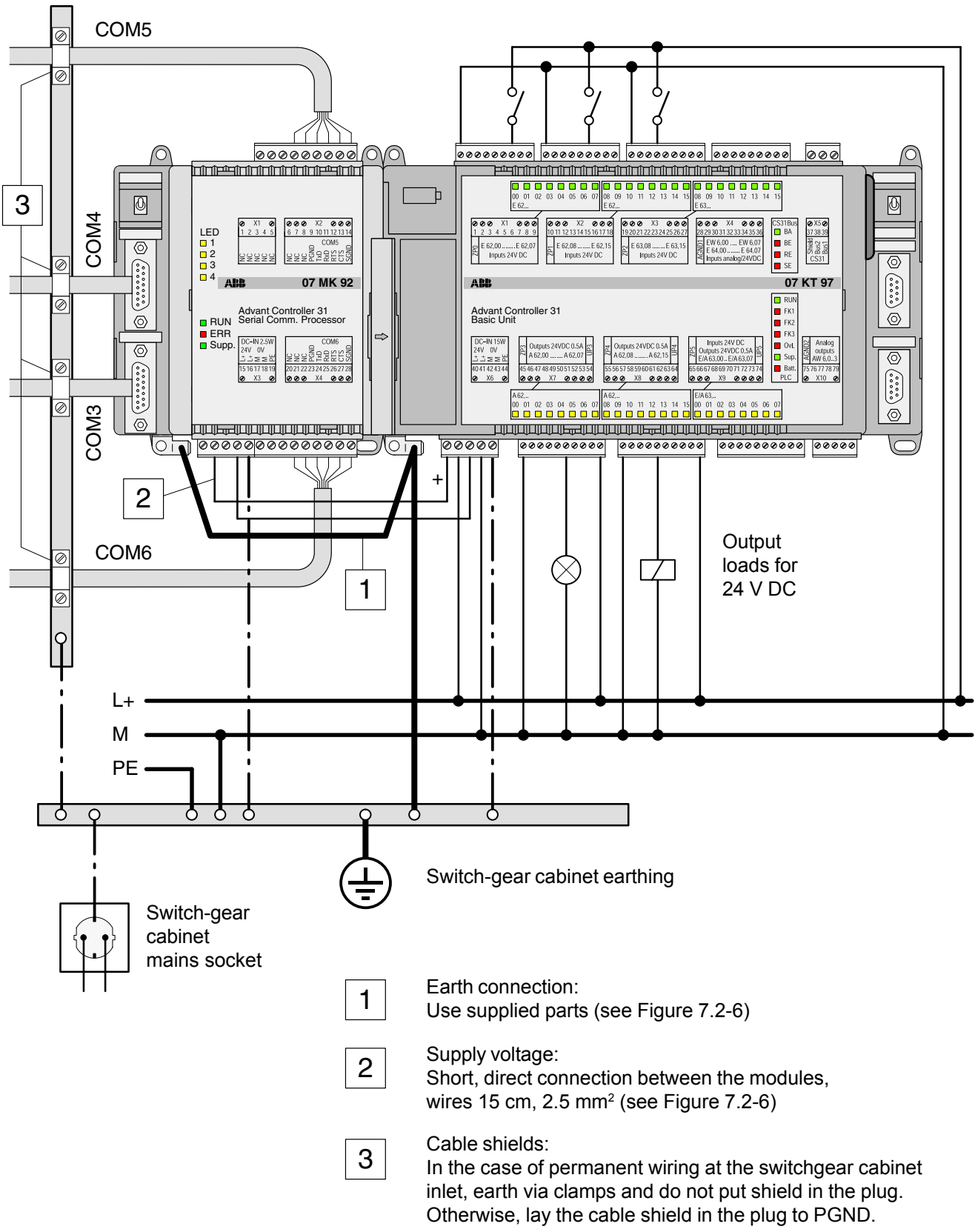
Fig. 7.2-3: Application example:
Communication module 07 MK 92 at basic unit 07 KT 97
(Section 7.2.3 Electrical connection applies in the same way to 07 KR 91, 07 KT 92 to 07 KT 97.)

1	Earth connection: Use supplied parts (see Figure 7.2-6)
2	Supply voltage: Short, direct connection between the modules, wires 15 cm, 2.5 mm^2 (see Figure 7.2-6)
3	Cable shields: In the case of permanent wiring at the switchgear cabinet inlet, earth via clamps and do not put shield in the plug. Otherwise, lay the cable shield in the plug to PGND.

7.2.3.2 Connecting the 24 V DC supply voltage

The supply voltage is fed in via a 5-pole detachable terminal block.

Important:
Plug and unplug terminal block only with power off!

Terminal assignment:

15	L+	*)	Supply voltage +24 V DC
16	L+	*)	Supply voltage +24 V DC
17	M	*)	Reference potential (0V)
18	M	*)	Reference potential (0V)
19	PE		Protective Earth terminal, connected with the Faston terminal inside the device. Do not cause earth loops! Connect PE and Faston to the same earthing potential!

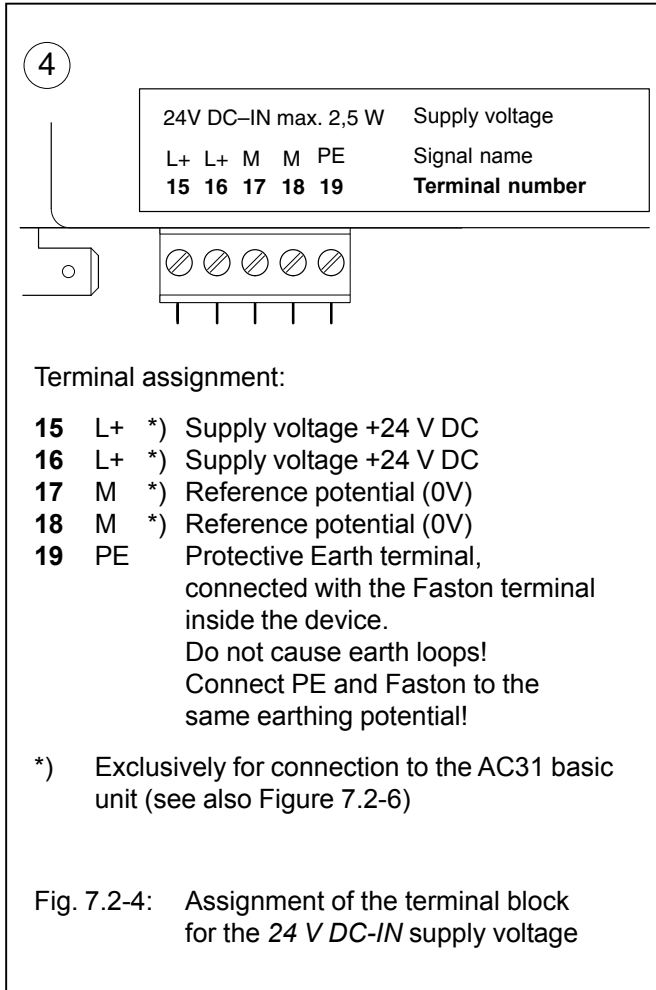*) Exclusively for connection to the AC31 basic unit (see also Figure 7.2-6)

Fig. 7.2-4:   Assignment of the terminal block for the *24 V DC-IN* supply voltage

7.2.3.3 Electrical isolation and notes on earthing

The following illustration shows which circuit parts of the unit are electrically isolated from each other and which internal connections exist. Here, both the clearances and creepage distances and also the test voltages used correspond to DIN/VDE 0160.

