

Driver for GE Fanuc SNPX

English

Svenska

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GE Fanuc SNPX

This manual presents installation and handling of the driver GE Fanuc SNPX to the terminals in the E-series.

The functionality in the E-terminals and in MAC Programmer+ are described in the E-manual.

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1 Introduction

This manual describes how the GE Fanuc PLC system is connected to the operator terminals in the E-series and how they communicate via the SNPX protocol. Addressing of an item in the PLC system is done in the normal GE Fanuc way.

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

The terminals support all GE Fanuc systems using the SNPX protocol.

2 Install and update driver

When installing MAC Programmer+ the drivers available at the time of release are installed automatically. A new driver can be added into MAC Programmer+ either with MAC Programmer+ 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 can use the function **Update terminal drivers from Internet** in the **File** menu in MAC Programmer+. All projects must be closed before this function is used and the computer must be able to connect to Internet. 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 MAC Programmer+. The function **Mark newer** will mark all drivers that are available in a newer version than 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 can use the function **Update terminal drivers from Disk** in the **File** menu in MAC Programmer+. 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 MAC Programmer+. The function **Mark newer** will mark all drivers that are available in a newer version than the one installed and the drivers not installed. Then select **Install**.

How to select the GE Fanuc SNPX driver in the project and how to transfer it to the terminal is described in *chapter 3*.

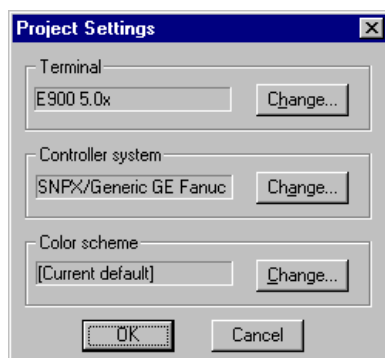
3 Connection

3.1 Settings in the MAC Programmer+

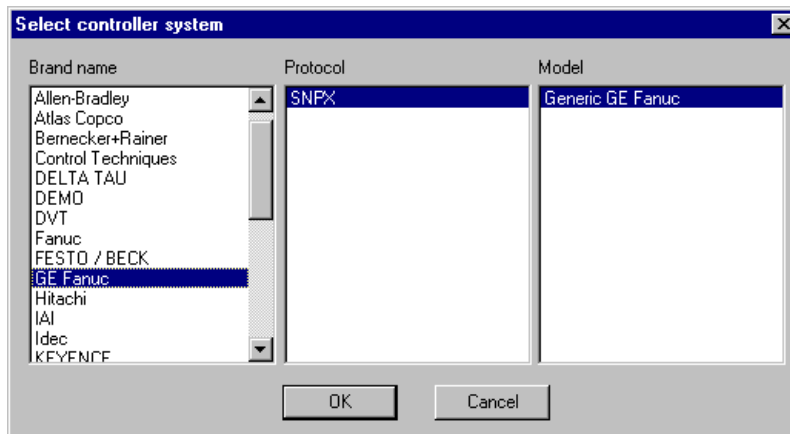
For communication with the GE Fanuc system via the protocol SNPX the following settings must be made in the programming tool MAC Programmer+.

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.

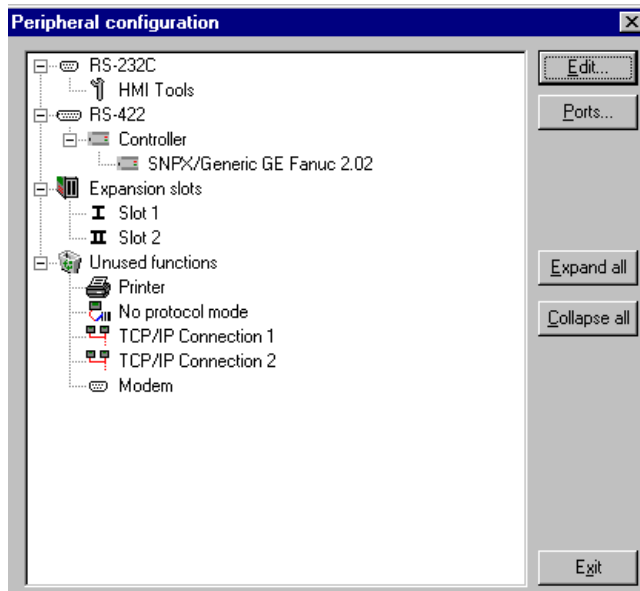


Press **Change...** under **Controller System** to get the choice list of available drivers. Choose **Brand name**, **Protocol** and then press **OK**. Press **OK** again to confirm the project settings.



Communication setup

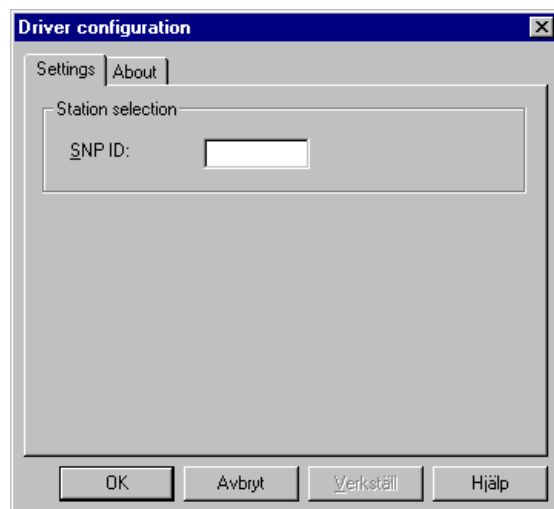
The settings for the communication between the terminal and the PLC system are changed under **Peripherals** in the **Setup** menu. To change which port the PLC system is connected to, mark and hold left mouse button down and drag to move it to the wanted position. Mark the selected connection and press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



The settings should be:

Parameter	Description
Port	RS-232C or RS-422
Baudrate	19200
Data bits	8
Stop bits	1
Parity	Odd

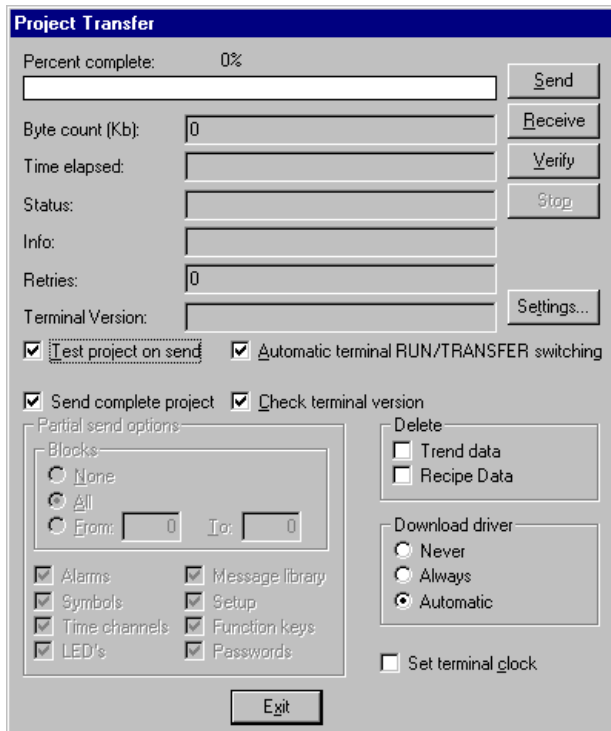
To make specific settings for the selected driver mark the driver name and press **Edit**.



Parameter	Description
SNP ID	If point-to-point connection is used nothing has to be specified.

Transfer the driver to the terminal

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



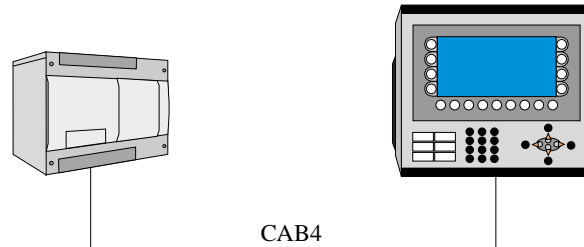
There are three alternatives when the driver is downloaded into the terminal.

