

Driver for MELSEC A CPU, MELSEC QnA/Q CPU, MELSEC A C24 and MELSEC QnA/Q C24

This manual presents installation and handling of the drivers for Mitsubishi Electric MELSEC A CPU, QnA/Q CPU, A C24 and QnA/Q C24 to the terminals in the E-series.

The functionality in the E-terminals and in E-Designer (MAC Programmer+) are described in the E-series manual.

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1 Introduction

This manual describes how the PLC systems in the MELSEC A, QnA and Q series from Mitsubishi Electric are connected to the operator terminals in the E-series via the protocols MELSEC A CPU, QnA/Q CPU, MELSEC A C24 and MELSEC QnA/Q C24 and how they communicate. Addressing of an item is done in the normal MELSEC A/QnA/Q way.

For information about the PLC systems we refer to the manual for the current system.

2 Install and update driver

When installing the programming tool (software) the drivers available at the time of release are installed automatically. A new driver can be added into the programming tool either with the programming tool using an Internet connection or from diskette. A driver can be updated to a newer version in the same way.

2.1 Installation of driver using Internet

To update available drivers to the latest version or to install new drivers you use the function **File/Update terminal drivers from Internet** in the programming tool. All projects must be closed before this function is used and the computer must be able to make an Internet connection. You do not need a browser. When the connection is established a list is shown with all drivers that can be downloaded from Internet to the computer. The list shows the version number of available drivers and the version number of installed drivers. Mark the driver/ drivers you want to install in the programming tool. The function **Mark newer** will mark all drivers that are available in a newer version then the one installed and the drivers not installed. Then select **Download**. Each driver is approximately 500 kb and it is ready to use when the download is ready.

2.2 Installation of driver from disk

To update available drivers to the latest version or to install new drivers you use the function **File/Update terminal drivers from Disk** in the programming tool. All projects must be closed before this function is used. Select the folder with the new driver and choose to open the mpd-file. A list displays all drivers that can be installed showing the version number of available drivers and the version number of installed drivers. Mark the driver/ drivers you want to install in the programming tool. The function **Mark newer** will mark all drivers that are available in a newer version then the one installed and the drivers not installed. Then select **Install**.

How to select one of the MELSEC drivers in the project and how to transfer it to the terminal are described in *chapter 3*.

3 Connecting the terminal to the PLC system

3.1 Settings in the programming tool

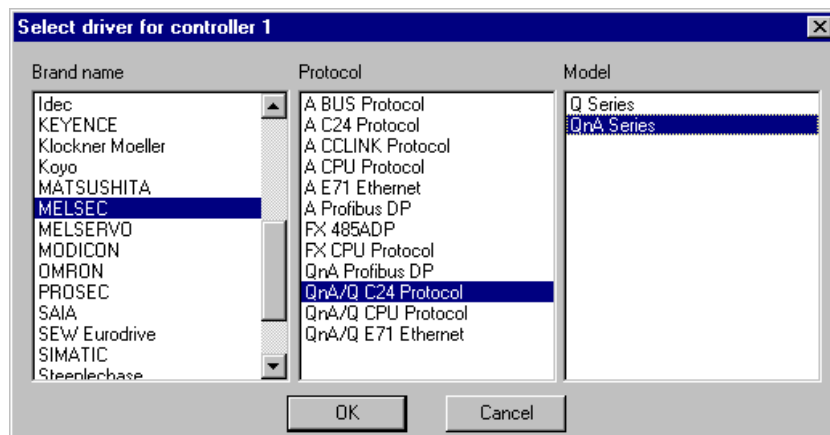
For communication with the PLC system via the protocol A CPU, QnA/Q CPU, A C24 or QnA/Q C24 the following settings must be made in the programming tool.

Driver selection

Choosing **New** in the **File** menu creates a new project and the dialog **Project Settings** is shown. In an existing project, the dialog is shown by selecting **Project Settings** in the **File** menu.

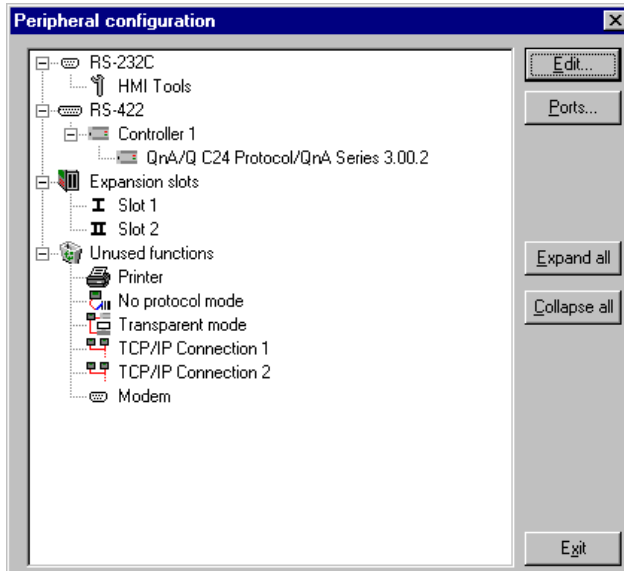


Press **Change...** under **Controller systems** to get the choice list of available drivers. Choose Brand name, Protocol and Model and then press **OK**. Press **OK** again to confirm the project settings.



3.2 Communication setup

The settings for the communication between the terminal and the PLC system are done under **Setup/Peripherals**. To change which port the PLC system is connected to, mark Controller and hold left mouse button down and drag to move it to the wanted communication port. Mark the selected communication port and press **Edit** to change the other communication settings.



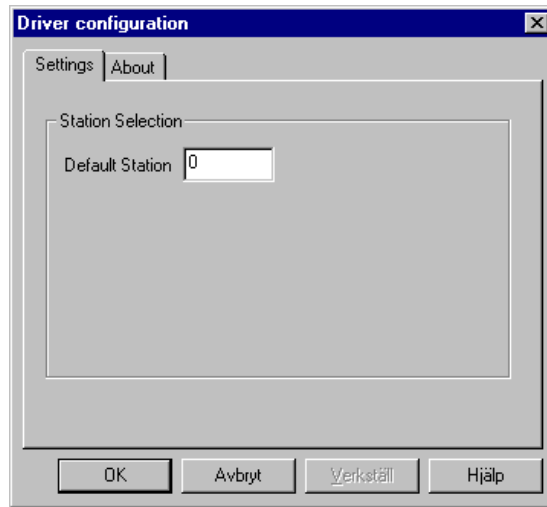
The settings should be:

Parameter	Description
Port	RS-232C or RS-422
Baudrate	1 200 – 19 200*
Data bits	7 or 8
Stop bits	1 or 2
Parity	Even, Odd or None

* 57 600 for Q CPU

To make specific settings for the selected driver mark the driver name and press **Edit**.