The unit is connected via the 6.3 mm Faston terminal (bottom left) to the functional earth (switch-gear cabinet earth) via a wire with a cross section of 6 mm^2 (also see Fig. 7.2-6).
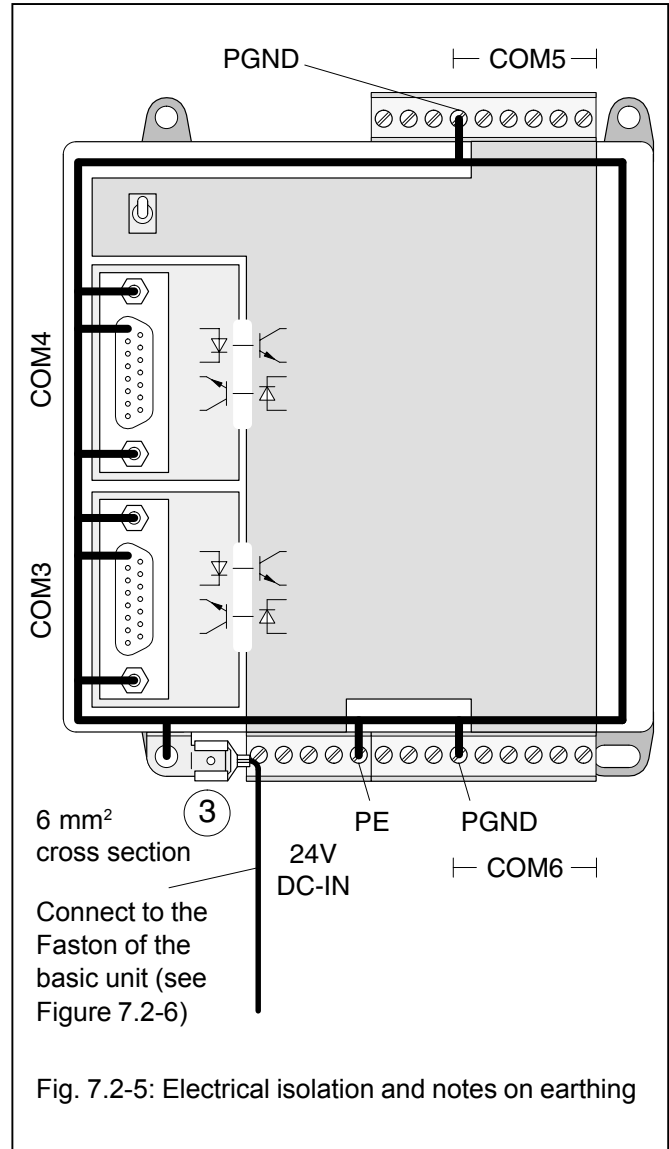
Fig. 7.2-5: Electrical isolation and notes on earthing
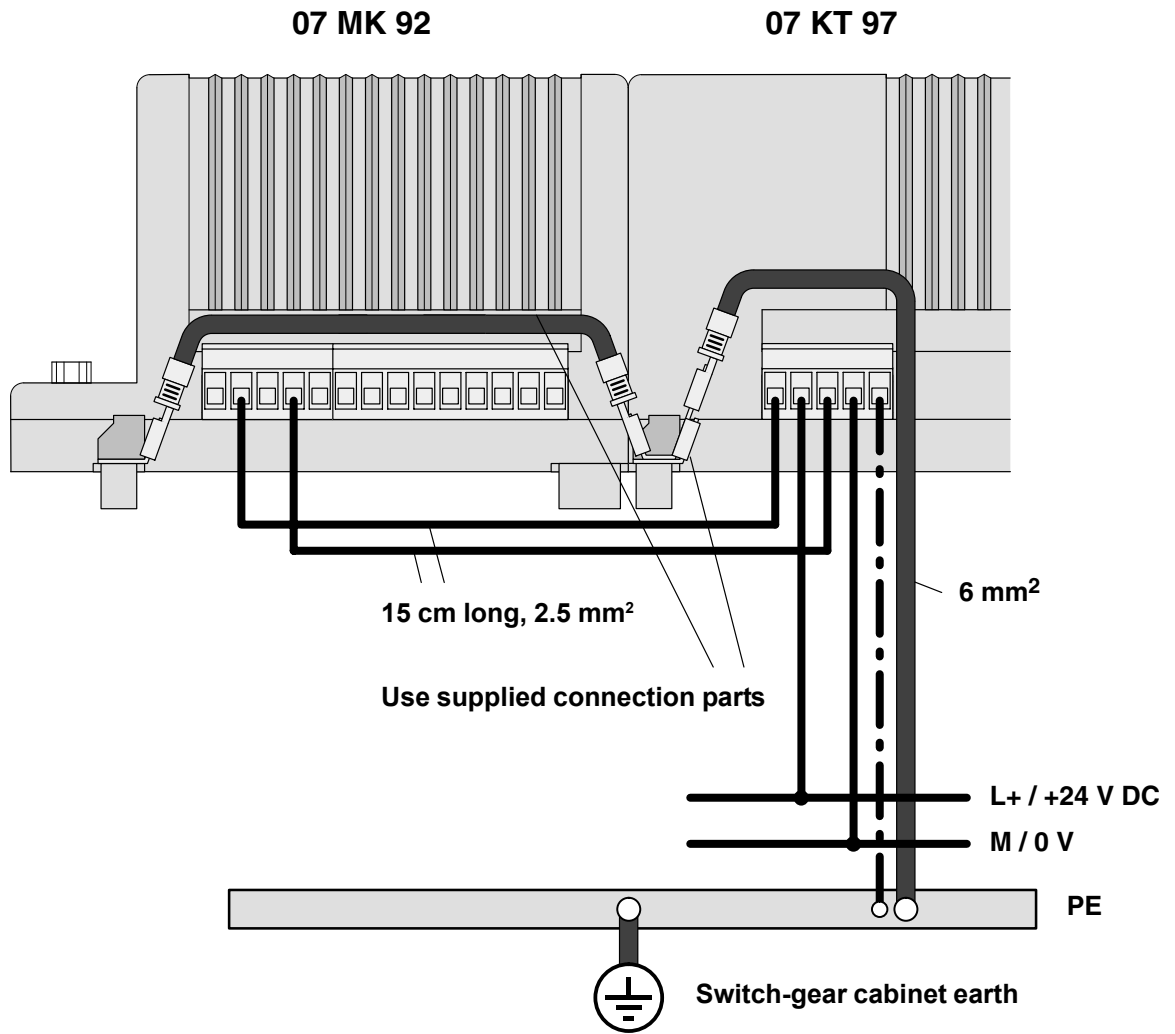
07 MK 92   **07 KT 97**

15 cm long, 2.5 mm²

Use supplied connection parts

6 mm²

L+ / +24 V DC

M / 0 V

PE

Switch-gear cabinet earth

Fig. 7.2-6: Earthing connections and voltage supply for 07 MK 92

7.2.3.4 Serial interfaces

Use

External units can be connected to the AC31 system via the serial interfaces. The interfaces are independent of each other. They can be managed via freely definable protocols.

Scope of functions

The four serial interfaces can be configured independently of each other in the following scope of functions:

- Data format 7 or 8 bits

- Even, odd or no parity

- Discrete baud rates
  from 300 Bd to 19200 Bd for COM3 and COM 4 and from 300 Bd to 9600 Bd for COM5 and COM6

- Automatic processing of the SW handshake (XON/XOFF)

- Automatic processing of the HW handshake (RTS/CTS)

- Error detection
  (parity, framing, overrun, break)

Serial interfaces COM3, COM4

Interface standard

- EIA RS-232 or

- EIA RS-422 or

- EIA RS-485

Both interfaces can be run independently of each other in one of the interface standards each. Selection is by choosing the corresponding interface signals.

