

8

EMBEDDED ETHERNET FUNCTION

This chapter describes the specifications of the embedded Ethernet function.

Chapter 8, "EMBEDDED ETHERNET FUNCTION", consists of the following sections:

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8.1 EMBEDDED ETHERNET PORT AND PCMCIA ETHERNET CARD

The embedded Ethernet function can be used by selecting one of two types of devices: the embedded Ethernet port and PCMCIA Ethernet card.

A selection can also be made to stop the embedded Ethernet function. The PCMCIA Ethernet card is to be inserted into the memory card slot for temporary communication.

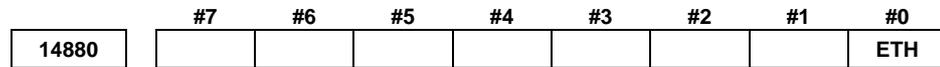
CAUTION

- 1 When using the embedded Ethernet function for the first time, set an IP address and other items carefully as instructed by the network administrator, then perform a sufficient communication test. Note that an incorrect IP address or other setting may cause a communication failure on the entire network.
- 2 A unit such as a PC situated in the same network can increase the communication processing load on the CNC even if the unit is not communicating with the CNC. Avoid connecting the CNC to a factory-wide network. Use a router or the like to separate the network including the CNC from the other networks.

NOTE

- 1 The embedded Ethernet port of FANUC Series 32i-A is available as an option.
- 2 Use the PCMCIA Ethernet card designated by FANUC. General Ethernet cards available on the market cannot be used.
- 3 The PCMCIA Ethernet card is used for FANUC LADDER-III or SERVO GUIDE.
- 4 Use the PCMCIA Ethernet card just for temporary communication as described above. Avoid using the card for continuous communication.
- 5 The PCMCIA Ethernet card is inserted into a memory card slot, with a part of the card left uninserted. When using the PCMCIA Ethernet card, take great care not to damage the card by hitting the protruding part of the card. When the card becomes unnecessary, remove the card immediately, in order to prevent any damage to the card.

Related NC parameters



[Input type] Setting input
 [Data type] Bit

0 **ETH** The embedded Ethernet function (embedded Ethernet port or PCMCIA Ethernet card) is:
 0: Used.
 1: Not used.

NOTE
 This parameter is valid with series 656F and edition 06 or later.



[Input type] Parameter input
 [Data type] Word
 [Valid data range] 0 to 3

Set embedded Ethernet usable with the 300is, 310is, and 320is of stand-alone type.

0: For the embedded Ethernet port, the connector (CD38A) for Ethernet on the control unit is used.
 For the PCMCIA Ethernet card, the card slot on the side of the display unit is used.

1: For the embedded Ethernet port, the connector (CD38A) for Ethernet on the control unit is used.
 For the PCMCIA Ethernet card, the card slot (CNM1B) on the control unit is used.

2: For the embedded Ethernet port, the connector (CD38S) for Ethernet on the rear of the display unit is used.
 For the PCMCIA Ethernet card, the card slot on the side of the display unit is used.

3: For the embedded Ethernet port, the connector (CD38S) for Ethernet on the rear of the display unit is used.
 For the PCMCIA Ethernet card, the card slot (CNM1B) on the control unit is used.

No.14896	embedded Ethernet port	PCMCIA Ethernet card
0	Port in the CNC	Memory card slot on a side of the display unit
1	Port in the CNC	Memory card slot in the CNC
2	Port in the rear of the display unit	Memory card slot on a side of the display unit
3	Port in the rear of the display unit	Memory card slot in the CNC

NOTE
 This parameter is valid with the FS300is/310is/320is-A of stand-alone type, and series 656F and edition 08 or later.

Notes on using Ethernet with Windows CE of FS300is/310is/320is-A

With the FS300is/310is/320is-A, the Ethernet interface on Windows CE may be used by both of the embedded Ethernet function of the CNC and application software on Windows CE.

Note that the restrictions below are imposed accordingly.

NOTE

- 1 When the FS300is/310is/320is-A of LCD-mounted type is used and the PCMCIA Ethernet card is selected for the embedded Ethernet function, application software on Windows CE cannot use the embedded Ethernet port. When the embedded Ethernet port is selected for the embedded Ethernet function, application software on Windows CE cannot use the PCMCIA Ethernet card.
- 2 When the FS300is/310is/320is-A of stand-alone type is used, the connection location of the embedded Ethernet function varies according to the setting of NC parameter No. 14896. So, the restrictions below are applied to the Ethernet interface on Windows CE.
 - (1) When 0 is set in NC parameter No. 14896 and the PCMCIA Ethernet card is selected for the embedded Ethernet function, application software on Windows CE cannot use the embedded Ethernet port.
 - (2) When 1 is set in NC parameter No. 14896, application software on Windows CE can use the embedded Ethernet port and PCMCIA Ethernet card.
 - (3) When 2 is set in NC parameter No. 14896, the restriction on item 1 above (for the LCD-mounted type) is applied.
 - (4) When 3 is set in NC parameter No. 14896 and the embedded Ethernet port is selected for the embedded Ethernet function, application software on Windows CE cannot use the PCMCIA Ethernet card.
- 3 When the FS300is/310is/320is-A is used, application software on Windows CE can perform communication simultaneously on a port (embedded Ethernet port or PCMCIA Ethernet card) selected for the embedded Ethernet function.

8.2 SETTING UP THE EMBEDDED ETHERNET FUNCTION

This section describes the setting of parameters for the embedded Ethernet function.

8.2.1 Setting of the FOCAS2/Ethernet Function

This subsection describes the settings required to operate the FOCAS2/Ethernet function.

Notes on using the FOCAS2/Ethernet function for the first time

NOTE

- 1 When running user's original application software created by using the FOCAS2/Ethernet function, use the embedded Ethernet port.
- 2 The FOCAS2/Ethernet function allows up to five FOCAS2/Ethernet clients to be connected to one CNC.
- 3 Concurrent access by multiple applications or personal computers may overload the CNC, reducing the communication speed.

8.2.1.1 Operation on the FOCAS2/Ethernet setting screen

On the Ethernet parameter setting screen, set the parameters for operating the FOCAS2/Ethernet function.

Procedure

- 1 Press the function key .
- 2 Soft keys [EMBED PORT] and [PCMCIA LAN] appear.
(When there is no soft keys, press the continue key.)
- 3 To display the Ethernet Setting screen for the embedded Ethernet port or the PCMCIA Ethernet card, press soft key [EMBED PORT] or [PCMCIA LAN], respectively.
- 4 Press soft keys [COMMON] and [FOCAS2] and then enter parameters for the items that appear.

NOTE

- 1 The parameters for the embedded Ethernet port and the parameters for the PCMCIA Ethernet card are independent of each other.
- 2 The settings of the FOCAS2/Ethernet function for the PCMCIA Ethernet card are made when a connection to SERVO GUIDE and FANUC LADDER-III is established.

COMMON screen (BASIC)

Press soft key [COMMON]. The COMMON screen (BASIC) is displayed.

COMMON: Setting[EMBEDDED]
 BASIC
 MAC ADDRESS 000019000001
 IP ADDRESS 192.168.0.100
 SUBNET MASK 255.255.255.0
 ROUTER IP ADDRESS 192.168.0.253
 AVAILABLE DEVICE EMBEDDED 1 / 2
 a >
 MEM STOP *** ** 12:00:00
 COMMON FOCAS2 FTP TRANS (OPRT) +

COMMON screen (BASIC)

Settings items

Item	Description
IP ADDRESS	Specify the IP address of the embedded Ethernet. (Example of specification format: "192.168.0.100")
SUBNET MASK	Specify a mask address for the IP addresses of the network. (Example of specification format: "255.255.255.0")
ROUTER IP ADDRESS	Specify the IP address of the router. Specify this item when the network contains a router. (Example of specification format: "192.168.0.253")

Display items

Item	Description
MAC ADDRESS	Embedded Ethernet MAC address
AVAILABLE DEVICE	Enabled device of the embedded Ethernet. Either the embedded Ethernet port or the PCMCIA Ethernet card is displayed.

FOCAS2 screen

Press soft key [FOCAS2]. The FOCAS2 screen is displayed.

FOCAS2/Ethernet: Setting [EMBEDDED]

BASIC

PORT NUMBER (TCP) 8193

PORT NUMBER (UDP) 0

TIME INTERVAL 0

AVAILABLE DEVICE EMBEDDED 1/1

a >

MEM STOP *** ***, 12:00:00

COMMON FOCAS2 FTP TRANS (OPRT) +

FOCAS2 screen

Setting items

Item	Description
PORT NUMBER (TCP)	Specify a port number to be used with the FOCAS2/Ethernet function. The valid input range is 5001 to 65535.
PORT NUMBER (UDP)	Set this item to 0 when it is used as the FOCAS2/Ethernet function.
TIME INTERVAL	Set this item to 0 when it is used as the FOCAS2/Ethernet function.

NOTE

- When a connection to the CIMPLICITY *i* CELL is established, set the UDP port number and time interval above as described in the FANUC CIMPLICITY *i* CELL Operator's Manual (B-75074).
- The unit of the time interval is 10 ms. The allowable range is between 10 and 65535. A time interval less than 100ms cannot be set.
- Decreasing the time interval setting increases the communication load and can affect the network performance.
Example) If the interval is set to 100 (100 x 10 ms = 1 second), broadcast data is sent every 1 second.

Initial setting of the PCMCIA Ethernet card

The PCMCIA Ethernet card is factory-set to the following default values, for ease of connection with SERVO GUIDE or FANUC LADDER-III.

IP ADDRESS : 192.168.1.1
 SUBNET MASK : 255.255.255.0
 ROUTER IP ADDRESS : None
 PORT NUMBER (TCP) : 8193
 PORT NUMBER (UDP) : 0
 TIME INTERVAL : 0

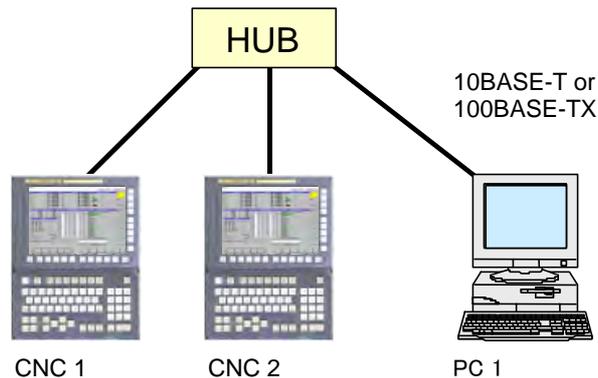
If a specified IP address is changed to a blank (space), the specified setting is reset to the default value.

The embedded Ethernet port does not have a default value.

8.2.1.2 Example of setting the FOCAS2/Ethernet function

The following shows a setting example required for the FOCAS2/Ethernet function to operate.

In this example, one personal computer is connected to two CNCs through FOCAS2/Ethernet.



	CNC 1	CNC 2
IP address	192.168.0.100	192.168.0.101
Subnet mask	255.255.255.0	255.255.255.0
Router IP address	None	None
TCP port number	8193	8193
UDP port number	0	0
Time interval	0	0

The Ethernet parameter screen is used for setting.

		PC 1
IP address		192.168.0.200
Subnet mask		255.255.255.0
Default gateway		None
CNC 1	NC IP address	192.168.0.100
	NC TCP port number	8193
CNC 2	NC IP address	192.168.0.101
	NC TCP port number	8193

"Microsoft TCP/IP property" of the personal computer (Windows 95/98/NT/2000/XP) is used for setting.

The arguments of the data window library function cnc_allclibhndl3 are used for setting.

8.2.2 Setting of the FTP File Transfer Function

This section describes the settings required for the FTP file transfer function to operate using the embedded Ethernet function.

Notes on using the FTP file transfer function for the first time

NOTE

- 1 When using the FTP file transfer function, use the embedded Ethernet port.
- 2 The number of FTP communications to which one CNC can be connected using the FTP file transfer function is one.

8.2.2.1 Operation on the FTP file transfer setting screen

On the Ethernet setting screen, set the parameters for operating the FTP file transfer function.

Procedure

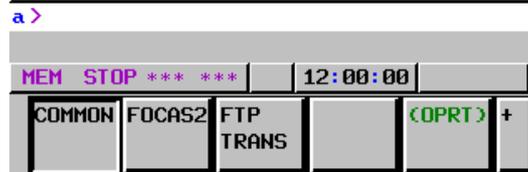
- 1 Press the function key  .
- 2 Soft keys [EMBED PORT] appear.
(When there is no soft keys, press the continue key.)
- 3 By pressing the [EMBED PORT] soft key, the Ethernet Setting screen for the embedded Ethernet port is displayed.
- 4 Press soft keys [COMMON] and [FTP TRANS] and then enter parameters for the items that appear.

NOTE

The parameters for the embedded Ethernet port and the parameters for the PCMCIA Ethernet card are independent of each other.
If the [PCMCIA LAN] soft key is pressed, the PCMCIA Ethernet card can be set up. However, the card setup is carried out for maintenance and is not necessary usually.

COMMON screen (BASIC)

Press soft key [COMMON]. The COMMON screen (BASIC) is displayed.