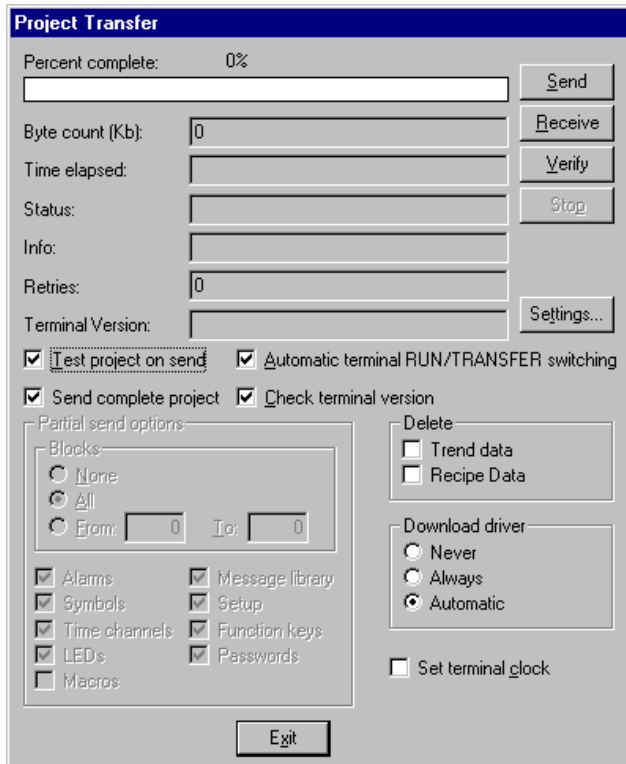
Only valid when using MELSEC A C24 or MELSEC QnA/Q C24 driver.



Under **Settings/Stations Selection** you define the **Default station** number. Values 0-63 can be stated. See also the section "*Station handling*" in this manual.

Transfer the driver to the terminal

The selected driver is downloaded into the terminal when the project is transferred to the terminal. Choose **Transfer/Project**.



There are three alternatives when the driver is downloaded into the terminal:

Function	Description
Never	The driver is not downloaded and the existing driver in the terminal is used.
Always	The driver is downloaded every time the project is transferred.
Automatic	The driver is downloaded if the driver in the terminal is not the same as the selected driver in the project. If it is the same the driver is not downloaded.

3.3 Settings in the PLC system

For information about settings in the PLC system we refer to the manual for current system.

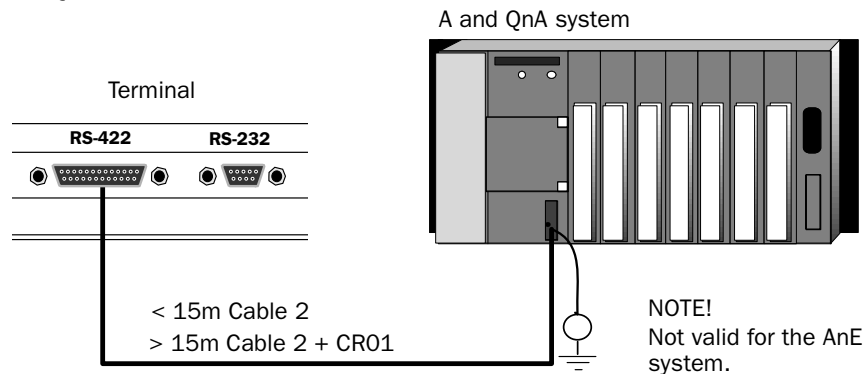
3.4 Connecting the terminal to the PLC system

Cable table

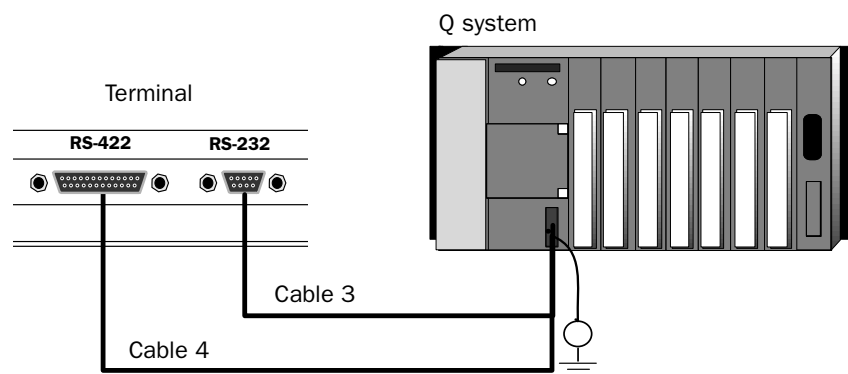
Name	Continentaleurope	GB	USA	Rest of the world
Cable 1	MAC-PC-CAB-R2 / CAB5	MAC-PROG/9-CAB / CAB5	MTA-PROG-C / CAB5	MAC-PROG/9-CAB / CAB5
Cable 2	MAC40-CPU-CAB-R4	MAC 40+ CAB	MTA-D25-C	MAC30/40-CAB/ CAB18
Cable 3	CAB16	CAB16	CAB16	CAB16
Cable 4	CAB17	CAB17	CAB17	CAB17

Connection to CPU-port on MELSEC PLC systems

A and QnA series



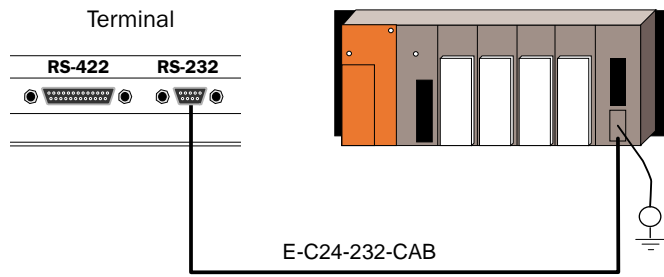
Q series



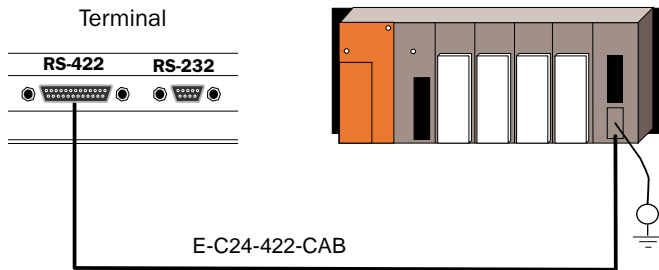
Connection to a C24 module on MELSEC PLC system

See chapter "Drawings" for cable drawings and Appendix for settings on the C24 module.

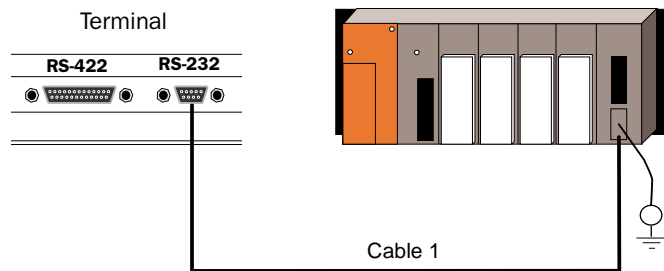
AJ71QC24/AJ71QC24N



**AJ71C24/AJ71UC24/A1SJ71QC24/A1SJ71C24-R4/
A1SJ71UC24-R4**



A1SJ71QC24/A1SJ71C24-R2/A1SJ71UC24-R2/A1SJ71QC24-R2



4 Addressing

Signal types in MELSEC

The PLC system's signal types are allocated according to the table below. See the PLC system manual for the used PLC system for the complete address area.

The terminal can handle different data types in the PLC systems. The following devices can be addressed.