Modes

- Programming and test mode

- Application mode

COM3 can be used as a programming and test interface.
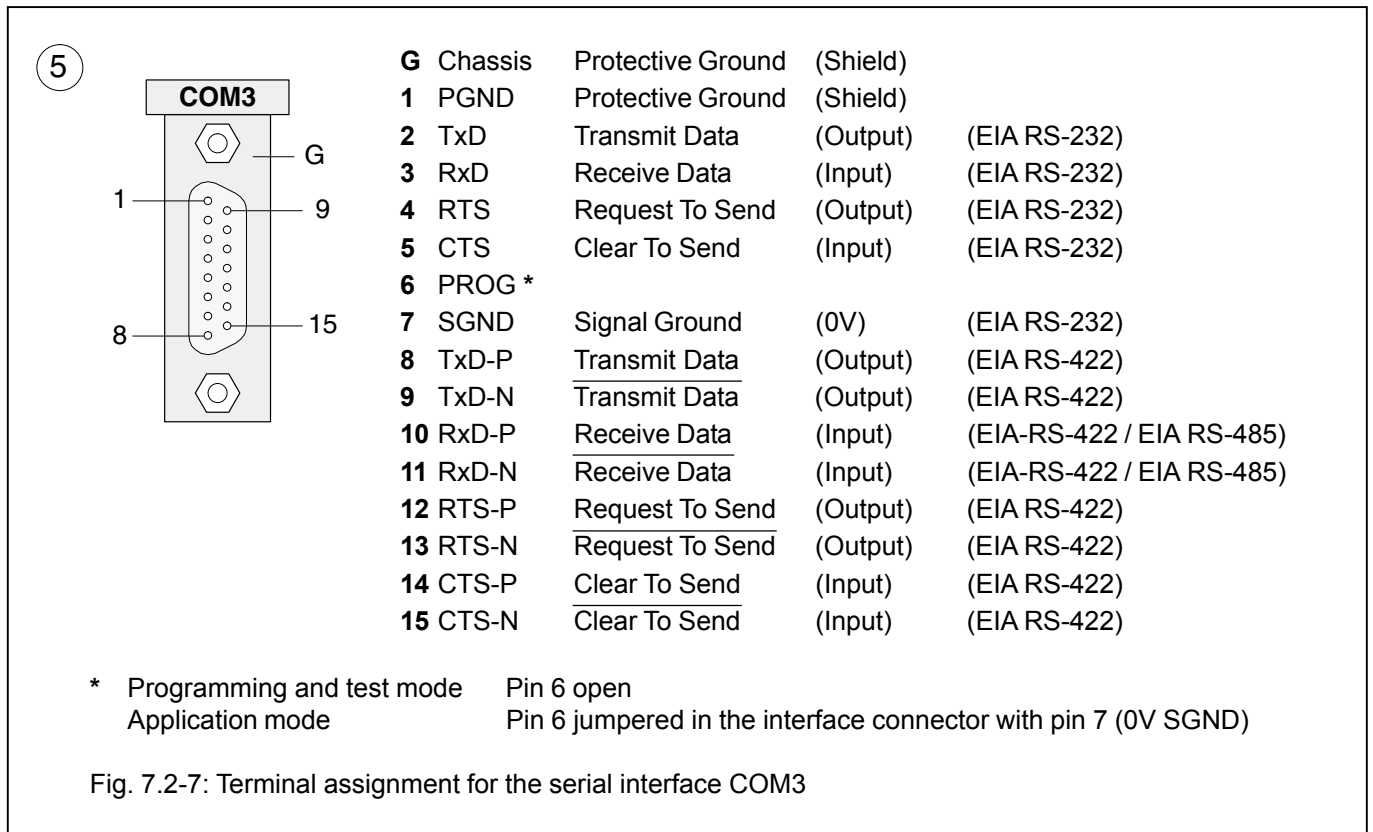
Electrical isolation

Both interfaces are electrically isolated.

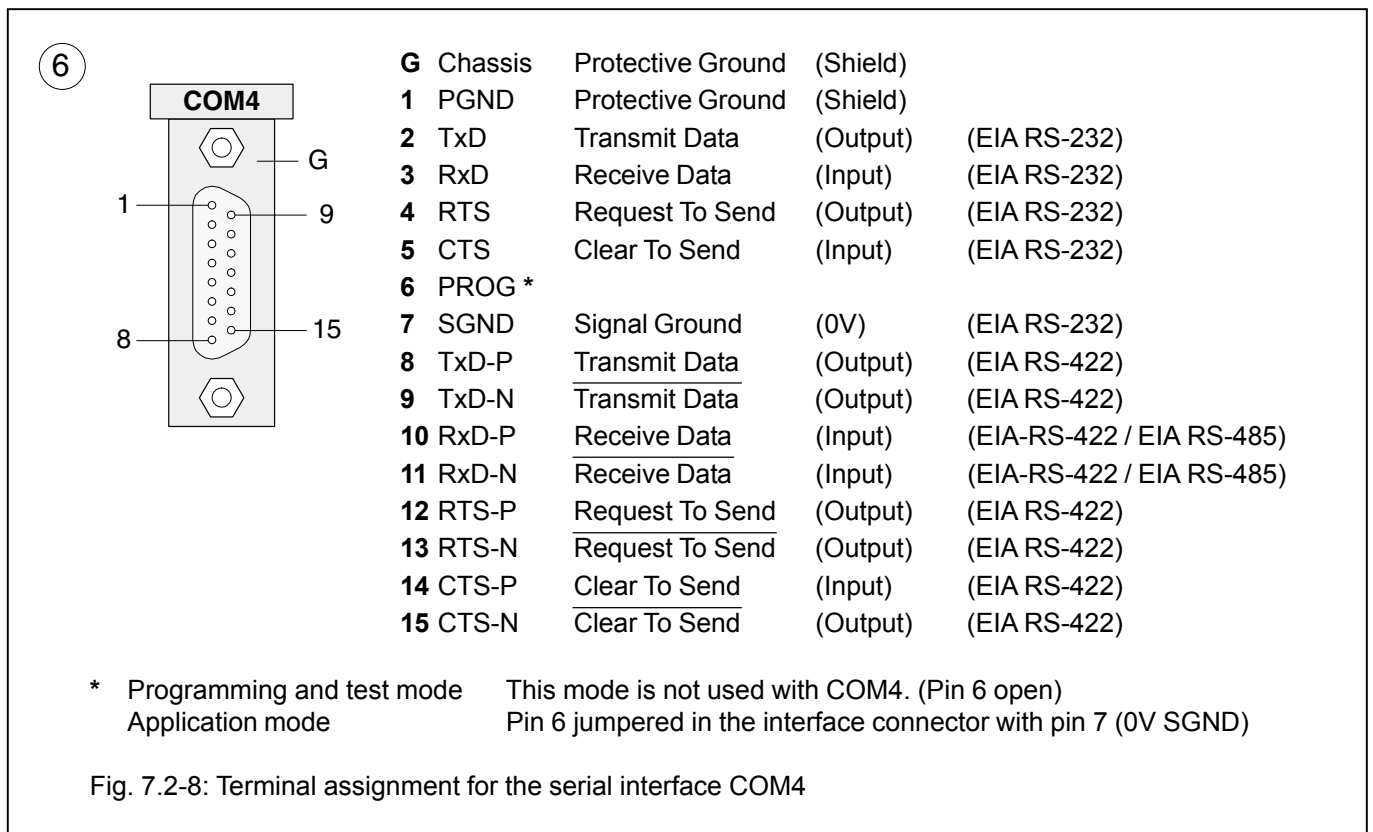**Connection**

Connection is via a 15-pole D-SUB connector (female).

Serial interface COM3: Terminal assignment

Interface standard: EIA RS-232, EIA RS-422, EIA RS-485

⑤

COM3

G	Chassis	Protective Ground	(Shield)	
1	PGND	Protective Ground	(Shield)	
2	TxD	Transmit Data	(Output)	(EIA RS-232)
3	RxD	Receive Data	(Input)	(EIA RS-232)
4	RTS	Request To Send	(Output)	(EIA RS-232)
5	CTS	Clear To Send	(Input)	(EIA RS-232)
6	PROG *			
7	SGND	Signal Ground	(0V)	(EIA RS-232)
8	TxD-P	Transmit Data	(Output)	(EIA RS-422)
9	TxD-N	Transmit Data	(Output)	(EIA RS-422)
10	RxD-P	Receive Data	(Input)	(EIA-RS-422 / EIA RS-485)
11	RxD-N	Receive Data	(Input)	(EIA-RS-422 / EIA RS-485)
12	RTS-P	Request To Send	(Output)	(EIA RS-422)
13	RTS-N	Request To Send	(Output)	(EIA RS-422)
14	CTS-P	Clear To Send	(Input)	(EIA RS-422)
15	CTS-N	Clear To Send	(Input)	(EIA RS-422)