COMMON screen (BASIC)

Setting items

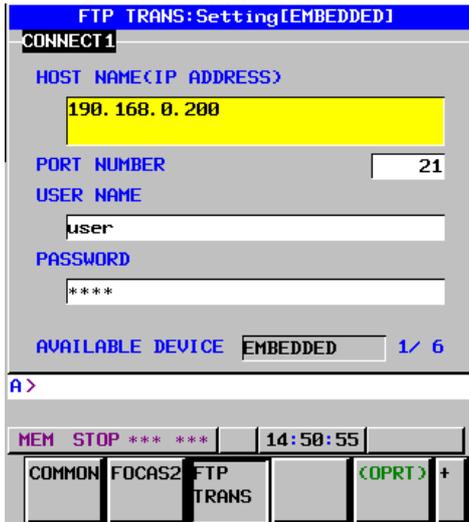
Item	Description
IP ADDRESS	Specify the IP address of the embedded Ethernet. (Example of specification format: "192.168.0.100")
SUBNET MASK	Specify a mask address for the IP addresses of the network. (Example of specification format: "255.255.255.0")
ROUTER IP ADDRESS	Specify the IP address of the router. Specify this item when the network contains a router. (Example of specification format: "192.168.0.253")

Display items

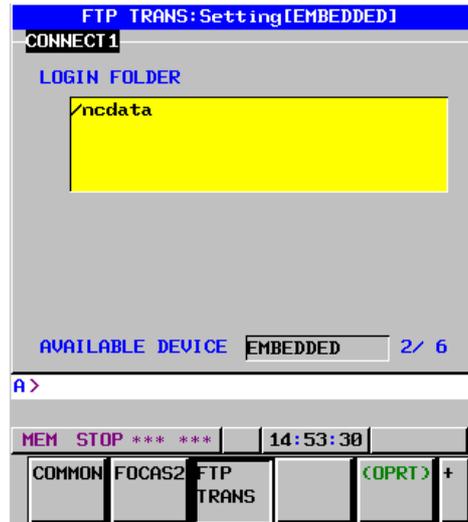
Item	Description
MAC ADDRESS	Embedded Ethernet MAC address
AVAILABLE DEVICE	Enabled device of the embedded Ethernet. Either the embedded Ethernet port or the PCMCIA Ethernet card is displayed.

transfer screen (CONNECT1, CONNECT2, CONNECT3)

- 1 Press soft key [FTP TRANS]. The FTP transfer screen is displayed.
- 2 Page keys   can be used to make settings for the three host computers for connection destinations 1 to 3.



FTP transfer screen (1st page)



FTP transfer screen (2nd page)

Item	Description
HOST NAME	Specify the IP address of the host computer. (Example of specification format: "192.168.0.200")
PORT NUMBER	Specify a port number to be used with the FTP file transfer function. An FTP session is used, so that "21" is to be specified usually.
USERNAME	Specify a user name to be used for logging in to the host computer with FTP. (Up to 31 characters can be specified.)
PASSWORD	Specify a password for the user name specified above. (Up to 31 characters can be specified.) Be sure to set a password.
LOGIN FOLDER	Specify a work folder to be used when logging in to the host computer. (Up to 127 characters can be specified.) If nothing is specified, the home folder specified in the host computer becomes the log-in folder.

Operation

Select a destination.

- 1 Pressing the [(OPRT)] soft key causes soft key [HOST SELECT] to be displayed. Pressing this soft key causes soft keys [CONNECT 1], [CONNECT 2], and [CONNECT 3] to be displayed.



- 2 Depending on the host computer to be connected, press soft key [CONNECT 1], [CONNECT 2], or [CONNECT 3]. Destination 1, 2, or 3 is highlighted in the screen title field. The computer corresponding to the highlighted destination is selected as the target computer to be connected.

CONNECT 1 → **CONNECT 1**

When destination 1 is selected

8.2.2.2 Related NC parameters

The NC parameters related to the FTP file transfer function are described below.

0020	I/O CHANNEL : Input/output device selection, or interface number for a foreground input device
------	---

[Data type] Byte
 [Valid data range] 9 : Select the embedded Ethernet as the input/output device.

For embedded Ethernet port

	#7	#6	#5	#4	#3	#2	#1	#0
14880							PCH	

[Input type] Setting input
 [Data type] Bit

- # 1 **PCH** When communication based on the FTP file transfer function starts, an FTP server presence check based on PING is:
 0: Made
 1: Not made

NOTE

Usually, set this parameter to 0 (to make a check). If this parameter is set to 1 (not to make an FTP server presence check based on PING), several tens of seconds may be required until an error is recognized when no FTP server is present on the network.

Mainly for security, a personal computer may be set to ignore the PING command. When communicating with such a personal computer, set this parameter to 1 (not to make an FTP server presence check based on PING).

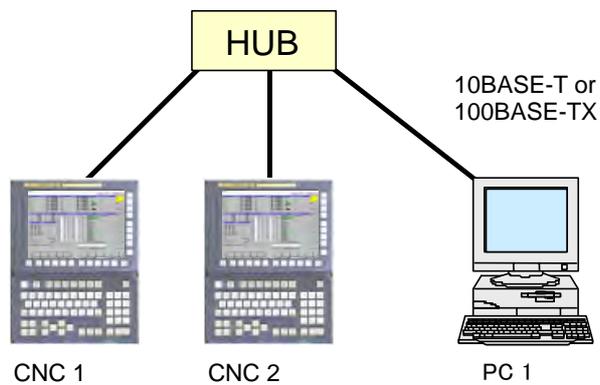
8.2.2.3 Example of setting the FTP file transfer function

The following shows a setting example required for the FTP file transfer function to operate.

(WindowsXP Professional is used as the OS for the personal computer).

In this example, one personal computer is connected to two CNCs through the FTP file transfer function.

- On Personal Computer 1, the FTP server function operates.
- On CNC 1 and CNC 2, the FTP client operates as the FTP file transfer function.



		CNC 1	CNC 2
IP address		192.168.0.100	192.168.0.101
Subnet mask		255.255.255.0	255.255.255.0
Router IP address		None	None
Connection host 1	Port number	21	21
	IP address	192.168.0.200	192.168.0.200
	User name	user	user
	Password	user	user
Login DIR		None	None
NC parameter No. 20		9	9

The Ethernet parameter screen is used for setting.

The parameter screen is used for setting.

		PC 1
IP address		192.168.0.200
Subnet mask		255.255.255.0
Default gateway		None
User name		user
Password		user
Login DIR		Default

"Microsoft TCP/IP property" of the personal computer (WindowsXP) is used for setting.

"User account" of the personal computer (WindowsXP) is used for setting.

"Internet service manager" of the personal computer (WindowsXP) is used for setting.

8.2.3 Setting Up the DNS/DHCP Function

The DHCP/DNS function is set up by using the COMMON screen (DETAIL) and NC parameters.

8.2.3.1 Setting up DNS

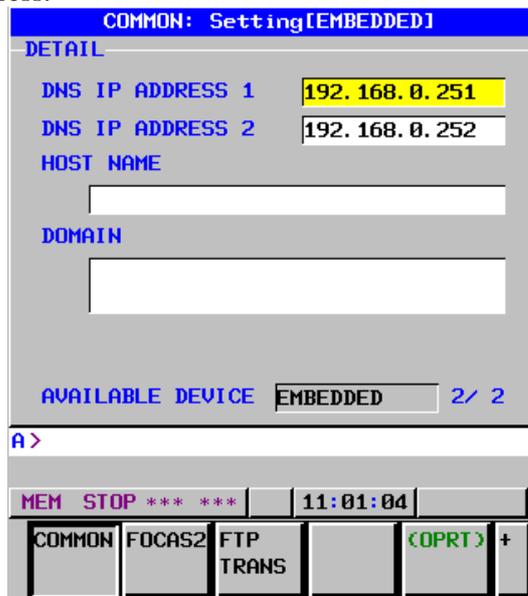
This subsection describes the procedure for setting up a DNS.

Procedure

- 1 Enable the DNS function, with reference to "Related NC Parameters," which will be seen later.
- 2 Set up the DNS server of the host computer.
- 3 Connect the host computer on which the DNS server is working (hereafter referred to as a DNS server), reboot the CNC, then press function key .
- 4 Press soft keys [EMBED PORT] and [COMMON] in that order. The COMMON screen (DETAIL) appears.
- 5 Enter the IP address of the DNS server in the corresponding DNS IP address field.

COMMON screen (DETAIL)

After pressing soft key [COMMON], press either page key   to call a desired COMMON screen (DETAIL). Specify a DNS IP address.



COMMON: Setting [EMBEDDED]

DETAIL

DNS IP ADDRESS 1 192.168.0.251

DNS IP ADDRESS 2 192.168.0.252

HOST NAME

DOMAIN

AVAILABLE DEVICE EMBEDDED 2 / 2

A >

MEM STOP *** ** 11:01:04

COMMON FOCAS2 FTP TRANS <OPRT> +

COMMON screen (DETAIL)

Display items

Item	Description
DNS IP ADDRESS 1, 2	Up to two DNS IP addresses can be specified. The CNC searches for the DNS server using DNS IP addresses 1 and 2 in that order.

8.2.3.2 Setting up DHCP

This subsection describes the procedure for setting up a DHCP.

Procedure

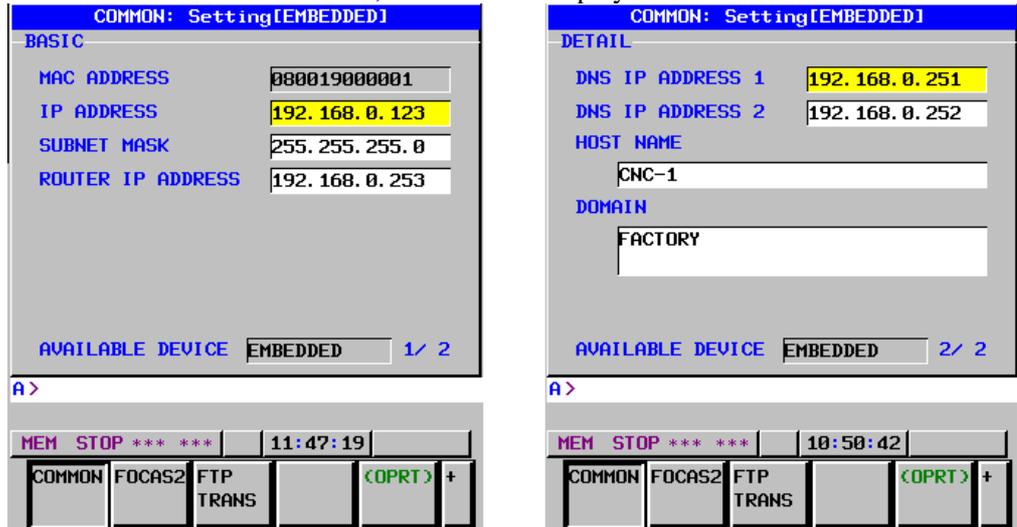
- 1 Enable the DHCP function, with reference to "Related NC Parameters," which will be seen later.
- 2 Set up the DHCP server of the host computer.
- 3 Connect the host computer on which the DHCP server is working (hereafter referred to as a DHCP server), reboot the CNC, then press function key .
- 4 Press soft keys [EMBED PORT] and [COMMON] in that order. The COMMON screen appears.
- 5 If the DHCP function of the CNC has been enabled and if the DHCP server is connected successfully, the DHCP server automatically specifies the following items.
 - IP ADDRESS
 - SUBNET MASK
 - ROUTER IP ADDRESS
 - DNS IP ADDRESS
 - DOMAIN

If the DHCP server cannot be connected, "DHCP ERROR" is displayed in each field.
- 6 If the DNS function has also been enabled and if the DHCP server and the DNS server work together (if the DNS server supports dynamic DNS), enter a host name.

COMMON screen (basic and detail)

After pressing soft key [COMMON], press either page key   to call a desired Ethernet common setting screen (basic, detail).

If the DHCP server is connected successfully and if the setting data can be obtained, the screen is displayed as shown below.



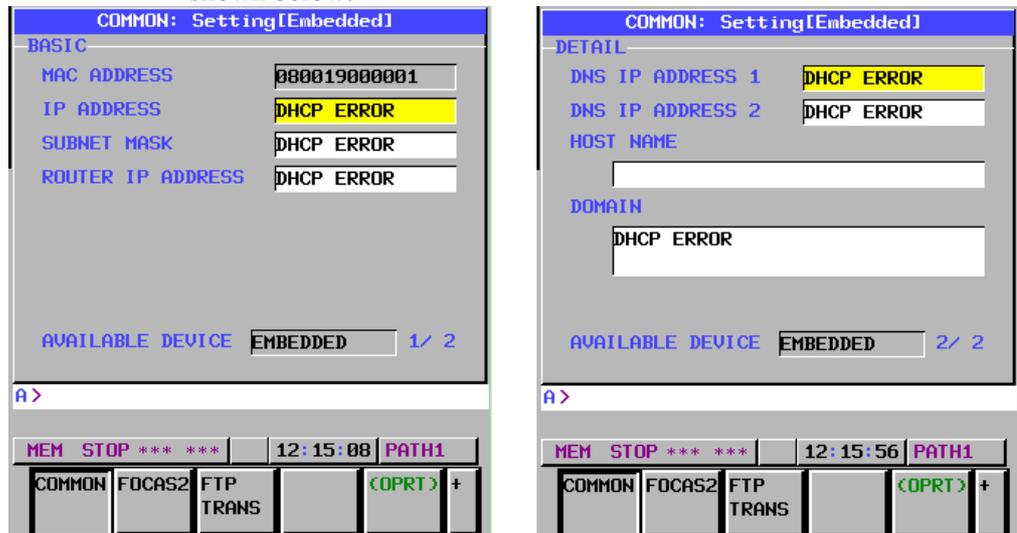
When the DHCP server is connected successfully

If the host name is not specified, the CNC automatically assigns a host name in the "NC-<MAC-address>" format.



