Cat. No. V054-E1-1

NTH25/25C
Programmable Terminal

OPERATION MANUAL

OMRON

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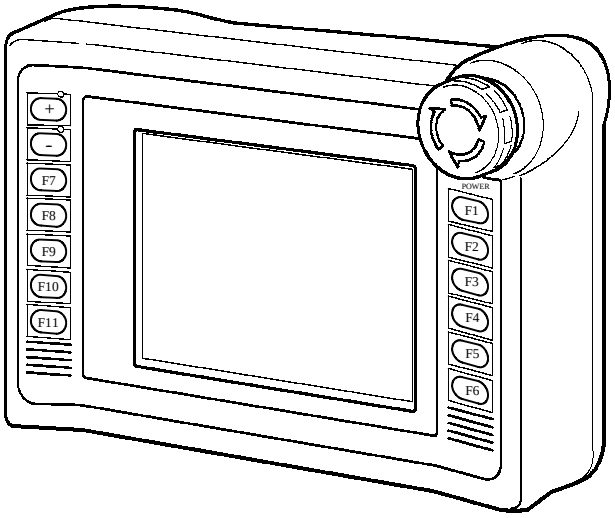
Programmable Terminal
Operation Manual

Produced May 1999



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OMRON Product References

All OMRON products are capitalized in this manual. The word "Unit" is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation "Ch," which appears in some displays and on some OMRON products, often means "word" and is abbreviated "Wd" in documentation in this sense.

The abbreviation "PC" means Programmable Controller and is not used as an abbreviation for anything else.

The abbreviation "Host" means a controller such as an FA computer which controls a PT (programmable terminal).

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Reference Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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About this Manual:

This manual describes the basic functions and operation procedures of the NTH-series programmable terminal NTH25/NTH25C, its operations when connected to a PC or a Host, and includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate the NTH-series programmable terminal NTH25/NTH25C.

Section 1 describes the functions and configuration of the NTH25/NTH25C.

Section 2 gives basic information on the method for connecting to the host and communication methods, and describes the names and functions of the parts of the NTH25/NTH25C.

Section 3 describes how to use the system menu, which allows various settings and checks to be performed using the touch panel of the NTH25/NTH25C.

Section 4 describes the functions of the NTH25/NTH25C, focusing on the functions of the display elements that can be registered for the screens.

Section 5 describes how to use the NTH25/NTH25C, when using memory link

Section 6 describes how to use the NTH Screen Data Converter.

Section 7 describes the corrective action to take when the system does not function normally, and the procedures for daily maintenance of the NTH25/NTH25C.

APPENDIX describes the specifications and method for making connector cables, and includes a list of related parts and a PC area map.

Related Manuals and Their Contents:

The related manuals are listed below.

The j symbol at the end of the manual number is the revision history number.

[Operating the programmable terminal and communicating with the host]

S NTH25/25C Programmable Terminal Operation Manual (V054-E1- j)
. . . . . This manual

This operation manual is the manual for the NTH25/25C itself.

This operation manual describes the functions and handling of both the programmable terminal body and the host interface function.

[Creating and transferring screen data]

S NT-series Support Tool Operation Manual (V053-E1- j)

The screens displayed on the NTH25/25C are created with the support tool and transferred to the NTH25/25C. This manual describes how to create and transfer screen data.

Note that in this manual, the NT-series Support Tool for Windows 95/98 is referred to as the “Support Tool”.

PRECAUTIONS

This section provides general precautions for using the Programmable Terminal.

The information contained in this section is important for the safe and reliable application of the Programmable Terminal. You must read this section and understand the information contained before attempting to set up or operate a Programmable Terminal.

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1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of introducing FA systems into production facilities.
- Personnel in charge of designing FA systems.
- Personnel in charge of installing and connecting FA systems.
- Personnel in charge of managing FA systems and facilities.

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for using the Programmable Terminal. Be sure to read this manual before attempting to use the NTH25/NTH25C and keep this manual close at hand for reference during operation.

WARNING It is extremely important that Programmable Terminals and related devices be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying Programmable Terminals to the above-mentioned applications.

WARNING Do not use input functions such as PT touch switches for applications where danger to human life or serious damage is possible, or for emergency switch applications.

3 Safety Precautions

Read these safety precautions carefully and make sure you understand them before using the Programmable Terminal so that you can use it safely and correctly.

Safety Conventions and their Meanings

This operation manual uses the following conventions and symbols to indicate cautions, warnings, and dangers in order to ensure safe use of the NTH25/NTH25C. The cautions, warnings, and dangers shown here contain important information related to safety. These instructions in the cautions, warnings, and dangers must be observed.

The conventions used and their meanings are presented below.

WARNING Indicates information that, if not heeded, could possibly result in loss of life or serious injury.

Caution Indicates information that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

⚠ WARNING

Do not attempt to take the unit apart and do not touch any internal parts while the power is being supplied. Doing either of these may result in electrical shock.

Caution

- Confirm the safety of the system before turning the power ON/OFF.
- Check the operation of all screen data and host programs carefully before using them. If their operation is incorrect, the system may operate unpredictably.
- When the programming console functions are used, carefully check that the system is safe before carrying out the following operations:
  - Changing monitor data
  - Switching the operation mode
  - Forced set or reset
  - Changing a present value or set value
- Allocate the PT status control area and PT status notify area so that they do not overlap each other.
- Do not use the touch switch input function for applications where there is a danger to human life or the possibility of serious property damage, or for emergency stop switches.
- Do not press touch switches with a force of greater than 30 N.
- Do not press touch switches inadvertently while the backlight is OFF.
  Only press touch switches after confirming system safety.
- If touch switches are pressed in rapid succession, their inputs may not be successfully received.
  Confirm that the input of a touch switch has been successfully received before moving on to the next operation.
- Be sure to use the limit check function to ensure safe use of the numeral input function.
- When the backlight is out or the display state is ”no–display,” do not inadvertently touch a touch switch or function switch.
  Check the safety of the system before you touch a touch switch or function switch.
- Confirm system safety before turning the power ON/OFF.
- Do not disassemble the PT for repair or modification.

SECTION 1
General

This section provides basic information about the functions and features of the NTH25/NTH25C, types of connection and communications methods. This information will enable you to understand the applications of the NTH25/NTH25C.

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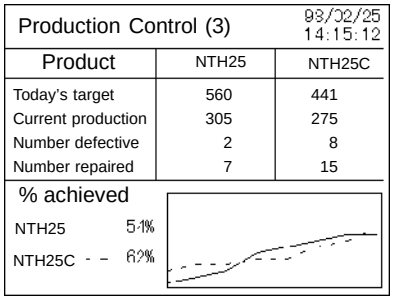
1-1 Role and Operation of the NTH25/NTH25C

The NTH25/NTH25C is a sophisticated display unit (programmable terminal) which automatically displays information and can also be used for operations when necessary at an FA production site. The following gives a general description of the role and operation of the NTH25/NTH25C for first–time users of a programmable terminal (PT).

1-1-1 Operation of an NTH25/NTH25C at an FA Production Site

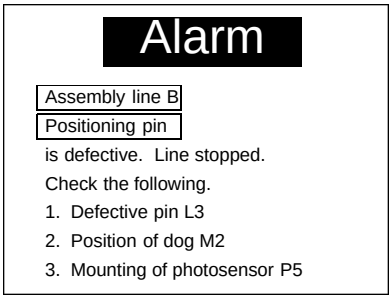
Monitoring of Production Line Status

The NTH25/NTH25C displays in real time information about the system and equipment and their operating status. The display is enhanced by graphs and other visuals, making the information easier to understand.



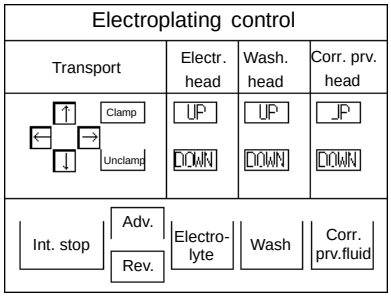
Directions to Workers on the Shop Floor

The NTH25/NTH25C warns workers of system or equipment failures and prompts the appropriate remedial action.



Panel Switch Functions

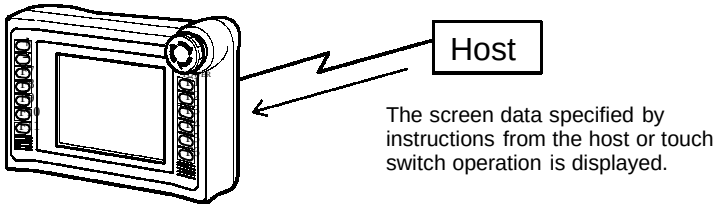
Setting touch switches on the NTH25/NTH25C allows workers to use the NTH25/NTH25C as an operating panel. The results of the operations are transmitted to the host.
You can move while holding the NTH25/NTH25C in your hands, making it ideal for fine–tuning at the production site.



1-1-2 Operations of the NTH25/NTH25C

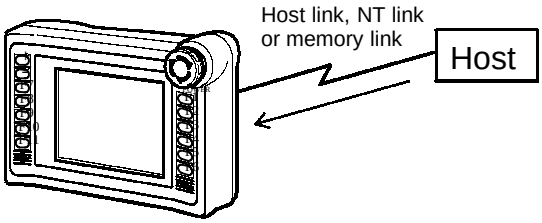
Displays Screens

The information to be displayed (screen data) can be created on a computer using the Support Tool, converted for use on the NTH25/NTH25C by the NTH Screen Data Converter, and stored in the NTH25/NTH25C. The screen data can be displayed on the NTH25/NTH25C in response to instructions from the host or touch switch operation.



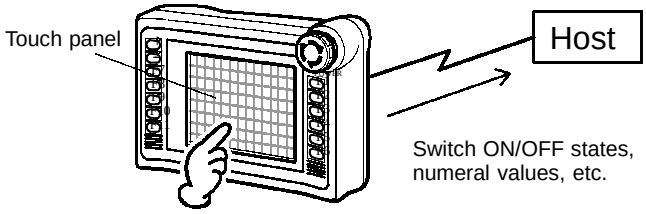
Receives Data from a Host

The NTH25/NTH25C can be connected to the host by a host link, NT link or memory link, and automatically receive necessary data from the host.



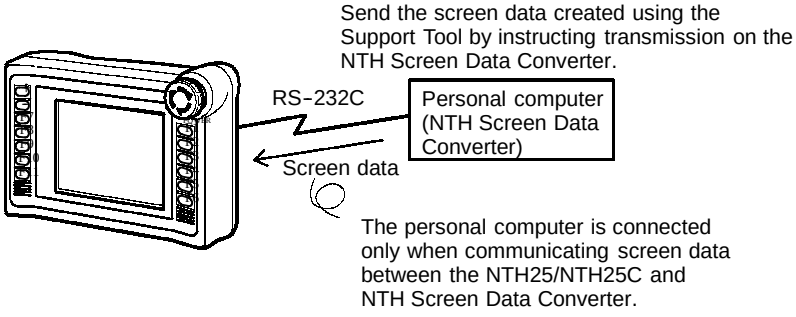
Sends Data to a Host

Data (switch ON/OFF states, numerals) input using the touch panel and function key switches can be transmitted to the host.



Screen Data

The screen data to be displayed on the NTH25/NTH25C can be created on a personal computer using the Support Tool. Convert the screen data for use on the NTH25/NTH25C using the NTH Screen Data Converter, connect the NTH25/NTH25C to the personal computer with an RS−232C cable, and send the data to the NTH25/NTH25C.



1-2 Functions of the NTH25/NTH25C

The NTH25/NTH25C has the following features.

1-2-1 Features

Handy PT

- Need not be mounted on operation panels.
- Easy to connect. Only connectors are needed.

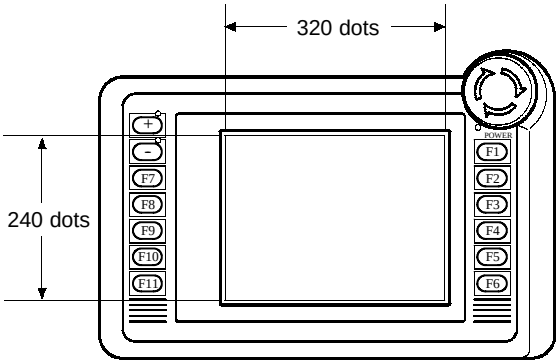
Downsized Body

- Slim and light body
- The communications cable and power cable are integrated in a single, slim cable, facilitating cable laying.

Construction Best Suited to the FA Environment

- The panel is an STN black-and-white LCD type with backlight for the NTH25 and an STN color LCD type with backlight for the NTH25C.
- Waterproofed equivalent to IP65*

  *: The panel may not be usable in environments where it is exposed to oil for long periods.



Hardware switch output

- The NTH25/NTH25C's hardware switch outputs can be used as emergency stop switches and for preventing erroneous operation.

Touch Switch Operation

- The contrast of the display panel can be adjusted by touch switch operation.

Screen Data Check Function

- Screen data can be checked simply by operations at the NTH25/NTH25C system menu without connecting the Support Tool.

Binary Data can be Read to/Written from the Host

- It is now possible to write binary data stored in words on the host directly to the NTH25/NTH25C. This makes data conversion by a program at the host unnecessary, reducing the load on the host.

Complies with International Standards

- The NTH25/NTH25C meets UL standards and EC directives.

1-2-2 Comparison between NTH25 and NTH25C

Two NTH25 models are available: the NTH25 and the NTH25C. The NTH25 supports versatile graphic display functions. The NTH25C supports this and a color display. The following table shows the differences between the NTH25 and NTH25C:

Function	NTH25	NTH25C
Type	NTH25-ST121B (black)	NTH25C-ST141B (black)
Display panel	STN black-and-white LCD display type (with white backlight)	STN color LCD type (with white backlight)

1-2-3 Comparison between NTH25/NTH25C and NT31/NT31C

The screen data for NTH25/NTH25C can be created by selecting NT31/NT31C without "–V1" on the Support Tool.
Note, however, that there are some differences between the NTH25/NTH25C and the NT31/NT31C without "–V1".

Item	NTH25/NTH25C	NT31/NT31C
Support Tool used	NT–ZJ3MX1/ZJCMX1–EV3 (The NTH Screen Data Converter is needed for sending screen data to the NTH25/NTH25C.)	NT–ZJ3MX1/ZJCMX1–EV3
Available communications method	Host link, NT link (1:1), memory link* *: The memory link uses a protocol different from that of NT series PTs. Screen data for the regular direct connection is converted by the NTH Screen Data Converter before it is sent to the NTH25/NTH25C.	Host link , NT link (1:1), NT link (1:N)
Memory link	– PT memory area to be used for each display element is already determined, so it need not be allocated. (Only lamp bits needs to be allocated to specified bits.) – Screen data saved in mmi format on the Support Tool is sent to the NTH25/NTH25C by specifying "Memory Link" on the NTH Screen Data Converter.	– Can be allocated to any area of PT memory for each display element. – Created screen data is sent to the NT31/NT31C from the Support Tool.
Use of memory unit	Not possible	Possible
RS–232C interface	Connector (9–pin) also used as port for screen data transfer	– Serial port A connector (also used for screen data transfer, 9–pin) – Serial port B connector (for host communications only, 25–pin)
RS–422A/485 interface	None	Serial port B (25–pin D–SUB connector)
Replacement backlight	Replacement not possible	NT31C–CFL01 (NT31/NT31C common use)
System program data	System program cannot be changed.	The system installer and system program data are supplied with the Support Tool.
Data backup by battery	Not possible (backed up by large–capacity capacitor)	Possible
Number of user–registered screens	Maximum of 1000	Maximum of 3999
Screen data capacity*1 (user program memory)	512 KB (flash ROM)	1 MB (flash ROM)
Numeral/character string memory table	None (Words on the host are directly referenced from display elements.)	Maximum of 2000
Input setting	Numeral value	Numeral value, character string

*1 This is the capacity of the flash memory that stores screen data.

Item	NTH25/NTH25C	NT31/NT31C
Graph display	Bar graph, trend graph	Bar graph, broken-line graph, trend graph
Indirect reference	Not possible	Possible
Bit memory table	240	Maximum of 1000
Image data	Maximum of 30 (Size is fixed by each code number for the image data.)	Maximum of 4095 (Any size can be specified in multiples of 8 dots.)
Library data	Maximum of 3980	Maximum of 12288
PT status control area size	5 words (partial change of contents)	5 words
PT status notify area size	7 words (partial change of contents)	2 words
Window control area	Maximum of 20 words (Individual words can be set to any area or position by the NTH Screen Data Converter.)	None
Trend graph control area	4 words (Can be set to any area or position by the NTH Screen Data Converter.)	None
Addresses allocatable to control area	DM, CH	DM, CH, HR, AR, LR

In addition to the above differences, the maximum number of elements that can be registered and how they are used may also differ.
For details on elements, see Section 4 "NTH25/NTH25C Functions."
For differences in programming, see Appendix F "Differences with NT31/NT31C Screen Data" on page 303.

- Differences in software and hardware specifications have resulted in various setting restrictions when using screen data created on the Support Tool on the NTH25/NTH25C. Before you create screen data on the Support Tool, first check Section 4 "NTH25/NTH25C Functions" and Appendix F "Differences with NT31/NT31C Screen Data" and create the screen data taking these restrictions into consideration.
- On the NTH25/NTH25C, thoroughly check the screen data created on the Support Tool before starting actual operation using that screen data.

1-2-4 Principal Functions of NTH25/NTH25C

The following are the principal functions of the NTH25/NTH25C.

Functions relating to data display

Character display

Characters of various sizes can be displayed. Characters can be flashed and displayed in reverse video.

Graphic display

Polylines, rectangles, polygons, circles, arcs, and sector shapes can be displayed. They can also be tiled with various patterns, flashed, or displayed in reverse video.

Numeral/character string display

The contents of words on the host are automatically read so that numerals and character strings can be displayed.

Graph display

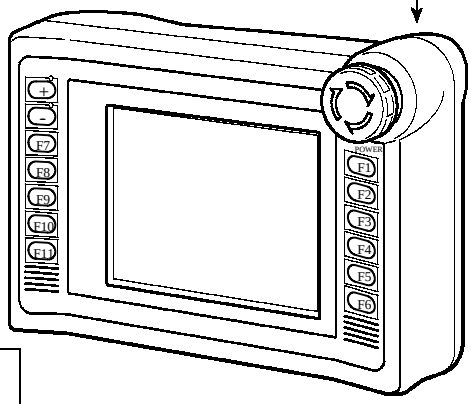
Not only bar graphs but also trend graphs can be displayed to indicate the contents of words on the host.

Lamp display

Lamps can be turned ON and flashed under the control of the host. It is also possible to display different graphics in their ON and OFF states.

Alarm list/history display

Warning messages are automatically displayed in a list in response to the state of a host bit. The date and time that the warning message occurred can also be displayed.



Functions relating to communications

Communications with the host

The NTH25/NTH25C can communicate with the host by three methods: host link, NT link (1:1) and memory link (NTH protocol). Data can be read from the host, data input by touch switches, and entry of numeral values sent to the host.

Functions relating to data input

Input by touch switches

Data can be input by simply touching touch switches displayed on the screen.
The possible functions of touch switches include sending entered data to the host and switching the screen display.

Input by function switches

Pressing a function switch on the NTH25/NTH25C sends the state of that switch to the host regardless of the currently displayed screen.

Pop-up window function

A window overlaying the currently displayed screen can be alternately opened and closed by pressing a touch switch.
In addition to fixed character and graphic displays, control keys and numeral input fields created as touch switches can also be registered to the window. The screen can be used efficiently since the window need only be opened when input is required.

Numeral input function

Numeral keys can be assigned to touch switches so that numerals can be input at the production site. The input data is written to words on the host.

Functions relating to data output

Switch output

The states of the emergency stop switches and two operation switches can be output.

Functions relating to the system

System menu

System settings and maintenance can be performed by selecting from system menus displayed on the screen.

Creation of screen data

Screen data created using the Support Tool on a personal computer can be converted for use on the NTH25/NTH25C using the NTH Screen Data Converter and stored in the built-in screen data memory.

Clock function

The time can be measured and output according to the internal clock data.

Programming console function

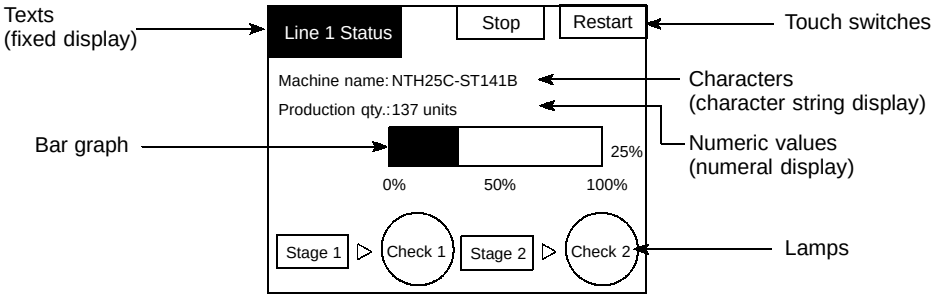
When the NTH25/NTH25C is connected to a C series CPM1, CQM1, or C200HX/HG/HE-(Z)E or SRM1 PC in an NT link (1:1) connection, operations equivalent to those of a programming console (C200H-PR027-E) are possible.

Trend graph logging function and background function

Changes in the contents on the host displayed in trend graphs can be recorded (logging function). Also, the record can be maintained even while the trend graph is not displayed (background function).

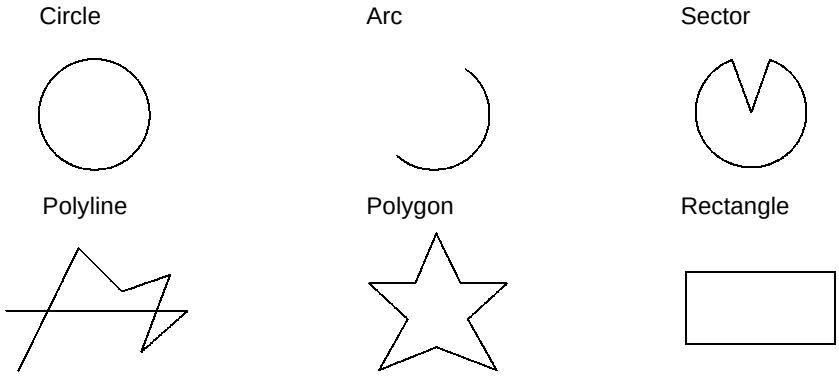
1-2-5 Displays

The NTH25/NTH25C can display various kinds of elements such as characters, numerals, graphs, lamps, and touch switches. The screen data displayed by the NTH25/NTH25C is created using the Support Tool on a personal computer.



- Fixed displays

  Characters and various graphics (circles, arcs, sectors, polylines, polygons and rectangles) whose display does not have to be changed, and mark data, image data, and library data that has already been registered, can be written directly onto the screen.



* A continuous straight line with up to 256 points can be drawn.

* A polygon with up to 255 vertices can be drawn.

”Marks” are graphics comprising 16 by 16 dots. On the NTH25/NTH25C, marks cannot be used as characters but as fixed display marks.

”Image data” are graphics comprising any required area of dots. They are registered in advance and as many as required can be displayed at any position on the screen.
Windows bit map (BMP) data can be used for images.
Image data are large in size but allow you to create more visually interesting graphics.

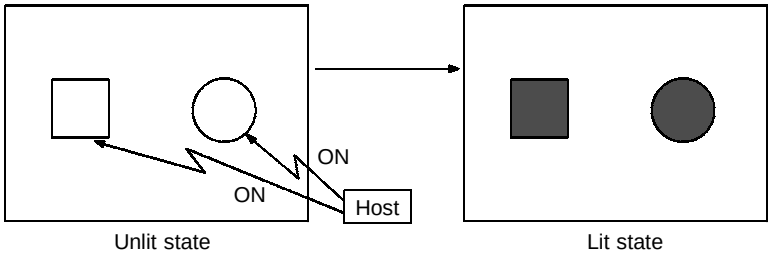
”Library data” are combinations of fixed display graphics registered as a single graphic. They are registered in advance and as many as required can be displayed at any position on the screen.
Library data are small in size since they are generated by combining graphics.

Mark Image data Library data

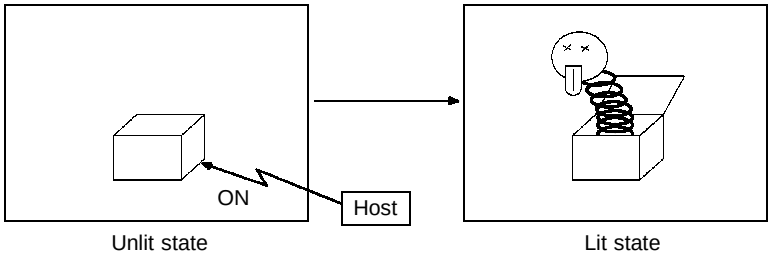
- Lamps

  These are graphics whose display status changes according to the states of bits on the host. Rectangles and circles can be used for lamps (normal (standard) lamps). They can be lit (displayed in reverse video) or flashed (repeated alternation between normal and reverse video display states) according to the state of the host bit.
  Lamps can also display different image/library data for the ON and OFF states of the host bit (such lamps are called ”image/library lamps”).

  – Normal (standard) lamps



  – Image/library lamps



- Touch switches

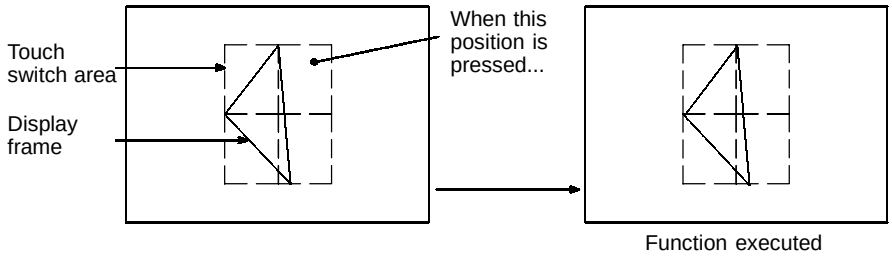
  These switches can be set at any location on the screen. Pressing a touch switch on the screen where a touch switch has been set can result in the following:

  Notification to a host bit (input notification function)
  Changing the displayed screen (screen switching function)
  Input of a numeral (input key function)
  Opening /closing a window

The following six types of display graphic can be used for touch switches:

Standard (double frame), no display frame, rectangle, circle, polygon, sector

When rectangle, circle, polygon, or sector is selected as the shape, the area within which pressing of the touch switch is sensed (the ”touch switch area”) can be set independently of the position where the display graphic is set.
Note, however, that the NTH25/NTH25C does not have a touch switch lamp function.



(On the NTH25/NTH25C, the display graphics other than “Standard” and “None” do not change when pressed.)

- Numeral display

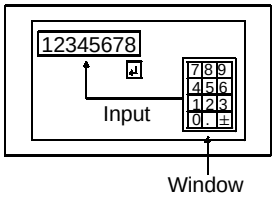
  The contents of words on the host are displayed as numerals. The displayed numerals can be changed by changing the contents of the word.
  Hexadecimal values can also be displayed.
  When decimal values are displayed, the number of digits for the integer part and fraction part of displayed values can be specified in advance.

- Character string display

  The contents of bits on the host are displayed as character strings. The displayed character strings can be changed by changing the contents of the word.

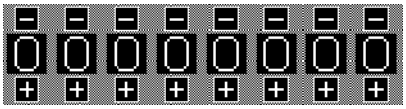
- Numeral input

  Numerals can be input at the PT by using touch switches. The input numerals are written to the host.



- Thumbwheel switches

  Numerals can be input by incrementing or decrementing each digit with the corresponding touch switch (+, –). The input numerals are written to the host.



- Graphs

These are graphics whose display changes according to the value of the bits reads from the host. There are the following two types.

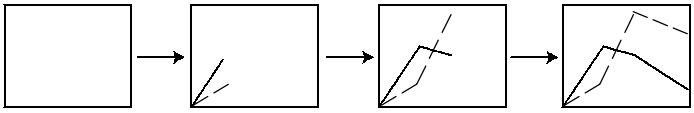
Bar graphs:

Bar graphs display the present contents of the bits on the host converted to a percentage within the range 0% to +100% of a preset value.

(On the NTH25/NTH25C, the frame is not displayed.)

Trend graphs:

Trend graphs display chronological changes in the value in a numeral memory table. The trend graph shifts position with the passage of time.
Past data is automatically recorded, and the host bits can be read (sampled) even while the trend graph is not displayed.
The user can choose to stop sampling, restart sampling, or display past data, by pressing touch switches.



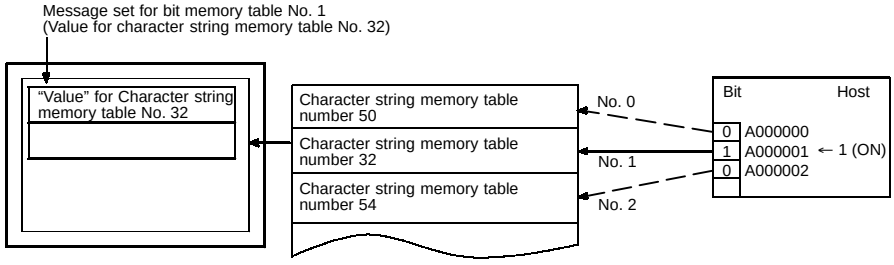
- Alarm list/history

The alarm list/history function displays messages (character strings) in list form, according to changes in the state of host bits. If the message is longer than the display field, it is displayed spread over two or more lines. (Messages are displayed at double line spacing.)

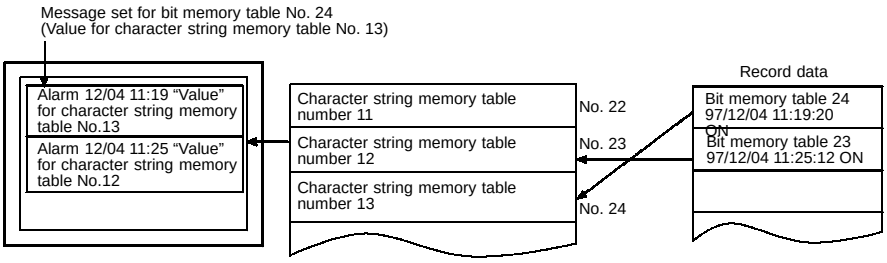
For the alarm list, messages (contents of character string memory tables) set for bit memory tables corresponding to the bits that turned ON are displayed.
For the alarm history, the date and time that the bit changed is recorded and displayed together with the message (character string) currently set to the bit memory table corresponding to the bits that turned ON and OFF. The ”alarm” is displayed when the bit turns ON, and the ”recovery” is displayed when the bit turns OFF.

The alarm list function is used to determine which bits are ON at the present time. The alarm history function is used to determine the times at which alarms occurred in the past.

– Alarm list



– Alarm history



1-3 Communications with the Host

The NTH25/NTH25C is connected to the host by one of the following three communications methods:

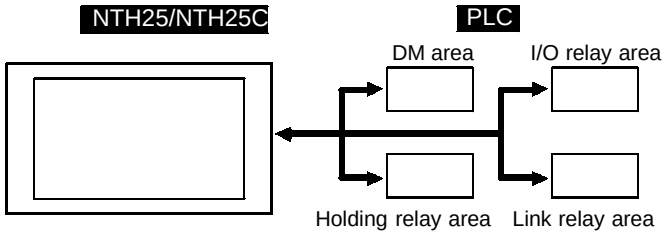
- Host link
- NT link (1:1)
- Memory link (NTH protocol)

In all of these communications methods that can be used with NTH25/NTH25C, data communications with the host is by ”direct connection.” (Memory link is, however, a quasi−direct connection.)

The following describes the host link and NT link that carry out the ”direct connection”. Memory link will be explained in section ”1−4 Communications by Using Memory Link”.

1-3-1 Direct Connection Function

With the NTH25/NTH25C, the bits and words that reference data required for display, and those for storing input data, can be allocated to any part of the PC memory area.
The NTH25/NTH25C can directly write to and read from these allocated bits and words to change the display status of the elements on the PT screen, control the PT operating status, and notify the host of statuses.
This function, which directly reads and writes the statuses of words and bits without using a PC program, is called the ”direct connection” function.
The words and bits that are allocated by direct connection are called the ”allocated words” and ”allocated bits”.
With the direct connection, the contents to be displayed at the NTH25/NTH25C are read from the memory area on the PC so that they are displayed on the NTH25/NTH25C, and the information entered on the NTH25/NTH25C is written to the memory area on the PC. The NTH25/NTH25C screen can be switched according to status of the PC memory area, and the NTH25/NTH25C’s status can be reflected in the PC’s memory area.



Features of the Direct Connection Function

The direct connection function has the following features:

- The bits and words for referencing the operating status and work instruction information and those for storing input data can be freely allocated to any area of PC memory.
- Since the NTH25/NTH25C can directly reference PC bit and word data without using a PC program, it can be connected to the PC without changing the PC program which controls the currently running production line.
- The area for controlling and notifying the NTH25/NTH25C statuses, including display screens, and display/no display status, can be freely allocated to any part of the PC memory area. This means that the PT status can be read and controlled just by reading this area at the PC, without preparing a special communications program.

The direct connection function allows the NTH25/NTH25C to read and write bits and words in the PC and to automatically update the NTH25/NTH25C screen display. This function can reduce the load on the PC so that its program development efficiency is improved.

1-3-2 Host Link

The host is connected to a PT in a 1:1 connection, and the words and bits of the host are read and displayed by host link communications. This method can be used for connection to the majority of PC types.

1-3-3 NT Link

NT link is a method for high−speed communications with a PC using the direct connection function. The PCs that can be connected to NTH25/NTH25C with the NT link are as follows:

CPM1, CQM1, C200HS, C200HX/HG/HE(−Z)E, CVM1/CV−series PC (−EV1 or later version), SRM1

The NTH25/NTH25C only supports NT link (1:1). With NT link (1:1), one PT is connected to one PC. The NT link (1:N) for connecting two or more PTs to one PC is not supported.

Features of the NT Link

- The NT link has the following features:
- High−speed communications with specific types of PCs can be executed.
- Writing in units of bits to the PC memory area is possible.
  This enables the other bits of words to which a touch switch has been allocated to be allocated for other purposes (e.g. a lamp).
  However, since data is written to the DM area in word units, the other bits of words allocated to touch switches in this area cannot be used for other purposes.
- It is possible to connect to PT without switching the PC operation mode. (When the host link is used, the PC is switched to the monitor mode when it is in the RUN mode.)
- When using C200HX/HG/HE−(Z)E, up to three NT link (1:1) systems can be connected by installing a communications board in the option slot of the CPU unit. For details on the communications board, refer to the SYSMAC α Communications Board User's Manual (SCCC−305).
- If the PC used supports the programming console function, the NTH25/NTH25C can be used as a programming console.

The NT link is compatible with the host link. So, the NTH25/NTH25C screen data and PC programs used with the host link direct connection can be used with the NT link as they are.

1-3-4 Functions of Allocated Bits and Words

Elements displayed on the NTH25/NTH25C and the NTH25/NTH25C status can be allocated to the bits and words of the PC when using the direct connection function. By changing the contents of these bits and words, the NTH25/NTH25C can be controlled by the PC. It is also possible to send data to the PC by pressing touch switches at the NTH25/NTH25C.

Controlling the NTH25/NTH25C with a PC

The following NTH25/NTH25C functions can be controlled by a PC.

- Screens:
  Display of designated screens, confirmation of screen numbers, etc.
- Display details of numerals and character strings:
  Updating of the contents of numerals, graphs and character strings to be displayed on the NTH25/NTH25C
- Lamps:
  Display instructions, confirmation of display status, etc.
- System control:
  Backlight ON/OFF, instruction of clock data output

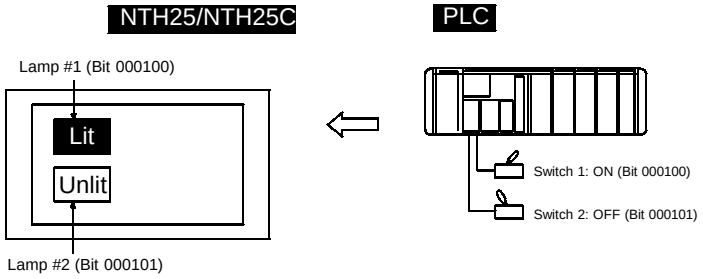
Notifying a PC from the NTH25/NTH25C

Data in the NTH25/NTH25C is sent to a PC when, for example, a touch switch is pressed. The following three types of data are sent to a PC:

- NTH25/NTH25C status, screen number of currently displayed screen
- Touch switch input states
- Numeral value input with the numeral input function using touch switches

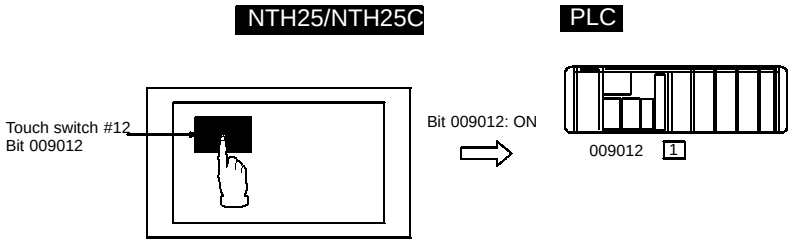
Functions of Display Elements

- Lamps (See page 137.)
  Allocation destination: Bit



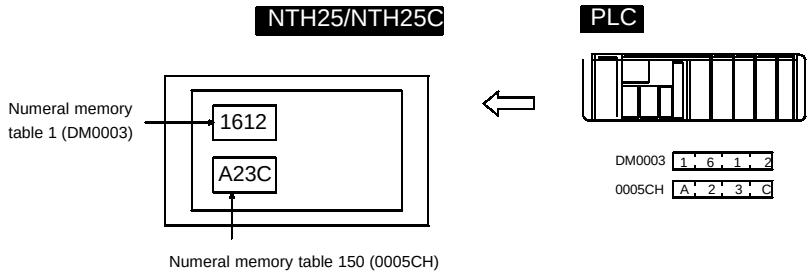
The PC's bit state is displayed by the "lamp" at the NTH25/NTH25C.
Normal (standard) lamps turn on (flash) when the PC's bit state (lamp bit) is ON (1), and go off when it is OFF (0).
With image/library lamps, the displayed image or library data can be switched according to the ON (1)/OFF (0) state of PC bits (lamp bits).

- Touch switches (See page 145.)
  Allocation destination: Bit



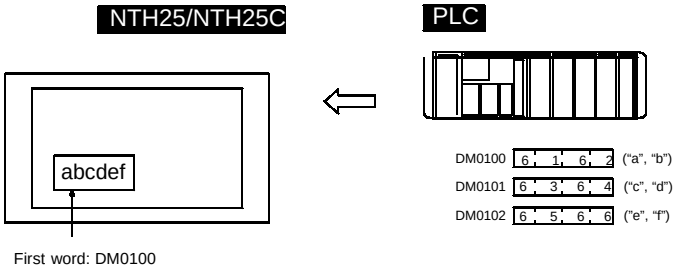
When the touch switch is pressed, the bit (notification bit) allocated to the PC turns ON (1) or goes OFF (0).

- Numeral display (See page 159.)
  Allocation destination: Word



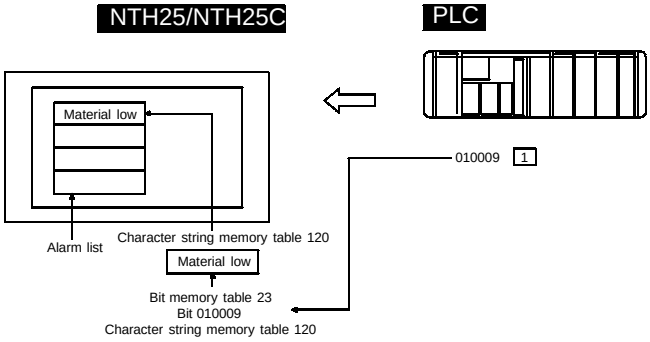
If the word contents change when the element to be displayed as a numeral by reading the word on the host is currently displayed on the screen, the value on the screen will also automatically change. This allows words to be monitored more easily.
While the contents of words on the host are displayed on screens, reading is executed so that the data on the screen is always the same as the contents of allocated words.
The NTH25/NTH25C does not have numeral memory tables. So, the word on the host is directly read from the element using only the allocation information of the word on the host.

- Character string display (See page 166.)
  Allocation destination: Word



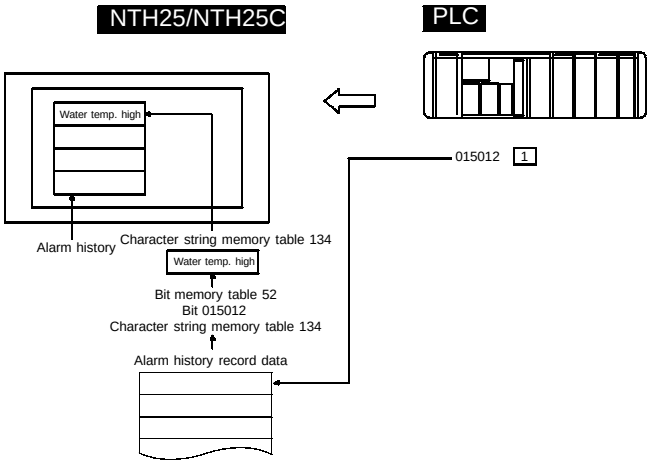
If the word contents change when the element to be displayed as a character string by reading the word on the host is currently displayed on the screen, the character string on the screen will also change automatically. This allows any messages to be displayed more easily.
While the contents of words on the host are displayed on screens, reading is executed so that the data on the screen is always the same as the contents of allocated words.
The NTH25/NTH25C does not have character string memory tables. So, the word on the host is directly read from the element using only the allocation information of the word on the host.

- Alarm list (bit memory table) (See page 189.)
  Allocation destination: Word



When the bit state of the PC corresponding to the bit memory table changes to ON (1), the value of the character string memory table currently registered to the bit memory table is displayed in the alarm list. When the bit state returns to OFF (0), the character string memory table display is automatically cleared.

- Alarm history (bit memory table) (See page 189.)
  Allocation destination: Word

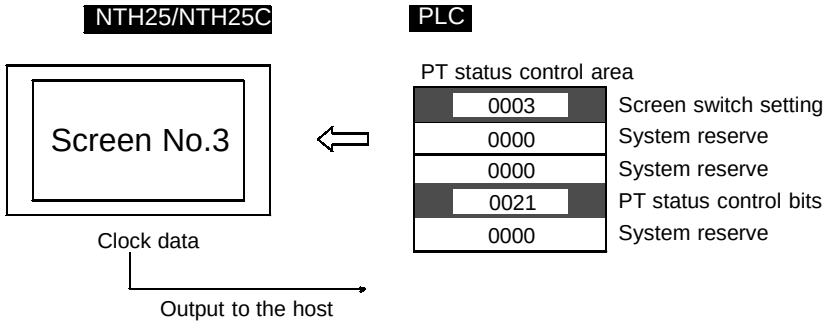


The PC bit corresponding to the bit memory table is continually monitored. When the bit turns ON (1), the date and time are recorded to the alarm history record data together with the value of the character string memory table currently registered to the bit memory table.
This record data can be displayed according to alarm history.

Functions of the PT Status Control Area (PC ↔ PT)

The ”PT status control area” is used to control the NTH25/NTH25C status. When data is written to this area on the PC, the NTH25/NTH25C reads the contents of this area and operates according to the contents.

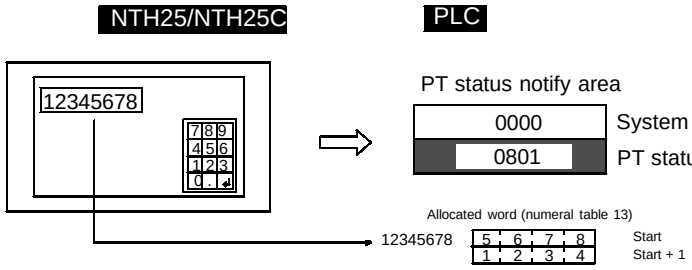
[Example of PT status control area application]
When data is written to the PT status control area, the NTH25/NTH25C operates as follows (page 90).



Functions of the PT Status Notify Area (PT to PC)

The ”PT status notify area” is used to notify the changes in the NTH25/NTH25C status.
When the NTH25/NTH25C status changes, this change in status is written to the PT status notify area on the PC. The NTH25/NTH25C status can be checked by reading the data from this area.

[Example of PT status notify area application]
When the NTH25/NTH25C status changes, this change in status is notified to the PT status notify area as follows (page 93):



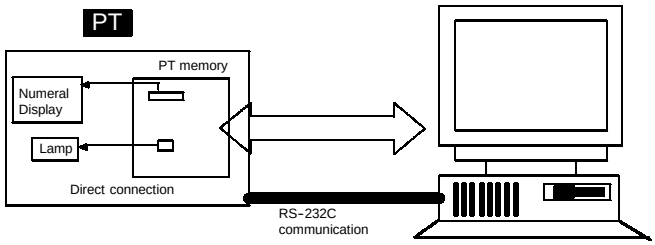
1-4 Communications by Using Memory Link

This section describes a communications method other than direct connection, called the ”memory link”.

1-4-1 Memory Link

Memory link is a means of sending and receiving data between a personal computer or an FA computer and the NTH25/NTH25C over the RS−232C interface.

In memory link, there is an area called ”PT memory”, as shown below, inside the NTH25/NTH25C. This area is treated as a virtual area on the PC. This enables simulation of direct connection to PT memory and display elements on the NTH25/NTH25C. The host can make the NTH25/NTH25C execute processes via PT memory by issuing memory link commands.



With the memory link, the only difference with the direct connection is that the NTH25/NTH25C finds its communications target internally instead of externally. So, the screen data for the direct connection can be used as it is. Note, however, that the maximum number of elements that can be registered sometimes varies between the direct connection and memory link. With the memory link on the NTH25/NTH25C, bits and words are automatically allocated to each element, so the PC address set to the element is invalid.

When compared to direct connection by the host link or NT link, the memory link is subject to restricted use of some functions as described below:

- Programming console functions cannot be used.
- PT status control bit and PT status notify bit functions differ slightly.
- The allocated bit and word are already determined for each element.

Reference

- The screen data is sent to the NTH25/NTH25C after the screen data for direct connection created on the Support Tool is converted for NTH25/NTH25C memory link use on the dedicated NTH Screen Data Converter.
- The NTH25/NTH25C uses the ”NTH protocol” memory link. This memory link differs with that for NT series PTs.

1-4-2 Comparison between Direct Connection and Memory Link

The two major differences between direct connection and memory link are as follows:

a) With the memory link, communications with the host must be carried out by using commands. Compared with regular direct connection, which can be used requiring almost no programs, memory link requires a program for executing command transactions. This, however, allows the PT to be used in a wider range of applications as a large variety of functions available in the direct connection can be used from numerous equipment such as personal computers and FA computers supporting the RS−232C interface.

b) As PT memory area to be used for each element is already determined, the PC address currently set to elements is invalid. When PT memory area is read and written from the host, the address already determined for each element is accessed regardless of the currently set PC address.

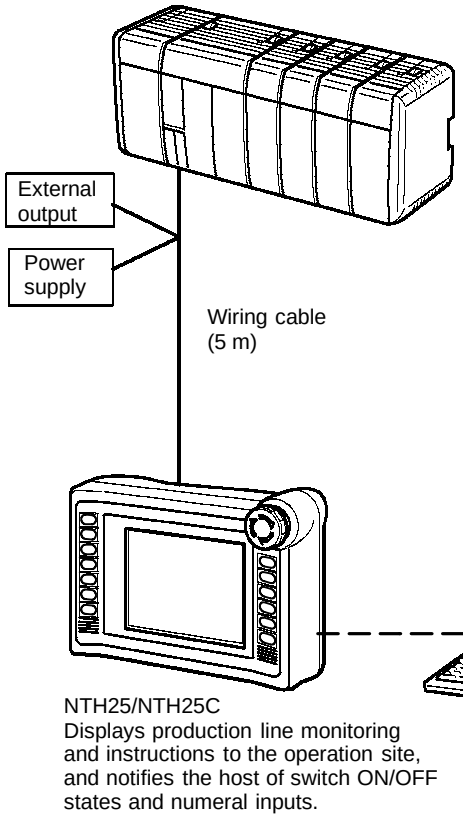
For details on communications between the host and the PT by the memory link, see Section 5 ”Using Memory Link (NTH Protocol)”. For details on how to use screens and display elements, see Section 4 ”NTH25/NTH25C Functions”.

1-5 System Configuration

This section shows the configuration of a system that uses an NTH25/NTH25C. For details on product models, see Appendix G ”Model List” (page 316).

1-5-1 Compatible Peripheral Devices

The following peripheral devices can be connected to an NTH25/NTH25C:



Host
Controls the NTH25/NTH25C as required while controlling machines and monitoring the production line.

Host link:	C series, CVM1/CV series, CS1 series, PCs, SRM1 Can be connected to CPU units, host link units, and SRM1. However, connection is not possible to some models of CPU unit and SRM1 (page 40).
NT link:	C Series, CVM1/CV series PCs, SRM1 Can be connected to CPU units and SRM1. Note, however, that connection is not possible to some models (page 53).
Memory link:	Can be connected to a personal computer or FA computer. (See page 55.).

Support Tool
Used to create screens for the NTH25/NTH25C on the personal computer.
(On the Support Tool, screens are created for use on the NT31/NT31C.)

NTH Screen Data Converter
Converts screen data created on the Support Tool to screen data for use on the NTH25/NTH25C, and sends the screen data to the NTH25/NTH25C. Also makes settings specific to the NTH25/NTH25C.

- Support Tool
  - NT-series Support Tool Ver. 3.0 for Windows 95/98 (Made by OMRON)
  - NT-ZJ3MX1-EV3 (FD version)
  - NT-ZJCMX1-EV3 (CD-ROM version)
- NTH Screen Data Converter (See page 38.)
  - NTH Screen Data Converter (made by OMRON) (CD-ROM version)
    The NTH Screen Data Converter is supplied as a standard accessory with the NTH25/NTH25C.

1-5-2 Connecting to the Host

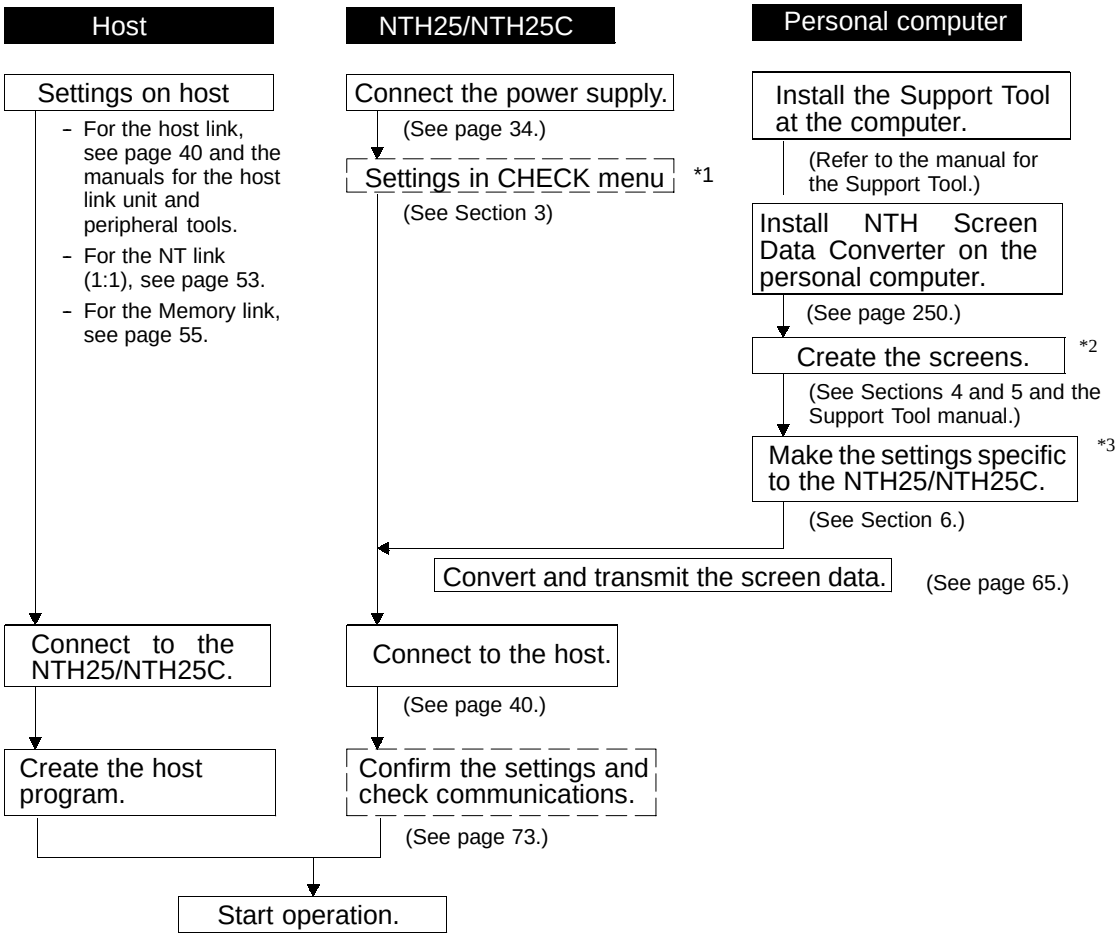
A dedicated communications connector (D–SUB 9–pin) is attached to the NTH25/NTH25C's cable. Use this connector to connect the NTH25/NTH25C to the host.

The NTH25/NTH25C's cable also divides into the control/power supply connector 10 cm from its tip. Use this connector, for example, to supply power and output switch states.

For details on connections, see 2–5 "Connecting to the Host".

1-6 Before Operating the NTH25/NTH25C

Follow the procedure below to start the NTH25/NTH25C system:



*1 On the NTH25/NTH25C, only the setting made in the CHECK menu is valid as the clock data.

*2 On the Support Tool, set the PT type to "NT31" or "NT31C" when you create screen data for the NTH25 and NTH25C, respectively. (NTH25 and NTH25C cannot be set directly on the Support Tool.) Do not, however, set "NT31–V1" or "NT31C–V1". Also, save the screen data created on the Support Tool only in the mmi format. Other format data such as the onw regular save format cannot be read by the NTH Screen Data Converter.

*3 mmi format screen data created on the Support Tool is read, and settings specific to the NTH25/NTH25C are made. On the NTH25/NTH25C, the communications method settings and PT type (NTH25/NTH25C) settings are both made in the NTH Screen Data Converter.

Reference

- For the Support Tool, use NT–series Support Tool for Windows 95/98 (Ver. 3.0.).
- NTH Screen Data Converter is provided with the NTH25/NTH25C.

For details on the equipment and software, refer to the following manuals:

Equipment or Software	Manual Title	Manual Number
Support Tool	NT-series Support Tool for Windows 95/98 Ver 3.0	V053-E1- j
PC	SYSMAC CPM1 User's Manual	W262-E1- j
	SYSMAC CPM1A User's Manual	W317-E1- j
	SYSMAC C200H User's Manual (for CPU01/03/11) (Programming)	W130-E1- j
	SYSMAC C200H User's Manual (for CPU21/23/31) (Programming)	W217-E1- j
	SYSMAC C200HS Setup Manual	W236-E1- j
	SYSMAC C200HS Programming Manual	W235-E1- j
	SYSMAC C200HX/HG/HE Setup Manual	W302-E1- j
	SYSMAC C200HX/HG/HE Programming Manual	W303-E1- j
	SYSMAC C1000H/C2000H User's Manual (Programming)	W140-E1- j
	SYSMAC CQM1 Reference Manual	W228-E1- j
	SYSMAC CVM1/CV500/CV1000/CV2000 User's Manual (Ladder) (Users using a CVM1-series PC should refer to the SYSMAC CV500/CV1000/CV2000 User's Manual.)	W202-E1- j
	CS1 series CS1G/H-CPU j j -E Programmable Controllers Operation Manual	W339-E1- j
	CS1 series Serial Communication Boards/Units Operation Manual	W336-E1- j
CompoBus master control unit	SRM1 User's Manual	W318-E1- j
Peripheral tools	SYSMAC Support Software Operation Manual: C-series PCs	W248-E1- j
	SYSMAC Support Software Operation Manual: CVM1 PCs	W249-E1- j
	SYSMAC CPT Operation Manual	W332-E1- j W333-E1- j
	CX-Programmer Operation Manual	-
Host link unit/ Communications Board	SYSMAC C series Host Link Unit User's Manual	W143-E1- j
	SYSMAC CVM1/CV Series Host Link User's Manual	W205-E1- j
	SYSMAC C200HW-COM01 C200HW-COM02-V1 to C200HW-COM06-EV1 Communications Boards Operation Manual	W304-E1- j

SECTION 2
Connection

This section describes the possible connection methods with the NTH25/NTH25C, and the functions of parts on the NTH25/NTH25C. This knowledge is required before connecting to the host and to peripheral devices.
This section also describes the operating environment for the NTH25/NTH25C, and how to connect to the host and the NTH Screen Data Converter running on the personal computer.

2-1 Method for Connection to the Host 30
2-1-1 Connection Method and Communications Method 30
2-2 Names and Functions of Parts 32
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2-1 Method for Connection to the Host

This section describes the methods for connecting to the host used with the NTH25/NTH25C, and the relationship between the connection method and the communications method.

2-1-1 Connection Method and Communications Method

- NTH25/NTH25C communications ports and communications methods

  The NTH25/NTH25C has one communications port which is used as follows:

Communications Port	Available Communications Methods	Communications Type
Serial port	Host link NT link (1:1) Memory link (NTH protocol) (NTH Screen Data Converter connection)	RS-232C

- Available communications methods with the host

  The following communications method can be used with hosts that are compatible with the NTH25/NTH25C:

  - RS-232C

  The communications type that is actually supported varies according to the host. For details, see 2-5 "Connecting to the Host".

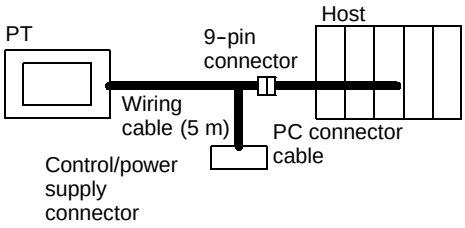
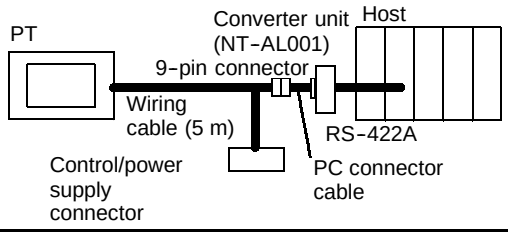
- Converting the communications type with an RS-232C/RS-422A converter unit

  The communications type can be converted as follows by using an RS-232C/RS-422A converter unit (NT-AL001, made by OMRON).

  - (NTH25/NTH25C side) RS-232C ↔ Converter unit ↔ RS-422A (Host side)

• Combinations of communications method and connection method

The following table shows the available connection methods depending on the communications method used and communications type between the NTH25/NTH25C and the host.

Communications Type at PT	Communications Type at Host	Available Connection Method	Available Communications Method			For Details, See Page
			Host link	NT link (1:1)	Memory link	
RS-232C	RS-232C	Connection via a PC connector cable 	f	f	f	P 56
	RS-422A	Connection via a converter unit 	f	f	f	P 56

f : Connection possible

- The PC connector cable is used for connecting the NTH25/NTH25C to the host.
- +5 V 150 mA of pin No.6 on the RS-232C interface is required for the RS-232C/RS-422A converter unit (NT-AL001).
- +5 V is not output from the NTH25/NTH25C's cable. When connecting an NT-AL001 to the NTH25/NTH25C, a separate power supply is required for the NT-AL001.
- The NT-AL001's cable cannot be connected or disconnected with the power ON. Always connect or disconnect the cable with the NT-AL001's power OFF.

Reference

- Do not directly connect the NTH25/NTH25C connector to the host or RS-232C/RS-422A converter unit. Be sure to connect via the PC connector cable as shown above.
- When extending the cable for the RS-232C/RS-422A converter unit, wire the cable referring to "Connections" (page 56) and Appendix C "Using an RS-232C/RS-422A Converter Unit" (page 293).

2-2 Names and Functions of Parts

This section describes the operating environment for the NTH25/NTH25C, and the names and functions of parts.

Caution When unpacking the NTH25/NTH25C and peripheral devices, check their external appearance and confirm that they are not damaged. Also shake them lightly and confirm that they do not emit any abnormal noises.

2-2-1 Installation Environment

Pay attention to the following points when installing the NTH25/NTH25C.

Caution Do not install the NTH25/NTH25C at sites subject to the following:

- Severe temperature variations
- Temperature or humidity outside the ranges stated in the specifications
- High humidity, condensation
- Splashing chemical agents
- Severe oil splashing
- Corrosive or flammable gases
- Strong vibrations or shocks
- Direct exposure to wind and rain (outdoor sites)
- Strong ultra-violet irradiation

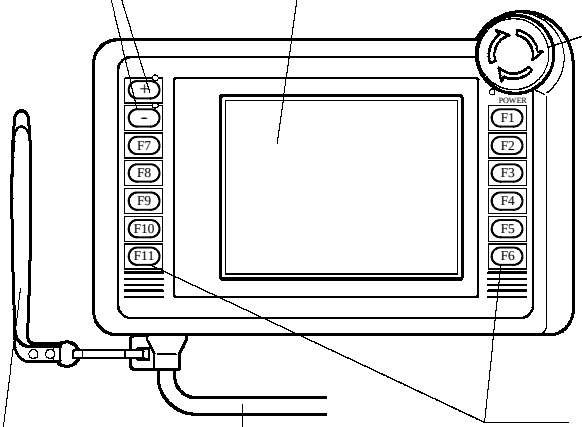
Take adequate measures to ensure shielding if the unit is used at a location subject to the following:

- Static electricity, or electrical noise from other equipment
- Strong electromagnetic fields
- Nearby power cables
- Potential exposure to radioactivity

2-2-2 Front View

Operation switches:
These two switches are a type of function switch. The exclusive OR of the states of these two switches is output.

Display:
The NTH25 has a black-and-white LCD screen with a backlight, and the NTH25C has an STN color LCD screen with a backlight. The entire area of the screen is a touch panel which works as an input device.



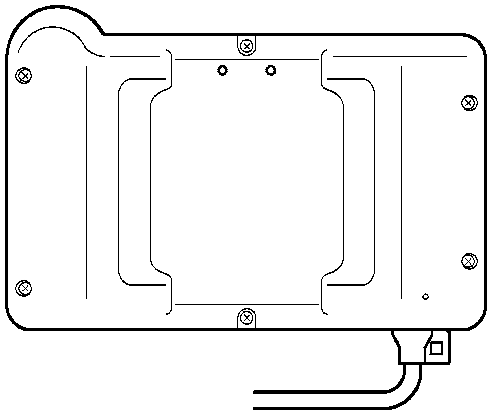
Emergency stop switch (push-lock switch):
This switch is normally closed condition type switch (1 circuit output). This switch remains pressed when pressed in. To cancel this state, turn the dial to the right (clockwise).

Hand strap:
Use this strap to prevent the NTH25/NTH25C from falling. When using the NTH25/NTH25C, pass your hand through the strap.

Function switches:
These 13 function switches (including operation switches) can be used in the same way as touch switches.

Wiring cable:
This exclusive cable is used collectively for 24 V(DC) power supply, serial communications, operation output and push-lock output. This cable is connected directly to the NTH25/NTH25C. This cable is 5 m long, and divides into a 9-pin D-SUB connector for serial communications and control/power supply connector 10 cm from its tip.

2-2-3 Rear View



Caution

- Confirm the safety of the system before turning the power ON/OFF.
- Do not drop the NTH25/NTH25C or subject it to shocks.
- Do not disconnect the PT with the system still running.

2-3 Wiring Cable Functions and Connections

This section describes the power supply and external output connections required for connecting the host and the NTH Screen Data Converter.
For details on connecting the NTH25/NTH25C to the NTH Screen Data Converter, see 2-4 "Connecting to the NTH Screen Data Converter". For details on connecting the NTH25/NTH25C to the host, see 2-5 "Connecting to the Host".