Function	Description
Never	The driver is not downloaded and the existing driver in the terminal is used.
Always	The driver is downloaded every time a 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 will not be downloaded.

3.2 Connecting the terminal to the PLC system

The connection is of the type “point-to-point”. The CPU port on the PLC system is connected to the RS-422 port on the terminal.

Connecting via standard cable



The cable CAB4 is connected between the CPU port on the PLC system and the RS-422 port on the terminal.

CAB4 is a standard cable that can be ordered from Beijer Electronics.

4 Addressing

The terminal can handle the following data types in the PLC system:

Name	Address	Read	Write	Type
Discrete Inputs	%Ixxx	Yes	Yes	Digital
Discrete Outputs	%Qxxx	Yes	Yes	Digital
Discrete Globals	%Gxxx	Yes	Yes	Digital
Internal Coils	%Mxxx	Yes	Yes	Digital
Temporary Coils	%Txxx	Yes	Yes	Digital
Status References	%Sxxx	Yes	No	Digital
Register References	%Rxxx	Yes	Yes	Analog 16-bit
Analog Inputs	%AIxxx	Yes	Yes	Analog 16-bit
Analog Outputs	%AQxxx	Yes	Yes	Analog 16-bit

xxx=address (minimum value = 1, maximum value depend on the PLC system).

It is possible to select bits in a register and read/write the values, example:

%R1.0-7 (Shows the value for bit 0-7 in register 1)

%R4.8-15 (Shows the value for bit 8-15 in register 4)

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

5 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.

5.1 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, i.e. the number of blocks does not affect the communication time.

Except for 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 the alarm messages

5.2 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, M0.0-M11.7. If the signals are spread out (e.g. I0.4, Q30.0, T45.3 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 signal** in the **Block Header** should only be used when the PLC system should force the presentation of another block. The **New display reg** can also be used if the PLC system is to change the block. This does not affect the communication as much as a larger number of **Display signal**.

Use the clock of the terminal

An extra load is put on the communication if the clock of the PLC system is used since the clock register must be read up to the terminal. Downloading of the clock to the PLC system also creates an extra load. The time interval between downloadings 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. In the GE Fanuc SNPX driver the number is 100 for analog devices and 800 for digital devices.

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.

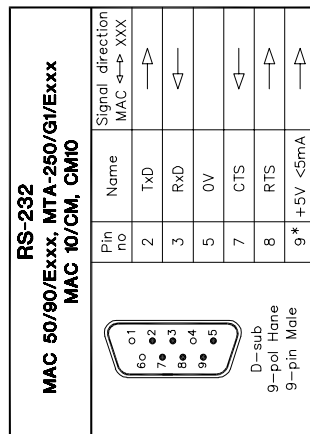
In the GE Fanuc SNPX driver the number is 20 for analog devices and 20 for digital devices.

Signal	1	2	3	4	5	6	7	8	9	10
Used	X	X					X	X	X	

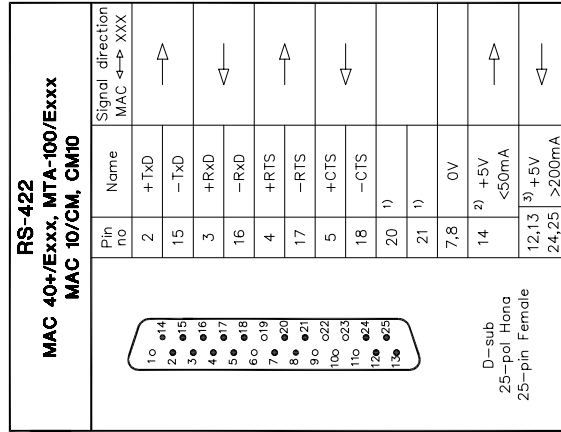
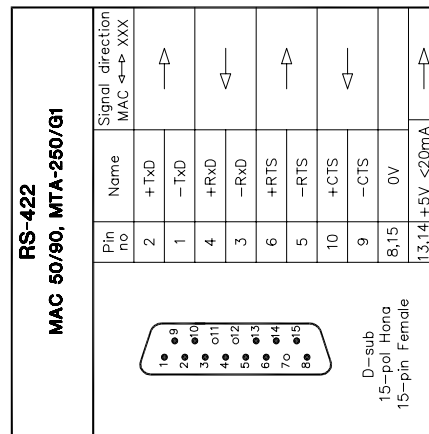


Waste

6 Drawings



* Ej i E-serien
Not in E-series



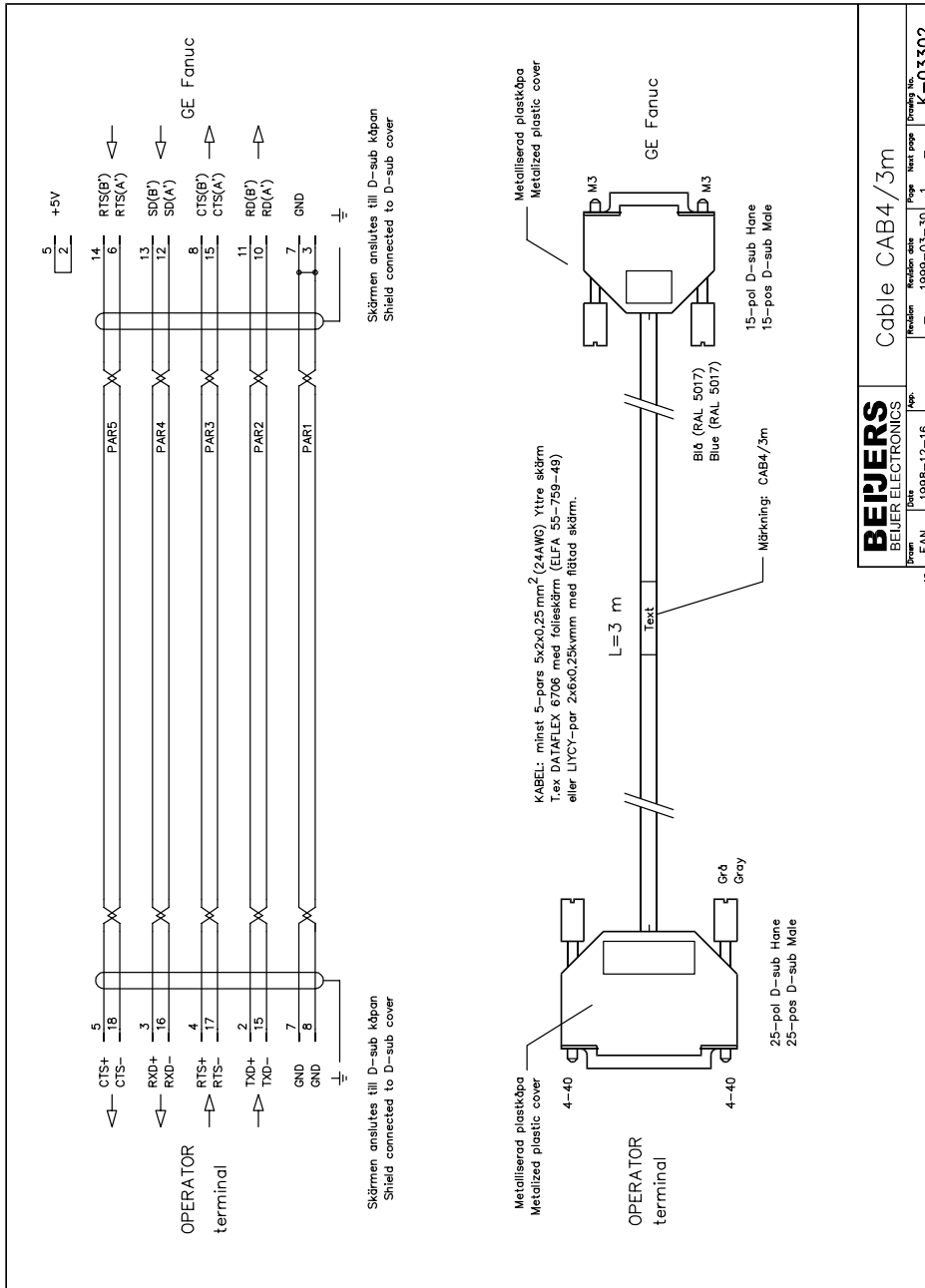
- 1) Stift 20 är anslutet till stift 21 internt i MAC'en.
Pin no 20 connected to pin no 21 internal in MAC/MTA.
- 2) Endast i E-serien och med serie nr 9901 eller senare
Only for E-series and with serial no 9901 or later
- 3) Endast E100/MAC40+/MTA-100
Only for E100/MAC40+/MTA-100