Example of automatically assigned host name

If the DHCP server cannot be connected, the screen is displayed as shown below.



When the DHCP server cannot be connected

Check items

Item	Description
IP ADDRESS	If the DHCP server is connected successfully, the items obtained from the DHCP server are displayed.
SUBNET MASK	
ROUTER IP ADDRESS	
DNS IP ADDRESS 1,2	If the DHCP server cannot be connected, "DHCP ERROR" is displayed.
DOMAIN	

Setting items

Item	Description
HOST NAME	<p>Enter the host name of the CNC.</p> <p>If a DHCP server and a DNS server work together, the DHCP server notifies the DNS server of this host name.</p> <p>If the host name is left blank, a host name is automatically assigned in the "NC-<MAC-address>" format.</p> <p>Example of automatically assigned host name: NC-080019000001</p>

Display items

Item	Description
MAC ADDRESS	MAC address of embedded Ethernet

8.2.3.3 Related NC parameters

For embedded Ethernet port

	#7	#6	#5	#4	#3	#2	#1	#0
14880		DHC	DNS		D1E			

[Input type] Setting input

[Data type] Bit

- # 3 D1E** With the embedded Ethernet port, when the DHCP function is used:
- 0: The default parameters for the FOCAS2/Ethernet function are specified.
- | | |
|-------------------|------|
| PORT NUMBER (TCP) | 8193 |
| PORT NUMBER (UDP) | 0 |
| TIME INTERVAL | 0 |
- 1: The default parameters for CIMPLICITY *i* CELL are specified.
- | | |
|-------------------|------|
| PORT NUMBER (TCP) | 8193 |
| PORT NUMBER (UDP) | 8192 |
| TIME INTERVAL | 50 |
- # 5 DNS** With the embedded Ethernet port, the DHCP function is:
- 0: Used.
- 1: Not used.
- # 6 DHC** With the embedded Ethernet port, the DHCP function is:
- 0: Used.
- 1: Not used.

A change in these parameters becomes effective after the power is turned off and on or after the embedded Ethernet function is restarted.

8.2.4 Setting of the Unsolicited Messaging Function

This subsection describes the setting required to operate the unsolicited messaging function with the embedded Ethernet function.

Software conditions

The software conditions for using the unsolicited messaging function are indicated below.

- CNC system software

Software	Drawing number	Series	Edition
Series 30i/300i/300is-MODEL A CNC system software	A02B-0303-H501#G002	G002	23.0 or later
	A02B-0303-H501#G012	G012	
	A02B-0303-H501#G022	G022	
	A02B-0303-H501#G032	G032	
Series 31i/310i/310is-MODEL A CNC system software	A02B-0307-H501#G101	G101	
	A02B-0307-H501#G111	G111	
Series 31i/310i/310is-MODEL A5 CNC system software	A02B-0306-H501#G121	G121	
	A02B-0306-H501#G131	G131	
Series 32i/320i/320is-MODEL A CNC system software	A02B-0308-H501#G201	G201	
Series 30i/300i/300is-MODEL A CNC system software	A02B-0303-H501#G003	G003	6.0 or later
	A02B-0303-H501#G013	G013	
	A02B-0303-H501#G023	G023	
	A02B-0303-H501#G033	G033	
Series 31i/310i/310is-MODEL A CNC system software	A02B-0307-H501#G103	G103	
	A02B-0307-H501#G113	G113	
Series 31i/310i/310is-MODEL A5 CNC system software	A02B-0306-H501#G123	G123	
	A02B-0306-H501#G133	G133	
Series 32i/320i/320is-MODEL A CNC system software	A02B-0308-H501#G203	G203	

- Communication software

Software	Drawing number	Series	Edition
Ethernet communication management application software	A02B-0303-J572#656F	656F	12 or later
Embedded Ethernet control software	A02B-0303-J571#656E	656E	11 or later

- Graphic software

Software	Drawing number	Series	Edition
Software for the 15" display unit graphic function	A02B-0207-J595#60VB	60VB	1.8 or later

- Windows CE standard application/library

Software	Drawing number	Series	Edition
Windows CE.NET standard application/library	A02B-0207-J809		1.8 or later

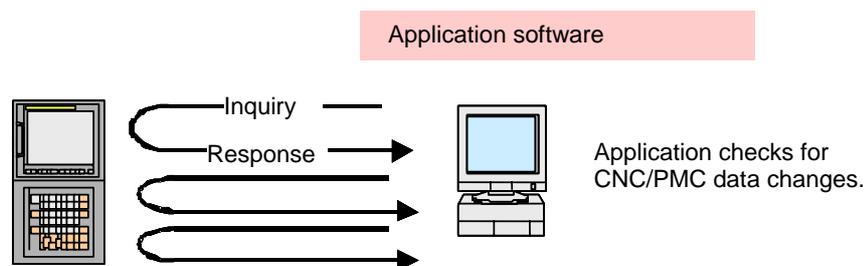
8.2.4.1 Overview

This subsection provides an overview of the unsolicited messaging function and describes the execution procedure.

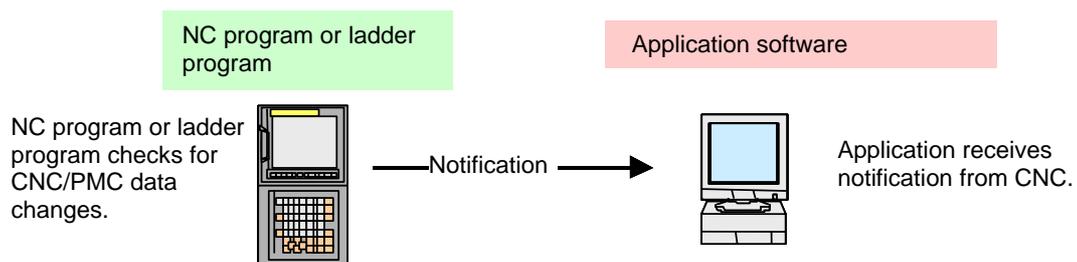
Overview of the unsolicited messaging function

An overview of the unsolicited messaging function is provided below. With the unsolicited messaging function, the CNC transmits messages (CNC/PMC data) in an unsolicited manner to application software on the personal computer according to a command from an NC program or ladder program. By using this function, the need for application processing on the personal computer to periodically inquire about the state of the CNC can be eliminated.

When the conventional function is used



When the unsolicited messaging function is used



NOTE

The unsolicited messaging function is a part of the FOCAS2/Ethernet function.

Unsolicited messaging function execution procedure

The execution procedure for the unsolicited messaging function is described below.

1 Preparation on the personal compute

Create an application using the FOCAS2 function for the unsolicited messaging function and install the unsolicited message server on a personal computer. For the method of creating an application using the FOCAS2 function for the unsolicited messaging function and the method of installing the unsolicited message server, refer to Chapter 5, "Unsolicited Messaging Function", in "FANUC Open CNC FOCAS1/FOCAS2 CNC/PMC Data Window Library Operator's Manual".

2 Preparation on the CNC

Create an NC program or ladder program for controlling unsolicited messaging.

For the method of creating an NC program or ladder program, see Subsection 8.2.4.6, "Execution methods".

3 Setting of the communication parameters for the unsolicited messaging function

To use the unsolicited messaging function, the following communication parameter settings are needed:

- (1) Setting for using the FOCAS2/Ethernet function
- (2) Setting of the parameters for the unsolicited messaging function

For (2), a choice can be made from two modes of setting: CNC mode for setting on the CNC screen and the PC mode for setting on the personal computer.

For the setting method of (1) and (2), see Subsection 8.2.4.2, "Setting of the FOCAS2/Ethernet function" through Subsection 8.2.4.5, "Setting on the personal computer".

4 Starting the NC program or ladder program

Start the NC program or ladder program created in step 2, "Preparation on the CNC". At this time, no unsolicited message is transmitted to the personal computer until step 5, "Starting the unsolicited messaging function", is executed.

5 Starting the unsolicited messaging function

Execute the FOCAS2 function `cnc_unsolicstart` on the personal computer. This execution places the CNC in the state (named "Ready") where a transmission request from the NC program or ladder program is awaited. Each time a transmission request is made from the NC program or ladder program, an unsolicited message is automatically transmitted to the personal computer.

6 Ending the unsolicited messaging function

To end unsolicited message transmission, execute the FOCAS2 function `cnc_unsolicstop` on the personal computer. This execution places the CNC in the state (named "Not Ready") where no unsolicited message is transmitted even when a request for transmission is made from the NC program or ladder program.

8.2.4.2 Setting of the FOCAS2/Ethernet function

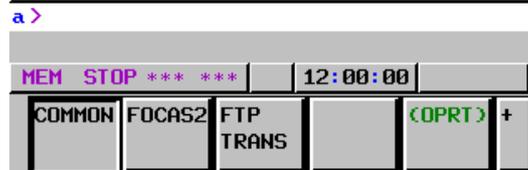
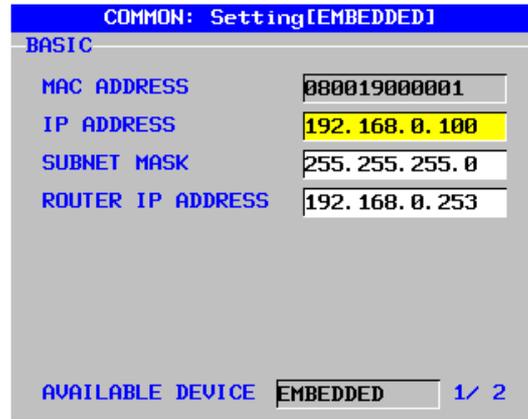
This subsection describes the setting of the FOCAS2/Ethernet function for operating the unsolicited messaging function.

Procedure

- 1 Enable the unsolicited messaging function according to "Related NC parameters" described later.
- 2 Start the CNC again then press function key  .
- 3 Soft key [EMBED PORT] is displayed. (Press the continuous menu key until the soft key is displayed.)
- 4 Press soft key [EMBED PORT]. The Ethernet Setting screen for the embedded Ethernet port is displayed.
- 5 Press soft keys [COMMON] and [FOCAS2] then make settings on each screen.
- 6 Press soft key [UNSOLI MSG]. The Unsolicited Message screen is displayed. (Press the continuous menu key until the soft key [UNSOLI MSG] is displayed.) For details of the Unsolicited Message screen, see Subsections starting with Subsection 8.2.4.3, "Mode selection".

COMMON screen (BASIC)

Press soft key [COMMON]. The COMMON screen (BASIC) is displayed.



COMMON screen (BASIC)

Settings items

Item	Description
IP ADDRESS	Specify the IP address of the embedded Ethernet. (Example of specification format: "192.168.0.100")
SUBNET MASK	Specify a mask address for the IP addresses of the network. (Example of specification format: "255.255.255.0")
ROUTER IP ADDRESS	Specify the IP address of the router. Specify this item when the network contains a router. (Example of specification format: "192.168.0.253")

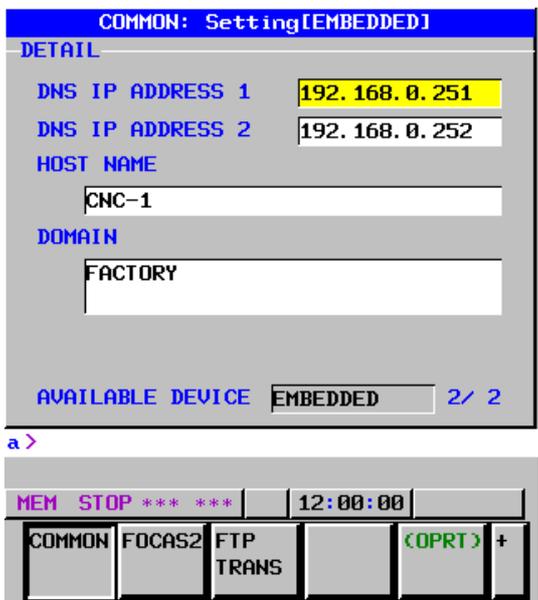
Display items

Item	Description
MAC ADDRESS	Embedded Ethernet MAC address
AVAILABLE DEVICE	Enabled device of the embedded Ethernet. Either the embedded Ethernet port or the PCMCIA Ethernet card is displayed.

NOTE
Set page 2 (DETAIL screen) of the COMMON screen when using the DNS/DHCP function. For details, see Subsection 8.2.3, "Setting Up the DNS/DHCP Function".