2-3-1 Connecting the control/power supply connector

Connect the external output and power supply via an exclusive connector to the control/power supply connector on the wiring cable that is connected directly to the NTH25/NTH25C .

Preparing the connector cable

Prepare the cable for connecting the external outputs or power supply to the control/power supply connector.

- Applicable connectors

  Use the following parts for connecting the control/power supply connector (10-pin flat cable connector) on the NTH25/NTH25C. For details, contact the manufacturer.

  Use the following connectors to prepare the PT wiring cable and the cable for relaying the power supply and external outputs.

Model	Name	Remarks		Manufacturer
IL-M-10P-S3C2-SA	Relay plug housing	10-pin	Relay cable (PT side)	Japan Aviation Electronics (JAE)
IL-M-C2-1-10000	Crimped pin connector	Contact pitch 2.5 mm, applicable power lead AWG28 to 22		

- Control/power supply connector pin arrangement

  The following table shows the control/power supply connector (Japan Aviation Electronics IL-G-10S-S3C2) pin arrangements:

Connector pin No.	Cable color	Signal Name/ Abbreviation	Function
1	Gray	+24 V	Power supply terminal +24 V
2	Gray/white	GND	Power supply terminal 0 V
3	Blue/white	OPR	Operation output
4	Black	(system reserve)	
5	Black/white	(system reserve)	
6	Brown	(system reserve)	
7	Brown/white	(system reserve)	
8	Green	EMR1	Emergency stop switch contact output
9	Green/white	EMR1	Emergency stop switch contact output
10	-	Unconnected	

Connecting the control/power supply connector

Insert the control/power supply connector in as far as it will go with the notch on the relay connector (plug housing) aligned with the NTH25/NTH25C connector (socket housing). Do not exert unnecessary force when inserting the connector.

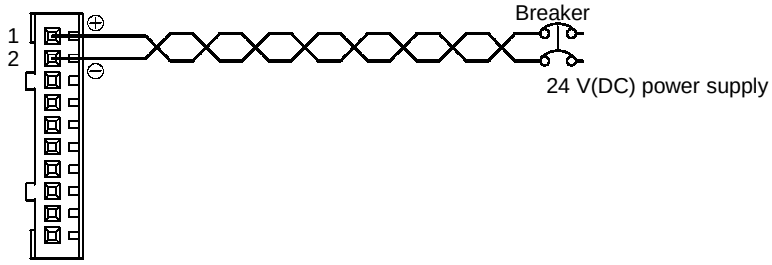
Power supply connection

Caution

- The entire system may stop depending on how the power is switched ON/OFF. Follow the correct procedure when turning the power ON/OFF.
- Do not perform a dielectric voltage test.
- If complying with EC directives (low voltage directives), use a power supply with reinforced insulation.

• Power supply

Connect the power supply so that 24 V(DC) is connected to pin No.1 of the control/power supply connector and 0 V is connected to the No.2 pin.



The following table shows the applicable power supply specifications. Use a power supply that satisfies the following specifications:

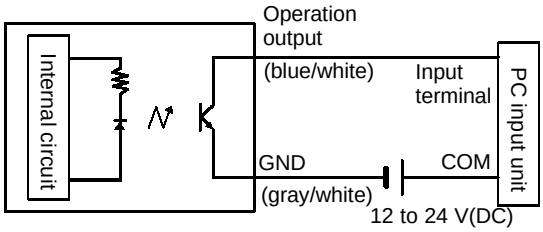
Item	Value
Power supply voltage	24 V(DC)
Allowable power supply voltage fluctuation range	20.4 V(DC) to 26.4 V(DC) (24 V(DC) −15% to +10%)
Power supply voltage capacity	15 W

Caution

- Use AWG28 to 22 twisted pair cable for connecting the power supply.
- Carefully check the wiring before switching ON the power.
- Do not connect AC power to the power supply terminals.
- Use DC power supplies with low voltage fluctuation.

Use of operation output

Pin No.3 (OPR) of the control/power supply connector is an operation switch output (Exclusive OR of two operation switches). Operation output can be used by connecting the required equipment to this pin via the circuit board.
With operation output, the state of the two operation switches is exclusive-ORed and output only when one is ON and the other is OFF. So it can be used for preventing erroneous operation.
The host can also be notified of the state of these operation switches.
The action (momentary/alternate) when the switch is pressed is set in "Function Key Settings" on the NTH Screen Data Converter. (See page 265.)
Note, however, that operation output and host notification function only when the NTH25/NTH25C is running. These do not function when the NTH25/NTH25C is not running, for example, while the CHECK menu is displayed or when the programming console function is being used.

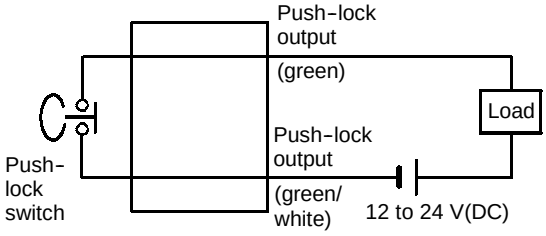


Insulation method: Photocoupler
External supply power: 12 to 24 V(DC)
Max. load current: 50 mA

Caution Operation output is not hard-wired; it is processed in the software. Do not use operation output in situations where its use may affect human life or cause major damage, or as emergency output. Implement a failsafe design on the system.

Use of emergency stop output

Pins No.8 (EMR1) and No.9 (EMR2) of the control/power supply connector are emergency stop switch outputs. Emergency stop output can be used by connecting the required equipment to these pins via the circuit board.
Once the emergency switch is pressed, it stays pressed (its output stays ON). So, the output can be used for an emergency stop. To cancel the switch (turn output OFF), turn the emergency stop (push-lock) switch on the NTH25/NTH25C to the right (clockwise).



Type: Normally closed condition
External supply power: 5 to 24 V(DC)
Max. load current: 1 mA to 1 A

Reference Do not connect a load that exceeds 24 V(DC) 1A.

2-3-2 Connecting the 9-pin D-SUB Connector

Connect the tool connector cable or PC connector cable to the 9-pin D-SUB connector (female) of the wiring cable that is directly connected to the NTH25/NTH25C.
Connect the tool connector cable to the personal computer (on which NTH Screen Data Converter is running), and connect the PC connector cable to the host (PC). For details on personal computer (on which NTH Screen Data Converter is running) connections, see 2-4 "Connecting to the NTH Screen Data Converter". For details on connecting to the host, see 2-5 "Connecting to the Host".

Pin arrangement of 9-pin D-SUB connector

The pin arrangement of the 9-pin D-SUB connector (female) is as follows:

Connector pin No.	Abbreviation	Signal Name	Signal Direction (PT↔ host/computer)
2	SD	Send data	→
3	RD	Receive data	←
4	RS	Request send	→
5	CS	Clear to send	←
9	SG	Grounding for signal	-
Connector hood	FG	Functional grounding	-

2-3-3 Grounding

The functional grounding of the NTH25/NTH25C is connected to the connector hood of the 9-pin D-SUB connector of the wiring cable.
Carry out wiring under the following conditions.

(1) When the distance between the NTH25/NTH25C and the host is short and it is assumed that there is no potential difference between grounds, ground as shown in Fig. (a) below.

(2) When there is a potential difference between the grounds of the NTH25/NTH25C and the host, ground as shown in Fig. (b). If there is some distance between the NTH25/NTH25C and host and grounding at a single point is difficult, do not ground the functional ground.

(3) If the NTH25/NTH25C is installed near equipment that generates electrical noise, such as a motor or inverter, do not ground the functional ground.

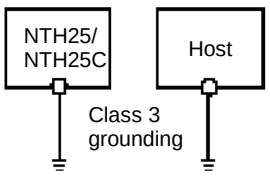


Fig. (a)

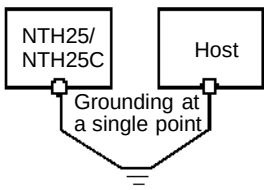


Fig. (b)

Caution Carry out grounding correctly in order to prevent erroneous operation due to electrical noise.

2-4 Connecting to the NTH Screen Data Converter

The NTH Screen Data Converter is for making settings unique to the NTH25/NTH25C, and converting screen data created on the Support Tool for sending to the NTH25/NTH25C.
To send screen data to the NTH25/NTH25C, connect the NTH25/NTH25C to the personal computer on which NTH Screen Data Converter is running via the tool connector cable.

Do not connect the 9-pin connector of the NTH25/NTH25C directly to the RS-232C port on the personal computer.

Reference

- Screen data cannot be sent directly from the Support Tool to the NTH25/NTH25C.
- The screen data for the NTH25/NTH25C must be created as the screen data for the NT31/NT31C on the Support Tool (Save it as a mmi format screen data file). The NTH Screen Data Converter reads the saved mmi format screen data, appends the screen data with settings specific to the NTH25/NTH25C, converts this data to screen data exclusively for use on the NTH25/NTH25C and sends the converted data to the NTH25/NTH25C.
- The NTH Screen Data Converter does not have a function for receiving (uploading) data stored on the NTH25/NTH25C. To back up screen data, be sure to save screen data created using the NT-series Support Tool.

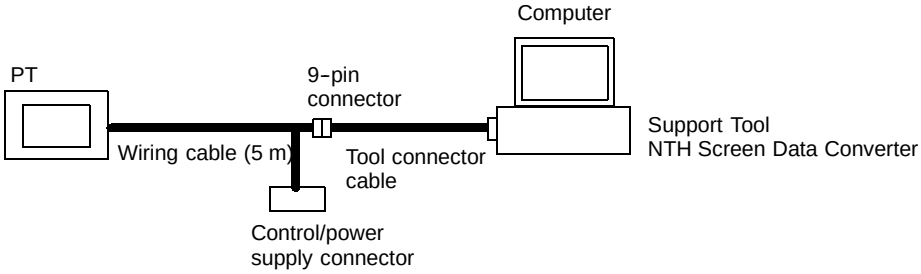
2-4-1 Connection Method

Connect the RS-232C connector on the NTH25/NTH25C's wiring cable to the connector on the tool connector cable connected to the personal computer.
The following tool connector cables can be used:

Model CV500-CN228 (cable length 2 m, made by OMRON)
(D-SUB 9-pin male ↔ D-SUB 25-pin male for NEC PC-9800 series excluding PC98-NX)

Model XW2Z-S001 (conversion cable, made by OMRON)
(D-SUB 25-pin female ↔ half-pitch 14-pin male for NEC notebook type PC-9800 series excluding PC98-NX)
A separate connector cable CV500-CN228 is needed for using this cable.

Model XW2Z-S002 (cable length 2 m, made by OMRON)
(D-SUB 9-pin male ↔ D-SUB 9-pin female, for PC/AT compatible personal computers



- Communications conditions

  The communications conditions are automatically set when the NTH Screen Data Converter is started up. (You need to specify only the communications port.)

2-5 Connecting to the Host

The following describes the method for connecting between the NTH25/NTH25C and the host.
Connect the PC connector cable to the RS−232C connector (D−SUB 9−pin connector) on the NTH25/NTH25C's wiring cable. Then connect the PC connector cable to the RS−232C port on the host.
The following PC connector cables can be used:

Model XW2Z−200T (9−pin and host side 9−pin connection, 2 m)
Model XW2Z−500T (9−pin and host side 9−pin connection, 5 m)
Model XW2Z−200S (9−pin and host side 25−pin connection, 2 m)
Model XW2Z−500S (9−pin and host side 25−pin connection, 5 m)

Fasten the above cable connectors and NTH25/NTH25C RS−232C connectors with screws using the mounting fixture (XM2Z−0001, sold separately).
The tensile load of the wiring cable is 30N. Do not apply a load exceeding this limit.

2-5-1 Host Types and Settings

The following describes the types of host that can be connected to a PT and the settings to be made at the host.

When using the host link

- Compatible host units

  Some models and series of OMRON PCs have the host link function built in. In addition, some C200HX/HG/HE (−Z) have an integral CPU that can be connected by the host link by installing a communications board.
  Check the model and series of the PC against the type of installed host link unit before making the connections.
  The following table shows the host units that can be connected to the NTH25/NTH25C by the host link.

PLC Series	Units with Built-in Host Link Function		CPUs Connectable with Host Link Units or Expansion Communications Board	Connectable to
	Host Link Unit/ Communications Board	CPU unit		
CS1 series	CS1G-CPU42/43/44/45-E CS1H-CPU63/64/65/66/67-E	CS1G-CPU42/43/44/45-E CS1H-CPU63/64/65/66/67-E	CS1W-SCB41-E	CS1G CS1H
C series	3G2A6-LK201-EV1		C200H-CPU01/03/11/21/23/31-E C1000H-CPU01-EV1 C2000H-CPU01-EV1	C2000H C1000H C2000H
	C200H-LK201-V1		C200H-CPU01/03/11/21/23/31-E C200HS-CPU01/03/21/23/31/33-E C200HS-CPU01/21/-EC C200HE-CPU11/32/42-E C200HE-CPU11/32/42-ZE C200HG-CPU33/43/53/63-E C200HG-CPU33/43/53/63-ZE C200HX-CPU34/44/54/64-E C200HX-CPU34/44/54/64/65/85-ZE	C200H C200HS C200HE C200HE-ZE C200HG C200HG-ZE C200HX C200HX-ZE
		C200HS-CPU21/23/31/33-E CPU21-EC		C200HS
	C20HW-COM02/04-EV1 C200HW-COM05/06-EV1	C200HE-CPU42-E C200HE-CPU42-ZE	C200HE-CPU32/42-E C200HE-CPU32/42-ZE	C200HE C200HE-ZE
		C200HG-CPU43/63-E C200HG-CPU43/63-ZE	C200HG-CPU33/43/53/63-E C200HG-CPU33/43/53/63-ZE	C200HG C200HG-ZE
		C200HX-CPU44/46-E C200HX-CPU44/64/65/85-ZE	C200HX-CPU34/44/54/64-E C200HX-CPU34/44/54/64/65/85-ZE	C200HX C200HX-ZE
	3G2A5-LK201-EV1 C500-LK203		C1000H-CPU01-EV1 C2000H-CPU01-EV1	C1000H C2000H
		CPM1-10/20/30CDR- +CPM1-CIF01		CPM1
		CPM1A-10/20/30/40CD - +CPM1-CIF01		
		CQM1-CPU21-E CQM1-CPU41/42/43/44/45-EV1		CQM1
CV series(*1)	CV500-LK201	CV500-CPU01-EV1	CV500-CPU01-EV1	CV500
		CV1000-CPU01-EV1	CV1000-CPU01-EV1	CV1000
		CV2000-CPU01-EV1	CV2000-CPU01-EV1	CV2000
CVM1 series (*1)	CV500-LK201	CVM1-CPU01-EV2 CVM1-CPU11-EV2 CVM1-CPU21-EV2	CVM1-CPU01-EV2 CVM1-CPU11-EV2 CVM1-CPU21-EV2	CVM1
CompoBus/S master control unit		SRM1-C02-V1		SRM1

*1 CPUs of CVM1/CV-series PCs without the suffix "-EV " caannot be connected.

- Settings at the host

  When using the host link, the settings shown below must be made at the host. (Some of these settings may not be necessary, or settings not shown here may be necessary depending on the unit.)

Item	Switch Setting
I/O port	RS-232C
Communications speed	1200, 2400, 4800, 9600, 19200 bps (*1)
Data length	ASCII, 7 data bits (*1)
Stop bit	2 stop bits (*1)
Parity	Even (*1)
1:1/1:N	1:N (*2)
Instruction level	Level 1, 2, 3
Unit #	00

*1 Set the same communications conditions on the host and the NTH25/NTH25C. Note, however, that some communications conditions cannot be set on some units. On the NTH25/NTH25C, set the host link communications conditions using the “Configuration” Menu at the NTH Screen Data Converter. With the host link protocol, the data length, stop bit and parity are fixed. So, set these communications conditions to the values in the table above on the NTH Screen Data Converter so that they match the conditions set on the host. For details on how to set communications conditions, see ”[Communication] page” (page 262).

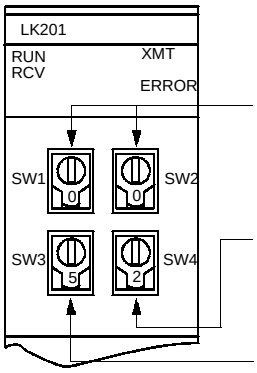
*2 The 1:N setting enables BCC (Block Check Character). It is not actually possible to connect two or more NTH25/NTH25Cs in a single host link.

The following describes how to make the setting for each type of unit.

- Connecting to a C series host link unit

  C200H/C200HS/C200HE/HG/HX (–ZE) backplate mounted type:
  C200H–LK201–V1

[Setting the front switches]
These switches are rotary switches. Set each switch with a flat blade screwdriver so that the values or symbols in the setting value window agree with the following:

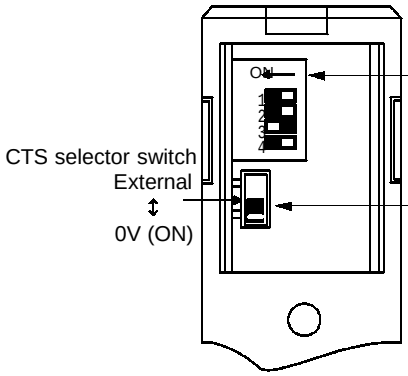


· Unit # (SW1, SW2)
Set these switches to “0”.

· Instruction level, parity, and transfer code (SW4)
Set this switch to “2”.

· Communications speed (SW3)
Set this switch to “4” to select 4800 bps.
Set this switch to “5” to select 9600 bps.
Set this switch to “6” to select 19200 bps.

[Setting the rear switches]

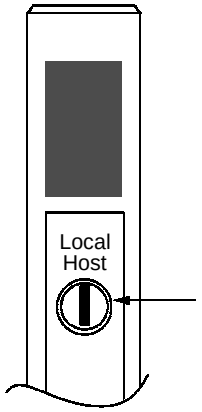


· 1-to-1/1-to-N selection (DIP switch)
Set #3 to “ON”.

· CTS selection (selector switch)
Set this always to “0V” (ON).

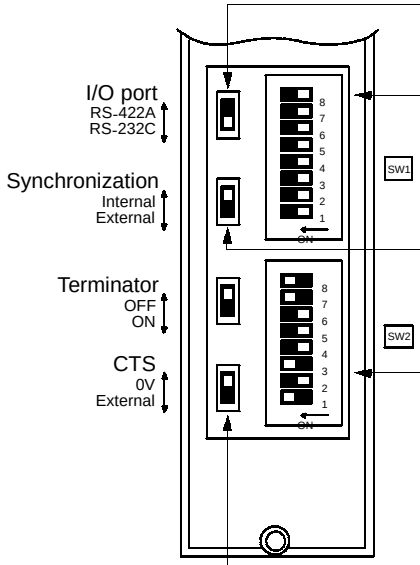
CH1000H/C2000H backplate mounted type: C500−LK201−V1

[Setting the front switches]



· Mode control (key switch)
Set this to “host link”.

[Setting the rear switches]



· I/O port selection (selector switch)
Set this to “RS-232C”.

· Unit # (DIP SW1)
Set SW1-1 to SW1-5 to “OFF” (“0”).

· Synchronization (selector switch)
Set this to “Internal”.

· Communications speed
(DIP SW2-1 to SW2-4)
Set these switches to “0010” to select 19200 bps.
Set these switches to “1010” to select 9600 bps.
Set these switches to “0110” to select 4800 bps.
(0: OFF 1: ON)

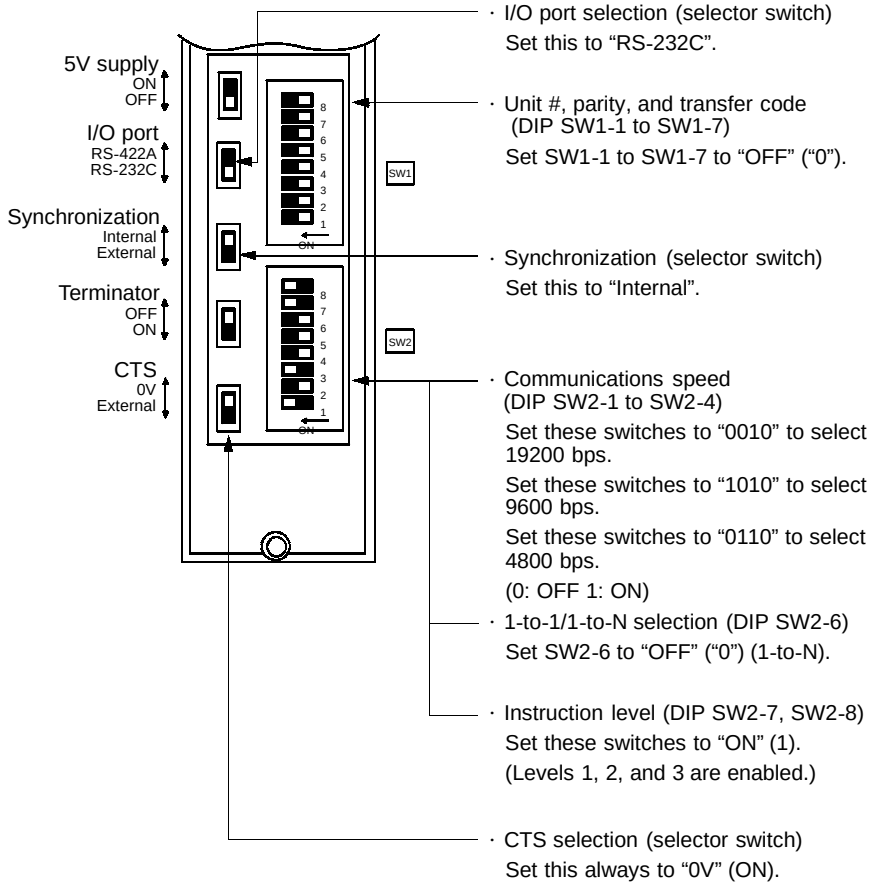
· 1-to-1/1-to-N selection (DIP SW2-6)
Set SW2-6 to “OFF” (“0”) (1-to-N).

· Instruction level (DIP SW2-7, SW2-8)
Set these switches to “ON” (1).
(Levels 1, 2, and 3 are enabled.)

· CTS selection (selector switch)
Set this always to “0V” (ON).

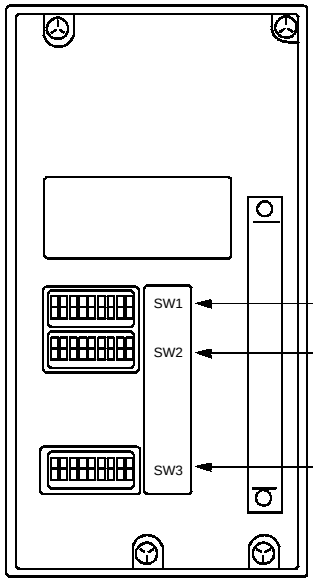
C1000H/C2000H backplate mounted type: C500–LK203

[Setting the rear switches]



C200H/C1000H/C2000H CPU mounting type: 3G2A6−LK201−EV1

[Setting the rear switches]



· Unit #, parity, and transfer code (DIP SW1-1 to SW1-5)
Set SW1-1 to SW1-5 to “OFF” (0).
* Parity is fixed at Even Parity. Transfer code is fixed at ASCII 7 data bits and 2 stop bits.

· Communications speed (DIP SW2-1 to SW2-4)
Set these switches to “0010” to select 19200 bps.
Set these switches to “1010” to select 9600 bps.
Set these switches to “0110” to select 4800 bps.
(0: OFF 1: ON)

· 1-to-1/1-to-N selection (DIP SW2-6)
Set SW2-6 to “OFF” (“0”) (1-to-N).

· Instruction level (DIP SW2-7, SW2-8)
Set these switches to “ON” (1).
(Levels 1, 2, and 3 are enabled.)

· CTS selection (DIP SW3-1 and SW3-2)
Set SW3-1 to “ON” (1), and SW3-2 to “OFF” (0).
(Set this always to “0V”.)

· Synchronization (DIP SW3-3 to SW3-6)
Set SW3-3, SW3-5, and SW3-6 to “ON” (1), and SW3-4 to “OFF” (0). (Set these to “Internal”.)

• Connecting to a CVM1/CV series host link unit

CVM1/CV series backplate mounted type: CV500-LK201

A CVM1/CV series host link unit (CV500-LK201) has two connectors (communications ports 1 and 2). Either of these ports can be used for connection to an NTH25/NTH25C by the RS-232C interface. Note, however, that a cable matching the connector must be prepared as the shape of the connector at these ports is different.

- Communications port 1
This port is a 25-pin connector for RS-232C use only.

- Communications port 2
This port is a 9-pin connector. Use of the RS-232C or RS-422A interface can be selected on this port. When use of the RS-232C interface is selected on this port, the I/O port selector switch on the front of the unit must be set to "RS-232C" (the upper position).

[CPU bus unit settings]
When connecting to a CVM1/CV series host link unit, set the following communications conditions for the CPU bus unit settings:

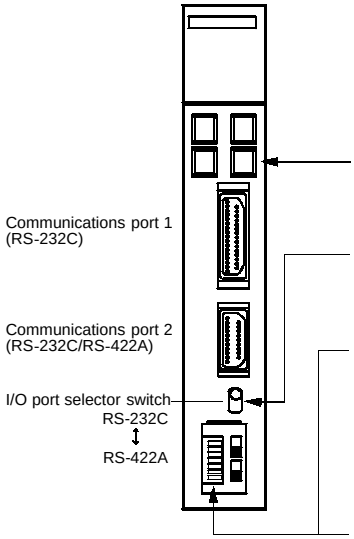
Item	Setting at Host
Communications speed	1200, 2400, 4800, 9600, 19200 bps (*1)
Data length	ASCII, 7 data bits (*1)
Stop bit	2 stop bits (*1)
Parity	Even (*1)
1:1, 1:N	1:N (*2)
Instruction level	Level 1, 2, 3

*1 Set the same communications conditions on the host and the NTH25/NTH25C. Note, however, that some communications conditions cannot be set on some units.
On the NTH25/NTH25C, set the host link communications conditions using the NTH Screen Data Converter. With the host link protocol, the data length, stop bit and parity are fixed. So, set these communications conditions to the values in the table above on the NTH Screen Data Converter so that they match the conditions set on the host. For details on how to set communications conditions, see "[Communication] page" (page 262).

*2 The 1:N setting enables BCC (Block Check Character). It is not actually possible to connect two or more NTH25/NTH25Cs in a single host link.

Set the CPU bus unit settings directly from a peripheral tool (e.g. SYSMAC support software).
For details on the CPU bus unit settings, refer to the SYSMAC CVM1/CV series Host Link Unit User's Manual (SBC-474).

[Setting the front switches]



· Unit # (SW3, SW4)

When using communication port 2, set these switches to “0”.

· I/O port selection (selector switch)

Set this to “RS-232C”.

· CTS selection (DIP SW2 and SW3)

Set SW2 or SW3 to “ON”. (Set this always to “0V”.)

To use communication port 1, set SW2. To use communication port 2, set SW3.

· Communication condition setting (DIP SW1)

Set this switch to “OFF”.

Communication is executed in accordance with the CPU bus unit system settings made at the PC. The initial values for the system settings are as follows.

- Communications speed: 9600 bps
- Parity: Even
- Xon/Xoff control: Not executed
- Communication method: Full duplex
- Stop bits: 2 stop bits
- Data length: 7 bits

• Connecting to a CPU

C-series CVM1/CV-series (-EV) CPU unit
CV500-CPU01-EV1/CV1000-CPU01-EV1/CV2000-CPU01-EV1
CVM1-CPU01-EV2/CVM1-CPU11-EV2/CVM1-CPU21-EV2

- PC system settings

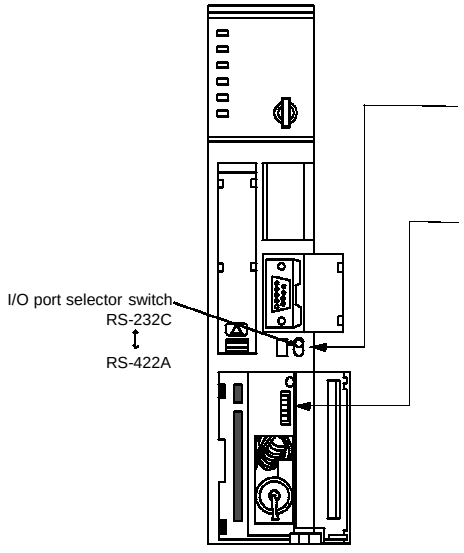
When connecting to a CVM1/CV series CPU, set the following communications conditions for the "PC system settings".

Item	Setting at Host
Communications speed	1200, 2400, 4800, 9600, 19200 bps (*1)
Data length	ASCII 7 bits (*1)
Stop bit	2 stop bits (*1)
Parity	Even (*1)
Unit #	00

*1 Set the same communications conditions on the host and the NTH25/NTH25C. Note, however, that some communications conditions cannot be set on some units. On the NTH25/NTH25C, set the host link communications conditions using the NTH Screen Data Converter. With the host link protocol, the data length, stop bit and parity are fixed. So, set these communications conditions to the values in the table above on the NTH Screen Data Converter so that they match the conditions set on the host. For details on how to set communications conditions, see "[Communication] page" (page 262).

Either set PC system settings directly from a peripheral tool (e.g. SYSMAC support software), or transmit the PC system settings made using a peripheral tool to the CPU.
For details on the PC system settings, refer to the SYSMAC CVM1/CV500/1000/2000 User's Manual (Ladder) (SBCC-472).

[Setting the front switches]



· I/O port selection (selector switch)
Set this to "RS-232C".

· System setting (DIP SW4)
To effect the existing DIP switch settings, set SW4 to "ON".
To effect the existing PC system settings, set SW4 to "OFF".

Caution
For CPUs manufactured before or during June 1995 (lot No. j j 65), the existing DIP switch settings differ from the existing PC system settings as follows.
- DIP switch settings:
  2,400 bps, 1 stop bit, even parity, 7 bit data length
- PC system settings:
  9600 bps, 2 stop bits, even parity, 7 bit data length

For CPUs manufactured from July 1995 onward (lot No. j j 75), the stipulated values in the DIP switch settings also are 9600 bps and 2 stop bits.

C-series C200HS, C200HX/HG/HE (-ZE), CPM1, CQM1 CPUs, SRM1

Connect to the RS-232C port with the built-in CPU unit, or the RS-232C port (port A or B) of the communications board. Note that the connection to a CPM1 must be made via an RS-232C adapter (CPM1-CIF01).

Reference Connection to the peripheral port of the CPU unit is not possible.

- PC system setting area settings

When connecting to a C200HS, C200HX/HG/HE (-ZE), CPM1, or CQM1 CPU, or SRM1, set the communications conditions for the PC system setting area as follows:

Item	Setting at Host
Communications mode	Host link mode
Communications speed	1200, 2400, 4800, 9600, 19200 bps (*1)
Data length	ASCII 7 bits (*1)
Stop bit	2 stop bits (*1)
Parity	Even (*1)
Unit #	00

*1 Set the same communications conditions on the host and the NTH25/NTH25C. Note, however, that some communications conditions cannot be set on some units. On the NTH25/NTH25C, set the host link communications conditions using the NTH Screen Data Converter. With the host link protocol, the data length, stop bit and parity are fixed. So, set these communications conditions to the values in the table above on the NTH Screen Data Converter so that they match the conditions set on the host. For details on how to set communications conditions, see "[Communication] page" (page 262).

Set the PC system setting area settings directly from a peripheral tool (e.g. SYSMAC support software).

For details on operations on the PC system setting area, refer to the manual for the PC in use.

The following shows the PC system setting area word numbers and settings to be made depending on the unit and port to which the connection is made.

When using the built-in RS-232C port of C200HS, C200HX/HG/HE (-ZE), CQM1, SRM1

Word Number	Writing Value	Settings
DM6645	0001	Host link mode, CTS control OFF Communications conditions are set by the contents of DM.
DM6646	0302	Data length 7 bits, 2 stop bits, even parity, communications speed 4800 bps
	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6648	0000	Unit # 00

When using port A of the communications board of C200HX/HG/HE (–ZE)

Word Number	Writing Value	Settings
DM6555	0001	Host link mode, CTS control OFF Communications conditions are set by the contents of DM.
DM6556	0302	Data length 7 bits, 2 stop bits, even parity, communications speed 4800 bps
	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6558	0000	Unit # 00

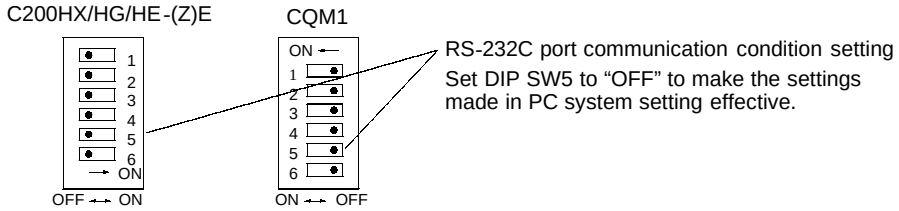
When using port B of the communications board of C200HX/HG/HE (–ZE)

Word Number	Writing Value	Settings
DM6550	0001	Host link mode, CTS control OFF Communications conditions are set by the contents of DM.
DM6551	0302	Data length 7 bits, 2 stop bits, even parity, communications speed 4800 bps
	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6553	0000	Unit # 00

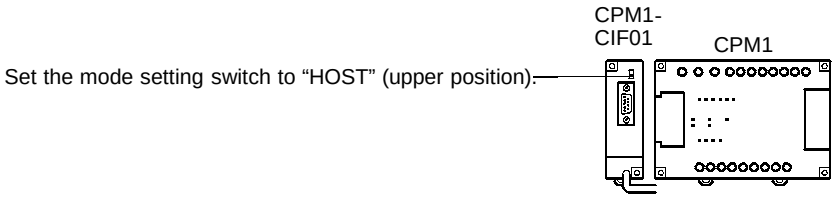
When using a CPM1

Word Number	Writing Value	Settings
DM6650	0001	Host link mode Communications conditions are set by the contents of DM.
DM6651	0302	Data length 7 bits, 2 stop bits, even parity, communications speed 4800 bps
	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6653	0000	Unit # 00

[Setting the DIP switches on the front of a C200HX/HG/HE (−ZE) and CQM1]
When using a C200HX/HG/HE (−ZE) or CQM1, the DIP switches on the front panel must be set as follows in order to enable the settings in the PC system setting area (data memory).



[Setting the switches on a CPM1 RS−232C adapter]



When using the NT link (1:1)

- Compatible host units

Some models and series of OMRON PCs have the NT link (1:1) function built in. There are also some C200HX/HG/HE(−ZE) CPUs that can be connected by the NT link (1:1) by installing a communications board.
Check the model and series of the PC against the type of the installed CPU unit before making the connections.
The following table shows the host units that can be connected to the NTH25/NTH25C by the NT link (1:1) using the RS−232C ports of both units.

PC Series	CPUs with Built-in NT Link Function	CPUs Connectable with Expansion Communication Board(*1)	Connectable to
C series	C200HS-CPU21-E, -EC C200HS-CPU23-E C200HS-CPU31-E C200HS-CPU33-E		C200HS
	C200HE-CPU42-(Z)E	C200HE-CPU32-(Z)E C200HE-CPU42-(Z)E	C200HE (-ZE)
	C200HG-CPU43-(Z)E C200HG-CPU63-(Z)E	C200HG-CPU33-(Z)E C200HG-CPU43-(Z)E C200HG-CPU53-(Z)E C200HG-CPU63-(Z)E	C200HG (-ZE)
	C200HX-CPU44-(Z)E C200HX-CPU64-(Z)E X200HX-CPU65-ZE C200HX-CPU85-ZE	C200HX-CPU34-(Z)E C200HX-CPU44-(Z)E C200HX-CPU54-(Z)E C200HX-CPU64-(Z)E C200HX-CPU65-ZE C200HX-CPU85-ZE	C200HX (-ZE)
	CPM1-10CDR- j (*2) CPM1-20CDR- j (*2) CPM1-30CDR- j (*2) CPM1A-10CD j - j (*2) CPM1A-20CD j - j (*2) CPM1A-30CD j - j (*2) CPM1A-40CD j - j (*2)		CPM1
	CQM1-CPU41-EV1 CQM1-CPU42-EV1 CQM1-CPU43-EV1 CQM1-CPU44-EV1 CQM1-CPU45-EV1		CQM1
CV series (*3)	CV500-CPU01-EV1		CV500
	CV1000-CPU01-EV1		CV1000
	CV2000-CPU01-EV1		CV2000
CVM1 series (*3)	CVM1-CPU01-EV2 CVM1-CPU11-EV2 CVM1-CPU21-EV2		CVM1
CompoBus/S master control unit	SRM1-C02-V1		SRM1

*1 One of the following communications boards is required: C200HW−COM02/COM04/COM05/COM06−EV1.

*2 A CPM1−CIF01 RS−232C adapter is required.

*3 CPU units of CVM1/CV series PCs without the suffix "−EV " cannot be connected.

- Settings at the host

  The following describes the setting methods for each unit.

- Connecting to a C-series C200HS, C200HX/HG/HE(-ZE), CPM1, CQM1, SRM1

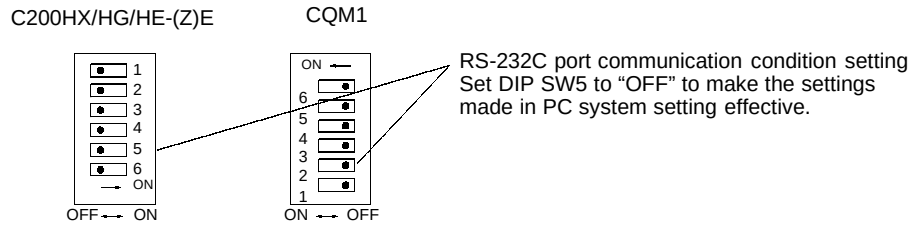
[PC system setting area settings]
Write the settings to the "PC system setting area" (data memory) directly from a peripheral tool (e.g. SYSMAC support software) according to the host model and port.

Host Model	Word Number	Writing Value	Setting
Built-in RS-232C port of C200HS, C200HX/HG/HE(-ZE), CQM1, SRM1	DM6645	4000	Use NT link (1:1)
Port A of C200HX/HG/HE(-ZE) (*1)	DM6555		
Port B of C200HX/HG/HE(-ZE) (*1)	DM6550		
CPM1	DM6650		

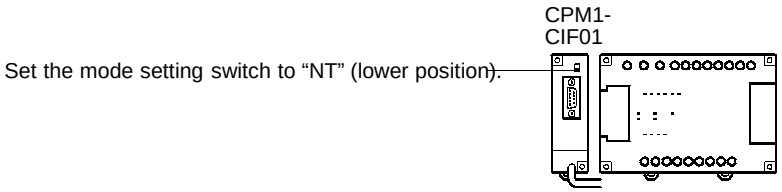
*1 RS-232C port of the communications board

For details on operations on the "PC system setting area", refer to the manual for the PC in use.

[Setting the DIP switches on the front of a C200HX/HG/HE(-ZE)and CQM1]
When using a C200HX/HG/HE(-ZE) or CQM1, the DIP switches on the front panel must be set as follows to enable the settings in the "PC system setting area" (data memory).

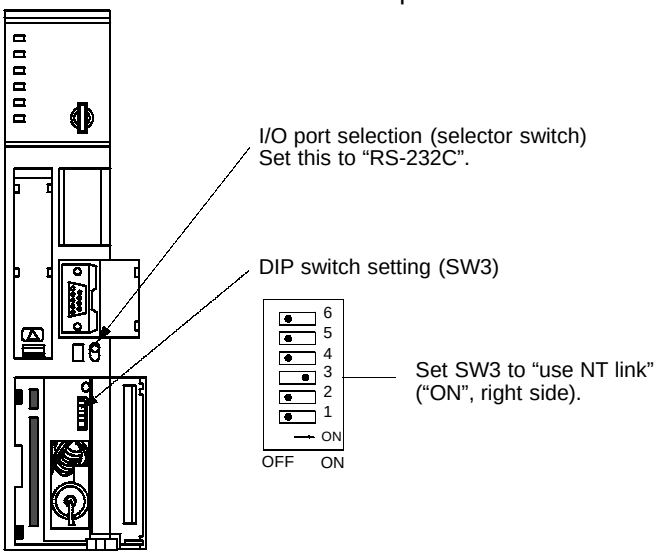


[Setting the switches on a CPM1 RS-232C adapter]



• Connecting to CVM1/CV series (–EV)

Set the DIP switches on the front panel as follows:



When using the CVM1/CV series, ”CPU execution processing (execution control 2)” in the PC system settings must be set to ”Simultaneous processing”.

When using the memory link

In the memory link, the connection can be made to a personal computer or FA computer supporting the RS–232 interface.

When connecting to the host by the memory link, it is necessary to create a program for the memory link on the host.

The following are the communications conditions that can be used in the memory link.
The settings of the host (e.g. personal computer or FA computer) must be compatible with one of the communications conditions in the following table. Set the same communications conditions on the NTH25/NTH25C using the memory switches. (See page 262).

Item	Setting at Host
I/O port	RS–232C
Communications speed	1200, 2400, 4800, 9600, 19200 bps. (*1)
Stop bit	1 bit, 2 bits (*1)
Data bit	7 bits, 8 bits (*1)
Parity	None, even, odd (*1)
Flow control	None (fixed)

*1 Set the same communications conditions on the host and the NTH25/NTH25C. On the NTH25/NTH25C, set the memory link communications conditions using the NTH Screen Data Converter. Set these communications conditions so that they match the conditions set on the host. For details on how to set communications conditions, see ”[Communication] page” (page 262).

2-5-2 Connections

This item describes how to connect when the RS−232C port on the host is connected to the RS−232C connector on the NTH25/NTH25C via the PC connector cable.

Caution When connecting the wiring cable to the PC connector cable, be sure to fasten both connectors with screws using the mounting fixture (XM2Z−001, sold separately).
The tensile load of the wiring cable is 30N. Do not apply a load exceeding this limit.

Wiring on the host link and NT link (1:1)

Applicable units :

CV500−LK201 (communications port 2)

CPM1−10CDR−	CPM1−20CDR−
CPM1−30CDR−	
CPM1A−10CD −	CPM1A−20CD −
CPM1A−30CD −	CPM1A−40CD −
CQM1−CPU21−E	
CQM1−CPU41−EV1	CQM1−CPU42−EV1
CQM1−CPU43−EV1	CQM1−CPU44−EV1
C200HS−CPU21−E, −EC	C200HS−CPU23−E
C200HS−CPU31−E	C200HS−CPU33−E
C200HE−CPU32−(Z)E	C200HE−CPU42−(Z)E
C200HG−CPU33−(Z)E	C200HG−CPU43−(Z)E
C200HG−CPU53−(Z)E	C200HG−CPU63−(Z)E
C200HX−CPU34−(Z)E	C200HX−CPU44−(Z)E
C200HX−CPU54−(Z)E	C200HX−CPU64−(Z)E
C200HX−CPU65−ZE	C200HX−CPU85−ZE
CV500−CPU01−EV1	CV1000−CPU01−EV1
CV2000−CPU01−EV1	
CVM1−CPU01−EV2	CVM1−CPU11−EV2
CVM1−CPU21−EV2	
SRM1−C02−V1	

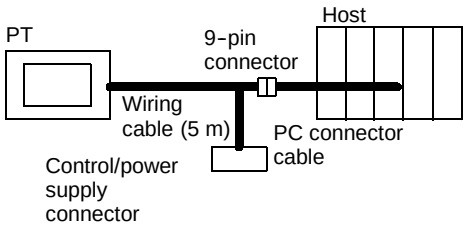
CPU units of CVM1/CV−series PCs without the suffix "−EV " cannot be connected by any connection method.

* When 0V is set for units having a CTS setting selector, you need not short−circuit RS and CS.

Connect the PC connector cable to the RS-232C connector (D-SUB 9-pin connector) on the NTH25/NTH25C's wiring cable. Then connect the PC connector cable to the RS-232C port on the host.
The following PC connector cables can be used:

Model XW2Z-200T (9-pin and host side 9-pin connection, 2 m)
Model XW2Z-500T (9-pin and host side 9-pin connection, 5 m)
Model XW2Z-200S (9-pin and host side 25-pin connection, 2 m)
Model XW2Z-500S (9-pin and host side 25-pin connection, 5 m)

Fasten the above cable connectors and NTH25/NTH25C RS-232C connectors with screws using the mounting fixture (XM2Z-001, sold separately).



Wiring for a memory link connection

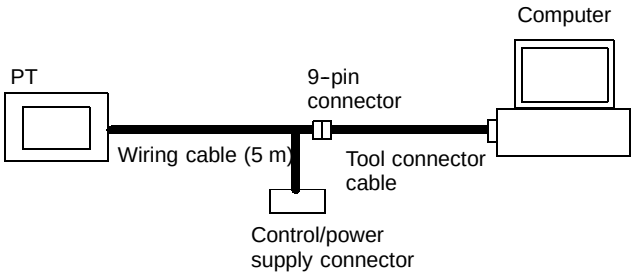
Connect the RS-232C connector on the NTH25/NTH25C's wiring cable to the connector on the tool connector cable connected to the personal computer.
Prepare the following tool connector cables:

Model CV500-CN228 (cable length 2 m, made by OMRON)
(D-SUB 9-pin male ↔ D-SUB 25-pin male for NEC PC-9800 series excluding PC98-NX)

Model XW2Z-S001 (conversion cable, made by OMRON)
(D-SUB 25-pin female ↔ half-pitch 14-pin male for NEC notebook type PC-9800 series excluding PC98-NX)
A separate connector cable CV500-CN228 is needed for using this cable.

Model XW2Z-S002 (cable length 2 m, made by OMRON)
(D-SUB 9-pin male ↔ D-SUB 9-pin female, for PC/AT compatible personal computers

Fasten the above cable connectors and NTH25/NTH25C RS-232C connectors with screws using the mounting fixture (XM2Z-001, sold separately).



SECTION 3
CHECK Menu Operation

This section describes the operation of the CHECK menu, focusing on the procedure to start up the NTH25/NTH25C. This section also describes functions that are convenient when using the NTH25/NTH25C and those that are useful for system maintenance.

3-1 CHECK Menu Operation Flow 60
3-2 Starting the NTH25/NTH25C 61
3-2-1 Operation at Startup 61
3-3 Operation Modes and the CHECK menu 62
3-3-1 Relationships among Modes 62
3-3-2 Operations with the CHECK menu 63
3-4 Transmitting the Screen Data 65
3-5 Starting Operation 67
3-6 Switching the Display Language 69
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3-8 Setting the Clock Data 71
3-8-1 Setting the Date and Time 72
3-9 Checking Screen Data 73
3-10 Programming Console Function 74
3-10-1 Usable Systems 74
3-10-2 Connection Method 75
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3-1 CHECK Menu Operation Flow

Follow the procedure below when using the NTH25/NTH25C for the first time.

[Create the Screen Data]

Create the data to be displayed on the NTH25/NTH25C by using the Support Tool. For details on how to create screen data, refer to the NT−series Support Tool Ver. 3.0 for Windows95/98 Operation Manual (V053−E1−).

↓

[Start Up the NTH25/NTH25C (Display the CHECK Menu)] (page 61, 67)

Turn ON the power to the NTH25/NTH25C.

The initial screen containing the "SET UP" touch switch is displayed.
To display the CHECK menu to transmit screen data, set clock data, monitor screens or perform other operations, press the "SET UP" or " " touch switch.
After about three seconds, the screen changes as follows:

- If the NTH25/NTH25C does not have screen data, "Please Transmit" or " " is displayed. This indicates that the NTH25/NTH25C is waiting to receive screen data.

↓

- If the NTH25/NTH25C has screen data, it enters the RUN mode, and the initial screen that was set using the Support Tool is displayed.

[Convert and Transmit the Screen Data] (page 65)

On NTH Screen Data Converter for the NTH25/NTH25C, read the screen data created using the Support Tool, and make the required settings.
When you have finished making the settings, connect the NTH25/NTH25C to the personal computer, and convert the data for the NTH25/NTH25C on the NTH Screen Data Converter to transmit the screen data to the NTH25/NTH25C.
For details on how to connect to the NTH Screen Data Converter, see "2−4 Connecting to the NTH Screen Data Converter". For details on how to use the NTH Screen Data Converter, see Section 6 "NTH Screen Data Converter".

↓

[Start Operation] (page 67)

Connect the NTH25/NTH25C to the host and start operation.

3-2 Starting the NTH25/NTH25C

After checking that the hardware has been connected correctly, switch ON the power to the NTH25/NTH25C to start it up.
This section describes the operation of the NTH25/NTH25C when it is started up.

3-2-1 Operation at Startup

The NTH25/NTH25C operates as follows when the power is switched ON.

[Initial Processing]

Self diagnosis – including a check on the internal memory of the NTH25/NTH25C and a system program check – and the internal processing required for startup, are performed.

↓

[Display of Initial Screen]

The initial screen is the first screen displayed when the NTH25/NTH25C starts up normally. This screen contains the "SET UP" or " " touch switch.
If you press the "SET UP" or " " touch switch, the CHECK menu is displayed.
If you do not press the "SET UP" touch switch or do not perform anything for about three seconds, the NTH25/NTH25C automatically enters the RUN mode.

↓

[Start of Communications with the Host]

Communications with the host starts when the RUN mode is entered. During the interval until communications is established, the initial screen that is set when you create screen data is displayed. For details, see "3–5 Starting Operation" (page 67).
If the NTH25/NTH25C cannot communicate properly with the host, the initial screen remains displayed for about ten seconds and then the message "No Reply from Host" is displayed. If this happens, check the connection with the host, and then turn the power to the NTH25/NTH25C OFF then back ON again to restart.

↓

[Operation Start]

Operation starts according to the contents of the screen data on the NTH25/NTH25C and the contents of the bits and words allocated on the host.

Reference

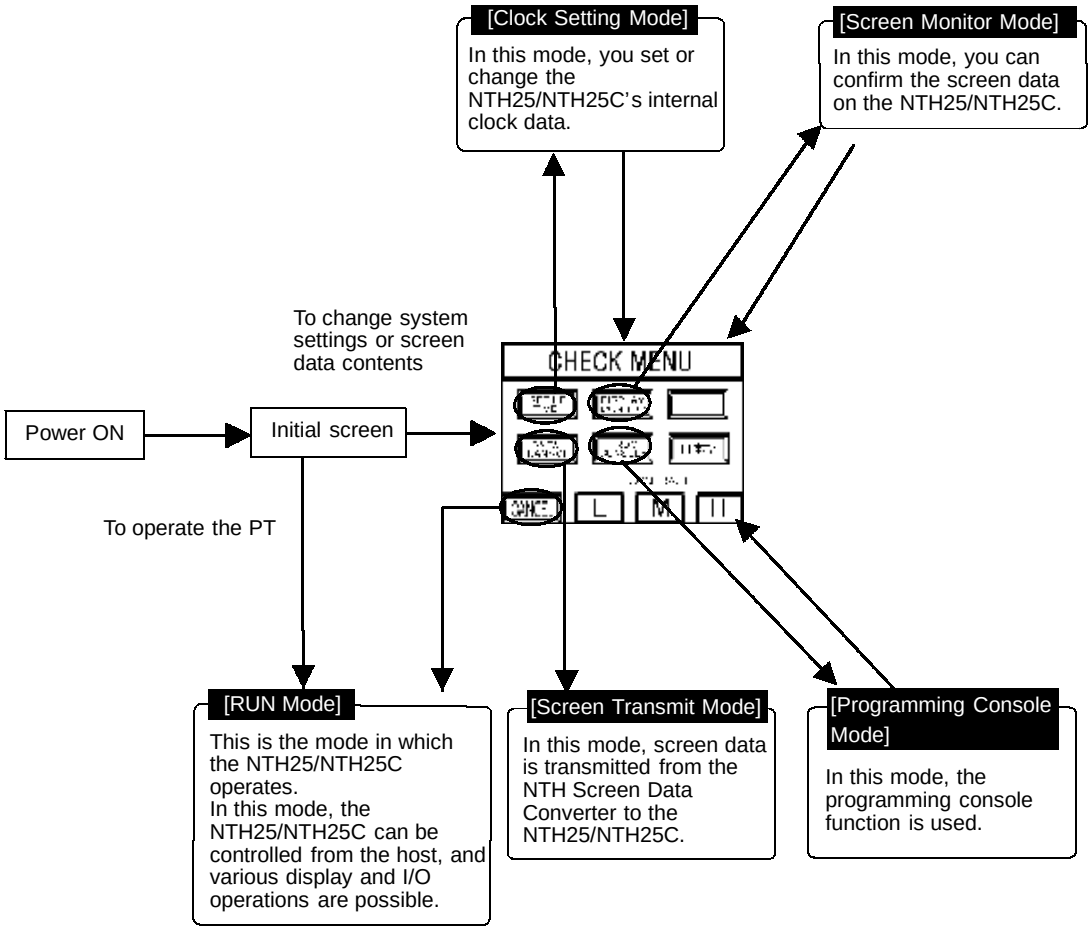
After operation has started, the CHECK menu cannot be displayed on NTH25/NTH25C. To display the CHECK menu, turn the power to the NTH25/NTH25C OFF, and then press the "Setup" touch switch on the initial screen again after the NTH25/NTH25C has restarted.

3-3 Operation Modes and the CHECK menu

The NTH25/NTH25C operates in five modes: the ”RUN”, ”Clock Setting”, ”Screen Monitor”, ”Screen Transmit” and ”Programming Console” modes. These modes except RUN mode can be selected on the CHECK menu.

3-3-1 Relationships among Modes

The figure below shows relationships among the CHECK menu and each of the operation modes.
For details on CHECK menu operation, see ”Operations with the CHECK Menu” (page 63).



Items in the CHECK Menu

The items displayed in the CHECK menu and their functions are as follows.

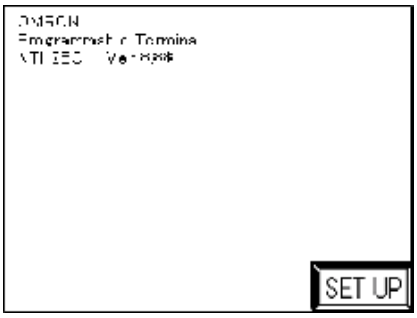
Menu Item	Function	Refer to
Cancel	Clears the CHECK menu screen and return to the RUN mode screen.	P 64, 67
Set up time	Displays the CLOCK SETTING MENU screen for setting the NTH25/NTH25C's internal clock.	P 71
Display monitor	Displays the Screen Monitor screen for confirming the screen stored on the NTH25/NTH25C.	P 73
Data Transmit	Displays the Transmit Mode screen for transmitting screen data to the NTH25/NTH25C from the NTH Screen Data Converter.	P 65
Programming Console	Displays the Programming Console Function screen for operating the NTH25/NTH25C as a programming console for the C-series CQM1, C200HX/HG/HE(-ZE) or SRM1.	P 74
Japanese ( )	Switches the display language for the CHECK menu and various modes to Japanese. (If the CHECK menu is already displayed in Japanese, then this touch switch becomes "English".)	P 69
Low, Middle, High	Adjusts the contrast of the NTH25/NTH25C screen.	P 70

3-3-2 Operations with the CHECK menu

This section describes how to use the menus, including how to call the System Menu and how to select menu items.

Calling the CHECK menu

The following screen is displayed for about three seconds after the NTH25/NTH25C is started up.



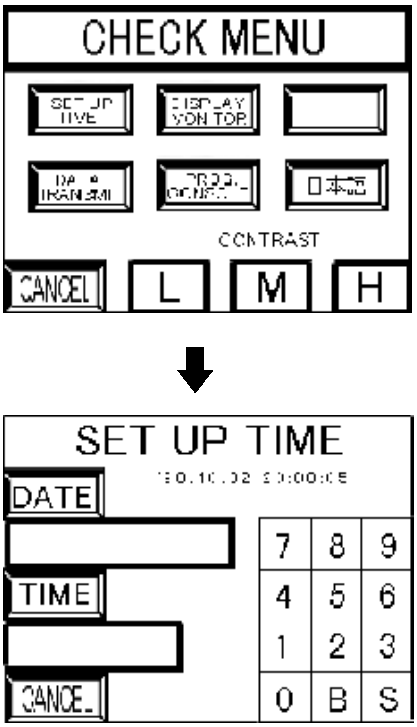
If you press the "SET UP" or " " touch switch while this screen is displayed, the CHECK menu is displayed.

Reference When the CHECK menu is displayed, the operation of the NTH25/NTH25C stops.

Selecting Menu Items

The menu items in the CHECK menu are displayed on the NTH25/NTH25C screen as touch switches. You can select menu items by simply touching the touch switches.

Example: Displaying the CLOCK SETTING MENU screen by pressing ”SET UP TIME” in the CHECK menu



Press ”SET UP TIME”.

Switching from the CHECK menu to the RUN Mode

Return to the RUN mode by selecting ”CANCEL” in the CHECK menu.

Reference

- The NTH25/NTH25C does not automatically return to the RUN mode if no operations are performed.
- Once the NTH25/NTH25C has entered the RUN mode, the CHECK menu cannot be displayed on NTH25/NTH25C. To display the CHECK menu, restart the NTH25/NTH25C.

3-4 Transmitting the Screen Data

The screen data is created with the Support Tool and then transmitted to the NTH25/NTH25C. This section explains how to transmit the screen data.
For details on how to create the screen data, and operations on the operation at NTH Screen Data Converter and the Support Tool, see Section 4 to 6 of this manual and the NT-series Support Tool Ver. 3.0 for Windows95/98 Operation Manual (V053-E1-).

Reference

- Screen data registered on the NTH25/NTH25C cannot be read from the NTH25/NTH25C.
- When screen is transmitted from the NTH Screen Data Converter, screen data that was previously registered on the NTH25/NTH25C is lost.
- If screen data is registered normally on the NTH25/NTH25C, the display language of the CHECK menu or messages is determined to the language used in the screen data.
  Note, however, that you can switch the display language by the "English" or "Japanese " touch switches in the CHECK menu. (page 69)
  Example: Transmitting Japanese language screen data at the default settings

CHECK menu→	Message during→ transmission	Message at completion of transmission
Japanese↔English (switchable)	English (not switchable)	Japanese (not switchable)

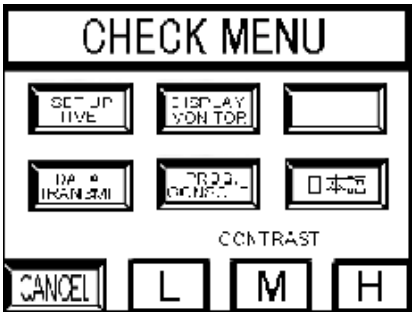
Transmitting Screen Data from the NTH Screen Data Converter

Follow the procedure below to transmit screen data from the NTH Screen Data Converter to the NTH25/NTH25C.

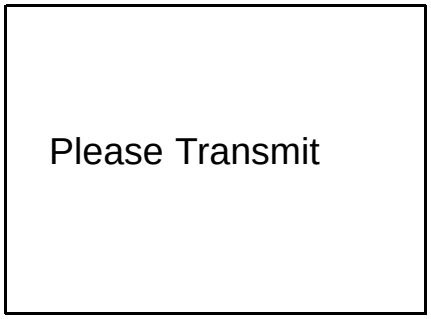
(1) Connect the NTH25/NTH25C to a personal computer in which the NTH Screen Data Converter has been installed and turn the power to the NTH25/NTH25C ON.

(2) Press the "SET UP" touch switch in the NTH25/NTH25C's initial screen to display the CHECK menu.

(3) Enter the Screen Transmit mode by following the menu operation on the CHECK Menu shown below at the NTH25/NTH25C.



Select "DATA TRANSMIT".



(4) Turn ON the power to the personal computer and start up the NTH Screen Data Converter.

(5) On the NTH Screen Data Converter, open the screen data to be transmitted, then set the communications method between the NTH25/NTH25C and the host, and make other necessary settings.

(6) Select "Transmit" on the NTH Screen Data Converter, specify the RS−232C port to be used for data transfer, and select "OK".
This starts transmission of screen data from the NTH Screen Data Converter to the NTH25/NTH25C.
During transmission, the following is displayed on the screens:
NTH Screen Data Converter: Transmission progress is displayed.
NTH25/NTH25C: "Receiving in progress ..." is displayed.

(7) When transmission of the screen data ends, the screen changes as follows:
On the NTH Screen Data Converter:
The NTH Screen Data Converter returns to the main menu.
On the NTH25/NTH25C:
"COMPLETED" is displayed. Press anywhere on the screen. This automatically restarts NTH25/NTH25C, and the initial screen is displayed.

If the screen data cannot be successfully transmitted from the Support Tool, check the state of the cable connection or the communications port used by the NTH Screen Data Converter (personal computer) for data transmission.

Precautions to Be Observed When Transmitting Screen Data

If any of the following, or a system error, occurs during transmission of screen data, the transmitted screen data will not be registered correctly in the NTH25/NTH25C. If this happens, the NTH25/NTH25C may not enter the RUN mode when started up, or there may be unpredictable malfunctions such as failure to display screens during operation. In this case, re−transmit the screen data to register it correctly.

- The power to the NTH25/NTH25C is interrupted.
- The power to the personal computer on which the NTH Screen Data Converter is running is interrupted or the computer is reset.
- The cable connecting the NTH25/NTH25C to the personal computer on which the NTH Screen Data Converter is running is disconnected or has a broken wire.

3-5 Starting Operation

After you have finished transmitting screen data, connect the NTH25/NTH25C to the host and start operation.

Caution Check the operation of all screen data and host programs carefully before using them. If their operation is incorrect, the system may operate unpredictably.

Switching to the RUN Mode and Starting Operation

Press the "Cancel" touch switch on the CHECK menu screen. The NTH25/NTH25C switches to the RUN mode and starts operation.
The operation at the start is as follows.

[Display of the Initial Screen]

First of all, the initial screen that was set to the screen data by the Support Tool is displayed.
Nothing will be displayed if the screen contents are incorrect, or data has not been registered to the currently set screen number.
At this stage, communications with the host is not yet established. So, if display elements that require communications with the host for referencing words allocated on the host are in the initial screen, numerical values are expressed as "0" (zero) and character string are expressed as blank spaces.

↓

[Checking Communications with the Host]

The NTH25/NTH25C waits for communications with the host to be established. If communications is not established within about ten seconds, the NTH25/NTH25C displays the message "No Reply from Host".

↓

[Display of the Specified Screen]

The specified screen is displayed when the contents (screen number of the screen to be displayed) of the first word of the PT status control area are read.
The screen will not be switched if the contents of the first word of the PT status control area are incorrect as a screen number. Also, nothing will be displayed if no data is registered to the currently set screen number.

Confirming Communications between the NTH25/NTH25C and the Host

Execute the host program and confirm that the following operations are performed normally.

- Confirm that the NTH25/NTH25C screens switch in accordance with the host program.
  If the screens do not switch correctly, check the connection between the host and the NTH25/NTH25C, and also check that the hardware settings are correct. For details, see Section 2 ”Connection”.
- Confirm that the operation results of touch switch and numeral input at the NTH25/NTH25C are sent to the host correctly by displaying the contents of the host words and bits using a peripheral tool (e.g. SYSMAC support software).
  If the results of operations at the NTH25/NTH25C are not sent to the host correctly, check the setting of the display elements. For details on setting display elements, see Section 4 ”NTH25/NTH25C Functions”.

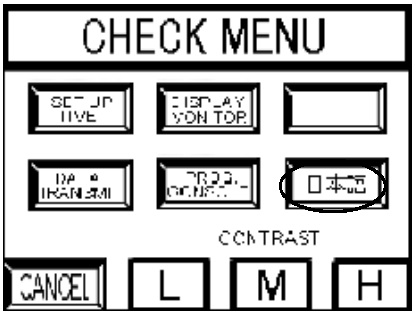
3-6 Switching the Display Language

On the NTH25/NTH25C, you can select either English or Japanese as the display language of the CHECK menu.