Digital signals (ON/OFF)

The terminal can handle digital signals of the following types:

Signal	Function	A series	QnA series	Q series
X	Input Relay	•	•	•
Y	Output Relay	•	•	•
M	Internal Relay	•	•	•
Dn.x	Bit addressing in Data Registers. Bit x in Data Register n. Hexadecimal addressing of the bits, 0-F.		•	•
L	Latch Relay	•	•	•
B	Link Relay	•	•	•
F	Error Relay	•	•	•
SB	Link Special Relay		•	•
V	Edge Relay		•	•
S	Step Relay		•	•
T	Timer	•	•	•
ST	Accumulated Timer		•	•
C	Counter	•	•	•
SM	Special Internal Relay		•	•

Analog signals (Values)

The terminal can handle analog signals of the following types:

Signal	Function	A series	QnA series	Q series
T	Timer	•	•	•
ST	Accumulated Timer		•	•
C	Counter	•	•	•
D	Data Register	•	•	•
SD	Special Register		•	•
R	File Register	•	•	•
W	Link Register	•	•	•
SW	Link Special Register		•	•
Z	Index Register		•	•
ZR	Serial number access format of file register		•	•

4.1 Station handling

Only valid when using MELSEC A C24 or MELSEC QnA/Q C24 driver.

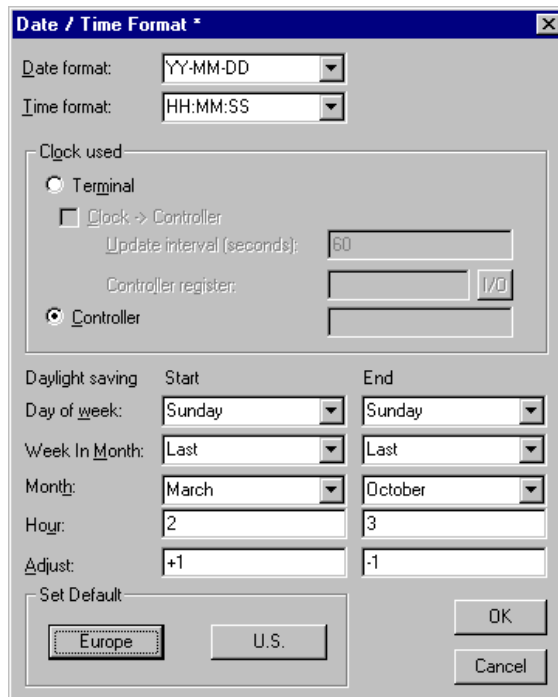
In the **Driver Configuration** dialog you state the **Default Station** number. The **Default station** is the station the terminal checks communication towards at startup and it is also the station for devices that are not assigned to any specific station. For communication with the other stations the station numbers is given as a prefix to the device.

Example

08 : D0 D0 from station 8
M0 M0 from the station set as **Default Station**.

4.2 Controller clock

The driver supports use of the clock in the PLC system, which means that the clock in the PLC system can be used in the terminal.



Select **Setup/Date/Time Format** and mark **Controller** in the **Clock used**-square if the clock in the PLC system should be used in the terminal.

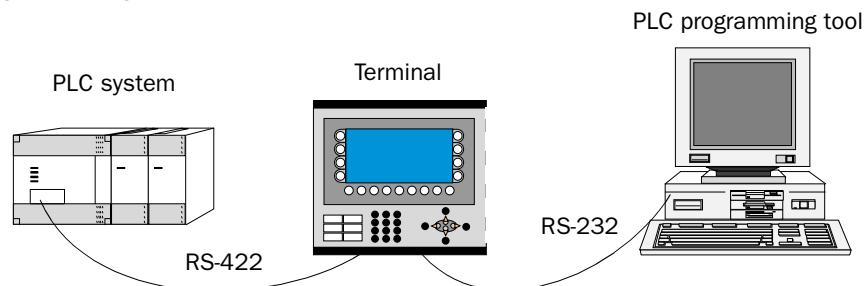
5 Transparent mode

In Transparent mode can one communication port (the programming/printer port) on the terminal be used to connect a unit working in parallel with the PLC system. This unit can be another terminal or a personal computer with for example the programming tool for the controller system or a superior operating system.

The Transparent mode works together with the MELSEC CPU port and MELSEC A, QnA or Q series communication ports with C24 protocol. For further information see the respective C24 manual.

Connecting a personal computer or other computer system

Personal computers with the MELSEC MEDOC programming tool or other computer system are connected directly to the terminal's programming/printer port.



Terminal with PLC programming tool connected to the programming/printer port of the terminal

Settings in the terminal and MELSEC MEDOC

The following settings must be made in the terminal and MELSEC MEDOC for the Transparent mode to work. The settings also apply for other PC-based monitoring systems such as SCADA, GX IEC Developer (MELSEC MEDOC *plus*) and GX Developer (GPPWin).

The terminal

The printer parameters are set under **Setup/Peripherals**.

The parameters should be 9600 baud, 8 data bits, 1 stop bit and odd parity if the terminal is connected to an A, QnA or Q CPU.

The parameters should be 19 200 baud, 8 data bits, 1 stop bit and no parity if the terminal is connected to one of the A, QnA or Q series communication modules.

MELSEC MEDOC

The transfer parameters should be changed to 19,200 baud, 8 data bits, 1 stop bit and no parity when transferring via the A-series communication ports. This is done under **Setup/Transfer**. The Interface should also be changed from CPU to AJ71 under Transfer.

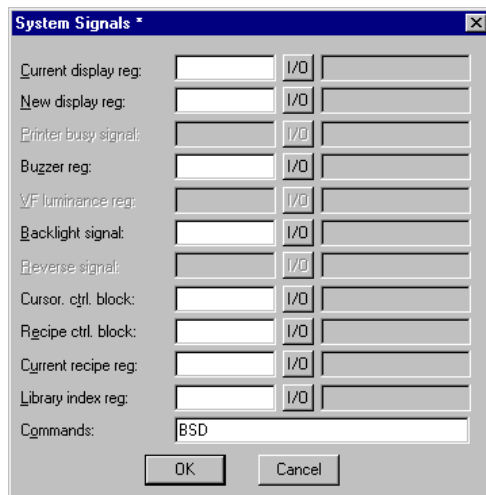
The transfer parameters should not be changed in MELSEC MEDOC for other projects. See the Installation manual for cable connections. The settings also apply for other PC-based monitoring systems such as SCADA,

GX IEC Developer and GX Developer.

Several terminals can be connected to the same PLC system with the function Transparent mode. In the manual for the terminals we describe how to connect two and three terminals. For more information about Transparent mode we refer to the manual for the terminals.

Commands

One or more commands can be stated on the command line. Select **Setup/System Signals** in E-Designer (MAC Programmer+) and enter the command on the command line. The commands are separated by a space.



The command **Batch Read (BR)** puts the terminal in Transparent mode communication when using MELSEC PLC systems.

The command **Baud Switch Disable (BSD)** disables baud switching when communicating in Transparent mode with QnA and Q systems. BSD must be set in the terminal not connected to the PLC system.

Transparent mode in a terminal network

To be able to make the Transparent mode function work in a terminal network with communication via the TCP/IP protocol the following demands must be met.

- The driver and its programming tool must support communication in Transparent mode. For information we refer to the manuals for the driver and controller system and also the manual for the terminals.
- A PC program for COM port to TCP/IP redirection must be used in the PC communication with the controller system in Transparent mode via the TCP/IP network.