COMMON screen (DETAIL)

When using the DNS function, press soft key [COMMON] then press page key   . The COMMON screen (DETAIL) is displayed. Set the DNS IP address setting items.



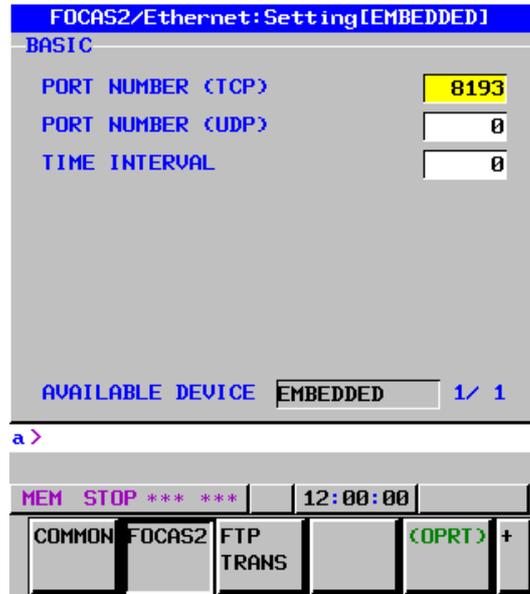
COMMON screen (DETAIL)

Display items

Item	Description
DNS IP ADDRESS 1, 2	Up to two DNS IP addresses can be specified. The CNC searches for the DNS server using DNS IP addresses 1 and 2 in that order.

FOCAS2 screen

Press soft key [FOCAS2]. The FOCAS2 screen is displayed.



FOCAS2 screen

Setting items

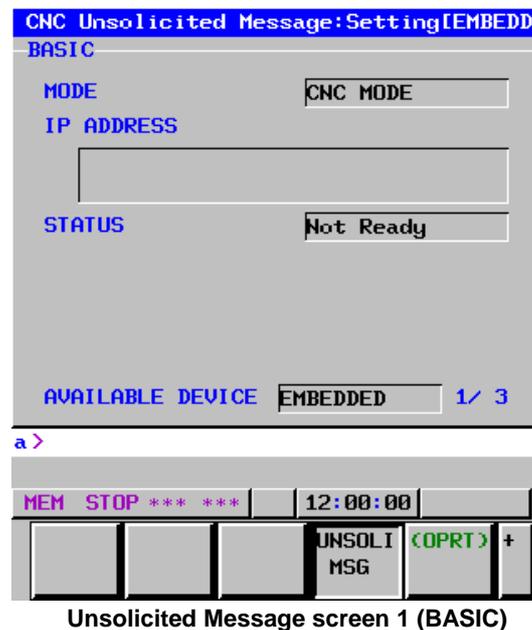
Item	Description
PORT NUMBER (TCP)	Specify a port number to be used with the unsolicited messaging function (FOCAS2/Ethernet function). The valid input range is 5001 to 65535.
PORT NUMBER (UDP)	Set this item to 0 when it is used as the unsolicited messaging function (FOCAS2/Ethernet function).
TIME INTERVAL	Set this item to 0 when it is used as the unsolicited messaging function (FOCAS2/Ethernet function).

8.2.4.3 Mode selection

This subsection describes the selection of a mode for setting the unsolicited messaging function.

Unsolicited Message screen (BASIC)

Press soft key [UNSOLI MSG]. The Unsolicited Message screen (BASIC) is displayed.



Unsolicited Message screen 1 (BASIC)

Setting items

Item	Description
MODE	<p>Select a mode for setting the unsolicited messaging function.</p> <p>For the method of selection, see "Operation" described later.</p> <ul style="list-style-type: none"> When "CNC MODE" is selected This mode enables setting on the CNC screen. In this case, setting on the personal computer is disabled. For details, see Subsection 8.2.4.4, "Setting on the CNC screen". When "PC MODE" is selected This mode enables setting on the personal computer. In this case, setting on the CNC screen is disabled. For details, see Subsection 8.2.4.5, "Setting on the personal computer".

NOTE

- 1 The mode is set to "PC MODE" at the time of initial use.
- 2 The mode can be switched only in the "Not Ready" state. For the "Not Ready" state, see "**Display items**" provided later.
- 3 If the mode is switched from "CNC MODE" to "PC MODE", all parameters set on the CNC screen are cleared.
- 4 The mode can be switched on the available device side only.

Operation

The mode can be switched as described below.

- 1 Press soft key [(OPRT)]. Soft key [MODE] is displayed.



- 2 Press soft key [MODE]. Soft keys [CNC MODE] and [PC MODE] are displayed.



Display items

Item	Description
IP ADDRESS	Displays the IP address of the personal computer currently connected. (Example of display format: "192.168.0.1")
STATUS	<p>Displays the current state. The following five states are available:</p> <p><1> Not Ready State where data is not transmitted even when a request for data transmission is made from an NC program or ladder program</p> <p><2> Ready State where data is transmitted when a request for data transmission is made from an NC program or ladder program</p> <p><3> Sending... State present from the acceptance of a request for data transmission from an NC program or ladder program until data transmission is completed</p> <p><4> Receiving... State present from completion of data transmission until response data is received</p> <p><5> Completed State present from reception of response data until response data processing is completed</p> <p>[Supplement]</p> <ul style="list-style-type: none"> • Data transmission Means unsolicited message transmission (CNC→PC). • Response data Means a response to an unsolicited message (PC→CNC).
AVAILABLE DEVICE	Device where embedded Ethernet is currently enabled. The embedded Ethernet port or PCMCIA Ethernet card is displayed.

NOTE

- 1 To switch the state from "Not Ready" to "Ready", the FOCAS2 function `cnc_unsolicstart` needs to be executed on the personal computer.
- 2 To switch the state from other than "Not Ready" to "Not Ready", the FOCAS2 function `cnc_unsolicstop` needs to be executed on the personal computer.
- 3 For the timing charts of the states, see Subsection 8.2.4.6, "Execution methods".

8.2.4.4 Setting on the CNC screen

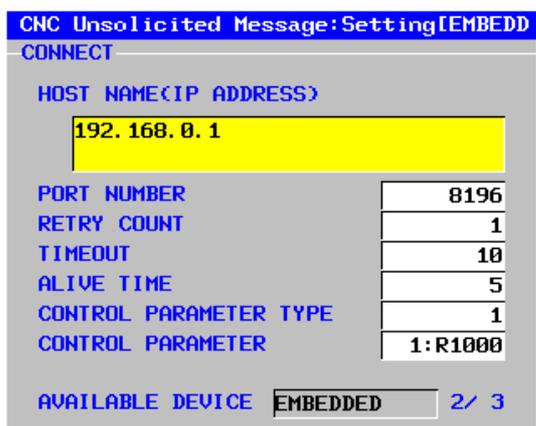
This subsection describes the method of setting on the Unsolicited Message screen.

NOTE

- 1 To enable the settings on the CNC screen and perform unsolicited messaging, the procedure below needs to be used.
 - (1) Set all setting items on the Unsolicited Message screen (CONNECT).
 - (2) Press soft key [(OPRT)] then press soft key [APPLY].
 - (3) Start unsolicited messaging (execute the FOCAS2 function cnc_unsolicstart) on the personal computer.
- 2 Setting of the setting items on the Unsolicited Message screen (CONNECT) and execution of the soft keys ([(OPRT)] then [APPLY]) are possible only in the "Not Ready" state. For the "Not Ready" state, see "**Display items**" in Subsection 8.2.4.3, "Mode selection".
- 3 On the setting screen on the unavailable device side, the setting items can be set. However, execution of the soft keys ([(OPRT)] then [APPLY]) is possible on the available device side only.

Unsolicited Message screen (CONNECT)

Press soft key [UNSOLI MSG] then open page 2 and page 3 with page keys  . The Unsolicited Message screen (CONNECT) is displayed.



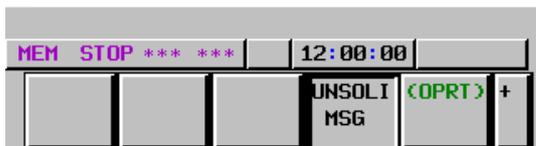
CNC Unsolicited Message:Setting[EMBEDD]
CONNECT

HOST NAME(IP ADDRESS)
192.168.0.1

PORT NUMBER 8196
RETRY COUNT 1
TIMEOUT 10
ALIVE TIME 5
CONTROL PARAMETER TYPE 1
CONTROL PARAMETER 1:R1000

AVAILABLE DEVICE EMBEDDED 2/3

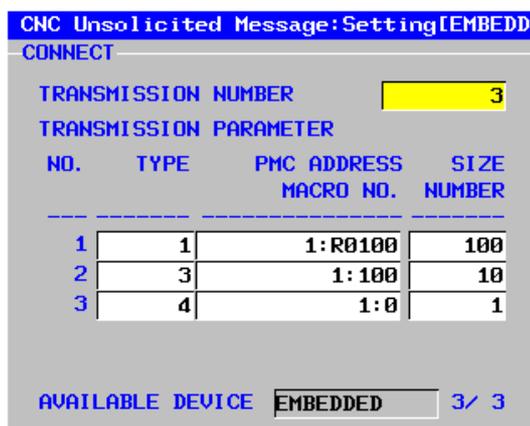
a >



MEM STOP *** ***, 12:00:00

UNSOLI MSG (OPRT) +

Unsolicited Message screen 2 (CONNECT)



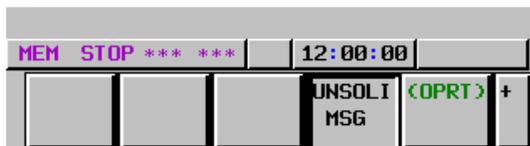
CNC Unsolicited Message:Setting[EMBEDD]
CONNECT

TRANSMISSION NUMBER 3
TRANSMISSION PARAMETER

NO.	TYPE	PMC ADDRESS MACRO NO.	SIZE NUMBER
1	1	1:R0100	100
2	3	1:100	10
3	4	1:0	1

AVAILABLE DEVICE EMBEDDED 3/3

a >



MEM STOP *** ***, 12:00:00

UNSOLI MSG (OPRT) +

Unsolicited Message screen 3 (CONNECT)

Setting items

Item	Description
HOST NAME (IP ADDRESS)	When the DNS function is disabled, specify the IP address of the communication destination personal computer. (Example of specification format: "192.168.0.1") When the DNS function is enabled, specify the host name of the communication destination personal computer. (Up to 63 characters can be specified.) (Example of specification format: "UNSOLI-SRV.FACTORY")
PORT NUMBER	Specify the TCP port number and UDP port number of the communication destination personal computer. Usually, specify "8196". The valid input range is 5001 to 65535.
RETRY COUNT	Specify the number of retries to be made when there is no response to data transmitted by the communication function. The valid input range is 0 to 32767.
TIMEOUT	Specify a time-out period (in sec) from the transmission of data by the communication function until a response is made to the transmitted data. The valid input range is 1 to 32767.
ALIVE TIME	Specify the time interval (in sec) of the alive signal to be transmitted while the communication function is operating normally. Specify a value not greater than the value of TIMEOUT. The valid input range is 1 to 32767.