Beijer
E.L.S. & M.T.S.
Date: 1983-09-07
App: BLE

Revision: —
Revision date: 2000-07-28
Page: 1
Next page: —
Drawing no: S-00724

MAC/MTA RS-232/RS-422

814 Revised L239r A3



BEIJERS BEIJER ELECTRONICS		Cable CAB4/3m	
Part No.	1998-12-16	Revision	1999-03-30
Page	1	Page	1
Sheet	1	Sheet	1
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7 Appendix

7.1 Major Error Codes for SNP

Error status		Description
Decimal	Hexa-decimal	
1	01h	Successful Completion. (This is the expected completion value in the COMMERQ Status Word.)
2	02h	Insufficient Privilege. For Series 90-70 PLC, the minor error code contains the privilege level required for the service request.
4	04h	Protocol Sequence Error. The CPU has received a message that is out of order.
5	05h	Service Request Error. The minor error code contains the specific error code. See table of Minor Error Codes.
6	06h	Illegal Mailbox Type. Service request mailbox type is either undefined or unexpected.
7	07h	The PLC CPU's Service Request Queue is full. The master should retry later. It is recommended that the master wait a minimum of 10 msec before sending another service request.
10	0AH	SNP DOS Driver Error. The minor error code contains the specific error code. See table of Minor Error Codes.
11	0Bh	Illegal Service Request. The requested service is either not defined or not supported. (This value is returned in lieu of the actual 01h value passed in the SNP error message, to avoid confusion with the normal successful COMMREQ completion.)
12	0Ch	Local SNP/SNP-X Error. An error occurred within the SNP task in the CMM module in this PLC. This error may occur in either an SNP master or an SNP slave. The minor error code contains the specific error code. See table of Minor Error Codes.
13	0Dh	Remote SNP Error. An error occurred within the SNP slave task in the CMM module in the remote PLC. The minor error code contains the specific error code. See table of Minor Error Codes.
14	0Eh	Autodial Error. An error occurred while attempting to send a command string to an attached external modem. The minor error code contains the specific error code. See table of Minor Error Codes.
15	0Fh	SNP-X slave error. An error occurred within the SNPX task in the remote slave device. The minor error code contains the specific error code. See the table of Minor Error Codes.
19	13h	Port configurator error.
80	50h	Problem with sending mail to the slave Service Request task. (Series 90-70 PLC CPU's only).
81	51h	Problem with getting mail from the slave Service Request task. (Series 90-70 PLC CPU's only).
85	55h	Slave SNP task timed out before receiving an SRP response. (Series 90-70 PLC CPU's only).
86	56h	Slave SNP task could not find the requested datagram connection. (Series 90-70 PLC CPU's only).
87	57h	Slave SNP task encountered an error in trying to write the datagram. (Series 90-70 PLC CPU's only).
88	58h	Slave SNP task encountered an error in trying to update the datagram. (Series 90-70 PLC CPU's only)

7.2 Minor Error Codes for SNP

The meaning of each Minor Error Code depends upon the Major Error Code for which it is defined. Consult the appropriate Minor Error Code table for the indicated Major Error Code.

Minor Error Codes for Major Error Code 5

Error status		Description
Decimal	Hexa-decimal	
-1	FFh	Service request has been aborted.
-2	FEh	No privilege for attempted operation.
-3	FDh	Unable to perform auto configuration.
-4	FC h	I/O configuration is invalid.
-5	FBh	Cannot clear I/O configuration.
-6	FAh	Cannot replace I/O module.
-7	F9h	Task address out of range.
-8	F8h	Invalid task name referenced.
-9	F7h	Required to log in to a task for service.
-10	F6h	Invalid sweep state to set.
-11	F5h	Invalid password.
-12	F4h	Invalid input parameter in request.
-13	F3h	I/O configuration mismatch.
-14	F2h	Invalid program cannot log in.
-15	F1h	Request only valid from programmer.
-16	F0h	Request only valid in stop mode.
-17	EFh	Programmer is already attached.
-18	EEh	Could not return block sizes.
-19	EDh	VMEbus error encountered.
-20	ECh	Task unable to be created.
-21	EBh	Task unable to be deleted.
-22	EAh	Not logged in to process service request.
-23	E9h	Memory Type selector not valid in context.
-24	E8h	No user memory is available to allocate.
-25	E7h	Configuration is not valid.
-26	E6h	CPU model number does not match.
-27	E5h	DOS file area not formatted.
-28	E4h	Memory Type for this selector does not exist.
-29	E3h	CPU revision number does not match.
-30	E2h	IOS could not delete configuration of bad type.
-31	E1h	No I/O configuration to read or delete.
-32	E0h	Service in process cannot login.
-33	DFh	Invalid datagram connection address.
-34	DEh	Size of datagram connection invalid.
-35	DDh	Unable to locate given datagram connection ID.
-36	DCh	Unable to find connection address.

Error status		Description
Decimal	Hexa-decimal	
-37	DBh	Invalid Memory type selector in datagram.
-38	DAh	Null pointer to data in Memory Type selector.
-39	D9h	Transfer type invalid for this Memory Type selector.
-40	D8h	Point length not allowed.
-41	D7h	Invalid datagram type specified.
-42	D6h	Total datagram connection memory exceeded.
-43	D5h	Invalid block name specified in datagram.
-44	D4h	Mismatch of configuration checksum.
-45	D3h	User Program Module (UPM) read or write exceeded block end.
-46	D2h	Invalid write mode parameter.
-47	D1h	Packet size or total program size does not match input.
-48	D0h	One or more PLC modules configured have unsupported revision.
-49	CFh	Specified device is not available in the system (not present).
-50	CEh	Specified device has insufficient memory to handle request.
-51	CDh	Attempt was made to read a device but no data has been stored on it.
-52	CCh	Data stored on device has been corrupted and is no longer reliable.
-53	CBh	A comm or write verify error occurred during save or restore.
-54	CAh	Device is write-protected.
-55	C9h	Login using non-zero buffer size required for block commands.
-56	C8h	Password(s) already enabled and cannot be forced inactive.
-57	C7h	Passwords are set to inactive and cannot be enabled or disabled.
-58	C6h	Control Program CP tasks exist but requestor not logged into main CP
-59	C5h	No task-level Rack/Slot configuration to read or delete.
-60	C4h	Verify with FACard or EEPROM failed.
-61	C3h	Text length does not match traffic type.
-62	C2h	The OEM key is NULL (inactive).
-63	C1h	Invalid block state transition.

Minor Error Codes for Major Error Code 10 (0Ah)

Error status		Description
Decimal	Hexa-decimal	
-110	92H	No SNP communication. Either communication has been lost or a communication session has not been established.
-111	91h	Bad SNP communication. Transmission was aborted after maximum retries due to serial errors (that is, parity, overrun, or framing errors).
-112	90h	Bad SNP BCC encountered. Transmission was aborted after maximum retries due to a bad Block Check Code.
-113	8Fh	Out-of-Sequence SNP message. SNP message type received was not the type expected.