* Programming and test mode   Pin 6 open
Application mode   Pin 6 jumpered in the interface connector with pin 7 (0V SGND)

Fig. 7.2-7: Terminal assignment for the serial interface COM3

Serial interface COM4: Terminal assignment

Interface standard: EIA RS-232, EIA RS-422, EIA RS-485

⑥

COM4

G	Chassis	Protective Ground	(Shield)	
1	PGND	Protective Ground	(Shield)	
2	TxD	Transmit Data	(Output)	(EIA RS-232)
3	RxD	Receive Data	(Input)	(EIA RS-232)
4	RTS	Request To Send	(Output)	(EIA RS-232)
5	CTS	Clear To Send	(Input)	(EIA RS-232)
6	PROG *			
7	SGND	Signal Ground	(0V)	(EIA RS-232)
8	TxD-P	Transmit Data	(Output)	(EIA RS-422)
9	TxD-N	Transmit Data	(Output)	(EIA RS-422)
10	RxD-P	Receive Data	(Input)	(EIA-RS-422 / EIA RS-485)
11	RxD-N	Receive Data	(Input)	(EIA-RS-422 / EIA RS-485)
12	RTS-P	Request To Send	(Output)	(EIA RS-422)
13	RTS-N	Request To Send	(Output)	(EIA RS-422)
14	CTS-P	Clear To Send	(Input)	(EIA RS-422)
15	CTS-N	Clear To Send	(Output)	(EIA RS-422)

* Programming and test mode   This mode is not used with COM4. (Pin 6 open)
Application mode   Pin 6 jumpered in the interface connector with pin 7 (0V SGND)

Fig. 7.2-8: Terminal assignment for the serial interface COM4

Serial interfaces COM5, COM6

Interface standard

EIA RS-232

Mode

Application mode
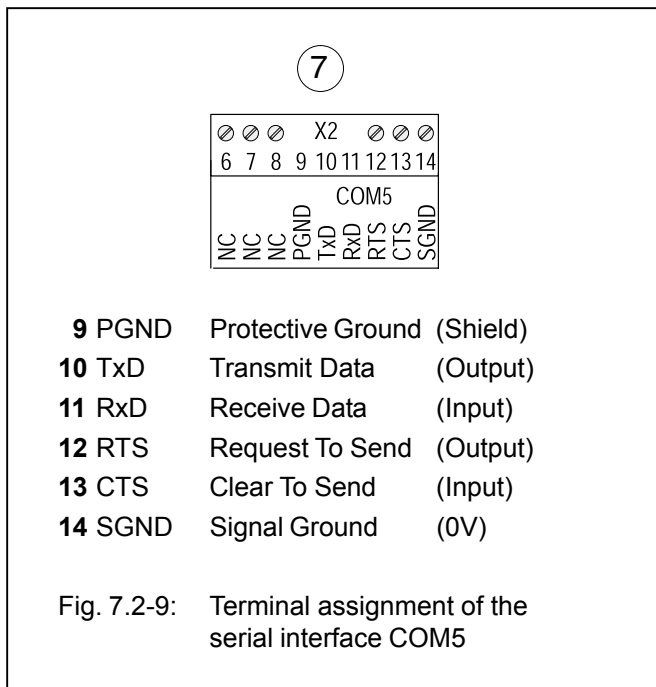
Electrical isolation

Both interfaces are not electrically isolated.

Connection
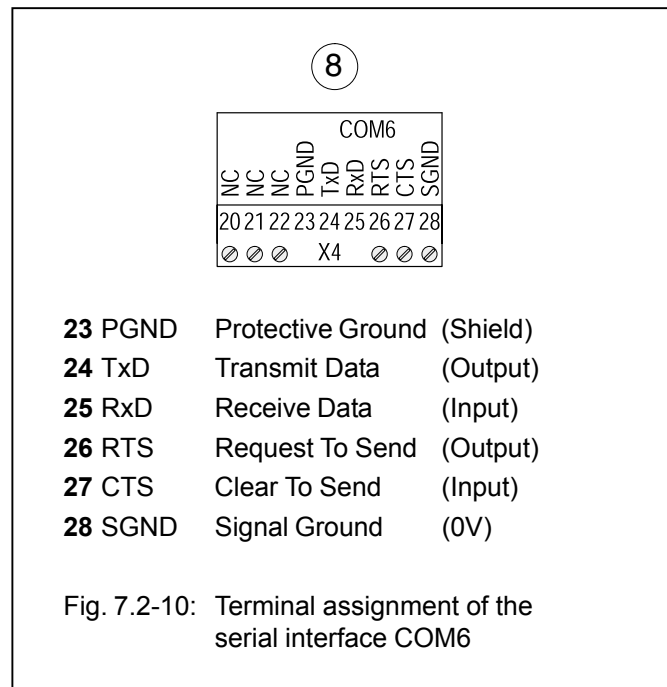
Connection is via removable screw-type terminal blocks.

Serial interface COM5: Terminal assignment

Interface standard: EIA RS-232

9	PGND	Protective Ground	(Shield)
10	TxD	Transmit Data	(Output)
11	RxD	Receive Data	(Input)
12	RTS	Request To Send	(Output)
13	CTS	Clear To Send	(Input)
14	SGND	Signal Ground	(0V)

Fig. 7.2-9: Terminal assignment of the serial interface COM5

Serial interface COM6: Terminal assignment

Interface standard: EIA RS-232

23	PGND	Protective Ground	(Shield)
24	TxD	Transmit Data	(Output)
25	RxD	Receive Data	(Input)
26	RTS	Request To Send	(Output)
27	CTS	Clear To Send	(Input)
28	SGND	Signal Ground	(0V)

Fig. 7.2-10: Terminal assignment of the serial interface COM6

7.2.3.5 Networking interface ⑨

The networking interface, a special parallel interface, allows the 07 MK 92 communication module to be connected to AC31 basic units (such as 07 KR 91 R353, 07 KT 92 to 07 KT 97). The housing of the communication module is connected to the housing of the AC31 basic unit by a snap-fit connection. The electrical connection is via a 40-pole ribbon cable with socket connector, soldered onto the 07 MK 92 side.

Note: Attachment and disconnection of units on the networking interface may only be performed when all supply voltages are switched off.

Fig. 7.2-11: Example: Connecting 07 MK 92 with 07 KT 97
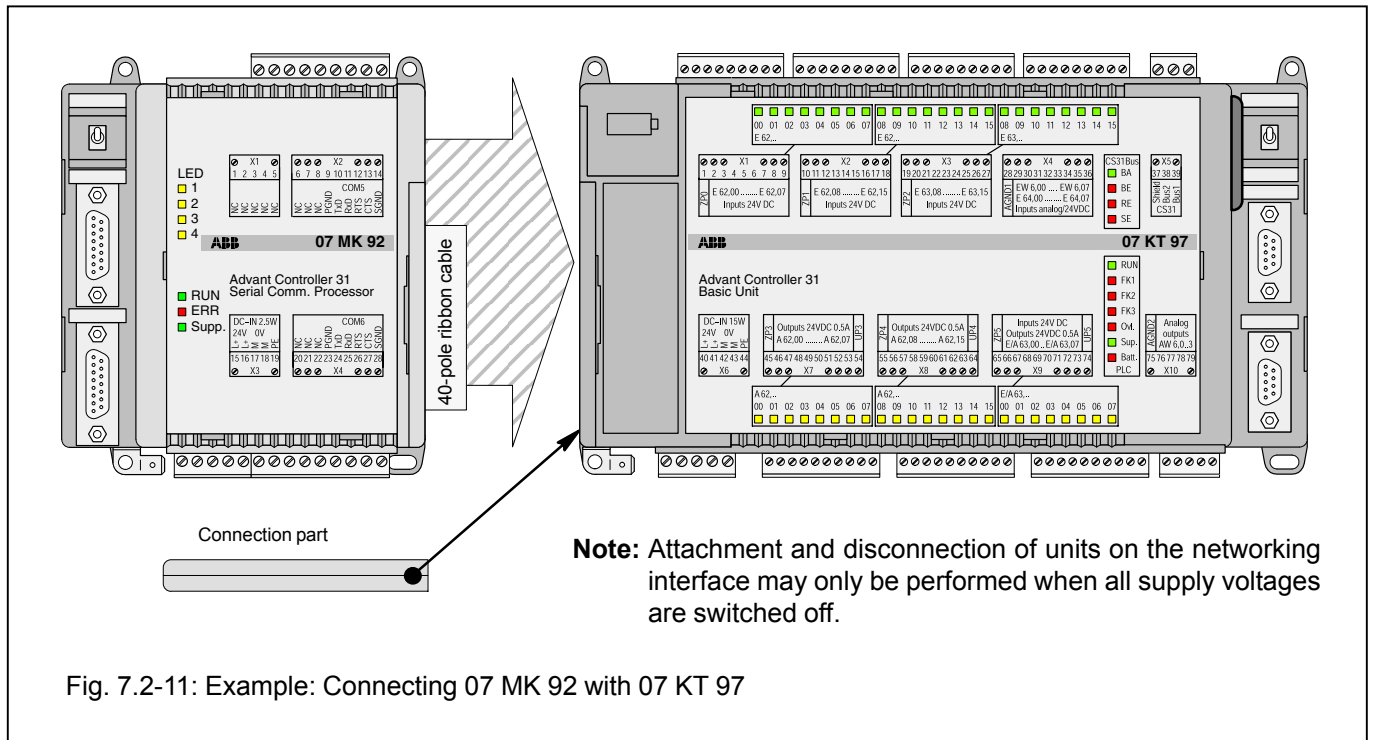
Mounting the expansion housing