Item	Description																				
CONTROL PARAMETER TYPE	Specify a type of control parameter. When this parameter is set to 0, the control parameter is invalid. <ul style="list-style-type: none"> • When set to 1: PMC address (response notification method) • When set to 2: PMC address (simplified method) • When set to 3: Custom macro variable (simplified method) • When set to 4: Volatile RTM variable (simplified method) (Note) The RTM variable is a real-time custom macro variable.																				
CONTROL PARAMETER	Specify a control parameter for executing data transmission. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="padding: 2px;">When CONTROL PARAMETER TYPE is set to 1</td> </tr> <tr> <td style="width: 30px; border: none;"></td> <td style="border: 1px solid black; padding: 2px;">Specify a PMC address for control. A PMC address in the R area or E area may be specified. Two bytes starting at a specified address are allocated in the area.</td> </tr> <tr> <td colspan="2" style="padding: 2px;">When CONTROL PARAMETER TYPE is set to 2</td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">Specify a PMC address for control. A PMC address in the R area or E area may be specified. Only a specified address (one byte) is allocated in the area.</td> </tr> <tr> <td colspan="2" style="padding: 2px;">When CONTROL PARAMETER TYPE is set to 3</td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">Specify a custom macro variable number for control. Only a volatile common variable may be specified as a custom macro variable. Only the variable with a specified variable number is allocated in the area.</td> </tr> <tr> <td colspan="2" style="padding: 2px;">When CONTROL PARAMETER TYPE is set to 4</td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">Specify a RTM variable number for control. Only a volatile RTM variable may be specified as a RTM variable. Only the variable with a specified variable number is allocated in the area.</td> </tr> </table>	When CONTROL PARAMETER TYPE is set to 1			Specify a PMC address for control. A PMC address in the R area or E area may be specified. Two bytes starting at a specified address are allocated in the area.	When CONTROL PARAMETER TYPE is set to 2			Specify a PMC address for control. A PMC address in the R area or E area may be specified. Only a specified address (one byte) is allocated in the area.	When CONTROL PARAMETER TYPE is set to 3			Specify a custom macro variable number for control. Only a volatile common variable may be specified as a custom macro variable. Only the variable with a specified variable number is allocated in the area.	When CONTROL PARAMETER TYPE is set to 4			Specify a RTM variable number for control. Only a volatile RTM variable may be specified as a RTM variable. Only the variable with a specified variable number is allocated in the area.				
When CONTROL PARAMETER TYPE is set to 1																					
	Specify a PMC address for control. A PMC address in the R area or E area may be specified. Two bytes starting at a specified address are allocated in the area.																				
When CONTROL PARAMETER TYPE is set to 2																					
	Specify a PMC address for control. A PMC address in the R area or E area may be specified. Only a specified address (one byte) is allocated in the area.																				
When CONTROL PARAMETER TYPE is set to 3																					
	Specify a custom macro variable number for control. Only a volatile common variable may be specified as a custom macro variable. Only the variable with a specified variable number is allocated in the area.																				
When CONTROL PARAMETER TYPE is set to 4																					
	Specify a RTM variable number for control. Only a volatile RTM variable may be specified as a RTM variable. Only the variable with a specified variable number is allocated in the area.																				
TRANSMISSION NUMBER	Specify the number of data items to be transmitted. The valid input range is 1 to 3.																				
TRANSMISSION PARAMETER (NO.1 to 3)	Specify each parameter for transmission data. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="padding: 2px;">TYPE</td> </tr> <tr> <td colspan="2" style="padding: 2px;">Specify a transmission data type. When this parameter is set to 0, the transmission parameter is invalid. <ul style="list-style-type: none"> • When set to 1 or 2: PMC address • When set to 3: Custom macro variable • When set to 4: Volatile RTM variable • When set to 5: Nonvolatile RTM variable </td> </tr> <tr> <td colspan="2" style="padding: 2px;">PMC ADDRESS or MACRO NO.</td> </tr> <tr> <td colspan="2" style="padding: 2px;">Specify the start of a transmission data area</td> </tr> <tr> <td colspan="2" style="padding: 2px;">When TYPE is set to 1 or 2</td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">Specify a PMC address for transmission.</td> </tr> <tr> <td colspan="2" style="padding: 2px;">When TYPE is set to 3</td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">Specify a custom macro variable number for transmission.</td> </tr> <tr> <td colspan="2" style="padding: 2px;">When TYPE is set to 4 or 5</td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">Specify a RTM variable number for transmission.</td> </tr> </table>	TYPE		Specify a transmission data type. When this parameter is set to 0, the transmission parameter is invalid. <ul style="list-style-type: none"> • When set to 1 or 2: PMC address • When set to 3: Custom macro variable • When set to 4: Volatile RTM variable • When set to 5: Nonvolatile RTM variable 		PMC ADDRESS or MACRO NO.		Specify the start of a transmission data area		When TYPE is set to 1 or 2			Specify a PMC address for transmission.	When TYPE is set to 3			Specify a custom macro variable number for transmission.	When TYPE is set to 4 or 5			Specify a RTM variable number for transmission.
TYPE																					
Specify a transmission data type. When this parameter is set to 0, the transmission parameter is invalid. <ul style="list-style-type: none"> • When set to 1 or 2: PMC address • When set to 3: Custom macro variable • When set to 4: Volatile RTM variable • When set to 5: Nonvolatile RTM variable 																					
PMC ADDRESS or MACRO NO.																					
Specify the start of a transmission data area																					
When TYPE is set to 1 or 2																					
	Specify a PMC address for transmission.																				
When TYPE is set to 3																					
	Specify a custom macro variable number for transmission.																				
When TYPE is set to 4 or 5																					
	Specify a RTM variable number for transmission.																				

Item	Description			
SIZE or NUMBER	<p>Specify the size of a transmission data area or the number of variables. The maximum specifiable number of bytes is as follows:</p> <ul style="list-style-type: none"> • When TRANSMISSION NUMBER is set to 1: 2890 bytes • When TRANSMISSION NUMBER is set to 2: 2874 bytes in total • When TRANSMISSION NUMBER is set to 3: 2858 bytes in total <p>When using macro variables (custom macro variables or RTM variables), use a conversion rate of one variable for eight bytes.</p> <p>When TYPE is set to 1 or 2</p> <table border="1" data-bbox="624 591 1437 629"> <tr> <td>Specify a PMC area size (bytes) for transmission.</td> </tr> </table> <p>When TYPE is set to 3</p> <table border="1" data-bbox="624 656 1437 752"> <tr> <td>Specify the number of custom macro variables for transmission. When a macro variable number of 1000 or greater (system variable) is used, this parameter can be set to 1 only.</td> </tr> </table> <p>When TYPE is set to 4 or 5</p> <table border="1" data-bbox="624 779 1437 817"> <tr> <td>Specify the number of RTM variables for transmission.</td> </tr> </table>	Specify a PMC area size (bytes) for transmission.	Specify the number of custom macro variables for transmission. When a macro variable number of 1000 or greater (system variable) is used, this parameter can be set to 1 only.	Specify the number of RTM variables for transmission.
Specify a PMC area size (bytes) for transmission.				
Specify the number of custom macro variables for transmission. When a macro variable number of 1000 or greater (system variable) is used, this parameter can be set to 1 only.				
Specify the number of RTM variables for transmission.				

 **CAUTION**

- 1 When setting a PMC address for control or a PMC address for transmission, observe the following:
 - (1) When a multipath PMC is used, use the following input format:
 <path-number>:<PMC-address>
 When specifying the PMC address R0500 of the second PMC path, for example, input "2:R500". When only the PMC address (R500) is input, the specification of the first path (1:R0500) is assumed for processing.
 When the key for ":" is unavailable, use the key for "/" or "EOB" instead.
 - (2) Ensure that a PMC address area for control never overlaps PMC areas used by other functions (FL-net, PROFIBUS-DP, and DeviceNet).
- 2 When setting a macro variable for control or a macro variable for transmission, observe the following:
 - (1) When a multipath CNC is used, use the following input format:
 <path-number>:<variable-number>
 When specifying variable number #100 of the second CNC path, for example, input "2:100". When only the variable number (100) is input, the specification of the first path (1:100) is assumed for processing.
 When the key for ":" is unavailable, use the key for "/" or "EOB" instead.
 - (2) Ensure that a macro variable for control never be doubly specified as a variable to be used for a purpose other than the unsolicited messaging function.

NOTE

- 1 Two methods are available for PMC address specification in CONTROL PARAMETER TYPE: response notification method and simplified method. For details of the methods, see Subsection 8.2.4.6, "Execution methods".
- 2 The valid setting range of PMC addresses depends on the usable PMC memory type. For details, refer to "PMC Programming Manual (B-63983EN)".
- 3 The valid setting ranges of custom macro variable numbers and RTM variable numbers depend on the selected options. For details, refer to "User's Manual (Common to Lathe System/Machining Center System) (B-63944EN)".
- 4 Ensure that the setting of TRANSMISSION NUMBER matches the settings of TRANSMISSION PARAMETER (NO. 1 to NO. 3). If TRANSMISSION NUMBER is set to 3, and an invalid value is specified in any of TRANSMISSION PARAMETER NO. 1 to NO. 3, for example, execution of soft key [APPLY] results in an error.

Operation

The settings of all setting items on the Unsolicited Message screen (CONNECT) can be made effective as follows:

- 1 Press soft key [(OPRT)]. Soft key [APPLY] is displayed.



- 2 Press soft key [APPLY].

8.2.4.5 Setting on the personal computer

For setting on the personal computer, create and set an application by using the following FOCAS2 functions:

- cnc_wrunsolicprm2 Parameter setting 2 for unsolicited messaging
- cnc_unsolicstart Start of unsolicited messaging

For details, refer to Chapter 5, "Unsolicited Messaging Function", in "FANUC Open CNC FOCAS1/FOCAS2 CNC/PMC Data Window Library Operator's Manual".

NOTE

- 1 To start unsolicited messaging, the FOCAS2 function cnc_wrunsolicprm2 needs to be executed first then the FOCAS2 function cnc_unsolicstart needs to be executed.
- 2 The FOCAS2 function cnc_wrunsolicprm2 can be executed only in the "Not Ready" state. For details of the state, see "**Display items**" in Subsection 8.2.4.3, "Mode selection".
- 3 When the FOCAS2 function cnc_wrunsolicprm2 is executed, the Unsolicited Message screen (CONNECT) displays the settings made on the personal computer.

8.2.4.6 Execution methods

How to execute the unsolicited messaging function is described below.

To execute the unsolicited messaging function, three methods are available:

- Using a PMC address for control based on the response notification method in a ladder program
- Using a PMC address for control based on the simplified method in a ladder program
- Using a macro variable for control based on the simplified method in an NC program

NOTE

- 1 When a ladder program is used, the response notification method and the simplified method are available. A major difference is that the response notification method sends RES_CODE to the ladder program in response to data transmission but the simplified method does not send a response. To utilize a ladder program based on logic used with the FS16i, for example, use the response notification method. When RES_CODE is unnecessary or a new ladder program is created, the simplified method can be used.
- 2 RES_CODE is recorded on the Ethernet log screen when a value other than 0x00 and 0x01 is detected.
- 3 For details of RES_CODE, refer to Chapter 5, "Unsolicited Messaging Function", in "FANUC Open CNC FOCAS1/FOCAS2 CNC/PMC Data Window Library Operator's Manual".

When a PMC address for control is used (response notification method)

A description of using a PMC address for control in a ladder program according to the response notification method is provided below.

NOTE

A combination of a PMC address for control and a macro variable for transmission is also usable. In this case, note that the read timing of the value of a macro variable to be transmitted cannot be identified when viewed from the ladder program. In the description below, a PMC address is used for both of control and transmission.

Explanation of PMC address signals for control

A detailed description of PMC address signals for control used to execute the unsolicited messaging function is provided below. A PMC address area for control consists of 2 bytes.

The description below assumes that Rxxxx (with no PMC path number specified) is used as a PMC address for control.

No.	#7	#6	#5	#4	#3	#2	#1	#0
Rxxxx	REQ							

REQ	<Rxxxx.7>
[Name]	Message transmission request signal
[Classification]	Input signal
[Function]	Requests transmission of an unsolicited message.
[Operation]	After preparing a transmission message at a PMC address for transmission, the ladder program sets this signal to 1. The message is then transmitted to the personal computer.

No.	#7	#6	#5	#4	#3	#2	#1	#0
Rxxxx+1	RES	COM	RES_CODE					

RES	<Rxxxx+1.7>
[Name]	Message response reception signal
[Classification]	Output signal
[Function]	Posts the reception of a response to an unsolicited message.
[Output condition]	Upon reception of a message by the personal computer, a response to the message is transmitted to the CNC (communication function). When the CNC (communication function) receives the response, this signal is set to 1. When this signal is set to 1, the ladder program reads RES_CODE then clears REQ to 0. Next, the CNC (communication function) clears RES_CODE to 0 then sets this signal to 0.

COM	<Rxxxx+1.6>
[Name]	Message transmission start signal
[Classification]	Output signal
[Function]	Posts the start of transmission of an unsolicited message.
[Output condition]	When transmission of a message to the personal computer is started, this signal is set to 1. Upon completion of message transmission, this signal is set to 0.

RES_CODE	<Rxxxx+1.0> to <Rxxxx+1.5>
[Name]	Message response reception result signal
[Classification]	Output signal
[Function]	Posts the reception result of a response to an unsolicited message.
[Output condition]	The reception result of a response to a message is set. After reading this signal, the ladder program clears REQ to 0. The CNC (communication function) then clears this signal to 0.

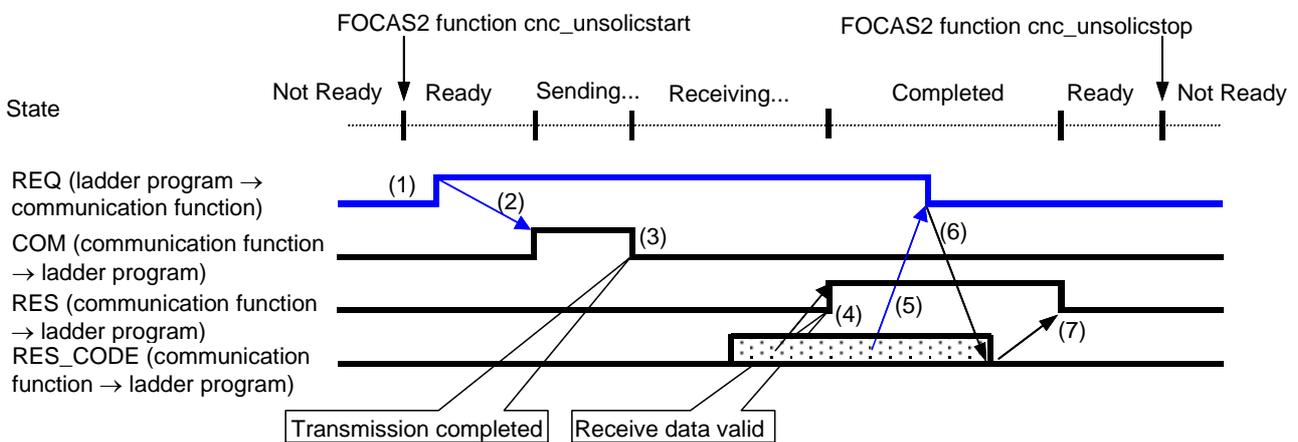
NOTE

For details of RES_CODE, refer to Chapter 5, "Unsolicited Messaging Function", in "FANUC Open CNC FOCAS1/FOCAS2 CNC/PMC Data Window Library Operator's Manual".