Reference

- The display language setting returns to its default when the power to the NTH25/NTH25C is turned OFF.
  Defaults follow the language of the screen data currently stored on the NTH25/NTH25C. (If the Support Tool used to create the screen data was the Japanese language version, the language of the screen data will be Japanese. If the Support Tool was the English language version, the language of the screen data will be English.)
  The display language will be English if no screen data is stored on the NTH25/NTH25C or the screen data is in error.
- Messages displayed during transmission of screen data or at completion of transmission follow the language of the screen data stored on the NTH25/NTH25C regardless of the display language set in the CHECK menu. (If no screen data is stored on the NTH25/NTH25C, then the display language will be English.)

Set the CHECK menu display language by following the operation below on the CHECK menu.



Select ” ”.
The CHECK menu display language will be Japanese.

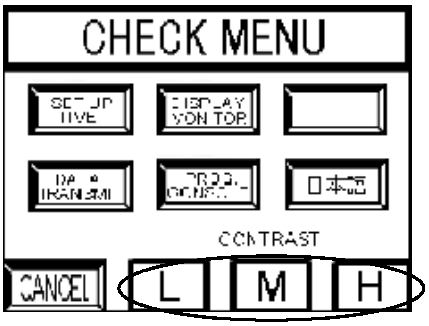
3-7 Adjusting LCD Contrast

On the NTH25/NTH25C, you can adjust the LCD contrast in three stages.

Reference

The LCD contrast setting is backed up in NTH25/NTH25C memory. So, it will not be lost when the power to the NTH25/NTH25C is turned OFF. Note, however, that the setting will be lost if the power is kept OFF for several days as internal settings are backed up not by a battery but by a capacitor.
Default is ”Middle”.

Set the LCD contrast by following the operation below on the CHECK menu.



Choose one of ”Low,” ”Middle” or ”High”.
LCD contrast changes according to the touch switch you chose.

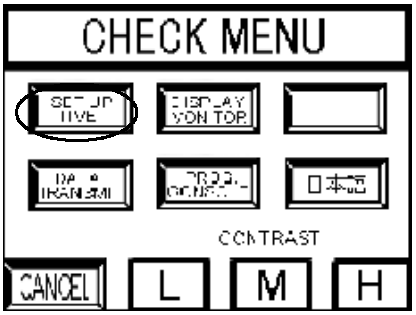
3-8 Setting the Clock Data

The NTH25/NTH25C has a ”clock function” for setting and displaying the date and time.
This section describes how to display and set the clock data by operation on the CHECK menu.

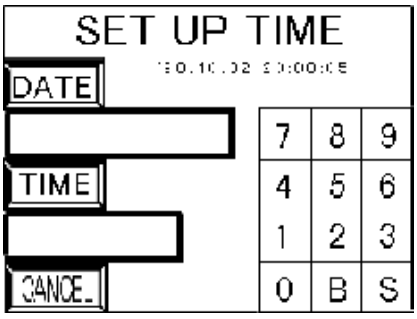
Reference

- When setting the clock data, be sure to set the correct date, time and day of the week. If you make a mistake, for example, when entering a value in the range 13 to 19 for the month setting, the setting is invalid and the entry field is cleared.
- Make sure that the data is correct when the month changes.
- For details on the clock function, see ”Clock Function” (page 216).
- The clock data is backed up in NTH25/NTH25C memory. So, it will not be lost when the power to the NTH25/NTH25C is turned OFF. Note, however, that the data will be lost if the power is kept OFF for several days as internal settings are backed up not by a battery but by a capacitor.
  Default is ”00 years:00 month:00 hours:00 minutes:00 seconds”.
- Clock data is used by the alarm history function. You can also write the NTH25/NTH25C’s clock data to words allocated on the host by instructing transmission of clock data on the host.

Set clock data by following the menu operation on the CHECK menu shown below.



Select ”SET UP TIME”.



Set the date and time. (See the following page.)

Return to the CHECK menu by selecting ”CANCEL” in the “SET UP TIME” screen menu.

3-8-1 Setting the Date and Time

• Setting the date

(1) Press ”Date”.
You can now enter the date under the ”Date” field.

(2) Enter the date in order ”Year, Month, Day” using the number keys displayed on the right. (”B” stands for Backspace, and ”S” stands for Set.)
Year: 4 digits (1980 to 2155*)
Month: 2 digits (00 to 12)
Day: 2 digits (00 to 31)
* The years 2156 to 2158 can be entered. The NTH25/NTH25C, however, may malfunction.

(3) Press the ”S” key. This sets the date and displays it at the top of the screen.
Example: December 24, 1998
Input: [1998122] → [S] → Display: [1998–12–24]

• Setting the time

(1) Press ”Time”.
You can now enter the time under the ”Time” field.

(2) Enter the time in order ”Hour, Minute, Second” using the number keys displayed on the right. (”B” stands for Backspace, and ”S” stands for Set.)
Hour: 2 digits (00 to 24) (In the 24–hour clock system, ”24” becomes ”00”)
Minute: 2 digits (00 to 60) (”60” becomes ”00”)
Second: 2 digits (00 to 60) (”60” becomes ”00”)

(3) Press the ”S” key. This sets the time and displays it at the top of the screen.

Example: To enter 16 hours:08 minutes;45 seconds
Input: [160845] → [S] → Display: [16:08:45]

Reference Though the NTH25/NTH25C checks whether the date and time that you entered is correct or not, be sure to enter the correct clock data.

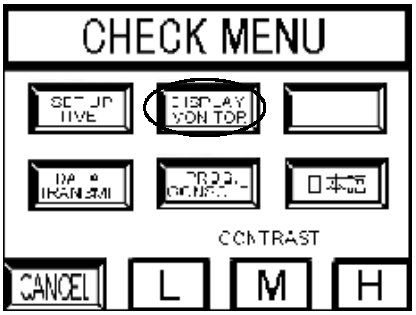
3-9 Checking Screen Data

The NTH25/NTH25C allows the registered screens (Nos. 1 to 1000) to be displayed and checked by operation on the CHECK menu.

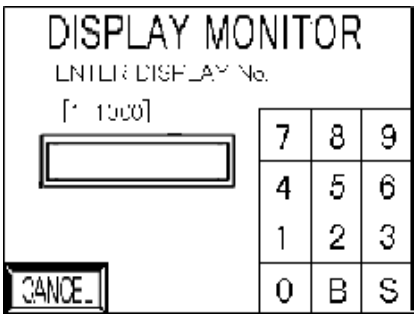
Reference

- Window screens cannot be displayed by operation on the CHECK menu. In the Screen Monitor screen, communications with the host is not performed. So, numerical values are expressed as ”0” (zero) and character strings are expressed as blank spaces in the case of display elements that require communications with the host for referencing words allocated on the host. Also, other display elements will not function.
- Only the user screens (Nos. 1 to 1000) can be displayed. Screens for system use cannot be displayed.

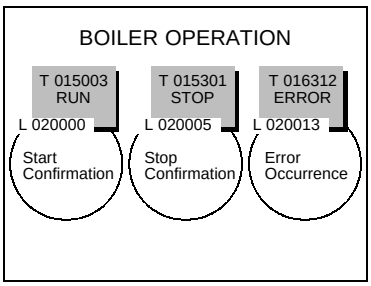
Display the Screen Monitor screen by following the menu operation on the CHECK menu shown below.



Select ”DISPLAY MONITOR”.



Specify the screen number to be checked using the number keys displayed on the right. (”B” stands for Backspace, and ”S” stands for Set.) Press the ”S” key. This displays the screen you specified.
If you specified an invalid screen number, ”Error” is displayed. Or, if you specified a screen number for which there is no screen data, a screen without any display elements is displayed.



When you have finished checking the screen, press anywhere on the screen to return to the Screen Monitor screen.
You can now continue to confirm other screens.

Return to the CHECK menu by selecting ”Cancel” in the “DISPLAY MONITOR” screen.

3-10 Programming Console Function

The NTH25/NTH25C features the ”programming console function.” This function allows the NTH25/NTH25C to be used instead of a programming console (type C200H-PRO27-E) for a C-series CPM1, CQM1, C200HX/HG/HE (-Z)E.
Except for recording (saving) ladder programs on cassette tape and playing (reading) them back, almost all the functions of a programming console can be executed.

Caution When the programming console functions are used, carefully check that the system is safe before carrying out the following operations:
- Changing monitor data
- Switching the operation mode
- Forced set or reset
- Changing a present value or set value

3-10-1 Usable Systems

The programming console function can be used with an NTH25/NTH25C connected to a PC when using the communications method indicated below.

Communications Method	Applicable PCs	Connected Port
NT Link (1:1)	C200HE-CPU42-(Z)E(*1) C200HG-CPU43-(Z)E(*1) C200HG-CPU63-(Z)E(*1) C200HX-CPU44-(Z)E(*1) C200HX-CPU64-(Z)E(*1) C200HX-CPU65-ZE(*1) C200HX-CPU85-ZE(*1) CQM1-CPU4 -EV1(*1) SRM1-C02-V1	CPU built-in RS-232C port
	CPM1-10CDR- CPM1-20CDR- CPM1-30CDR- CPM1A-10CD - CPM1A-20CD - CPM1A-30CD - CPM1A-40CD -	Peripheral port (*2)

*1 The peripheral port programming console always has priority. If a programming console is connected later, the programming console function of the NTH25/NTH25C is invalidated and operation from the NTH25/NTH25C becomes impossible.
The programming console cannot be connected to the RS-232C port of the communications board.

*2 An RS-232C cable cannot be connected to the peripheral port directly. An RS-232C conversion adapter (CPM1-CIF01) is required.

Reference

Note that the programming console function cannot be used with CPM1, CQM1, and C200HX/HG/HE PCs of the following lot numbers.

CPM1: 5, *6
where * is a number in the range 1 to 9 or the letter X or Y.

CQM1: 3, 4, 5, *6
where * is a number in the range 1 to 9 or the letter X or Y.

C200HX/HG/HE: 5 *6
where * is a number in the range 1 to 9 or the letter X.

3-10-2 Connection Method

For CQM1, C200HX/HG/HE(-ZE), SRM1

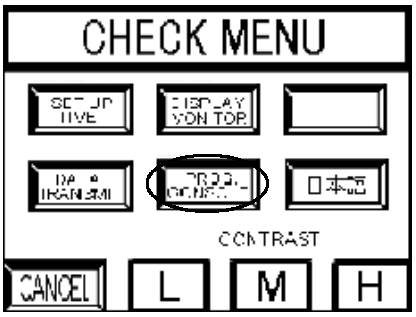
The connection method is exactly the same as for the NT link (1:1). Make the connection to the PC by referring to Section 2 ”Connection”.

For CPM1

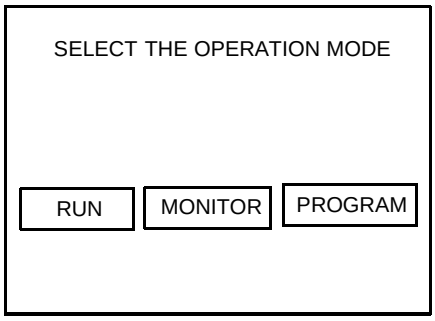
The connection method is the same as for the NT link (1:1). Connect the RS-232C cable to the peripheral port via an RS-232C conversion adapter (CPM1-CIF01). Make the connection to the PC by referring to Section 2 ”Connection”.

3-10-3 Method of Use

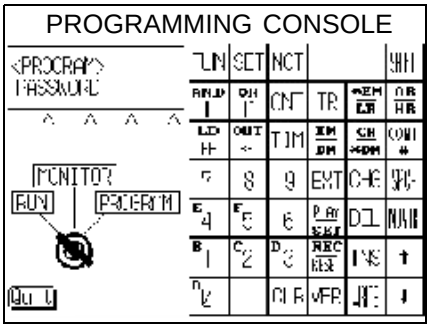
The "programming console" screen is displayed by operating the CHECK menu as described below.



Select "PROG. CONSOLE".



Specify the host's operation mode.



The programming console screen is displayed. Press the programming console sheet keyboard (touch switches) on the screen for the operation. Press the "Quit" touch switch at the bottom left of the screen to exit the screen.
An error is displayed if a wrong communications protocol is selected or a programming console is connected to a peripheral port.

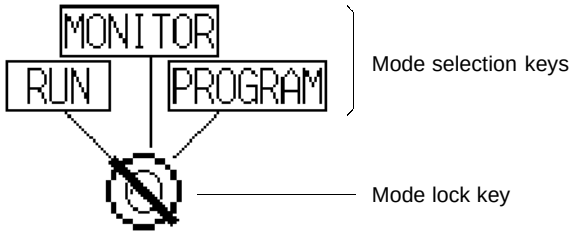
Reference When an error screen is displayed, press anywhere on the screen to return to the CHECK menu.

Key Operations

The following describes only the differences with an actual programming console. For details on using the NTH25/NTH25C as a programming console, refer to the instruction manual for the programming console (C200H-PRO27-E).

- Mode selection keys, mode lock key

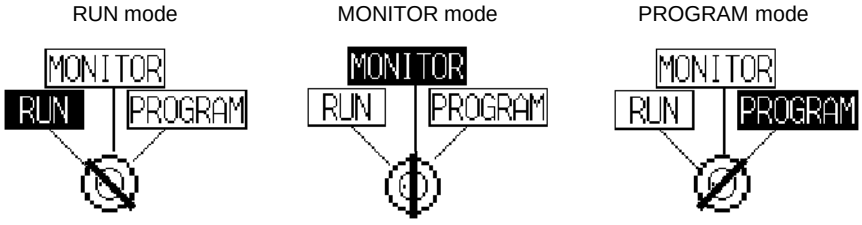
The display element on the programming console screen shown below comprises the mode selection keys and the mode lock key. The mode selection keys change the operation mode of the PC, and the mode lock key prevents unintended mode changes.



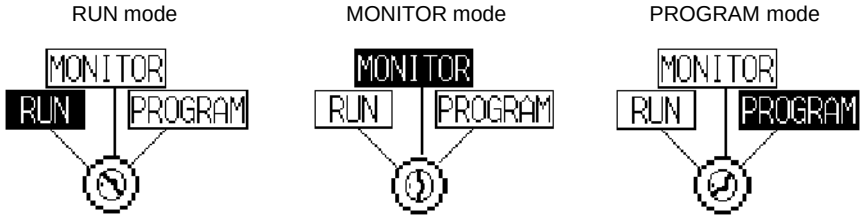
The RUN, MONITOR, and PROGRAM mode selection key elements are touch switches. Pressing these key elements changes the PC operation mode. (Unlike an actual programming console, it is possible to switch directly between the RUN mode and the PROGRAM mode.)

The mode lock key element is also a touch switch. Each press of this key element toggles between the "lock ON" (with no key displayed) and "lock OFF" (with key displayed) states. In the lock ON state, mode selection key operations are disabled. The mode displays change as indicated in the figures below in the lock ON status and in the lock OFF state.
When the programming console function starts, the lock ON status is established. If the RUN, MONITOR, or PROGRAM mode selection key is pressed in the lock OFF status, the mode changes and the lock ON status is established.

- In lock OFF state



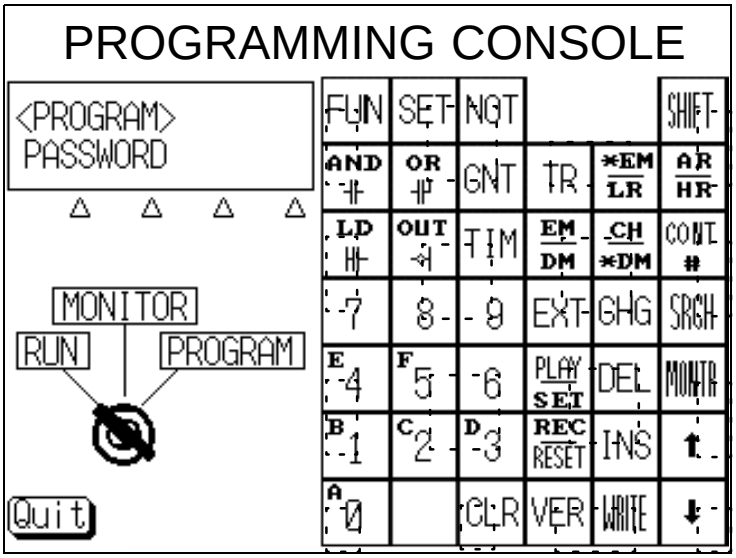
- In lock ON state



Reference After the NTH25/NTH25C has entered the Programming Console Function screen, specify the operation mode of the PC immediately by the mode selection keys.

- Programming console sheet keyboard

The programming console keyboard used on the screen when the programming console function is used is comprised entirely of touch switches (shown by the dashed line frames in the figure below). A key operation is executed by pressing a touch switch. However, since there is a discrepancy between the size of the displayed keys and the size of the touch switches, be sure to press as close to the center of the key as possible by referring to the figure below.



Differences with Respect to Programming Consoles

- Programs cannot be stored (recorded) or read (played back). If it is necessary to store or read a program, use a peripheral tool.
- When the programming console function is used on the NTH25/NTH25C, the buzzer tone do not sound.

Reference When the programming console function is used on the NTH25/NTH25C, the operation sequence ([CLEAR] → [MONITOR] → [SHIFT] → [1]) for muting the key input tone does not function.

SECTION 4
NTH25/NTH25C Functions

This section describes the functions of the NTH25/NTH25C.

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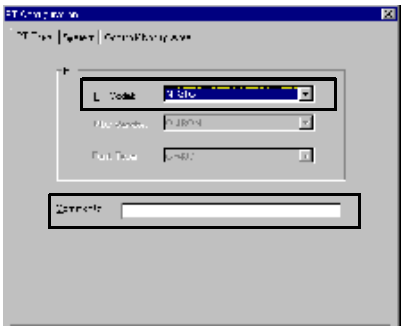
4-1 PT Configuration Settings

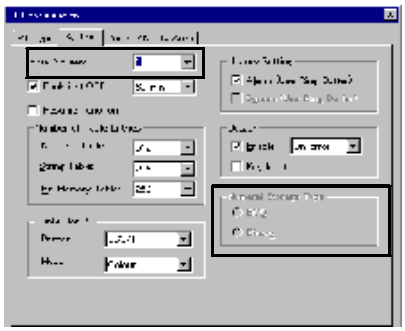
The basic operation of the NTH25/NTH25C is determined by the ”PT Configuration” settings made on the Support Tool and ”Configuration” on the NTH Screen Data Converter.

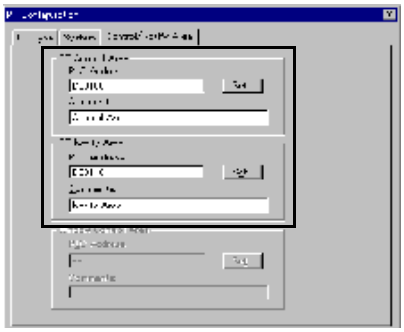
This section describes the settings made under ”PT Configuration” and ”Configuration”. However, note that the operations on the Support Tool are not described. For details on these operations, see the NT-series Support Tool Ver. 3.0 for Windows95/98 Operation Manual (V053-E1-) or Section 6 ”NTH Screen Data Converter”.

4-1-1 Support Tool ”PT Configuration” Settings

The Support Tool has the following PT Configuration settings:







Only sections enclosed by ☐ are valid.

[PT Model]

Set the model of PT to be connected and type of screen data to be created. Set as follows for whichever of NTH25/NTH25C is being used:

NTH25 in use: NT31 (Do not select NT31-V1.)
NTH25C in use: NT31C (Do not select NT31C-V1.)

[Comments]

Set a comment relating to the screen data here. This comment is valid only within the Support Tool, and cannot be displayed on the NTH25/NTH25C.

[PT Control/Notify Area]

Set the allocated words for the PT status control area and PT status notify area here. See ”4-3 Areas for Control/Notification” (page 89).

[Initial Screen]

Set the screen number of the screen that is displayed when NTH25/NTH25C operation starts. Note, however, that the screen number switches to the screen number written to the "screen switch setting" word in the PT status control area when communications with the host is begun. For details, see "Functions of the PT Status Control Area" (page 91).

[History Setting]

This setting is invalid when the NTH25/NTH25C is used.

[Number of Table Entries]

This setting is invalid when the NTH25/NTH25C is used.

[Numeral Storage Type]

Set whether the contents of words allocated on the host are handled collectively as BCD data or binary data. However, the numeral storage type set here is valid only when "System" is set for "Storage Type" for each numeral memory table concerned.

Storage Type and Recognizable Numerals

When the contents of words allocated on the host are displayed in numeral display elements, for example, numerals are interpreted according to the "Numeral Strage Type". The numeral storage type setting changes how the NTH25/NTH25C recognizes numerals even if the contents of the word are the same.

BCD data format:

The contents of words on the host are interpreted as BCD (Binary Coded Decimal) values. Note, however, that the "–" sign cannot be input to words on the host. So, the contents of words whose uppermost digit is "F" are treated as a negative value.
If "A" to "E" are stored to the uppermost digit of a word on the host, or if "A" to "F" are stored to digits other than the uppermost digit, conversion or display will be in error. For example, those digits only will be calculated as being hexadecimal values.

Binary data format:

The contents of words on the host are interpreted as signed binary data. In this format, the uppermost bit is a sign bit. (When the bit is 1, this indicates that the contents of words are a negative value.) When the allocated word is one word, bit 15 is the sign bit, and when two words, bit 31 is the sign bit.

4-1-2 NTH Screen Data Converter ”Configuration” Settings

The NTH Screen Data Converter has the following Configuration settings. For details on settings and operations, see ”Configuration”, page 260.

Reference When ”NT Link” is set to ”Comm. Method” on the [Initialize] page, communication cannot be set. If set to ”Memory Link”, the PLC Setting cannot be set.

- [Initialize] Page

– Model (PT type)

NTH25, NTH25C

– Auto CFL off (backlight auto OFF–ON/OFF and auto OFF time)

0: Auto OFF is OFF (PT status control bit ”backlight mode” is enabled)
1 to 99: 1 to 99 minutes (PT status control bit ”backlight mode” is disabled)

– Comm. Method (communications method used for communications between

NTH25/NTH25C and host)
Host link, memory link, NT link (1:1)

- [Communication] page

– Baud rate (communications speed)

1200, 2400, 4800, 9600, 19200

– Stop bit (stop bit length)

1, 2

– Data length

7, 8

– Parity (ON/OFF, type)

Even, odd, none

- [PLC Setting] page

– PLC Model (type of PC connected to NTH25/NTH25C)

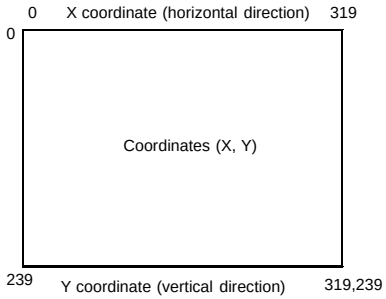
SYSMAC–C (C series PC, SRM1), SYSMAC–CV/CS1 (CVM1/CV/CS1 series PC)

4-2 NTH25/NTH25C Screen

This section gives an outline of the screen, which is the basis of NTH25/NTH25C functions.

4-2-1 Screen Composition

The NTH25/NTH25C screen is 320 dots wide by 240 dots high. Each dot is set by a combination of an X coordinate (horizontal direction) and a Y coordinate (vertical direction). The coordinate origin (0, 0) is at the top left of the screen.



4-2-2 Screen Numbers

The screens of the NTH25/NTH25C are classified and managed by ”screen numbers”.
Screen numbers are used to designate the first screen displayed when the NTH25/NTH25C is started up, and to designate the target screen when switching the screen display or other operations.
The NTH25/NTH25C allows up to 1000 screens to be registered in addition to screens reserved for specific functions. For these screens, screen numbers can be designated without restriction within the range 1 to 1000. There are also no restrictions on the order of screen numbers; they can also be discontinuous.
When creating a screen at the NTH25/NTH25C using the Support Tool, designate a screen number and then register the display elements.
Note, however, that image/library lamps can be used only in screen numbers 1 to 200.

4-2-3 Screen Types

The screens that can be displayed by the NTH25/NTH25C are classified as follows according to their function.

- Normal (standard) screens
- Window screens
- System screens (Programming Console screen)

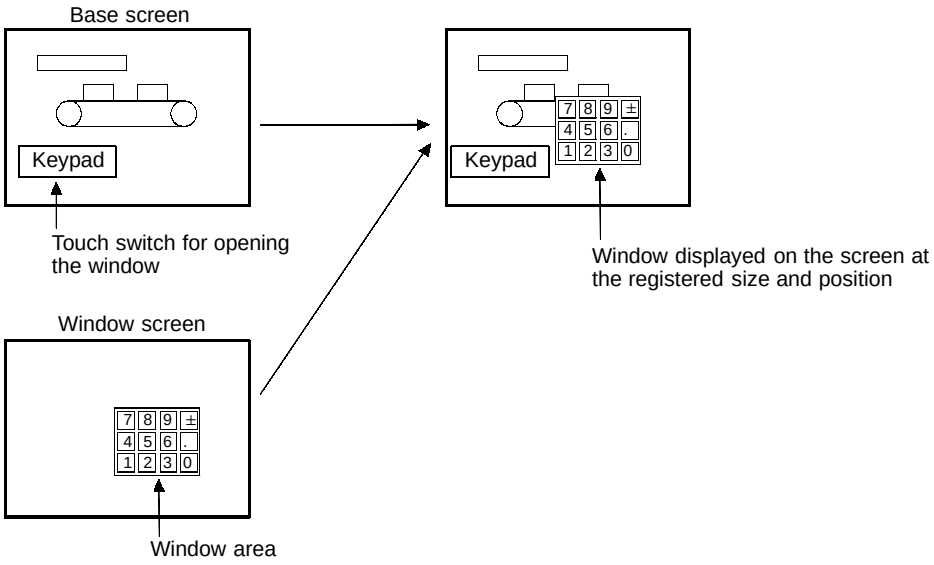
Normal (standard) Screens

Normal (standard) screens are the basic screens of the NTH25/NTH25C. They have no specific functions themselves and their purpose is to display elements that have already been registered.
Normal (standard) screens can be registered under any screen numbers in the range 1 to 1000.

Window Screens

By the normal (standard) screen display method, a screen is displayed over the entire panel area. In addition to this display method, the NTH25/NTH25C also allows screens to be displayed in only one part of the screen area. This partial screen is called a ”window”, and a screen to which a window is registered is called a ”window screen”.

Up to 20 window screens can be registered under any screen number in the range 1 to 1000. However, screens that are registered as window screens cannot be displayed independently like normal (standard) screens.



Windows can be called anytime by operating a touch switch, regardless of which screen is currently displayed. It is also possible to open and close windows by the control from the host.
For details, see ”Window Functions” (page 211).

System Screens

Screens with predetermined functions are called ”system screens”.
The table below shows the type of system screen:

Screen number	Name	Function
9020	Programming console function screen	As an extended function, the NTH25/NTH25C features the ”programming console” function, which enables equivalent functions to those of a programming console. When the NTH25/NTH25C is connected to a host which supports the programming console function, it can be used in place of the programming console by designating screen number 9020 as the display screen.

For details on the programming console function, see 3–10 ”Programming Console Function” (page 74).

Screen Attributes

The NTH25/NTH25C allows attributes to be set to each screen, so that the specific function defined by the attribute is executed when the screen is displayed.
Set the screen attributes as the properties of each screen using the Support Tool.
The screen attribute that can be set is as follows.

- Comment

A comment indicating the contents of the screen can be set as any required character string up to 24 characters long.

4-2-4 Color Display

The NTH25C can display the entire screen, and elements such as text and graphics, in eight different colors. Specify a color as an attribute for each display element when creating a screen using the Support Tool.

Available Colors

The NTH25C can display the following eight colors:

Black, blue, red, magenta, green, cyan, yellow, white

When the display mode for elements is set to inverse and inverse flash, colors are displayed in their corresponding inverse color.
Display color and their respective inverse colors are as follows:

Black ↔ White, Blue ↔ Yellow, Red ↔ Cyan, Magenta ↔ Green

Reference

”Inverse color” is a color combination that is opposite in terms of the three primary color: red, green and blue.

Example: Blue (red 0, blue 1, green 0) ↔ Yellow (red 1, blue 0, green 1)

- Color correspondence between NTH25C and NTH25

The only colors that the NTH25 can display are black and white.
The screen data for the NTH25C can be displayed on an NTH25 and in this case the color correspondences are as follows.

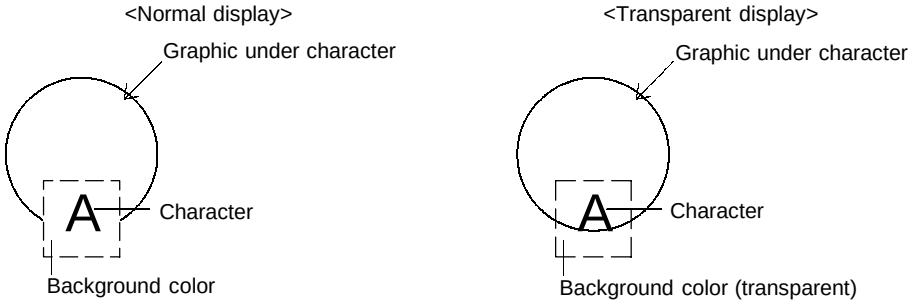
Colors on NTH25C	Colors on NTH25
Black, blue, red, magenta	White
Green, cyan, yellow, white	Black

Reference

When screen data is created for the NTH25, black and white are displayed as white and black respectively on the Support Tool. On the display of a black-and-white personal computer, the display at the NTH25 matches the colors displayed at the Support Tool. But when a personal computer with a color display is used, the colors are reversed.

Transparent Display

When elements are displayed on top of others, normally the background color of the element on top conceals the element below so that it cannot be seen.
In addition to the above eight colors, the color ”transparent” is available for the background of some display elements.
When ”transparent” is set, nothing appears behind the element, and the display element or screen background color underneath it is visible.



• Possible applications of the color designation ”transparent”

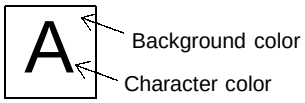
Background of labels for lamps and touch switches (fixed as ”transparent”)
(Though ”transparent” can be set as the background color for characters (fixed display) and tiling patterns and marks, this color designation is displayed as black on the NTH25 and white on the NTH25C.)

• Impossible applications of the color designation ”transparent”

Background of character string display elements
Background of numeral display elements
Background of numerals in numeral input fields
Background of characters indicating percentages (%) on graphs
Display color of lamps and touch switches
Background color of temporary input fields
Display color of alarm list/history

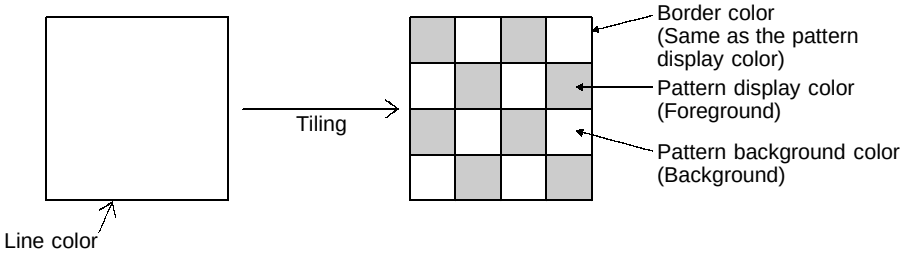
Text Display Color

The color of characters (character color) and that of their rectangular enclosing frames (background color) can be specified.



Graphic Display Color

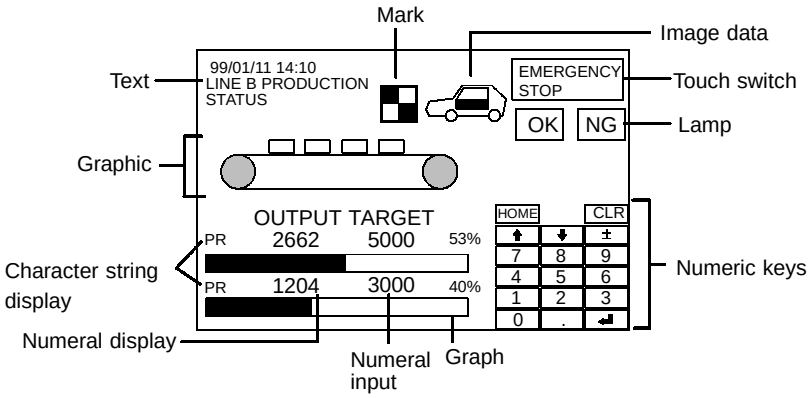
The colors of lines and tiling patterns can be specified for graphics.
The colors that can be designated for tiling patterns are the color of the pattern itself and the background color of the pattern.
On the NTH25/NTH25C, the border line color specified on the Support Tool is invalid as the tiling pattern display color is used as the color of the tile border.



Reference When a lamp, a touch switch, and a graphic are displayed in color, part of the frames of the display elements may be invisible because of the combination of the background, and tiling colors. This is a phenomenon peculiar to a color LCD, and is not a failure of the system. In such a case, change the color combination.

4-2-5 Display Elements

The NTH25/NTH25C can display the following elements on a screen:



Element		Description	See
Fixed display	Arcs	Possible display modes: standard/flash/inverse/inverse flash. Other display modes are not available.	Page 109
	Circles	Possible display modes: standard/flash/inverse/inverse flash. Other display modes are not available.	Page 109
	Rectangles	Possible display modes: standard/flash/inverse/inverse flash. Other display modes are not available.	Page 109
	Polygons	Possible display modes: standard/flash/inverse/inverse flash. Other display modes are not available.	Page 109
	Polylines	Possible display modes: standard/flash. Other display modes are not available.	Page 109
	Sectors	Possible display modes: standard/flash/inverse/inverse flash. Other display modes are not available.	Page 109
	Texts	Possible display modes: standard/flash/inverse flash. Other display modes are not available.	Page 119
	Tiling	The inside of an enclosed area is filled with a tiling pattern.	Page 123
	Image data	Graphics of any required size, composed of dots. The display mode cannot be changed.	Page 130
	Library data	These are a grouped set of elements used as a single element. Fixed display graphics can be registered as library data.	Page 134
	Marks	These are graphics composed of 16 by 16 dots which can be treated as characters.	Page 126
Lamps	Normal (standard) lamps	These are graphics that light (flash) and go out according to the state of bits at the host. The following shapes can be selected for normal (standard) lamps: rectangles or circles.	Page 137
	Image/library lamps	These are elements that display different image/library data according to the state of bits at the host.	Page 137
Touch switches		These are elements that can be used as switches: they allow the execution of various functions, such as notification to the host, to be executed by pressing the touch panel of the NTH25/NTH25C. Double line frame can be set to touch switches. Touch switches can also overlap circles, polygons, sectors and other fixed display graphics.	Page 145
Numeral display		The contents of the currently allocated host (PC) are displayed as a numeral. The display changes in accordance with changes in the data contents.	Page 159
Character string display		The contents of the currently allocated host (PC) are treated as a character code and are displayed as a character string. The display changes in accordance with changes in the data contents.	Page 166
Graphs	Bar graphs	The data contents of the currently allocated host (PC) are displayed in the form of a bar graph.	Page 172
	Trend graphs	The data contents of the currently allocated host (PC) are displayed in the form of a broken–line graph.	Page 176
Alarms	Alarm list	This element monitors the state of host bits designated in advance, and displays the message corresponding to the bit that turns ON.	Page 189
	Alarm history	This element monitors the state of host bits designated in advance, and displays the contents of the alarm history record (occurrence order) which records the time when the bits turn ON, together with the message corresponding to each bit. The frequency order cannot be displayed on the NTH25/NTH25C.	Page 189
Input Settings	Numeral input	This is an element for inputting numerals to the currently allocated host (PC) by using touch switches as numeral keys.	Page 196
	Thumbwheel switch	This is an element for inputting numerals to the currently allocated host (PC) by using ”+” and ”–” touch switches for each digit.	Page 203

4-3 Areas for Control/Notification

The following areas are provided for the controlling and exchanging information relating to a PT (such as changes in status) between the NTH25/NTH25C and the host.

• PT status control area

This area is used to designate the screen to be displayed on the NTH25/NTH25C, to notify the host of the currently displayed screen number, to copy data contents between memory tables in the NTH25/NTH25C, and to control the status of the backlight and other statuses.
Allocate the PT status control area to the host on the Support Tool.

• PT status notify area

This area is used to notify the host of the memory table number when there is a change in the data contents of a memory table in the NTH25/NTH25C, and to notify the host of information such as changes in the PT status.
Allocate the PT status notify area to the host on the Support Tool.

• Window control area

This is work area used by the host for controlling windows. When windows are used, more than the required number of window control areas (maximum 20 areas) must be allocated to the host.
Allocate the window area to the host on the NTH Screen Data Converter.

• Trend graph control area

This area is for stopping and continuing sampling (reading the contents of words on the host) of trend graphs and clearing past trend graph records.
Allocate the trend graph control area to the host on the NTH Screen Data Converter.

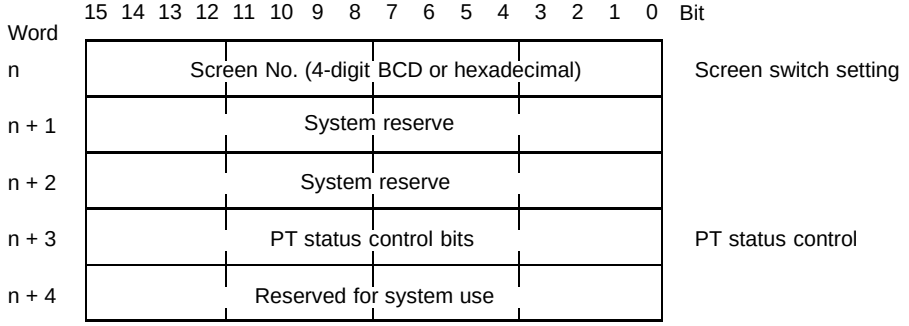
Reference

- The PT status control area and PT status notify area must be allocated to the host.
- The PT status control area, PT status notify area, window control area and trend control area must be allocated so that they do not overlap each other.
- The window control area and trend graph control area must be allocated to the host when windows and trend graphs are used.

4-3-1 PT Status Control Area (Host ↔ NTH25/NTH25C)

When data is written to this area from the host, the NTH25/NTH25C reads the data and operates accordingly. However, note that the number of the currently displayed screen is written to the ”screen switch setting” word from the NTH25/NTH25C too.

The PT status control area is configured as five consecutive words as shown below. The first word (word n) is set in the ”Control/Notify Area” settings in the PT configuration settings made using the Support Tool.



Allocated Words of the PT Status Control Area

The PT status control area (host ↔ NTH25/NTH25C) can be allocated to the following host (PC) areas.

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation
DM	Data memory		Data memory	
CH	I/O relay		I/O relay	
TIM	Timer present value		Timer present value	
CNT	Counter present value		Counter present value	
HR	Holding relay			
AR	Auxiliary relay		Special auxiliary relay	
LR	Link relay			

: OK : NG

Since the special auxiliary relays of the CVM1/CV series PCs are all allocated to system functions, they cannot be used for purposes other than system use.

The range of each memory area differs according to the PC type. see Appendix H ”PC Memory Map”, page 321.

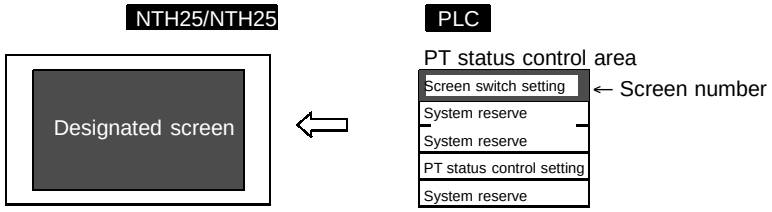
Functions of the PT Status Control Area

- Screen switch setting

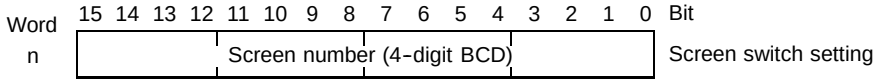
Data is written to the ”screen switch setting” word from both the NTH25/NTH25C and the host. The meaning of the data differs according to whether it is written from the NTH25/NTH25C or the host. However, if the NTH25/NTH25C is currently operating, the number of the screen currently displayed on the NTH25/NTH25C is always reflected in the ”screen switch setting” word.

- When data is written from the host

To switch the screen displayed at the NTH25/NTH25C by an instruction from the host, write the screen number, as a 4-digit BCD value, to the ”screen switch setting” word. (On the NTH25/NTH25C, screen numbers cannot be specified in hexadecimal.)



[”Screen switch setting” in the PT status control area]



The screen numbers that can be set are as follows.

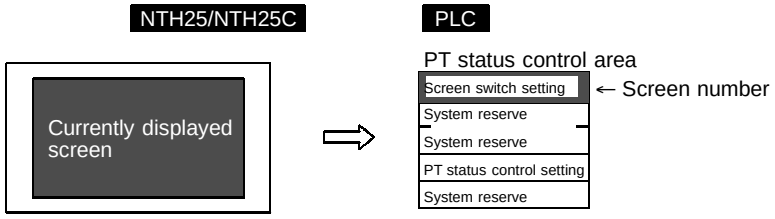
BCD	Screen
0000	No-display (screen cleared)
0001 to 1000	Screen numbers 1 to 1000
9020	Programming console screen

Reference

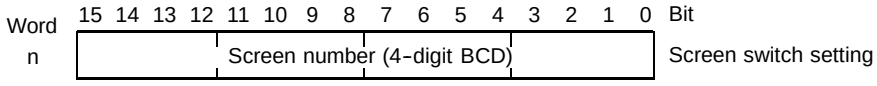
- The screen can also be switched by touch switch operation (page 145).
- If no elements are registered to the designated screen number, the screen enters a no-display state. If a screen of screen number 1001 or onwards is designated, the screen is not switched.
- When operation of NTH25/NTH25C is started, the screen display follows the ”Initial Screen” setting made in ”PT Configuration” on the Support Tool. After this, screen display follows the ”screen switch setting” when communications is established with the host.
- If the ”screen switch setting” is also invalid (for example, the screen number is not specified in BCD), the screen is not switched. Also, the screen enters a no-display state if a screen number to which screen data is not registered is specified.

• When data is written from the NTH25/NTH25C

When the screen display has been switched by operation at the NTH25/NTH25C, the new screen number is written as a 4-digit BCD into the "screen switch setting" word by the NTH25/NTH25C. (On the NTH25/NTH25C, screen numbers cannot be specified in hexadecimal.)



["Screen switch setting" in the PT status control area]



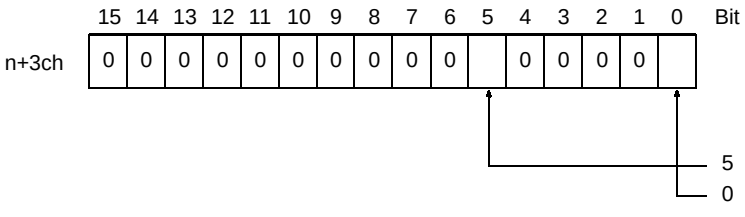
The following screen numbers are notified:

BCD	Screen
0000	No-display (screen cleared)
0001 to 1000	Screen numbers 1 to 1000
9020	Programming console screen

Reference The screen number is notified only when the screen is switched by operation on the NTH25/NTH25C.

• PT status control bits

The functions of the PT status control bits are as follows:



	Control content	1 (ON)	0 (OFF)
5	Clock data output	Yes	No
0	Backlight mode	ON	OFF

Reference The PT status control bits are checked in individual bits by the NTH25/NTH25C. The only functions that are actually executed are those whose corresponding bit state has changed.

• Clock data output (bit 5)

This bit is used to notify the PT status notify bit of the NTH25/NTH25C's internal clock data (year, month, day, hours, minutes). (See page 93.)
The state of bit 5 controls output of clock data as follows:

1 (ON): Notifies PT status notify area.
0 (OFF): Does not notify PT status notify area.

Caution For system safety, leave clock data output in the PT status control area set to 1 (ON) at all times, and run a program that periodically reads clock data output in the PT status control area to confirm whether or not the PT is operating normally.

• Backlight mode (bit 0)

The backlight mode is used for controlling the backlight of the NTH25/NTH25C.

The state of bit 8 controls backlight operation as follows:

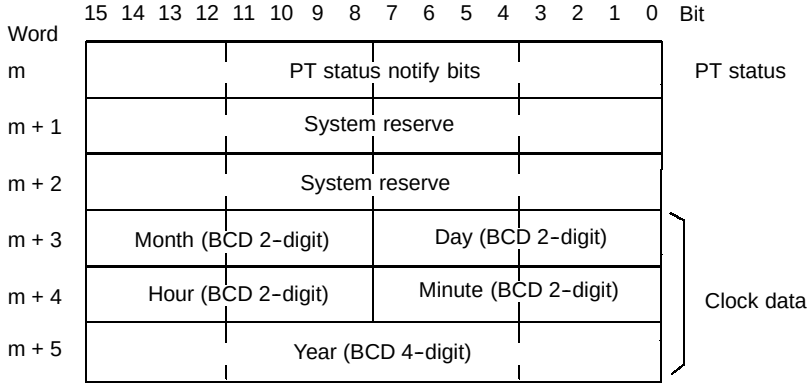
- 1 (ON): Lights the backlight.
- 0 (OFF): Does not light the backlight.

Reference

- NTH series PTs differ from NT series PTs in that the ”Configuration” – ”Auto CFL off” setting on the NTH Screen Data Converter determines enable/disable of the PT status control bit ”backlight mode” (bit 0).
  To enable the ”backlight mode”, set the ”Auto CFL off” setting to 0 (OFF). (If the ”Auto CFL off” setting is set to 1 to 99, the ”backlight mode” is disabled.)
- The default PC setting for each area is 0. So, PT status control bit ”backlight mode” (bit 0) also is 0 (OFF). When you connect the NTH25/NTH25C with the ”backlight mode” set to 0, the backlight remains out. In this case, set the PT status control bit ”backlight mode” (bit 0) to 1 (ON).

4-3-2 PT Status Notify Area (NTH25/NTH25C to Host)

The PT status notify area is provided to notify the host of changes in the status of the NTH25/NTH25C. The host can determine the status of the NTH25/NTH25C by reading this area.
The PT status notify area is configured as six consecutive words as shown below. The first word (word m) is set in the ”Control/Notify Area” settings in the PT configuration settings made using the Support Tool.



Allocated Words of the PT Status Notify Area

The PT status notify area (NTH25/NTH25C to host) can be allocated to the following host (PC) areas.

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation
DM	Data memory		Data memory	
CH	I/O relay		I/O relay	
TIM	Timer present value		Timer present value	
CNT	Counter present value		Counter present value	
HR	Holding relay			
AR	Auxiliary relay		Special auxiliary relay	
LR	Link relay			

: OK : NG

Since the special auxiliary relays of the CVM1/CV series PCs are all allocated to system functions, they cannot be used for purposes other than system use.

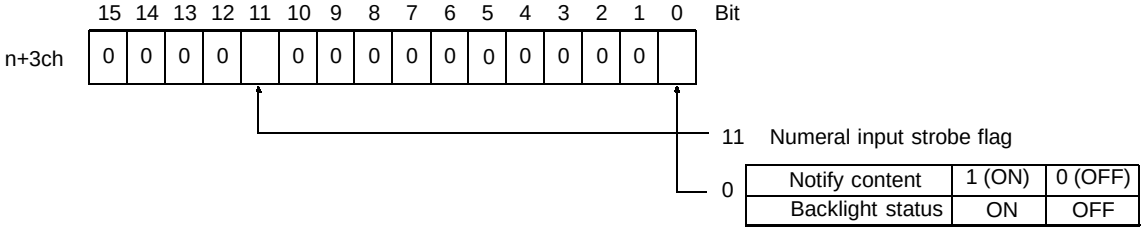
The range of each memory area differs according to the PC type. See Appendix H ”PC Memory Map”, page 321.

Caution Allocate the PT status control area and PT status notify area so that they do not overlap each other.

Functions of the PT Status Notify Area

- PT status notify bits

The functions of the PT status notify bits are as follows:



- Numeral input strobe flag (bit 11)

This bit is set to ”1” (ON) when a numeral is input using the numeral input function of the NTH25/NTH25C. After the host is notified, this bit is automatically returned to ”0” (OFF).
Note, however, that when the NTH25/NTH25C is connected to a CVM1/CV series CPU unit, startup may not be detected when the PC is set to asynchronous operation.

- Backlight status (bit 0)

The backlight status of the NTH25/NTH25C is notified as follows:

1 (ON): Backlight lit
0 (OFF): Backlight off

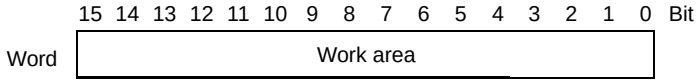
Note, however, this bit is returned to ”0” (OFF) when the NTH25/NTH25C displays the System Menu or an error screen.

• Clock data

The NTH25/NTH25C's internal clock data is written at 1−minute intervals for the duration that "clock data output" of the PT status control in PT status control area bit is 1 (ON).
The date and time can be displayed on the NTH25/NTH25C by sending the value written here to a word to which a numeral display element is allocated.

4-3-3 Window Control Area

This is work area used by the NTH25/NTH25C for controlling windows.
The 1−word area shown below must be allocated to the host for more than the required number of window screens to be used. (The maximum number of window screens used is 20, so the maximum number of words that can be allocated is also 20.) Each of the words in the window control area need not be continuous as they can be allocated individually to the host. These words are set at "window control area setting" in "Configuration" on the NTH Screen Data Converter. Allocate areas for more than the required number of window screens in order from "window control area" No.1 on the NTH Screen Data Converter.



More than the required number of window screens (maximum 20 areas) must be allocated individually to the host.

Reference

- When using windows, window control areas for more than the required number of window screens must be allocated to the host. (Allocate areas for more than the required number of window screens in order from "window control area" No.1 on the NTH Screen Data Converter.)
- After allocating window control areas, do not change their contents.

Allocated Words of the Window Control Area

The window control area can be allocated to the following host (PC) areas.

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation
DM	Data memory		Data memory	
CH	I/O relay		I/O relay	
TIM	Timer present value		Timer present value	
CNT	Counter present value		Counter present value	
HR	Holding relay			
AR	Auxiliary relay		Special auxiliary relay	
LR	Link relay			

: OK : NG

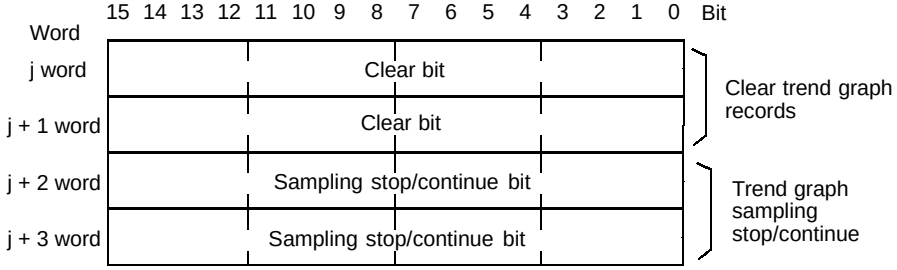
Since the special auxiliary relays of the CVM1/CV series PCs are all allocated to system functions, they cannot be used for purposes other than system use.

The range of each memory area differs according to the PC type. See Appendix H "PC Memory Map", page 321.

4-3-4 Trend Graph Control Area (host to NTH25/NTH25C)

By manipulating the trend graph control area, you can start and continue sampling (reading the contents of words on the host), and clear trend graph data recorded in the past from each trend graph. For details on trend graphs, see ”Trend Graphs”, page 176.

The trend graph control area is configured as four consecutive words as shown below. The first word (j word) in each area is set in the ”Trend Graph Control Area Setting” in the configuration settings on the NTH Screen Data Converter.



Reference When using trend graphs, the trend graph control area must be allocated to the host.

Allocated Words of the Trend Graph Control Area

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation
DM	Data memory		Data memory	
CH	I/O relay		I/O relay	
TIM	Timer present value		Timer present value	
CNT	Counter present value		Counter present value	
HR	Holding relay			
AR	Auxiliary relay		Special auxiliary relay	
LR	Link relay			

: OK : NG

The trend graph control area can be allocated to the following host (PC) areas.

Since the special auxiliary relays of the CVM1/CV series PCs are all allocated to system functions, they cannot be used for purpose other than system use.

The range of each memory area differs according to the PC type. See Appendix H ”PC Memory Map”, page 321.

Up to one trend graph frame can be registered to a single screen, and up to 20 frames can be registered to the entire screen data file. Trend graph numbers 1to 20 are allocated automatically from the smallest screen number upwards.

The clear bit and sampling stop/continue bit correspond to trend graph numbers as follows:

Clear bit / Sampling bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Bit
j word	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
j + 2 word																	
j + 1 word													20	19	18	17	
j + 3 word																	

(Figures in frames are trend graph numbers. ”–” indicates that the number is unused (always 0).)

Functions of the Trend Graph Control Area

Sampling can be stopped and continued, and past data records can be cleared by writing to each bit corresponding to a trend graph number as follows:

- Clear bit

0 (OFF): Not cleared
1 (ON): Cleared

- Sampling stop/continue bit

0 (OFF): Continue (not stopped)
1 (ON): Stop

Reference

Sampling stop/continue and clearing of past records can also be performed by operating touch switches. (See page 145.) Note, however, that when a touch switch is operated, the operation is applied collectively to trend graphs 1 to 16 and 17 to 20.

4-4 Memory Tables

The OMRON PTs have the following three memory areas that can be written to freely from the host.

- "Numeral memory tables" for numeric value data Page 98
- "Character string memory tables" for text data Page 101
- "Bit memory tables" for bit data Page 103

The contents of numeral memory tables and character string memory tables can be set when the respective memory table is displayed on the screen on the Support Tool, or set by a table editor.

Reference

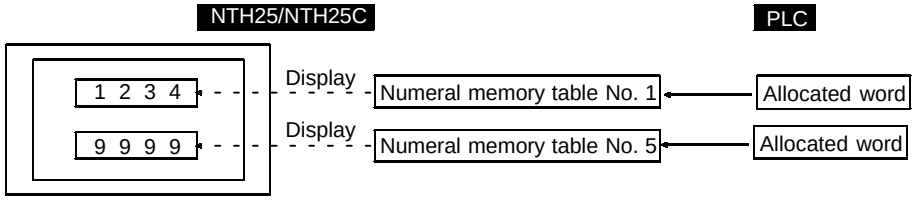
The above description is for most OMRON PTs.
The NTH25/NTH25C does not hold these memory tables internally; display elements directly reference words and bits on the host.
Note, however, that when screen data is created on the Support Tool, you cannot set to directly reference the host from a display element. So, be sure to allocate a memory table to a display element so that the host is referenced from the memory table. Though the display element does not actually have a memory table, the host is referenced using the PC address currently set to the memory table.

4-4-1 Numeral Memory Tables

[Function Outline]

"Numeral memory tables" are internal memories for storing numeral data. Note, however, that the NTH25/NTH25C does not actually have numeral memory tables, so, only the host word (PC address) and referencing method (storage method) currently set to the numeral memory table are used when a display element references a host word. (When screens are created on the Support Tool, set a numeral memory table to the display element so that the host is artificially referenced via the numeral memory table.)

Numeral memory tables are allocated numeral memory table numbers so that they can be managed and specified individually.



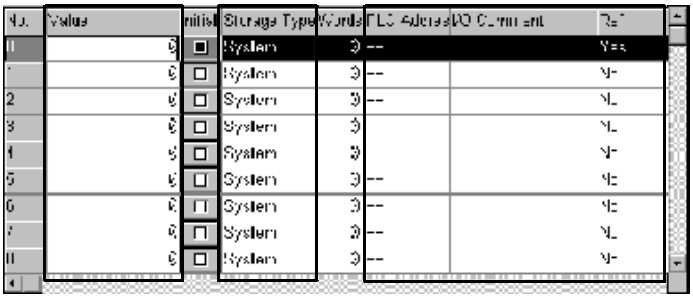
[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Number of numeral memory tables	Changeable	Not supported
Number of words in numeral memory tables	Settable	Not supported (Automatically determined by the type of display element and number of display digits)
Value	Settable	Not supported
Initial	Settable	Not supported

[Common Attributes]

Numeral memory tables have the following properties.



Only sections enclosed by ☐ are valid.

Property	Possible Settings
	Meaning
Storage Type	System/Binary/BCD
	Sets whether to recognize the contents of host words as ”binary” (hexadecimal) or BCD (Binary Codes Decimal). If a setting is made for ”System”, it complies with the ”Numeral Storage Type” setting in the PT configuration. For details, see ”Word contents and displayed numeral” (page 163) and ”Input numeral and stored data” (page 208).
PLC Address	Any word address on the host
	Word on the host to which the numeral memory table is allocated When the numeral memory table is allocated to two words, specify the first (lower) word. For details, see ”Allocated words” (page 100).
I/O Comment	Up to 16 characters of text
	Comment that describes the contents of a numeral memory table

• Allocated words

Numeral memory tables can be allocated to the following host (PC) areas.

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation
DM	Data memory		Data memory	
CH	I/O relay		I/O relay	
TIM	Timer present value		Timer present value	
CNT	Counter present value		Counter present value	
HR	Holding relay			
AR	Auxiliary relay		Special auxiliary relay	
LR	Link relay			

: OK : NG

The range of each memory area differs according to the PC type. See Appendix H ”PC Memory Map”, page 321.

[Display Functions]

Numeral memory tables themselves have no display function.
To display the contents of numeral memory tables (words on host), use ”Numeral Display” (page 159) or 4−11 ”Graphs” (page 172).

[Input Functions]

The numeral memory table setting is used to read and display the contents of words on the host from the display element.
Note, however, that reading is only executed for those elements that are being used for the currently displayed screen.

[Output Functions]

The numeral memory table setting is used to write the numeral that was input by the numeral input function to the word on the host.
Note, however, that writing is only executed in the following cases.

- When the contents of the numeral memory table have changed as a result of operations at the NTH25/NTH25C, such as use of the input setting function.

[Processing Functions]

The contents of the allocated word(s) on the host are interpreted and stored in accordance with the set properties (see ”Common Attributes”).

[Relationship with Other Elements]

- When ”numeral display” is used, the contents of the word on the host can be interpreted and displayed in real time according to the PC address and storage type currently set to the numeral memory table (page 159).
- When ”bar graph” is used, the contents of the word on the host can be interpreted and displayed in real time in the form of a bar graph according to the PC address and storage type currently set to the numeral memory table (page 172).
- When a ”trend graph” is used, changes over time in the contents of a numeral memory table can be displayed in the form of a broken line graph (page 176).

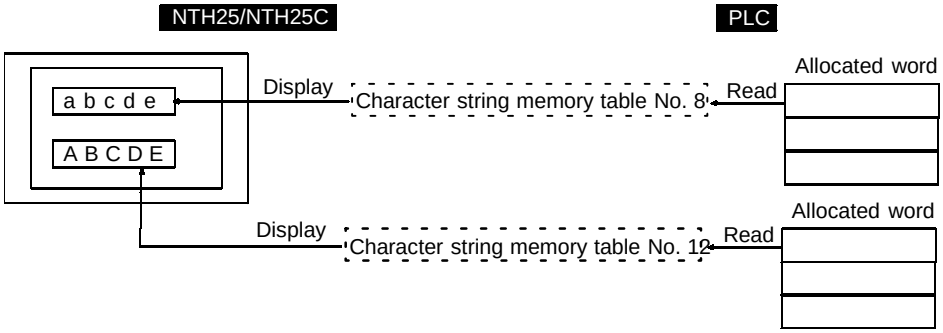
- When a ”numeral input” is used, numerals can be input to the word on the host from an NTH25/NTH25C screen (page 196).
- If the contents of numeral memory tables are changed by operation on the NTH25/NTH25C, the change is notified to the ”numeral input strobe” of the ”PT status notify area” (page 93).

4-4-2 Character String Memory Tables

[Function Outline]

”Character string memory tables” are internal memories for recording character string data. Note, however, that the NTH25/NTH25C does not actually have character string memory tables, so, only the host word (PC address) currently set to the character string memory table is used when a character string display element references a host word. (When screens are created on the Support Tool, set a character string memory table to the character string display element so that the host is artificially referenced via the character string memory table.)

Character string memory tables are allocated character string memory table numbers so that they can be managed and specified individually.



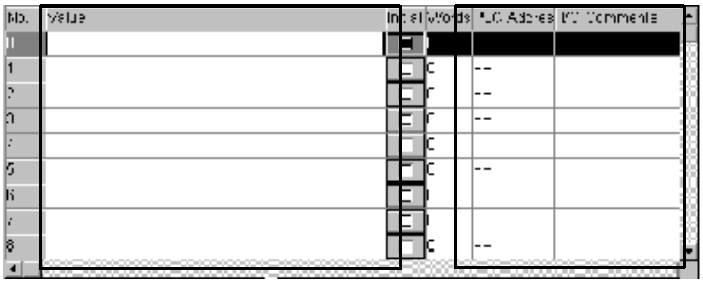
[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Number of character string memory tables	Settable	Not supported
Number of words in character string memory table	Settable	Not settable (fixed to 21 CH)
Value	Used as the initial value of the character string memory table	Not used as the initial value. It is used only as the alarm message for the alarm list/history function.
Initial	Settable	Not supported
Usable characters	Alphanumerics and symbols, marks	Alphanumerics and symbols

[Common Attributes]

Character string memory tables have the following properties.



Only sections enclosed by ☐ are valid.

Property	Possible Settings
	Meaning
Value	Alphanumeric and symbols
	Default character string after the contents of the character string memory table have been initialized. (The default is actually used as the alarm message for the alarm list/history function.)
PLC Address	Any word address on the host
	Host word(s) to which the character string memory table is allocated Specify the first (lower) word. For details, see ”Allocated words” below.
I/O Comment	Up to 16 characters of text
	Comment that describes the contents of a character string memory table

• Allocated words

Character string memory tables can be allocated to the following host (PC) areas.

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation
DM	Data memory		Data memory	
CH	I/O relay		I/O relay	
TIM	Timer present value		Timer present value	
CNT	Counter present value		Counter present value	
HR	Holding relay			
AR	Auxiliary relay		Special auxiliary relay	
LR	Link relay			

: OK : NG

The range of each memory area differs according to the PC type. See Appendix H ”PC Memory Map”, page 321.

[Display Functions]

Character string memory tables themselves have no display function.
To display the contents of character string memory tables, use 4−10 ”Character String Display” (page 166).
The character string that is set as the “Value” is displayed as the message in the ”alarm list” (page 189) and ”alarm history” (page 189) functions.

[Input Functions]

The character string memory table setting is used to read and display the contents of words on the host from the display element.
Note, however, that reading is only executed for those elements that are being used for the currently displayed screen.

[Output Functions]

Character string memory tables have no output function.

[Processing Functions]

Character string memory tables have no data processing function.

[Relationship with Other Elements]

- When ”character string display” is used, the contents of the word on the host can be interpreted and displayed in real time according to the PC address currently set to the character string memory table (page 166).
- When ”alarm list” or ”alarm history” is used, the contents of the “Value” set to the character string memory table can be displayed as a message (page 189).

4-4-3 Bit Memory Tables

[Function Outline]

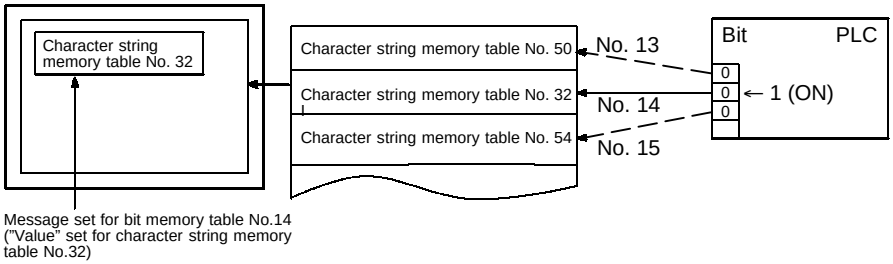
Bit memory tables are internal memories for storing bit data.
They are allocated to a bit on the host to monitor a bit, and can execute a specific function in accordance with the status of that bit.
Bit memory tables are allocated bit memory table numbers so that they can be managed and specified individually.

Bit memory tables have the following functions.