1. Detach the cover on the basic unit from the networking interface.

2. Plug the socket strip of the 40-pole ribbon cable secured to the 07 MK 92 onto the networking connector of the basic unit.

3. Place both units on a level surface and slide them together so that they engage.

4. Slide in the connection part to fix the housing in position.

7.2.4 Diagnosis

LED displays for system messages RUN, ERR, Supply

green	☐ **RUN**
red	☐ **ERR**
green	☐ **Supply**

The green LED "RUN" lights up when the user application is being processed.

The red LED "ERR" lights up when a fatal error (RAM error, DP-RAM error, EPROM error, Flash EPROM error) or a serious error is present.

The green LED "Supply" indicates the presence of the supply voltage.

Fig. 7.2-12: LED displays for system messages RUN, ERR, Supply

LED displays, freely configurable

The yellow LEDs "LED1...LED4" are configurable. They can be controlled by the application program.

yellow	☐ **LED1**
yellow	☐ **LED2**
yellow	☐ **LED3**
yellow	☐ **LED4**

Fig. 7.2-13: LED displays, freely configurable

Operating states, error display

RUN gn	ERR rd	Supply gn	Meaning	Remedy
■	■	■	Supply voltage not present.	● Switch on supply voltage. ● Check supply voltage.
■	■	★	Supply voltage present. 07 MK 92 is ready to process the user application. – Load user application with 907 MK 92. – Start processing of application: Switch RUN/STOP switch to RUN.	
★	■	★	The user application is running.	
X	★	★	A serious error is present which caused the user application to abort automatically.	● Read out error and remedy if this is possible.
★	★	★	Initialization procedure. Voltage ON.	
■ = LED off, ★ = LED on, X = LED on or off, gn = green, rd = red				

Fig. 7.2-14: Signalling operating states and error display

7.2.5 Programming and test software 907 MK 92

The communication module is programmed with the programming and test software 907 MK 92. This software can be run on an IBM-compatible PC. The PC is connected with the COM3 interface of the communication module.

In addition to the programming and test software, the package 907 MK 92 contains documentation of the communication module 07 MK 92 and configuration examples.

7.2.6   Technical data

In general, the details in section 1 "System data and system structure" of volume 2 of the system description "Advant Controller 31" apply as technical data. Supplementary and deviating data is listed below.

7.2.6.1   General data

Number of serial interfaces	4
Number of parallel interfaces	1 networking interface for connecting to the Advant Controller 31 basic unit
Built-in application software memory	Flash EPROM 128 kbytes
Diagnosis	4 configurable LEDs: LED1...4 (controlled by the application program)
Operating and error displays	3 LEDs: RUN, ERR, Supply
Conductor cross section for the removable terminals	max. 2.5 mm^2

7.2.6.2   Supply voltage for 07 MK 92 R1161

Rated supply voltage	24 V DC
Power dissipation	typ. 2.5 W
Max. current consumption with rated voltage with supply voltage 30 V	210 mA 170 mA
Protection against reversed terminal connection	yes (only when units with electrically isolated interfaces are connected to COM5/COM6)

7.2.6.3   Connection of serial interfaces COM3, COM4

Interface standard	EIA RS-232 or EIA RS-422 or EIA RS-485
Programming with 907 MK 92	via IBM-PC (or compatible)
Man-machine communication	yes, e.g. with an operating station
Electrical isolation	yes, interfaces with respect to each other and with respect to the rest of the unit (also see Figure 7.2-5)
Potential differences	So that no earthing potential differences arise between the 07 MK 92 and the peripheral units connected to COM3 and COM4, the latter are supplied from the switch-gear cabinet mains socket (also see earthing connections in Figure 7.2-5).
Terminal assignment and description of the interfaces COM3, COM4	see page 7.2-7 onwards

7.2.6.4   Connection of serial interfaces COM5, COM6

|	
Interface standard	EIA RS-232
Man-machine communication	yes, e.g. with an operating station
Electrical isolation	none
Potential differences	see COM3, COM4
Terminal assignment and description of the interfaces COM5, COM6	see page 7.2-9 onwards

7.2.6.5 LED displays

LEDs for operating and error displays:
- Supply voltage present (Supply)   1 green LED
- Fatal or serious error occurred (ERR)   1 red LED
- Application program processing running (RUN)   1 green LED

Configurable LEDs for diagnosis: LED1...LED4   4 yellow LEDs

7.2.6.6 Mechanical data

Mounting on DIN rail	in accordance with DIN EN 50022–35, 15 mm deep. The DIN rail is located in the middle between the upper and the lower edges of the module.
Fastening by screws	using 4 M4 screws.
Width x height x depth	140 x 120 x 85 mm
Wiring method	by removeable terminal blocks with screw-type terminals, max. 2.5 mm^2
Weight	450 g
Dimensions for mounting	see the following drawing
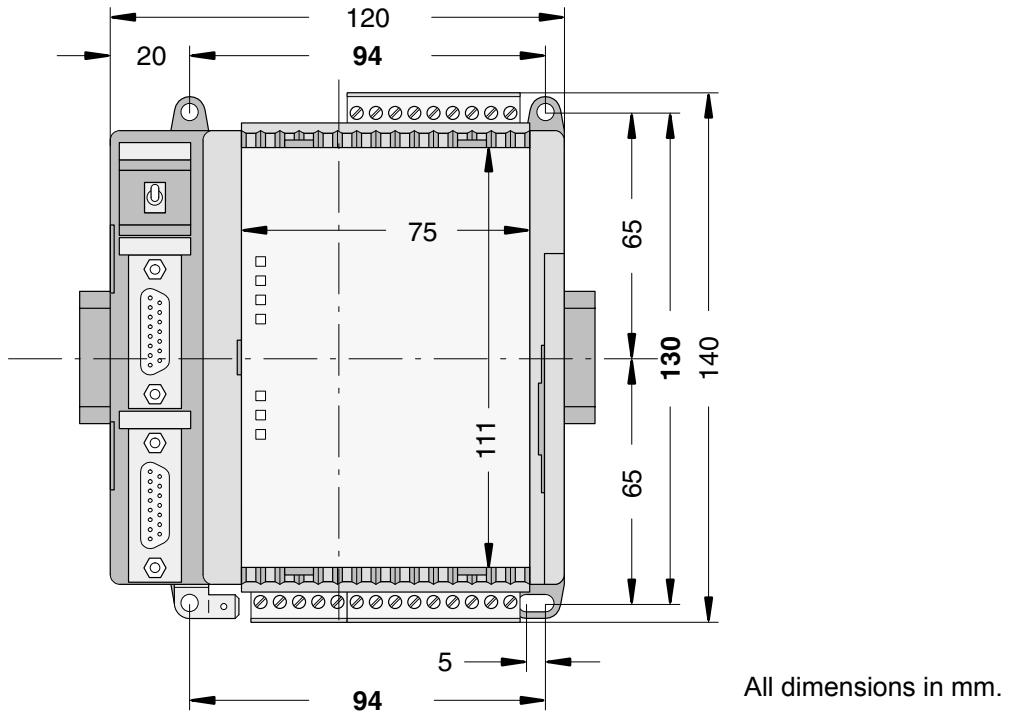
The device is 85 mm deep. The interface connectors COM3 and COM4 are set deeper so that the mounting depth required does not become any larger even with detachable interface cables. If, however, a DIN rail is used, the mounting depth is increased by the overall depth of the rail.