Error status		Description
Decimal	Hexa-decimal	
-114	8Eh	PC Serial port configured for SNP Master driver is not open; no communication can take place.
-115	8Dh	Bad DOS Version. Must have DOS2.0, or later, to support the SNP DOS Driver.

Minor Error Codes for Major Error Code 12 (0Ch)

Note!

Minor Error Codes 1-31 indicate no-fatal errors; SNP or SNPX communication is not terminated.

Error status		Description
Decimal	Hexa-decimal	
1	01h	WAIT-type COMMREQ is not permitted. Must use NOWAIT-type.
2	02h	COMMREQ command is not supported.
3	03h	SNP communication is not active. Must initiate a new SNP communication by sending an Attach or Long Attach COMMREQ.
4	04h	SNP slave did not respond to Attach message from master.
5	05h	Unable to write SNP Status Word to local PLC memory. May be due to invalid Status Word memory type or address.
6	06h	Master device memory type is not valid in this PLC.
7	07h	Master device memory address or length is zero.
8	08h	Unable to read or write master device memory locations specified in COMMREQ. Usually caused by invalid memory address for this PLC. SNP message exchange may have taken place.
9	09h	Master device memory data length exceeds maximum data size of CMM module (2048 bytes). Must use a smaller data length. Use multiple COMMREQs if total data length exceeds this maximum value.
10	0Ah	Slave device memory type is missing or not valid.
11	0Bh	Slave device memory address is missing or zero.
12	0Ch	COMMREQ Data Block Length is too small. (When expected COMMREQ length is 6 words or less, an improper length may cause other minor error codes 6-11.)
13	0Dh	Invalid Diagnostic Status Word (DSW) starting word or length.
14	0Eh	Invalid maximum SNP message data size. Must be an even value from 42 to 2048 bytes.
15	0Fh	Invalid Privilege Level. Must be 0 through 4 or -1.
16	10h	Invalid Fault Table selector. Must be 1 for I/O Fault Table or 2 for PLC Fault Table.
17	11h	Invalid Fault Table starting index. Must be 1-32 for I/O Fault Table or 1-16 for PLC Fault Table.
18	12h	Invalid fault count. Must be 1-32 for I/O Fault Table or 1-16 for PLC Fault Table.
19	13h	Invalid Set PLC Date/Time mode. Must be 1-4.

Error status		Description
Decimal	Hexa-decimal	
20	14h	Invalid Set PLC Date/Time date, time or day-of-week value.
21	15h	Unable to retrieve master device PLC time/date from PLC CPU.
22	16h	Invalid slave PLC type. Must be 01h for normal datagram or 81h (129) for permanent datagram.
23	17h	Invalid datagram type. Must be 01h for normal datagram or 81h (129) for permanent datagram.
24	18h	Missing or too many datagram point formats. Must be 1-32.
25	19h	Invalid datagram point format data.
26	1Ah	Datagram area size is too small to include data for all specified point formats.
27	1Bh	Invalid number of Control Program Names. Must be 1-8.
28	1Ch	SNP-X Request exceeds maximum data size (1000 bytes). Must use a smaller data length. Use multiple COMMREQs if necessary.
29	1Dh	Invalid SNP-X communication session type. Must be 0 for a single slave device, or 1 for multiple slave devices.
30	1Eh	Illegal destination SNP ID specified for SNP-X slave. Must be 0-7 ASCII characters, plus a terminating null character (00h). The Null SNP ID (eight bytes of 00h) may be used to specify any single device. The Broadcast SNP ID (eight bytes of FFh) may be used to specify all slave devices on the serial link.
31	1Fh	Destination SNP ID does not match SNP-X session type. The Broadcast SNP ID is not permitted in a single-slave SNP-X session. The Null SNP ID is not permitted in a multiple-slave SNP-X session.

Minor Error Codes for Major Error Code 12 (0Ch) (Continued)

Note!

Minor Error Codes 32-118 indicate fatal errors; subsequent communication must be initiated with an Attach of Long Attach COMMREQ, or any remote SNP-X COMMREQ.

Error status		Description
Decimal	Hexa-decimal	
32	20h	Inactivity timeout (T3'). The SNP slave has not received any new SNP messages within the configured T3' time interval.
33	21h	A Parity error has occurred on a Attach, Attach Response, or Update Realtime Datagram message. Communications have not been established.
34	22h	A BCC (Block Check Code) error has occurred on an Attach, Attach Response, or Update Realtime Datagram message. Communications have not been established.
35	23h	A Framing or Overrun serial error has occurred on an Attach, Attach Response, or Update Realtime Datagram message. Communications have not been established.
36	24h	An invalid SNP message type was received when an Attach, Attach Response, or Update Realtime Datagram message was required. Communications have not been established.

Error status		Description
Decimal	Hexa-decimal	
37	25h	An invalid next message length value was specified in an Attach, Attach Response, or Update Realtime Datagram was required. Communications have not been established.
38	26h	An unexpected SNP message type was received when an Attach, Attach Response, or Update Realtime Datagram was required. Communications have not been established.
39	27h	Another Break was received while SNP slave was waiting for an Attach or Update Realtime Datagram message.
40	28h	An SNP message has been sent and retried the maximum number of times. A maximum of two retries are permitted. A retry is caused by a NAK from the remote SNP device.
41	29h	A received SNP message has been NAKed the maximum number of two times. The NAKed message may be retransmitted a maximum of two times.
42	2Ah	An unknown message was received when an acknowledge (ACK or NAK) was required.
43	2Bh	Sequence Error. An unexpected SNP message type was received.
44	2Ch	A received SNP message contains bad next message length value.
45	2Dh	Acknowledge timeout. An acknowledge (ACK or NAK) was not received within the configured T2 time interval. A slave device may generate this error if the master device has aborted after maximum response NAKs and does not NAK the next response retry.
46	2Eh	Response timeout. The SNP Master did not receive an SNP Response message within the configured T5' time interval.
47	2Fh	Buffer message timeout. An expected Text Buffer or Connection Data message was not received within the configured T5' interval.
48	30h	Serial output timeout. The CMM module was unable to transmit a Break, an SNP message, or SNP acknowledge (ACK or NAK) from the serial port. (May be due to missing CTS signal when the CMM module is configured to use hardware flow control.
49	31h	SNP slave did not receive a response from the Service Request Processor in the PLC CPU.
50	32h	COMMREQ timeout. The COMMREQ did not complete within the configured time interval.
51	33h	An SNP Request or Response was aborted prior to completion due to reception of a Break.
52	34h	PLC backplane communications error.
53	35h	Invalid Piggyback Status data memory type or address. Communications have not been established.
54	36h	Invalid CNP Slave SNP ID. Must be a 0-7 ASCII character, plus a terminating null character (00h). The Null SNP ID (eight bytes of 00h) may be used to specify any single slave device.
55	37h	The SNP master has received a response message containing an unexpected data length. Usually indicates a problem with the remote SNP slave device. May occur when Series 90-70 commands (Task Memory or Program Block Memory Read/Write) are issued to a Series 90-30 slave device.
56	38h	Response code in received SNP-X response message does not match expected value. (Response code must equal the request code +80h.)