The programming tool MELSEC MEDOC supports Transparent mode communication in TCP/IP network with MELSEC PLC systems according to the following table.

Programming tool	PLC system
MELSEC MEDOC	All MELSEC PLC-system except for QnA/Q CPU and QnA/Q C24

6 Efficient communication

To make the communication between the terminal and the PLC system quick and efficient the following should be noted about how the signals are read and what can be done to optimize the reading.

6.1 Signals affecting the communication time

It is only signals to objects in the current block that are read continuously. Signals to objects in other blocks are not read, that is the number of blocks does not affect the communication time.

Besides the signals to objects in the current block, the terminal is continuously reading the following signals from the PLC system:

- Display signals
- Block print-out signals
- LED registers
- Alarm signals
- Remote acknowledge signals on alarms and alarm groups
- Login signal
- Logout signal
- Trend registers at the sample points
- Bargraph registers if using min/max indicators
- New display register
- Buzzer register
- Backlight signal
- Cursor control block
- Recipe control block
- Library index register
- Index registers
- PLC clock register if the PLC clock is used in the terminal
- List erase signal
- No protocol control register
- No protocol on signal

Signals not affecting the communication time

The following signals do not affect the communication time:

- Signals linked to function keys
- Time channels
- Objects in alarm messages

6.2 How to make the communication more efficient

Group PLC signals consecutively

The signals from the PLC system are read most rapidly if all signals in the list above are consecutive. If for example, 100 signals are defined, it is quickest to read these if they are linked to, for example, M0-M99. If the signals are spread out (e.g. X4, M17, T45 etc.) the updating is slower.

Efficient block changes

Block changes are carried out most rapidly and efficiently through the block jump function on the function keys or through a jump object. "Display signals" in the block header should only be used when the PLC system is to force the presentation of another block. The "New Display" register can also be used if the PLC system is to change the block. This does not affect communication as much as a larger number of "Display signals".

Use the clock of the terminal

An extra load is put on communication if the clock of the PLC system is used since the clock register must be read to the terminal. Downloading of the clock to the PLC system also creates an extra load. The interval between downloads should therefore be as long as possible.

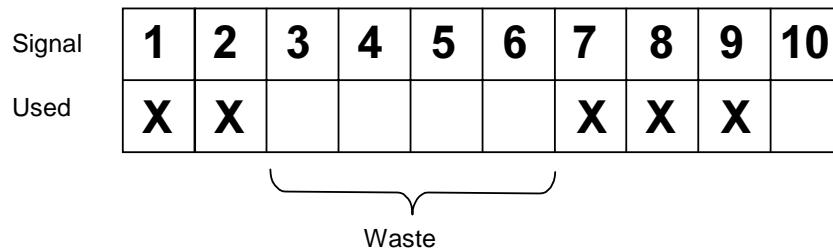
Packaging of signals

When the signals are transferred between the terminal and the PLC system, all signals are not transferred simultaneously. Instead they are divided into packages with a number of signals in each package. To decrease the number of packages that have to be transferred and make the communication faster this number has to be considered. The number of signals in each package depends on the used driver, according to the table below.

PLC system	Number of signals in each package	
	Analog signals	Digital signals
A CPU	116	800
QnA/Q CPU	60	200
A C24	58	200
QnA/Q C24	51	864

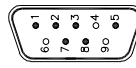
To make the communication as fast as possible the number of packages has to be minimized. Consecutive signals require a minimum of used packages but it is not always possible to have consecutive signals. In such cases the so-called waste between two signals has to be considered. The waste is the maximum distance between two signals you can have and still keep them in the same package. The waste depends on the used driver, according to the table below.

PLC system	Waste	
	Analog signals	Digital signals
A CPU	20	100
QnA/Q CPU	20	40
A C24	20	100
QnA/Q C24	54	864



7 Drawings

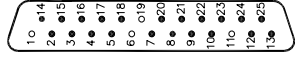
RS-232



Pin no	Name	Signal direction Terminal	Signal direction Terminal
1	4) +5V >200mA	←	XXX
2	TxD	→	←
3	RxD	←	→
5	0V	→	←
7	CTS	←	→
8	RTS	→	←
9			

4) Only for E50 with 232-25-ADP. On all other terminals, not connected.

RS-422




Pin no	Name	Signal direction Terminal	Signal direction Terminal
2	+TxD	→	←
15	-TxD	←	→
3	+RxD	→	←
16	-RxD	←	→
4	+RTS	→	←
17	-RTS	←	→
5	+CTS	→	←
18	-CTS	←	→
20	1)		
21	1)		
7,8	0V		
14	+5V <50mA	→	←
12,13	2) +5V	→	←
24,25	2) >200mA	←	→
9	3) TxD	→	←
10	3) RxD	←	→
22	3) CTS	→	←
23	3) RTS	→	←

D-sub
25-pin Male
25-pin Female

1) Pin no 20 connected to pin no 21 internal in the terminal
2) Only for E50, E100, E150
3) Only for E50