Fig. 7.2-15: Dimensions of the communication module 07 MK 92, front view, **the dimensions for assembly bore holes are printed in bold**

7.2.6.7 Mounting hints

Mounting position	vertical, terminals above and below
Cooling	The natural convection cooling must not be hindered by cable ducts or other material mounted in the switch-gear cabinet.

7.2.6.8 Ordering data

Communication module 07 MK 92 R1161   Order No. GJR5 2533 00 R1161 (no longer available)

Scope of delivery   Communication module 07 MK 92 R1161
2 9-pole terminal blocks (5.08 mm grid)
1 5-pole terminal block (5.08 mm grid)
Cable including terminals for making the
  earth connection

Further literature

System description Advant Controller 31, English   Order No. 1SAC 1316 99 R 0201

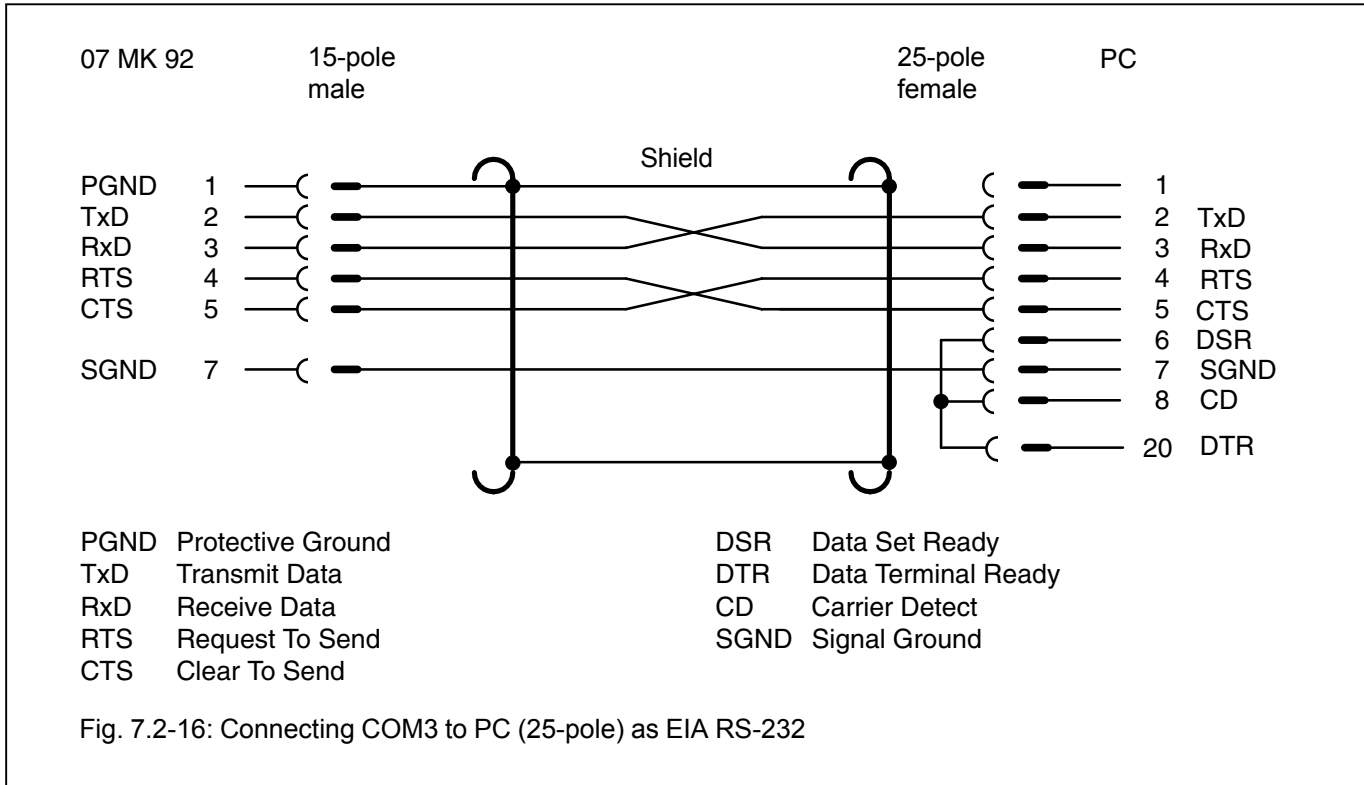**Software**

Programming and test software 907 MK 92   Order No. GJP5 2074 00 R0102
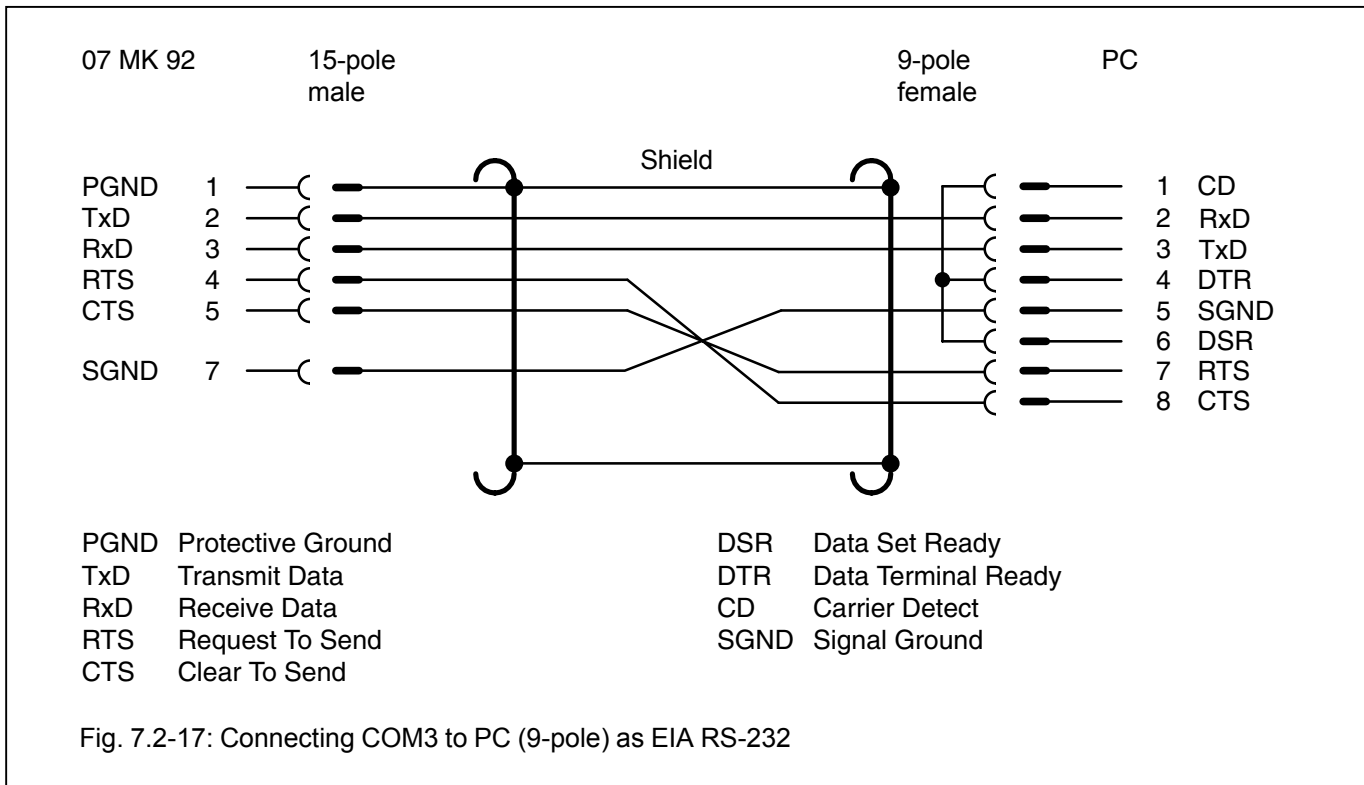
907 MK 92 consists of:
– Documentation
– Software
  – Basic functions for 07 MK 92 R1161
 – Paradigm Locate V 3.21