Error status		Description
Decimal	Hexa-decimal	
57	39h	SNP-X Response message exceeds maximum data size (decimal 1000 bytes). Data in the Response is ignored.
64	40h	A parity error has occurred on a X-Attach Response message when establishing a new SNP-X communication session. Communications have not been established.
65	41h	A framing or overrun error has occurred on an X-Attach Response message when establishing a new SNP-X communication session. Communications have not been established.
66	42h	A BCC (Block Check Code) error has occurred on an X-Attach Response message when establishing a new SNP-X communication session. Communications have not been established.
67	43h	An invalid message type was received when an X-Attach Response was required when establishing a new SNP-X communication session. Communications have not been established.
68	44h	An invalid next message type value was detected in an X-Attach Response message when establishing a new SNP-X communication session. Communications have not been established.
69	45h	An invalid response code was detected in an X-Attach Response message when establishing a new SNP-X communication session. Communications have not been established.
70	46h	An expected X-Attach Response message was not received within the response timeout interval when establishing a new SNP-X communication session. The master has retried the X-Attach message twice without receiving a response. Communications have not been established.
80	50h	A parity error has occurred on an X-Attach Response message when reestablishing an existing SNP-X communication session. Communications have not been established.
81	51h	A framing or overrun error has occurred on an X-Attach Response message when reestablishing an existing SNP-X communication session. Communications have not been established.
82	52h	A BCC (Block Check Code) error has occurred on an X-Attach Response message when reestablishing an existing SNP-X communication session. Communications have not been established.
83	53h	An invalid message type was received when an X-Attach Response message when reestablishing an existing SNP-X communication session. Communications have not been established.
84	54h	An invalid next message type value was detected in an X-Attach Response message when reestablishing an existing SNP-X communication session. Communications have not been established.
85	55h	An invalid response code was detected in an X-Attach Response message when reestablishing an existing SNP-X communication session. Communications have not been established.
86	56h	An expected X-Attach Response message was not received within the response timeout interval when reestablishing an existing SNP-X communication session. The master has retried the X-Attach message twice without receiving a response. Communications have not been established.
96	60h	A parity error has occurred on an X-Response message.
97	61h	A framing or overrun error has occurred on an X-Response message.

Error status		Description
Decimal	Hexa-decimal	
98	62h	A BCC (Block Check Code) error has occurred on an C-Response message.
99	63h	An invalid message type was received when an X-Response message was required.
100	64h	An invalid next message type value was detected in an X-Response message.
101	65h	An invalid response code was detected in an X-Response message.
102	66h	An expected X-Response message was not received within the response timeout interval.
112	70h	A parity error has occurred on an Intermediate Response message.
113	71h	A framing or overrun error has occurred on an intermediate Response message.
114	72h	A BCC (Block Check Code) error has occurred on an Intermediate Response message.
115	73h	An invalid message type was received when an Intermediate Response message was requires.
116	74h	An invalid next message type value was detected in an Intermediate Response message.
117	75h	An invalid response code was detected in an Intermediate Response message.
118	76h	An expected Intermediate Response message was not received within the response timeout interval.

Minor Error Codes for Major Error Code 13 (0Dh)

Error status		Description
Decimal	Hexa-decimal	
64	40h	The requested service is not supported by the CNP slave.
65	41h	SNP slave on CMM module requires PLC CPU privilege level 2 to operate. The SNP slave has rejected a request to change to a higher or lower privilege level.
66	42h	SNP Request or REsponse message exceeds maximum data length of the CMM module. (Total data length for Mailbox and all following Buffer messages is 2048 bytes.) The master must use a smaller data length. Use multiple requests if total data length exceeds the maximum value.
67	43h	Improper Write Datagram message format. Series 90-70 slave devices use a different format for this message than Series 90-30 or Series 90-20 slave devices. The master must use the proper message format for this SNP slave device. (The SNP master in the CMM module sends this message as part of the Establish Datagram COMMREQ command. The datagram has been partially established, but is not usable; the datagram should be cancelled by using the Datagram ID returned by the COMMREQ.)
68	44h	A datagram error occurred in a Series 90-70 slave device (dual-port error).

Minor Error Codes for Major Error Code 14 (0Eh)

Error status		Description
Decimal	Hexa-decimal	
1	01h	Not used.
2	02h	The modem command string length exceeds 250 characters.
3	03h	COMMREQ Data Block Length is too small. Output command string data is missing or incomplete.
4	04h	Serial output timeout. The CMM module was unable to transmit the modem autodial output from the serial port. (May be due to missing CTS signal when the CMM is configured to use hardware flow control).
5	05h	Response was not received from modem. Check modem and cable.
6	06h	Modem responded with BUSY. Modem is unable to complete requested connection. The remote modem is already in use; retry the connection request at a later time.
7	07h	Modem responded with NO CARRIER. Modem is unable to complete requested connection. Check the local and remote modems and the telephone line.
8	08h	Modem responded with NO DIALTONE. Modem is unable to complete the requested connection. Check the modem connections and the telephone line.
9	09h	Modem responded with ERROR. Modem is unable to complete the requested command. Check the modem command string and modem.
10	0Ah	Modem responded with RING, indicating that the modem is being called by another modem. Modem is unable to complete the requested command. Retry the modem command at a later time.
11	0Bh	An unknown response was received from the modem. Modem is unable to complete the requested command. Check the modem command string and modem. The modem response is expected to be either CONNECT or OK.

Minor Error Codes for Major Error Code 15 (0Fh)

Note!

Minor Error Codes 1-21 indicate non-fatal errors; the SNP-X communication session is not terminates.

Error status		Description
Decimal	Hexa-decimal	
1	01h	The service request code is an X-Request message is unsupported or invalid at this time. This error may occur if an SNP-X communication session has not been successfully established at the slave device.
2	02h	Insufficient privilege level in the slave PLC CPU for the requested SNP-X service. Password protection at PLC CPU may be preventing the requested service.
3	03h	Invalid slave memory type in X-Request message.

Error status		Description
Decimal	Hexa-decimal	
4	04h	Invalid slave memory address or range in X-Request message.
5	05h	Invalid data length in X-Request message. Data length must be non-zero and may not exceed decimal 1000 bytes.
6	06h	X-Buffer data length does not match the service request in X-Request message. The X-Buffer message length is obtained from the Next Message Length field in the X-Request message; the length of the data within the buffer message is always the message length minus 8 bytes.
7	07h	Queue Full indication from Service Request Processor in slave PLC CPU. The slave is temporarily unable to complete the service request; the master should try again later. It is recommended that the master wait at least 10 msec before repeating the X-Request. (This error applies to CMM module only.)
8	08h	Service Request Processor response exceeds 1000 bytes; the SNP-X slave device cannot return the data in an X-Response message. (This error applies to CMM module only).
16	10h	Unexpected Service Request Processor error. (This error applies to CMM module only; the unexpected SRP error code is saved in the Diagnostic Status Word in the CMM module).
21	15h	Requested service is not permitted in a Broadcast request. The master must direct the X-Request message to a specific SNP-X device.

Minor Error Codes for Major Error Code 15 (0Fh) (Continued)

Note!

Minor Error Codes 32-35 indicate fatal errors; subsequent SNP-X communication must be initiated with an Z-Attach message. The SNP-X slave device returns these error codes in an X-Response message.

Error status		Description
Decimal	Hexa-decimal	
32	20h	Invalid Message Type field in a received X-Request message. The message type of an X-Request message must be 58h='X'.
33	21h	Invalid Next Message Type or Next Message Length field in a received X-Request message. If this request does not use a buffer (0-2 bytes of data), the Next Message Type must be zero. If this request will be followed with a buffer message (more than 2 bytes of data), the Next Message Type must be 54h='T', and the Next Message Length must specify the length of the X-Buffer message. Valid X-Buffer message lengths are 9-1008 bytes (data length plus 8 bytes).
34	22h	Invalid Message Type field in a received X-Buffer message. The message type of an X-Buffer message must be 54h='T'.
35	23h	Invalid Next Message Type field in a received X-Buffer message. Since an X-Buffer message is never followed by another message, the Next Message Type must always be zero.

Minor Error Codes for Major Error Code 15 (0Fh) (Continued)

Note!

Minor Error Codes 64-115 indicates fatal errors; subsequent SNP-X communication must be initiated with an X-Attach message. The SNP-X slave device is unable to return an X-Response message; these error codes are available only in the Diagnostic Status Words maintained for each serial port on the CMM module.