RS-485

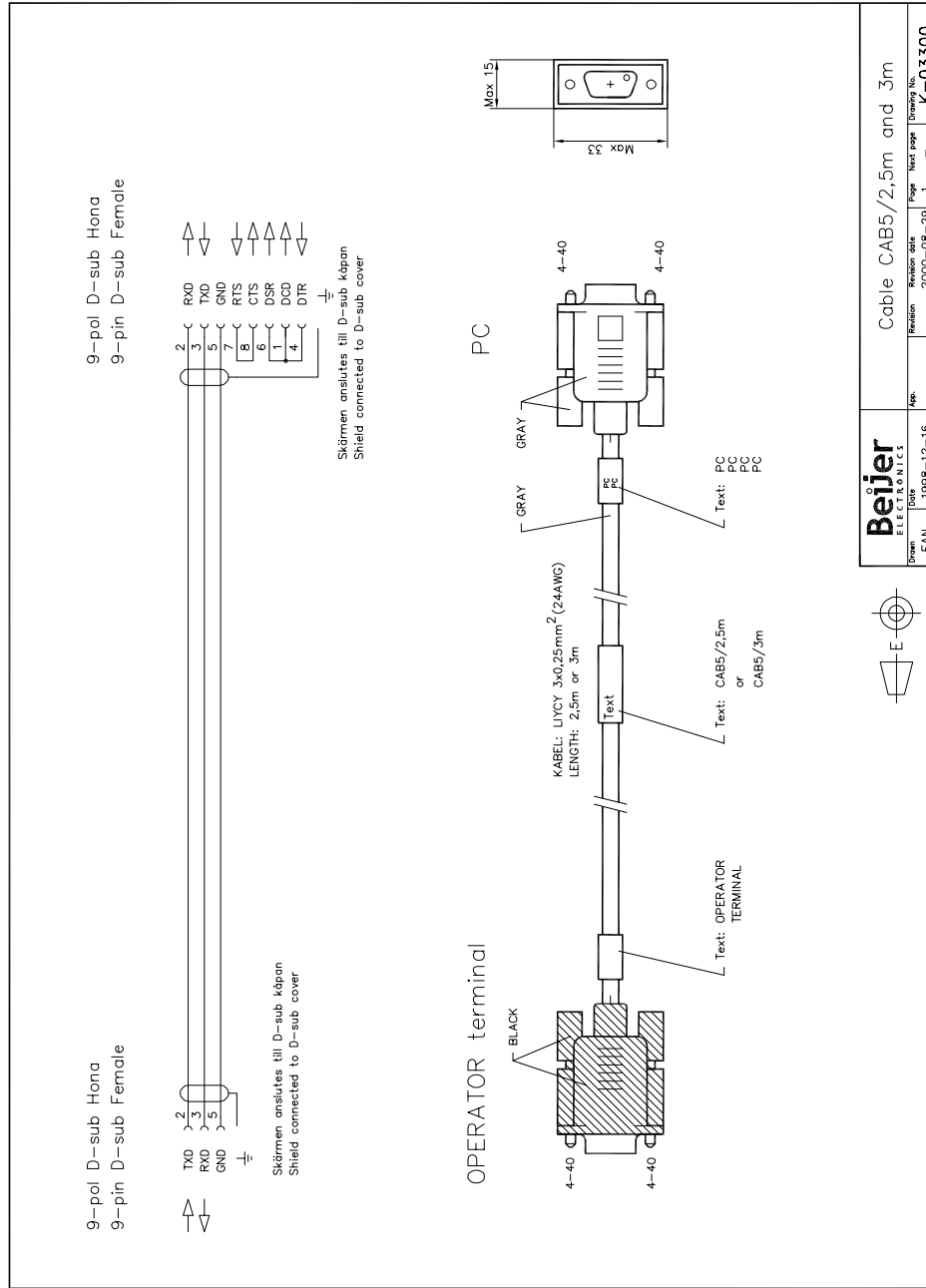
Only for E610, E615



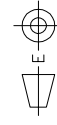
Pin no	Name	Signal direction Terminal	Signal direction Terminal
1	Tx/Rx+	←	→
2	Tx/Rx-	→	←
3	0V		
4	⊥		