• Alarm list/history function

When the state of the host bit to which a bit memory table is allocated changes to 1 (ON), the “Value” (message) of the character string memory table currently set to the bit memory table is displayed (this is the ”alarm list function”). To use the alarm list function, it must be registered to the screen in advance. If more than one bit memory table is set to the alarm list function, the bit memory table with the smallest bit memory table number is given display priority. So, it is possible to allocate an order of priority to displayed messages.

The date and time when the state of the host bit to which the bit memory table is allocated changes to ”1” (ON) is recorded in the alarm history (this is the ”alarm history function”).
For details, see 4-12 ”Alarm List, Alarm History” (page 189).



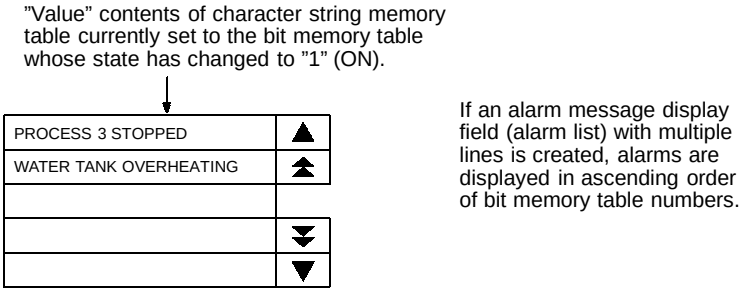
• Operation when using the alarm list/history function

The operation when using the alarm list/history function is as follows.

Reference

- For the alarm list function, display is in ascending order of bit memory table numbers. For the alarm history function, display is in occurrence order (from newest record).
- With the alarm list function, the message is automatically cleared when the host bit to which the bit memory table is allocated returns to ”0” (OFF) during display.

When the state of a bit memory table changes to ”1” (ON), the contents of the currently set character string memory table are displayed as a message.



[Setting Restrictions]

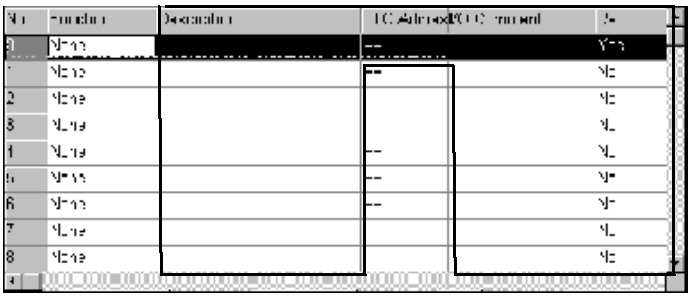
The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Number of bit memory tables	Settable	Not settable (fixed to 240) (bit memory tables 0 to 239)
Allocated bits in bit memory table	Settable in single bits independently to each bit memory table	Only the word number currently set to bit memory table number 0 is supported. (Bit memory table number 0 is automatically allocated in order to bit 0 of the specified word, bit memory table number 1 to bit 1 of the specified word, and so forth until bit memory table number 16 is allocated to bit 0 of the next specified word, after which bit memory table number 0 is allocated to bit 0.)
Character string used as message	Contents of any character string memory table (Character string memory tables can be set independently to each bit memory table.) Multiple lines cannot be displayed.	Default character string (Value) of character string memory tables numbers 0 to 239. (Character string memory tables can be set independently to each bit memory table.) Multiple lines cannot be displayed.
Functions of bit memory table	None, Switch screen, Alarm	Not settable (fixed to Alarm)
Screen switching, screen number	Settable	Not settable (screen switching function not supported)
Image/library code	Settable	Not settable (image/library data can not be displayed)
Recording to alarm history	Settable	Not Settable (always recorded)
Message display color	Settable individually to each bit memory table	Only setting of bit memory table number 0 is supported. (Other bit memory tables are set to the same setting.)

[Common Attributes]

Bit memory tables have the following common properties.

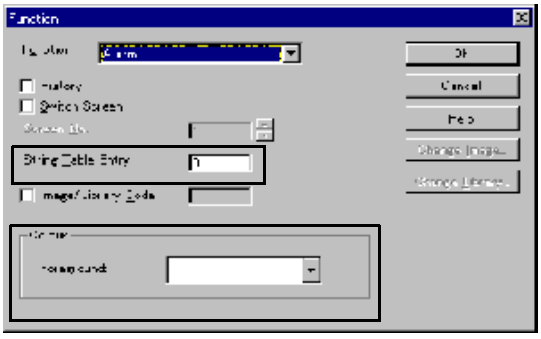
- Common properties



Only sections enclosed by ▭ are valid.

Property	Possible Settings
	Meaning
Description	
	Indicates the settings unique to each function.
PLC Address	Bit number on the bit on host
	Bit on host to which a bit memory table is allocated. On NTH25/NTH25C, only the setting of the word number of bit memory table number 0 is supported. The settings of other PC addresses in the bit memory table are not supported. In this case, bit memory table numbers are automatically allocated in number order as follows: bit memory table number 0 to bit 0 of the specified word, bit memory table number 1 to bit 1 of the specified word and so forth until bit memory table number 16 is allocated to bit 0 of the next specified word, after which bit memory table number 0 is allocated to bit 0 of the specified word.
I/O Comment	Up to 16 characters of text
	Comment that describes the contents of a bit memory table

- Alarm list/history function properties



Only sections enclosed by ▭ are valid.

Property	Possible Settings
	Meaning
String table entry	0 to 239
	Number of the character string memory table whose contents are displayed as a message in the alarm list/history when the state of the allocated bit of the bit memory table changes to ”1” (ON). (”Value” set for the character string)
Foreground color	Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
	Color of message text (only black and white on NTH25) Only the setting of bit memory number 0 is supported.

• Allocated bit

Bit memory table number 0 can be allocated to the following host (PC) areas. (Only the word number is valid. The setting of other allocated bits in the bit memory table are invalid.)

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation
DM	Data memory		Data memory	
CH	I/O relay		I/O relay	
TIM	Timer present value		Timer present value	
CNT	Counter present value		Counter present value	
HR	Holding relay			
AR	Auxiliary relay		Special auxiliary relay	
LR	Link relay			

: OK : NG

The range of each memory area differs according to the PC type. See Appendix H ”PC Memory Map”, page 321.

To specify the data memory (DM), a bit number (00 to 15) must be specified after the word number. Note, however, that the bit number is always handled as 00 actually.

[Display Functions]

Messages are displayed according to the state of the bit memory table if the ”alarm list” and ”alarm history” functions are registered to the screen.

[Input Functions]

The contents of bits to which the bit memory table is currently allocated are always read and processed according to the state of the bit memory table. Note, however, that no processing is carried out when a bit is not allocated to bit memory table number 0.

[Output Functions]

Bit memory tables have no output function.

[Processing Functions]

Bit memory tables have no data processing function.

[Relationship with Other Elements]

- When the alarm list function is used, messages can be displayed in real time in accordance with the state of bits on the host (page 189).
- When the alarm history function is used, the date and time when the state of the host bit changes to ”1” (ON), and the number of times it comes ON, can be displayed (page 189).

Reference When the number of alarm history records exceeds 200, the records are deleted from the oldest record onwards so that new alarm history data can be stored.

4-5 Fixed Displays

”Fixed displays” are graphics and text that are always displayed on the screen and do not change. This section gives details of fixed displays.

The following types of fixed display are available:

- Text Page 119
- Circle Page 109
- Arc Page 109
- Sector Page 109
- Polyline Page 109
- Polygon Page 109
- Rectangle Page 109
- Tiling Page 123
- Mark Page 126

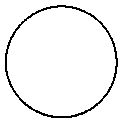
Reference The Support Tool also includes image data and library data as fixed display elements, but since these are functionally different, they are described separately in this manual. For details on image and library data, see 4–6 ”Image and Library Data” (page 130).

4-5-1 Circles, Arcs, Sectors, Polylines, Polygons, Rectangles (fixed displays)

[Function Outline]

These are graphics that are always displayed. Standard, inverse, flash, and inverse flash displays are possible depending on the type of graphic.
Since fixed display graphics are always displayed in the order in which they were created on the Support Tool (graphics created later overlay those created earlier), their order must be taken into consideration when creating them. Note, however, that the display order within a fixed display graphic can be changed using the Support Tool.

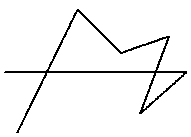
Circle



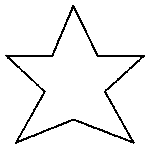
Arc

Sector

Polyline



Polygon



Rectangle

* A continuous straight line with up to 256 intermediate points can be drawn.

* A polygon with up to 255 vertices can be drawn.

[Restrictions]

- Up to 65535 of the following graphics can be registered on one screen. (The same applies to window screens.)

  Fixed display text, circles, arcs, sectors, polylines, polygons, rectangles, tiling, marks

  There is no restriction on the number of graphics that can be registered to one screen data file; any number can be registered as long as the maximum data file size is not exceeded.

- One polyline can comprise up to 256 linked points including the start and end points.
- One polygon can be given up to 255 vertices.
- It is not possible to create elements which project out of the screen area (except for those parts of elements which are not actually drawn, such as the center point of an arc).
- Graphics such as circles, sectors, polylines, polygons and rectangles, whose inside area is tiled when they are displayed in reverse, are sometimes not tiled correctly if other graphics are drawn behind them. If this happens, either change the display order on the Support Tool, or change their color. (If such a graphic is a polygon, you can also change its tiling attribute point.)

[Common Attributes]

The common attributes are described separately for each element.

[Display Functions]

• Arcs

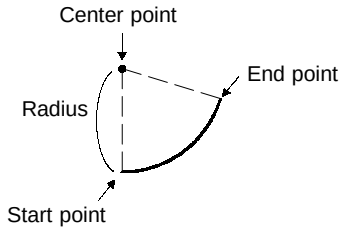
The following shows the relationship between the properties of an arc and the displayed graphic.

• Properties

General			
	Position		
		Center point	Coordinates of the center of the circle that includes the arc
		Start point	Coordinates of the start point of an arc
		End point	Coordinates of the end point of an arc
	Size		
		Radius	Radius of the circle that includes the arc (dot units)
	Attribute		Display mode for the arc (“Display attribute and drawing result”, page 111. Standard/Inverse/Flash/Inverse Flash
	Color		
		Foreground	Display color of the arc (colors other than black and white featured with NTH25C only) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White

The line style is fixed as ”solid” and thickness is fixed as one dot.

On the Support Tool, specify the center point, start point and end point as follows. When the start point is set, the radius is automatically set accordingly.



• Display attribute and drawing result

Attribute	Drawing Result
Standard	Only the line of the arc is drawn in the foreground color. 
Inverse*1	The arc drawn between its start and end points is displayed in the foreground inverse color.  Inverse color display
Flash	Repeated alternation between ”standard” display and no display.  ⇔ No display
Inverse Flash*1	Repeated alternation between ”inverse” and no display.  ⇔ No display Inverse color display

*1 If the arc’s background color is set to the same color as the inverse color of ”line color”, the arc will become invisible. Change either ”line color” or the background color.

• Circle

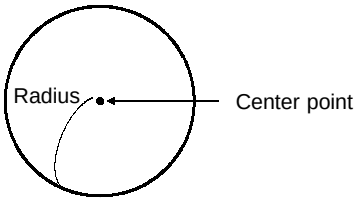
The following shows the relationship between the properties of a circle and the displayed graphic.

• Properties

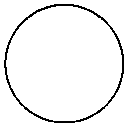
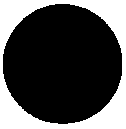
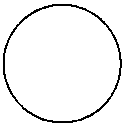
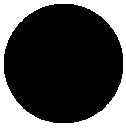
General		
Position		
	Center point	Coordinates of the center of the circle
Size		
	Radius	Radius of the circle (dot units)
Attribute		Display mode for the circle (“Display attribute and drawing result”, below). Standard/Inverse/Flash/Inverse Flash
Color		
	Foreground	Display color of the circle (colors other than black and white featured with NTH25C only) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White

The line style is fixed as ”solid” and thickness is fixed as one dot.

On the Support Tool, specify the center point and radius as follows.



• Display attribute and drawing result

Attribute	Drawing Result
Standard	Only the line of the circle periphery is drawn in the foreground color. 
Inverse*1	The entire circle is displayed in the foreground inverse color. 
Flash	Repeated alternation between ”standard” display and no display.  ⇔ No display
Inverse Flash*1	Repeated alternation between ”inverse” and no display.  ⇔ No display

*1 If the circle’s background color is set to the same color as the inverse color of ”foreground color”, the circle will become invisible. Change either ”foreground color” or the background color.

• Rectangle

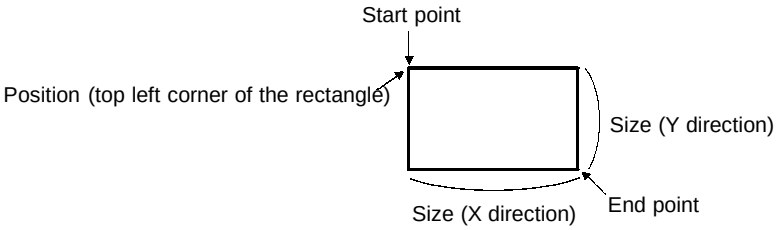
The following shows the relationship between the properties of a rectangle and the displayed graphic.

• Properties

General		
	Position	Coordinates of the top left vertex of the rectangle
	Size	Width and height of the rectangle (dot units)
	Attribute	Display mode for the rectangle (“Display attribute and drawing result”, below). Standard/Inverse/Flash/Inverse Flash
	Color	
	Foreground	Display color of the rectangle (colors other than black and white featured with NTH25C only) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White

The line style is fixed as ”solid” and thickness is fixed as one dot.

On the Support Tool, specify the start point and end point as follows. (It is not necessary to draw the rectangle from top left to bottom right). The position and size are automatically set by specifying the start point and end point.



• Display attribute and drawing result

Attribute	Drawing Result
Standard	Only the boundary line of the rectangle is drawn in the foreground color.
Inverse*1	The entire rectangle is displayed in the foreground inverse color.
Flash	Repeated alternation between ”standard” display and no display. ⇔ No display
Inverse Flash*1	Repeated alternation between ”inverse” and no display. ⇔ No display

*1 If the rectangle’s background color is set to the same color as the inverse color of ”foreground color”, the rectangle will become invisible. Change either ”foreground color” or the background color.

• Polygon

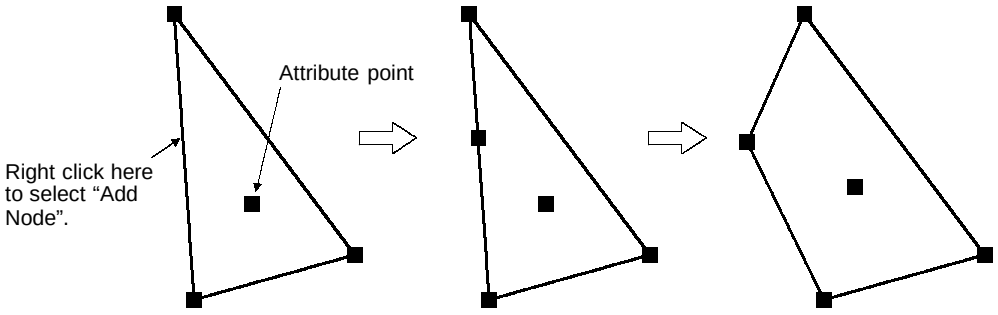
The following shows the relationship between the properties of a polygon and the displayed graphic.

• Properties

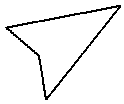
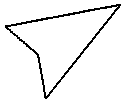
General		
	Attribute	Display mode for the polygon. (See ”Display attribute and drawing result”, page 115.) Standard/Inverse/Flash/Inverse Flash
	Foreground color	
	Line color	Display color of the polygon (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
	Attribute Point	Coordinates of the point that will be the start position for tiling in inverse display or inverse flashing display.

The line style is fixed as ”solid” and thickness is fixed as one dot.

On the Support Tool, create the polygon by changing the number and position of the vertices using a triangle as the base graphic element. The attribute point is automatically set inside the polygon (its position can be changed).

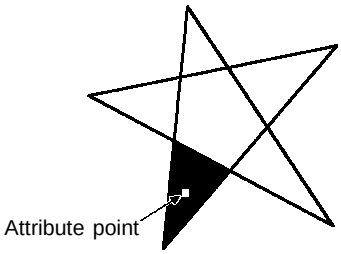


• Display attribute and drawing result

Attribute	Drawing Result
Standard	Only the contour of the polygon is drawn in the foreground color. 
Inverse*1	The inside of the polygon is displayed in the foreground inverse color (see below). 
Flash	Repeated alternation between ”standard” display and no display.  ⇔ No display
Inverse Flash*1	Repeated alternation between ”inverse” and no display (see below).  ⇔ No display

*1 If the polygon’s background color is set to the same color as the inverse color of ”foreground color”, the polygon will become invisible. Change either ”foreground color” or the background color.

If inverse or inverse flash display is set for a polygon with multiple closed areas, like the one shown below, only the closed area that contains the attribute point is tiled.



• Polyline

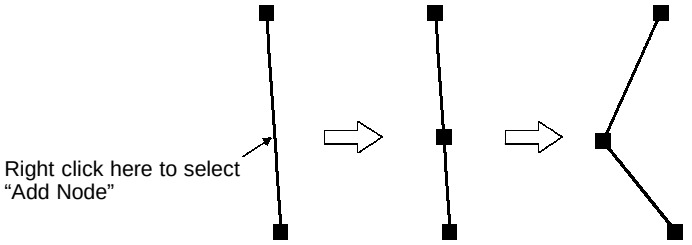
The following shows the relationship between the properties of a polyline and the displayed graphic.

• Properties

General		
	Line Style	Line type used for the polyline Solid —————— Dash — — — — — — — — — Dot-dash -·-·-·-·-·-·-·-·-·- Dot-dot-dash -··-··-··-··-··-
	Attribute	Display mode for the polyline. (See ”Display attribute and drawing result”, below.) Standard/flash
	Color	
	Foreground	Display color of the polygon (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White

The line thickness is fixed as one dot.

On the Support Tool, create the polyline by changing the number and position of the vertices using a straight line as the base graphic element.



• Display attribute and drawing result

Attribute	Drawing Result
Standard	The polyline is displayed in the foreground color all the time.
Flash	Repeated alternation between ”standard” display and no display. ⇔ No display

• Sector

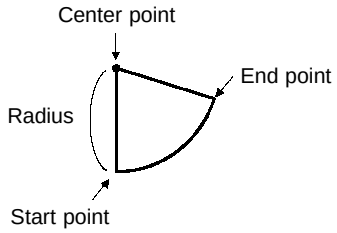
The following shows the relationship between the properties of a sector and the displayed graphic.

• Properties

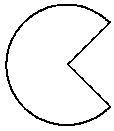
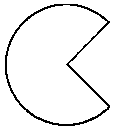
General		
	Position	
		Center point: Center coordinates of the circle that includes the sector
		Start point: Coordinates of the start point of the sector
		End point: Coordinates of the end point of the sector
	Size	
		Radius: Radius of the circle including the sector (unit: dot)
	Attribute	Display mode for the sector. (See ”Display attribute and drawing result”, page 118.) Standard/Inverse/Flash/Inverse Flash
	Foreground color	
		Line color: Display color of the sector (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White

The line style is fixed as ”solid” and thickness is fixed as one dot.

On the Support Tool, specify the center point, start point, and end point as follows. The radius is automatically set according to the specified start point.



• Display attribute and drawing result

Attribute	Drawing Result
Standard	Only the boundary line of the sector is drawn in the foreground color. 
Inverse*1	The entire sector is displayed in the foreground inverse color. 
Flash	Repeated alternation between ”standard” display and no display.  ⇔ No display
Inverse Flash*1	Repeated alternation between ”inverse” and no display.  ⇔ No display

*1 If the sector’s background color is set to the same color as the inverse color of ”foreground color”, the sector will become invisible. Change either ”foreground color” or the background color.

[Input Functions]

There are no input functions for circles, arcs, sectors, polylines, polygons, or rectangles.

[Output Functions]

There are no output functions for circles, arcs, sectors, polylines, polygons, or rectangles.

[Processing Functions]

There are no data processing functions for circles, arcs, sectors, polylines, polygons, or rectangles.

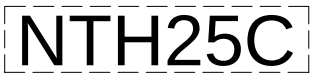
[Relationship with Other Elements]

- When tiling is used, the inside of an area enclosed by a continuous solid line of the same color can be tiled with a specified pattern (page 123). Note, however, that if the line is broken at any point, or if it flashes or is deleted, the tiling pattern will project and cover the area outside the line as well. Tiling will also spread outside the intended boundary line, in accordance with the display order, if it is displayed before the boundary line.
- It is possible to group multiple fixed display elements as a single library data by combining multiple fixed display elements. If the display attribute for any of the elements when you are registering the element is ”Flash” or ”Inverse Flash”, the display flashes in accordance with this setting. The timing of the flashing is the same for all elements.
- Both text (page 119) and mark (page 126) fixed displays will overlap each other in accordance with the order in which they were created. Note, however, that you can change the way in which they overlap using the Support Tool.

4-5-2 Text (Fixed Display)

[Function Outline]

These are character strings that are continually displayed as a fixed display. Standard, flash, and inverse flash displays are possible. (Inverse display can be specified by swapping the foreground color and background color of the character string.)
Since the display order will always follow the order in which the elements are created on the Support Tool (character strings created later overlay others created earlier), the order in which text is created must be taken into consideration when character strings are going to overlap.
On the NTH25/NTH25C, character strings are not allowed to contain marks (character code FF20 to FFFF Hex). (Marks are treated as invalid codes and are displayed as two standard characters.)



[Restrictions]

- Up to 65535 of the following graphics can be registered on one screen. (The same applies to window screens.)

  Fixed display text, circles, arcs, sectors, polylines, polygons, rectangles, tiling, marks

  There is no restriction on the number of graphics that can be registered to one screen data file; any number can be registered as long as the maximum data file size is not exceeded.

- The following numbers of characters can be displayed in one text display element, depending on the scale:

  1 x 1 (equal): Up to 40 characters
  1 x 2 (high): Up to 40 characters
  2 x 1 (wide): Up to 20 characters
  2 x 2: Up to 20 characters
  4 x 4: Up to 10 characters
  8 x 8: Up to 5 characters
  (3 x 3 characters set on the Support Tool are displayed as 2 x 2 characters on the NTH25/NTH25C.)

- Note, however, that if the text size exceeds the screen size, the Support Tool changes its display position automatically so that the text is displayed to fit inside the screen. If the text can not be displayed within the screen even if the Support Tool has changed its position, an error message will be displayed. In this case, change the number of characters or scale of the text so that the text fits inside the screen.

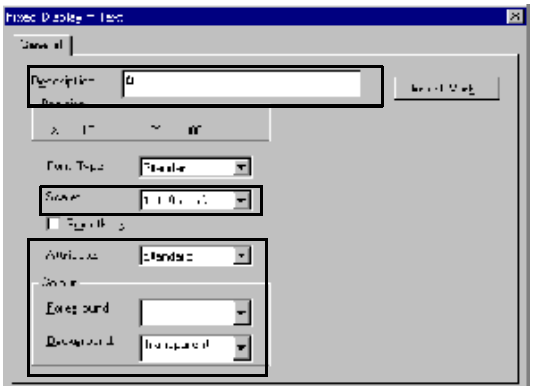
[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Half height font	Settable	Not supported (displayed as standard font)
Character size 3 x 3	Settable	Not supported (displayed as 2 x 2 character)
Smoothing	Settable	Not supported (displayed without smoothing)
Foreground color ”transparent”	Settable	Not supported (displayed as black on the NTH25, and white on the NTH25C)

[Display Functions]

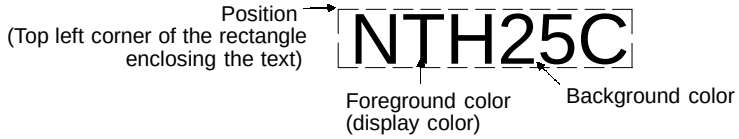
The following shows the relationship between the properties of a text display element and the displayed text.



Only sections enclosed by ☐ are valid.

• Properties

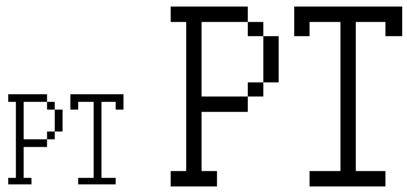
General		
	Description	Displayed text Alphanumerics and symbols, Marks
	Position	Coordinates of the top left corner of the rectangle that encloses the text to be displayed.
	Scale	Scale at which the text is displayed ("Enlarged display", below). 1 x 1 (equal), 1 x 2 (high), 2 x 1 (wide), 2 x 2, 4 x 4, 8 x 8 (3 x 3 characters set on the Support Tool are displayed as 2 x 2 characters on the NTH25/NTH25C.)
	Attribute	Display mode for the text (See "Display attribute and drawing result", page 122). Standard/Flash/Inverse Flash
	Color	
	Foreground	Display color of the text (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White/ (Even if "transparent" is set, it is displayed as black on the NTH25 and white on the NTH25C.)
	Background	Background color of the text (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White/ Transparent



• Enlarged display

Character strings (text and marks) can be displayed at the following scales:

1×1 (Equal) 2×1 (Wide) 1×2 (High) 2×2



4×4 8×8

3 x 3 characters set on the Support Tool are displayed as 2 x 2 characters on the NTH25/NTH25C.

• Display attribute and drawing result

Attribute	Drawing Result
Standard	The text element is displayed at the specified foreground color and background color. ABCDEFG
Flash	Repeated alternation of the ”standard” display and no display. ABCDEFG ⇔ No display
Inverse Flash*1	Repeated inverted display of each of the foreground and background colors and no display. ABCDEFG ⇔ No display

*1 If the text’s background color is set to the same color as the inverse color of ”foreground color” and the background color is set to ”transparent”, the text will become invisible. Either change the foreground color or the background color, or set the background color to a color other than ”transparent.”

[Input Functions]

Text displays have no input function.

[Output Functions]

Text displays have no output function.

[Processing Functions]

Text displays have no data processing function.

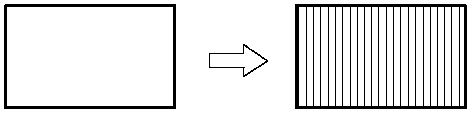
[Relationship with Other Elements]

- It is possible to group multiple fixed display elements as a single library data by combining multiple fixed display elements. If the display attribute for any of the elements when you are registering the element is ”Flash” or ”Inverse Flash”, the display flashes in accordance with this setting. The timing of the flashing is the same for all elements.
- Circles, arcs, sectors, polylines, polygons, rectangles (page 109) and marks (page 126) overlap each other in accordance with the order in which they were created. Note, however, that you can change the way in which they overlap using the Support Tool.

4-5-3 Tiling

[Function Outline]

An area enclosed by a solid line of a specified color is tiled with the specified tiling pattern.



[Restrictions]

- Up to 65535 of the following graphics can be registered on one screen. (The same applies to window screens.)

  Fixed display text, circles, arcs, sectors, polylines, polygons, rectangles, tiling, marks

  There is no restriction on the number of graphics that can be registered to one screen data file; any number can be registered as long as the maximum data file size is not exceeded.

- The area to be tiled must be enclosed by a solid line of the same color. If the line is broken at any point, or if it flashes or is deleted, the tiling pattern will project and cover the area outside the line as well. Tiling will also spread outside the intended boundary line, in accordance with the display order, if it is displayed before the border line.

- Depending on the combination of the foreground color (wheb tiled) and the background color of a graphic, part of the frame of the graphic may be invisible. This is a phenomenon peculiar to a color LCD, not a failure of the PT. If this causes a problem, change the color combination.
  The line thickness of images on the Support Tool differs from that on the NTH25/NTH25C. Be sure to check the display on the NTH25/NTH25C.

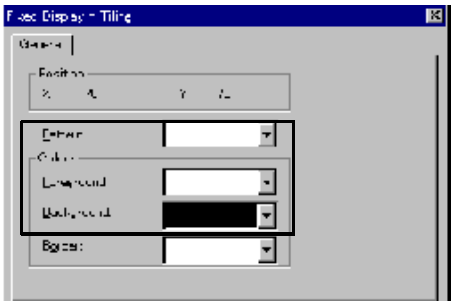
[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Border	Settable	Not settable (”Foreground color” is used as border color.)
Tiling pattern ”Box,” ”Grid” and ”border”	Settable	Not supported (Displays ”Uniform”.)
Tiling pattern ”Slant right” and ”Slant left”		The foreground color becomes the background color, and vice versa.
Background color ”transparent”	Settable	Not settable (displayed as black on NTH25 and white on the NTH25C)

[Display Functions]

The following shows the relationship between the tiling properties and tiling method.



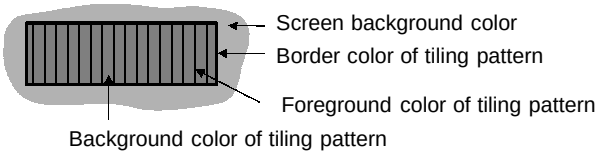
Only sections enclosed by ☐ are valid.

• Properties

General		
	Position	Coordinates where tiling starts
	Pattern	Tiling pattern (See ”Pattern and color”, page.125) Uniform, Slant right, Box (Not supported), Crosshatch, Slant left, Grid (Not supported), Stripe, Border (Not supported), Diamond, Halftone (On the NTH25/NTH25C, ”Box”, ”Grid” and ”Border” are displayed as ”Uniform” and slant right and slant left are displayed with their foreground color swapped with the background color, and vice versa.)
	Color	
		Foreground: Display color of the tiling pattern (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
		Background: Background color of the tiling pattern (colors other than black, white, and transparent featured with NTH25C only) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White/ Transparent (Even if ”transparent” is set, it is displayed as black on the NTH25 and white on the NTH25C.)

• Pattern and color

The following shows the relationship between pattern and color, taking the ”Stripe” pattern as an example.



[Input Functions]

Tiling has no input function.

[Output Functions]

Tiling has no output function.

[Processing Functions]

Tiling has no data processing function.

[Relationship with Other Elements]

- Tiling can also be included in library data displays with other graphics.
- Circles, arcs, sectors, polylines, polygons, rectangles (page 109) and marks (page 126) overlap each other in accordance with the order in which they were created. Note, however, that you can change the way in which they overlap using the Support Tool.
- ”Color Palette Symbol” is supplied with NT−series Support Tool for Windows 95/98 (Ver. 3.0). For color palette symbols, combinations of foreground and background colors are registered by each tiling pattern.
  By copying the symbol, you can register the required tiling object on a screen easily while checking the display status of color palette symbols. For details, see the Operation Manual for the Support Tool (V053−E1−). Note, however, that some tiling pattern (box, grid) palette symbols are not supported on NTH25/NTH25C.

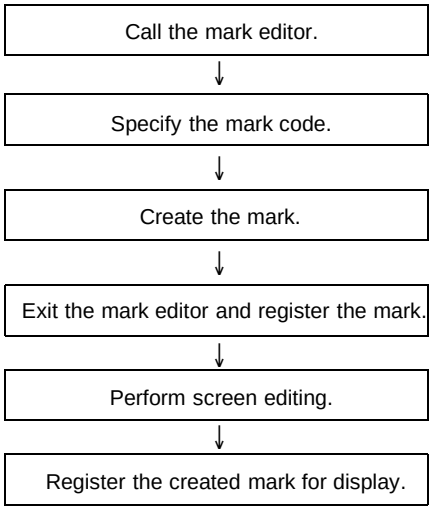
4-5-4 Marks

[Function Outline]

Marks are pictograms comprising 16 by 16 dots. They are allocated to character codes for use.
Marks are created with the mark editor on the Support Tool, independently of screens, and as many as required can be displayed at any position on any screen.

• Procedure for creating and using marks

The following briefly describes the procedure for creating marks and registering them on a screen. For details, see the Operation Manual for the Support Tool.



[Restrictions]

- Up to 83 marks can be created for one screen data file. Each of the marks is allocated any required character code within the range FF20 to FF72 Hex so that it can be managed and specified. Though any code up to FFFF Hex can be registered on the Support Tool, do not use FF73 Hex onwards as these codes are reserved for the system.
- Up to 65535 of the following graphics can be registered on one screen. (The same applies to window screens.)

  Fixed display text, circles, arcs, sectors, polylines, polygons, rectangles, tiling, marks

  There is no restriction on the number of graphics that can be registered to one screen data file; any number can be registered as long as the maximum data file size is not exceeded.

[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

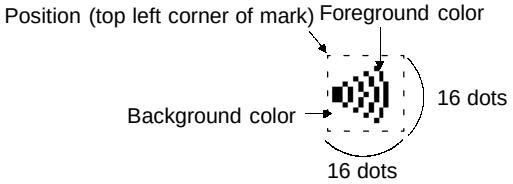
Item	Support Tool	NTH25/NTH25C
Mark size 3 x 3	Settable	Not supported (Displays in 4 x 4)
Foreground color ”transparent”	Settable	Not supported (displayed as black on the NTH25 and white on the NTH25C)
Insertion of marks in character strings	Possible	Not possible (displayed as a two standard character space)

[Display Functions]

The following shows the properties of mark displays and their relationship with character strings to be displayed. (Though mark properties are subject to several restrictions, all of the items are supported.)

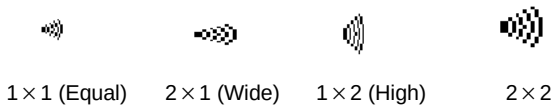
• Properties

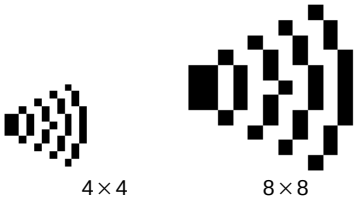
General		
	Position	Coordinates of the top left corner of the mark
	Code	Character code of the mark FF20 to FF83 Hex
	Attribute	Display mode for the mark. (See ”Display attribute and drawing result”, page xx.) Standard/Flash/Inverse Flash
	Size	Scale at which the mark is displayed. (See ”Enlarged display”, page 128) 1 x 1 (equal), 1 x 2 (high), 2 x 1 (wide), 2 x 2, 4 x 4, 8 x 8 (3 x 3 characters set on the Support Tool are displayed as 2 x 2 characters on the NTH25/NTH25C.)
	Color	
	Foreground	Display color of the mark (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White/ (Even if ”transparent” is set, it is displayed as black on the NTH25 and white on the NTH25C.)
	Background	Background color of the mark (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White/ Transparent



• Enlarged display

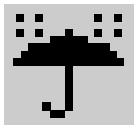
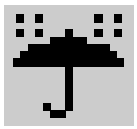
Marks can be displayed at the following scales:





3 x 3 characters set on the Support Tool are displayed as 2 x 2 characters on the NTH25/NTH25C.

• Display attribute and drawing result

Attribute	Drawing Result
Standard	The mark is displayed at the specified foreground color and background color. 
Flash	Repeated alternation of the ”standard” display and no display.  ⇔ No display
Inverse Flash *1	Repeated inverted display of each of the foreground and background colors and no display.  ⇔ No display

*1 If the mark’s background color is set to the same color as the inverse color of ”foreground color” and the background color is set to ”transparent”, the marks will become invisible. Either change the foreground color or the background color, or set the background color to a color other than ”transparent.”

[Input Functions]

Marks have no input function.

[Output Functions]

Marks have no output function.

[Processing Functions]

Marks have no data processing function.

[Relationship with Other Elements]

- It is possible to group multiple fixed display elements as a single library data by combining multiple fixed display elements. If the display attribute for any of the elements when you are registering the element is ”Flash” or ”Inverse Flash”, the display flashes in accordance with this setting. The timing of the flashing is the same for all elements.
- Marks overlap with other fixed display elements in accordance with the order in which they were registered. Note, however, that you can change the way in which they overlap using the Support Tool.

4-6 Image and Library Data

4-6-1 Image Data Display

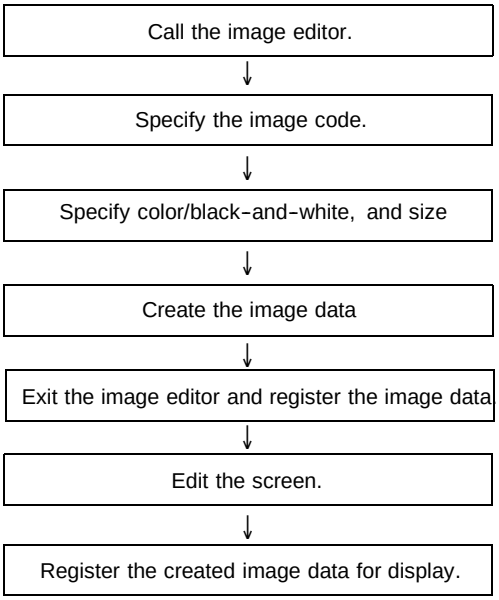
[Function Outline]

”Image data” are images composed of dots.
Image data are created using the image editor on the Support Tool, independently of screens, and as many image data as required can be displayed at any position on any screen. It is also possible to import files in the Windows BMP format and register them as image data.
Registering frequently used and complex images as image data allows them to be displayed easily whenever required.

Each dot of the image data can be given eight colors.

- Procedure for creating and using image data

The following briefly describes the procedure for creating image data and registering them to a screen. For details, see the Operation Manual for the Support Tool.



[Restrictions]

- Up to 30 image data can be created in one screen data file. Each of the image data is allocated any code within the range 0001 to 001E Hex (image/library code range) so that it can be managed and specified. The data registered from code 001F Hex onwards is invalid.
- Up to 64 image data can be registered to one screen. Note, however, that more than a total of 257 image data and library data cannot be displayed in one screen.
- The size of image data is determined as follows for each image code.

Image code	Width (dots)	Height (dots)
0001, 0002 Hex	128	64
0003 to 0006 Hex	64	64
0007 to 000E Hex	32	64
000F to 001E Hex	32	32

Though image data can be specified at any size in multiples of eight on the Support Tool, note that the actual image size is already determined to each code on the NTH25/NTH25C.
If the image size set on the Support Tool does not match the above sizes, the image data is placed so that its upper left corner is matching, surplus parts are displayed in black and area projecting off screen are ignored.

- The codes used for image data are dedicated for image/library data use only.
- Image data that projects out of the screen area cannot be specified.
- Compressed image data is not displayed correctly on the NTH25/NTH25C. Be sure to uncheck ”Compression” before you create and register image data.

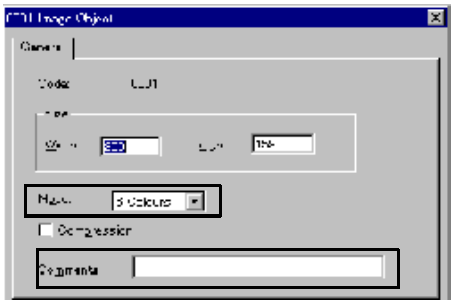
[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

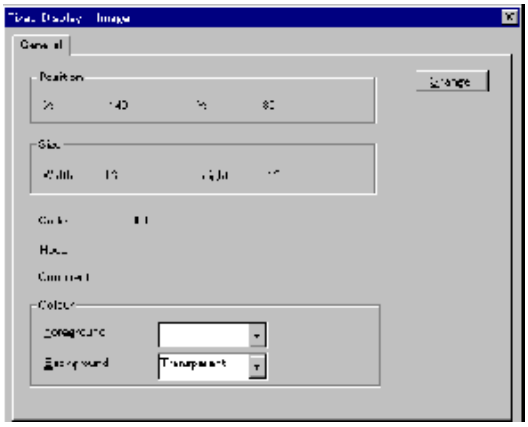
Item	Support Tool	NTH25/NTH25C
Image size	Any size can be set at multiples of eight in the horizontal and vertical directions.	Size is fixed by image code. (See ”Restrictions” above.)
Data compression	Settable	Not settable (fixed to ”Compression OFF”)
Foreground color, background color	Settable	Not settable (displayed as black and white)

[Display Functions]

The following shows the relationship between properties of image data and their method of display.

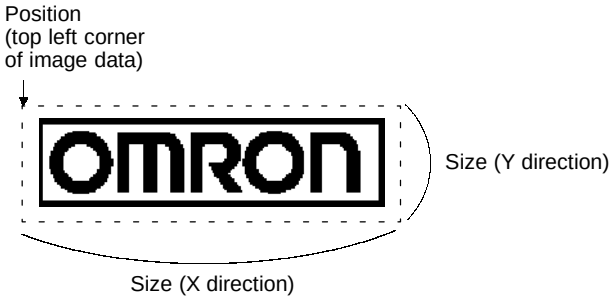


Only sections enclosed by ☐ are valid.



- Properties

General		
	Position	Coordinates of the top left corner of the image data
	Size	Size of the image data
	Code	Image/library code of the image data 0001 to 001E Hex
	Mode	Color mode of the image data (specified by the image editor) 2 Colors/8 Colors (Even in the 2 Colors mode, the foreground color and background color are not supported on the NTH25C, and are displayed as white and black at all times.)
	Comment	Comment allocated to the image data (specified by the image data)



- When an unregistered code is specified

Processing is as follows when a code to which no image data is registered is specified:

- Image code 0001 to 001E Hex

  The symbol (⊠) indicating an unregistered code is displayed on the Support Tool. On the NTH25/NTH25C, however, the image size corresponding to the specified code is displayed tiled at the matching position from the top left corner.

- Image code 001F to 0FFF Hex
  The symbol (⊠) indicating an unregistered code is displayed on the Support Tool, but on the NTH25/NTH25C nothing is displayed.

[Input Functions]

Image data have no input function.

[Output Functions]

Image data have no output function.

[Processing Functions]

Image data have no data processing function.

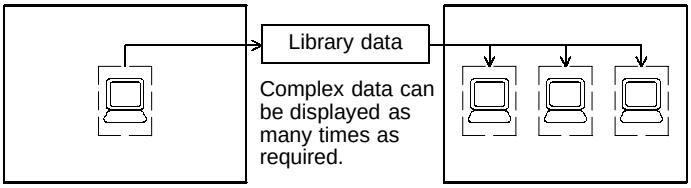
[Relationship with Other Elements]

- Difference between image data and library data
  Image data can take any form as it is composed of dots, but library data can only be formed by combining fixed display–text or graphics.
  Since only drawing information for text and graphics is registered as the library data, library data is lighter than image data, which requires all the dots to be displayed on the screen to be registered as data.
  Another difference is that ”flash” and ”inverse flash” display are not possible for image data, whereas library data can be displayed in these display modes in accordance with the display attributes of the registered elements. All elements flash at the same time.
- it is possible to specify different image/library data for the graphic displayed when a lamp (image/library lamp) is ON and OFF (page 137).
- Image data elements overlap with other fixed display elements in accordance with the order in which they were registered. Note, however, that you can change the way in which they overlap using the Support Tool.

4-6-2 Library Data Display

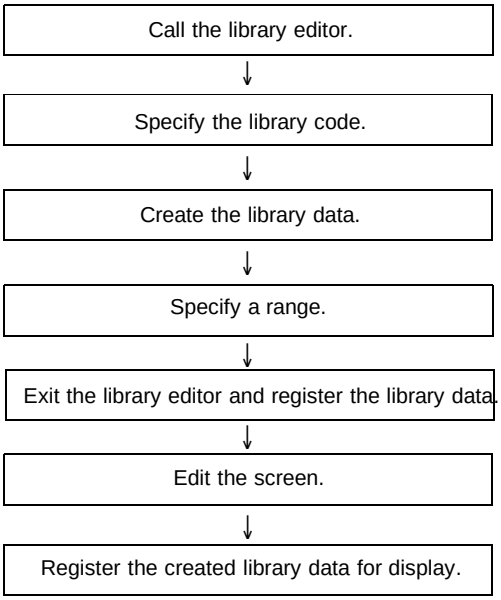
[Function Outline]

"Library data" are grouped multiple fixed display−text and graphic elements registered as a single element. Library data can be registered in any required size.
Library data are created using the library editor on the Support Tool, independently of screens, and as many library data as required can be displayed at any position on any screen.
Registering frequently used and complex images as library data allows them to be displayed easily whenever required.
Since the individual elements within a library data are displayed in the order they were created using the Support Tool (graphics created later overlay those created earlier), the order must be taken into consideration when creating them.



• Procedure for creating and using library data

The following briefly describes the procedure for creating library data and registering them to a screen. For details, see the Operation Manual for the Support Tool.



Reference

When creating lamps on the NTH25C (color type) screen using the NT-series Support Tool (Ver 3.0), pay attention to the following.

- When the "background color" screen property is set to a color other than black, the light ON and OFF colors of the lamp are not displayed correctly.
  To correctly light the lamp, either tile a fixed graphic of the same size as the lamp and place it so that it overlaps the lamp, or use regular tiling without using the "background color" screen property.

[Restrictions]

- Up to 3980 library data can be created in one screen data file. Each of the library data is allocated any code within the range 1000 to 1F8B Hex (image/library code range) so that it can be managed and specified.
- A total of up to 256 of library data can be registered to one screen. Note, however, that more than a total of 257 image data and library data cannot be displayed in one screen.
- The maximum number of elements that can be registered to one library data is 64.
- The following fixed display elements can be registered in library data. Other elements cannot be registered.

  Text, circles, arcs, sectors, polylines, polygons, rectangles, tiling, marks
- The codes used for library data are dedicated for image/library data use only.
- It is not possible to create library data which project out of the screen area.

[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

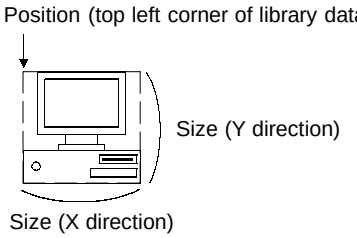
Item	Support Tool	NTH25/NTH25C
Maximum number of library data	12288	3980
Library code	1000 to 3FFF Hex	1000 to 1F8B Hex

[Display Functions]

The following shows the relationship between properties of library data and their method of display. (Though library data properties are subject to several restrictions, all of the items are supported.)

• Properties

General		
	Position	Coordinates of the top left corner of the library data
	Size	Size of the library data
	Code	Image/library code of the library data 1000 to 1F8B Hex
	Comment	Comment allocated to the library data (specified by the library editor)



- When an unregistered code is specified

When a code to which no library data is registered is specified, the symbol ( ) indicating an unregistered code is displayed on the Support Tool, but on the NTH25/NTH25C nothing is displayed.

[Input Functions]

Library data have no input function.

[Output Functions]

Library data have no output function.

[Processing Functions]

Library data have no data processing function.

[Relationship with Other Elements]

- Difference between image data and library data
  Image data can take any form as it is composed of dots, but library data can only be formed by combining fixed display–text and graphics.
  Since only drawing information for text and graphics is registered as the library data, library data is lighter than image data, which requires all the dots to be displayed on the screen to be registered as data.
  Another difference is that ”flash” and ”inverse flash” display are not possible for image data, whereas library data can be displayed in these display modes in accordance with the display attributes of the registered elements. All elements flash at the same time.
- It is possible to specify different image/library data for the graphic displayed when a lamp (image/library lamp) is ON and OFF (page 137).
- Library data elements overlap with other fixed display elements in accordance with the order in which they were displayed. Note, however, that you can change the way in which they overlap using the Support Tool.

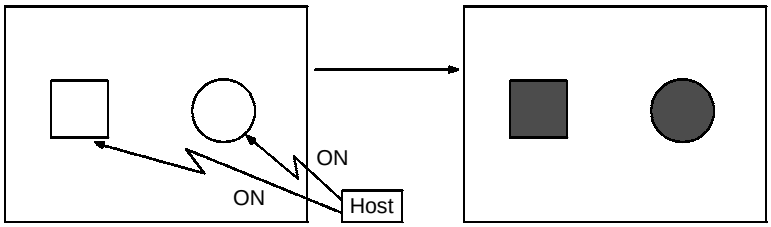
4-7 Lamps

[Function Outline]

”Lamps” are graphics that change according to the change in state of a currently set bit. Lamps are classified into the following two major categories:

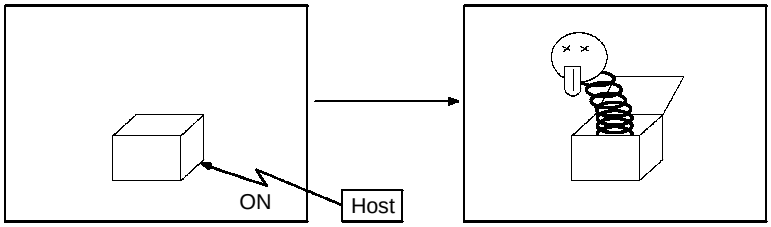
• Normal (standard) lamps

Normal (standard) lamps change the display state (OFF/ON/flashing) of fixed display graphics.



• Image/library lamps

Image/library lamps display independent graphics (image/library data) in the ON and OFF states.

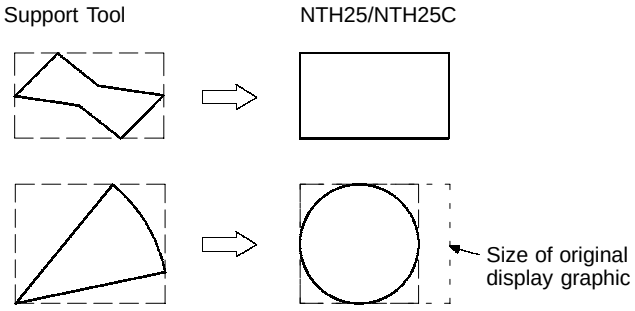


Lamps are arranged and set on the screen when creating screen data using the Support Tool.

[Restrictions]

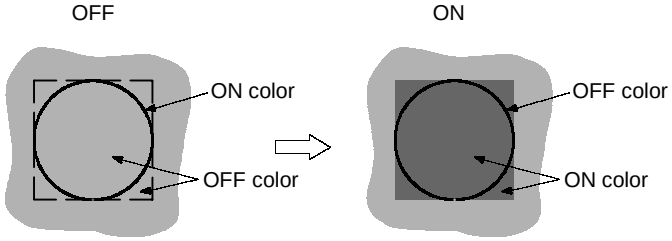
- Up to 64 standard lamps and image/library lamps can be registered to one screen respectively.
  Though more than 65 standard lamps and image/library lamps each can be registered to a screen on the Support Tool, note that on the NTH25/NTH25C, however, each of the lamps exceeding 64 lamps are discarded. The order in which this number is exceeded is from the display order with the smallest number. (Normally, the order in which lamps were created becomes the display order. This display order can be changed using the Support Tool.)
- Up to 64000 standard lamps and up to 12800 image/library lamps can be registered to one screen data file.
  On the Support Tool, any number of standard lamps and image/library lamps can be registered to one screen data file. On the NTH25/NTH25C, however, note that excess lamps are discharged if the number of registered lamps exceeds the maximum permissible number as they are displayed in screen number order. On the same screen, the order in which this number is exceeded is from the display order with the smallest number. (Normally, the order in which lamps were created becomes the display order. This display order can be changed using the Support Tool.)

- Image/library lamps are subject to the maximum simultaneous display restriction imposed on image and library data. This means that only up to a total of 64 image/library lamps, image data and library data can be displayed on one screen.
- On the Support Tool, you can select four types of graphics, rectangles, polygons, circles and sectors as the display graphics for standard lamps. On the NTH25/NTH25C, however, polygons are displayed as a rectangle of the same ”size” and sectors are displayed as a circle inscribing the maximum size of the sector of the same area. (Rectangles and circles are displayed in the same way that they were created.) Do not use polygons and sectors as their display on the NTH25/NTH25C differs with that on the Support Tool.



If the aspect ratio of the original sector is not 1:1, the circle is shifted towards the top left of the sector area.

- When a circular standard lamp turns ON on the NTH25/NTH25C, all OFF colors inside the rectangular area circumscribing the circle are changed to the ON color. For this reason, when the periphery color of a circular standard lamp is the same as the OFF color, the entire rectangular area changes color to the ON color as shown below.



If this happens, change the background color or OFF color.

- When the memory link is in use, lamp numbers 1 to 64 are appended to standard lamps, and image/library lamps in their respective display order. (Standard lamps are counted separately from image/library lamps.)
  Bits corresponding to a lamp number must be set as shown in the following table to lamp bits (bits for controlling lamp states) when the memory link is used. (Standard lamps operate independently of image/library lamps even if the same bit number is set.)

Lamp number	Corresponding bits
1 to 16	00000 to 00015
17 to 32	00100 to 00115
33 to 48	00200 to 00215
49 to 64	00300 to 00315

- If library data projects out of the screen when it is displayed on image/library lamp, nothing is displayed. Normally, the library data is set so that it does not project out of the screen by the Support Tool.
- Processing is as follows when nothing is registered to a specified code on an image/library lamp:

  Code 0001 to 001E Hex:
  The lamp is tiled black at the image size corresponding to the code. (See page 131.)

  Code 001F Hex onwards:
  Nothing is displayed.
- Restrictions on lamp labels are the same as for fixed display–text. (See page 119.)
- The lamp display order is the order in which different lamp types were created. Note, however, that the display order of lamps of the same type can be changed using the Support Tool.

[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Maximum number of lamps in one screen	Total of 256 including standard lamps, and image/library lamps	64 each for standard lamps, and image/library lamps (See ”Restrictions”.)
Maximum number of lamps in one screen data file	No limit	Standard lamp: 64000 Image/library lamp: 12800 (See ”Restrictions”.)
Screens in which image/library lamps can be registered	No limit	Screen numbers 1 to 200 only
Shapes of Standard lamp	Rectangle, polygon, circle and sector	Rectangle and circle (See ”Restrictions”.)
”Transparent” OFF color for standard lamps	Settable	Not settable (displayed as black on the NTH25, and white on the NTH25C)
Color of standard lamp frames	Settable	Not settable (displayed as ON color when OFF, and as OFF color when ON)
Image/library lamp foreground and background colors	Settable	Not settable (displayed at the color used when it was created)
Lamp bit when memory link is used	Any bit settable	Bits already determined for each lamp must be set. (See ”Restrictions”.)

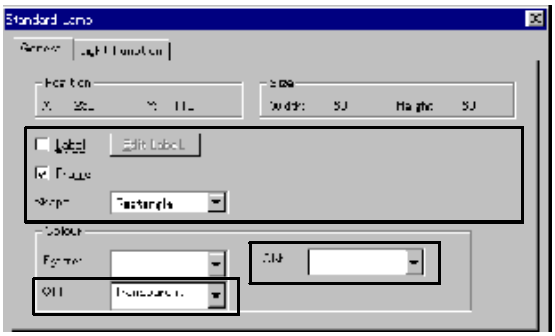
[Common Attributes]

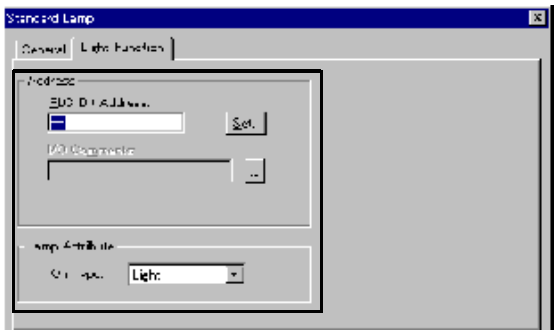
The common attributes are described separately as they vary widely according to the type of lamp.

[Display Functions]

• Normal (standard) Lamps

The following shows the relationship between the properties of a normal (standard) lamp and the displayed graphic.





Only sections enclosed by ☐ are valid.

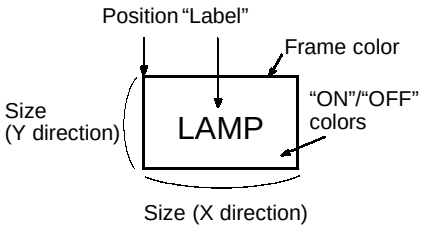
• Properties

General		
	Position	Coordinates of the top left corner of the lamp display area
	Size	Width and height of the lamp display area (unit: dot)
	Label	Presence or absence of a character string (label) appended to the lamp Checked (character string)/Unchecked (no character string)
	Description	Character string appended to the lamp Alphanumeric and symbols For details on the properties of labels, see ”Text (Fixed Display)” (page 119).
	Frame	Presence/absence of a frame for the lamp display graphic Checked (frame)/Unchecked (no frame)
	Shape	Shape of the lamp (display graphic) Rectangle/Circle (Polygons and sectors set on the Support Tool are displayed as rectangles and circles, respectively on the NTH25/NTH25C.)
	Color	
	ON	Color of the lamp in the ON state (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
	OFF	Color of the lamp in the OFF state (Colors other than black and white are featured on only the NTH25C. Black/Blue/Red/Magenta/Green/Cyan/Yellow/White/ (Even if ”transparent” is set, it is displayed as black on the NTH25 and white on the NTH25C.)
Light Function		
	Address	
	PC Address	Allocated bit of the lamp (See ”Allocated bit”, page xx.) (Bits already determined for each lamp are set when the memory link is in use.)
	I/O Comment	Comment that describes the contents of the allocated bit Character string of up to 16 characters
	Lamp Attribute	
	ON Type	Display mode when the lamp is ON Light/Flash

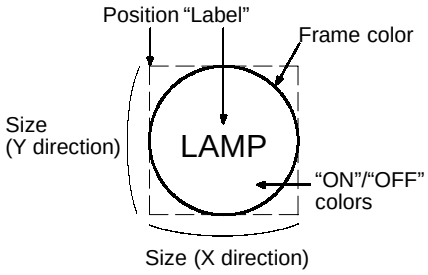
Reference OFF and ON colors can be set independently for lamp labels. Note, however, that the background color is fixed to ”transparent”.

• Lamp shapes

Rectangle



Circle



• Allocated bit

[Host link , NT link (1:1)]
Lamp bits can be allocated to the following host (PC) areas.

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation
DM	Data memory		Data memory	
CH	I/O relay		I/O relay	
TIM	Timer present value		Timer present value	
CNT	Counter present value		Counter present value	
HR	Holding relay			
AR	Auxiliary relay		Special auxiliary relay	
LR	Link relay			

: OK : NG

The range of each memory area differs according to the PC type. See Appendix H ”PC Memory Map”, page 321.

[Memory link]

The bits in the following table corresponding to the lamp number (number 1 to 64 to be allocated in display order) must be set.

Lamp number	Corresponding bits
1 to 16	00000 to 00015
17 to 32	00100 to 00115
33 to 48	00200 to 00215
49 to 64	00300 to 00315

• Display of lamps

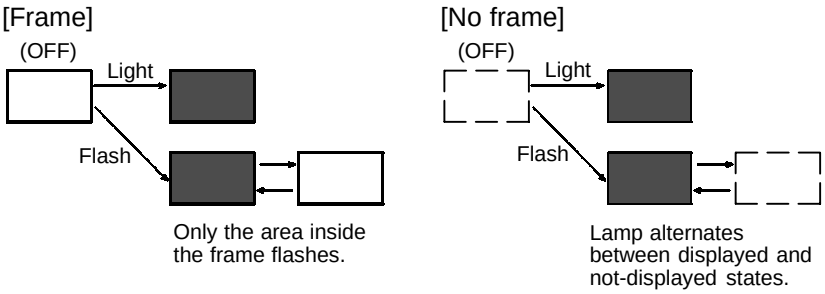
Lamps are displayed as follows according to the state of the allocated bit.

0 (OFF): OFF
1 (ON): ON, or flashing

Whether a lamp is lit continuously or flashes when the lamp bit is set to ”1” (ON) is determined by the ”ON Type” attribute.
Also, note that the display when the lamp is ON or flashing also changes according to the presence or absence of a frame.

Frame: The frame is always displayed.

No frame: The lamp may be invisible when the frame is OFF or flashing depending on the OFF color.

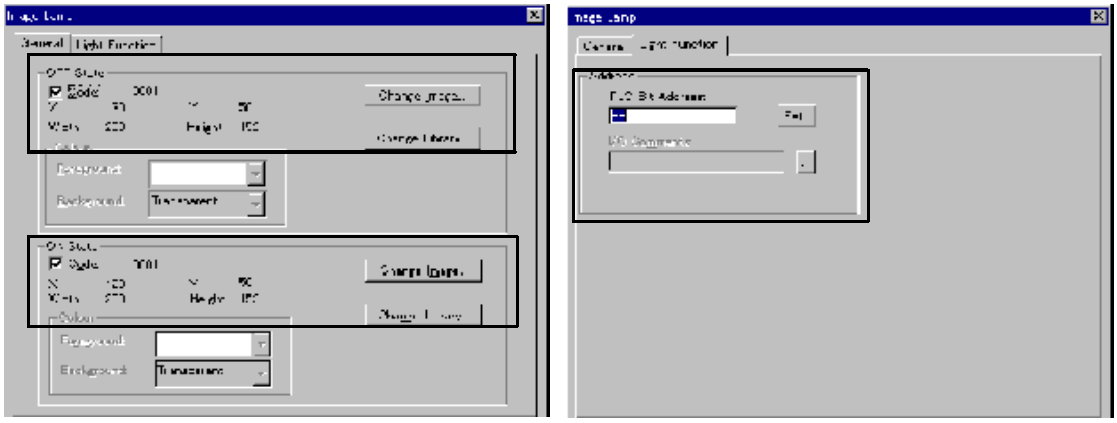


• To change labels

The labels of normal (standard) lamps are fixed display text. To make the label change in accordance with the conditions, create an image/library lamp and register different image/library data for its OFF and ON states.

• Image/library lamps

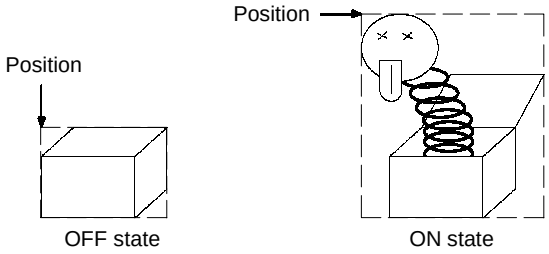
The following shows the relationship between the properties of an image/library lamp and the displayed graphic.



Only sections enclosed by ☐ are valid.

- Properties

General		
	OFF state	
	X, Y	Coordinates of the top left corner of the image/library data displayed in the OFF state
	Width, Height	Width and height of image/library data displayed in the OFF state
	Code	Image/library data code displayed in the OFF state
	ON State	
	X, Y	Coordinates of the top left corner of the image/library data displayed in the ON state
	Width, Height	Width and height of image/library data displayed in the ON state
	Code	Image/library data code displayed in the ON state
Light Function		
	Address	
	PC Bit Address	Allocated bit of the lamp (See ”Allocated bit”, below.)
	I/O Comments	Comment that describes the contents of the allocated bit Up to 16 characters



Allocated bit

[Host link, NT link (1:1)]

Lamp bits can be allocated to the following host (PC) areas.

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation
DM	Data memory		Data memory	
CH	I/O relay		I/O relay	
TIM	Timer present value		Timer present value	
CNT	Counter present value		Counter present value	
HR	Holding relay			
AR	Auxiliary relay		Special auxiliary relay	
LR	Link relay			

: OK : NG

The range of each memory area differs according to the PC type. See Appendix H ”PC Memory Map”, page 321.

[Memory link]

The bits in the following table corresponding to the lamp number (number 1 to 64 to be allocated in display order) must be set.

Lamp number	Corresponding bits
1 to 16	00000 to 00015
17 to 32	00100 to 00115
33 to 48	00200 to 00215
49 to 64	00300 to 00315

[Input Functions]

Lamps read the contents of a bit on the host and execute processing in accordance with the bit state.
Note, however, that the bit is read only in the following case:

- When a lamp is used on the currently displayed screen

[Output Functions]

Lamps have no output function.

[Processing Functions]

Lamps have no data processing function.

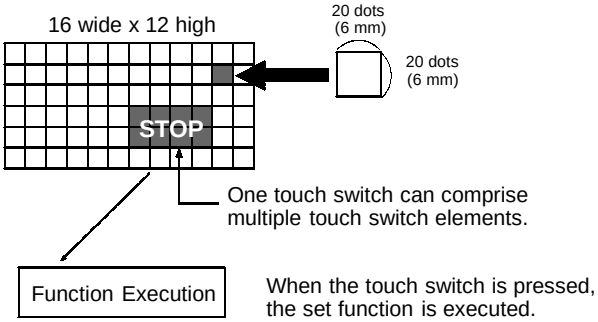
[Relationship with Other Elements]

- Lamps overlap with other elements in accordance with the order in which they were registered on the screen with the Support Tool. Note, however, that you can change the way in which they overlap using the Support Tool.