Error status		Description
Decimal	Hexa-decimal	
64	40h	Serial output timeout. The slave was unable to transmit an SNP-X message from the serial port. (May be due to missing CTS signal when the CMM module is configured to use hardware flow control.)
65	41h	An SNP-X request was aborted prior to completion due to reception of a Break.
66	42h	An C-Buffer message was received containing greater than 1000 bytes of data. The data is ignored.
67	43h	The SNP-X slave did not receive a response from the Service Request Processor in the PLC CPU.
68	44h	PLC backplane communications error.
80	50h	A parity error has occurred in a received X-Attach message.
81	51h	A framing or overrun error has occurred in a received X-Attach message.
82	52h	A BCC (Block Check Code) error has occurred in a received X-Attach message.
83	53h	An invalid Message Type was received when an C-Attach message was required. (For an X-Attach message, the message type must be 58h='T'.)
84	54h	An invalid Next Message Type value was detected in a received X-Attach message. (For an X-Attach message, the Next Message Length must be zero).
85	55h	An invalid request code was detected in a received X-Attach message.
96	60h	A parity error has occurred in a received X-Request message.
97	61h	A framing or overrun error has occurred in a received X-Request message.
98	62h	A BCC (Block Check Code) error has occurred in a received X-Request message.
112	70h	A parity error has occurred in a received X-Buffer message.
113	71h	A framing or overrun error has occurred in a received X-Buffer message.
114	72h	A BCC (Block Check Code) error has occurred in a received X-Buffer message.
115	73h	An expected X-Buffer message was not received.

Minor Error Codes for Major Error Code 19 (13h)

Error status		Description
Decimal	Hexa-decimal	
2	02h	Unsupported COMMREQ. These errors are only generated when there is no protocol currently being run on a port and the port receives a COMMREQ. (The port may be disabled or an error has occurred in processing a new configuration).
3	03h	Invalid COMMREQ length.
4	04h	Invalid COMMREQ status word location.
5	05h	Invalid COMMREQ data.

GE Fanuc SNPX

Denna manual är en installations- och hanteringsmanual till drivrutinen GE Fanuc SNPX till operatörsterminalerna i E-serien.

Funktionaliteten i terminalerna och i MAC Programmer+ är beskriven i E-seriemmanualen.

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Beijer Electronics AB reserverar sig mot att informationen i denna manual kan komma att ändra sig utan föregående varning. Alla exempel i denna i denna manual används endast för att öka förståelsen om hur programmen arbetar. Beijer Electronics AB tar inget ansvar för att dessa fungerar i verkliga applikationer.

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1 Introduktion

Denna manual beskriver hur GE Fanuc PLC-system ansluts till operatörsterminalerna i E-serien och hur de kommunicerar via protokollet SNPX. Adressering i PLC systemet göres normalt på GE Fanuc sätt. För information om PLC systemet refereras till manualen för aktuellt system.

Terminalerna stöder GE Fanuc PLC-systemen och kommunicerar via SNPX-protokollet.

2 Installation och uppdatering av drivrutin

Tillgängliga drivrutiner installeras samtidigt som MAC Programmer+ installeras. En ny drivrutin kan läggas till i MAC Programmer+ antingen med hjälp av MAC Programmer+ och en Internetanslutning eller från diskett. En drivrutin kan uppdateras till nyare version på samma sätt.

2.1 Installation av drivrutin med Internet

För att uppdatera tillgängliga drivrutiner till senaste version eller för att installera nya drivrutiner används funktionen **Update terminal drivers from Internet** i menyn **File** i MAC Programmer+. Alla projekt måste stängas innan funktionen används och datorn måste kunna göra en Internetanslutning. Någon browser behövs inte. När anslutningen är etablerad visas en lista med alla drivrutiner som kan laddas ner via Internet till datorn. I listan visas versionsnummer på tillgängliga drivrutiner och versionsnumret på installerade drivrutiner i MAC Programmer+. Markera de drivrutiner som ska installeras i MAC Programmer+. Funktionen **Mark Newer** markerar alla drivrutiner som finns tillgängliga i en senare version och de som inte är installerade. Välj därefter **Download**. Varje drivrutin är ungefär 500 kb stor och de är färdiga att använda så snart nedladdningen är klar.

2.2 Installation av drivrutin från diskett

För att uppdatera tillgängliga drivrutiner till senaste version eller för att installera nya drivrutiner används funktionen **Update terminal drivers from Disk** i menyn **File** i MAC Programmer+. Alla projekt måste stängas innan funktionen används. Välj den katalog som innehåller den nya drivrutinen och välj att öppna mpd-filen. En lista visas med alla drivrutiner som kan installeras. I listan visas versionsnummer på tillgängliga drivrutiner och versionsnumret på installerade drivrutiner i MAC Programmer+. Markera de drivrutiner som ska installeras i MAC Programmer+. Funktionen **Mark newer** markerar alla drivrutiner som finns tillgängliga i en senare version och de som inte är installerade. Välj därefter **Install**.

Hur man väljer GE Fanuc SNPX drivrutinen i projektet och hur man överför den till terminalen beskrivs i *kapitel 3*.

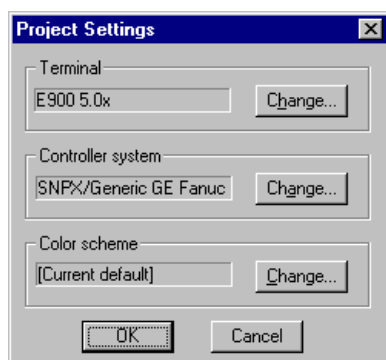
3 Anslutning av terminalen till PLC-systemet

3.1 Inställningar i MAC Programmer+

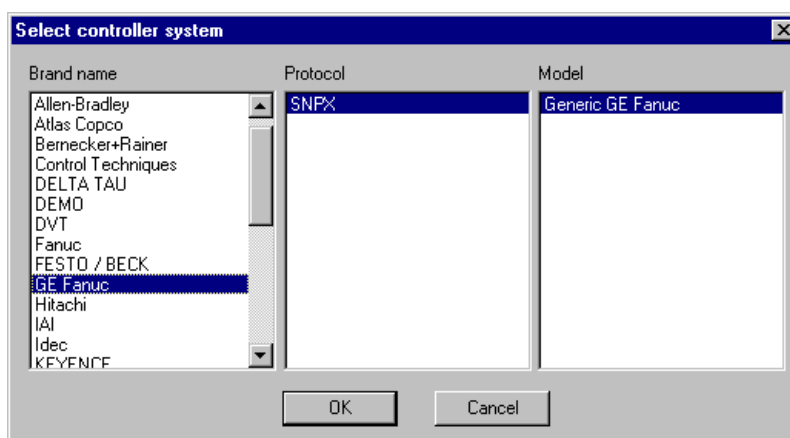
För kommunikation med GE Fanuc PLC-system via protokollet SNPX måste följande inställningar göras i programmeringsverktyget MAC Programmer+.

Val av drivrutin

Välj **New** i **File** menyn. Då skapas ett nytt projekt och dialogen **Project Settings** visas. I ett befintligt projekt visas dialogen genom att man väljer **Project Settings** i **File** menyn.