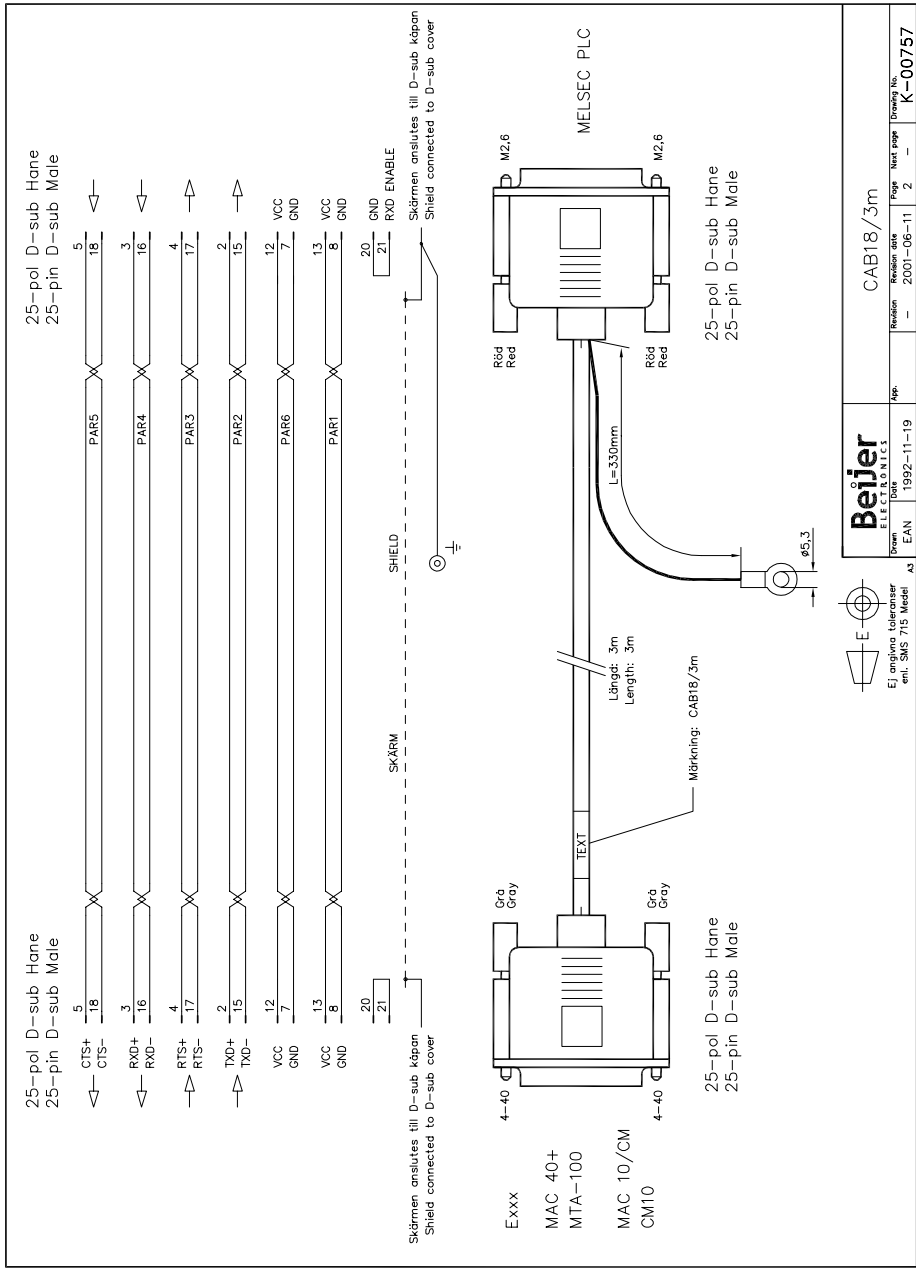
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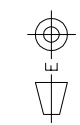
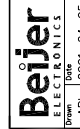
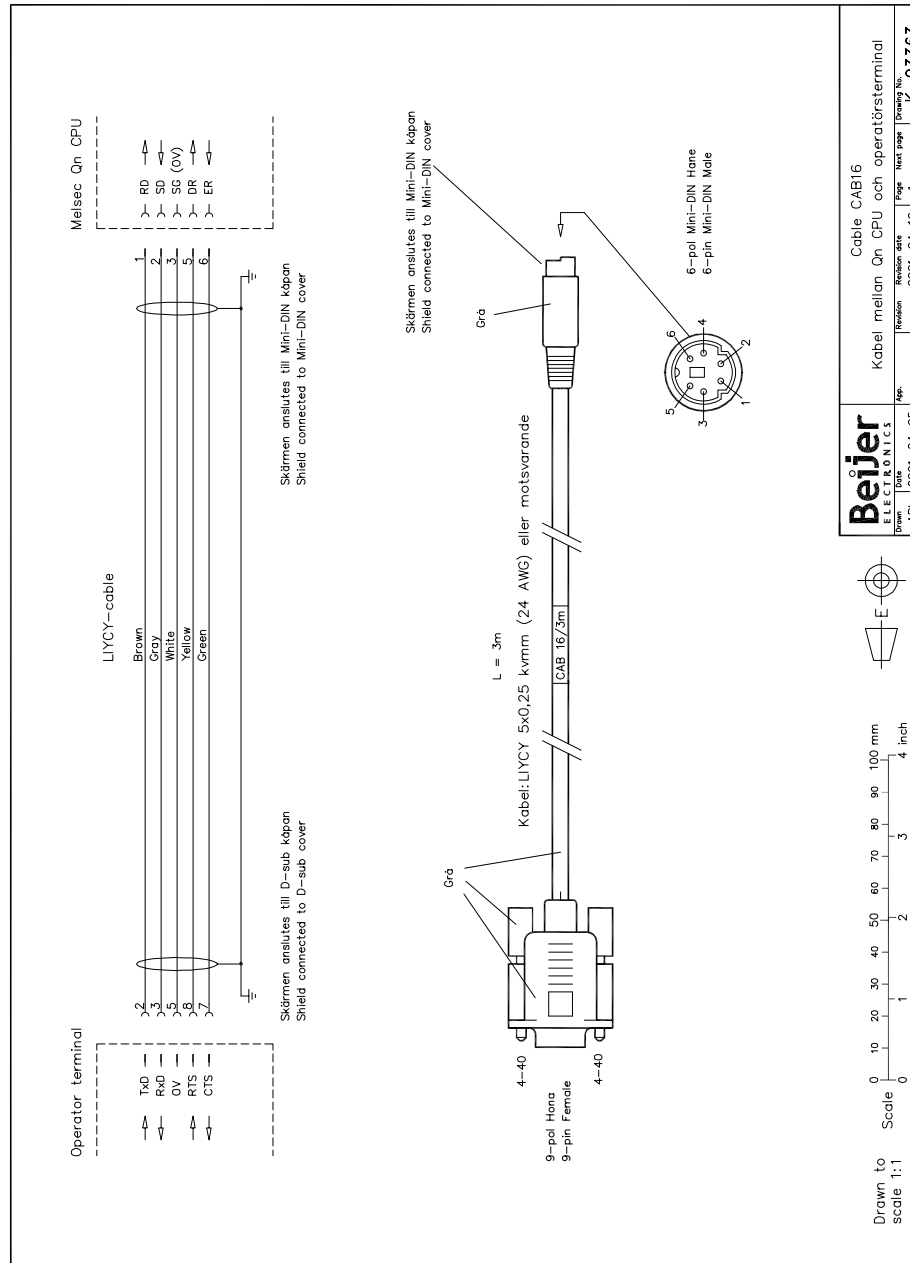
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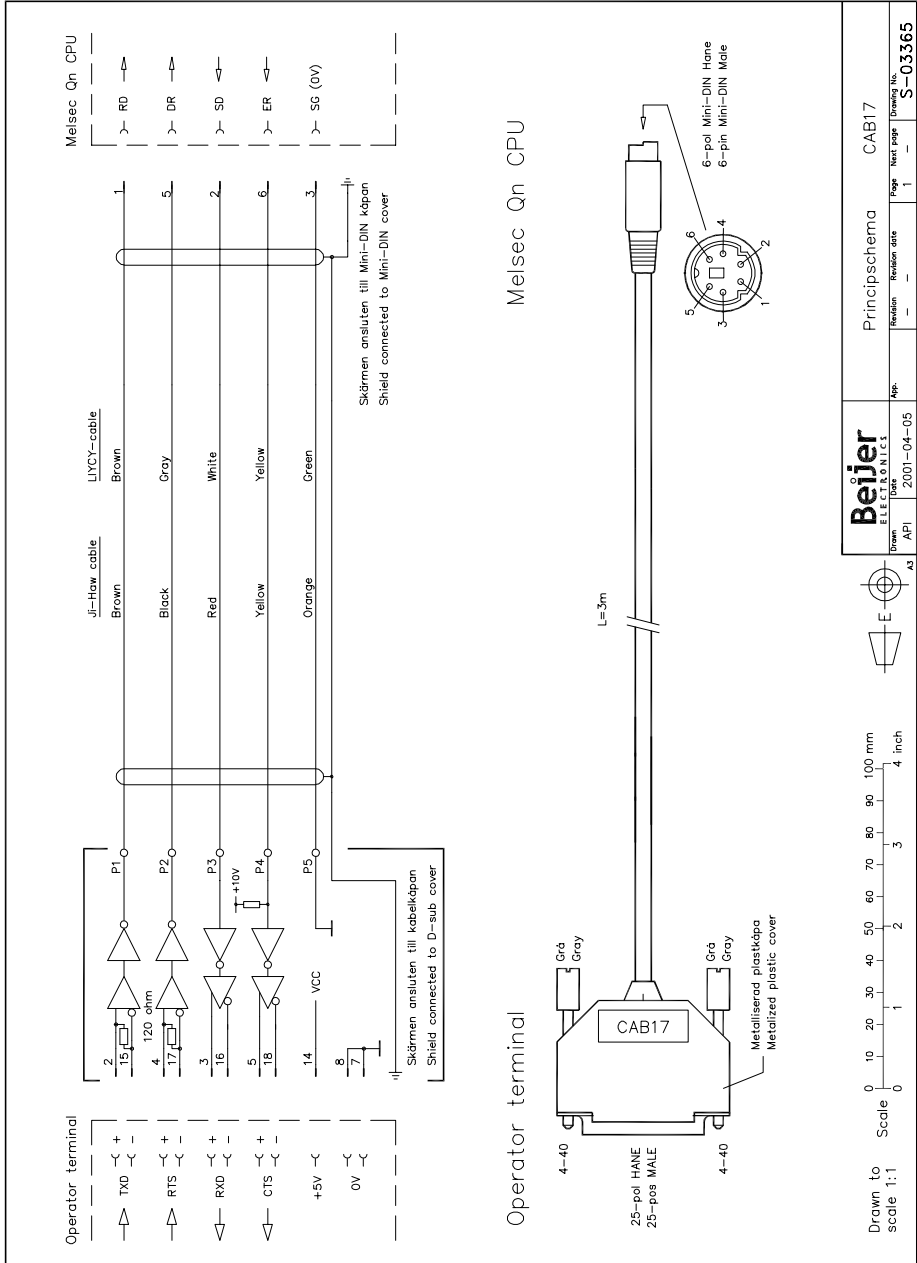
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enl. SMS 715 Meddel. A3