Timing chart of PMC address signals for control

The timing chart of PMC address signals for control based on the response notification method is described below.

In the example below, an unsolicited message is transmitted once after reception of the FOCAS2 function `cnc_unsolicstart` then the FOCAS2 function `cnc_unsolicstop` is received.



- (1) After checking that RES is set to 0, the ladder program prepares a message then sets REQ to 1.
- (2) Because of REQ set to 1, the communication function sets COM to 1 then transmits the message.
- (3) Upon completion of message transmission, the communication function sets COM to 0.
- (4) Upon reception of a response to the message, the communication function sets RES_CODE then sets RES to 1.
- (5) Because of RES set to 1, the ladder program reads RES_CODE then sets REQ to 0.
- (6) Because of REQ set to 0, the communication function clears RES_CODE to 0.
- (7) The communication function sets RES to 0.

NOTE

For details of the states, see "Display items" in Subsection 8.2.4.3, "Mode selection".

When a PMC address for control is used (simplified method)

A description of using a PMC address for control in a ladder program according to the simplified method is provided below.

NOTE
 A combination of a PMC address for control and a macro variable for transmission is also usable. In this case, note that the read timing of the value of a macro variable to be transmitted cannot be identified when viewed from the ladder program. In the description below, a PMC address is used for both of control and transmission.

Explanation of PMC address signals for control

A detailed description of PMC address signals for control used to execute the unsolicited messaging function is provided below. A PMC address area for control consists of 1 byte. The description below assumes that Rxxxx (with no PMC path number specified) is used as a PMC address for control.

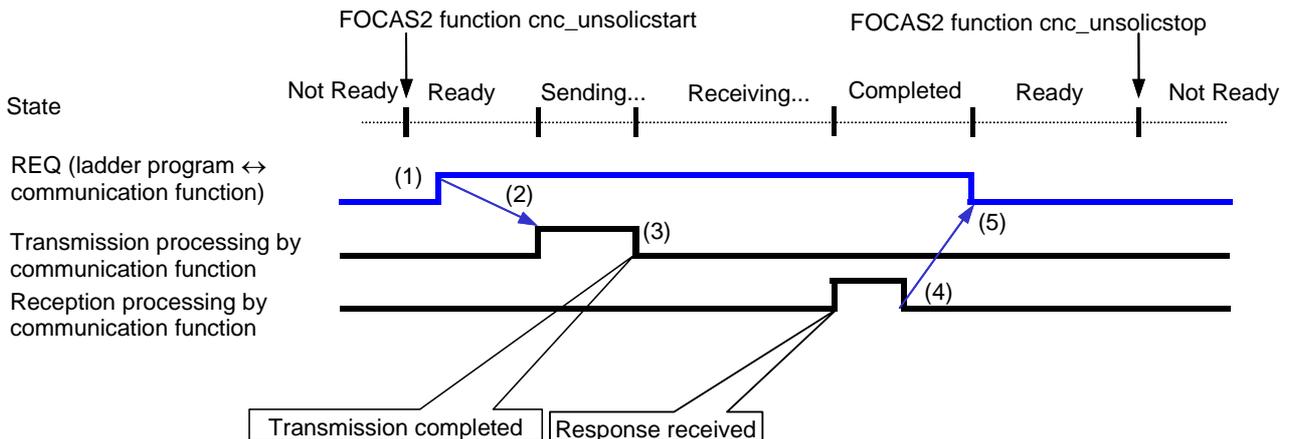
No.	#7	#6	#5	#4	#3	#2	#1	#0
Rxxxx	REQ							

REQ <Rxxxx#7>
 [Name] Message transmission request signal
 [Classification] Input/Output signal
 [Function] Requests transmission of an unsolicited message.
 [Operation] After preparing a transmission message at a PMC address for transmission, the ladder program sets this signal to 1. The message is then transmitted to the personal computer. Upon reception of a response to the message, the CNC (communication function) clears this signal to 0.

Timing chart of PMC address signals for control

The timing chart of PMC address signals for control based on the simplified method is described below.

In the example below, an unsolicited message is transmitted once after reception of the FOCAS2 function `cnc_unsolicstart` then the FOCAS2 function `cnc_unsolicstop` is received.



- (1) After checking that REQ is set to 0, the ladder program prepares a message then sets REQ to 1.
- (2) Because of REQ set to 1, the communication function transmits the message.
- (3) The communication function completes message transmission processing.
- (4) Upon reception of a response to the message, the communication function completes reception processing.
- (5) Because of reception processing completed, the communication function sets REQ to 0.

NOTE

For details of the states, see "**Display items**" in Subsection 8.2.4.3, "Mode selection".

When a macro variable for control is used (simplified method)

A description of using a macro variable for control in an NC program according to the simplified method is provided below.

Macro variables for control are classified as custom macros and RTM macros, but the same execution method is applicable.

NOTE

A combination of a macro variable for control and a PMC address for transmission is also usable. In this case, note that the read timing of the value of PMC data to be transmitted cannot be identified when viewed from the NC program. In the description below, a macro variable is used for both of control and transmission.

Explanation of a macro variable for control

A detailed description of a macro variable for control used to execute the unsolicited messaging function is provided below. One macro variable for control is used.

The description below assumes that #xxxx (with no CNC path number specified) is used as a macro variable number for control.

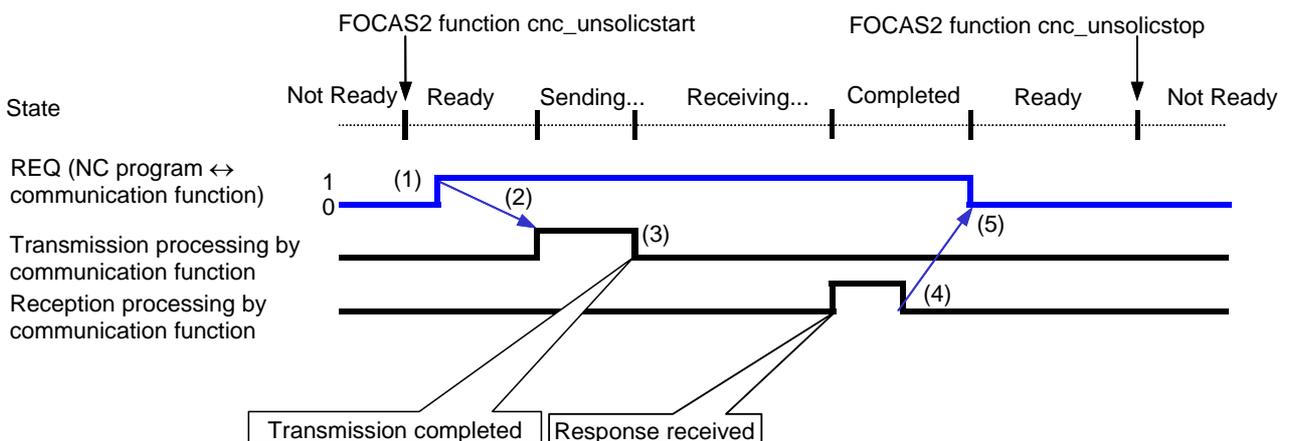
REQ	<#xxxx>
[Name]	Message transmission request signal
[Classification]	Input/Output signal
[Function]	Requests transmission of an unsolicited message.
[Operation]	After preparing a transmission message in a macro variable for transmission, the NC program sets this signal to 1. The message is then transmitted to the personal computer. Upon reception of a response to the message, the CNC (communication function) clears this signal to 0.

NOTE
 A REQ input/output value is a real number. So, "0" means "0.0", and "1" means "1.0".

Timing chart of a macro variable for control

The timing chart of a macro variable for control based on the simplified method is described below.

In the example below, an unsolicited message is transmitted once after reception of the FOCAS2 function cnc_unsolicstart then the FOCAS2 function cnc_unsolicstop is received.



- (1) After checking that REQ is set to 0, the NC program prepares a message then sets REQ to 1.
- (2) Because of REQ set to 1, the communication function transmits the message.
- (3) The communication function completes message transmission processing.

- (4) Upon reception of a response to the message, the communication function completes reception processing.
- (5) Because of reception processing completed, the communication function sets REQ to 0.

NOTE

For details of the states, see "**Display items**" in Subsection 8.2.4.3, "Mode selection".

Example of using a macro variable for control

An example of using a macro variable for control is provided below.

- Example

[Description]

An NC program on CNC path number 1 posts NC command start date and time information as an unsolicited message to the personal computer.

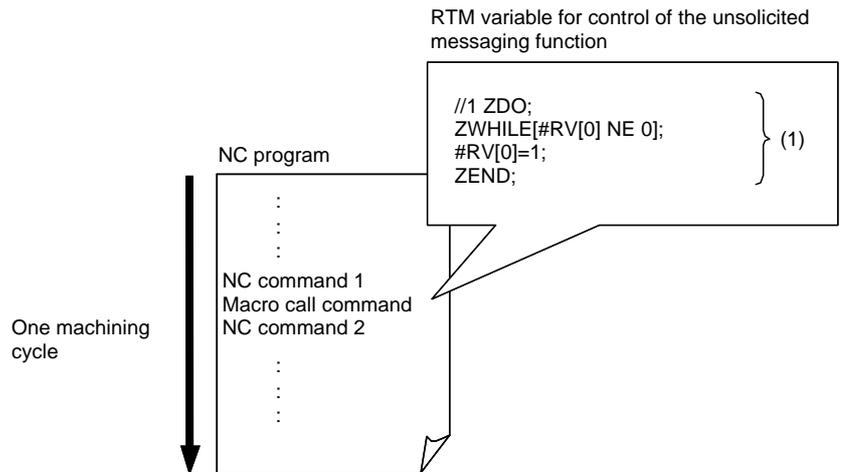
[Setting]

As a macro variable for control, volatile RTM variable number #0 (REQ) is used. On the other hand, macro variables for transmission are used for date and time information managed inside the CNC (system variable numbers #3011 and #3012).

Setting item	Set value
CONTROL PARAMETER TYPE	4
CONTROL PARAMETER	1:0
TRANSMISSION NUMBER	2
TRANSMISSION PARAMETER (NO.1)	
TYPE	3
MACRO NO.	1:3011
NUMBER	1
TRANSMISSION PARAMETER (NO.2)	
TYPE	3
MACRO NO.	1:3012
NUMBER	1

[Example of NC program]

A RTM variable is executed in synchronism with the immediately following NC command according to the RTM variable specification. At this time, the operation timing of the immediately following NC command is not affected. So, the NC program indicated below posts NC command 2 start date and time information as an unsolicited message to the personal computer.



(Tip) (1) in the example above corresponds to the number in the timing chart provided earlier.

NOTE

- 1 Note that if a custom macro is used as a macro for control, the operation timing of an NC command is affected. If the RTM variable in the example above is replaced with a custom macro, for example, NC command 2 becomes unexecutable unless the macro variable for control is changed.
- 2 For details of custom macros and RTM variables, refer to "User's Manual (Common to Lathe System/Machining Center System) (B-63944EN)".

8.2.4.7 Related NC parameters

For embedded Ethernet port

	#7	#6	#5	#4	#3	#2	#1	#0
14880				UNM				

[Input type] Setting input

[Data type] Bit

- # 4 **UNM** With the embedded Ethernet port, the unsolicited messaging function is:
 0: Not used
 1: Used

	#7	#6	#5	#4	#3	#2	#1	#0
14882				UNS				

[Input type] Setting input

[Data type] Bit

- # 4 **UNS** When the embedded Ethernet port is used and termination of the unsolicited messaging function is specified from other than the connected unsolicited message server, the function:
 0: Rejects termination.
 1: Accepts termination.

After these parameters are modified, the power must be turned off then back on or the embedded Ethernet function must be terminated then restarted for the settings to become effective.

8.3 SWITCHING BETWEEN THE EMBEDDED ETHERNET DEVICES

There are two types of embedded Ethernet devices: the embedded Ethernet port and PCMCIA Ethernet card. Screen operation is required to switch between these two types of devices.

Procedure

- 1 Press the function key .
- 2 Soft keys [EMBED PORT] and [PCMCIA LAN] appear.
(When there is no soft keys, press the continue key.)
- 3 Press soft key [EMBED PORT] or [PCMCIA LAN], press soft key [COMMON], and then press [(OPRT)] to display soft key [EMB/PCMCIA].
- 4 Pressing soft key [EMB/PCMCIA] switches between enabled devices.

NOTE

- 1 Information on a switched device is stored in nonvolatile memory.
On the next power-on, the device last selected can be used as is.
- 2 When using the unsolicited messaging function, note the following:
 - Processing is forcibly started from the "Not Ready" state, regardless of the unsolicited message transfer state.
 - When the parameter for control is set to use the response notification method, RES and RES_CODE (0x01) are posted to the ladder program.
 - When the parameter for control is set to use the simplified method, REQ is cleared.