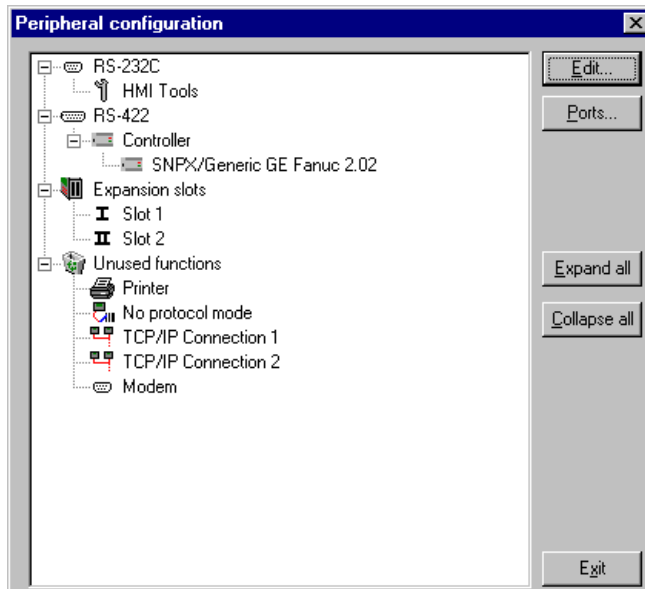


Tryck på **Change...** under **Controller system** och välj i listan över tillgängliga drivrutiner. Välj fabrikat, protokoll och tryck på **OK**. Tryck på **OK** igen och bekräfta projektinställningarna.



Kommunikationsinställning

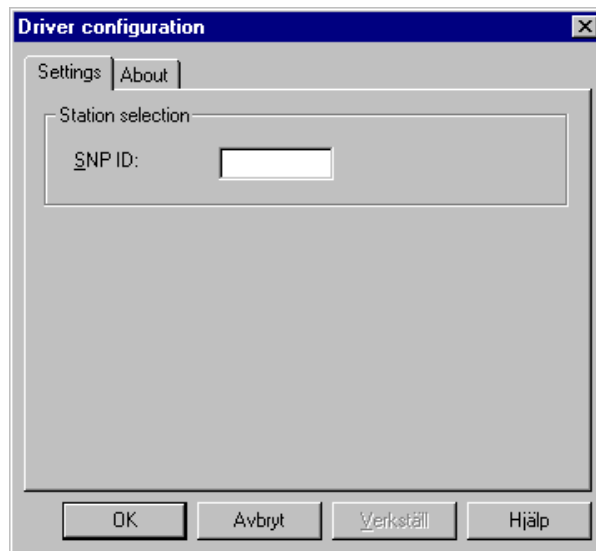
Inställningarna för kommunikationen mellan terminalen och PLC-systemet görs under **Peripherals** i **Setup** menyn. För att ändra vilken port PLC-systemet är anslutet till markera **Controller** och håll vänster musknapp nere och drag till den aktuella positionen. Markera den valda anslutningen och tryck **Edit** för att ändra de övriga kommunikationsinställningarna.



Inställningarna skall vara:

Parameter	Beskrivning
Port	RS-232C eller RS-422
Baudrate	19200
Data bits	8
Stop bits	1
Parity	Odd

För att göra speciella inställningar för den valda drivrutinen, markera och tryck på **Edit**.



Parameter	Beskrivning
SNP ID	Om point-to-point anslutning används behöver inga inställningar göras

Överföra drivrutinen till terminalen

Drivrutinen laddas ner till terminalen när hela projektet överförs till terminalen. Välj **Project** i **Transfer** menyn

Project Transfer

Percent complete: 0%

Byte count (Kb): 0

Time elapsed:

Status:

Info:

Retries: 0

Terminal Version:

Test project on send Automatic terminal RUN/TRANSFER switching

Send complete project Check terminal version

Partial send options:

Blocks:

None

All

From: 0 To: 0

Alarms Message library

Symbols Setup

Time channels Function keys

LED's Passwords

Delete:

Trend data

Recipe Data

Download driver:

Never

Always

Automatic

Set terminal clock

Exit

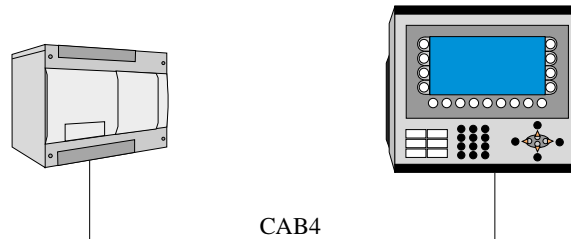
Det finns tre olika alternativ när drivrutinen laddas ner till terminalen.

Funktion	Beskrivning
Aldrig	Drivrutinen laddas aldrig, befintlig drivrutin i terminalen används.
Alltid	Drivrutinen laddas varje gång projekt överföres.
Automatiskt	Drivrutinen laddas om drivrutinen i terminalen inte är samma som i projektet. Om samma drivrutin finns laddas den inte.

3.2 Koppla in terminalen till PLC-systemet

Anslutningen är av typen "point-to-point" master/slav. CPU porten på PLC-systemet ansluts till RS-422 porten på terminalen.

Anslutning via standardkabel



Kabeln CAB4 ansluts mellan PLC-systemets CPU port och terminalens RS-422 port.

CAB4 är en standardkabel som kan beställas från Beijer Electronics.

4 Adressering

Terminalen kan hantera följande datatyper i PLC-systemet:

Namn	Adress	Läsa	Skriva	Typ
Discrete Inputs	%Ixxxx	Yes	Yes	Digital
Discrete Outputs	%Qxxxx	Yes	Yes	Digital
Discrete Globals	%Gxxxx	Yes	Yes	Digital
Internal Coils	%Mxxxx	Yes	Yes	Digital
Temporary Coils	%Txxxx	Yes	Yes	Digital
Status References	%Sxxxx	Yes	No	Digital
Register References	%Rxxxx	Yes	Yes	Analog 16-bit
Analog Inputs	%AIxxxx	Yes	Yes	Analog 16-bit
Analog Outputs	%AQxxxx	Yes	Yes	Analog 16-bit

xxxx=adress (minmumvärdet=1, maximumvärdet beror på PLC-systemet).

Det är möjligt att välja bitar i ett register och läsa/skriva dessa värden, exempelvis:

%R1.0-7 (Visar värdet för bit 0-7 i register 1)

%R4.8-15 (Visar värdet för bit 8-15 i register 4)

För information om instruktionerna i PLC-systemet hänvisas till manualen för PLC-systemet.

5 Effektiv kommunikation

För att göra kommunikationen mellan terminalen och PLC-systemet snabb och effektiv bör följande noteras om hur signalerna läses och vad som kan göras för att optimera detta.

5.1 Signaler som påverkar kommunikationstiden

Det är endast signalerna till objekten i aktuellt block som läses kontinuerligt. Signalerna till objekten i de andra blocken läses inte och antalet block påverkar därför inte kommunikationstiden.

Förutom signalerna till objekten i det aktuella blocket, läser terminalen hela tiden följande signaler från PLC-systemet:

- Display signaler
- Blockutskriftsignaler
- LED register
- Larmsignaler
- Fjärrkivering av larm och larmgrupper
- Login signal
- Logout signal
- Trendregister vid samplingspunkterna
- Register till stapelobjekten om min/max indikatorer används
- New Display-register
- Summerregistret
- Registret som styr bakgrundsbelysningen
- Kontrollblocket för markören
- Kontrollblocket för recept i PLC-systemet
- Indexregistret till biblioteket
- Indexregister
- Registren till PLC-klockan om PLC-klockan används i terminalen
- Signalen som styr radering av larmlistan
- Kontrollregistret för No protocol
- Kontrollsignalen som styr om No protocol skall vara aktivt

Signaler som inte påverkar kommunikationstiden

Följande signaler påverkar inte kommunikationstiden:

- Signaler kopplade till funktionstangenterna
- Tidkanalerna
- Objekt i larmtexter

5.2 Hur man kan göra kommunikationen effektivare

Gruppera PLC-signalerna i en följd

Signalerna från PLC-systemet läses snabbast om signalerna i listan ovan är i en följd. Om till exempel 100 signaler är definierade, läses dessa snabbast om de grupperas, till exempel M0.0-M11.7. Om signalerna sprids ut (t ex I0.4, Q30.0, T45.3 etc.) går uppdateringen långsammare.