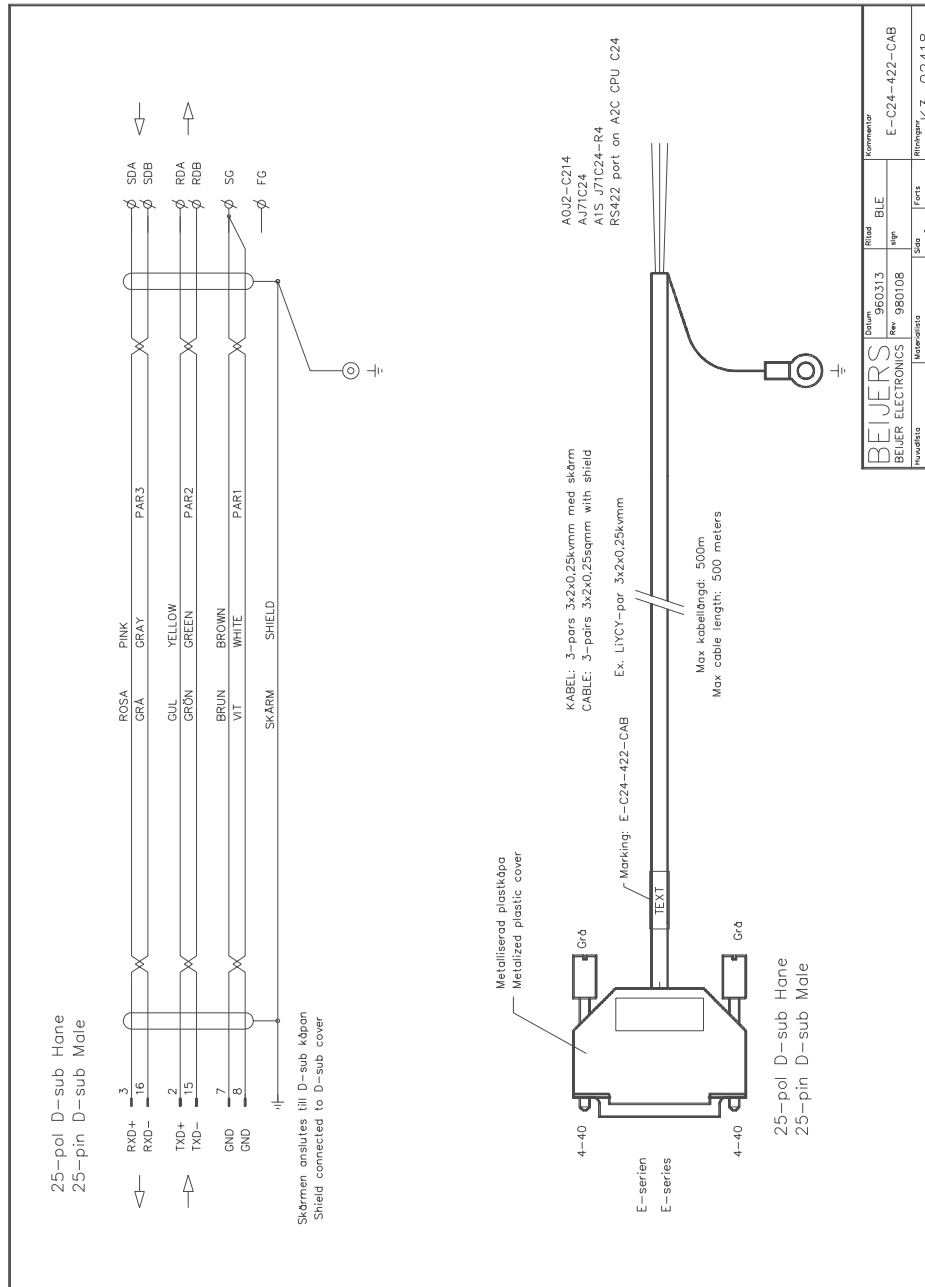


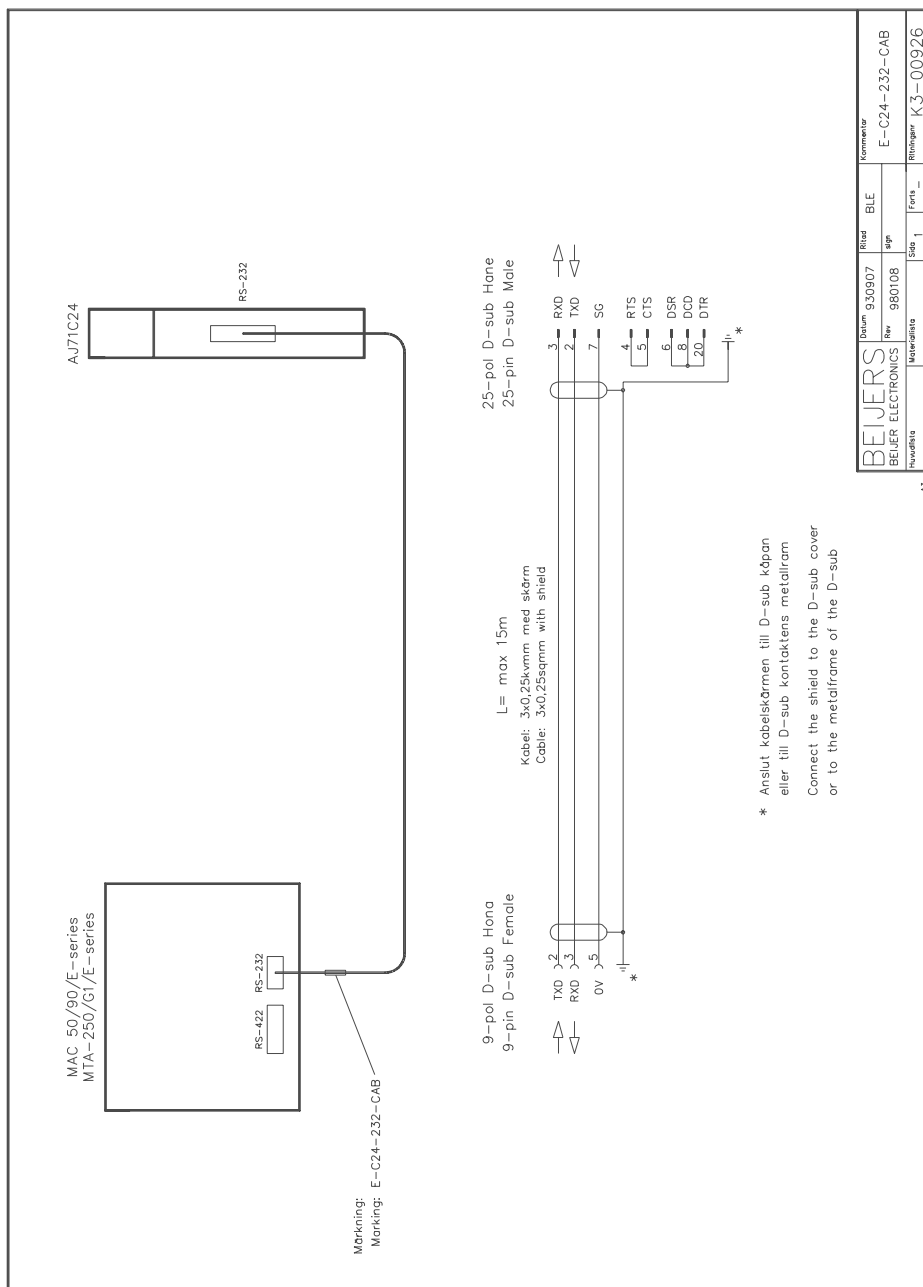
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Revision	2001-04-19	1	—
Revision date	2001-04-19	1	—
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Drawing No. K-03363			

Cable CAB16
Kabel mellan Qn CPU och operatörsterminal







8 Appendix

8.1 Error messages

Error messages in the terminals when communicating with MELSEC PLC systems. The messages are shown on the display of the terminal.

A CPU and C24 driver:

Error code	Description
Comm Error	Communication error.
File Reg Err xxxx	An object tries to read a file register not configured in the parameters in the PLC system.
Illegal dev [x]	Trying to read an not valid device type (D, X, Y...). Only C24.

QnA/Q CPU driver:

Error code	Description
Comm Error xxxx	Communication error, see the table below.
SYSTEM ERROR Comm Error	Communication error during start-up.