7.2.7 System cables

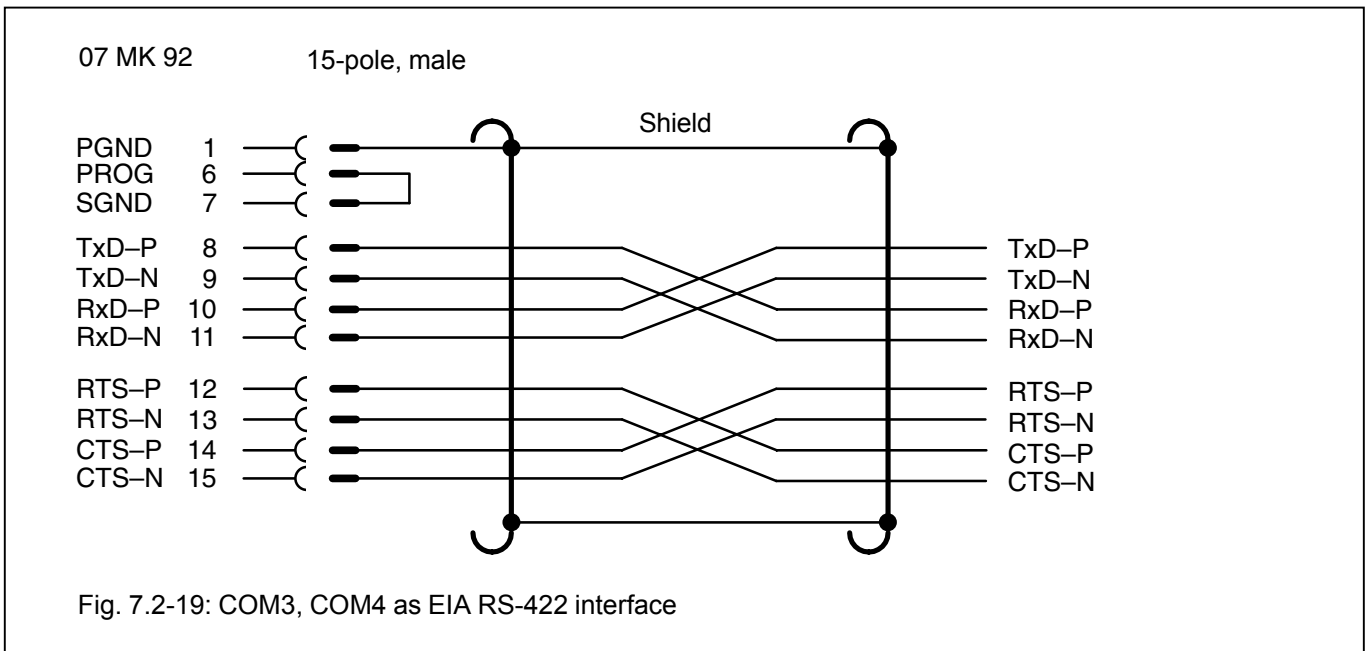### 7.2.7.1 COM3 to PC (25-pole) for programming und test software 907 MK 92

PGND   Protective Ground
TxD   Transmit Data
RxD   Receive Data
RTS   Request To Send
CTS   Clear To Send

DSR   Data Set Ready
DTR   Data Terminal Ready
CD   Carrier Detect
SGND   Signal Ground

Fig. 7.2-16: Connecting COM3 to PC (25-pole) as EIA RS-232

7.2.7.2 COM3 to PC (9-pole) for programming and test software 907 MK 92

PGND   Protective Ground
TxD   Transmit Data
RxD   Receive Data
RTS   Request To Send
CTS   Clear To Send

DSR   Data Set Ready
DTR   Data Terminal Ready
CD   Carrier Detect
SGND   Signal Ground

Fig. 7.2-17: Connecting COM3 to PC (9-pole) as EIA RS-232

7.2.7.3 COM3, COM4 as EIA RS-232 interface

Fig. 7.2-18: COM3, COM4 as EIA RS-232 interface

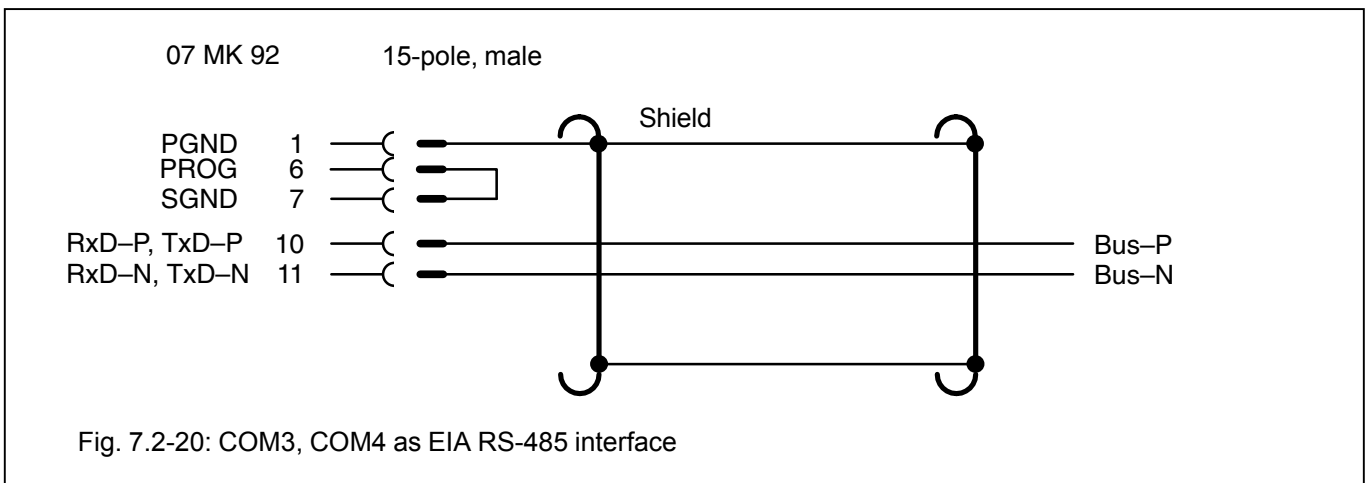### 7.2.7.4 COM3, COM4 as EIA RS-422 interface
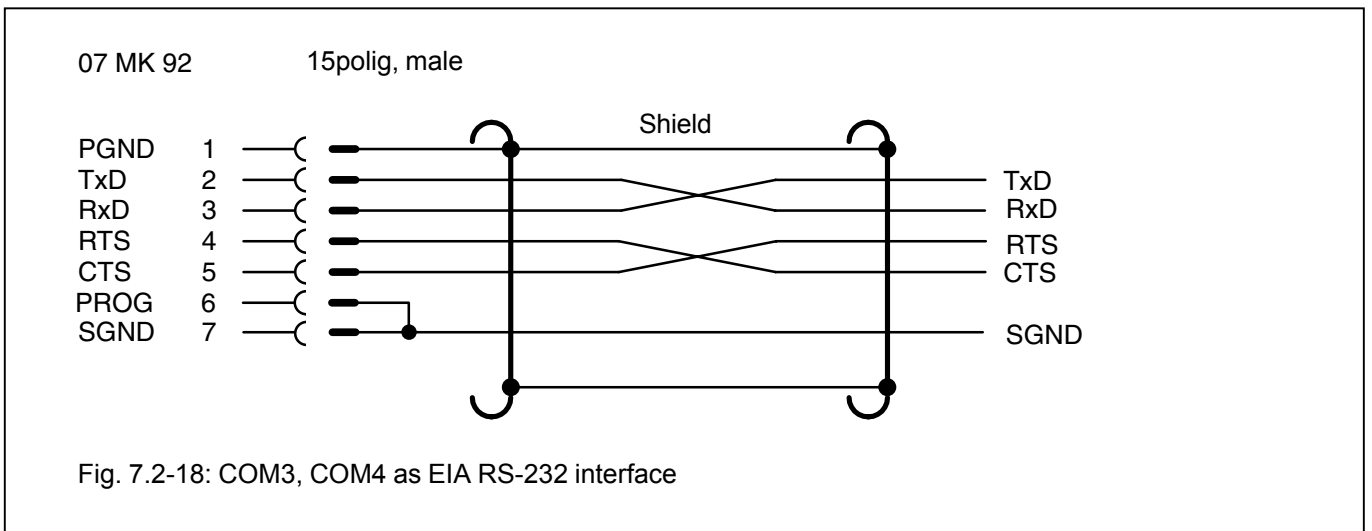
Fig. 7.2-19: COM3, COM4 as EIA RS-422 interface