8.4 EMBEDDED ETHERNET OPERATIONS

8.4.1 FTP File Transfer Function

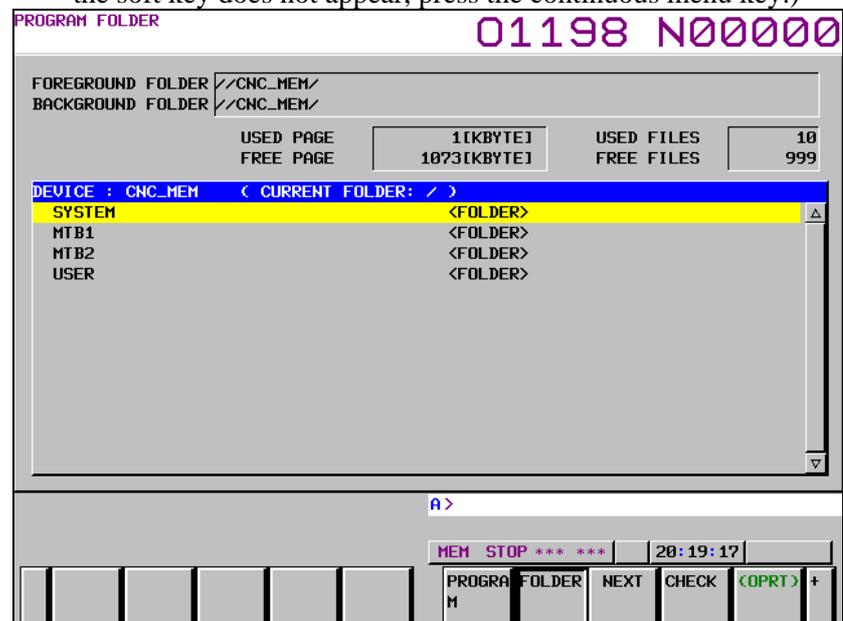
The operation of the FTP file transfer function is described below.

Host file list display

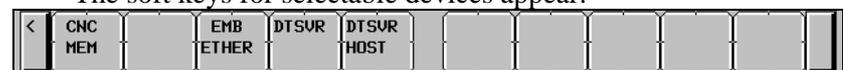
A list of the files held on the host computer is displayed.

Procedure

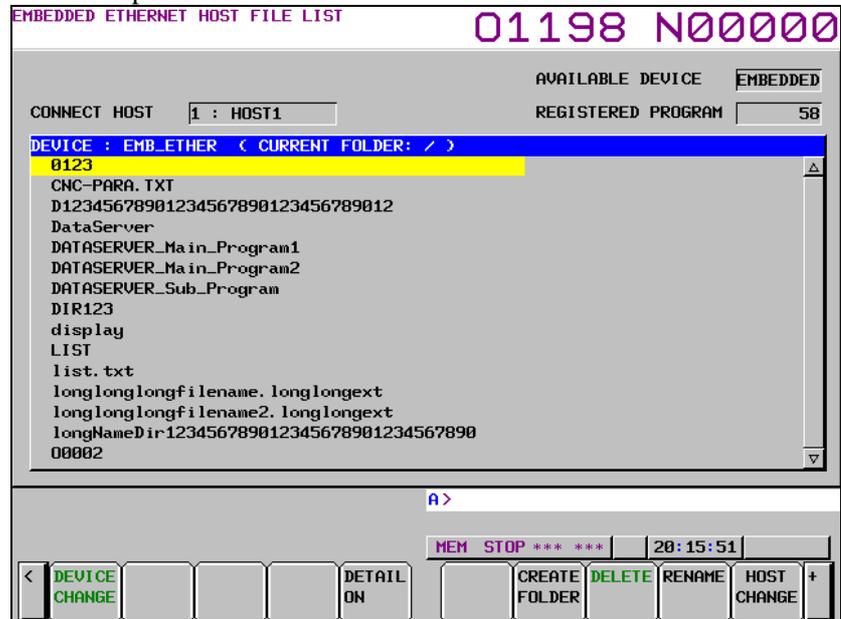
- 1 Press the function key .
- 2 Press soft key [FOLDER]. The program folder screen appears. (If the soft key does not appear, press the continuous menu key.)



- 3 Press soft keys [(OPRT)] and [DEVICE CHANGE] in that order. The soft keys for selectable devices appear.



- 4 Press soft key [EMB ETHER]. The program directory screen is changed to the contents of the hard disk on the host computer (embedded Ethernet host file list screen). On this screen, you can operate files.



Embedded Ethernet host file list screen

NOTE

When using the FTP file transfer function, check that the valid device is the embedded Ethernet port. The two conditions below determine a connection destination on the host file list screen:

- (1) Check that the valid device is the embedded Ethernet port. Make a selection in "DEVICE SELECTION" on the Ethernet setting screen.
- (2) A host computer can be selected from connection destinations 1, 2, and 3. Make a selection according to the [HOST] soft key described later.

- 5 When a list of files is larger than one page, the screen display can be switched using the page keys  .

Display item

AVAILABLE DEVICE

The currently selected device is displayed.
Check that the embedded Ethernet port is selected currently.

CONNECT HOST

Number of the currently connected host of the host computer

REGISTERED PROGRAM

The number of files in the current folder.

DEVICE

Current device. When the embedded Ethernet host file list is selected, "EMB_ETHER" is displayed.

CURRENT FOLDER

Current work folder in the host computer

FILE LIST

Information of the files and folders in the host computer

Operation list

DEVICE CHANGE

Enables a device to be selected from the program folder screen. To select the embedded Ethernet host file list, press soft key [EMB ETHER].

DETAIL ON, DETAIL OFF

Switches between the outline and detailed file lists.

CREATE FOLDER

Creates a new subfolder in the current work folder.

DELETE

Deletes a file or folder.

RENAME

Renames a file or folder.

HOST CHANGE

Changes the connected host computer.

SEARCH

Searches the current folder for a file.

REFRESH

Updates the information displayed on the embedded Ethernet host file list screen.

8.4.1.1 Displaying and operating the file list

REFRESH, DETAIL ON, DETAIL OFF

Update the file list data or change the file list type.

- 1 Press soft key [REFRESH] to update the file list data.
- 2 Press soft key [DETAIL OFF] to display only file names.
- 3 Press soft key [DETAIL ON] to display file attributes, sizes, dates, and file names.

NOTE

The items displayed in the detailed list depend on the FTP server setting on the host computer.

Moving a folder

Move a folder.

- 1 Select a folder you want to move using cursor keys  and .
- 2 Press MDI key .

CREATE FOLDER

Create a new folder.

- 1 Move to a folder in which you want to create a new folder.
- 2 Enter a folder name.
- 3 Press soft key [CREATE FOLDER].

DELETE

Delete a file or folder.

- 1 Select a file or folder you want to delete using cursor keys  and .
- 2 Press soft key [DELETE].
 - To execute the deletion, press soft key [EXEC].
 - To cancel the deletion, soft key [CANCEL].

DELETE (multiple files)

Delete multiple files at a time.

- 1 Press soft key [SELECT START].
- 2 Select a file or folder you want to delete using cursor keys 
and .
- 3 Press soft key [SELECT].
The selected file is highlighted.
Repeat steps 2 and 3 for each file you want to delete.
- 4 Press soft key [DELETE].
 - To execute the deletion, press soft key [EXEC].
 - To cancel the deletion, soft key [CANCEL].

NOTE

Up to 10 files can be selected at a time.

RENAME

Rename a file or folder.

- 1 Select a file or folder you want to rename using cursor keys  and .
- 2 Enter a new file or folder name.
- 3 Press soft key [RENAME].

SEARCH

Search the current work folder for a file.

- 1 Enter a file name.
- 2 Press soft key [SEARCH].

HOST CHANGE

Change the connected host computer.

- 1 Press soft key [HOST CHANGE].
The connected host number changes from 1 to 2 to 3, then back to 1.

8.5 RESTART OF THE EMBEDDED ETHERNET

Communication using the embedded Ethernet can be restarted.

Procedure

- 1 Press the function key .
- 2 Soft keys [EMBED PORT] and [PCMCIA LAN] appear.
(When there is no soft keys, press the continue key.)
- 3 Press soft key [EMBED PORT] or [PCMCIA LAN], press soft key [COMMON], and then press [(OPRT)] to display soft key [RSTART].
- 4 Pressing soft key [RSTART] resets embedded Ethernet communication and then restarts it.

NOTE

- 1 Pressing soft key [RSTART] forcibly interrupts communication even when it is in progress.
- 2 This function makes a restart by software. An actual restart may be impossible under some conditions.
- 3 When using the unsolicited messaging function, note the following:
 - Processing is forcibly started from the "Not Ready" state, regardless of the unsolicited message transfer state.
 - When the parameter for control is set to use the response notification method, RES and RES_CODE (0x01) are posted to the ladder program.
 - When the parameter for control is set to use the simplified method, REQ is cleared.

8.6 MAINTENANCE SCREEN FOR EMBEDDED ETHERNET FUNCTION

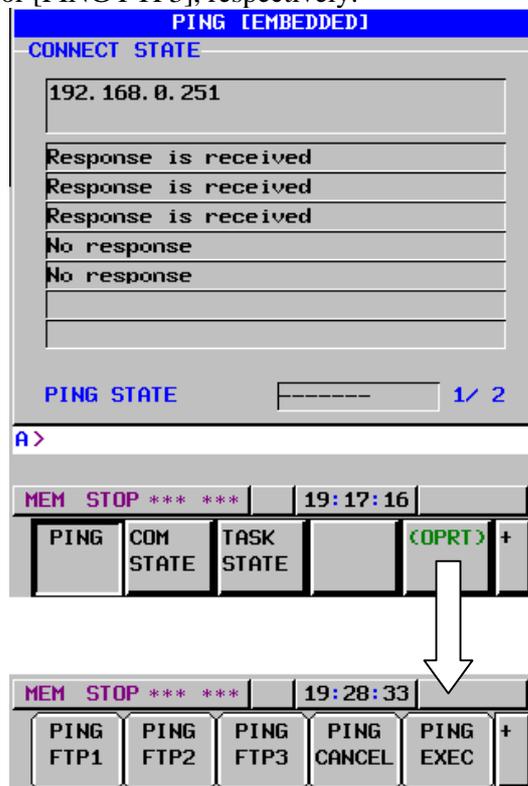
With the embedded Ethernet function, a dedicated maintenance screen is available.

The maintenance screen enables operations to be checked when the embedded Ethernet function operates abnormally.

Displaying and operating the PING screen

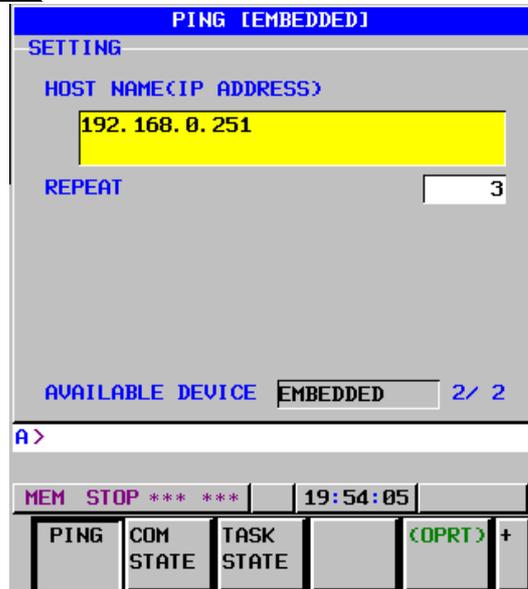
Procedure

- 1 Press the function key .
- 2 Soft keys [EMBED PORT] and [PCMCIA LAN] appear.
(When there is no soft keys, press the continue key.)
- 3 By pressing the [EMBED PORT] soft key, the Ethernet Setting screen for the embedded Ethernet is displayed.
By pressing the [PCMCIA LAN] soft key, the Ethernet Setting screen for the PCMCIA Ethernet card can be set.
- 4 Press soft key [PING] and then press [(OPRT)].
- 5 To send the PING command to connection destination 1 for FTP file transfer, press soft key [PING FTP1] Similarly, to send the PING command to connection destination 2 or 3, press [PING FTP2] or [PING FTP3], respectively.



PING connection status screen

- 6 To send the PING command to the desired destination, enter the address of the destination on the PING setting screen. (Page keys   are used for switching.)