Effektiva blockbyten

Blockbyte sker effektivast via blockhoppfunktionen på funktionstangenterna eller via hoppobjekt. **Display signal** i blockhuvudet bör endast användas då PLC-systemet ska tvinga fram en annat block. Ska PLC-systemet byta bild kan även **New display reg** användas. Det belastar inte kommunikationen lika mycket som ett större antal **Display signal**.

Använd klockan i terminalen

Används terminalklockan belastas kommunikationen eftersom PLC-systemets klockregister måste läsas upp till terminalen. Nerladdningen av terminalklockan till PLC-systemet belastar också, tidsintervallet mellan nerladdningarna bör därför vara så långt som möjligt.

Packning av signaler


När signalerna skall överföras mellan terminalen och PLC-systemet överförs inte alla signaler samtidigt. De delas istället in i paket med ett antal signaler i varje. För att minska antalet paket som skall överföras och för att göra kommunikationen snabbare måste man ta hänsyn till detta. Antalet signaler i varje paket beror på drivrutinen.

I GE Fanuc SNPX drivrutinen är antalet 100 st för analoga signaler och 800 st för digitala signaler.

För att göra kommunikation så snabb som möjligt måste antalet paket minimeras. Signaler i en följd behöver ett minimalt antal paket men det är kanske inte alltid nödvändigt. I sådana fall blir det sk glapp mellan två signaler. Glappet är maximumavståndet mellan två signaler där de fortfarande kan hållas inom samma paket. Glappet beror på vilken drivrutin du använder.

I GE Fanuc SNPX drivrutinen är antalet 20 för analoga signaler och 20 för signaler.

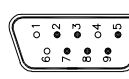
Signal	1	2	3	4	5	6	7	8	9	10
Använd	X	X					X	X	X	



Glapp

6 Ritningar

RS-232
MAC 50/90/Exxx, MTA-250/G1/Exxx
MAC 10/CM, CM10

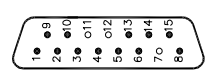


Pin no	Name	Signal direction MAC ↔ XXX
2	TxD	→
3	RxD	←
5	0V	
7	CTS	←
8	RTS	→
9*	+5V <5mA	→

D-sub
 9-pin Hona
 9-pin Male

* Ej i E-serien
 Not in E-series

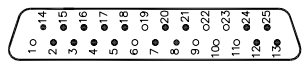
RS-422
MAC 50/90, MTA-250/G1



Pin no	Name	Signal direction MAC ↔ XXX
2	+TxD	→
1	-TxD	→
4	+RxD	←
3	-RxD	←
6	+RTS	→
5	-RTS	→
10	+CTS	←
9	-CTS	←
8,15	0V	
13,14	+5V <20mA	→

D-sub
 15-pin Hona
 15-pin Female

RS-422
MAC 40+/Exxx, MTA-100/Exxx
MAC 10/CM, CM10

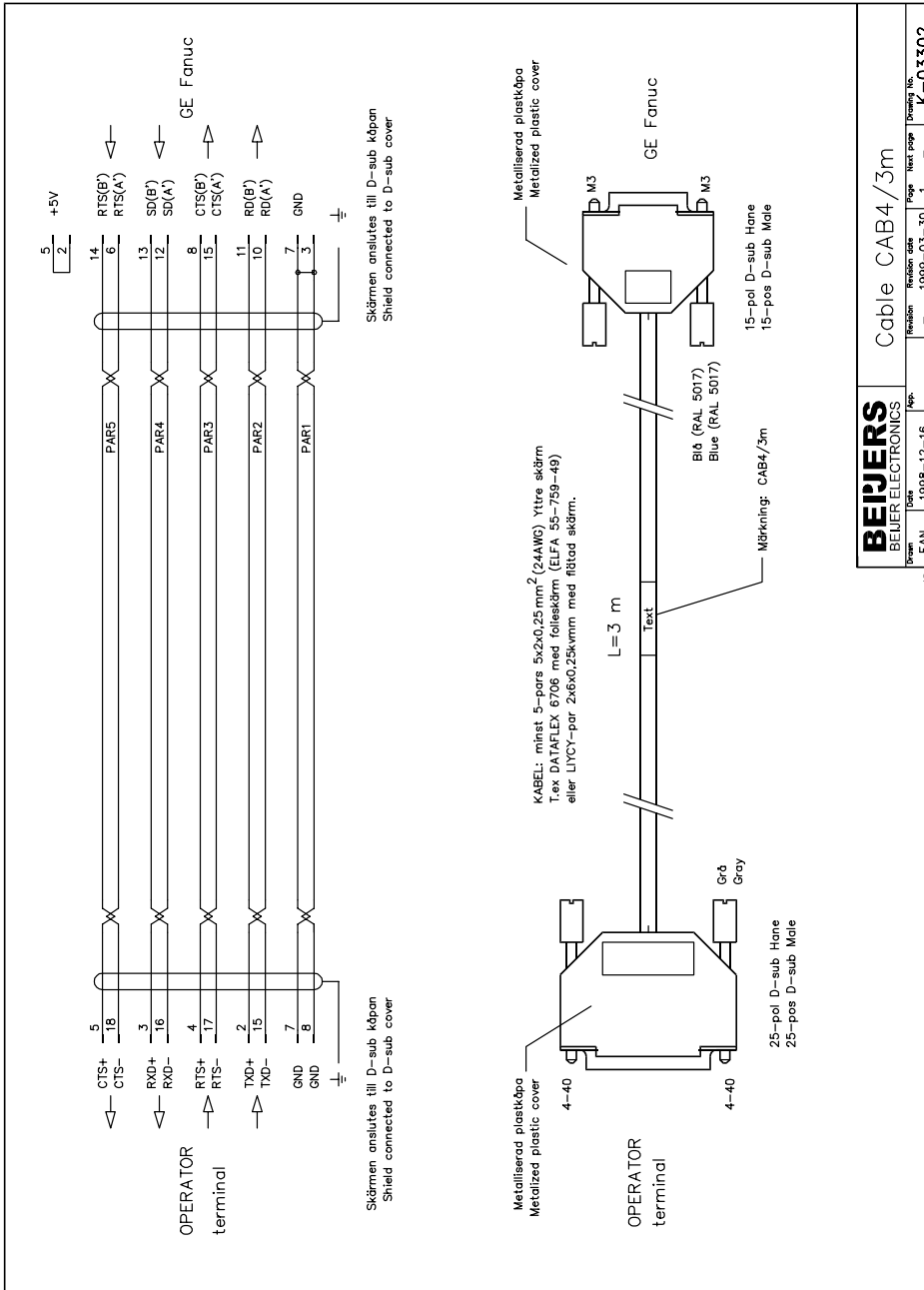


Pin no	Name	Signal direction MAC ↔ XXX
2	+TxD	→
15	-TxD	→
3	+RxD	←
16	-RxD	←
4	+RTS	→
17	-RTS	→
5	+CTS	←
18	-CTS	←
20	1)	
21	1)	
7,8	0V	
14	2) +5V <50mA	→
12,13	3) +5V >200mA	←
24,25		

D-sub
 25-pin Hona
 25-pin Female

- 1) Stift 20 är anslutet till stift 21 internt i MAC'en.
 Pin no 20 connected to pin no 21 internal in MAC/MTA.
- 2) Endast i E-serien och med serie nr 9901 eller senare
 Only for E-series and with serial no 9901 or later
- 3) Endast E100/MAC40+/MTA-100
 Only for E100/MAC40+/MTA-100

Beijer ELECTRONICS		MAC/MTA RS-232/RS-422	
Drawn	Date	Revision	Revision date
BLE	1993-09-07	—	2000-07-28
Bld Revised: 1.25ppr A3		Page	Sheet page
		1	—
		Drawing No. S-00724	



7 Appendix

7.1 Felkoder för SNP

För beskrivning av felkoder hänvisas till engelskt appendix i denna manual.