Item	Content	Reply status	
Common Errors	Sum check error (periphery only)	4000H	
	Cannot handle RT	4001H	
	Cannot handle SRT	4002H	
	Impossible global request command	4003H	
	Command not usable during system protect	4004H	
	Data range larger than buffer size	4005H	
	No password release	4006H	
	CID differing from CPU data	4007H	
	Device setting	Cannot handle device name	1030H
		Device range over	4031H
Cannot handle device modification		4032H	
No random write possible on the desinated Y because it is used by the system		4033H	
Protect	Improper device	4034H	
	Hardware protection active	4050H	
	No execution possible because memory protect switch is ON	4051H	
Others	Data error	4080H	

8.2 Settings on the C24 module in the MELSEC PLC system

AJ71C24

Station number:

When communicating with the E-series: 0

Mode setting:

When communicating with the E-series: A

Setting of the switches

Switch	Default comm. settings in software to E-series	Setting items	Position of Setting Switch		Notes
			ON	OFF	
SW11	ON	Main channel settings	RS-422	RS-232C	Valid for modes A to D
SW12	ON	Data length	8 bits	7 bits	–
SW13	OFF	Transmission speed setting	Refer to the table below		–
SW14	ON				
SW15	ON				
SW16	OFF	Parity check	Enabled	Disabled	–
SW17	OFF	Parity setting	Even	Odd	Valid only when SW16 is ON
SW18	OFF	Stop bit	2 bits	1 bit	–
SW21	ON	Sum check	Enabled	Disabled	For dedicated protocol
SW22	ON	Write during RUN	Enabled	Disabled	

AJ71C24

Switch	Default comm. settings in software to E-series	Setting items	Position of Setting Switch		Notes
			ON	OFF	
SW23	OFF	Send area terminal resistance	Present	Absent	Valid only when SW11 is ON
SW24	OFF	Receive area terminal resistance	Present	Absent	

AJ71UC24

Switch	Default comm. settings in software to E-series	Setting items	Position of Setting Switch		Notes
			ON	OFF	
SW23	ON	Computer link/Multidrop	Comuter link	Multidrop link	Must be ON
SW24	OFF	Multi drop settings	Master station	Local station	Valid only when SW23 is OFF

Baudrate	300	600	1200	2400	4800	9600	19200	Un-usable
SW13	OFF	ON	OFF	ON	OFF	ON	OFF	ON
SW14	OFF	OFF	ON	ON	OFF	OFF	ON	ON
SW15	OFF	OFF	OFF	OFF	ON	ON	ON	ON

The settings of the switches must correspond with the communication settings in E-Designer (MAC Programmer+) and in the terminal.

For more detailed information see the manual to the module.

A1SJ71C24-R4/A1SJ71UC24-R4/A1SJ71C24-R2/A1SJ71UC24-R2**Station number:**

When communicating with the E-series: 0

Mode setting:

When communicating with the E-series:

A1SJ71C24-R4/A1SJ71UC24-R4: 5

A1SJ71C24-R2/A1SJ71UC24-R2: 1

Setting of the switches:

Switch	Default comm. settings in software to E-series	Setting items	Position of Setting Switch		Notes
			ON	OFF	
SW01 Only -R4	OFF	Main drop settings	Master station	Local staion	Valid only when SW2 is OFF
SW02 Only -R4	ON	Computer link/Multidrop	Comuter link	Multidrop link	Must be ON
SW03	OFF	Unused	–	–	–
SW04	ON	Write during RUN	Enabled	Disabled	For dediated protocol

Switch	Default comm. settings in software to E-series	Setting items	Position of Setting Switch		Notes
			ON	OFF	
SW05	OFF	Transmission speed setting	Refer to the table below		–
SW06	ON				
SW07	ON				
SW08	ON	Data length	8 bits	7 bits	–
SW09	OFF	Parity check	Enabled	Disabled	–
SW10	OFF	Parity setting	Even	Odd	Valid only when SW09 is ON
SW11	OFF	Stop bit	2 bits	1 bit	–
SW12	ON	Sum check	Enabled	Disabled	For dedicated protocol

Baudrate	300	600	1200	2400	4800	9600	19200	Un-usable
SW05	OFF	ON	OFF	ON	OFF	ON	OFF	ON
SW06	OFF	OFF	ON	ON	OFF	OFF	ON	ON
SW07	OFF	OFF	OFF	OFF	ON	ON	ON	ON

The settings of the switches must correspond with the communication settings in E-Designer (MAC Programmer+) and in the terminal.

For more detailed information see the manual to the module.

AJ71QC24/AJ71QC24N/A1SJ71QC24/A1SJ71QC24-R2

Station number:

When communicating with the E-series: 00

Mode setting:

When communicating with the E-series: 5

Setting of the switches:

Switch	Default comm. settings in software to E-series	Setting items	Position of Setting Switch		Notes
			ON	OFF	
SW01	OFF	Operation setting	Interlocking	Independent	CH1 always OFF
SW02	ON	Data length	8 bits	7 bits	–
SW03	OFF	Parity check	Enabled	Disabled	–

Switch	Default comm. settings in software to E-series	Setting items	Position of Setting Switch		Notes
			ON	OFF	
SW04	OFF	Parity setting	Even	Odd	Valid only when SW03 is ON
SW05	OFF	Stop bit	2 bits	1 bit	–
SW06	ON	Sum check	Enabled	Disabled	For dedicated protocol
SW07	ON	Write during RUN	Enabled	Disabled	
SW08	OFF	Setting change	Allow	Prohibit	–
SW09	OFF	Transmission speed setting	Refer to the teable below		–
SW10	ON				
SW11	ON				
SW12	OFF				
SW13-15	OFF	–	Set all to OFF		Placed on the left side of the AJ71QC24(N)

Transmission speed setting AJ71QC24/A1SJ71QC24/A1SJ71QC24-R2

Baudrate	300	600	1200	2400	4800	9600	19200
SW09	OFF	ON	OFF	ON	OFF	ON	OFF
SW10	OFF	OFF	ON	ON	OFF	OFF	ON
SW11	OFF	OFF	OFF	OFF	ON	ON	ON
SW12	OFF	OFF	OFF	OFF	OFF	OFF	OFF

Transmission speed setting AJ71QC24N

Baudrate	300	600	1200	2400	4800	9600
SW09	OFF	ON	OFF	ON	OFF	ON
SW10	OFF	OFF	ON	ON	OFF	OFF
SW11	OFF	OFF	OFF	OFF	ON	ON
SW12	OFF	OFF	OFF	OFF	OFF	OFF
Baudrate	19200	38400	14400	28800	57600	115200
SW09	OFF	ON	OFF	ON	OFF	ON
SW10	ON	ON	OFF	OFF	ON	ON
SW11	ON	ON	OFF	OFF	OFF	OFF

Baudrate	300	600	1200	2400	4800	9600
SW12	OFF	OFF	ON	ON	ON	ON

The total of CH1 and CH2 must be within 115200 BPS.

The settings of the switches must correspond with the communication settings in E-Designer (MAC Programmer+) and in the terminal. For more detailed information see the manual for the module.

QJ71C24 and QJ71C24-R2

The settings for the QJ71C24 and QJ71C24-R2 are set in the PLC programming tool, for more information see the manual for the module.