PING connection status screen

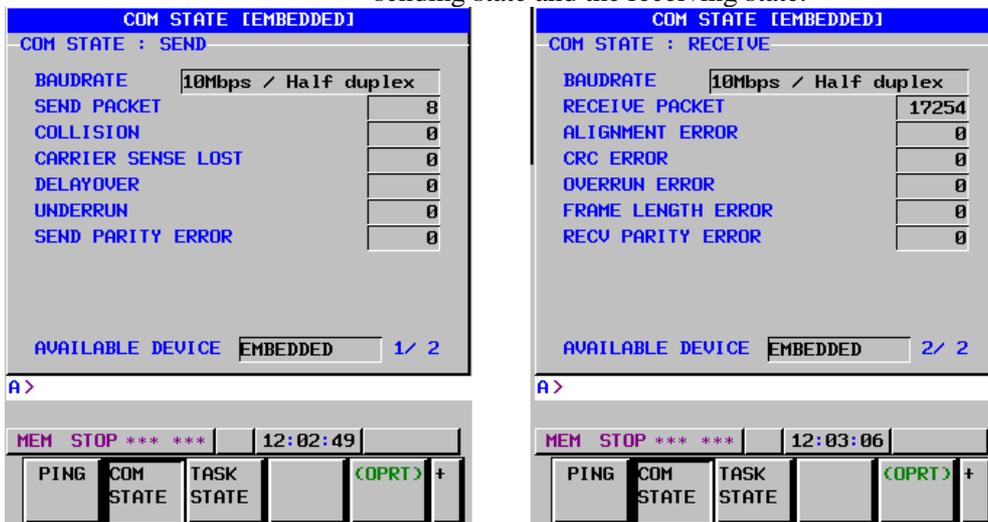
- 7 After entering the address and the repeat count, press the soft key [PING]. The specified number of PING commands are sent to the specified destination.
- 8 To cancel the PING command currently being sent, press soft key [PING CANCEL].

Displaying Communication status screen

Procedure

- 1 Press the function key .
- 2 Soft keys [EMBED PORT] and [PCMCIA LAN] appear.
(When there is no soft keys, press the continue key.)
- 3 By pressing the [EMBED PORT] soft key, the Ethernet Setting screen for the embedded Ethernet is displayed.
By pressing the [PCMCIA LAN] soft key, the Ethernet Setting screen for the PCMCIA Ethernet card can be set.
- 4 To display the communication status of the embedded Ethernet, press soft key [COM STATE].

Page keys   can be used to switch between the sending state and the receiving state.

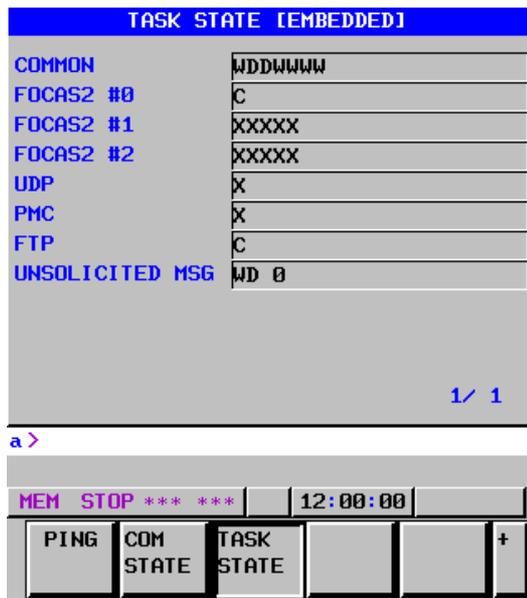


Communication status screen

TASK STATE screen

Procedure

- 1 Press the function key .
- 2 Soft keys [EMBED PORT] and [PCMCIA LAN] appear.
(When there is no soft keys, press the continue key.)
- 3 To display the Ethernet Setting screen for the embedded Ethernet port or the PCMCIA Ethernet card, press soft key [EMBED PORT] or [PCMCIA LAN], respectively.
- 4 Pressing soft key [TASK STATUS] causes the task status of the embedded Ethernet function to be displayed.



TAST STATE screen

The following symbols are used.

	Symbol and meaning
FOCAS2 #0	C: Waiting for a connection from the host W: Data processing in progress (1) D: Data processing in progress (2) N: FOCAS2 out of service
FOCAS2 #1,#2	W: Data processing in progress (1) D: Data processing in progress (2) X: Not yet executed
PMC	W: Data processing in progress (1) D: Data processing in progress (2) X: Not yet executed
UDP	W: Data processing in progress (1) D: Data processing in progress (2) X: Not yet executed
FTP	C: Execution wait W: Data processing in progress (1) D: Data processing in progress (2) X: Not yet executed

	Symbol and meaning
UNSOLICITED MSG	W: Data processing in progress (1) D: Data processing in progress (2) N: Abnormal state X: Not yet executed Number: Alive signal (UDP) transmission in progress when count-up operation is performed

8.7 LOG SCREEN OF THE EMBEDDED ETHERNET FUNCTION

This screen displays the log of the embedded Ethernet function.

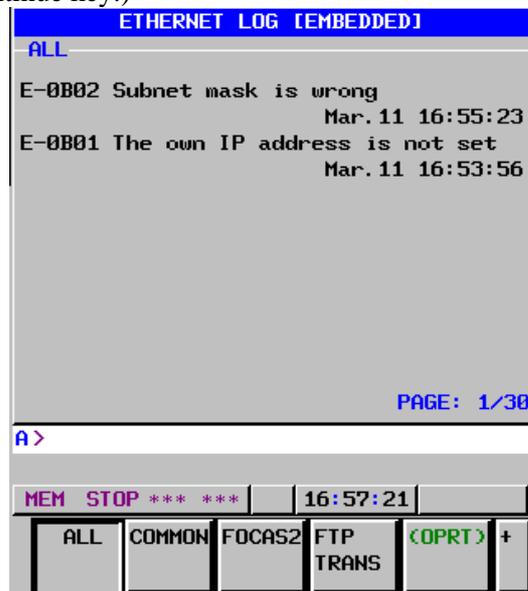
NOTE

If alarm SR2032, “EMBEDDED ETHERNET/DATA SERVER ERROR” is issued during data transfer using the embedded Ethernet function, check the error details on the log screen of the embedded Ethernet function.

Displaying the log screen

Procedure

- 1 Press the function key .
- 2 To display the log screen for the embedded Ethernet port or PCMCIA Ethernet card, press soft key [EMBED LOG] or [PCMCIA LOG], respectively. (When there is no soft keys, press the continue key.)



LOG screen

The newest error log appears at the top of the screen. The date and time when an error occurred are displayed at the right end of the line. The format of date and time data is “MMM.DD hh:mm:ss” where MMM represents a month, dd represents a day, hh represents hours, mm represents minutes, and ss represents seconds.

The date and time of the upper item shown above is March 11, 16:55:23.

To clear the log, press soft keys [(OPRT)] and [CLEAR] in that order.



The log for each function can be displayed by using soft keys on the embedded Ethernet log screen.

- (1) Soft key [ALL]
Displays all log related to the embedded Ethernet.
- (2) Soft key [COMMON]
Displays the log related to the parameter settings of the embedded Ethernet function and the basic communication function.
- (3) Soft key [FOCAS2]
Displays the log related to the FOCAS2/Ethernet function.
- (4) Soft key [FTP TRANS]
Displays the log related to FTP file transfer.
- (4) Soft key [UNSOLT MSG]
Displays the log related to the unsolicited messaging function.

Error and message

Error No.	Log message	Description and necessary action
E-0118 E-0119	Error occurred while wait for FOCAS2 pdu	A communication error has occurred because of any of the following: → The network quality has been lowered to such a level that data cannot be received from a PC at the other end. The communication channel has been logically shut down. → Software running on a PC at the other end has logically shut down the communication channel. → The Ethernet cable has been disconnected.
E-011A	All communication paths are busy	All the FOCAS2/Ethernet communication channels are busy.
E-0148	Cannot save parameter for Unsolicited Message	When the FOCAS2 function <code>cnc_wrunsolicprm2</code> was received, the parameter for the unsolicited messaging function could not be saved for one of the following causes: → The mode of the unsolicited messaging function is not set to "PC mode". → The state of the unsolicited messaging function is not "Not Ready". → The argument "parameter-for-unsolicited-message" of the FOCAS2 function <code>cnc_wrunsolicprm2</code> includes an invalid value.
E-0149	The received parameter for Unsolicited Message is wrong	When the FOCAS2 function <code>cnc_wrunsolicprm2</code> , <code>cnc_rdunsolicprm2</code> , <code>cnc_unsolicstart</code> , or <code>cnc_unsolicstop</code> was received, the argument "parameter-number-for-unsolicited-message" was found to be invalid.
E-0200	Received message from FTP server	A message sent by the FTP server is directly displayed.
E-0202	Connection failed with FTP server	Software of the FTP server may not be running. Start the software of the FTP server.

Error No.	Log message	Description and necessary action
E-0207	The router is not found	The specified IP address of the router may be wrong. Alternatively, the router may be turned off. Check whether the IP address of the router has been correctly specified and whether the router is turned on.
E-0208	The FTP server is not found	The specified IP address of the FTP server may be wrong. Alternatively, the FTP server may be turned off. Check whether the IP address of the FTP server has been correctly specified and whether the FTP server is turned on.
E-020B	Cannot login into FTP server	Check whether a correct user name and password are specified when logging into the FTP server.
E-020C	The parameters of FTP server are wrong	Check whether a correct user name and password are specified when logging into the FTP server.
E-020D	Changing a work folder of host failed	Check the work folder logging into the FTP server.
E-041A	Frame transmission failed (TCP)	A communication error has occurred because of any of the following: → The network quality has been lowered to such a level that data cannot be received from a PC at the other end. The communication channel has been logically shut down. → Software running on a PC at the other end has logically shut down the communication channel. → The Ethernet cable has been disconnected.
E-0901	Cannot read MAC address	The MAC address is not written in the hardware. Alternatively, the hardware has been damaged.
E-0A06	Network is too busy	An excessive amount of data is flowing over the network. One possible solution is to divide the network.
E-0B00	The own IP address is wrong	Specify a correct IP address in the designated format.
E-0B01	The own IP address is not set	Specify an IP address.
E-0B02	Subnet mask is wrong	Specify a correct subnet mask in the designated format.
E-0B03	Subnet mask is not set	Specify a subnet mask.
E-0B04	Router IP address is wrong	There may be class disagreement between the IP address of the local node and the IP address of the router.
E-0B05	IP address of DNS server is wrong	There may be class disagreement between the IP address of the local node and the IP address of the DNS server.
E-0B06	The own host name is wrong	Check whether a correct host name is specified.
E-0B07	The own domain name is wrong	Check whether a correct domain name is specified.
E-0B08	TCP port number is wrong	A value beyond the permissible setting range may be specified.
E-0B09	UDP port number is wrong	A value beyond the permissible setting range may be specified.
E-0B0B	IP address of remote FTP server is wrong	Specify a correct IP address in the designated format.
E-0B0C	Port No of a remote FTP server is wrong	A value beyond the permissible setting range may be specified.
E-0B0D	User name of remote FTP server is wrong	The specified user name may contain a prohibited character.
E-0B0E	Password of remote FTP server is wrong	The specified password may contain a prohibited character.
E-0B0F	Login folder of remote FTP srv is wrong	The specified log-in folder name may contain a prohibited character.
E-0B18	Cannot set because DHCP is available	To allow a set-up, disable the DHCP client function.
E-0B19 E-0B1A	Embedded Ethernet port isn't found	The software or hardware of embedded Ethernet function cannot be recognized. Check whether the software has been incorporated. Check whether the hardware is sound.

Error No.	Log message	Description and necessary action
E-0B27	Unsolicited Message function isn't available	<p>The software condition for using the unsolicited messaging function is not satisfied. The cause may be one of the following:</p> <ul style="list-style-type: none"> → The version of communication software is not supported yet. → NC parameters for using the unsolicited messaging function are not set. <p>For supported versions of communication software and the NC parameters, see Subsection 18.2.4, "Setting of the Unsolicited Messaging Function".</p>
E-0B29	Mode of Unsolicited Message is wrong	<p>In the CNC mode, the FOCAS2 function <code>cnc_wrunsolicprm2</code> cannot be executed.</p>
E-0B2A	Status of Unsolicited Message is wrong	<p>The state of the unsolicited messaging function was other than "Not Ready", so that the parameters for the unsolicited messaging function could not be updated. The cause may be one of the following:</p> <ul style="list-style-type: none"> → In a state other than "Not Ready", the FOCAS2 function <code>cnc_wrunsolicprm2</code> or <code>cnc_unsolicstart</code> was executed. → In a state other than "Not Ready", soft key [APPLY] was pressed.
E-0B2B	Cannot refresh parameter of Unsolicited Message	<p>The parameters for the unsolicited messaging function could not be updated. The cause may be one of the following:</p> <ul style="list-style-type: none"> → The problem of E-0B29 or E-0B2A occurred. → A parameter for the unsolicited messaging function includes an invalid value.
E-0B44	Invalid value exists in Transmission parameter of Unsolicited Message	<p>The parameter for the unsolicited messaging function, TRANSMISSION NUMBER or TRANSMISSION PARAMETER (NO. 1 to NO. 3), includes an invalid value.</p>
E-0B45	The total of Transmission size of Unsolicited Message exceeds the limitation	<p>The sum of sizes specified by the parameters for the unsolicited messaging function, TRANSMISSION PARAMETER NO. 1 to NO. 3, exceeds the maximum specifiable number of bytes. For the maximum specifiable number of bytes, see the setting item "TRANSMISSION PARAMETER" in Subsection 18.2.4.4, "Setting on the CNC screen".</p>
E-XXXX	(No message)	<p>An internal error has occurred. Make a notification of the error number.</p>