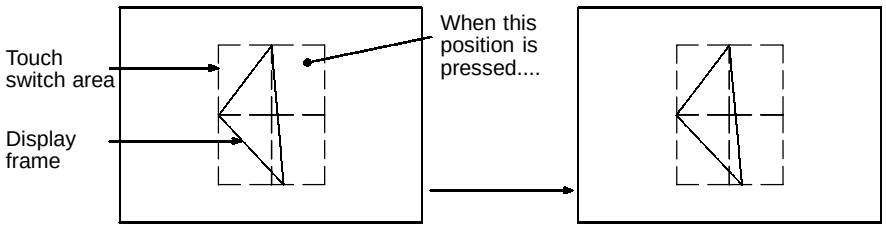
4-8 Touch Switches

[Function Outline]

The NTH25/NTH25C allows input from the touch panel on the screen. Bit information can be sent to the host or the NTH25/NTH25C screen can be switched by pressing (touching) the touch switches on the screen.



In the same way as lamps, graphics which change in accordance with the state of a currently set bit are set for touch switches. In addition, an area where the touching of the touch switch can be detected (the ”touch switch area”) is also set for them. (Some touch switch display graphics do not change on the NTH25/NTH25C.)
Touch switches are arranged and set on screens when creating screen data using the Support Tool. When a touch switch is pressed, the function set to it in advance is executed.
The way a touch switch is displayed and the processing when it is pressed can each be set independently.



Touch switch function executed
(Touch switch display graphics other than “none” or “standard” do not change on the NTH25/NTH25C even when they are pressed.)

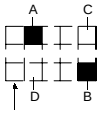
Caution

- Do not use the touch switch input function for applications where there is a danger to human life or the possibility of serious property damage, or for emergency stop switches.
- Do not press touch switches with a force of greater than 30 N.
- Do not press touch switches inadvertently while the backlight is OFF. Only press touch switches after confirming system safety.
- If touch switches are pressed in rapid succession, their inputs may not be successfully received.
  Confirm that the input of a touch switch has been successfully received before moving on to the next operation.

Reference

Caution When Pressing Three Touch Switches
When multiple touch switches are arranged as shown in the example below and the three are pressed at the same time, a malfunction will occur due to a peculiarity of the touch switch mechanism.
Be careful how you arrange touch switches.

Example: When touch switches are created at positions A and B and at one of the points of intersection C or D



Smallest touch switch frame

- If switches A, B, and C come ON at the same time, touch switch D will also come ON due to the touch switch mechanism.
- If switches A, B, and D come ON at the same time, touch switch C will also come ON due to the touch switch mechanism.

• Functions that can be set to touch switches

Any of the following functions can be set to touch switches. For details, see ”Processing Functions” (page 153).

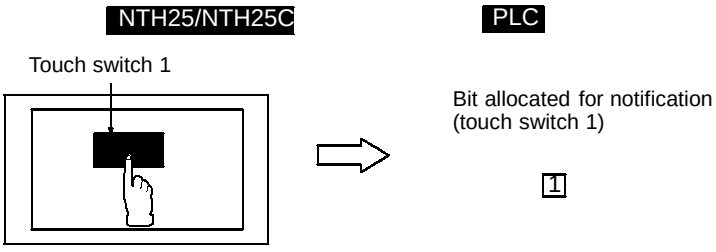
• Host notification function

When a touch switch is pressed, the state of a bit for notification on the host (the ”notify bit”) changes.
It may change in any of the two following ways.

Momentary: The notify bit is set to ”1” (ON) only while the touch switch is pressed, and returns to ”0” (OFF) when the touch switch is released.

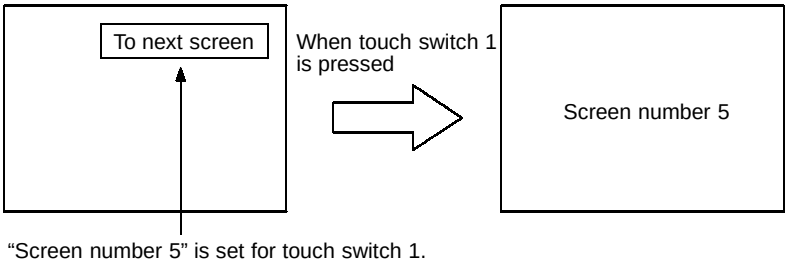
Alternate: Each time the touch switch is pressed, the notify bit is switched to ”1” (ON) if currently set to ”0” (OFF), and to ”0” (OFF) if currently set to ”1” (ON).

Though ”Set” and ”Reset” can be set on the Support Tool, they act as momentary switches on the NTH25/NTH25C. When using the memory link on the NTH25/NTH25C, the touch switch for the host notification function will always act as a ”Momentary” switch.



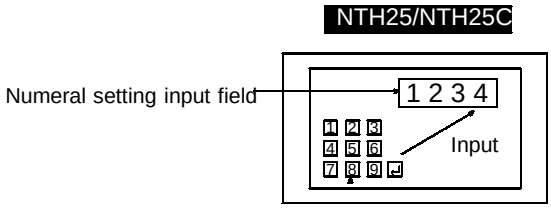
• Screen switching function

When a touch switch is pressed, the display switches to the set screen.



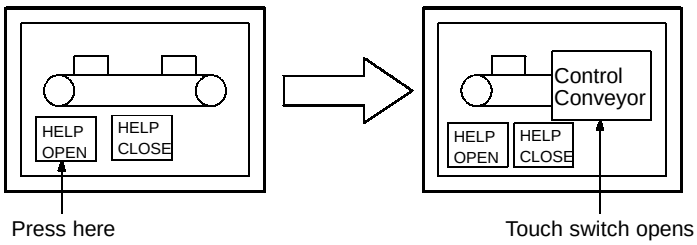
• Control key function

When used in combination with the numeral input function, pressing a touch switch allows numerals to be input to input fields. It is also possible to execute special functions such as applying and clearing input numerals.



• Window key function

This function makes it possible to open and close windows by pressing a touch switch.



[Restrictions]

- Up to 192 touch switches can be registered for one screen.
  There is no restriction on the number of touch switches that can be registered to one screen data file; any number can be registered as long as the maximum data file size is not exceeded.
- When free-shape display graphics (rectangles, polygons, circles and sectors) are set as the shape of touch switches on the Support Tool, they are displayed as fixed displays (OFF color) on the NTH25/NTH25C. For this reason, the display of the touch switch will not change even if it is pressed. (Touch switches can be set to invert when their shape is set to "None" or "Standard".)
- The following table shows the functions that can be set on the Support Tool. These functions cannot be set on the NTH25/NTH25C.

Function	Description
Character string input function	On the NTH25/NTH25C, touch switches having these functions are not displayed.
Copy key function	
Screen print function	
Cursor move function	Touch switches having the cursor move function are also displayed on the NTH25/NTH25C, and react when they are pressed. However, they will not function. The same function can be set to numeral input elements.

- On the NTH25/NTH25C, the screen switching return key (screen switching key that acts to return to the previously displayed screen) cannot be used on touch switches.
- Only one "Open" key for the pop-up keyboard function can be used in one screen.

- The ”Toggle” key for the pop−up keyboard function acts as the ”Open” key. For this reason, when a screen has an ”Open” key and an ”Toggle” key, only one key, the one with the earlier display order, is enabled.
- When polygons are used as the display graphics for touch switches, one polygon can be given up to 255 vertices.
- Restrictions on touch switch labels are the same as for fixed display−text. (See page 119.)
- The touch switch display order is the order in which different touch switch types were created. Note, however, that the display order of touch switches of the same type can be changed using the Support Tool.
- Touch switches are not allowed to overlap each other on the NTH25/NTH25C. Prevent touch switches including those for numeral input, alarm lists and trend graphs from overlapping.

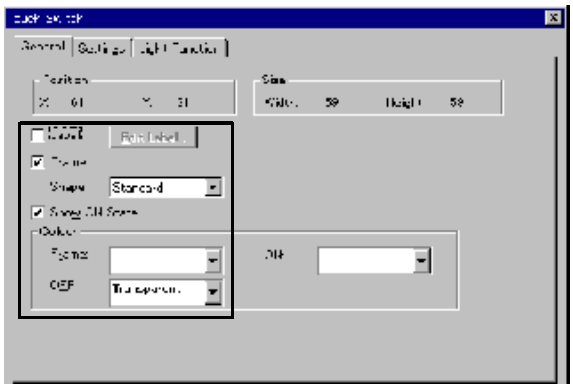
[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

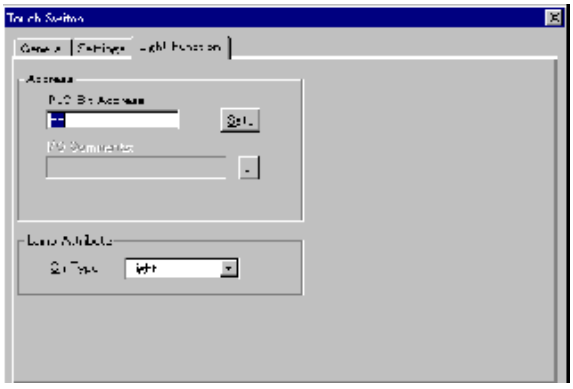
Item	Support Tool	NTH25/NTH25C
Overlapping of touch switches	Possible	Not possible (The touch switch whose display order is the latter is deleted.)
Shape ”Shadow”, ”3-Dimension”	Settable	Not supported (displayed as ”Standard” (double frame))
Shape ”Standard”	Rectangle at same position as touch switch area	Double frame at same position as touch switch area
”ON” color	Settable	Not supported (Display graphics are displayed in OFF color, and the inverse color when ON.)
Lamp bit (bit for controlling ON/OFF from the host)	Settable	Not supported (Note, however, that the lamp is displayed at the inverse color when the shape is set to ”None” or ”Standard” and ”Show ON State” is checked.)
Function	- Notify Bit - Screen Switching - Control Code Input - Pop-up Keyboard - Character String Input - Copy Setting - Cursor Move - Print Screen	Only the following functions are enabled: - Notify Bit - Switch Screen - Control Code Input - Pop-up Keyboard (Other functions are invalid.) (See ”Restrictions”.)
Action type ”Set” or ”Reset” when the notify bit function is used	Settable	Not supported (Functions as ”Momentary” switch.)
Action type when notify bit function is used on the memory link	Any type settable	Not supported (All function as ”Momentary” switch.)
Control key when the control code input function is used	-	Some keys are not supported. (See ”Control Code Input Function” on page 156.)
Action type ”Open” when pop-up keyboard function is used	Two or more can be set in one screen.	Only one enabled in one screen. (See ”Restrictions”.)
Action type ”Toggle” when pop-up keyboard function is used	Settable	Not supported (Functions as ”Open” key.) (See ”Restrictions”.)

[Common Attributes]

The following shows the settings common to touch switches. Further settings may be necessary depending on the function.



Only sections enclosed by ▭ are valid.



Lamp Settings cannot be used on the NTH25/NTH25C.

- Properties

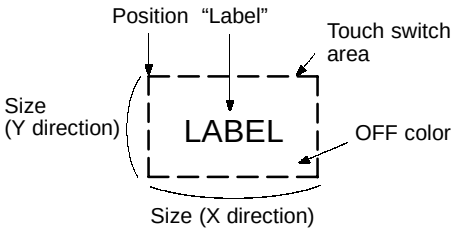
General		
	Position	Coordinates of the top left corner of the touch switch display area
	Size	Width and height of the touch switch display area (unit: dot)
	Label	Presence or absence of a character string (label) on the touch switch Checked (character string)/Unchecked (no character string)
	Description	Character string appended to the touch switch Alphanumeric and symbols Up to 40 characters can be set for the label. For details on the properties of labels, see ”Text (Fixed Display)” (page 119).
	Frame	Presence/absence of a frame for the touch switch display graphic. Checked (frame used)/Unchecked (no frame)
	Shape	Shape of the touch switch (display graphic) – Fixed-shape display frame No frame/Standard (double frame) (If Shadow and 3-Dimension are set, they are displayed as a double frame.) – Free-shape display frame Rectangle/Polygon/Circle/Sector (Displayed as fixed display on the NTH25/NTH25C.)
	Show ON State	Inversion of display graph when touch switch is pressed Checked (inversion)/ Unchecked (no inversion) (On the NTH25/NTH25C, inversion is enabled only on display frames of fixed graphics.)
	Color	
		Frame: Color of the frame (valid only when ”Frame” above is checked). (Colors other than white and black are featured with NTH25C only.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
		ON: Display color when the touch switch is ON (colors other than white and black are featured with NTH25C only) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
		OFF: Display color when the touch switch is OFF (Colors other than black and white are featured on only the NTH25C. Black/Blue/Red/Magenta/Green/Cyan/Yellow/White/Transparent (When “transparent” is set, it is displayed in inverse color of the touch switch background when showing inverse attribute.)

Settings		
	Function	Processing functions executed when touch switches are pressed Notify Bit Switch Screen Control code input Pop-up keyboard The following functions cannot be used on the NTH25/NTH25C. Input Key - String Copy Setting Cursor Move (Numeral input elements have the same function.) Print Screen

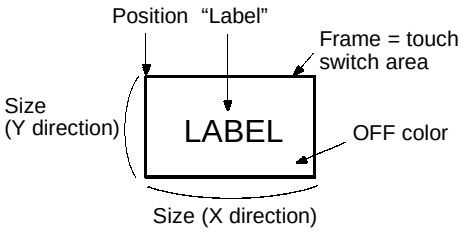
• Lamp shape

<With fixed-shape display frame>
When a fixed-shape display frame is used, the lamp is displayed in the exact shape of the area that responds as a touch switch (touch switch area).
When "No frame" is selected, only the label is displayed unless the touch switch is pressed. (If no label is set, nothing will be displayed unless the touch switch is pressed.)

No frame



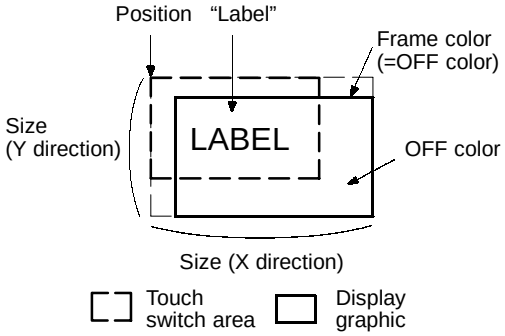
Standard



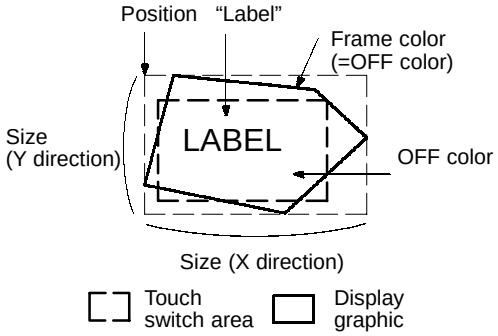
If Shadow and 3-Dimension are set, they are displayed as "Standard" on the NTH25/NTH25C.

<With free-shape display frame>
When a free-shape display frame is used, the display graphic can be set anywhere, independently of the area that responds as a touch switch (touch switch area). Note, however, that touch switches do not turn ON even if pressed on the NTH25/NTH25C as they are displayed as fixed display graphics.

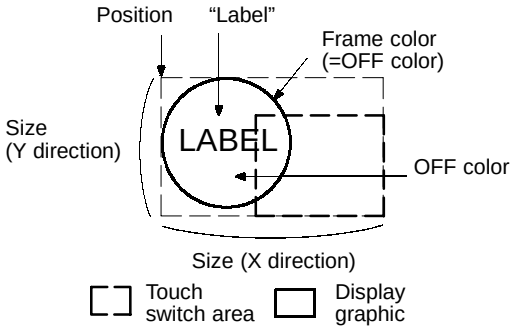
Rectangle



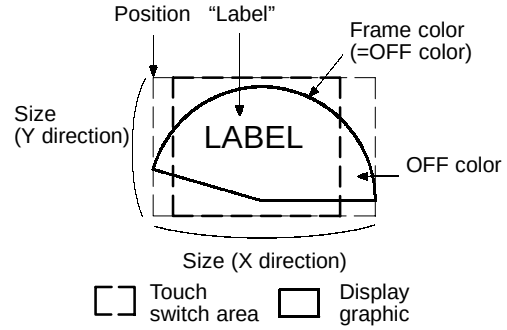
Polygon



Circle



Sector

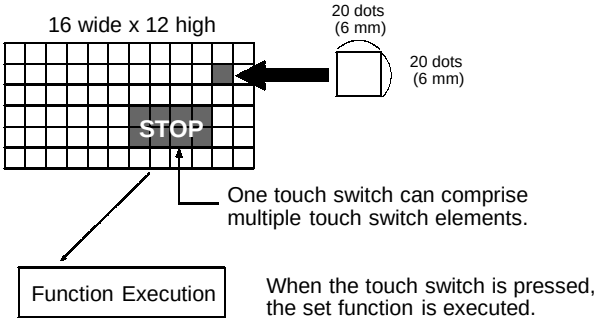


[Display Functions]

On the NTH25/NTH25C, touch switches can be made to invert when they are touched when a fixed–shape display frame is used. If you select ”No frame” or ”Standard” as the display frame and check ”Show ON State”, the touch area will turn ON when the touch switch is pressed. (The area will be displayed at the inverse color of the OFF color.)

[Input Functions]

The touch switch elements of the NTH25/NTH25C are arranged in a grid 16 elements wide by 12 elements high on the screen. It is possible to create a single large rectangular touch switch area using multiple touch switch elements.



If any one of the touch switch elements within the set touch switch area is pressed, this is interpreted as the touch switch as a whole being pressed, and the set function is executed.
When ”Show ON State” is checked, the display graphic (touch switch area) is displayed in reverse video for the duration that the touch switch is pressed.

[Output Functions]

Touch switches can make the following outputs depending on their set processing function.

- Host notification function
  The notify bit on the host is overwritten in accordance with the set notification method.
  For details, see ”Processing Functions” below.
- The NTH25/NTH25C does not have a function for controlling the sound when a touch switch is pressed. (Touch switches will always sound when they are pressed.)

[Processing Functions]

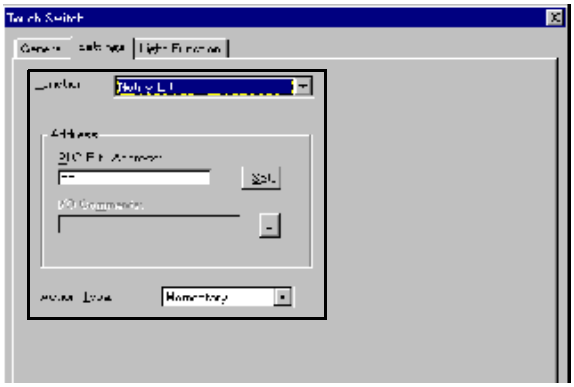
When a touch switch is pressed, the set function is executed.
The following four functions can be set:

- Host notification function
- Screen switching function
- Control code input function
- Pop-up keyboard function

• Host notification function

This function notifies the host that a touch switch has been pressed.
To use this function, a bit for notification (the notify bit) must be set to the touch switch. The input states of the touch switches displayed at the NTH25/NTH25C are always reflected in the notify bits. If the notify bit is not set, the touch switch will not function. (It will not function when pressed.)

The properties for the input notification function are as follows.



Only sections enclosed by ☐ are valid.

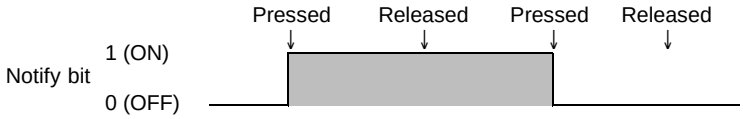
Settings		
Address		
	PC Address	Allocated bit for touch switch notification (See ”Allocation of the notify bit”, page 154.).
	I/O Comments	Comment that describes the contents of the allocated bit Character string of up to 16 characters
	Action Type	Notification operation when the touch switch is pressed Momentary, Alternate (Even if ”Set” and ”Reset” are set, they act as momentary switches. When the memory link is used, the switch acts as a momentary switch if either of ”Set” and ”Reset” is set.)

• Types of notification operation

The following two methods for notification to the host can be specified:

Momentary: The notify bit turns ON while a touch switch is pressed. It turns OFF when the switch is released.

Alternate: Each time the touch switch is pressed, it turns OFF if it is ON, or ON if it is OFF. The state of the notify bit does not change when the touch switch is released.



When the host link or NT link (1:1) is used on the NTH25/NTH25C, ”Set” and ”Reset” will act as momentary switches even if they are set.
When the memory link is used, touch switches having the host notification function will always act as momentary switches.

Reference If there are multiple momentary touch switches on one screen that are allocated to the same bit, and these multiple switches are pressed and released at the same time, the OFF state will be notified each time that one of the switches is released.

• Notes on notification action

Note the following points when using touch switch input notification.

- If the screen is switched while a momentary touch switch is pressed, the touch switch itself will disappear and the host is notified of the ”OFF” state.
- Alternate touch switches notify the host of a 0 (OFF) when a screen having a touch switch is displayed. Each subsequent press of an alternate touch switch toggles notification between 1 (ON) and 0 (OFF). Writing of the notify bit midway by the host is invalid.

• Allocation of the notify bit

The notify bit can be allocated to the following host (PC) areas.

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation
DM	Data memory		Data memory	
CH	I/O relay		I/O relay	
TIM	Timer present value		Timer present value	
CNT	Counter present value		Counter present value	
HR	Holding relay			
AR	Auxiliary relay		Special auxiliary relay	
LR	Link relay			

: OK : NG

The range of each memory area differs according to the PC type. See Appendix H ”PC Memory Map”, page 321.

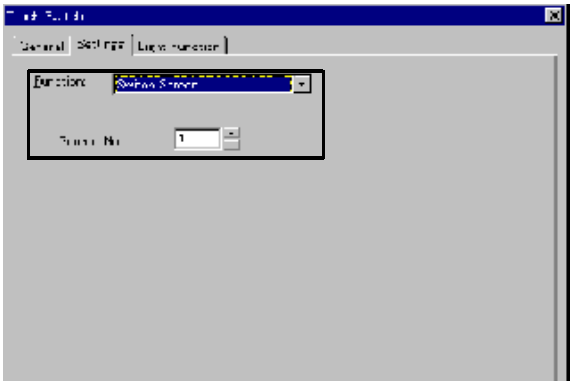
• Screen switching function

This function allows the screen to be switched by touch switch operation on the NTH25/NTH25C, without instructions from the host.
To use this function, the screen number to be displayed must be set to the touch switch. When the touch switch is pressed during NTH25/NTH25C operation, the display switches to the set screen. (At this time, the new screen number is notified via the PT status notify area.)

Reference

- When a screen with a number other than a settable is allocated to a touch switch, the screen does not switch and the currently displayed screen remains displayed.
- The screen can also be switched by PT status control area operation (page 90).
- On the NTH25/NTH25C, touch switches having the screen switching function only act to write new screen numbers to the ”Screen switch setting” in the PT status control area. Actual screen switching action is executed by NTH25/NTH25C reading ”Screen switch setting”. So, note that pressing a touch switch will not switch a screen if communications trouble, for example, is preventing communications with the host.

The attributes for screen switching are as follows.



Only sections enclosed by ☐ are valid.

Settings		
	Screen number	Screen number of screen to be newly displayed 1 to 1000, 9020

• Specified screen number and display operation

The display operation on the NTH25/NTH25C depends on the specified screen number, as follows.

Screen numbers 1 to 1000:

The display switches to the screen with the currently set screen number. The host is notified of the screen number of the newly displayed screen.

Screen number 9020:

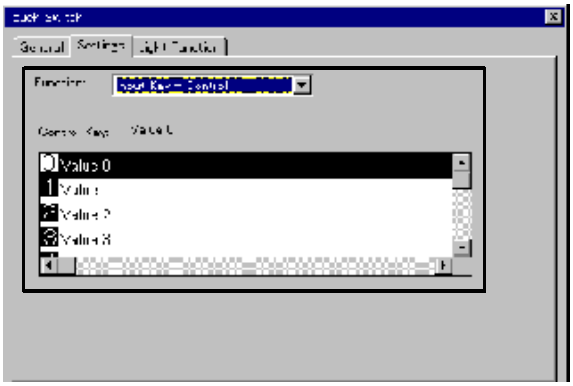
The programming console screen is displayed. The host is notified of screen number 9020.
This makes it possible to use the programming console function even in the RUN mode.
(Note, however, that the programming console function can be used only when the PT is connected to a PC which can use the programming console function.)
The PT's RUN mode is canceled while the programming function is being used. Monitoring of PT status control area, the data logging function for trend graphs and monitoring of the alarm history also are not performed.
To return from the programming console function, exit this function, by PT operation. (It is not possible to exit this function from the host.)

On the NTH25/NTH25C, the screen switching return key (screen switching key that acts to return to the previously displayed screen) cannot be used on touch switches.

- Control code input function

Control keys are used as numeral keys (0 to 9, A to F) when the numeral input function is used, and as special keys with fixed functions. By allocating a specific control key to a touch switch, it can be used to execute a specific function.

The attributes for control keys are as follows.



Only sections enclosed by ☐ are valid.

Settings	
Control key	Control key to be set

The following functions can be set to touch switch control keys.

Key	Function
0 to 9, A to F	Used to input numerals (1 digit)
CLR	Clears numeric values in input fields
.	Used to input a decimal point
↵ *1	Applies input without shifting to another input field (same as ENT)
ENT*1	Applies input without shifting to another input field (same as ↵)

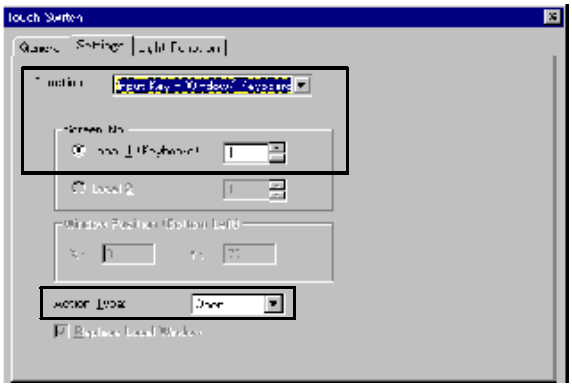
*1 Only one of the ↵ and ENT keys can be registered to a screen. Though two or more of these keys can be registered on the Support Tool, only the first one in the display order is valid; the others will be deleted.

Keys other than the above can be set on the Support Tool. However, these keys will not actually function even if they can be displayed on the NTH25/NTH25C.

- Pop-up window/keyboard function

This function is used to control the opening and closing of windows when using the window function. (See "Window Function", page 211.)

The attributes for the window key are as follows.



Only sections enclosed by ☐ are valid.

Settings		
	Screen No.	
		Local 1 (keyboard): Check this attribute when the window is to be controlled. (fixed as checked) – Specify the screen number of the window to be controlled. 1 to 1000
	Action Type	Controlling method of the window Open/Close (Setting toggle action will result in an open action.)

• Behavior according to ”Action Type”

Open : Opens the specified window.
Whether or not the window is actually opened depends on the window display state.
The window is displayed at the position that was specified when it was created.
If another window of the same type is already opened, nothing will be executed even if the touch switch is pressed.
If the specified window does not exist, no operation is performed.
Only one ”Open” key can be registered to one screen.

Close : Closes the specified window.
When the ”close” window key is pressed, the window currently displayed is closed.

Though ”Toggle” can be set as the action type on the Support Tool, this type acts as an open key on the NTH25/NTH25C.
Only one of the ”Open” and ”Toggle” keys can be registered to a screen. Though two or more of these keys can be registered on the Support Tool, only the first one in the display order is valid; the others will be deleted.

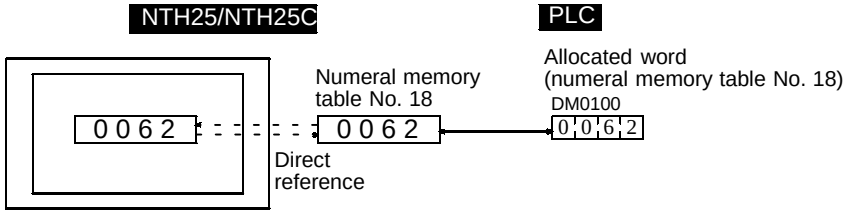
[Relationship with Other Elements]

- Numerals can be input by using control keys in combination with ”Numeral Input” (page 196).
  Registering an input control key to a window in advance allows you to use the entire of the base screen.
- Special touch switches (control keys) with specific functions are automatically created for the following elements.
  Trend graphs (page 176), alarm list (page 189), alarm history (page 189), numeral input (page 196), thumbwheel switches (page 203)

4-9 Numeral Display

[Function Outline]

The contents of numeral memory tables (words on host) are displayed as numerals.
The values can be displayed either in decimal or hexadecimal notation.



The NTH25/NTH25C does not actually have numeral memory tables, so the PC address set to the numeral memory table and numerical storage type are used to directly reference words on the host from a numeral display element.

[Restrictions]

- The maximum number of numeral display elements that can be registered to one screen varies as follows according to the communications method:
  [Host link, NT link (1:1)]
  Max. 120
  The number of numeral display elements is counted according to their display order, and elements exceeding this maximum are discarded. Normally, the display order is the order in which elements were created. This order can be changed using the Support Tool.
  [Memory link]
  Max. 120
  Only the numeral display elements to which numeral memory table numbers 0 to 119 are set are valid. Other numeral display elements are discarded.
- Numeral display elements in the same screen cannot reference the same numeral memory table. If a screen contains two or more numeral display elements to which the same numeral memory table has been set, only the element having the earliest display order is valid. Normally, the display order is the order in which elements were created. This order can be changed using the Support Tool.
  The same numeral memory table does not affect if it is referenced by an element such as a graph or numeral input that is not a numeral display element.
- There is no restriction on the number of numeral displays that can be registered to one screen data file; any number can be registered as long as the maximum data file size is not exceeded.
- Numeral display elements cannot be specified indirectly. If indirect specification is set, display will not be as intended.
- The range of numerals that can be displayed depends on the ”Storage Type” (”BCD” or ”Binary”) setting for the numeral memory table, ”Display Type” (”Decimal” or ”Hexadecimal”), and ”Display Sign” settings for the numeral memory table. (See ”Word contents and displayed numeral” page 163.)

- The number of words on the host that are referenced by numeral display is as follows depending on the number of display digits:
  When the number of digits in the integer part + number of digits past the decimal point is =< 4 digits: 1 word
  When the number of digits in the integer part + number of digits past the decimal point is > 5 digits: 2 words

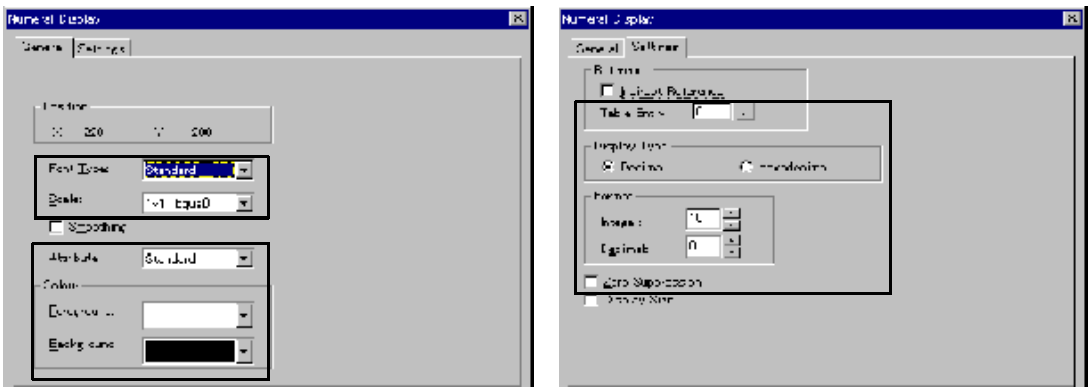
[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Maximum number of numeral displays in one screen	256	120 (See "Restrictions".)
Indirect specification	Settable	Not supported (fixed to direct specification)
Font type ("Half Height")	Settable	Not supported (displayed as "Standard")
Font type ("Double Width")	Displayed as set	Not supported (displayed as "Standard" with width doubled) (displayed as standard in 8 x 8 display)
Size 3 x 3	Settable	Not supported (displayed as 2 x 2)
Smoothing	Settable	Not supported (displays without smoothing)
Maximum number of display digits	10 digits	8 digits (Sign digit and decimal point are counted as one digit each.) (See "Number of display digits" page 162.)
Display sign	Settable	Not supported (displayed with a sign)

[Common Attributes]

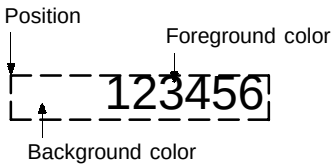
The following shows the relationship between the properties of a numeral display and the displayed numeral.



Only sections enclosed by ☐ are valid.

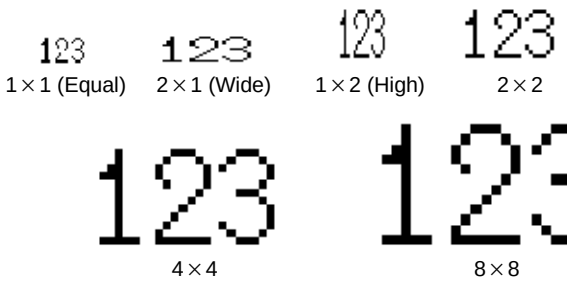
• Properties

General		
	Position	Coordinates of the top left corner of the field in which the numeral is displayed
	Font Type	Display font for numerals Double width font and standard font (Half height fonts are displayed as standard fonts on the NTH25/NTH25C.) (Double width fonts are displayed as standard fonts on the NTH25/NTH25C with their width doubled. Note, however, that 8 x 8 is displayed as standard font.)
	Scale	Scale at which the numeral is displayed (See ”Enlarged display”, page 162.) 1 x 1 (equal), 1 x 2 (high), 2 x 1 (wide), 2 x 2, 4 x 4, 8 x 8 (3 x 3 characters set on the Support Tool are displayed as 2 x 2 characters on the NTH25/NTH25C.)
	Attribute	Display mode for the numerals (See ”Display attributes and drawing result”, page 162.) Standard/Flash/Inverse Flash
	Color	
	Foreground	Display color of the numerals (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
	Background	Background color of the numerals (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
Settings		
	Reference	
	Table Entry	Numeral memory table number containing the numeral that is referenced for display 4-digit BCD value
	Display Type	Display format for the numeral (See ”Word contents and displayed numeral”, page 163.) Decimal/Hexadecimal
	Format (”Number of display digits”, page 162)	
	Integer	Number of digits in the integer part of the numeral 1 to 8 Within 8 digits including sign digit and decimal point digit
	Decimal	Number of digits in the decimal fraction of the numeral 0 to 6 Within 8 digits including sign digit and decimal point digit
	Zero Suppression	Whether or not zero suppression is used (See ”Zero suppression”, page 163.) Checked (zero suppression used)/Unchecked (zero suppression not used)



• Enlarged display

Numerals can be displayed at the following scales.



• Display attribute and drawing results

Attribute	Drawing Result
Standard	The numeral display is displayed at the specified foreground color and background color. 12345678
Flash	Repeated alternation of the ”standard” display and no display. 12345678 ⇔ No display
Inverse Flash	Repeated inverted display of each of the foreground and background colors and no display. 12345678 ⇔ No display

• Number of display digits

All contents of numeral memory tables are stored as integers. To display a numeral that has a decimal fraction, set the ”decimal” setting to ”1” or higher to specify the number of digits past the decimal point. A decimal point is automatically inserted. Note that if the number of digits of the numeral is greater than the total of the settings for ”Integer” and ”Decimal”, the upper digit(s) is discarded and the number of displayable lower digits in the integer part and past the decimal point are displayed.
The maximum number of digits in the integer part is eight, and the maximum number of digits past the decimal point is six. Up to a total of eight digits including one digit each for the sign and the decimal point can be specified.

Reference

The number of words on the host that are referenced is as follows depending on the number of display digits:

When the number of digits in the integer part + number of digits past the decimal point is =< 4 digits: 1 word
When the number of digits in the integer part + number of digits past the decimal point is > 5 digits: 2 words

In the following example, let us assume that ”Zero Suppression” is set to ”None”.

Example: Displaying ”123456”
- Setting for ”Integer” = 8 and ”Decimal” = 0:
  Resulting display: 00123456
- Setting for ”Integer” = 4 and ”Decimal” = 4:
  Resulting display: 012.3456
- Setting for ”Integer” = 2 and ”Decimal” = 4:
  Resulting display: 12.3456
- Setting for ”Integer” = 1 and ”Decimal” = 4:
  Resulting display: 2.3456

• Zero suppression

The numeral is displayed right-justified within the sum of the number of digits specified for ”Integer” and the number of digits specified for ”Decimal”. Normally, when the number of digits of the numeral is small, the excess digits to the left are filled with zeros. When ”Zero Suppression” is checked, no zeros are set in the excess digits and they are left blank.

00012345 — Without zero suppression (when the number of digits displayed is 8)

12345 — With zero suppression

• Word contents and displayed numeral

The range of numerals that can be displayed depends on the following settings:

Numeral storage type (BCD/binary)
Display Type (”Decimal”/”Hexadecimal”)

<Function of Numeral Storage Type>
The numeral storage type determines whether the contents of words on the host are recognized as BCD (Binary Coded Decimal) or binary (hexadecimal).
When BCD is set, a word on the host is judged to be a minus number if its uppermost digit is ”F”. (The number of valid digits of a minus number is one digit less.) ”Uppermost digit” here refers to bits 12 to 15 when one word is referenced, and bits 12 to 15 of the second word when two words are referenced.
When binary is set, words on the host are handled as signed binary data, so a word is judged to be a minus number when its uppermost digit is ”1” (ON). (The numeral is handled as 2’s complement.) ”Uppermost digit” here refers to bit 15 when one word is referenced, and bit 15 of the second word when two words are referenced.

<Function of Display Type>
The display type determines whether display is decimal or hexadecimal.

<Permissible Display Range>
The permissible display range depends on the settings made for "Numeral Storage Type" and number of referenced words and "Display Type", as follows.

Storage types	Number of words	Display Type	Permissible Display Range	
BCD	1	Decimal	–999 to 9999	
		Hexadecimal	0 to 270F Hex	*
	2	Decimal	–9999999 to 99999999	
		Hexadecimal	0 to 5F5E0FF Hex	*
Binary	1	Decimal	–32768 to 32767	
		Hexadecimal	0 to FFFF Hex (8000 to FFFF Hex, 0 to 7FFF Hex)	*
	2	Decimal	–9999999 to 99999999	
		Hexadecimal	0 to FFFFFFFF Hex (80000000 to FFFFFFFF Hex, 0 to 7FFFFFFF Hex)	*

* During hexadecimal display, minus numbers are displayed using absolute values.

<Relationship between contents of host words and displayed numeral>
The contents of words on the host are interpreted according to the "Numeral Display Type" setting and displayed after conversion according to the "Display Type" setting.
So the result also differs according to the settings made for "Words", "Numeral Storage type (BCD/binary)" and "Display Type" made for numeral display elements.
The following shows an example of this.

Contents of Word on Host	"Storage Type"	"Words"	"Display Type"	Displayed numeral
1234	BCD	1	Decimal	1234
F123				–123
F0001234		2		–1234
1234		1	Hexadecimal	4D2
F123				FF85
F0001234		2		FFFFFB2E
1234	Binary	1	Decimal	4660
F123				3805
F0001234		2		********
1234		1	Hexadecimal	1234
F123				F123
F0001234		2		F0001234

Reference

When "Storage Type" is set to BCD, the word is treated as a minus number when the uppermost digit of the word contents is "F". If the word contents are incorrect BCD data, display will not be as intended. For example, some of the digits will be recognized as hexadecimal values.

[Display Functions]

In numeral display, numerals are displayed in accordance with the ”General” settings.
For details on the display mode according to the ”General” settings, see ”Common Attributes”.

[Input Functions]

Numeral displays do not have a direct input function as they display the contents of words on the host via numeral memory tables. Note, however, that the NTH25/NTH25C does not actually have numeral memory tables, so actually the numeral display reads the contents of words on the host.

[Output Functions]

Numeral displays have no output function.

[Processing Functions]

With numeral displays, the contents of words on the host are converted to display numerals in accordance with the ”Numeral Storage Type” of the specified numeral memory table and the ”Properties” setting for the numeral display element. For details, see ”Common Attributes”.

[Relationship with Other Elements]

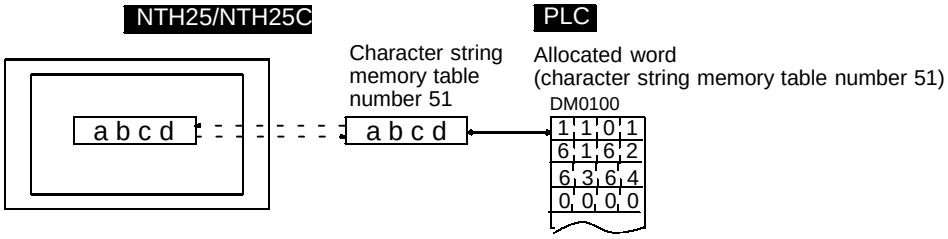
- The same conversion method and display mode used with numeral displays is used when displaying numerals by ”numeral input” (page 196).

Numeral displays overlap other elements in accordance with the order in which they were registered to the screen using the Support Tool. Note, however, that you can change the way in which they overlap using the Support Tool.

4-10 Character String Display

[Function Outline]

The contents of character string memory tables (words on host) are displayed as character strings.
Alphanumeric and symbols in character string memory tables can be displayed. On the NTH25/NTH25C, character strings are not allowed to contain a mark (character code FF20 to FFFF Hex). (These are treated as invalid codes, and are displayed as two standard spaces.)



The NTH25/NTH25C does not actually have character string memory tables, so the PC address set to the character string memory table is used to directly reference words on the host from a character string display element.

[Restrictions]

- The maximum number of character string display elements that can be registered to one screen varies as follows according to the communications method:
  [Host link, NT link (1:1)]
  Max. 50
  The number of character string display elements is counted according to their display order, and elements exceeding this maximum are discarded. Normally, the display order is the order in which elements were created. This order can be changed using the Support Tool.
  [Memory link]
  Max. 50
  Only the character string display elements to which character string memory table numbers 0 to 49 are set are valid. Other character string display elements are discarded. Note, however, that if a screen contains two or more character string display elements to which the same character string memory table has been set, only the element having the earliest display order is valid. Normally, the display order is the order in which elements were created. This order can be changed using the Support Tool.
- There is no restriction on the number of character string displays that can be registered to one screen data file; any number can be registered as long as the maximum data file size is not exceeded.
- Character string display elements cannot be specified indirectly. If indirect specification is set, display will not be as intended.

- The following numbers of characters can be displayed in one character string display, depending on the scale.

  1 x 1 (equal): Up to 40 characters
  2 x 1 (wide): Up to 40 characters
  1 x 2 (high): Up to 20 characters
  2 x 2: Up to 20 characters
  4 x 4: Up to 10 characters
  8 x 8: Up to 5 characters
  (3 x 3 characters set on the Support Tool are displayed as 2 x 2 characters on the NTH25/NTH25C.)
  Note, however, that if the character string display size exceeds the screen size with the specified value, the position of the display field is automatically modified so that all of the character string fits inside the screen.
  If the character string display cannot be displayed to fit inside the screen even if its position has been modified, an error message will be displayed.
  Note, however, that on the NTH25/NTH25C, a character string of more than set number of character digits can be displayed. In such a case, the character string continues as it is to the right. If this results in the character string projecting off the screen, a carriage return is made at that point, and the text following it is shifted one line downward and displayed from the left edge. If the character string projects from the bottom of the screen, the text following it is displayed at the top left of the screen.

- On the NTH25/NTH25C, the number of words that are referenced by character string displays is fixed as 21.
  The first of the allocated words is the word for setting the character size and display attributes, and the remaining 20 words are displayed as character strings.

- The characters that can be displayed are alphanumeric, symbols and marks. Note, however, that control codes from ASCII codes other than 00 Hex are displayed as standard spaces (20 Hex). 00 Hex is treated as the end of the character. So, prevent character strings from containing 00 Hex. Display ends just before 00 Hex. (When you specify a character string, try to specify one word such as 0000 Hex at the end of the character.)

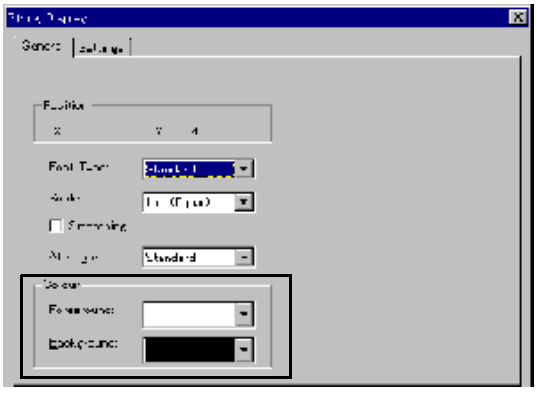
[Setting Restrictions]

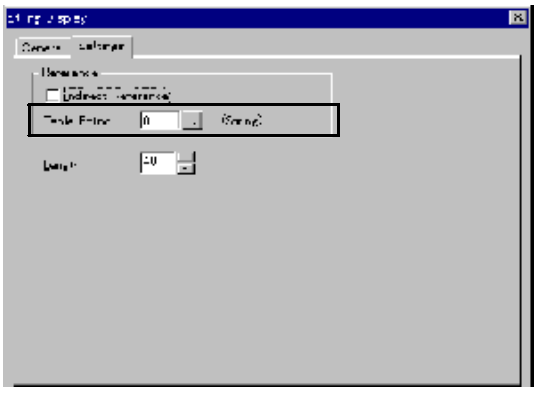
The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Maximum number of character string displays in one screen.	256	50 (See "Restrictions".)
Indirect referencing	Settable	Not supported (fixed to direct referencing)
Font type "Half Height"	Settable	Not supported (displayed as standard font)
Size 3 x 3	Settable	Not supported (displayed as 2 x 2)
Smoothing	Settable	Not supported (displays without smoothing)
Character size, attribute	Settable	Not supported (These can be set any time according to the contents of the first allocated word on the host.) (See "Character size and attribute" page 169.)
Number of character digits	Any number of digits can be set within the range 1 to 40 (after standard character conversion)	Not supported (The number of character digits is adjusted according to the contents stored to the allocated words on the host.)

[Common Attributes]

The following shows the relationship between the properties of a character string display and the displayed character string.

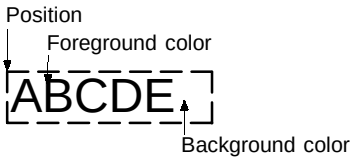




Only sections enclosed by ☐ are valid.

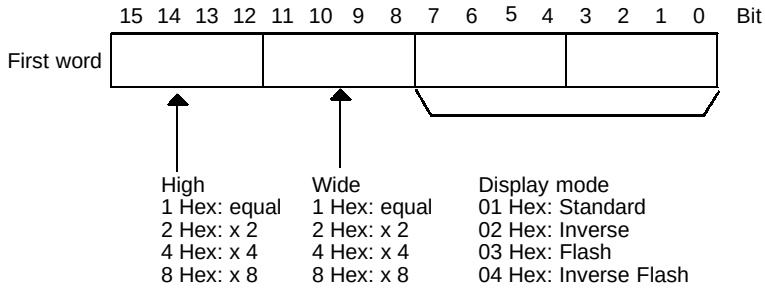
• Properties

General		
	Position	Coordinates of the top left corner of the field in which the character string is displayed.
	Color	
	Foreground	Display color of the text (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
	Background	Background color of the text (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
Settings		
	Reference	
	Table Entry	Character string memory table number to which the character string to be displayed is currently stored



Character size and attribute

On the NTH25/NTH25C, you can change the character size and how the character is displayed (display attribute) according to the contents of the first allocated word on the host.
The contents of the first word specifies the character size and attribute as follows:



On the NTH25/NTH25C, you can specify the size of the character in the high and wide directions for each character. Available scales are as follows.

1 x 1 (Equal), 1 x 2 (High), 2 x 1 (Wide), 2 x 2, 4 x 4, 8 x 8

If you specify an invalid size, the character is displayed at equal size.
The origin of the character when it is scaled is the top left corner coordinate of the character string.
If the character string projects off the NTH25/NTH25C's screen, a carriage return is made at that point, and the text following it is shifted one line downward and displayed from the left edge. If the character string projects from the bottom of the screen, the text following it is displayed at the top left of the screen.

Character string display elements are displayed as follows according to the setting of the first word.

Attribute	Drawing Result
1: Standard	The character string display element is displayed at the specified foreground color and background color. ABCDEFG
2: Inverse	The character string display element is drawn at each of the inverse colors for the foreground color and background color. ABCDEFG
3: Flash	Repeated alternation of the ”standard” display and no display. ABCDEFG ⇔ No display
4: Inverse Flash	Repeated alternation of the foreground color and background color. ABCDEFG ⇔ No display

• How to specify character strings

On the NTH25/NTH25C, the contents of allocated words (second to 21st word) on the host are treated as ASCII code, and the character string corresponding to these codes is displayed in order from the second word onwards. The data in one word is displayed from the upper byte (bits 31 to 16) followed by the lower byte (bits 15 to 0).

The NTH25/NTH25C displays 20 words of character string data at all times. So, to display a character string that does not fill 20 words, you must either append the character string with 0000 Hex, or fill the remainder with standard spaces (20 Hex).
When 0000 Hex is written to one word of data as a character string, the NTH25/NTH25C treats this as the end of the character string. Subsequent data is invalid. Note, however, that the NTH25/NTH25C does not clear the display when the character string display is updated. Sometimes the previously displayed character string remains behind the currently displayed character string. If the number of characters to be displayed is not fixed, fill the trailing part with standard spaces (20 Hex), and write 0000 Hex last of all to indicate the end of the character string.

[Display Functions]

In the character string display, the character string is displayed in accordance with the ”General” settings.
For details on the display mode according to the ”General” settings, see ”Common Attributes” (page 173).

[Input Functions]

Character string displays do not have a direct input function as they display the contents of words on the host via character string memory tables. Note, however, that the NTH25/NTH25C does not actually have character string memory tables, so actually the character string display reads the contents of words on the host.

[Output Functions]

Character string displays have no output function.

[Processing Functions]

Character string displays have no processing function.

[Relationship with Other Elements]

- Character string displays overlap other elements in accordance with the order in which they were registered to the screen using the Support Tool. Note, however, that you can change the way in which they overlap using the Support Tool.

4-11 Graphs

The following two types of graphs can be used with the NTH25/NTH25C. The contents of numeral memory tables (words on the host) are automatically read, and the graph display is updated.

- Bar graphs See below
- Trend graphs Page 176

4-11-1 Bar Graphs

[Function Outline]

The contents of a numeral memory table (words on the host) are displayed in the form of a bar graph.
The numeral can also be indicated as a percentage of the specified numeral.

(The frame is not displayed on the NTH25/NTH25C.)

[Restrictions]

- The maximum number of bar graph elements that can be registered to one screen varies as follows according to the communications method:
  [Host link, NT link (1:1)]
  Max. 30
  The number of bar graph elements is counted according to their display order, and elements exceeding this maximum are discarded. Normally, the display order is the order in which elements were created. This order can be changed using the Support Tool.
  [Memory link]
  Max. 30
  Bar graphs are counted in order from the smallest numeral memory table number. Bar graphs exceeding this maximum are discarded.
- Bar graph elements in the same screen cannot reference the same numeral memory table. If there are two or more bar graph elements to which the same numeral memory table is set in the same screen, the element having the smallest display number is valid. Normally, the display order is the order in which elements were created. This order can be changed using the Support Tool.
- There is no restriction on the number of bar graphs that can be registered to one screen data file; any number can be registered as long as the maximum data file size is not exceeded.
- On the NTH25/NTH25C, the contents of the words on the host are recognized according to the setting made for "Numeral Storage Type" (BCD/binary) for the numeral memory table. For details, see "Word contents and display numerals" page 163. Note, however, that the number of referenced words for bar graphs is fixed to one.
- On the NTH25/NTH25C, the number of words that are referenced for displaying bar graphs is fixed to one.
- Bar graphs cannot specify numeral memory tables indirectly. Direct referencing must be used.

- Restrictions on % display characters are the same as for fixed display-text. (See page 119.)

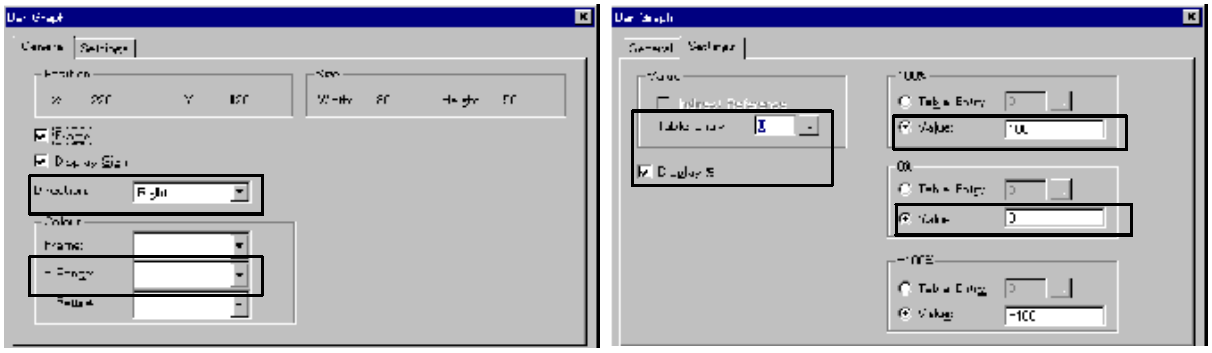
[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Maximum number of bar graphs on one screen	50	30 (See "Restrictions".)
Frame	Settable	Not supported (displayed without frame)
Sign display	Settable	Not supported (displayed without sign)
Color "Frame" "- Range"	Settable	Not supported
-100% "Value"	Settable	Not supported
0% "Value", 100% "Value"	Minus numbers can also be set.	Minus numbers are treated as 0.
% value "Table Entry"	Settable	Not supported (fixed to setting by value)

[Common Attributes]

The following shows the relationship between the properties of a bar graph and the display results.



Only sections enclosed by ☐ are valid.

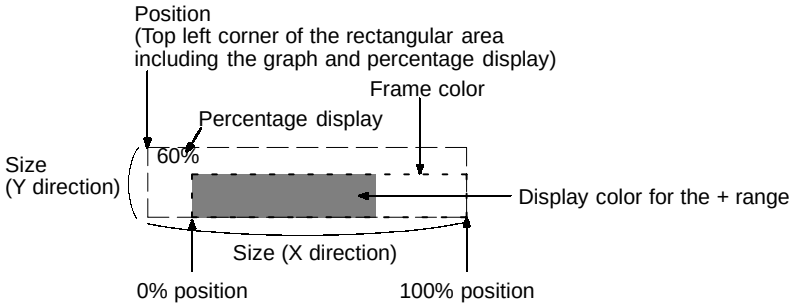
• Properties

General		
	Position	Coordinates of the top left corner of the bar graph area
	Size	Width and height of the area in which the bar graph is displayed (unit: dot) Width: 2 to 320, Height: 2 to 240
	Direction	Direction in which the bar graph extends (See ”Incremental Direction of Bar Graphs”, page 175.) Up/Down/Left/Right
	Color	
	+ Range	Display color of the positive range (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
Settings		
	Value	
	Table Entry	Number of numeral memory table to be displayed
	Display %	Percentage (%) indication of the contents of the numeral memory table for the specified value (”How to calculate the percentage value”, page 175.) Checked (percentage display)/ Unchecked (no percentage display) For details on the ”Display %” property, see ”Text (Fixed Display)” (page 119).
	100%*1	
	Value	Specify the 100% value (default: 100). Range: 0 to 2147483647 (Minus numbers specified on the Support Tool are treated as 0 on the NTH25/NTH25C.)
	0%*1	
	Value	Specify the 0% value (default: 0). Range: 0 to 2147483647 (Minus numbers specified on the Support Tool are treated as 0 on the NTH25/NTH25C.)

*1 The 0% value and 100% values must satisfy the following relationship:
0% value < 100% value

Reference It is not possible to specify a character attribute and transparent background for a percentage display.

• Display result



(The frame is not displayed on the NTH25/NTH25C.)

• Incremental direction of bar graphs

The following shows the incremental directions of the bar graph according to the setting made for ”Direction”.

“Up”:
The bar graph increments upward.

Direction

“Down”:
The bar graph increments downward.

Direction

“Left”:
The bar graph increments to the left.

Direction

“Right”:
The bar graph increments to the right.

Direction

• How to calculate the percentage value

The percentage value is calculated as follows:

$$\text{Percentage value} = \frac{\text{Displayed numeric value} - [0\%]}{[100\%] - [0\%]} \times 100$$

If the result of calculating the % value is less than 0%, the result is taken to be 0% and if the result is more than 100% it is taken to be 100%. Bar graphs are displayed with % values calculated in this way.

• Contents of host words

With bar graphs on the NTH25/NTH25C, the contents of the words on the host are recognized according to the setting made for ”Numeral Storage Type” (BCD/binary) for the numeral memory table. For details, see ”Word contents and displayed numeral” for ”Numeral displays” on page 163. Note, however, that the number of referenced words for bar graphs is fixed to one.

[Display Functions]

Bar graphs indicate numerals in accordance with the ”General” settings.
For details on the display method according to the ”General” settings, see ”Common Attributes”.

[Input Functions]

Bar graphs have no input function.

[Output Functions]

Bar graphs do not have a direct output function as they display the contents of words on the host via numeral memory tables. Note, however, that the NTH25/NTH25C does not actually have numeral memory tables, so actually the bar graph reads the contents of words on the host.

[Processing Functions]

Bar graphs calculate the percentage value in accordance with the settings made for ”Settings”.
For details on how to calculate depending on the ”Settings” settings, see ”Common Attributes”.

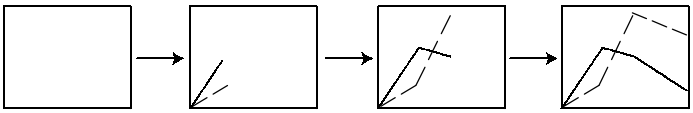
[Relationship with Other Elements]

- Bar graphs overlap other elements in accordance with the order in which they were registered to the screen using the Support Tool. Note, however, that you can change the way in which they overlap using the Support Tool.

4-11-2 Trend Graphs

[Function Outline]

Trend graphs represent the changes over time in the contents of a numeral memory table (words on the host) as a single line.
It is possible to display two or more lines in the same frame so that they can be compared.



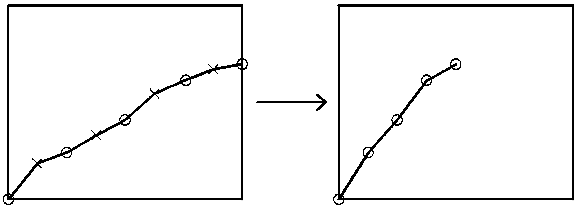
There are two types of trend graph: ”standard” where the graph is drawn as though a pen were moving across paper, and ”pen recorder” where the graph is drawn as though the paper were moving under a pen.
With trend graphs, a 100% value and 0% value can be specified for each line, and the graph is displayed based upon the largest 100% value and smallest 0% value on the line to be displayed.
Past values can be recorded, and then displayed by back tracking (the ”logging function”), and the contents of words on the host can be sampled even while other screens are displayed (the ”background function”). On the NTH25/NTH25C, the contents of the set word on the host continue to be sampled regardless of whether or not there is a trend graph on the currently displayed screen. (Sampling can also be stopped by manipulating touch switches and controlling operation from the host.)

[Restrictions]

- One trend graph frame can be registered to one screen. Up to eight trend graph frames can be registered at once to each screen.
- The maximum number of trend graph lines that can be registered to a screen data file is as follows.
  The number of trend graph lines are counted in order from the smallest screen number, and lines exceeding 40 are discarded. Also, the number of lines in one screen are counted according to the display order. Normally, the display order is the order in which elements were created. This order can be changed using the Support Tool.

- Trend graph elements in the same screen cannot reference the same numeral memory table. If there are two or more trend graph elements to which the same numeral memory table is set in the same screen, the element having the smallest display number is valid. Normally, the display order is the order in which elements were created. This order can be changed using the Support Tool.
- The maximum number of trend graph frames that can be registered to a screen data file is 20.
- If the set sampling cycle is shorter than the time taken for display update processing, sampling results that cannot be processed in time are skipped and the data is sometimes not be displayed correctly.

  Example: The data indicated by X marks in the graph on the left cannot be processed in time for screen updating, and is skipped. So only the data indicated by is displayed. The result is as shown in the graph on the right.



- On the NTH25/NTH25C, the contents of the words on the host are recognized according to the setting made for "Numeral Storage Type" (BCD/binary) for the numeral memory table. For details, see "Word contents and displayed numeral" page 163. Note, however, that the number of referenced words for trend graphs is fixed to one.
- Trend graphs cannot specify numeral memory tables indirectly. Direct referencing must be used.
- On the Support Tool, you can set whether or not to display signs. On the NTH25/NTH25C, however, this setting is invalid. Signs are displayed as a ratio to the largest 100% value and smallest 0% value on the line to be displayed. The −100% value setting is also invalid as there is no sign display.
- On the Support Tool, you can select whether or not to use the data logging function and background function. On the NTH25/NTH25C, however, these functions are used all the time, so this setting is invalid.

- On the NTH25/NTH25C, dedicated touch switch functions vary as follows from the NT series PT. For details, see “Display controls using touch switches” from page 184.

Item	NT series PT	NTH25/NTH25C
Stop	Stops sampling of the current trend graph.	Stops sampling of all groups belonging to the current trend graph.
Continue	Continues sampling of the current trend graph.	Continues sampling of all groups belonging to the current trend graph.
Clear Display	Clears the display of the current trend graph, and start display again. (Past records are not cleared.)	Cancels the clear record state by the ”Clear record touch switch” and starts display. This function acts on all groups belonging to the current trend graph.
Clear Log	Clears all past logging data in the PT. Recording is resumed immediately after past logging data is cleared.	Clears all group logging data belonging to the current trend graph. After logging data is cleared, the record clear state remains as it is, and recording is not started.

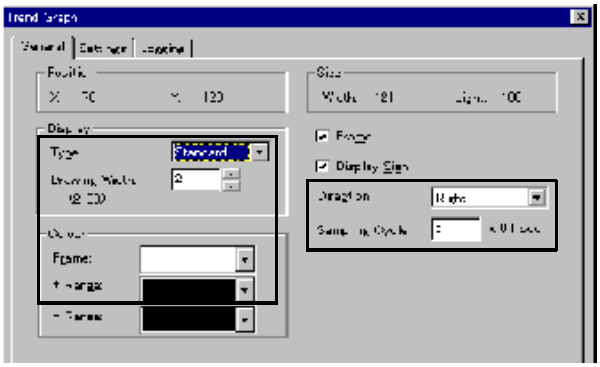
[Setting Restrictions]

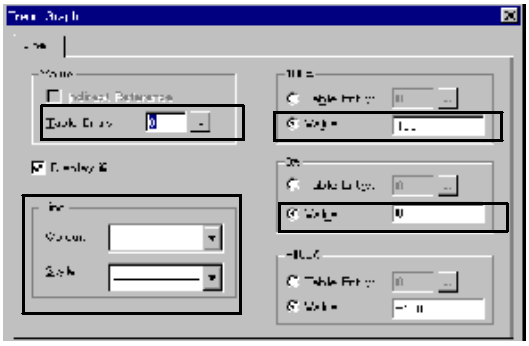
The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

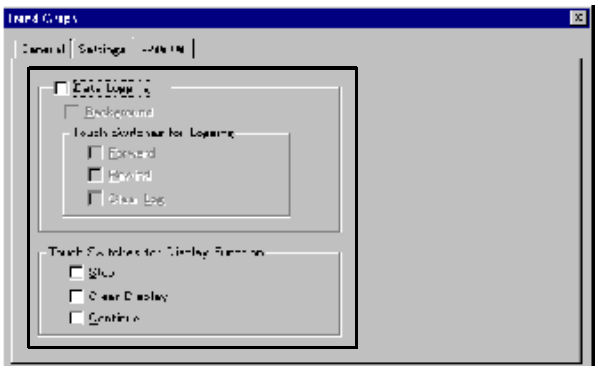
Item	Support Tool	NTH25/NTH25C
Maximum number of lines that can be displayed in one trend graph	50	8 (See ”Restrictions”.)
Maximum number of trend graph frames that can be registered to one screen data file	No limit	20 (See ”Restrictions”.)
Maximum number of lines that can be registered to one screen data file	No limit (Maximum number of lines is 8 when lines are sampled by data logging function.)	40 (All lines are sampled by data logging.)
Frame	Settable	Not supported (displayed with frame)
Display Sign	Settable	Not supported (displayed without sign)
Color ”– Range”	Settable	Not supported
Display %	Settable	Not supported (% not displayed)
–100% ”Value”	Settable	Not supported
0% ”Value”, 100% ”Value”	Minus numbers can be set.	Minus numbers are treated as 0.
% value ”Table Entry”	Settable	Not supported (fixed to setting by value)
Data logging function, background function	Use of these respective functions can be set.	Not supported (always used) (See ”Restrictions”.)