7.2.7.5 COM3, COM4 as EIA RS-485 interface

Fig. 7.2-20: COM3, COM4 as EIA RS-485 interface

7.2.7.6 COM5 as EIA RS-232 interface

Signal   Terminals 07 MK 92

PGND	9	
TxD	10	
RxD	11	
RTS	12	
CTS	13	
SGND	14	

Shield

TxD
RxD
RTS
CTS
SGND

Fig. 7.2-21: COM5 as EIA RS-232 interface

7.2.7.7 COM6 as EIA RS-232 interface

Signal   Terminals 07 MK 92

PGND	23	
TxD	24	
RxD	25	
RTS	26	
CTS	27	
SGND	28	

Shield

TxD
RxD
RTS
CTS
SGND
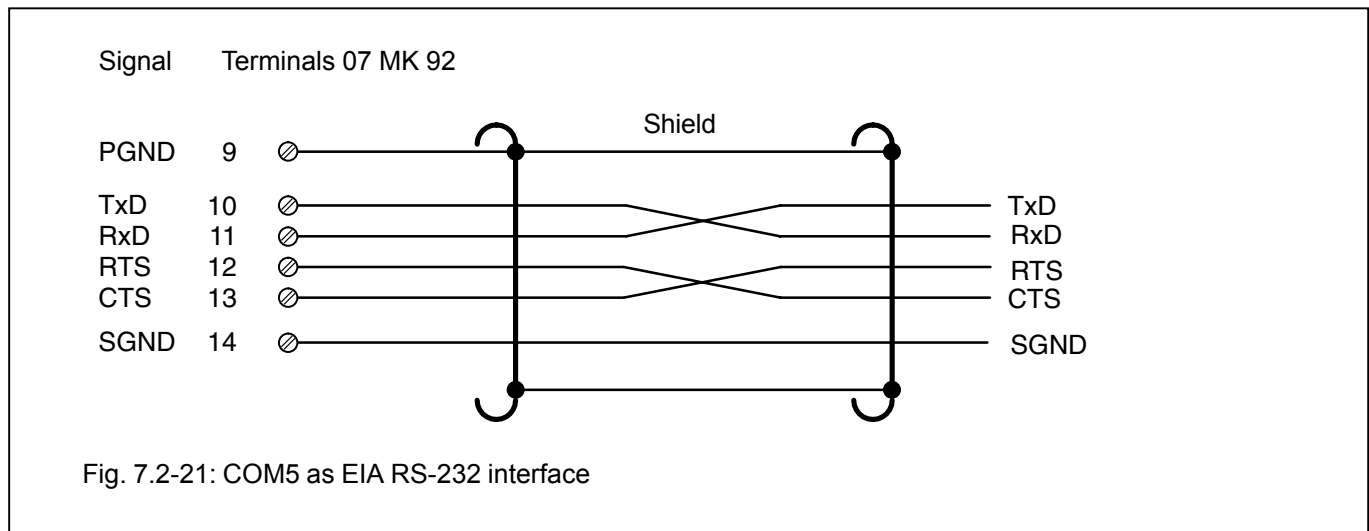
Fig. 7.2-22: COM6 as EIA RS-232 interface
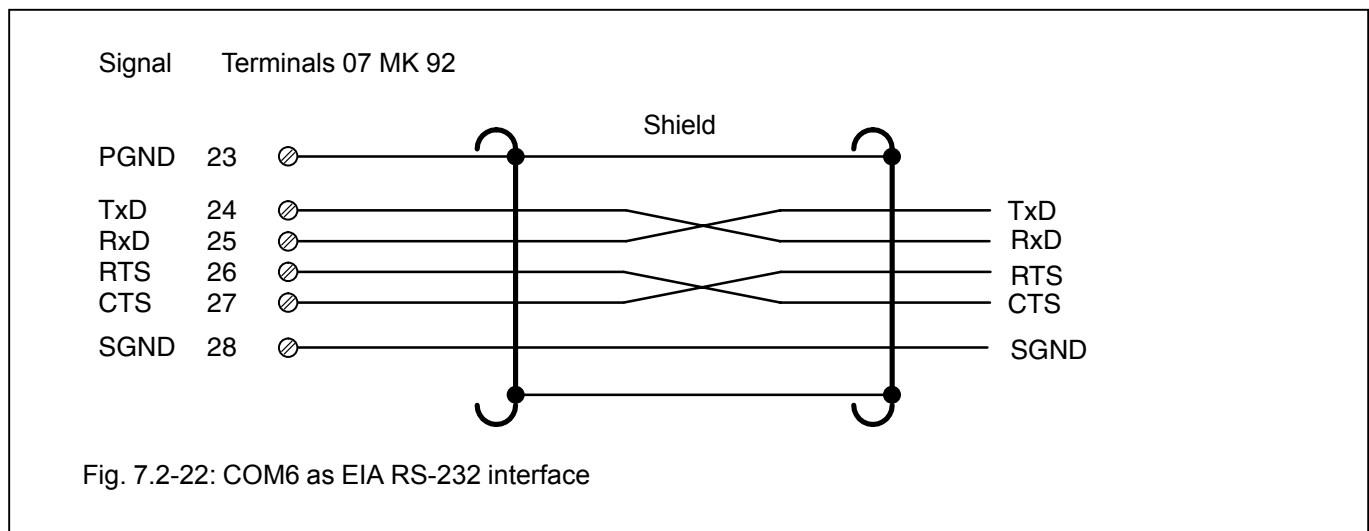
7.2.8 Memory areas in 07 MK 92

Used EPROM area	FFFFF (128 kB EPROM) FE000
Free EPROM area	FDFFF E0000
Not used	DFFFF C0000
Flash EPROM	BFFFF (128 kB) A0000
Not used	9FFFF 99000
LEDs	98FFF 98000
Not used	97FFF 90800
Dual Port RAM	907FF (2 kB) 90000
Not used	8FFFF 80000
Free RAM area	7FFFF (512 kB RAM) 00B00
Used RAM area	00AFF 00000

7.2.9 LED control

Addressing:	Segment:	9800	
	Offset:	0	LED1
		1	LED2
		2	LED3
		3	LED4
		4	LED RUN
(Flash programming voltage		5	EEPROM - Vpp)
		6	LED ERR

7.2.10 Allocation of the ports

Port P2PIN	Bit 5	RUN / STOP (1 = STOP, 0 = RUN)
Port P2PIN	Bit 6	Status of pin 6 at COM3
Port P2PIN	Bit 7	Status of pin 6 at COM4
Port P1LTCH	Bit 5	Control of RTS COM3
Port P1LTCH	Bit 7	RS-485 change-over COM3
Port P1LTCH	Bit 3	Control of RTS COM4
Port P1LTCH	Bit 6	RS-485 change-over COM4

The addresses of the ports are listed in the file MK92HW.H

ABB