[Common Attributes]

The following shows the relationship between the properties of a trend graph and the display results.







Only sections enclosed by [ ] are valid.

- Properties

General		
	Position	Coordinates of the top left corner of the graph area
	Size	Width and height of the area in which the trend graph is displayed (unit: dot) Width: 2 to 320, Height: 2 to 240
	Display	
	Type	Line drawing mode (See ”Line drawing mode”, page 181.) Standard/Pen Reco)
	Drawing Width	Interval between consecutive data on the drawn graph in dot units (See ”Drawing width”, page 181.)
	Direction	Direction of motion of the graph (See ”Line drawing mode”, page 181.) Up/down/left/right – Standard type: Direction of motion from the latest drawing position – Pen recording type: Direction of motion of the line as a whole
	Sampling Cycle	Cycle (time interval) for data reading (graph updating) Range: 0.5 to 6553.5 in 0.5 second units (Input range is 5 to 65535 (in 0.1 steps). Multiples of 5 only can be entered. Note, however, that on the NTH25/NTH25C units are rounded up to one second units (multiples of 10).)

General		
	Color	
		Frame: Display color of the frame (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
		+ Range: Display color of the plus range (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
Settings (properties of each line)		
	Line	
		Color: Display color of the line (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
		Style: Line type used · Solid line: —————— · Broken line: — — — — — — — — — · 1-dot chain line: -·-·-·-·-·-·-·-·-·-·-·- · 2-dot chain line: -··-··-··-··-··-··-··-
	100%*1	
		Value: Specify the 100% value (default: 100). Range: 0 to 2147483647 (Minus numbers specified on the Support Tool are treated as 0 on the NTH25/NTH25C.)
	0%*1	
		Value: Specify the 0% value (default: 0). Range: 0 to 2147483647 (Minus numbers specified on the Support Tool are treated as 0 on the NTH25/NTH25C.)
Data Logging		
	Touch Switches for Logging	
		Forward: Presense/absence of a touch switch to proceed to the next page Checked (touch switch set)/Unchecked (touch switch not set)
		Rewind: Presense/absence of a touch switch to return to the previous page Checked (touch switch set)/Unchecked (touch switch not set)
		Clear record *2: Presense/absence of a touch switch to clear the logging data Checked (touch switch set)/Unchecked (touch switch not set)
	Touch Switches for Display Function	
		Continue *2: Presence/absence of a touch switch to continue data sampling Checked (touch switch set)/Unchecked (touch switch not set)
		Stop *2: Presence/absence of a touch switch to stop data sampling Checked (touch switch set)/Unchecked (touch switch not set)
		Clear display *2: Presense/absence of a touch switch to clear the trend graph display Checked (touch switch set)/Unchecked (touch switch not set)

*1: The 0% value and 100% value must satisfy the following relationship:
0% value < 100% value

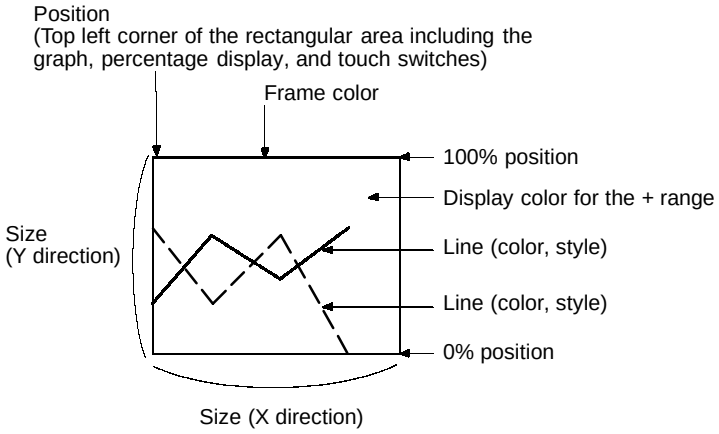
*2: On the NTH25/NTH25C, trend graphs are managed in order from the smallest screen number 1 to 20 having a trend graph. Clear record, continue sampling, stop sampling and clear display touch switches can be controlled in separate groups, 1 to 16 (group 1) and 17 to 20 (group 2) from among trend graphs 1 to 20.
For example, when the trend graph stop switch for trend graph 11 is pressed, sampling of all trend graph numbers 1 to 16 in group 1 is stopped.
To control trend graphs individually one frame at a time, use the trend graph control area. (See page 186.)

The line thickness for trend graphs is fixed to 1 dot.

Reference

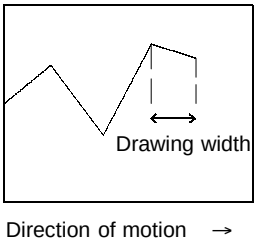
If a small value is set for ”Interval Type”, the line will appear to be a solid line even if ”broken line”, ”1−dot chain line”, or ”2−dot chain line” is specified.

• Display result



• Drawing width

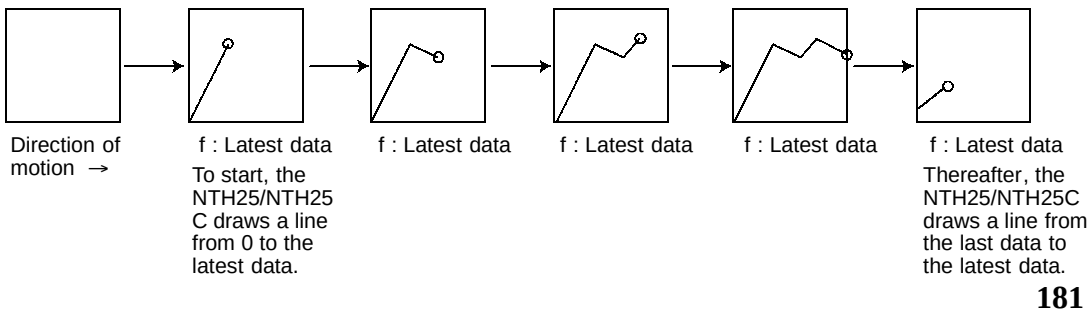
The drawing width is the interval at which successive data are drawn in the direction of motion. If a value outside the display area of the graph is specified, the graph will not be displayed.
On the NTH25/NTH25C, the actual drawing width is adjusted to a value obtained by evenly dividing the frame width.



• Line drawing mode

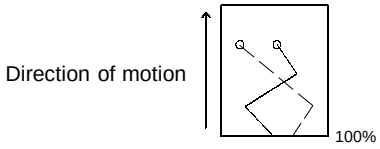
The graph is drawn as shown below depending on the settings made for ”Type” and ”Direction”.
The 100% value is at the top of the frame when ”Direction” is set to horizontal and at the right of the frame when ”Direction” is set to vertical.

<When ”Standard” is set for ”Type”>
With the standard type, the latest drawing position moves in the direction of motion specified by ”Direction” with the passage of time. If the direction of motion is set to ”Right”, the display changes as indicated below. When the line reaches the edge of the graph area, the line is cleared and then drawn again from the beginning.

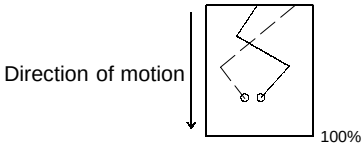


The following shows the drawing results for each ”Direction” setting.

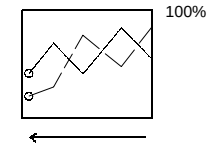
“Up”:
The drawing position moves upward.



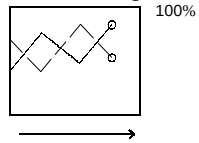
“Down”:
The drawing position moves downward.



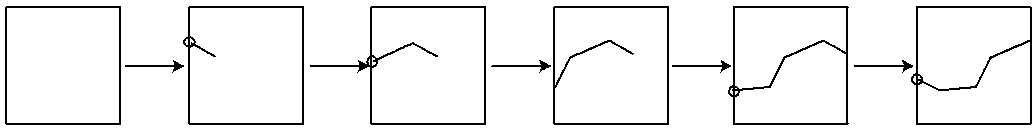
“Left”:
The drawing position moves to the left.



“Right”:
The drawing position moves to the right.

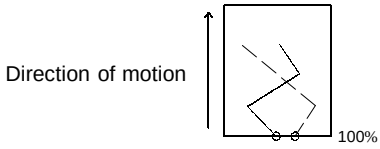


<When ”Pen Reco” is set for ”Type”>
With the pen recorder type, the latest drawing position is always displayed at the edge of the graph area. As time passes, the line already displayed on the graph moves in the direction specified by ”Direction” (as if paper were moving under a pen). When the direction of motion is set to ”Right”, the display changes as shown below. When the line reaches the edge of the graph area, the data is cleared from the oldest first.

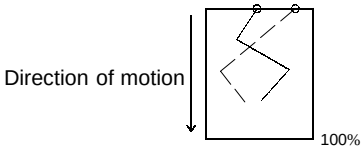


The following shows the drawing results for each ”Direction” setting.

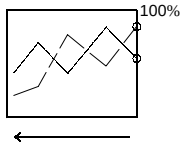
“Up”:
The drawn line moves upward.



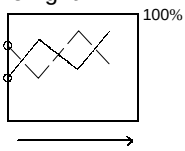
“Down”:
The drawn line moves downward.



“Left”:
The drawn line moves to the left.



“Right”:
The drawn line moves to the right.



• Trend graph frame maximum and minimum values

The maximum and minimum values that can be displayed in a trend graph are as follows:

<Maximum value>
The largest value of the 100% values for each of the lines displayed on the trend graph become the maximum value of the trend graph frame.

<Minimum value>
The smallest value of the 0% values for each of the lines displayed on the trend graph become the minimum value of the trend graph frame.

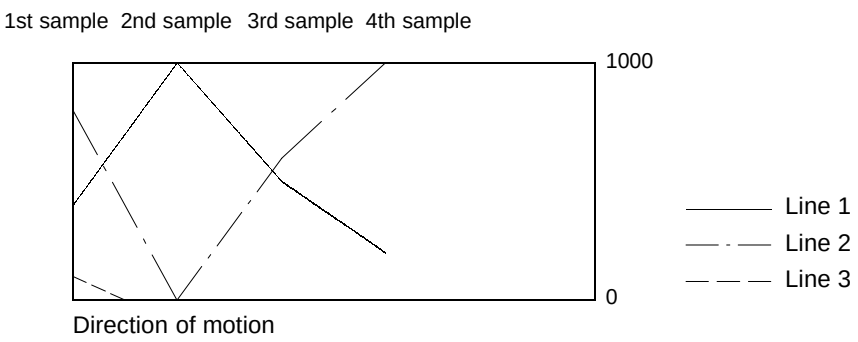
Example: Standard type graph displaying three lines
The 100% and 0% values of the displayed lines are displayed as follows:

	100% Value	0% Value
Line 1	500	200
Line 2	250	0
Line 3	1000	500

In this case, the maximum value becomes 1000 and the minimum value becomes 0.

Changing the values of each line in the trend graph results in the graph shown below.

	1st sample	2nd sample	3rd sample	4th sample
Line 1	400	1000	500	200
Line 2	100	–100	–200	–500
Line 3	800	0	600	1000



Take care when setting maximum and minimum values as setting lines whose 100% and 0% values are far away from each other will make the graph difficult to view.

• Out–of–range display

Values exceeding the maximum and minimum values of the trend graph are displayed as the maximum and minimum values.

• Contents of host words

On NTH25/NTH25C trend graphs, the contents of the words on the host are interpreted according to the setting made for ”Numeral Storage Type” (BCD/binary) for the numeral memory table. For details, see ”Word contents and display numerals” page xx. Note, however, that the number of referenced words for trend graphs is fixed to one.

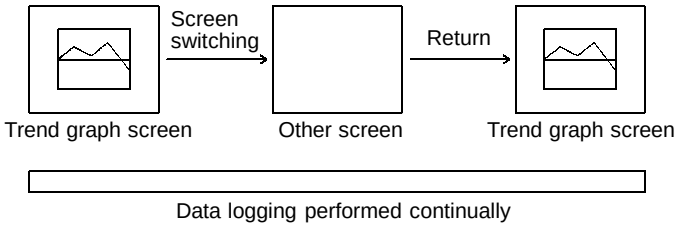
• Data logging function and background function

The data logging function allows you to record (log) the displayed values internally on the NTH25/NTH25C.
The data logging function allows you to back track and display past data in the form of a trend graph.
On the NTH25/NTH25C, the data logging function can be executed on a maximum of 40 data points. Note, however, that the maximum amount of data that can be recorded for each line is 640 points. If the data exceeds the limit, the data is deleted from the oldest point. When all of the data for the page is deleted while past data is being displayed, the oldest data at that time is displayed by pressing the "Forward" touch switch.
If the "Clear Log" touch switch has been set to be automatically generated, the data can be cleared at any time (data is cleared in groups). Note, however, that the record clear state using the "Clear Log" touch switch can be canceled only by the "Clear display" touch switch. To use the "Clear Log" touch switch, be sure to set the "Clear display" touch switch so that it is automatically generated.
The background function allows data to be sampled even while the trend graph is not displayed.
The recorded data is displayed by back tracking when the trend graph is displayed. Note, however, that processing on the NTH25/NTH25C may be slowed down since sampling continues while the background function is being used.

Reference

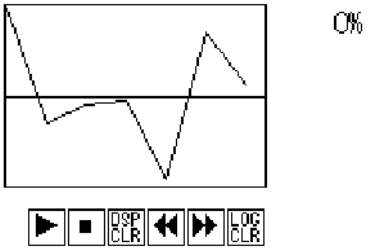
- Data retained by the data logging function is retained even when the NTH25/NTH25C is turned OFF.
- The data logging function and background function are used at all times for trend graphs on the NTH25/NTH25C.

Data is recorded as follows by the data logging function and background function.



• Display controls using touch switches

Trend graphs can be given the following indication and touch switches for controlling operation.



These dedicated touch switches can be used for sampling data and manipulating display.
The relevant functions are performed only once when the touch switches are pressed.

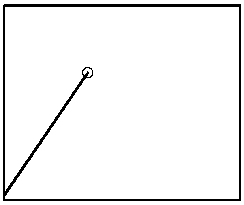
Reference

- On the NTH25/NTH25C, trend graphs are managed by numbers 1 to 20 in order from the smallest screen number having a trend graph.
  Trend graphs are managed in two separate groups: group 1 (trend graph numbers 1 to 16) and group 2 (trend graph numbers 17 to 20). For example, if you press the ”stop” touch switch for the trend graph having trend graph number 11 belonging to group 1, sampling of all trend graph numbers 1 to 16 in group 1 is stopped. Likewise, pressing the touch switch for trend graph number 17, sampling of all trend graph numbers 17 to 20 is stopped.
- To control (clear record, stop/continue sampling) trend graphs one frame at a time, use the trend graph control area. (See page 186.)

”Stop” touch switch
This switch stops data sampling. Updating of the trend graph display is also stopped at the same time.
On the NTH25/NTH25C, the ”stop” touch switch operates on all data within a group.
While sampling is stopped, the ”stop” touch switch is lit.
When the background function is used, pressing the ■ (stop) touch switch stops sampling in the background.

After pressing the ”stop” touch switch, if you press the ◀◀ (previous page (rewind)) touch switch to return to a past display and then press the ▶ (restart (continue)) touch switch to restart sampling, past data will not be displayed and new data will start to be drawn again.

Example:



”Restart” (continue) touch switch
This touch switch restarts the sampling of data stopped by pressing the ”stop” touch switch. Updating of the trend graph display is also started at the same time.
On the NTH25/NTH25C, the ”restart” touch switch operates on all data within a group.
During sampling, the ”restart” (continue) touch switch is lit.

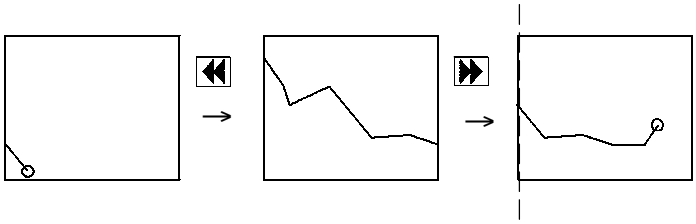
DSP
CLR

”Display clear” (clear display) touch switch (Function differs with that for NT series PTs.)
This cancels the clear record state made by the ”log clear” touch switch, and restarts recording and display.
On the NTH25/NTH25C, the ”clear display” touch switch operates on all data within a group.

LOG CLR ”Log clear” (clear log) touch switch (Function differs with that for NT series PTs.)
This touch switch clears all the logging data. At the same time, the currently displayed trend graph is also cleared. When the ”log clear” touch switch is pressed, records are cleared, and recording and display are no longer carried out until the ”clear display” touch switch is pressed.
On the NTH25/NTH25C, the ”clear log” touch switch operates on all data within a group.

◀◀ ”Previous page” (rewind) touch switch
This touch switch displays logging data older than that of the currently displayed trend graph.
With a standard type trend graph, if this touch switch is pressed during display of the latest data to back track to past data, and then the ”next page” (forward) touch switch is pressed to return to display of the latest data, the latest data is drawn following the past data.

Example:



▶▶ ”Next page” (forward) touch switch
This touch switch displays logging data newer than that of the currently displayed trend graph.
When the latest data is displayed during data logging, updating of the trend graph display is automatically restarted.

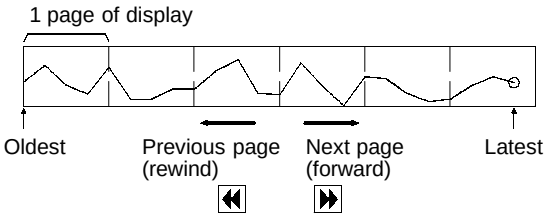
- Display control using the trend graph control area

Stopping/continuing trend graphs and clearing of records is also possible by manipulating the trend graph control area. Manipulating the trend graph control area allows trend graphs to be individually controlled.
The trend graph control area allows you to allocate words on the host at the ”trend control area” of the NTH Screen Data Converter.
For details on operations, see ”Trend graph control area setting” on page 271.

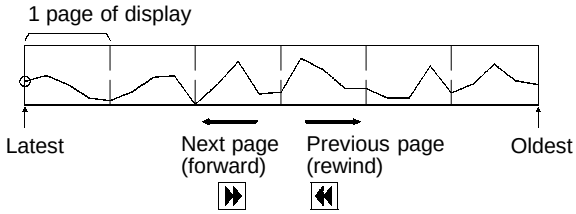
• Display direction of previous/next page touch switch

The following shows the display direction of the previous/next page touch switches when ”Right” is set for ”Direction”.

[Type: Standard]



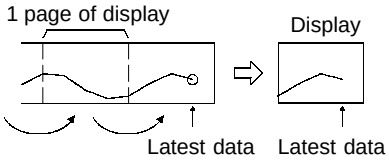
[Type: Pen Reco]



• When the display is rewound from past data to the latest.

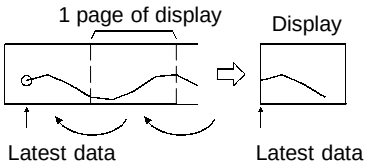
The following shows the display when the page is rewound to the latest display after displaying past data.

– Standard type



– Pen record type

With the pen recorder type, the latest drawing position is always displayed at the edge of the graph area. So, old data may be displayed discontinuously as shown below (internally, the data is recorded continuously) depending on the number of data points in the latest page.



[Display Functions]

- With trend graphs, the graph area is displayed in accordance with the ”General” settings, and the broken line is displayed in accordance with the ”Settings” (properties of each line) settings.
  For details on the display mode depending on the ”General” and ”Settings” (properties of each line) settings, see ”Common Attributes”.
- When two or more broken line graphs are registered, they are overwritten in the order in which they were registered. When broken lines overlap, colors are displayed in their corresponding inverse color. So, line types and colors may appear to be different from their specified color. The same applies when broken lines overlap the graph frame.
  *: Display color and their respective inverse colors are as follows:
  Black ↔ White, Blue ↔ Yellow, Red ↔ Cyan, Magenta ↔ Green

[Input Functions]

Trend graphs do not have a direct input function as they display the contents of words on the host via numeral memory tables. Note, however, that the NTH25/NTH25C does not actually have numeral memory tables, so actually the trend graph reads the contents of words on the host.

[Output Functions]

Trend graphs have no output function.

[Processing Functions]

Trend graphs have no data processing function.

[Relationship with Other Elements]

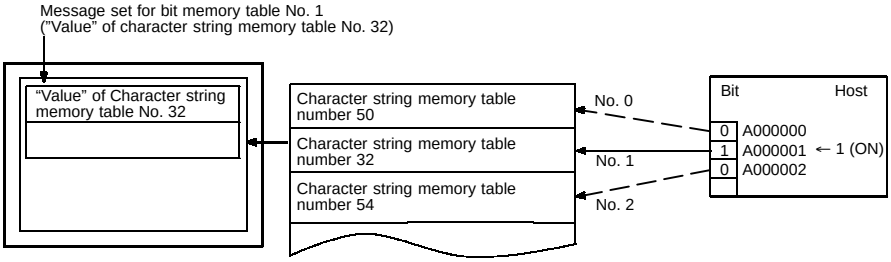
Do not overlap other elements within the area in which a trend graph is drawn. This can cause the graph to be displayed incorrectly.

4-12 Alarm List, Alarm History

[Function Outline]

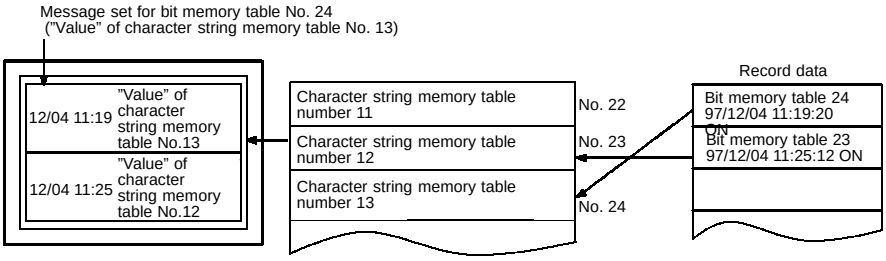
• Alarm list

The NTH25/NTH25C can monitor the state of bits on the connected host specified in bit memory tables and display the corresponding message (”Value” of character string memory table) when the state of a specific bit changes to ”1” (ON). The element used to execute this function is called an ”alarm list”.



• Alarm history

The NTH25/NTH25C can continually monitor bits on the host specified in bit memory tables, record the date and time when their state changes to ”1” (ON), and display this information together with the corresponding message (”Value” of character string memory table) for the bit. The element used to execute this function is called an ”alarm history”.



Reference

- On the NTH25/NTH25C, when a message projects off the display field, it is displayed over two or more lines at double-line spacing.
- Alarm history record data that is currently recorded internally by the NTH25/NTH25C is retained by a capacitor when operation is stopped, for example, during use of the programming console function, or when the power is turned OFF. Note, however, that the capacitor discharges and the record data will be cleared after a few days. Record data is also cleared when screen data is sent to NTH25/NTH25C memory.

• Differences between alarm list and alarm history

The alarm list and alarm history differ in the following respects:

Item	Alarm List	Alarm History
Recording	No recording executed	Date and time of occurrence is recorded.
Display order	Ascending order of bit memory table numbers whose bits on the host have changed state to ”1” (ON)	Chronological order in which the states of the monitored bits changed to ”1” (ON) (the newest record first)

• Outline of alarm list/alarm history operations

The following describes alarm list and alarm history operations.

Reference

- The alarm list and alarm history check bits on the host allocated bit memory tables.
  Consequently, if a large number of host bits is set, processing on the NTH25/NTH25C may be slowed down.
- Alarm lists are displayed in ascending order of bit memory table numbers, and alarm histories are displayed in occurrence order (from the newest record).
- In the case of alarm lists, the message is automatically cleared if the state of a host bit allocated a bit memory table returns to ”0” (OFF) while an alarm list is displayed.
  In the case of alarm histories, the previous message remains, and a message indicating that the bit has changed to 0 (OFF) again is displayed if the state of a host bit allocated a bit memory table returns to 0 (OFF) while an alarm history is displayed.
  Also, the corresponding message is displayed if the state of a host bit changes to 1 (ON) while an alarm history is displayed.

[Restrictions]

- Only either of an alarm list or alarm history can be registered to a screen.
- An alarm list/alarm history can display up to 8 messages at the same time. Messages which are hidden can be displayed by operating the line or page scroll touch switches specially provided.
- The maximum number of data records that can be recorded with the alarm history is 200.
- On the Support Tool, bit memory table numbers and the number of referenced bit memory tables can be set to alarm lists. The NTH25/NTH25C, however, always monitors 240 host bits (15 words) from the PC address (bit) currently set to bit memory table number 0. So, the bit memory table numbers and the number of referenced bit memory tables settings are invalid. (See ”Bit memory tables” page 103.)
- On the NTH25/NTH25C, messages for alarm lists and alarm histories that cannot fit on one line are displayed over two or more lines. (If the message projects downwards off the screen, the entire message is fed to the next page.) Messages spread over two or more lines are displayed at double–line spacing. For this reason, the appearance of messages differs from that on the Support Tool.
  Be sure to check the display on the NTH25/NTH25C before use.

- On the Support Tool, you can set whether or not to display the date and time of occurrence and the display mode. On the NTH25/NTH25C, however, this setting is invalid, and the display is always the occurrence order in the format ”month/day, hours:minutes”. Set as follows to prevent mismatch with the display on the Support Tool:

History Info:	Checked
Order Type:	Occurrence order
Info Type:	Month/day, hours:minutes

On the NTH25/NTH25C, changes in bit states are displayed as follows in addition to the infomation above:

When bit state changes from 0 (OFF) to 1 (ON):	Alarm occurrence
When bit state changes from 1 (ON) to 0 (OFF):	Recovery

- On the Support Tool, the width of the message display field is ”Length” plus the date and time of occurrence. (Actually, it is slightly longer as the field is adjusted to fit the touch switch.) Whereas, on the NTH25/NTH25C, the part up to the date of occurrence display is included in ”Length” and the display field width is calculated by adding the message display field on the Support Tool to the bit change information component (5 digits). So, when ”month/day hours:minute” display (12 digits) is set, the display on the NTH25/NTH25C is seven digits narrower than on the Support Tool. Arrange elements taking this into consideration when creating screens.

  Example: When ”Length” is set to 16 and ”month/day hours:minutes” display is set:
  – On Support Tool
  Display field width = 16 digits + 12 digits = 28 digits
  – On the NTH25/NTH25C
  Display field width = 16 digits + 5 digits = 21 digits

  According to the above calculation, only four digits will be used for displaying messages on the NTH25/NTH25C. To use 16 digits for displaying messages, you must set ”Length” to 28.

- On the NTH25/NTH25C, the alarm history cannot be displayed in the frequency (count) order.

- On the Support Tool, you can set the color of message display field frames and their background color when lit. On the NTH25/NTH25C, however, these settings are invalid as message display fields do not have a function for acting a touch switch. Display fields are displayed in their OFF color at all times.

- On the Support Tool, you can set whether or not to display image/library data and their color. On the NTH25/NTH25C, however, image/library data cannot be displayed in alarm lists and histories, so these settings are invalid.

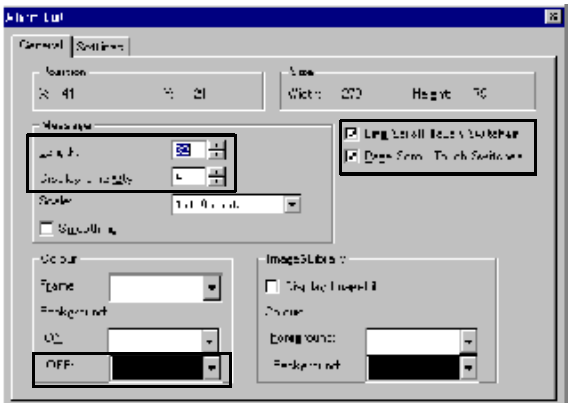
[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Maximum number of alarm list and histories on one screen	Total of 4	Either of one
Maximum number of messages that can be displayed simultaneously	12	8
Bit memory table number for alarm lists, number of referenced bit memory tables	Settable	Not supported (All bit memory tables are referenced at all times.) (See ”Restrictions”.)
Alarm history properties ”History Info”, ”Order Type”, ”Info Type”	Settable	Not supported (The occurrence order is always displayed in the ”month/day hours:minute” format.) (See ”Restrictions”.)
Display scaling of messages	Settable	Not supported (always displayed as Equal)
Smoothing	Settable	Not supported (displayed without smoothing)
”Frame” and ON color of message display field	Settable	Not supported (displayed at OFF color) (See ”Restrictions”.)
Display and color of Image-Lib	Settable	Not supported (Image/library data cannot be displayed.) (See ”Restrictions”.)

[Common Attributes]

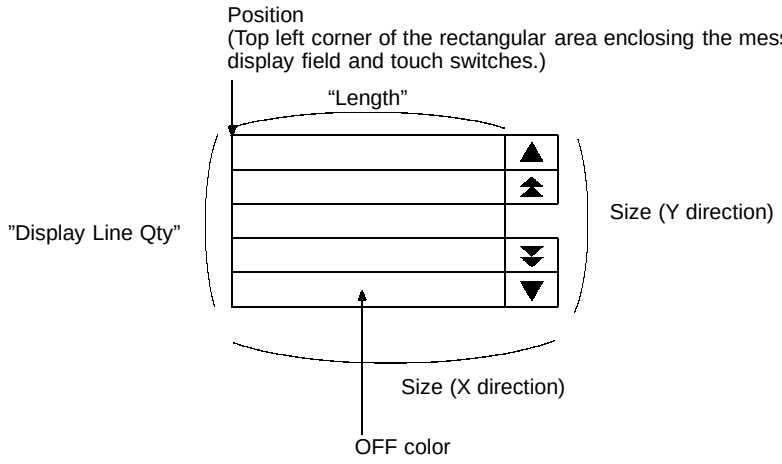
The following shows the relationship between the common properties of alarm lists and alarm histories and the display result.



Only sections enclosed by ☐ are valid.

• Properties

General			
	Position		Coordinates of the top left corner of the alarm list/history
	Size		Width and height of the alarm list/history (unit: dot) (Note that motion is in touch-switch-sized units only.)
	Message		
		Length	Maximum number of characters in the message to be displayed 1 to 39
		Display Line Qty	Maximum number of messages to be displayed 1 to 8 (Values 9 or above set on the NTH25/NTH25C are handled as 8.)
	Line Scroll Touch Switches		Touch switches for scrolling messages in line units Checked (touch switches present)/Unchecked (touch switches absent)
	Page Scroll Touch Switches		Touch switches for scrolling messages in page units Checked (touch switches present)/Unchecked (touch switches absent)
	General		
		Background color	
			OFF color of the message display field (Colors other than black and white are featured on only the NTH25C. Black/Blue/Red/Magenta/Green/Cyan/Yellow/White



- The positions of line/page scroll touch switches can be set separately. Note, however, that their display colors and sizes cannot be changed.
- The "Length" range in alarm histories is different from the above. (See "Restrictions".)

[Display Functions]

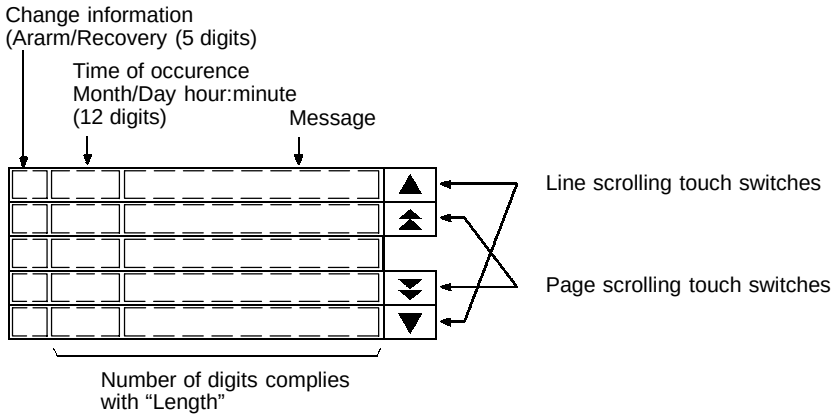
• Alarm list

In addition to the ”Common Attributes”, alarm lists have “Settings” properties. All properties, however, are invalid.

– Drawing result
An alarm list monitors 240 host bits (15 words) from the PC address (bit) set to bit memory table number 0, and executes display in accordance with the ”General” settings.
For details on the display mode according to the ”General” settings, see ”Common Attributes”.

• Alarm history

Apart from the ”Common Attributes”, alarm histories have the “Settings” properties. All properties, however, are invalid.
– Display result
The history is displayed as follows depending on the settings made for ”General” .



For details on the display mode according to the ”General” settings, see ”Common Attributes”.

• Display at message update

When the state of a monitored host bit changes during display of an alarm list/ alarm history, the display changes as follows.

– With an alarm list
When the state of a monitored host bit changes to ”1” (ON), the corresponding message is displayed. When it changes back to ”0” (OFF), the message is cleared (the messages are displayed in ascending order of bit memory table numbers).

[When a message is added]
– If a message is added outside the display range (before or after the display range), the currently displayed message does not change.
– If a message is added within the display range, the new message is displayed, and the messages following it are shifted one line downward.

[When a message is deleted]
– If a message is deleted outside the display range (before or after the display range), the currently displayed message does not change.
– If a message is deleted within the display range, the messages following it are shifted one line upward, except when it is the topmost message in the display that is deleted. In this case, the message immediately preceding the present display range is displayed in its place.

• Alarm history

When the status of the monitored host bit changes to ”1” (ON), the corresponding message becomes the latest message and is appended to the history record. When the state of the bit changes back to ”0” (OFF), the message remains displayed.
Since new messages are added at the end of the history, the displayed messages do not change. If the states of multiple bits change to ”1” (ON) at the same time, the bit memory table with the smallest bit memory table number is given priority.

• Note on clearing alarm history record data

Alarm history record data that is currently recorded internally by the NTH25/NTH25C is retained by a capacitor when operation is stopped, for example, during use of the programming console function, or when the power is turned OFF. Note, however, that the capacitor discharges and the record data will be cleared after a few days. Record data is also cleared when screen data is sent to NTH25/NTH25C memory.

[Input Functions]

Alarm lists and alarm histories do not have a direct input function as they display the contents of words on the host via bit memory tables. Note, however, that the NTH25/NTH25C does not actually have bit memory tables, so actually the Alarm lists and alarm histories read the contents of words on the host.

[Output Functions]

Alarm lists and alarm histories have no output function.

[Processing Functions]

Alarm lists and alarm histories have no data processing function.

[Relationship with Other Elements]

- Alarm lists and alarm histories monitor the states of host bits and display messages, in accordance with the settings of bit memory tables. For details, see ”Bit Memory Tables” (page 103).

4-13 Inputting Numerals

4-13-1 Numeral key type (”Numeral Input”)

[Function Outline]

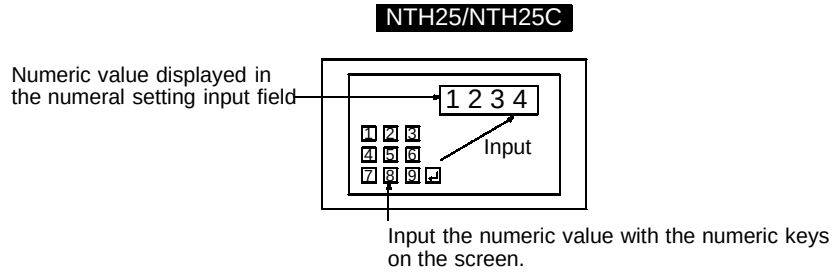
Numeral key type numeral input fields are input fields for inputting numerals on the screen.
The numerals input to a numeral input field using touch switches are written to a numeral memory table (words on host).
The values can be input either in decimal or hexadecimal format.

The NTH25/NTH25C does not actually have numeral memory tables, so only the PC address set to the numeral string memory table and the numeral storage type are used to directly reference words on the host from a numeral display element.

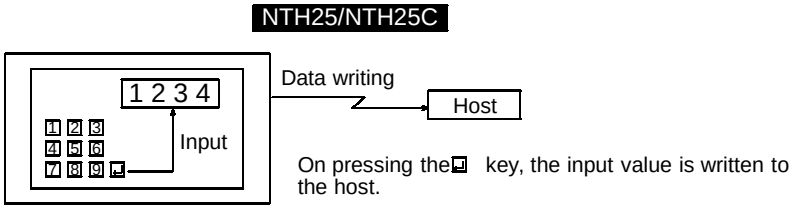
• Outline of operation

The following shows the basic operation of a numeral key type numeral input field.

(1) A numeral is input to a numeral input field using touch switches.



(2) On applying the input numeral with the ↵ touch switch it is written to a numeral memory table (words on host).
At this time, the host is notified via the PT status notify area that a numeral has been input.
With thumbwheel type numeral input field, each time a change is made to the numeral and applied, the host is notified of that change.



[Restrictions]

- The maximum number of numeral input elements that can be registered to one screen varies as follows according to the communications method:
  [Host link, NT link (1:1)]
  Max. 80 total of numeral key types and thumbwheel types
  The number of numeral input elements is counted according to their display order, and elements exceeding this maximum are discarded. Note, however, that on the Support Tool numeral key type and thumbwheel type numeral input elements are counted individually. So, both of their display orders cannot be checked simultaneously. Take care to prevent this limit from being exceeded, and thoroughly check the screen on the NTH25/NTH25C before operation.
  [Memory link]
  Max. 80 total of numeral key types and thumbwheel types
  The number of numeral input elements is counted in order from the smallest numeral memory table number, and elements exceeding this maximum are discarded. (The same numeral memory table cannot be set to two or more numeral input elements in the same screen.)
- There is no restriction on the number of input fields that can be registered to one screen data file; any number can be registered as long as the maximum data file size is not exceeded.
- The range of numerals that can be input varies on the ”Storage Type” (BCD/binary) of the numeral memory table, and the ”Display Type” (decimal/hexadecimal), and ”Display Type” settings made for the numeral input element. For details, see ”Input numeral and stored data” (page 200).
- The number of words on the host that are referenced by numeral input elements is as follows depending on the number of display digits:

  When the number of digits in the integer part + number of digits past the decimal point is =< 4 digits: 1 word
  When the number of digits in the integer part + number of digits past the decimal point is > 5 digits: 2 words
- With numeral key type numeral input elements on the standard screen (base screen), numerals in the process of being entered are not displayed. The numerals are displayed once the ↵ or ENT key is pressed to apply the entry. Note, however, that the previous numeral remains displayed if the numeral you entered is in error or is caught in the limit check.
  With numeral key type numeral input fields (temporary input fields) on window screens, numerals in the process of being entered are displayed. Note, however, that the previous numeral remains displayed if the numeral you entered is in error or is caught in the limit check.
- The maximum number of digits that can be set on the Support Tool is ten. However, on the NTH25/NTH25C, the maximum is eight for the integer part and six for the decimal fraction. The sign digit and decimal point are counted as one digit each. Set the number of digits taking this restriction into consideration to prevent mismatch with the display on the Support Tool.
- On the Support Tool, signed display can be set. However, minus numbers cannot be entered in numeral input on the NTH25/NTH25C. So this setting is invalid.

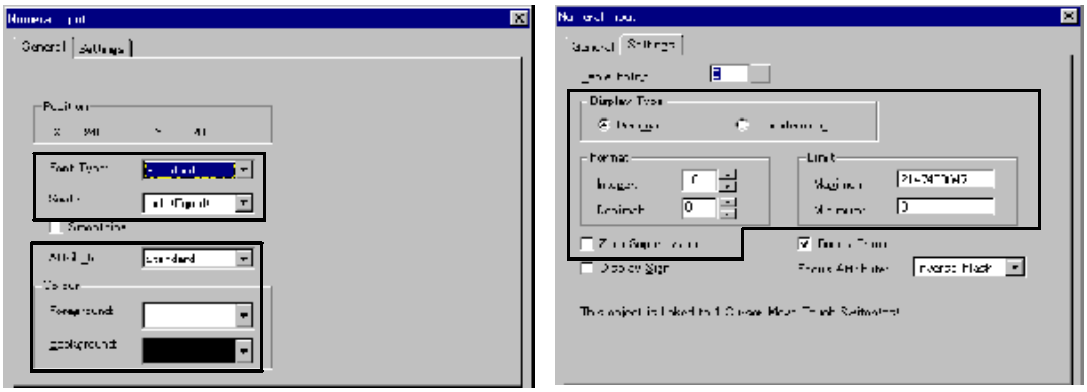
[Setting Restrictions]

The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Maximum number of numeral key type numeral inputs in one screen	256	80 (This maximum includes the total of both numeral key types and thumbwheel types.) (See ”Restrictions”.)
Font type ”Half Height”	Settable	Not supported (displayed in standard)
Font type ”Double Width”	Settable	Displayed as standard font with width doubled. Note, however, that 8 x 8 fonts are displayed as standard font.
Size 3 x 3	Settable	Not supported (displayed in 2 x 2)
Smoothing	Settable	Not supported (displayed without smoothing)
Maximum number of display digits	10 digits	8 digits (The decimal point is also counted as one digit.) (See ”Number of display digits” on page 200.)
Display Sign	Settable	Not supported (Minus numbers cannot be entered.)
Focus Frame, Focus Attribute	Settable	Not supported (displayed without cursor)

[Common Attributes]

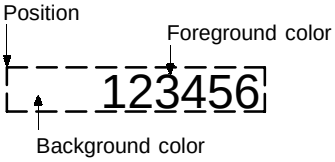
The following shows the relationship between the properties of a numeral input field and the numerals input and displayed.



Only sections enclosed by ☐ are valid.

• Properties

General			
	Position	Coordinates of the top left corner of the numeral input field	
	Font Type	Display font for the numerals Standard/Double Width (When a double width font is specified, the standard font is displayed with its width doubled. Half height fonts are displayed as standard fonts.)	
	Scale	Scale at which the numeral is displayed (See "Enlarged display", page 162.) 1 x 1 (equal), 1 x 2 (high), 2 x 1 (wide), 2 x 2, 4 x 4, 8 x 8 (3 x 3 characters set on the Support Tool are displayed as 2 x 2 characters on the NTH25/NTH25C.)	
	Attribute	Display mode for numerals (See "Display attributes and drawing result", page 202.) Standard/Flash/Inverse Flash	
	Color		
		Foreground	Display color of numerals (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
		Background	Background color of numerals (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
Settings			
	Table Entry	Number of the numeral memory table to which the input numeral is written (BCD 4 digits) 0 to 1999 (host link, NT link (1:1)) 0 to 499 (memory link)	
	Display Type	Display type for numerals (See "Input numeral and stored data", page 200.) Decimal/Hexadecimal	
	Format (See "Number of display digits", page 200.)		
		Integer	Number of digits in the integer part of the numeral 1 to 8
		Decimal	Number of digits in the decimal fraction of the numeral 0 to 6
	Limit (See "Upper/lower (max./min.) limit check", page 202.)		
		Maximum	Upper limit for numerals that can be input
		Minimum	Lower limit for numerals that can be input
	Zero Suppression	Use of zero suppression (See "Zero suppression", page 163.) Checked (zero suppression used)/Unchecked (zero suppression not used)	



• Number of display digits

All numerals are stored as integers to words on the host. To display a numeral that has a decimal fraction in a numeral input field, set the ”Decimal” setting to ”1” or higher to specify the number of places past the decimal point. A decimal point is automatically inserted.
If the number of numeral digits is greater than the ”Integer” and ”Decimal” total, the upper digits are discarded, and only the displayable lower integer digits and the decimal fraction are displayed.
The maximum number of digits in the integer part is eight, and the maximum number of digits past the decimal point is six. Up to a total of eight digits including one digit for the decimal point can be specified.

Example: Displaying ”123456”
- Setting for ”Integer” = 8 and ”Decimal” = 0:
  Resulting display: 00123456
- Setting for ”Integer” = 4 and ”Decimal” = 4:
  Resulting display: 12.3456
- Setting for ”Integer” = 2 and ”Decimal” = 4:
  Resulting display: 12.3456
- Setting for ”Integer” = 1 and ”Decimal” = 4:
  Resulting display: 2.3456

• Input numeral and stored data

The range of numerals that can be input and the conversion method for storing numerals depend on the following factors:

Numeral Storage Type (BCD/binary)
Display Type (decimal/hexadecimal)

<Function of Numeral Storage Type>
The numeral storage type determines whether the contents of words on the host are recognized as BCD (Binary Coded Decimal) or binary (hexadecimal). Numerals are converted according to this method also when words on the host are written to.
Note, however, that minus numbers cannot be entered in numeral input on the NTH25/NTH25C.

<Function of Display Type>
The display type determines whether numerals are displayed in decimal or hexadecimal.

<Permissible Input Range>
The table below shows the permissible input ranges for each of the settings made for "Numeral Storage Type" and number of referenced words, and "Display Type". Note, however, that the decimal point is not shown in the table as numerals are displayed using the values stored on the host. Even if an attempt is made to enter a value outside of these ranges, the limit check on the NTH25/NTH25C prevents the value from being entered. (Even if the value is within the ranges in the table, values outside the range set to the limit check cannot be input.)

Storage types	Number of words	Display Type	Permissible Display Range	
BCD	1	Decimal	0 to 9999	
		Hexadecimal	0 to 270F Hex	
	2	Decimal	0 to 99999999	*
		Hexadecimal	0 to 5F5E0FF Hex	
Binary	1	Decimal	0 to 9999	
		Hexadecimal	0 to 7FFF Hex	
	2	Decimal	0 to 99999999	*
		Hexadecimal	0 to 7FFFFFFF Hex	

*: If the numeral has a decimal point, the number of digits that can be used as the numeral is one digit less.

<Numerals and contents of host words>
When a numeral is entered, it is written to the words on the host according to the settings made for "Display Type" and "Numeral Storage Type".
The examples in the following table are for numerals without a decimal point.

Input numeral	Display Type	Words	Storage Type	Contents of Word on Host	Display on NTH25/NTH25C after Numeral Is Applied
1234	Decimal	1 word	BCD	1234	1234
123456		1 word		1234	1234
1234		2 words		00001234	00001234
000004D2	Hexade-cimal	1 word		2A	0042
1234		1 word		1234	04D2
123456789		2 words		12345678	00BC614E
4660	Decimal	1 word	Binary	1234	4660
32768		1 word		8000	32768
123456789		2 words		BC614E	12345678
1234	Hexade-cimal	1 word		1234	1234
7FFF		1 word		7FFF	7FFF
7FFFFFFF		2 words		7FFFFFFF	7FFFFFFF

Reference

- When the ”Numeral Storage Type” is set to BCD, entered numerals are converted to BCD data before they are written to words on the host. Note, however, that when a value that is not a BCD is entered, the value will not be entered or displayed as intended. For example, some digits will be ignored.
  When the ”Numeral Storage Type” is set to binary, entered numerals are converted to hexadecimal data before they are written to words on the host.
- When the ”Numeral Storage type” is set to BCD, set the ”Display Type” to decimal. Even if ”Display Type” is set to hexadecimal, entered numerals are treated as BCD and cannot be input correctly.
- Though minus numbers cannot be entered on the NTH25/NTH25C, minus numbers are sometimes displayed in the numeral input field on the NTH25/NTH25C when a minus number is stored to the contents of words on the host.

• Upper/lower (max./min.) limit check

The NTH25/NTH25C has a function for checking the correctness of an input numeral. This prevents a numeral outside the permissible range from being input so that the input of an illegal value will not adversely affect the system.
In the case of a numeral key type numeral input field, the limit check is executed when an attempt is made to apply a numeral. If the value is higher than the upper limit or lower than the lower limit, the input value is cleared. (The status returns to that before input was attempted.)

Caution Be sure to use the limit check function to ensure safe use of the numeral input function.

• Display attribute and drawing result

Attribute	Drawing Result
Standard	The numeral display is displayed at the specified foreground color and background color. 
Flash	Repeated alternation of the ”standard” display and no display.  ⇔ No display
Inverse Flash	Repeated inverted display of each of the foreground and background colors and no display.  ⇔ No display

• Specifying the input field when there are multiple input fields

When the screen contains multiple input fields, specify the required numeral input field by the cursor move touch switch.
Note, however, that on the NTH25/NTH25C, only the cursor move touch switch that you use to register numeral input fields to screen is valid. Cursor move touch switches made for different purposes using the touch switch functions cannot be used even if they are linked to a numeral input field later.

[Display Functions]

Numerals are displayed in the numeral input field in accordance with the ”General” settings.
For details on the display mode according to the ”General” settings, see ”Common Attributes”.

[Input Functions]

Numerals are input to numeral input fields by using the ”control code input key” touch switches.

[Output Functions]

Numeral inputs do not have a direct input function as they write to words on the host via numeral memory tables. Note, however, that the NTH25/NTH25C does not actually have numeral memory tables, so actually numeral inputs write to words on the host.
The host is notified that a numeral has been input by the PT status notify area.

[Processing Functions]

With numeral input fields, input numerals are converted to display numerals in accordance with the ”Settings” property.
For details on the method of conversion using the ”Settings” property, see ”Common Attributes”.

[Relationship with Other Elements]

- ”Numeral display” (page 159) use the same conversion method and display mode as numeral input fields.
- Input and apply touch switches are required to use numeral input fields.
- A cursor move touch switch must be made for numeral key type numeral input fields, so numeral input fields cannot overlap each other, and numeral input fields cannot overlap touch switches.

4-13-2 Thumbwheel Type (Thumbwheel)

[Function Outline]

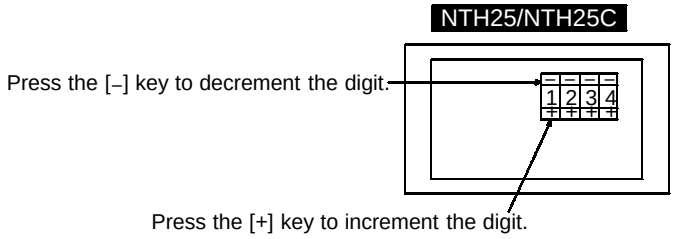
Thumbwheel type numeric input fields are input fields for inputting numerals on the screen.
Touch switches are provided to increment or decrement each digit of a numeral, making it easier to change numerals and to write them to numeral memory tables. The values can be input in either decimal or hexadecimal format.

The NTH25/NTH25C does not actually have numeral memory tables, so only the PC address currently set to the numeral string memory table and the numeral storage type are used to directly reference words on the host from a numeral display element.

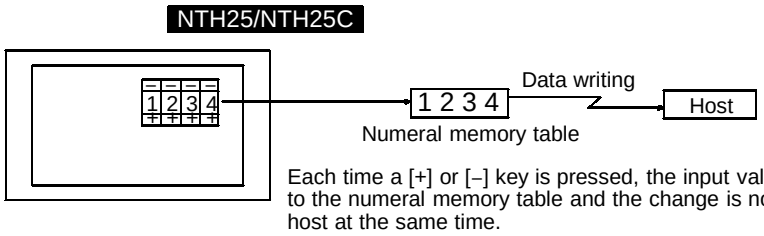
• Outline of operation

The following shows the basic operation of a thumbwheel type numeral input field.

(1) The value in the numeral input field is changed using the increment and decrement (+, –) touch switches.



(2) Each time a change is made to the numeral and applied, the host is notified of that change via the PT status notify area.



[Restrictions]

- The maximum number of numeral input elements that can be registered to one screen varies as follows according to the communications method:
  [Host link, NT link (1:1)]
  Max. 80 total of numeral key types and thumbwheel types
  The number of numeral input elements is counted according to their display order, and elements exceeding this maximum are discarded. Note, however, that on the Support Tool numeral key type and thumbwheel type numeral input elements are counted individually. So, both of their display orders cannot be checked simultaneously. Take care to prevent this limit from being exceeded, and thoroughly check the screen on the NTH25/NTH25C before operation.
  [Memory link]
  Max. 80 total of numeral key types and thumbwheel types
  The number of numeral input elements is counted in order from the smallest numeral memory table number, and elements exceeding this maximum are discarded. (The same numeral memory table cannot be set to two or more numeral input elements in the same screen.)
- There is no restriction on the number of input fields that can be registered to one screen data file; any number can be registered as long as the maximum data file size is not exceeded.
- The range of numerals that can be input depends on the ”Storage Type” (BCD/binary) of the numeral memory table, and the ”Display Type” (decimal/hexadecimal) settings made for the numeral input field. For details, see ”Input numeral and stored data” (page 208).

- The number of words on the host that are referenced by numeral input elements is as follows depending on the number of display digits:

  When the number of digits in the integer part + number of digits past the decimal point is =< 4 digits: 1 word
  When the number of digits in the integer part + number of digits past the decimal point is > 5 digits: 2 words

- The maximum number of digits that can be set on the Support Tool is ten. However, on the NTH25/NTH25C, the maximum number of digits in the integer part is eight, and the maximum number of digits past the decimal point is six. Up to a total of eight digits including one digit for the decimal point can be specified. Set the number of digits taking this restriction into consideration to prevent mismatch with the display on the Support Tool.
- On the Support Tool, signed display can be set. However, minus numbers cannot be entered in numeral input on the NTH25/NTH25C. So this setting is invalid.
- The appearance of thumbwheel type numeral input fields on the Support Tool differs from that on the NTH25/NTH25C. Check the display on the NTH25/NTH25C before use.

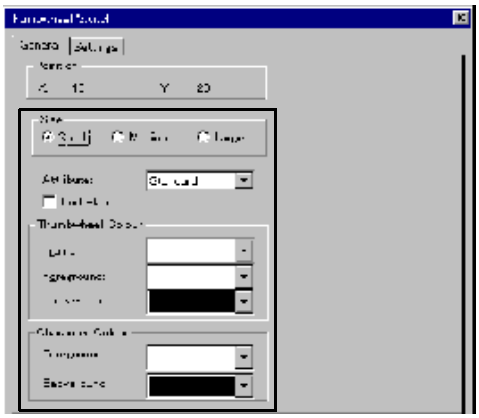
[Setting Restrictions]

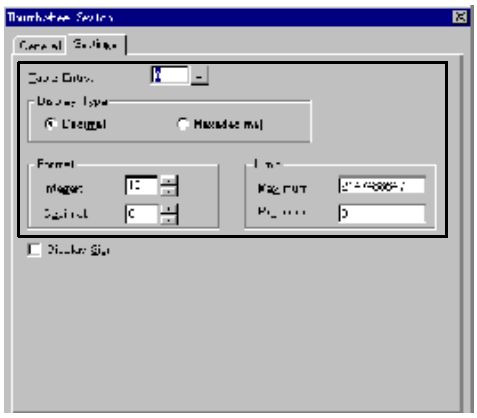
The items that can be set on the Support Tool vary from the valid settings on the NTH25/NTH25C. Pay attention to these restrictions when creating screen data.

Item	Support Tool	NTH25/NTH25C
Maximum number of thumbwheel type numeral inputs in one screen	64	80 (This maximum includes the total of both numeral key types and thumbwheel types.) (See ”Restrictions”.)
Frame color	Color of frame for numeral input field and color of character and frame of ”+” and ”–” touch switches	Color of character and frame of ”+” and ”–” touch switches
Maximum number of displayed digits	10 digits	8 digits (The decimal point is also counted as one digit.) (See ”Number of digit displayed” on page 207.)
Display Sign	Settable	Not supported (Minus numbers cannot be entered.)

[Common Attributes]

The following shows the relationship between the properties of a thumbwheel type numeral input field and the numerals input and displayed.



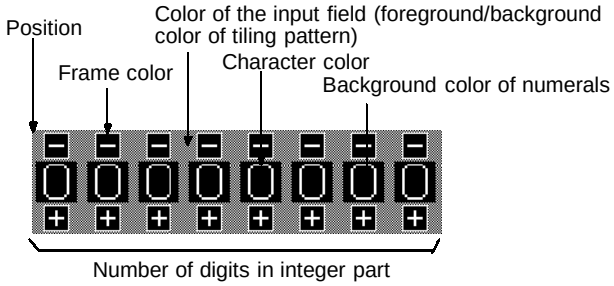


Only sections enclosed by ☐ are valid.

- Properties

General		
	Position	Coordinates of the top left corner of the numeral input field
	Thumbwheel Color	
		Frame: Color of character and frame of ”+” and ”−” touch switches (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
		Foreground: Foreground color of the numeral input field (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
		Background: Background color of the numeral input field (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
	Character Color	
		Foreground: Display color of the numerals (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White
		Background: Background color of the numerals (Colors other than black and white are features only on the NTH25C.) Black/Blue/Red/Magenta/Green/Cyan/Yellow/White

Settings			
Table Entry		Number of the numeral memory table to which the input numeral is written (BCD 4 digits) 0 to 1999 (host link, NT link (1:1)) 0 to 499 (memory link)	
Display Type		Display format for the numeral (See ”Input numeral and stored data”, page 208.) Decimal/Hexadecimal	
Format (See ”Number of digits displayed”, page 207.)			
	Integer	Number of digits in the integer part of the numeral 1 to 8	Maximum combined total of 8 digits
	Decimal	Number of digits in the decimal fraction of the numeral 0 to 6	
Limit (See ”Upper/lower (max./min.) limit check”, page 209.)			
	Maximum	Upper limit for numerals that can be input	
	Minimum	Lower limit for numerals that can be input	



• Number of digits displayed

All numerals are stored as integers to words on the host. To display a numeral that has a decimal fraction in a numeral input field, set the ”Decimal” setting to ”1” or higher to specify the number of places past the decimal point. A decimal point is automatically inserted.
If the number of numeral digits is greater than the ”Integer” and ”Decimal” total, the upper digits are discarded, and only the displayable lower integer digits and the decimal fraction are displayed.
The maximum number of digits in the integer part is eight, and the maximum number of digits past the decimal point is six. Up to a total of eight digits including one digit for the decimal point can be specified.

Example: Displaying ”123456”
- Setting for ”Integer” = 8 and ”Decimal” = 0:
  Resulting display: 00123456
- Setting for ”Integer” = 4 and ”Decimal” = 4:
  Resulting display: 12.3456
- Setting for ”Integer” = 2 and ”Decimal” = 4:
  Resulting display: 12.3456
- Setting for ”Integer” = 1 and ”Decimal” = 4:
  Resulting display: 2.3456

• Input numeral and stored data

The range of numerals that can be input and the conversion method for storing numerals depend on the following factors:

- Numeral Storage Type (BCD/binary)
- Display Type (decimal/hexadecimal)

<Function of Numeral Storage Type>
The numeral storage type determines whether the contents of words on the host are recognized as BCD (Binary Coded Decimal) or binary (hexadecimal). Numerals are converted according to this method also when words on the host are written to.
Note, however, that minus numbers cannot be entered in numeral input on the NTH25/NTH25C.

<Function of Display Type>
The display type determines whether numerals are displayed in decimal or hexadecimal.

<Permissible input ranges>
The table below shows the permissible input ranges for each of the settings made for "Numeral Storage Type" and number of referenced words, and "Display Type". Note, however, that the decimal point is not shown in the table as numerals are displayed using the values stored on the host. Even if an attempt is made to enter a value outside of these ranges, the limit check on the NTH25/NTH25C prevents the value from being entered. (Even if the value is within the ranges in the table, values outside the range set to the limit check cannot be input.)

Storage types	Number of words	Display Type	Permissible Display Range	
BCD	1	Decimal	0 to 9999	
		Hexadecimal	0 to 270F Hex	
	2	Decimal	0 to 99999999	*
		Hexadecimal	0 to 5F5E0FF Hex	
Binary	1	Decimal	0 to 9999	
		Hexadecimal	0 to 7FFF Hex	
	2	Decimal	0 to 99999999	*
		Hexadecimal	0 to 7FFFFFFF Hex	

*: If the numeral has a decimal point, the number of digits that can be used as the numeral is one digit less.

Reference

- When the "Numeral Storage Type" is set to BCD, entered numerals are converted to BCD data before they are written to words on the host.
  When the "Numeral Storage Type" is set to binary, entered numerals are converted to hexadecimal data before they are written to words on the host.
- When the "Numeral Storage Type" is set to BCD, set the "Display Type" to decimal. Even if "Decimal Type" is set to hexadecimal, entered numerals are treated as BCD and cannot be input correctly.
- Though minus numbers cannot be entered on the NTH25/NTH25C, minus numbers are sometimes displayed in the numeral input field on the NTH25/NTH25C when a minus number is stored to the contents of words on the host.

• Upper/lower (max./min.) limit check

The NTH25/NTH25C has a function for checking the correctness of an input numeral. This prevents a numeral outside the permissible range from being input so that the input of an illegal value will not adversely affect the system.
The upper/lower (max./min.) limit check is executed at the following timing according to the type of numeral input field.
For a thumbwheel type numeral input field, the check is executed each that time the increment/decrement key of each digit position is pressed.
Note, however, that carry over and underflow are no longer possible at the highest digit position if n and m are in the relationship n...n < m...m [upper limit: 1n...n, lower limit: 0m...m ("n" and "m" are arbitrary values at each digit)].

Example: If the upper limit value and the lower limit value are 1200 and 201, respectively, the numeral can be changed only in the following range: from 201 to 999 if the default is a 3–digit value and from 1000 to 1200 if the default is a 4–digit value.
The reason for this is that the upper/lower (max./min.) limit check function does not allow the numeral at the highest digit position to change from 0 to 1 or from 1 to 0.
To avoid this, either set the upper and lower limit values so that the relationship becomes "n...n >= m...m", or provide a touch switch separately to write a numeral for carry over or underflow.

Caution Upper/lower limits are checked when the entered numeral values are applied.

[Display Functions]

Numerals are displayed in the numeral input field in accordance with the "General" settings.
For details on the display mode according to the "General" settings, see "Common Attributes".

[Input Functions]

Numerals are input to a thumbwheel type numeral input field by using the "+" and "–" touch switches provided for each digit.

[Output Functions]

Numeral inputs do not have a direct input function as they write to words on the host via numeral memory tables. Note, however, that the NTH25/NTH25C does not actually have numeral memory tables, so actually numeral inputs write to words on the host.
The host is notified that a numeral has been input by the PT status notify area.

[Processing Functions]

With numeral input fields, input numerals are converted to display numerals in accordance with the "Settings" property.
For details on the method of conversion using the "Settings" property, see "Common Attributes".

[Relationship with Other Elements]

- ”Numeral display” (page 159) use the same conversion method and display mode as numeral input fields.
- A cursor move touch switch must be made for numeral key type numeral input fields, so numeral input fields cannot overlap each other, and numeral input fields cannot overlap touch switches.

4-14 Special Functions

In addition to display elements, the NTH25/NTH25C is provided with the following functions. These functions can also be executed on the NTH25/NTH25C.

- Window Function P 211
- Function Switches P 214
- Backlight OFF Function P 215
- Clock Function P 216
- Programming Console Function P 217

This section describes each of these special functions.

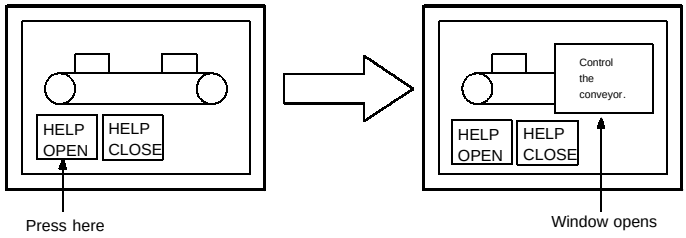
4-14-1 Window Function

The NTH25/NTH25C has a "window function." This function can display a window overlapping the currently displayed screen (base screen). This function allows you to open windows without restriction whenever you need them.

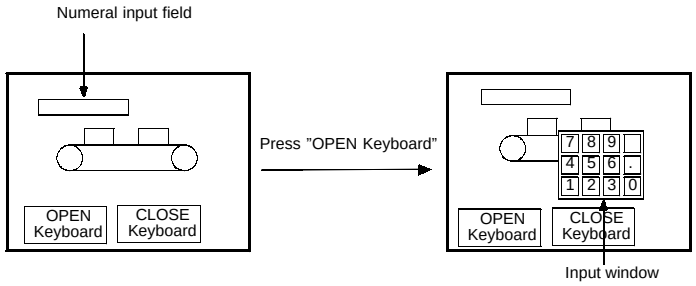
What are windows?

A "window" is a screen that can be displayed overlaying the currently displayed screen (base screen). You can specify any size and display position for a window. Windows can be used mainly for the applications below. Windows are referred to as "Window/Keyboard Screen" in the Support Tool due to the fact that they are mainly used as keyboards.

- An explanatory message can be registered to a window, enabling it to be used as a HELP screen during operation.

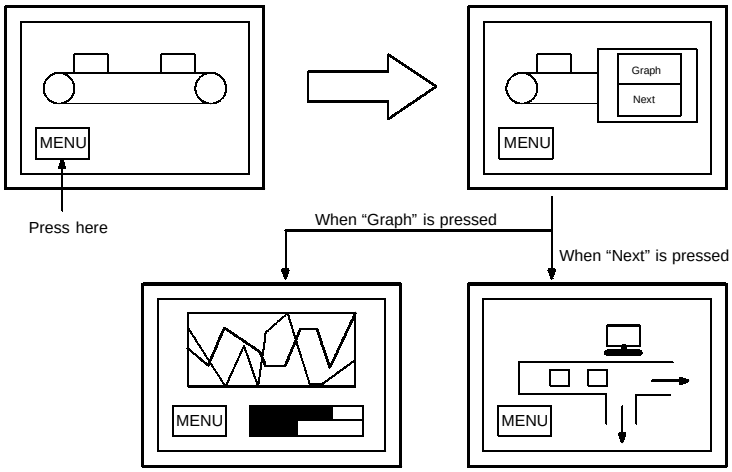


- If you register multiple control keys (touch switches) for numeral input in advance, you can call up these keys whenever you need them.



Reference To fix a numeral setting, you need a ↵ key for applying the numeral that you entered. Allocate the or ENT control key to a touch switch to create this key.

– If you register multiple screen switching keys (touch switches) in advances, you can use these keys as menus for switching the screen.



Window Screens and Display Elements

The window function allows you to create a window in any of the user screens, numbered 1 to 1000. (A screen to which a window is registered is called a ”window screen”.)
You can register up to 20 window screens to one screen data file.
When a screen is registered as a window screen, you must specify the window area to set the size of the window. The window is always displayed at the ”window area” size.
The window position becomes the position of the ”window area” on the window screen. (You cannot change this position.)

You can register the following elements on NTH25/NTH25C window screens. Other elements are invalid in window screens.

– Fixed display elements (characters, graphics, marks)

– Touch switches (Input notify touch switch is not allowed.)

– Numeral input field (Only one can be used. This becomes the ”temporary input field.”)

Reference

- Elements that project off the window area will not be displayed when the window opens.
- Display processing slows down slightly while a window is open.
- On the NTH25/NTH25C, the window screen can no longer be used when even part of a window overlaps a touch switch on the base screen.

Opening/closing a window

On the NTH25/NTH25C, windows are opened and closed as follows:

– By pressing a touch switch having a ”pop–up keyboard function”

Reference

- If the window that you specified to open is not a window screen, the open instruction is ignored.
- On the NTH25/NTH25C, only one ”Open” or ”Toggle” key can be displayed inside the same screen. Even though multiple keys can be registered on the Support Tool, only the key having the smallest display order number is valid. Other keys are discarded.

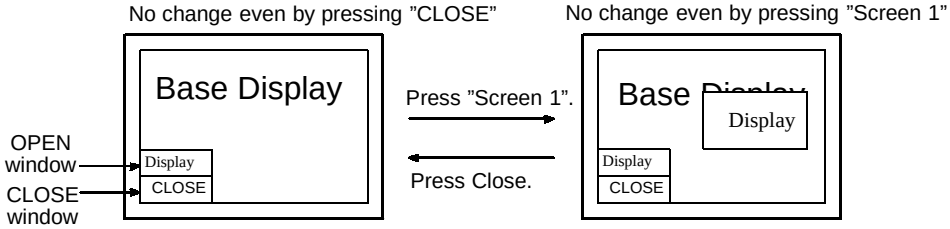
• Pressing a touch switch having the pop–up keyboard function

Pressing a touch switch having the pop–up keyboard function opens and closes the window currently specified on the NTH25/NTH25C.
Opening and closing a window by a pop–up keyboard function key involves the following control operations:

Open: Opens the specified window. If another window is already opened, that window is first closed before the specified window opens. If the specified window is already opened, nothing happens.

Close: Closes the currently open window regardless of the number of the specified window. Toggles keys set on the Support Tool function as open keys on the NTH25/NTH25C.

Only one window can be opened at any one time.
When you switch to a different screen, the currently opened window is automatically closed.



[Settings]

When you create a screen on the Support Tool, set the ”pop–up keyboard function” for opening and closing the window to a touch switch, and specify the window number (keyboard screen number) to be opened to register it to the screen.
You can specify the following window screen numbers:

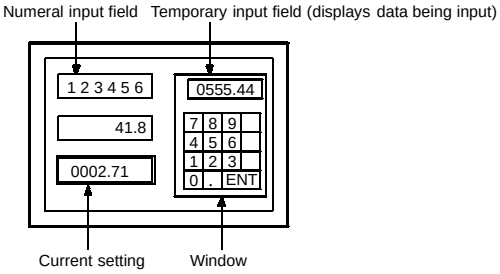
0001 to 1000: Screen numbers (keyboard screen number) 1 to 1000

Reference

- The window will not open if the number you specified is not a window screen.
- The state of the window after the ↵ or ENT key is pressed to apply a numeral during numeral key type numeral input varies according to the communications method as follows:
  [Host link, NT link (1:1)]
  The window remains displayed also after numerals are applied.
  [Memory link]
  The window closes when a numeral is applied.
- On the Support Tool, the touch switch for the ”cursor move” function has a check box for the ”Use Window/Keyboard Screen” function. This check box is not provided on the NTH25/NTH25C. The NTH25/NTH25C has no function for automatically displaying a window by pressing a cursor move key.

Temporary Input Fields

Only one numeral key type numeral input field can be registered to a window. This input field is shared with multiple numeral input fields on the base screen, and can be used as a temporary input field before actually inputting data to the actual input field on the base screen.
The advantage of a temporary input field is that entries can be input to it while checking the current setting on the base screen.



However, if there is not even one numeral input field (numeral key type) on the base screen, the temporary input field will be displayed but cannot be used. Also, thumbwheel type numeral input fields cannot be registered to windows.
If the temporary input field has fewer digits than the actual input field on the base screen (integer part + decimal fraction part + decimal point digit + sign digit), it will be displayed but cannot be used.
If it is not possible to use a temporary input field, you must input the data directly onto the base screen.

4-14-2 Function Switches

The NTH25/NTH25C is provided with 13 function switches: "+", "−" and "F1" to "F11". The host can be notified of the function of these function switches.
This section only briefly describes the functions of these function switches. For details on how to set these function switches, see "Function key Settings" (page 265).

Reference The "+" and "−" function switches can be set to output bits as operation output at the same time as the above notify host function. For details, see "Use of Operation Output" (page 36).

Bit notify and word notify

There are two type of notify actions when a function switch is pressed: bit notify and word notify.

Reference
- When the host link or NT link (1:1) is used, bit notify and word notify can be used simultaneously.
  When the memory link is used, you can use only one of bit notify (notify only the bit ON/OFF state) or word notify (notify the specified value).
  The notification details and action during notification vary according to the communications method. For details, see "Function key Settings" (page 265).
- The host notification method can be set separately on each function switch.

• Bit notify

The host is notified of changes in the switch state.
Two notify actions are available: notification only when the switch is pressed (momentary), and notification when the switch is pressed and then released (alternate).

• Word notify

When the switch is pressed, the host is notified of a number (binary, 4–digit hexadecimal) currently set by the NTH Screen Data Converter.

4-14-3 Backlight OFF Function

The NTH25/NTH25C has a backlight OFF function for turning the screen OFF if it is not operated for a fixed period of time. The purpose of this function is to extend the service life of the backlight.
This backlight OFF function operates only while the NTH25/NTH25C is running, and can only started up in the CHECK menu or in the RUN mode.

Caution When the backlight is out or the display state is "no–display," do not inadvertently touch a touch switch or function switch.
Check the safety of the system before you touch a touch switch or function switch.

Reference

- The backlight can also be turned OFF by setting the state of the PT status control bit, bit 0 (backlight mode). Note, however, that "Configuration" – "Auto CFL off" must be set to (disable backlight auto OFF function) on the NTH Screen Data Converter when the PT status control bit is used. So, the PT control area bit and the backlight auto OFF function cannot be used simultaneously.
- The backlight OFF function does not function while screen switching is periodically being performed from the host.

Turning the backlight ON again

The above operations can turn the backlight back ON again when the backlight OFF function is activated and the backlight is OFF:

– Pressing a function switch
– Touching a touch panel
– Switching the screen from the host

If you touch a touch switch while the backlight is OFF, only the operation of turning the backlight ON again is executed and touch switch functions (e.g. notification to host, screen switching) are not executed. (When a function switch is pressed, notification of the function switch also is executed.)

Reference

- When the backlight is turned OFF by manipulating the PT status control bit, it can be turned ON again only by setting the PT status control bit "backlight mode" (bit 0) to 1 (ON). (The backlight cannot be turned ON again by the above operation.)
- The backlight will not turn ON again when display contents (e.g. currently displayed numerals and character strings) are only updated.

Setting the backlight OFF function

On the NTH Screen Data Converter, set whether or not to use the backlight OFF function or set the time until the backlight turns OFF when the backlight OFF function is set to be used when you send the screen data to the NTH25/NTH25C. For details on the setting, see ”[Initialise] page” page 261.

4-14-4 Clock Function

The NTH25/NTH25C has a clock function for managing the date and time. The clock data managed internally by the NTH25/NTH25C can also be written to the host by instructing reading from the host.

Reference

- The NTH25/NTH25C does not have a backup battery. Required data is backed up by a capacitor. Note, however, that this capacitor discharges and the clock data will be cleared after a few days, causing the clock function to malfunction.
- The NTH25/NTH25C does not allow display and setting of clock data by using the clock function on the Support Tool. To set the date and time, use System Menu.
- The clock data is not set on the NTH25/NTH25C before shipment from the factory.

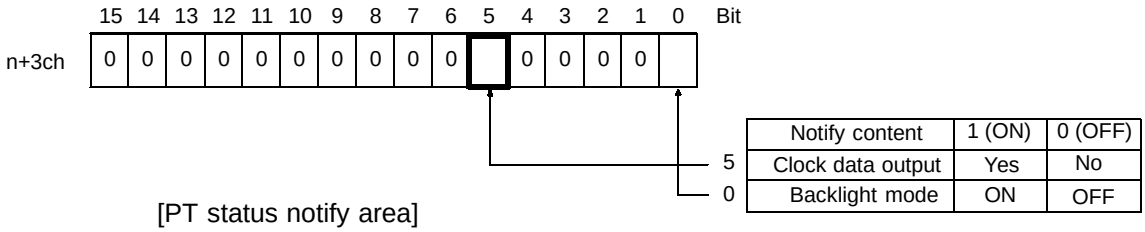
Setting Clock Data

Display the menu for displaying and setting clock data from the System Menu and make the required settings. For details, see 3–8 ” Setting the Clock Data” (page 71).

How to read the clock data

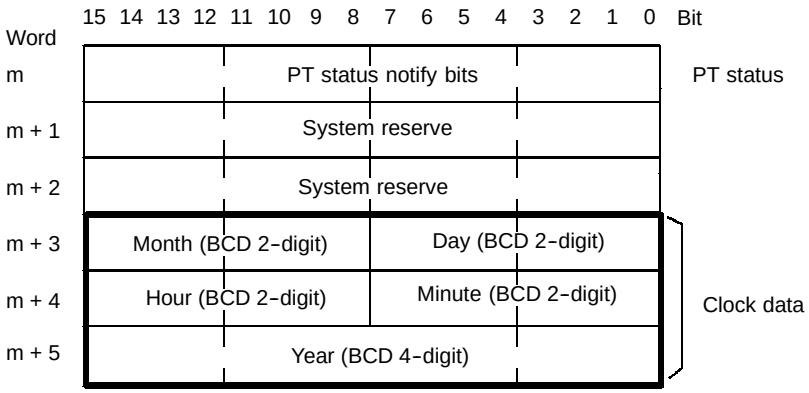
Output the clock data currently set by the NTH25/NTH25C’s clock function to the host.
The following area for NTH25/NTH25C clock data is provided in the PT status control area and PT status notify area:

[PT status notify area]



Notify content	1 (ON)	0 (OFF)
Clock data output	Yes	No
Backlight mode	ON	OFF

[PT status notify area]



[Settings]

The PT status control area and PT status notify area must be allocated to words on the host. So, settings for controlling operation on the NTH25/NTH25C are not required.

[Operation]

To output the NTH25/NTH25C's internal clock to the PT status notify area, manipulate the PT status control area as follows.

(1) Set bit 5 of the 4th word (n+3 word) in the PT status control area as follows:
n+3 word
Bit 5: Clock data output
Output: 1 (ON)
No output: 0 (OFF)
Clock data is written at 1−minute intervals to the area for notifying the clock data in the PT status notify area for the duration that the state of this bit is 1 (ON). Note, however, that the clock data output interval may fluctuate when numerals are frequently input on the NTH25/NTH25C.

4-14-5 Programming Console Function (Expansion Function)

As an extended function, the NTH25/NTH25C features the "programming console function". This function allows the NTH25/NTH25C to be used in place of a programming console (model CPM1A) for a C−series CPM1 (CPM1A), or a CQM1, C200HX/HG/HE−EZ or SRM1−C02−V1.
Almost all of the programming console functions are possible, with the exception of recording (storing) ladder programs on cassette tape and playing (reading) them back.
For details on the system configuration for using the programming console function, how to connect to a PC, and how to use the programming console function, see 3−10 "Programming Console Function" (page 74).

The programming console function can be used even when the PC is in the RUN mode. Note, however the NTH25/NTH25C will stop operating at the same time that the programming console function is applied. (RUN LED turns OFF.)
Pressing the "Quit" touch switch on the programming console function screen quits the programming console function. The RUN mode is then returned to, and the screen currently specified at "Screen Switch Setting" in the PT status control area is displayed.

SECTION 5
Using Memory Link (NTH Protocol)

This section gives an overview of memory link (NTH protocol) operations, and mainly describes communications between the NTH25/NTH25C and host when using memory link (NTH protocol).

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5-1 Operation of Memory Link

This section describes the function of the memory link (NTH protocol). For an outline of the memory link functions, see 1−4 ”Communications by Using Memory Link”.

5-1-1 PT Memory

With the NTH25/NTH25C memory link, data transactions between the host and the NTH25/NTH25C are handled via ”PT memory.” PT memory is automatically allocated to each element.
PT memory is a virtual PC area within the NTH25/NTH25C. The NTH25/NTH25C reads and writes to the internal PT memory, and the host controls and monitors the NTH25/NTH25C by reading/writing PT memory.
With PT memory, there is no classification of the area as there is with real PC areas; it comprises a memory link area of addresses 0000 to 9999 and A000 to A050.
With the NTH25/NTH25C memory link, PT memory differs from regular PC memory in that one address corresponds to a single elements. So, when two words are used for a single element such as for a numeral display, the data of multiple words corresponds to a single address. (The data of multiple words can be read or written on a single address by memory link commands.)
The following table summarizes the differences in the allocated words (addresses) between when regular direct accessing is performed and when the NTH25/NTH25C memory link is used.

Item	Direct Access	Memory Link (NTH protocol)
Address/element correspondence	Allocatable to any address (area and position)	Addresses used for each element is already determined.
Address/data correspondence	– In case of word addresses: 1 word for 1 address. In case of bit addresses: 1 bit for 1 address – In case of elements that use multiple words, multiple addresses are occupied.	The data volume per 1 address varies according to element type.

Reference

With the NTH25/NTH25C memory link, addresses are automatically allocated to each element. So, the PC addresses and number of allocated channels set on the Support Tool are invalid. (Predetermined bits must be set for only lamp bits.)

5-1-2 Configuration of PT Memory

The following table shows the correspondence between display elements and functions in PT memory.

Address	Words/ Address	Write Direction	Display Elements/Function	See
0000	1 word	PT → host	Touch switches (for input notify function) Function switches	Page 230
0001 to 0080	2 words	PT → host	Numeral input (numeric key type, thumbwheel type)	Page 233
0900	1 word	PT → host	PT status notify bit (Function differs slightly from direct access.)	Page 234
0903 to 0905	1 word	PT → host	Clock data	Page 235
1000	1 word	PT ↔ host	Display screen number	Page 236
1001	1 word	Host → PT	PT status control bit (Function differs slightly from direct access.)	Page 237
2000 to 2014	1 word	Host → PT	Bit memory table (alarm list, alarm history)	Page 238
3001 to 3120	2 words	Host → PT	Numeral display	Page 239
4001 to 4200	4 words (x 4 words bits)	Host → PT	Image/library lamp	Page 240
7001 to 7030	1 word	Host → PT	Bar graph	Page 241
8001 to 8040	1 word	Host → PT	Trend graph	Page 242
8103 to 8104	1 word	Host → PT	Clear trend graph record	Page 243
8107 to 8108	1 word	Host → PT	Trend graph sampling stop/continue	Page 244
9001 to 9050	21 words	Host → PT	Character string display	Page 245
A001 to A050	4 words (x 4 words bits)	Host → PT	Standard lamp	Page 247
F000	1 words	PT → Host	Touch switches (for input notify function) Function switches	Page 230

Reference

Addresses are specified in BCD. Note, however, that the first word of addresses used only by lamps is ”A” (41 Hex) and Switches Notify “F” (46 Hex).

5-1-3 Key Points When Creating Screen Data

Memory link has unique restrictions since the allocation of elements differs with that for host link and NT link (1:1).
The following table summarizes points to be aware of when creating screen data for the memory link. For details, see descriptions for elements in this section and in Section 4 ”NTH25/NTH25C Functions”.

Display Elements/ Function	Settings When Creating Screen Data	Memory Link Operation on NTH25/NTH25C
Touch switches (for input notify function)	An appropriate allocated bit is set to the touch switch notify bit. (This setting is actually invalid.)	The position code of a touched touch switch is written to PT memory address 0000. At the same time, the notify command notifies the host of the state and position code of the touch switch.
Function switches	The notify method is set by the NTH Screen Data Converter.	The position code or numeral value of the touched function switch is written to PT memory address 0000 according to the currently set notify method. At the same time, the notify command notifies the host of the state and position code or numeral value of the function switch.
Numeral input (numeric key type, thumbwheel type)	Appropriate allocated bits are set to numeral memory tables 0 to 79 (these settings are actually invalid), and those numeral memory tables are set to numeral input elements.	Numeral memory tables 0 to 79 are automatically allocated to PT memory addresses 0001 to 0080. Note, however, that when there are two or more numeral input elements to which the same numeral memory table has been set, only the numeral input element having the smallest screen number and earliest display order is valid.
PT status notify bit	Though PT status notify area must be allocated on the Support Tool, this allocation is actually invalid. Allocate this area to an appropriate channel.	When the state of the PT status notify bit changes due to the state of the backlight or normal/erroneous execution of a memory link command, the change is written to PT memory address 0900. At the same time, the notify command notifies the host of the PT status notify bit.
Bit memory table (for alarm list/alarm history function)	An appropriate allocated bit is set to bit memory table 0 (this setting is actually invalid), and the alarm list/alarm history elements are registered to the screen.	Bit memory tables 0 to 239 are automatically allocated to each of the bits in PT memory addresses 2000 to 2014.
Numeral display	Appropriate allocated bits are set to numeral memory tables 0 to 119 (these settings are actually invalid), and that numeral memory table is set to a numeral display element.	Numeral memory tables 0 to 119 are automatically allocated to PT memory addresses 3001 to 3120. Note, however, that when there are two or more numeral display elements to which the same numeral memory table has been set, only the numeral display element having the smallest screen number and earliest display order is valid.
Image/library lamp	Image/library lamp numbers 1 to 64 are calculated according to the display order, and lamp bits are allocated to 00000 to 00315 according to this lamp number.	Screen numbers 1 to 200 are automatically allocated to PT memory addresses 4001 to 4200. A single PT memory address comprises four words (lamp bits for 64 image/library lamps). So, during control by the host, the notify command writes 4-word data to the PT memory address corresponding to the screen.
Bar graph	Appropriate allocated words are set to numeral memory tables 0 to 29 (these settings are actually invalid), and that numeral memory table is set to a trend graph element.	Numeral memory tables 0 to 29 are automatically allocated to PT memory addresses 7001 to 7030. Note, however, that when there are two or more trend graph elements to which the same numeral memory table has been set, only the trend graph element having the smallest screen number and earliest display order is valid.

Display Elements/ Function	Settings When Creating Screen Data	Memory Link Operation on NTH25/NTH25C
Trend graph	An appropriate numeral memory table is set to each line to be displayed on the trend graph (this setting is actually invalid), and that line is set to the trend graph element.	Each line is automatically allocated to PT memory addresses 8001 to 8040 in order from the smallest screen number and in the earliest display order if in the same screen. Trend graph frames are automatically allocated to each of the bits of PT memory addresses 8103 and 8104 (clear trend graph records) and 8107 and 8108 (sampling stop/ continue) as trend graph control area in order from the smallest screen number.
Character string display	Appropriate allocated words are set to character string memory tables 0 to 49 (these settings are actually invalid), and that character string memory table is set to a character string display element.	Character string memory tables 0 to 49 are automatically allocated to PT memory addresses 9001 to 9050. Note, however, that when there are two or more character string display elements to which the same character string memory table has been set, only the character string display element having the smallest screen number and earliest display order is valid.
Standard lamp	Standard lamp numbers 1 to 64 are calculated according to the display order, and the lamp bits are allocated to 00000 to 00315 according to this lamp number.	Screen numbers 1 to 1000 are automatically allocated to PT memory addresses A001 to A050 in 50 screen increments. (For example, screen numbers 1, 51, 101 ... 951 share PT memory address 4001.) A single PT memory address comprises four words (lamp bits for 64 standard lamps). So, during control by the host, the notify command writes 4–word data to the PT memory address corresponding to the screen.

5-2 Outline of Communications

This section describes the basic communications protocol when using memory link and the program flow for using memory link. In this description, communications is performed on the RS–232C interface using BASIC commands.

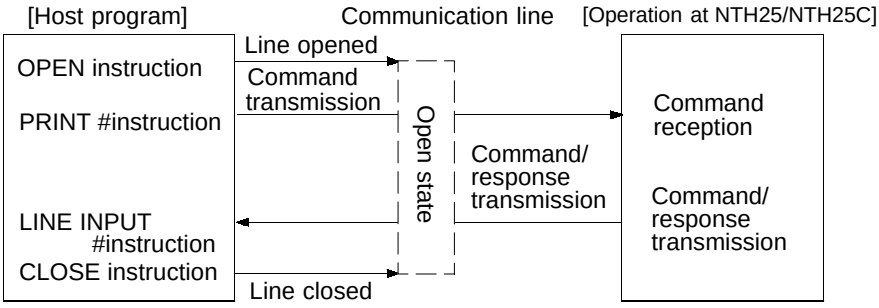
5-2-1 Communications Protocol

Communications between the host and the NTH25/NTH25C takes place in accordance with the following protocol.

(1) To perform communications, the communications line must first be opened. ”Opening” here means enabling use of the line.

(2) The NTH25/NTH25C is controlled and its state read by commands.

(3) To terminate communications, close the communications line.



Once the line has been opened, it can be used until it is closed.

• Function of each instruction

OPEN instruction : Opens the RS–232C line.
Also sets the communications conditions at the host (see page 55).

PRINT # instruction : Sends commands to the NTH25/NTH25C via the RS–232C line.

LINE INPUT # instruction : Receives the response from the NTH25/NTH25C. The LINE INPUT command is used as the response data sometimes includes data that corresponds to a control code.

CLOSE instruction : Closes the RS–232C line.

For detailed information on instructions, refer to the BASIC language instruction manual for the host.

5-2-2 Memory Link Commands/Responses

With memory link, data transactions between the host and NTH25/NTH25C are handled using the following commands and responses.
Commands and responses are used according to the following three operations.

• Writing to PT from Host

Data is written to PT memory from the host according to commands, and the result (normal or erroneous end) is returned as the response.
This operation can be performed only on PT memory whose write direction is ”Host to PT”.

Reading to Host from PT

The host issues commands for reading the contents of PT memory, and the read data is returned as the response.
This operation can be performed only on PT memory whose write direction is ”PT to host”.

Notifying to Host from PT

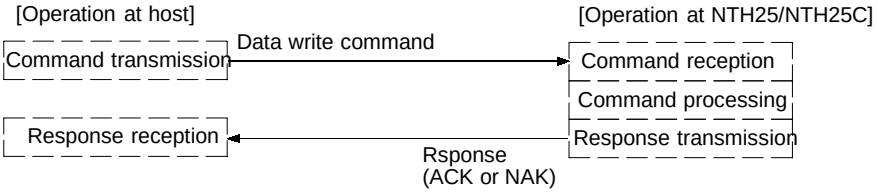
The host is notified of changes in PT memory states as the command. (A response from the host is not required.)
The following two changes in PT memory states are notified:

Touch switches/function switches (address 0000)
PT status notify bit (address 0900)

Reference

When commands are issued continuously, be sure to acknowledge the response from the NTH25/NTH25C for the previous command before issuing the next command.

Writing to PT from Host



• Data write command

The write command is sent in the following format. This command can be used only for PT memory that can be written to by the host.

ID : ”00” (30 Hex, 30 Hex) fixed

W : ”W” (57 Hex) fixed
This indicates the write mode.

Address : Address of PT memory at write destination (4 BCD digits)
Note, however, that the first word of addresses used only by lamps is ”A” (41 Hex).

D11, D12, D13, D14 to Dn1, Dn2, Dn3, Dn4:
Write data (4 hexadecimal digits) n words
Number of words n and the contents of the data vary according to the element.
For details, see the description for the respective element.

• Response during a write

A response is returned as follows according to the results of processing:

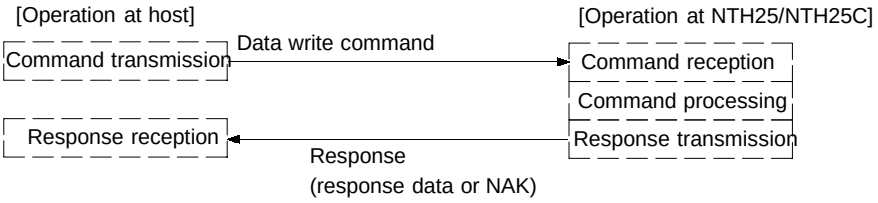
Normal end

[ACK]
06

Erroneous end

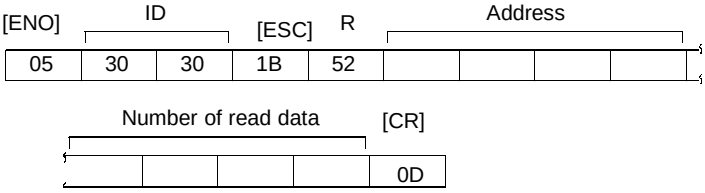
[NAK]
15

Reading to Host from PT



• Read command

The read command is sent in the following format:



ID : ”00” (30 Hex, 30 Hex) fixed

R : ”R” (52 Hex) fixed
This indicates the read mode.

Address : Address of PT memory at read source (4 BCD digits)
Note, however, that the first word of addresses used only by lamps is ”A” (41 Hex).
When the data of continuous multiple elements is to be read, specify the first address.

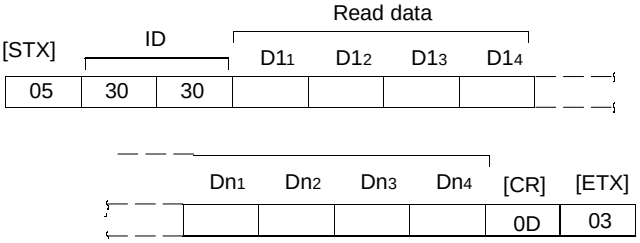
Number of read data:

Number of elements whose data is to be read (4 BCD digits)
The maximum data that can be read in one operation is 63 words.
When an attempt is made to read data exceeding 63 words, data may not be read correctly.

• Response during a read

A response is returned as follows according to the results of processing:

Normal end



ID : ”00” (30 Hex, 30 Hex) fixed

D11, D12, D13, D14 to Dn1, Dn2, Dn3, Dn4 :

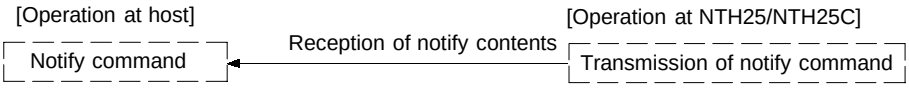
Write data (4 hexadecimal digits) n words
When the data of continuous multiple elements is read, the data for the number of elements is returned in order from the first element.
Number of words n and the contents of the data vary according to the element.
For details, see the description for the respective element.
The maximum data that can be read in one operation is 63 words.

Erroneous end

[NAK]

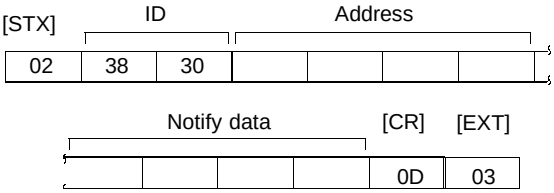
15

Notify PT to Host



• Notify command

The notify command is sent in the following format. This command is used only when notifying ”touch switches/function switches”, “clock data” and the ”PT status notify bit”.



ID : ”80” (38 Hex, 30 Hex) fixed

Address : Address of PT memory whose state changed (4 BCD digits)

D1, D2, D3, D4 : Notify data (4 hexadecimal digits) n words
The contents of the data varies according to the element. For details, see the description for the respective element.

5-2-3 Notes on Using Commands

The following describes the points that should be observed when using commands.

• Method for Specifying Commands

When a personal computer or similar device is used as the host and a high−level language such as BASIC or C is used for writing the program, commands are specified as ASCII character strings.
Write the numeric values (BCD or hexadecimal) or character string for parameters as ASCII character strings. Parts in brackets, such as [ESC] and [CR] each indicate one control code (the [ESC] code, the [CR] code, etc.).

In the explanations of commands, expressions such as ”4 BCD digits” and ”2 hexadecimal digits” are used to mean ”the ASCII character strings for a numeric value expressed as four BCD digits” and ”the ASCII character string for a numeric value expressed as 2 hexadecimal digits”, respectively. Do not specify BCD and hexadecimal data without alteration; always convert it into an ASCII character string before transmission.

Example: To display the screen having screen number 123, specify and write ”0123” to PT memory address 1000 as follows:

[ENO]	0	0	[ESC]	W	1	0	0	0
05	30	30	1B	57	31	30	30	30

0	1	2	3	[CR]
30	31	32	33	0D

Reference

In the ”Format” sections in the explanations for commands/responses, parentheses are used to indicate parts that can under some circumstances be omitted, and ** is used to indicate the ASCII code (2 hexadecimal digits) of the specified character.

• Processing differences according to command length

- If a command is too long because it has been incorrectly specified, the command will continue to be written to the next address. If the next address is for a PT memory that cannot be written to, the NAK code (15 Hex) will be returned.
- If a command is short because it has been incorrectly specified, processing is as follows:
  If the command does not contain the CR code (0D Hex), the NTH25/NTH25C waits for the command. If there will be no response at all, send the CR code (0D Hex).
  If the command is found to be too short when the CR code (0D Hex) is received, the NAK code (15 Hex) will be returned from the NTH25/NTH25C.

• Command transmission intervals

- If commands are sent too frequently, processing at the NTH25/NTH25C will not be able to keep pace with the commands and commands that cannot be processed are discarded.
- To prevent commands from being discarded, issue commands so that host waits for the response from the NTH25/NTH25C before issuing the next command.

- Order of priority of input communications commands

- When a reason for input notification arises during processing of a command from the host, the input command is issued only after processing of the currently executing command has ended.

5-3 Data Structure According to Display Element and Function

This section describes for each element the structure of the data that is specified by the write command and the data that is returned by the read command.

Touch switches, function switches (PT to host) Address 0000/F000

The data (position or numeral) that indicates the touched touch switch or function switch is written when a touch switch or function switch having the input notify function is pressed on the NTH25/NTH25C. (The state of PT memory does not change when a touch switch not having the input notify function is pressed.)

Elements and address

Only PT memory address 0000 is used regardless of the touch switch or function switch that was touched.

Data contents

This data comprises one word as follows:

- Touch switches

The position code (4 hexadecimal digits) to be written to PT memory address 0000/F000 corresponds to the 16 (horizontal) x 12 (vertical) touch area as follows:

[Touch switch area and position codes]

0000 Hex	0001 Hex	0002 Hex		000F Hex
0100 Hex	0101 Hex	0102 Hex		010F Hex
0200 Hex	0201 Hex	0202 Hex		020F Hex
0A00 Hex	0A01 Hex	0A02 Hex		0A0F Hex
0B00 Hex	0B01 Hex	0B02 Hex		0B0F Hex

When a touch switch is registered straddling two or more touch switch areas, the position of the top left touch switch area is notified.

• Function switches (notify by position code)

If the function switch is set so that it is notified by a position code (”SW”) by the NTH Screen Data Converter, the position code (4 hexadecimal digits) to be written to PT memory address 0000/F000 is as follows:

[Function switches and position codes]

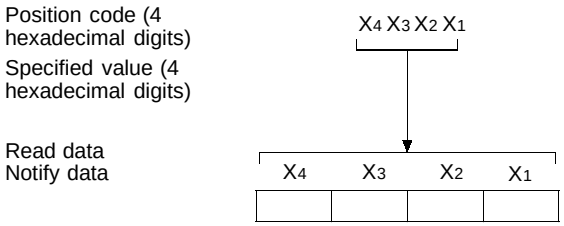
Function switch	Position code	Function switch	Position code
+	0C00 Hex	F1	0D00 Hex
–	0C01 Hex	F2	0D01 Hex
F7	0C02 Hex	F3	0D02 Hex
F8	0C03 Hex	F4	0D03 Hex
F9	0C04 Hex	F5	0D04 Hex
F10	0C05 Hex	F6	0D05 Hex
F11	0C06 Hex		

– Function switches (notify by specified value)
If the function switch is set so that it is notified by a specified value (”specified value”) by the NTH Screen Data Converter, the currently set ”specified value” (4 hexadecimal digits, 0000 to FFFE Hex) is notified.

Reference

When a value in the same range as the position code of a touch switch/function switch is specified as the ”specified value,” the distinction as to whether the data is a position code or the currently set specified value can no longer be made. Take note of this when setting the ”specified value.”

• Position code/specified value and read/notify data



FFFF Hex is written in place of the position code or specified value:

Until a touch switch/function switch is pressed for the first time after operation of the NTH25/NTH25C is started
Or, from when all position codes and specified values of the touched switches are read by the host until the next touch switch/function switch is pressed

[Explanation]

- The switch state is notified as follows by ”addresses” by the notify command of the touch switch/function switch. (With memory link, all touch switch notify operations are ”momentary.”)
  When pressed: address F000 Hex
  When released: address 0000 Hex
- Only one position code or specified value can be read from PT memory address 0000/F000 in one operation. However, up to eight position codes or specified values of pressed touch switches/function switches are registered to NTH25/NTH25C memory.
  When the next touch switch/function switch is pressed before PT memory address 0000/F000 is read by the host, that position code or specified value is registered to NTH25/NTH25C memory. Each time that PT memory address 0000/F000 is read, data is written to PT memory address 0000/F000 in order from the oldest data.
  If a touch switch is pressed nine times or more before PT memory address 0000/F000 is read by the host, the previous record is held, and the new position codes and specified values are no longer registered to NTH25/NTH25C memory.
- When memory link is used, do not press four or more touch switches simultaneously. Doing so might prevent the change in touch switch states from being read correctly by the NTH25/NTH25C.

Numeral input (PT to host) Addresses 0001 to 0080

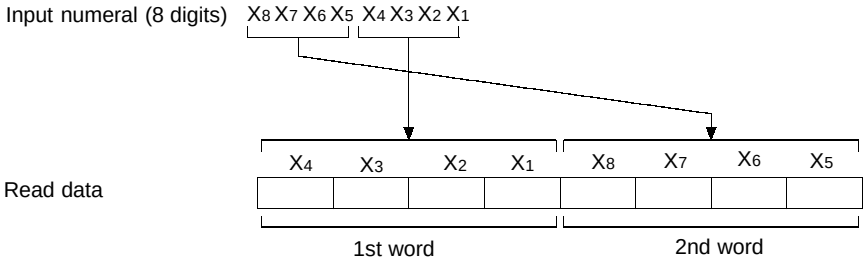
When a numeral is entered in the numeral input field (numeric key type, thumbwheel type) on NTH25/NTH25C, the entered numeral is written.

Elements and address

Numeral memory tables 0 to 79 currently set to the numeral input elements correspond to PT memory addresses 0001 to 0080.

Data contents

This data comprises two words. Note, however, that when the number of input digits is four or less, the 2nd word becomes 0000 Hex.
The structure of the data to be read is as follows:



Input numerals are notified in BCD when the ”numeral storage type” set on the Support Tool is set to ”BCD” and are notified in hexadecimal when the ”numeral storage type” is set to ”binary”.
00000000 Hex is written until the first numeral is input to the relevant numeral memory table after start of NTH25/NTH25C operation.

Explanation

- PT memory for numeral input is separated from PT memory for numeral display and graph display. So, PT memory for numeral input is not affected if the same numeral memory table is used on a numeral display element or graph element.

PT status notify bit (PT to host) Address 0900

The state of the backlight on the NTH25/NTH25C and the error status (protocol error) of memory link commands is reflected at all times.

Reference Memory link differs from direct access (host link , NT link (1:1) in that there is no numeral input strobe for the PT status notify bit. The PT status notify bit in memory link commands also reflects the presence of an error for the command in bit 2.

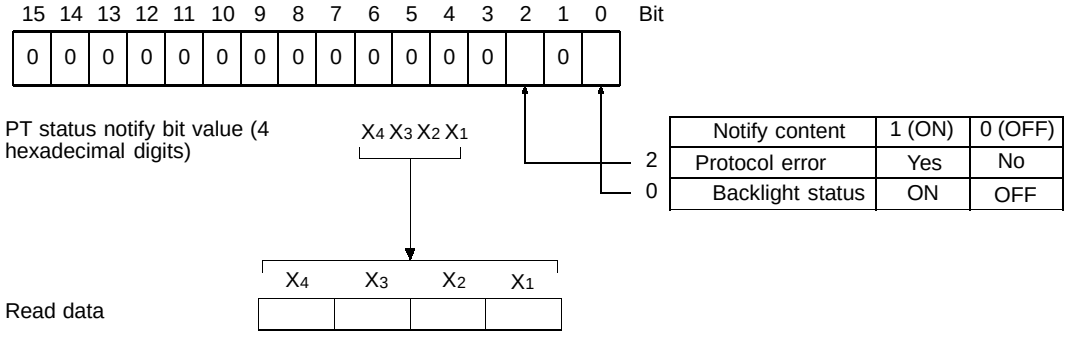
Elements and address

Only PT memory address 0900 is used.

Data contents

This data comprises one word.

The following shows the function of each bit.



Explanation

- If the state of the backlight changes during NTH25/NTH25C operation, the change in state is reflected in ”backlight status.” Also, if an erroneous command is received during NTH25/NTH25C operation, ”protocol error” is set to 1 (ON).
- If host control changes the state of the backlight or sends an illegal command to NTH25/NTH25C, a command for notifying the change in state of the PT status notify bit (PT memory address 0900) is returned from the NTH25/NTH25C in addition to the response (ACK or NAK) to the sent command.
  If issue of an illegal command causes the PT status notify bit to be notified from the NTH25/NTH25C, and a normal command is issued after this notification, the command for notifying the ”protocol error” 0 (OFF) state is issued by NTH25/NTH25C.

Clock data (PT to host) Addresses 0903 to 0905

The NTH25/NTH25C's internal clock data is written to these addresses.

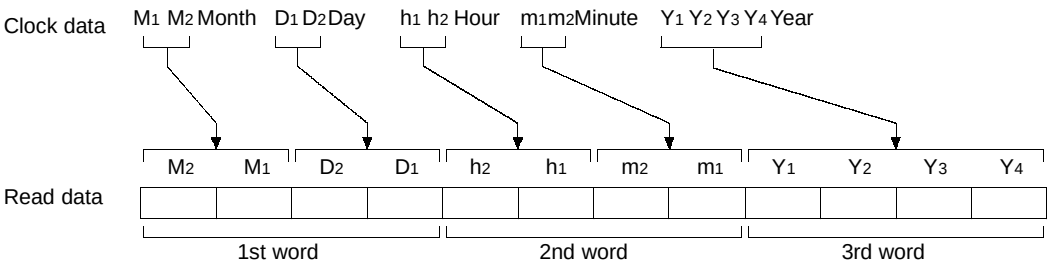
Elements and address

Clock data corresponds to PT memory addresses 0903 to 0905 as follows:
Month, day: 0903
Hour, minute: 0904
Year: 0905

Data contents

This data comprises three words.
The following shows the structure of the data to be read:

Data	Range
Month	01 to 12 (two BCD digits)
Day	01 to 31 (two BCD digits)
Hour	00 to 23 (two BCD digits, 24-hour system clock)
Minute	00 to 59 (two BCD digits)
Year	1980 to 2079 (four BCD digits)



0000 Hex is written to addresses 0903 to 0905 until execution of clock data output after start of NTH25/NTH25 operation.

Explanation

- NTH25/NTH25C's internal clock data is written at 1-minute intervals for the duration that "clock data output" (bit 5) of the PT status control bit at PT memory address 1001 is 1 (ON).
  The clock data is not output when "clock data output" of the PT status control bit is 0 (OFF). In this case, the previous value is held as the contents of the PT memory address.
- To batch read all clock data, specify 0903 as the "address" and 0003 as the read data, and execute the read command.
- Individual clock data can be read by independently reading PT memory addresses 0903 to 0905.
- Normal operation of NTH25/NTH25C can be confirmed by periodically reading the clock data.

Display screen number (sent between PT and host) Address 1000

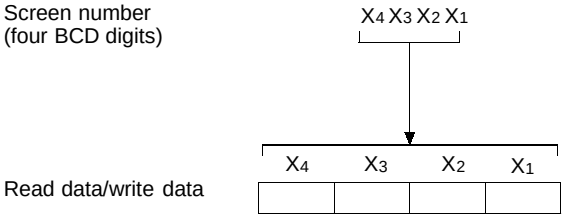
The meaning of this data varies according to which of the NTH25/NTH25C or host the screen number is written from.
When the screen is switched by operation on the NTH25/NTH25C, the new screen number is written from the NTH25/NTH25C.
When the screen number is written from the host, the specified screen is displayed on the NTH25/NTH25C.

Elements and address

Only PT memory address 1000 is used.

Data contents

This data comprises one word.
The screen number (0000 to 1000, four BCD digits) are stored as follows:



Screen number 0000 Hex indicates ”no display”. Note, however, that there is also no display on the NTH25/NTH25C when a screen number to which no screen data is registered is specified.

PT status control bit (host to PT) Address 1001

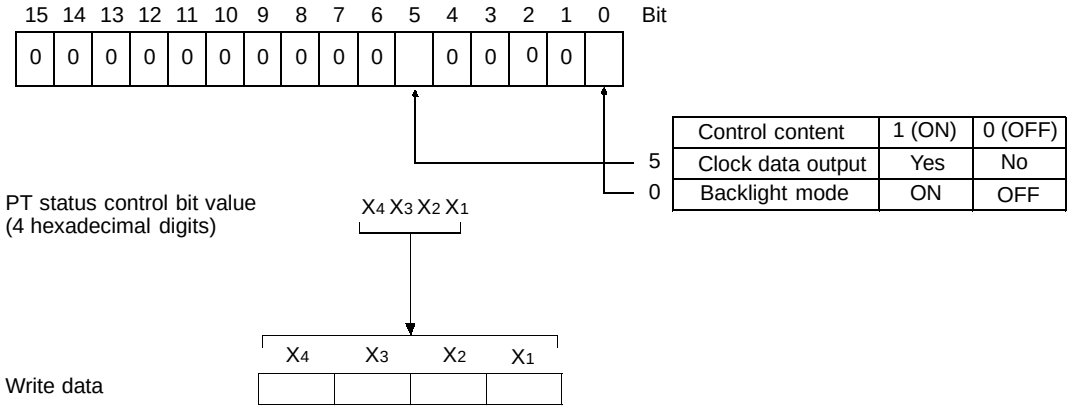
This data controls the state of the NTH25/NTH25C's backlight (turns it ON or OFF), and outputs the NTH25/NTH25C's internal clock data.

Elements and address

Only PT memory address 1001 is used.

Data contents

This data comprises one word.
The following shows the function of each bit.



Explanation

- When the state of the backlight changes, the contents of PT status notify bit PT memory address 0900 also changes.
  "Backlight mode" (bit 0) is enabled only when "Configuration" – "Auto CFL off" is set to 0 by the NTH Screen Data Converter. If "Auto CFL off" is set to a value within the range 1 to 99, the backlight cannot be controlled even by changing "backlight mode".
- Clock data is written at 1–minute intervals to clock data output PT memory addresses 0903 to 0905 for the duration that clock data output is 1 (ON).

Bit memory table (host to PT) Addresses 2000 to 2014

The date when bit memory tables were changed and messages currently set to bit memory tables can be displayed in alarm list/history elements on the NTH25/NTH25C by writing 1 (ON) to the bit memory table from the host. (On the NTH25/NTH25C, bit memory tables are used only by the alarm list/history function.)

Elements and address

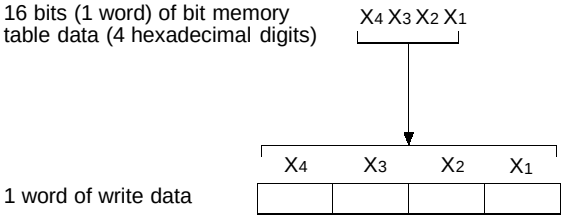
Bit memory tables 0 to 239 correspond to each of the bits of PT memory 2000 to 2014 as shown in the figure below. (The allocated bits set to bit memory tables on the Support Tool are invalid.)

PT memory	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Bit
2000	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
2001	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
2013	223	222	221	220	219	218	217	216	215	214	213	212	211	210	209	208	
2014	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225	224	

(Numbers in frames are bit memory table numbers.)

Data contents

Each of the PT memory addresses comprises one word.
Specify the data to write as follows in blocks of 16 bit memory tables.



Data is 0000 Hex until the first write operation is performed after start of NTH25/NTH25C operation.

Explanation

- Data can be batch−written to continuous multiple PT memory addresses. To do this, specify the first PT memory address at ”address” and then specify the data of the number of words to be written at ”write data”.

Numeral display (host to PT) Addresses 3001 to 3120

This data specifies the display value on numeral display elements.

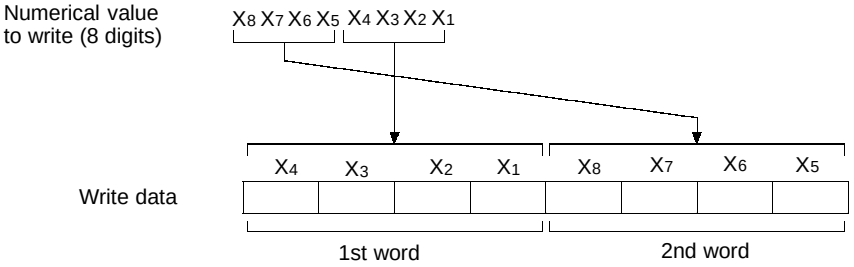
Elements and address

Numeral memory tables 0 to 119 currently set to numeral display elements correspond to PT memory addresses 3001 to 3120. (With memory link on NTH25/NTH25C, up to 120 numeral display elements can be registered in the entire screen data file.)

Data contents

This data comprises two words.

Specify the data to write as follows.



Write display numerals in BCD when the ”numeral storage type” currently set to the numeral memory table is set to ”BCD” and in hexadecimal when the ”numeral storage type” is set to ”binary”.

00000000 Hex is written until the first numeral is input to the relevant numeral memory table after start of NTH25/NTH25C operation.

Explanation

- The number of words to be actually used for numeral display is determined by the number of display digits (number of digits in integer section + number of digits past the decimal point) on the numeral display element as follows:
  Number of display digits 4 digits: 1 word
  Number of display digits > 4 digits: 2 words
  If only one word is to be used for display, only the 1st word (lower four digits) are enabled. (The 2nd word is ignored.)
- PT memory for numeral display is separated from PT memory for numeral input and graph display. So, PT memory for numeral display is not affected if the same numeral memory table number is used on a numeral input element or graph element.

Image/library lamp (host to PT) Addresses 4001 to 4200

This data controls (turns ON and OFF) image/library lamps. (The image/library corresponding to the state (ON or OFF) is displayed on image/library lamps.)

Elements and address

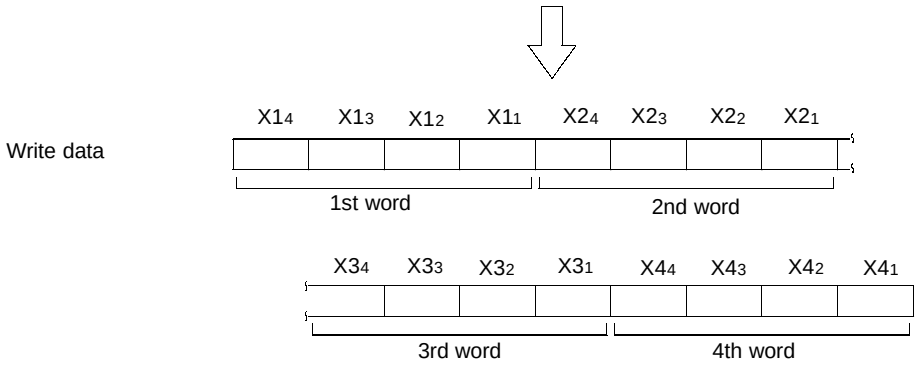
Screen numbers 1 to 200 correspond to PT memory addresses 4001 to 4200. (Image/library lamps can be used only in screens with screen numbers 1 to 200.)

Data contents

This data comprises four words (64 bits).
Four words (64 bits) of data (4 hexadecimal digits x four words) corresponds to image/library lamps as shown in the figure below. (Up to 64 image/library lamps can be used in a single screen.) The image/library lamp numbers in the figure below are automatically allocated from 1 according to the image/library lamp display order.

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Hexadecimal representation
1st word	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	$X1_4$ $X1_3$ $X1_2$ $X1_1$
2nd word	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	$X2_4$ $X2_3$ $X2_2$ $X2_1$
3rd word	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	$X3_4$ $X3_3$ $X3_2$ $X3_1$
4th word	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	$X4_4$ $X4_3$ $X4_2$ $X4_1$

(Numbers in frames are image/library lamp numbers.)



Explanation

- The image/library lamp number is automatically allocated from 1 according to the display order. Though this order is normally the same as the order in which image/library lamps are created on the Support Tool, the order can be changed on the Support Tool.
- To use image/library lamps, you must set a lamp bit (00000 to 000315) that corresponds to a lamp number when you create screen data on the Support Tool. (See page 143.) The lamp will not function as a lamp if an incorrect lamp number is set.
- Image/library lamps PT memory is provided for each screen. Image/library lamps can also be turned ON and OFF the moment they are displayed by writing this information before displaying the screen.

Bar graph (host to PT) Addresses 7001 to 7030

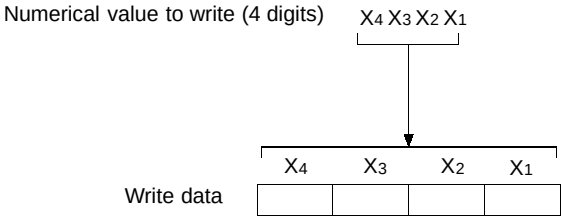
This data specifies the numeral to be displayed on bar graphs.

Elements and address

The order 1 to 30, when numeral memory table numbers currently set to bar graphs are counted from the smallest number upwards, corresponds to PT memory addresses 7001 to 7030. (With memory link on NTH25/NTH25C, up to 30 bar graphs can be registered to a single screen.)

Data contents

This data comprises one word.
Specify the data to write as follows:



Write bar graphs in BCD when the ”numeral storage type” currently set to the numeral memory table is set to ”BCD” and in hexadecimal when the ”numeral storage type” is set to ”binary”.

0000 Hex is written until the first numeral is input to the relevant numeral memory table after start of NTH25/NTH25C operation.

Explanation

- PT memory for bar graph display is separated from PT memory for numeral input, numeral display and trend graph display. So, PT memory for bar graph display is not affected if the same numeral memory table number is used on a numeral input, numeral display and trend graph display element.

Trend graph (host to PT) Addresses 8001 to 8040

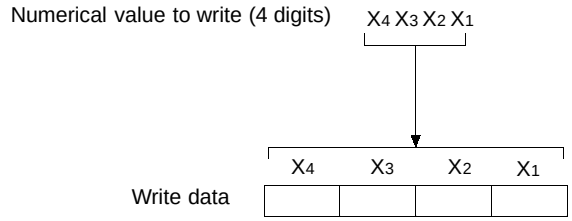
This data specifies the numeral to be displayed on trend graphs.

Elements and address

The order 0 to 39, when trend graph lines are counted from the smallest screen number upwards, corresponds to PT memory addresses 8001 to 8040. (With memory link on NTH25/NTH25C, up to 40 lines displayed in trend graphs can be registered in the entire screen data file.) When the lines of two or more trend graphs are currently registered to a single screen, the order number is allocated according to the display order. Though this order is normally the same as the order in which trend graphs are created on the Support Tool, the order can be changed on the Support Tool.

Data contents

This data comprises one word.
Specify the data to write as follows:



Write trend graphs in BCD when the ”numeral storage type” in the numeral memory table currently set to trend graph lines is set to ”BCD” and in hexadecimal when the ”numeral storage type” is set to ”binary”.

0000 Hex is written until the first numeral is input to the relevant numeral memory table after start of NTH25/NTH25C operation.

Explanation

- With memory link on NTH25/NTH25C, the PT memory corresponding to the lines currently registered to the trend graph frame are read according to the sampling interval currently set to the trend graph frame.
- Numerals that are read from PT memory are registered to NTH25/NTH25C memory by the data logging function.
- Clearing of past records and reading (sampling) of trend graph PT memory can be controlled by writing to PT memory addresses 8103 and 8104 (clear trend graph records) or PT memory addresses 8107 and 8108 (sampling stop/continue). (See pages 243 and 244.)
- PT memory for trend graph display is separated from PT memory for numeral input, numeral display and bar graph display. So, PT memory for trend graph display is not affected if the same numeral memory table number is used on a numeral input, numeral display and bar graph display element.

Clear trend graph record (host to PT) Addresses 8103, 8104

These data clear the display numerals of past trend graphs recorded using the data logging function. Records can be cleared by individual trend graph frame.

Elements and address

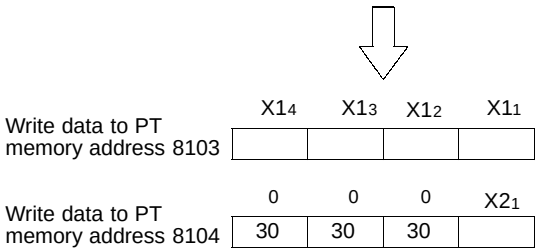
Trend graph numbers 1 to 16 correspond to PT memory address 8103, and numbers 17 to 20 to address 8104. (For details, see ”Data contents” below)

Data contents

These data each comprise one word (16 bits).
The data (4 hexadecimal digits) of each word (16 bits) in each PT memory address corresponds to the trend graph frame as shown in the figure below. (Only one trend graph frame can be registered to a single screen, and in all up to 20 trend graph frames can be used in the entire screen data file.)
The trend graph numbers shown below are automatically allocated from trend graph 1 in order from the smallest screen number for screens having a trend graph.

	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Hexadecimal representation
PT memory	8103	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	$X1_4$ $X1_3$ $X1_2$ $X1_1$
	8104													20	19	18	17	0 0 0 $X2_1$

(Numbers in frames are trend graph numbers. ”–” indicates that the number is unused (always ”0”).)



The records in trend graph frames are cleared as follows according to the state of the corresponding bit:

When the bit state changes from ”0” (OFF) to ”1” (ON): Record is cleared.
Other bit states: Record is not cleared.

Explanation

- Trend graph numbers are automatically allocated from 1 in order from the smallest screen number for screens having a trend graph.
- Clearing of trend graph records is executed when the bit corresponding to the trend graph number changes state from 0 (OFF) to 1 (ON). To execute another clear after records have been cleared, return the bit state to 0 (OFF) and then set it to 1 (ON). Note, however, that the response to the first clear record command must be acknowledged before the second clear record command is executed.
- Batch writing to PT memory addresses 8103 and 8104 is also possible. To do this, specify 8103 as the ”address”, and specify two words of data to ”write data” in the order ”write data to PT memory address 8103” and then ”write data to PT memory address 8104”.

Trend graph sampling stop/continue (host to PT) Addresses 8107, 8108

These data control (stop/continue) sampling (reading) of data (PT memory addresses 8001 to 8020) for trend graphs. Sampling can be controlled by individual trend graph frame.

Elements and address

Trend graph numbers 1 to 16 correspond to PT memory address 8107, and numbers 17 to 20 to address 8108. (For details, see ”Data contents” below)

Data contents

These data each comprise one word (16 bits).
The data (4 hexadecimal digits) of each word (16 words) in each PT memory address corresponds to the trend graph frame as shown in the figure below. (Only one trend graph frame can be registered to a single screen, and in all up to 20 trend graph frames can be used in the entire screen data file.)
The trend graph numbers shown below are automatically allocated from trend graph 1 in order from the smallest screen number for screens having a trend graph.

	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Hexadecimal representation
PT memory	8107	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	$X1_4$ $X1_3$ $X1_2$ $X1_1$
	8108													20	19	18	17	0 0 0 $X2_1$

(Numbers in frames are trend graph numbers. ”–” indicates that the number is unused (always ”0”).)

	$X1_4$	$X1_3$	$X1_2$	$X1_1$
Write data to PT memory address 8107				

	0	0	0	$X2_1$
Write data to PT memory address 8108	30	30	30	

Data for trend graphs is sampled as follows according to the state of the corresponding bit:

When bit is ”0”: Sampling is executed (continued).
When bit is ”1”: Sampling is not executed (stopped).

Explanation

- Trend graph numbers are automatically allocated from 1 in order from the smallest screen number for screens having a trend graph.
- Trend graph display no longer changes state while sampling of trend graphs is stopped. (The data logging function also stops while sampling is stopped.)
- Batch writing to PT memory addresses 8107 and 8108 is also possible. To do this, specify 8107 as the ”address”, and specify two words of data to ”write data” in the order ”write data to PT memory address 8103” and then ”write data to PT memory address 8108”.

Character string display (host to PT) Addresses 9001 to 9050

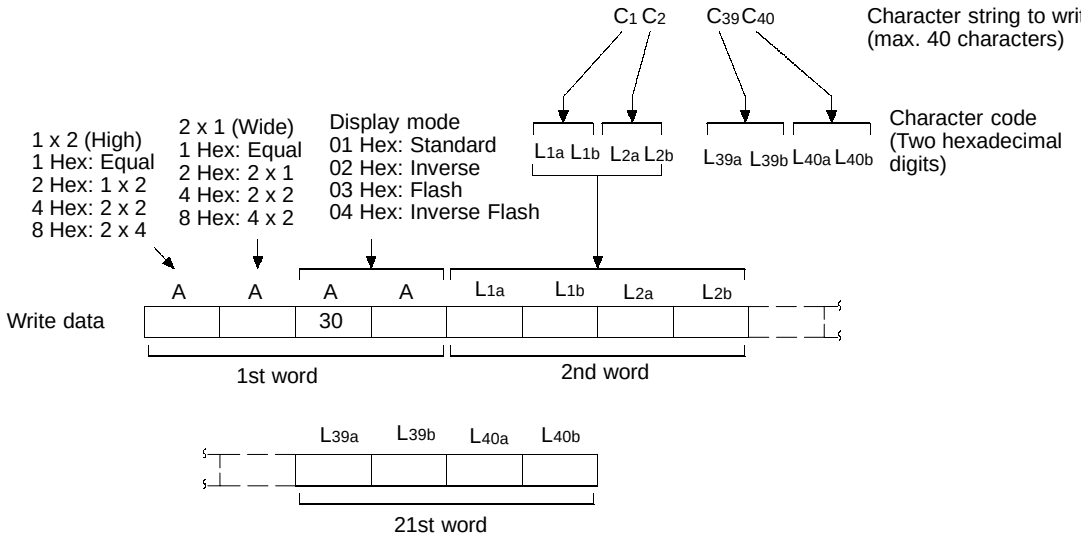
This data specifies display character strings on character string display elements and their display method.

Elements and address

Character string memory tables 0 to 49 currently set to character string display elements correspond to PT memory addresses 9001 to 9050. (With memory link on NTH25/NTH25C, up to 50 character string display elements can be registered in the entire screen data file.)

Data contents

This data comprises 21 words.
Specify the data to write as follows. (The first word specifies the display method.)



The effective size of actual characters on the NTH25/NTH25C is as follows:
Equal, 1 x 2 (High), 2 x 1 (Wide), 2 x 2, 4 x 4, 8 x 8

0000 Hex is written until the first character string is written to the relevant character string memory table after start of NTH25/NTH25C operation.

Explanation

- All 21 words need not necessarily be specified as the write data. Only the first word is written to change only the attribute of the data, for example. In this case, the NTH25/NTH25C executes processing when the CR code (0D Hex) indicating the end of the write command is received.

- When 0000 Hex is written to one word of data as a character string, the NTH25/NTH25C treats this as the end of the character string, and ignores subsequent data. Note, however, that the display is not cleared when the character string display is updated on the NTH25/NTH25C. So, the previously displayed character string may still be remaining on screen behind the data. If the number of display characters is not fixed, fill the remaining area with standard spaces (20 Hex), and write 0000 Hex last of all to indicate the end of the character string.
- The origin from where the character is extended is the top left corner coordinate of the character string.
- If a newly specified character string extends out of the right of the NTH25/NTH25C's screen, it will be carriage–fed at that point, and displayed from the left edge of the next line (position lowered by the height of the character).
  If the character string extends out of the bottom of the screen, it will be displayed from the top left corner of the screen.

Standard lamp (host to PT) Addresses A001 to A050

This data controls (turns ON and OFF) standard lamps.

Elements and address

With standard lamps, addresses A001 to A050 are shared with screen numbers 1 to 1000 as follows:

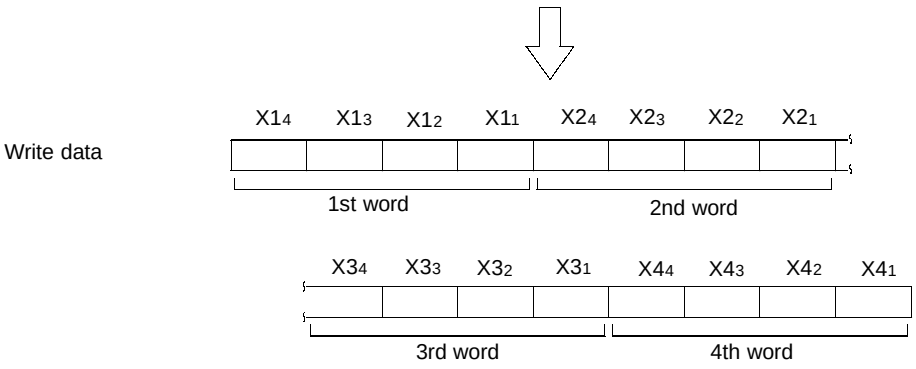
Address	Screen number				
A001	1	51	101		951
A002	2	52	102		952
A003	3	53	103		953
A050	50	100	150		1000

Data contents

This data comprises four words (64 bits).
Four words (64 bits) of data (4 hexadecimal digits x four words) corresponds to standard lamps as shown in the figure below. (Up to 64 image/library lamps can be used in a single screen.) The standard lamp numbers in the figure below are automatically allocated from 1 according to the standard lamp display order.

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Hexadecimal representation
1st word	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	$X1_4$ $X1_3$ $X1_2$ $X1_1$
2nd word	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	$X2_4$ $X2_3$ $X2_2$ $X2_1$
3rd word	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	$X3_4$ $X3_3$ $X3_2$ $X3_1$
4th word	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	$X4_4$ $X4_3$ $X4_2$ $X4_1$

(Numbers in frames are standard lamp numbers.)



Explanation

- The standard lamp number is automatically allocated from 1 according to the display order. Though this order is normally the same as the order in which standard lamps are created on the Support Tool, the order can be changed on the Support Tool.
- 50 screens' worth of standard lamp PT memory is provided. Standard lamps can also be turned ON and OFF the moment they are displayed by writing this information before displaying the screen.
- To use standard lamps, you must set a lamp bit (00000 to 000315) that corresponds to a lamp number when you create screen data on the Support Tool. (See page 143.) The lamp will not function as a lamp if an incorrect lamp number is set.

SECTION 6
NTH Screen Data Converter

This section describes the functions of NTH Screen Data Converter and how to use these functions.

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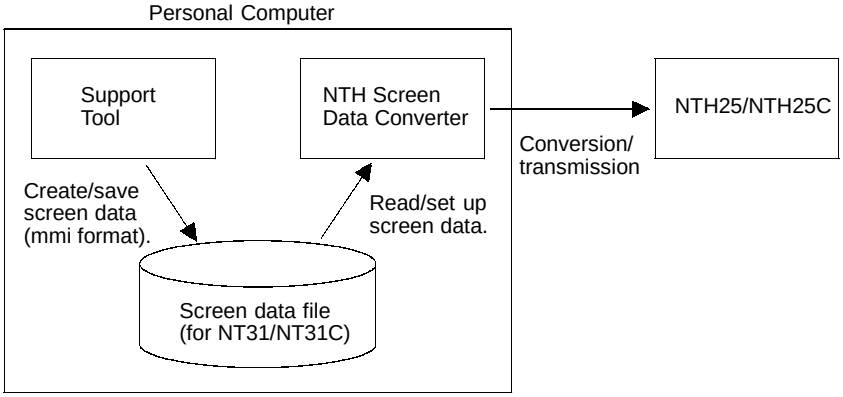
6-1 Outline of NTH Screen Data Converter

6-1-1 What is NTH Screen Data Converter?

The NTH25/NTH25C cannot be selected on the Support Tool as PT models. To specify the screen data for use on the NTH25/NTH25C, you must specify the PT model as follows:

NTH25: PT model ”NT31”
NTH25C: PT model ”NT31C”

However, the functions and data sizes of the NT31/NT31C differ from those of the NTH25/NTH25C. So, the screen data created on the Support Tool for use on the NT31/NT31C must be converted to screen data for use on the NTH25/NTH25C by NTH Screen Data Converter before it is sent to the NTH25/NTH25C.
On NTH Screen Data Converter, you can make settings specific to the NTH25/NTH25C.



Reference

- NTH Screen Data Converter can be executed independently of the Support Tool. So, it need not be installed on the same personal computer as the Support Tool. In this case, however, move the screen data file saved in mmi format to the personal computer running NTH Screen Data Converter so that the data can be read by NTH Screen Data Converter.
- The screen data currently registered on the NTH25/NTH25C cannot be read by NTH Screen Data Converter and the Support Tool.

6-1-2 Functions of NTH Screen Data Converter

NTH Screen Data Converter has the following functions:

- Reading of screen data files

  The screen data file for use on the NT31/NT31C that was created using NT Series Support Tool for Windows95/98 (Ver.3.0) is read.
  Note, however, that only mmi format files can be read. The screen data to be read by NTH Screen Data Converter and transferred to NTH25/NTH25C must be saved in the mmi format.
  Screen data containing functions that are not supported on the NTH25/NTH25C sometimes cannot be read.

- Settings for the NTH25/NTH25C

  The following items are set as NTH25/NTH25C-specific settings:

  [Configuration]
  Backlight auto OFF time
  Communications method (host link/NT link (1:1)/memory link (NTH protocol))
  Communications conditions with the host
  Host PC type

  [Function key setting]
  Set the notification method of function switches and allocated bits and words for function switches.

  [Window control area setting]
  Set the word to be used for manipulating window functions.

  [Trend graph control area setting]
  Set the area for controlling (sampling stop/continue, clear records) trend graphs.

- Screen data conversion

  The screen data created on the Support Tool for use on the NT31/NT31C is converted for use on the NTH25/NTH25C.
  During conversion, functions that are not supported on the NTH25/NTH25C, out-of-range bit and word settings, and elements exceeding the maximum permissible number of elements are invalid and deleted from the screen data file.

Reference

When invalid settings or elements are deleted, messages and error logs are not displayed on NTH Screen Data Converter. When creating screens for the NTH25/NTH25C, observe restrictions such as the maximum permissible number of elements, and check these elements on the NTH25/NTH25C screen after sending them to the NTH25/NTH25C.

- Sending (writing) screen data to the NTH25/NTH25C

  After the settings are made for the NTH25/NTH25C and screen data is converted for use on the NTH25/NTH25C, the screen data is sent to the NTH25/NTH25C.
  The NTH25/NTH25C must be set to the screen send mode before the screen data is sent to the NTH25/NTH25C.
  For details on how to enter the screen send mode, see Section 3−4 "Transmitting the Screen Data" on page 65.

6-2 Setting Up NTH Screen Data Converter

6-2-1 Equipment Needed To Use NTH Screen Data Converter

Prepare the following equipment to use NTH Screen Data Converter:

Hardware

- Recommended CPU

  Pentium 100 MHz or faster

- Personal computer

  Use an IBM personal computer or 100% compatible machine capable of running Microsoft Windows95 or Microsoft Windows98.

  An RS−232C port capable of communications at a baud rate of 19,200 bps or higher must be allocated to one of ports COM1 to COM4 to send screen data to the NTH25/NTH25C.

- RAM

  At least 16 MB

- Free area in hard disk

  At least 5 MB

- CD ROM drive

  At least one drive is required to install NTH Screen Data Converter.

- Display

  VGA compatible display

- Mouse

  Serial mouse or bus mouse

Operating system

- Microsoft Windows95 or Microsoft Windows98

  Windows3.1, WindowsNT and WindowsNT4.0 are not supported.

6-2-2 How to Install NTH Screen Data Converter

Install NTH Screen Data Converter on the hard disk.
To install NTH Screen Data Converter, execute the installation program provided with the NTH25/NTH25C.

Reference

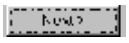
When you specify ”Custom” as the setup method, you can select the required items to install from the following files:

- Program Files (NTH Screen Data Converter application)
- Ddata Files (PC information files)

Data cannot be converted successfully without ”Ddata Files”. Normally, be sure to install all of these files.

Basic installation operation

The following buttons are displayed during installation:

 :

Clicking on this button confirms the settings in the currently displayed window and displays the next window.

 :

Clicking on this button cancels the settings in the currently displayed window and displays the previous window.

 :

Clicking on this button closes the currently displayed window. The status currently set in the window is canceled.
If you click this button in the installation window, you can cancel installation. In this case, a cancel confirmation message appears on screen.

 :

Clicking on this button displays the actual folder configuration as a tree. In this display, you can select the folder to install NTH Screen Data Converter to.

Procedure

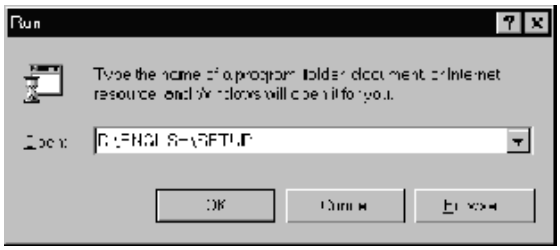
(1) Start up Windows95 or Windows98. (In this example, the OS is Windows98.)

(2) Put NTH Screen Data Converter CD-ROM in the CD-ROM drive (in this example, drive D:). The setup program automatically starts. Proceed to step 6. If the setup program does not start automatically, follow steps 3 to 5 to execute the setup program.

Reference You can execute the setup program by double-clicking "Setup.exe" in the "English" folder in NTH Screen Data Converter CD-ROM by displaying the "Explorer" of Windows95 or Windows98. In this case, you can skip steps 3, 4, and 5.

(3) Click on the Windows Start button and select "Run...".

(4) Enter "D: \ENGLISH\SETUP" in the input field in the displayed window. (This entry is not case-sensitive, you can enter either lower-case or upper-case characters.)
Note that the drive destination must agree with the name of the drive where you put the CD-ROM. If you put the CD-ROM in drive E:, input "E: \ENGLISH\SETUP".



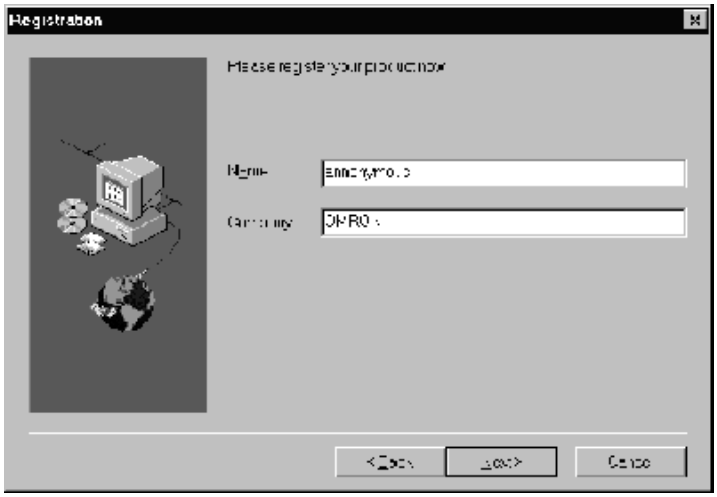
(5) Click on OK.

This starts installation of NTH Screen Data Converter.

(6) When the setup (Welcome) screen of NTH Screen Data Converter is displayed, click on Next>.

The screen for entering the user information (name and company name) appears.

(7) Enter your name and company name.
The default name and company name are those currently registered to your personal computer.



After you have finished setting the user information, click on Next>.

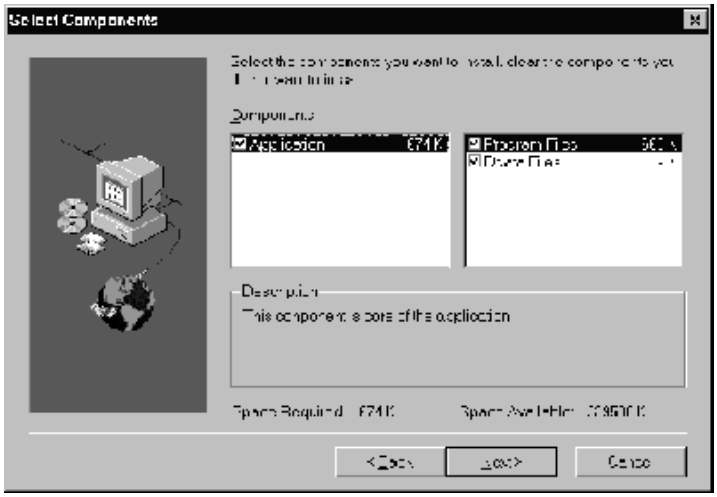
The screen for specifying the setup method and installation directory appears.

(8) Choose the setup method (Typical/compact/custom) and the installation directory.
The following is the default directory:
C:\Program Files\Omron\NTHConverter\
To change the installation directory, click Browse..., and specify the required drive and directory. (If you specify a directory that does not exist on the hard disk, the directory is automatically made under the name you specified.)

After you have finished setting the drive and directory, click on Next>.

If you chose ”Custom” as the setup method, a screen for selecting the program and data (components) to install appears.
If you chose ”Typical” or ”Compact” as the setup method, a screen for specifying the registration destination (program folder) for the Start menu appears immediately. Proceed to step 10. (The installation procedure is the same for both the ”Typical” and ”Compact” setup methods; all items are installed.)

(9) Click on the check box, displayed to the left of the program to be selected. This prefixes the program with the check mark.



After you have finished selecting the program, click on [Next>].

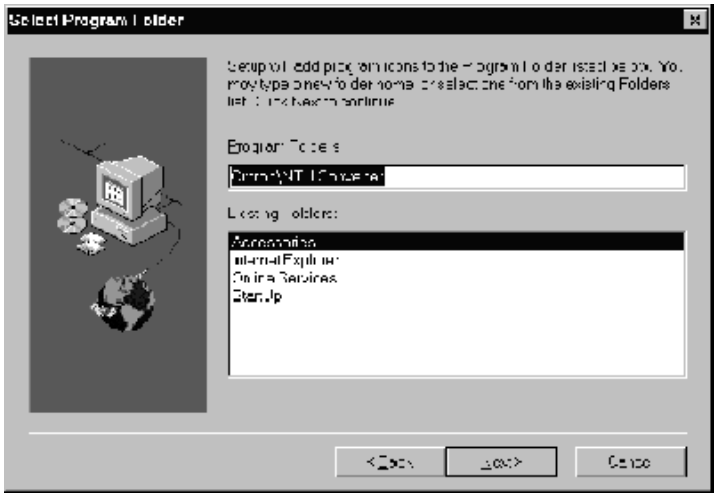
The screen for specifying the registration destination (program folder) for start menu appears.

Reference Data cannot be converted successfully without "Ddata Files". Normally, install all of these files.

(10) In the Windows Start menu, specify the folder (program folder) where the short-cut to NTH Screen Data Converter is created.
The default short-cut is as follows:

Start\Program\Omron\NTH Converter

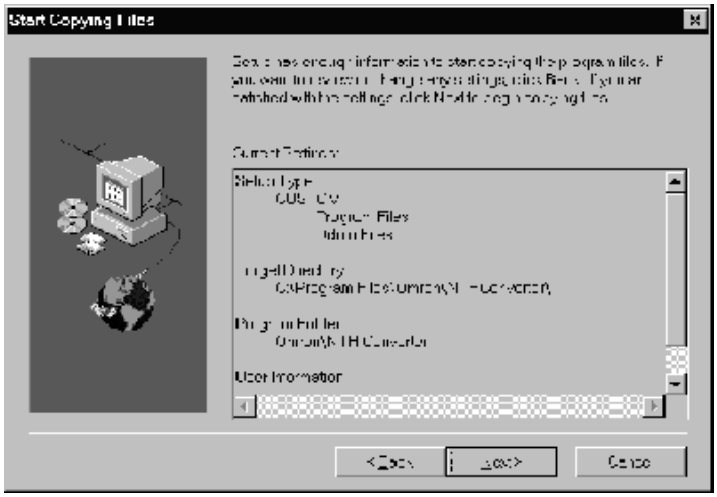
If you want to change the folder, select the desired folder from the "Existing Folders" or directly enter the folder name. (If you specify a folder that does not exist on the hard disk, the folder is automatically made under the name you specified.)



After specifying the folder, click on [Next>].

A screen for confirming the installation method appears.

(11) Scroll the contents of ”Current settings” and confirm the installation method and contents to be installed.

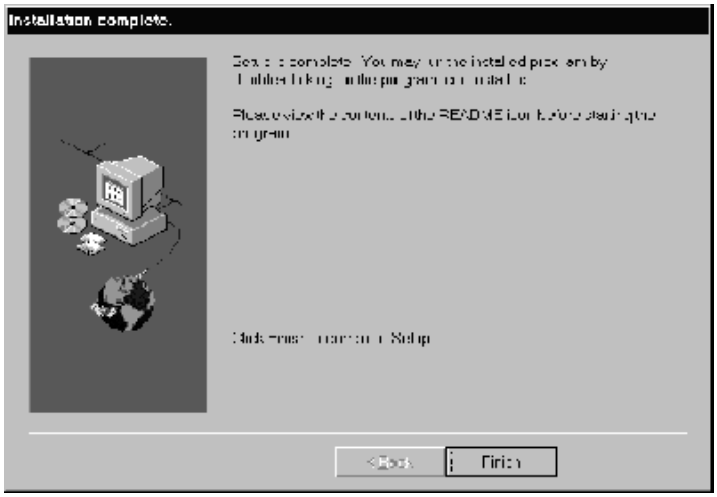


After you have finished checking, click on Next>.

This executes the installation and starts copying of the files to the specified directory.

During the installation, a progress bar is displayed to indicate how far installation has progressed.

(12) When installation ends, the folder specified in step 10 is displayed, and the following window appears.



Click on Finish. This completes installation of NTH Screen Data Converter.

Uninstall

The Uninstaller (uninstall software) is not provided with NTH Screen Data Converter.
If NTH Screen Data Converter is no longer required, follow the procedure below to delete NTH Screen Data Converter files and installation information. (If the same folder as NTH Screen Data Converter contains other files in addition to those that were copied when NTH Screen Data Converter was installed, these files will not be deleted and remain in the folder after NTH Screen Data Converter is uninstalled.)

(1) Select the Windows [Start] button and then select [Settings] – [Control Panel].
The Control Panel window appears.

(2) Double-click [Add/Remove Programs].

(3) Select "NTHConverter" from the list of applications currently displayed in the [Setup and Delete] page, and click [Add/Remove].
The confirmation message for removing the files appears.

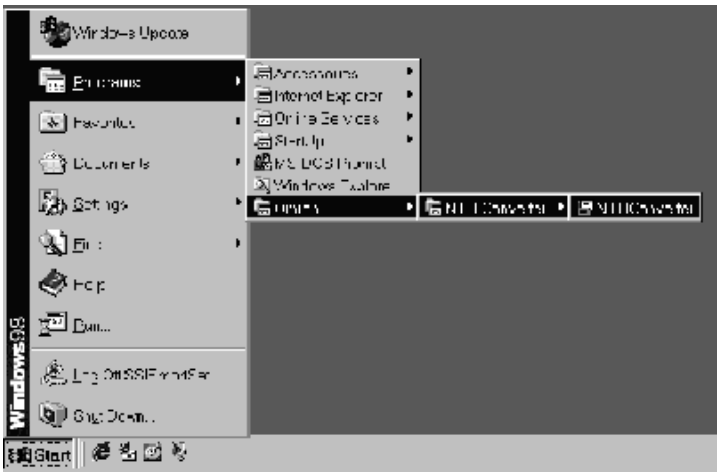
(4) Click [Yes].
From here on, follow the on-screen instructions.

6-3 Operating NTH Screen Data Converter

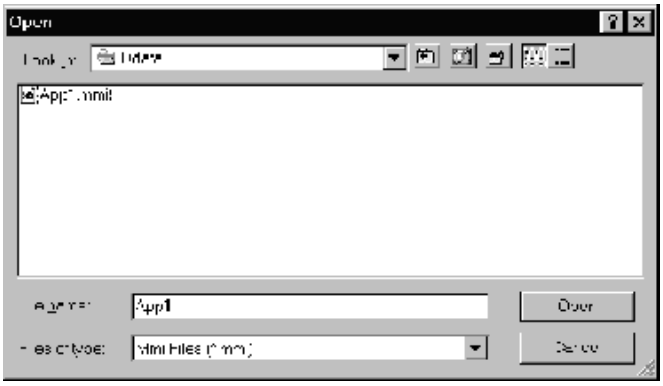
6-3-1 Starting Up and Exiting NTH Screen Data Converter

Starting up NTH Screen Data Converter

To start up NTH Screen Data Converter, click the Windows Start button, and select ”Programs”, ”Omron”, ”NTH Converter” and then ”NTHConverter”.



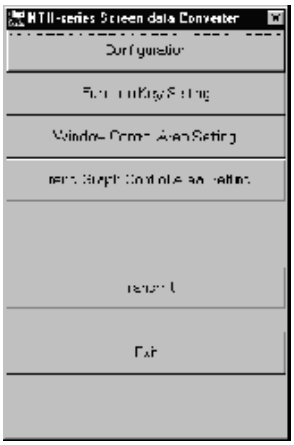
This starts up NTH Screen Data Converter, and the window for specifying the screen data file (mmi format file created on the Support Tool for use on the NT31/NT31C) to be converted for use on the NTH25/NTH25C appears.



Specify the screen data file and click Open. The main window appears.

Reference

If you attempt to read an illegal screen data file, the message ”Selected file cannot be converted” is displayed. Click OK. The display returns to the window for specifying the screen data file. Examples of illegal screen data files are files with the .mmi extension but containing data that was not created on the Support Tool, or files to which elements having functions not supported on the NTH25/NTH25C are registered.



Exiting NTH Screen Data Converter

Any of the following operations exits NTH Screen Data Converter:

- Clicking [Exit] on the main window
- Clicking the [X] button at the top right of the main window
- Double-clicking the NTH Screen Data Converter icon at the top left of the main window
- Clicking the NTH Screen Data Converter icon at the top left of the main window and selecting [Close] in the control menu box that is displayed
- Simultaneously holding down the Alt key and F4 key.

When NTH Screen Data Converter is exited, the display returns to the Windows screen.

6-3-2 Configuration

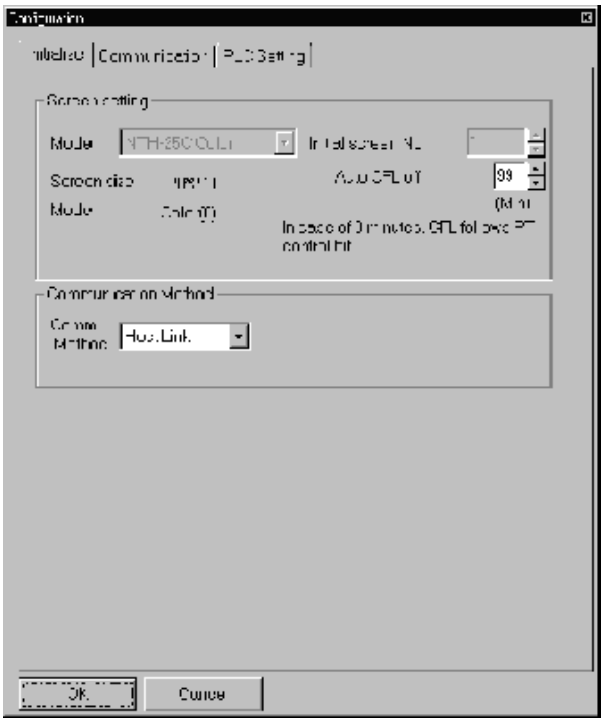
Click [Configuration] in the main window. The [Configuration] screen appears.

This screen comprises the following three pages, and is used for setting the PT model, communications methods, communications conditions and host PC type:

- [Initialize] page
- [Communication] page
- [PLC Setting] page

[Initialize] page

This page is for setting the basic operation of the NTH25/NTH25C.



Item		Function
Screen setting		
	Model	The PT model is displayed according to the contents of the read screen data file. NT31 screen data: NTH25 black-and-white NT31C screen data: NTH25C color
	Screen size	The screen size of the PT model is displayed. (fixed to 320 x 240 dots)
	Mode	The color mode of the PT model is displayed. NTH25: black-and-white NTH25C: color (8)
	Initial screen No.	The number of the "initial screen" that is set when you created the screen data on the Support Tool is displayed.
	Auto CFL off	Set the time that the NTH25/NTH25C's backlight automatically turns OFF in minutes. 0: The backlight does not automatically turn OFF. (Operation follows the PT status control bit on the host.) 1 to 99: Time (1 to 99 minutes) until the backlight automatically turns OFF. (The PT status control bit is invalid.)
Communication Method		
	Comm. Method	Set one of the following communications methods to be used for communications with the host. Host link, memory link, NT link

• About the Backlight Auto OFF Function (Auto CFL off function)

The NTH25/NTH25C is provided with the backlight auto OFF function. This function automatically turns the NTH25/NTH25C's backlight OFF when it is not operated for a fixed period of time.
Using this function allows you to extend the backlight's service life.
To enable use of the auto backlight OFF function, set "Auto CFL off" to a value within the range 1 to 99 (number of minutes until the backlight automatically turns OFF). At this setting, the PT status control bit "backlight mode" (bit 0) is disabled.
To disable use of the auto backlight OFF function, set "Auto CFL off" to 0. At this setting, the PT status control bit "backlight mode" (bit 0) is enabled.

When the backlight auto OFF function is activated and the backlight is turned OFF, the backlight can be turned ON again by one of the following operations:

- Pressing a function switch
- Touching the touch panel
- Screen switching from the host

If you press a touch switch while the backlight is OFF as a result of activation of the backlight auto OFF function, only relighting of the backlight will be executed; the function of the switch (e.g. notification to host or screen switching) is not executed. (When a function switch is pressed, notification of the function switch's state is also executed.)

Reference

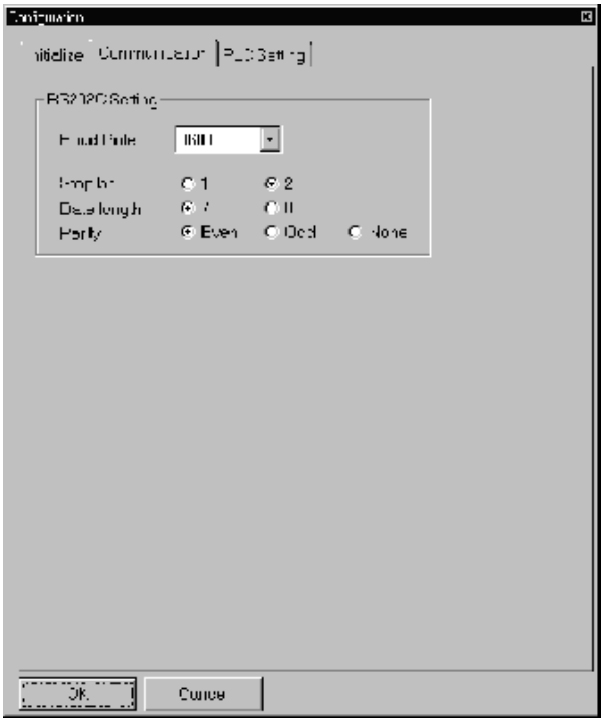
- If the backlight is turned OFF by manipulating the PT status control bit with "Auto CFL off" set to 0, the backlight can be turned back ON only by changing the PT status control bit "backlight mode" (bit 0) state to 1 (ON). (It cannot be turned back ON by the methods described in the previous paragraph when the backlight auto OFF function is activated.)
- In its default state, the contents of each of the areas on the PC are 0. So, the PT status control bit "backlight mode" (bit 0) also is 0 (OFF). When the NTH25/NTH25C is connected with "Auto CFL off" set to 0, the backlight will remain OFF.

[Communication] page

This page is for setting the communications conditions with the host.
For details on setting the communications conditions on the host, see "2−5 "Connecting to the Host".

Reference

- The communications conditions on NTH Screen Data Converter must be set to the same settings as on the host.
- When "Comm. Method" in the [Configuration] page is set to [NT Link], the communications conditions cannot be set.
  When "Comm. Method" is set to [Host Link], be sure to set the following communications conditions:
  Stop bit: 2
  Data length: 7
  Parity: even

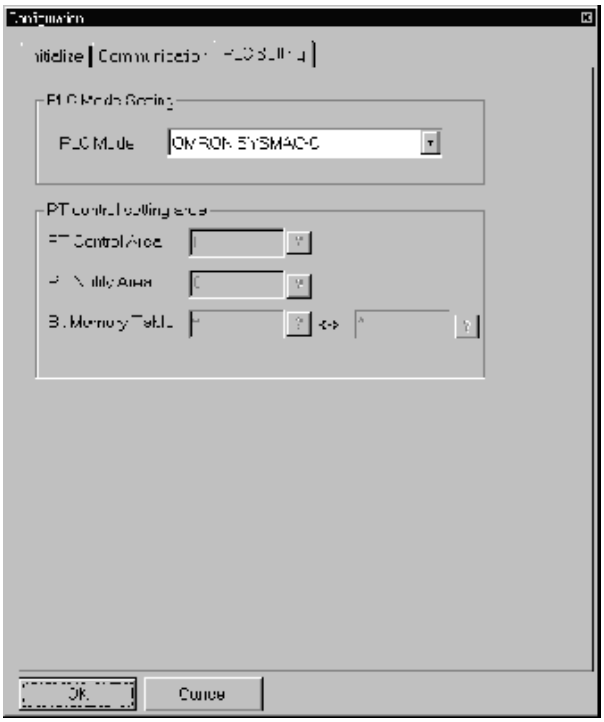


Item		Function
RS232C settings		
	Baud rate	Set one of the following as the baud rate: 1200, 2400, 4800, 9600, 19200 bps
	Stop bit	Set either of the following as the stop bit: 1, 2
	Data length	Set either of the following as the data length: 7, 8
	Parity	Set one of the following as the parity setting and type: Even, odd, none

[PLC Setting] page

This page is for setting the PC type (host) to be connected to the NTH25/NTH25C.

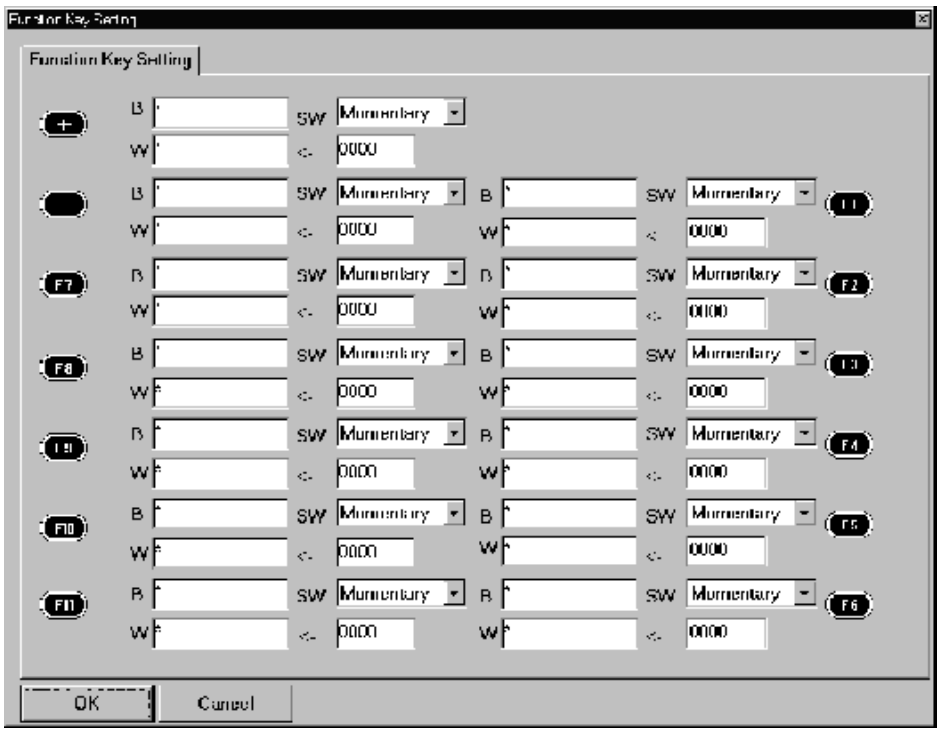
Reference When ”Comm. Method” in the [Configuration] page is set to [Memory Link], the PC type cannot be set.



Item		Function
PLC Mode Setting		
	PLC Model	Set one of the following as the PC type to be connected to the NTH25/NTH25C: OMRON SYSMAC−C (C series PC, SRM1) OMRON SYSMAC−CV/CS1 (CVM1/CV/CS1 series PC)
PT control setting area		
	PT Control Area	The allocated word (first word number) in the ”PT status control area” that was set when screen data was created on the Support Tool is displayed.
	PT Notify Area	The allocated word (first word number) in the ”PT status notify area” that was set when screen data was created on the Support Tool is displayed.
	Bit Memory Table	The allocated word (first word number) in bit memory table number 0 that was set when screen data was created on the Support Tool is displayed.

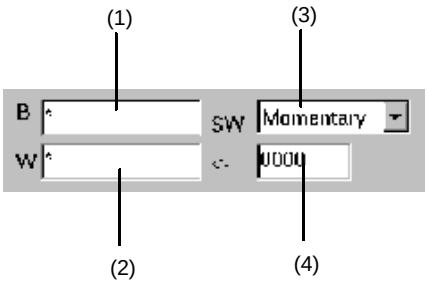
6-3-3 Function key settings

Click [redacted] in the main window. The [Function Key Setting] screen is displayed.
In this screen, set the action of the function switches.



Host link, NT link (1:1)

Set the following items to each of the function switches.



Item	Function
(1)	Set the bit by which pressing of the function switch is notified. (This can be used simultaneously with word notification in (2).) For details on settable areas, see "Allocated bits" below. To disable bit notification, enter "*".
(2)	Set the word by which pressing of the function switch is notified. (This can be used simultaneously with bit notification in (1).) For details on settable areas, see "Allocated words" below. To disable word notification, enter "*".
(3)	Set one of the following as the notification action in bit notification: Momentary: While pressed 1 (ON) While not pressed 0 (OFF) Alternate: Each press toggles the bit state between 0 (OFF) and 1 (ON).
(4)	Set the value that is written to the word when a function switch is pressed in word notification. (Releasing the function switch will not result in any change.) 0000 to FFFE Hex

Allocated bits

The areas in the following table can be specified as the notify bit for function switches:

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation	How To Specify Bits
DM	Data memory		Data memory		
CH	I/O relay		I/O relay		1212
TIM	Timer present value		Timer present value		
CNT	Counter present value		Counter present value		
HR	Holding relay				HR0101
AR	Auxiliary relay		Special auxiliary relay		
LR	Link relay				LR1215

: OK : NG

The range of each memory area differs according to the PC type. For details, see Appendix H "PC Memory Map", page 321.

[How to Specify Areas]

- I/O relay
  Enter only two word number digits and two bit number digits.
- Other areas
  Enter the characters (HR, LR) indicating the area followed by two word number digits and two bit number digits.

• Allocated words

The areas in the following table can be specified as the notify word for function switches. The allocated word for function switches is fixed to one word.

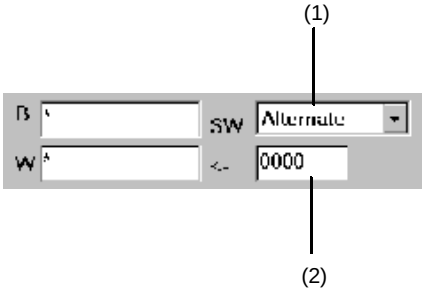
Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation	How To Specify Bits
DM	Data memory		Data memory		DM0123
CH	I/O relay		I/O relay		1
TIM	Timer present value		Timer present value		TIM055
CNT	Counter present value		Counter present value		CNT032
HR	Holding relay				
AR	Auxiliary relay		Special auxiliary relay		
LR	Link relay				

: OK : NG

The range of memory area differs according to the PC type. For details, see Appendix H ”PC Memory Map”, page 321.

[How to Specify Areas]
- I/O relay
Enter only four word number digits.
- Other areas
Enter the characters (DM, TIM, CNT) indicating the area followed by the word number. For the DM area, enter a 4-digit word number. For the TIM or CNT areas, enter a 3-digit word number.

Memory link



When the memory link is used, the area to be used is already determined (PT memory). So, bits and words need not be allocated.

- Response to the host → PT read command

  When a function switch is pressed, one word of data indicating the switch is written to PT memory (address 0000 Hex). (Four words are held in the NT25/NTH25C's internal buffer.)
  When the PT memory (address 0000 Hex) is read from the host, the data which is currently written to PT memory is returned to the host. For details, see Section 5 "Using Memory Link (NTH Protocol)."
  Set the following items to each of the function switches:

Item	Function
(1)	Set one of the following as the action of the function switch when it is pressed: OFF: Nothing is executed. SW: The position code is written to PT memory. (See page 269.) Specified value: The specified value in (2) below is written to PT memory.
(2)	Set the value to be written to PT memory when (1) above is set to "Specified value". 0000 to FFFE Hex

  FFFF Hex is written when a touch switch or function switch is not pressed or when all of the information of a pressed switch is being read from the host.

- Response to the PT → host notify command

  When a function switch is pressed or released, the host is notified of a 1–word address and 1–word data as the notify command. For details, see Section 5 "Using Memory Link (NTH Protocol)."
  Set the following items to each of the function switches:

Item	Function
(1)	Set one of the following as the action of the function switch when it is pressed or released: OFF: Nothing is notified. SW: When pressed Address: F000 Hex Data: Position code When released Address: 0000 Hex Data: Position code (For details on position codes, see page xx.) Specified value: When pressed Address: F000 Hex Data: Specified value of (2) below When released Address: 0000 Hex Data: Specified value of (2) below
(2)	Set the value to be notified to the host when (1) above is set to ”Specified value”. 0000 to FFFE Hex

Position Codes of Function Switches

The following table shows the position codes of the function switches:

Function switch	Position code	Function switch	Position code
+	0C00 Hex	–	–
–	0C01 Hex	F1	0D00 Hex
F7	0C02 Hex	F2	0D01 Hex
F8	0C03 Hex	F3	0D02 Hex
F9	0C04 Hex	F4	0D03 Hex
F10	0C05 Hex	F5	0D04 Hex
F11	0C06 Hex	F6	0D05 Hex

6-3-4 Window control area setting

Click  in the main window. The [Window Control Area Setting] screen appears.

This screen is for setting the allocated words for the work area to be used in window displays.

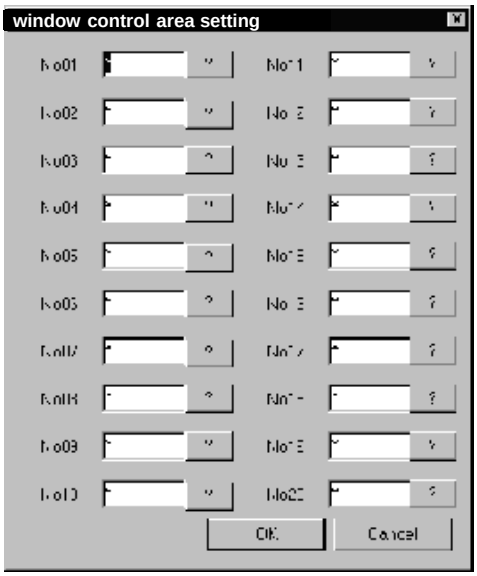
In a window display, a work area of one word for each window screen is required. Specify words not used for other applications in order from word number 1 for the necessary number of window screens.

Caution

- Be sure to set the same number or more window control areas than the actual number of windows in the screen data file.
- Do not change the contents of words as they are used by the NTH25/NTH25C as work area.

Reference

When ”Comm. Method” in the [Configuration] page is set to [Memory Link], the window control area cannot be set.



The areas in the following table can be specified as the window control area. The allocated word is fixed to one word.

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation	How To Specify Bits
DM	Data memory		Data memory		DM0123
CH	I/O relay		I/O relay		1
TIM	Timer present value		Timer present value		TIM055
CNT	Counter present value		Counter present value		CNT032
HR	Holding relay				
AR	Auxiliary relay		Special auxiliary relay		
LR	Link relay				

: OK : NG

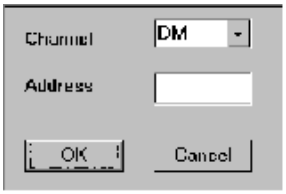
The range of each memory area differs according to the PC type. For details, see Appendix H ”PC Memory Map”, page 321.

[How to Specify Areas]

- I/O relay
  Enter only four word number digits.
- Other areas
  Enter the characters (DM, TIM, CNT) indicating the area followed by the word number. For the DM area, enter a 4-digit word number. For the TIM or CNT areas, enter a 3-digit word number.

Reference

Click [...] at the right of the entry field. The following screen for setting the address appears. In this screen, you can specify the area type and word number individually.



In this screen, the number of digits for the word number are as follows:

DM: 4 digits, Other: 3 digits

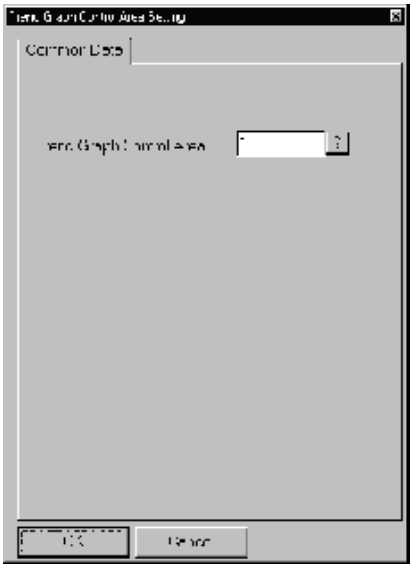
6-3-5 Trend graph control area settings

Click [Trend Graph Control Area Setting] in the main window. The [Trend Graph Control Area Setting] screen appears.
This screen is for setting the allocated words of the areas for trend graph control. There are two areas for trend graph control. For details on trend graph control areas, see "Trend Graphs" on page 176.

- Data clear control area
  This area clears past data (logging data) in words to be displayed. Data can be cleared from each trend graph frame individually.
- Display updating stop control area
  This area stops and continues reading (sampling) of words to be displayed. Sampling can be stopped and continued on each trend graph frame individually.

Reference

When "Comm. Method" in the [Configuration] page is set to [Memory Link], the trend control area cannot be set.



The areas in the following table can be specified as the trend graph control area. The allocated words for the trend graph control area are fixed to four words.

Symbol	C Series PCs	Allocation	CVM1/CV Series PCs	Allocation	How To Specify Bits
DM	Data memory		Data memory		DM0123
CH	I/O relay		I/O relay		1
TIM	Timer present value		Timer present value		TIM055
CNT	Counter present value		Counter present value		CNT032
HR	Holding relay				
AR	Auxiliary relay		Special auxiliary relay		
LR	Link relay				

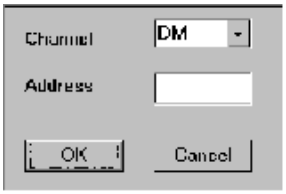
: OK : NG

The range of each memory area differs according to the PC type. For details, see Appendix H ”PC Memory Map”, page 321.

[How to Specify Areas]
- I/O relay
Enter only four word number digits.
- Other areas
Enter the characters (DM, TIM, CNT) indicating the area followed by the word number. For the DM area, enter a 4-digit word number. For the TIM or CNT areas, enter a 3-digit word number.

Reference

Click ... at the right of the entry field. The following screen for setting the address appears. In this screen, you can specify the area type and word number individually.



In this screen, the number of digits for the word number are as follows:

DM: 4 digits, Other: 3 digits

Trend graph control area functions

The NTH25/NTH25C manages trend graphs using numbers 1 to 20 in order from the smallest number for screens having a trend graph. (This number is automatically allocated by the NTH25/NTH25C.)
Corresponding trend graphs can be controlled by turning the bits in the trend graph control area ON and OFF.

• Data clear control area

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1st word	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
2nd word													20	19	18	17

(Figures in frames are trend graph numbers. "–" indicates that the number is unused (always 0).)

Clearing of records in trend graph frames is carried out as follows according to the state of the corresponding bit:

Bit state change from 0 to 1: Record is cleared.
Other: Nothing is executed.

• Display updating stop control area

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1st word	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
2nd word													20	19	18	17

(Figures in frames are trend graph numbers. "–" indicates that the number is unused (always 0).)

Data for trend graphs is read (sampled) according to the state of the corresponding bit:

Bit "0": Sampling is carried out (continued).
Bit "1": Sampling is stopped.

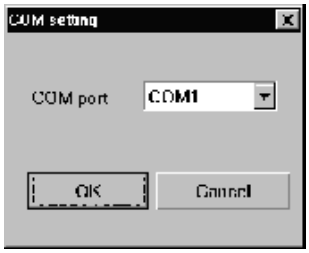
6-3-6 Transmitting Screen Data

When you have finished making the required settings, send the screen data to the NTH25/NTH25C following the procedure below.

(1) Connect the NTH25/NTH25C to a personal computer on which NTH Screen Data Converter is running. (See page 38.)

(2) Set the NTH25/NTH25C to the screen send mode.
Select "Send Screen" in the CHECK menu on the NTH25/NTH25C.
For details on operations in the CHECK menu and the screen send mode, see Section 3 "CHECK Menu Operation."

(3) Click [ ] in the main window on NTH Screen Data Converter.
The following screen appears.



(4) Choose one of "COM1" to "COM4" as the RS–232C port to which the NTH25/NTH25C is connected. Then click [OK].
This starts transmission of screen data.

When transmission of screen data ends successfully, the display returns to the NTH Screen Data Converter main window and the NTH25/NTH25C automatically restarts.

If transmission of screen data does not end successfully, the following happens:

- On NTH Screen Data Converter, the ”Communications Error” message is displayed. Click OK to return to the main window.
- On the NTH25/NTH25C, the ”Standing By To Send” or ”Receiving Data” message remains displayed, or the display changes to indicate a communications error.
  If the ”Standing By To Send” or ”Receiving Data” message remains displayed, turn the power OFF then back ON again to restart the NTH25/NTH25C.

Reference

If transmission of screen data does not end successfully, the screen data sent and stored in the NTH25/NTH25C may be in error. If this happens, the NTH25/NTH25C may malfunction and operation may not be as intended. For example, the NTH25/NTH25C may no longer enter the RUN mode when it is started up, or screens may no longer be displayed during operation. Send the screen data again later and check that screen data is successfully sent.

SECTION 7
Troubleshooting and Maintenance

This section describes the action to take when an error occurs during NTH25/NTH25C operation, and how to carry out maintenance and inspection to prevent errors from occurring.

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7-1 Troubleshooting

When a fault relating to the operation of the NTH25/NTH25C occurs, find the symptoms in the table below and remedy by following the corresponding ”Remedy”.

Caution
- Confirm system safety before turning the power ON/OFF.
- Do not disassemble the PT for repair or modification.

1. When installation is not successful

Symptoms	Cause	Remedy
Power LED fails to turn ON	Power is not being supplied.	Check the connections and make sure that power is supplied correctly. (See ”Connecting the Power Supply”, page 35.)
	Power supply fuse has blown.	Contact your OMRON service center.
The display language of the initial screen and CHECK menu is Japanese.	Screen data created in the Japanese version of NTST is saved to the NTH25/NTH25C.	Send screen data created in the English version of NTST to the NTH25/NTH25C. After this data has been sent, restart the NTH25/NTH25C and the display language will change to English.
The display is dim.	Insufficient contrast	Increase the contrast in the CHECK menu (page 70).
	Backlight is defective, or its life has expired.	Contact your OMRON service center. (The backlight cannot be replaced by the customer.)
The display is faint.	The contrast is too high.	Decrease the contrast (page 70).

2. When screen data is not sent successfully

Symptoms	Cause	Remedy
Cannot communicate with the NTH Screen Data Converter	The NTH25/NTH25C is not in the Screen Transmit mode.	Display the CHECK menu and select the Transmit mode. (See 3-4 ”Transmitting the Screen Data”, page 65.)
	Not connected to the NTH Screen Data Converter.	Check the installation of the connector cable. (See 2-4 ”Connecting to the NTH Screen Data Converter”, page 38.)
	The PT model setting and communications port setting on the NTH Screen Data Converter do not match the NTH25/NTH25C.	Using the ”Configuration” settings of the NTH Screen Data Converter, set the PT model to match the NTH25/NTH25C. Also, match the ”COM port” setting of the [Comms. Setting] page that is displayed when ”Transmit” is selected with the RS-232C port that is currently connected to the NTH25/NTH25C.
Data transmission from the NTH Screen Data Converter is delayed (approx. 30 min.)	The cable for NTH25/NTH25C is directly connected to the computer.	Connect the tool connector cable to the computer, and the NTH25/NTH25C cable to the tool connector cable. (See 2-4 ”Connecting to the NTH Screen Data Converter”, page 38.)
The ”Data Communications Error” message is displayed.	Faulty communications cable connection	Check the cable connections, and conduct an electrical continuity test. Replace the cable if the results of the test are no good.
	Transmission of screen data was canceled on the NTH Screen Data Converter.	Do not press the right mouse button (pause data transmission) on the NTH Screen Data Converter (computer) during transmission of screen data.
The ”Excessive Screen Data” message is displayed.	The screen capacity that can be registered to NTH25/NTH25C is exceeded.	Reduce the total amount of screen data, for example, by registering some of the elements to a library.

3. When the NTH25/NTH25C is not started up successfully

Symptoms	Cause	Remedy
Nothing is displayed on the screen.	Screen number 0 or a screen to which screen data is not registered has been read at the host.	This is not an error. Change the screen number. (See ”Screen Numbers”, page 83.)
	The backlight is OFF.	– If the ”Auto CFL off” is set to a value other than 0 by the NTH Screen Data Converter, the backlight will automatically turn OFF if the screen is not operated within a specific time. To turn the backlight back ON, touch the screen again. – If the ”Auto CFL off” is set to 0 by the NTH Screen Data Converter, the backlight will turn OFF for the time that bit 0 of the PT status control bit is 0 (OFF). In this case, set bit 0 of the PT status control bit to 1 (ON). If the above remedy does not turn the backlight ON, contact your OMRON service center.
When an attempt is made to enter the RUN mode, the initial screen and the ”No Reply from Host” message are displayed alternately.	The PC model setting is not matching.	Match ”PLC Model” on the ”Configuration” – [PLC Setting] page of the NTH Screen Data Converter with the actually connected PC.
	NTH25/NTH25C and host communications conditions are not matching.	Make sure that the host’s communications speed, stop bit length, data length and parity settings match the settings on the NTH25/NTH25C set on the NTH Screen Data Converter.
	Defective communications cable connection	Check the cable connections, and conduct an electrical continuity test. Replace the cable if the results of the test are no good.
The ”Device Setup Error” is displayed.	The PC model setting does not match.	Match ”PLC Model” on the ”Configuration” – [PLC Setting] page of the NTH Screen Data Converter with the actually connected PC.
	A PC address (word, bit) outside the communication range is allocated.	Correctly set the allocated words and bits referring to the descriptions for each of the elements in Section 4 ”NTH25/NTH25C Functions” and ”Appendix H PC Memory Map”, page 321.
	An area classification outside of the NTH25/NTH25C range is specified.	Correctly set the allocated words and bits referring to the descriptions for each of the elements in Section 4 ”NTH25/NTH25C Functions” and ”Appendix H PC Memory Map”, page 321.
Display elements that were supposed to have been created in the Support Tool are not displayed, or displayed is not as intended.	The data placed by the Support Tool is partially deleted or changed during data conversion by the NTH Screen Data Converter due to functional restrictions specific to the NTH25/NTH25C.	Check the restrictions relating to elements that can be displayed on the NTH25/NTH25C referring to Section 4 ”NTH25/NTH25C Functions”, and correct the screen data.

4. When communications with the host are not successful

Symptoms	Cause	Remedy
Cannot communicate with the host Example) – The "No Reply from Host" message is displayed. – Communications error message is displayed during communications with the host.	The "Configuration" – [Communication] page setting on the NTH Screen Data Converter is not matching.	Check the "Configuration" – [Communication] page on the NTH Screen Data Converter, and match the communications protocol settings for the host and NTH25/NTH25C. (See "[Communication] page", page 262.)
	The NTH25/NTH25C and host are not correctly connected.	Check that the type, length, and installation of the connector cable match the specifications. (See 2–5 "Connecting to the Host", page 40.)
	The PC communications port setting does not match.	Make sure that the communications port setting matches the communications setup (communications type, communications conditions) on the NTH25/NTH25C using the PC peripheral tool. (See 2–5 "Connecting to the Host", page 40.)
	The power to the NTH25/NTH25C, RS–232C/RS–422A conversion unit or host is OFF.	Check the power supply.
Cannot communicate by the memory link.	An attempt is being made to communicate by the NT series memory link protocol.	The NTH25/NTH25C memory link differs from the memory link of other NT series PTs in its communications method and commands. Create a program for the NTH25/NTH25C.
The touch panel and function switches do not respond.	Communications is unstable due to external noise	Carry out grounding work in accordance with the conditions by referring to "Grounding" (page 35). Also, adopt electrical noise countermeasures, for example, by separating the power lead and signal leads.
	The touch panel and function switches are broken.	Contact your OMRON service center.
	Touch switches and function switches are not allocated to the host.	Allocate the touch switches and function switches to the host. Allocate touch switches using the Support Tool, and allocate function switches using the NTH Screen Data Converter.
The PC mode has changed to the monitor mode.	The NTH25/NTH25C changes the mode when host link communications is used.	This is an NTH25/NTH25C specification. When using a PC that can also be connected using the NT link method, use an NT link connection (The mode is not changed with the NT link method).
Updating of numerals and text is delayed.	Communications is unstable due to external noise	Carry out grounding work in accordance with the conditions by referring to "Grounding", page 37. Also, adopt electrical noise countermeasures, for example, by separating the power lead and signal leads.
	There are too many numeral/text displays on the displayed screen.	Reduce the number of numeral/string displays on the screen for which updating is delayed.
	The cycle time is extended due to heavy processing at the host.	Shorten the host cycle time.
The "No Reply from Host" message is displayed from time to time during normal operation.	Communications is unstable due to external noise	Carry out grounding work in accordance with the conditions by referring to "Grounding" (page 37). Also, adopt electrical noise countermeasures, for example, by separating the power lead and signal leads.
The display is not switched from the initial screen even if switching of the display screen is instructed on the host. Or, there is no display.	Communications conditions between the NTH25/NTH25C and host do not match.	Make sure that the host's communications speed, stop bit length, data length and parity settings match the settings on the NTH25/NTH25C set on the NTH Screen Data Converter.
	The screen number specified in the PT status control area is not BCD.	Specify the screen number in BCD.
	A screen number to which screen data is not registered is specified.	There is no display on the NTH25/NTH25C if you specify a screen number to which no elements have been registered. Specify the correct screen number.

Symptoms	Cause	Remedy
The ”Data Communications Error” message is displayed.	Faulty communications cable connection	Check the cable connections, and conduct an electrical continuity test. Replace the cable if the results of the test are no good.
	Transmission of screen data was canceled on the NTH Screen Data Converter.	Do not press the right mouse button (pause data transmission) on the NTH Screen Data Converter (computer) during transmission of screen data.
The ”Device Setup Error” is displayed.	The PC model setting does not match.	Match ”PLC Model” on the ”Configuration” – [PLC Setting] page of the NTH Screen Data Converter with the actually connected PC.
	A PC address (word, bit) outside the communication range is allocated.	Correctly set the allocated words and bits referring to the descriptions for each of the elements in Section 4 ”NTH25/NTH25C Functions” and ”Appendix H PC Memory Map”, page 321.
	An area classification outside of the NTH25/NTH25C range is specified.	Correctly set the allocated words and bits referring to the descriptions for each of the elements in Section 4 ”NTH25/NTH25C Functions” and ”Appendix H PC Memory Map”, page 321.

5. When screen display or functions are abnormal

Symptoms	Cause	Remedy
The touch panel and function switches do not respond.	Communications is unstable due to external noise	Carry out grounding work in accordance with the conditions by referring to ”Grounding” (page 37). Also, adopt electrical noise countermeasures, for example, by separating the power lead and signal leads.
	The touch panel and function switches are broken.	Contact your OMRON service center.
	Touch switches and function switches are not allocated to the host.	Allocate the touch switches and function switches to the host. Allocate touch switches using the Support Tool, and allocate function switches using the NTH Screen Data Converter.
The graph display does not change.	Either of percentage display settings 0% or 100% is incorrect.	Set the 0, and 100% values in the following relationship: 0% value < 100% value
The trend graph display does not agree with the actual time axis.	The cycle for graph display update processing is longer than the set sampling cycle.	Delete other display elements on the same screen as the trend graph that are allocated to the host and have a high update frequency. Or, lengthen the sampling cycle.
Updating of numerals and text is delayed.	Communications is unstable due to external noise	Carry out grounding work in accordance with the conditions by referring to ”Grounding”, page 37. Also, adopt electrical noise countermeasures, for example, by separating the power lead and signal leads.
	There are too many numeral/text displays on the displayed screen.	Reduce the number of numeral/string displays on the screen for which updating is delayed.
	The cycle time is extended due to heavy processing at the host.	Shorten the host cycle time.
Display elements that were supposed to have been created in the Support Tool are not displayed, or displayed is not as intended.	The data placed by the Support Tool is partially deleted or changed during data conversion by the NTH Screen Data Converter due to functional restrictions specific to the NTH25/NTH25C.	Check the restrictions relating to elements that can be displayed on the NTH25/NTH25C referring to Section 4 ”NTH25/NTH25C Functions”, and correct the screen data.

Symptoms	Cause	Remedy
The character attribute of the character string display differs from its setting, or the first character is not displayed.	A ladder program for the NT31/NT31C is being used without being corrected for the NTH25/NTH25C on the host.	On the NTH25/NTH25C, the first allocated word of the character string display is used for setting the character string display method. (The size and display attribute set on the Support tool is invalid.) Correct the ladder program.
Cannot input numerals	The upper/lower (max./min.) limit check for numeral input is in effect.	Check the screen data's upper/lower (max./min.) limit check setting for numeral input, and correct it if necessary. (For numeral key type, see page 196; for thumbwheel type, see page 203.)
	Numeral memory table is not allocated to host.	When creating screen data for the NTH25/NTH25C on the Support Tool, be sure to allocate the numeral memory tables to be used to the host.
Window screen does not open	Window control area is not allocated.	Allocate "window control areas" exceeding the number of window screens to be used to the host using the NTH Screen Data Converter.
The display of overlapping elements is strange.	Touch switches are overlapping.	Correct so that touch switches are not overlapping.
Overlapping placed image/library lamps are not displayed correctly.		If image/library lamps are overlappping, display of the last changed image/library lamp takes priority.
The tile spreads over the entire screen when tiling is executed.	The tile border is incomplete.	Draw the tiling border as a solid line and not as a dash or dot–dash.
	Tiled elements are placed on the tile border.	Place the tiled element inside and not on the border.
	The border was drawn after tiling.	Correct the display order on the entire screen so that the tiled element is drawn behind the border.
	The border set in the Support Tool is invalid.	The color of some elements such as a frame display of touch switches sometimes changes. Correct, for example, by drawing the border on the line of a fixed display.
Numeral display elements are not displayed.	Another numeral display element is referencing the same numeral memory table on the same screen.	Multiple numeral display elements are not allowed to reference the same numeral memory table on the same screen. Correct so that a different numeral memory table is referenced.
The alarm list/history does not match the image in the Support Tool.	The alarm list/history specifications differ between the NT31/NT31C and NTH25/NTH25C.	Check the alarm list/history specifications on the NTH25/NTH25C, and check the image on a PT.
A circular standard lamp is lit square.	The periphery of a circular standard lamp is the same color as the lamp's OFF color.	On the NTH25/NTH25C, change all lamp OFF colors inside the rectangular area enclosing the circle of the standard lamp to ON colors. Change the periphery color or lamp OFF color.

6. When the programming console function is not functioning normally

Symptoms	Cause	Remedy
The programming console function cannot be used.	The communications settings are incorrect.	Set the communications method to "NT link" when using the programming console function.
	A programming console is connected.	It is not possible to use a programming console and the programming console function at the same time. Disconnect the programming console.
	The PC does not support the programming console function.	Not all PCs support the programming console function. Check the model of PC you are using. (See 3–10 "Programming Console Function", page 74.)

7-2 Maintenance of the NTH25/NTH25C

Carry out maintenance work in order to ensure that the NTH25/NTH25C is always in optimum working order.

⚠ WARNING

Do not attempt to take the NTH25/NTH25C apart and do not touch any internal parts while the power is being supplied. Doing so might result in electrical shock.

Caution Continual display of the same pattern for a long time (roughly 24 hours) will result in a residual image forming on the screen. Periodically switch the screen display to prevent residual images from forming.

Spare PT

We recommend preparing a spare NTH25/NTH25C to minimize system downtime in the event of an NTH25/NTH25C failure or if the screen display becomes difficult to read due to deterioration of the display unit.

Backlight

When the backlight in the display dims and it is difficult to view the screen, contact your OMRON service center and we will replace the backlight. (The backlight cannot be replaced by the customer.)

- Guide to backlight replacement

Under normal operating conditions it can be assumed that the backlight will need to be replaced after about 10,000 hours. However, the life of the backlight does varies, particularly, in accordance with the temperature in the environment in which it is used. (For example, use in low temperatures reduces the life of the backlight.) It should be replaced when the display dims and the screen is difficult to view.

7-3 Inspection and Cleaning

Clean and inspect the NTH25/NTH25C regularly to ensure that it is always in optimum working order.

Cleaning Method

When the display becomes dirty, the screen becomes difficult to view. Clean the screen from time to time as follows.

- In daily cleaning, wipe the display with a soft dry cloth. If it is particularly dirty, attempting to remove it by wiping with a dry cloth may damage the front sheet of the unit. In this case, wipe with a damp cloth beforehand.
- If dirt cannot be removed with a dry cloth, wipe the display with a firmly wrung cloth moistened with diluted neutral detergent (2%).
- If rubber or vinyl products such as tape, are left stuck to the display for long periods they may cause dirt stains. If such items are stuck to the display, remove them during cleaning.

Caution Never use volatile solvents such as benzene or paint thinner, or chemical dusters.

Inspection Method

In normal operating environments, inspect the NTH25/NTH25C at intervals of between 6 months and a year. In environments that are extremely hot and humid, or very dusty environments, shorten the inspection interval.

• Items required for inspection

Prepare the following items before starting the inspection:

- Screwdrivers (Philips, flat head)
- Tester (or digital voltmeter)
- Industrial alcohol
- 100% cotton cloth
- Hygrometer (required in some cases)
- Thermometer (required in some cases)
- Synchroscope (required in some cases)

• Points inspected

Inspect the following points to determine whether or not they are within the standard. If they are not, either improve the surrounding environment so that the values fall within the standard, or adjust the NTH25/NTH25C, for example by re-tightening screws.

Point Inspected	Inspection Details	Standard	Inspection Instrument
Power supply voltage	Fluctuation in power supply terminal voltage	Permissible voltage fluctuation range (24 VDC −15% to +10%)	Tester
Ambient environmental conditions	Ambient temperature (temperature inside operation panel)	0 to 50	Thermometer
	Ambient humidity (humidity in the operation panel)	35% to 85% RH	Hygrometer
	Dust	Dust must not be accumulating.	Visual inspection
Mounting site	Connection of connector cables	Connectors must be fully inserted and locked, and not be loose.	Philips screwdriver
	Screws must not be loose.	To be no looseness	Philips screwdriver
	State of external connector cables	Faults such as incipient disconnection	Visual inspection
Components with limited lives	Brightness of the backlight	Must be sufficiently bright. Backlight life (room temperature and humidity): Brightness is halved after about 10,000 hours in use.	Visual inspection

Caution

- Do not disassemble for repairs or modification.
- Disposal of the NTH25/NTH25C (including the backlight) may be regulated by national or local authorities. Dispose the NTH25/NTH25C (including the backlight) in accordance with the laws and regulations of the relevant country and local authority.

Reference

Request When Replacing the NTH25/NTH25C

When replacing the NTH25/NTH25C after discovering a fault during inspections, note the following points:

- Be sure to switch the power OFF before starting replacement.
- After replacement, check that the new NTH25/NTH25C is free of errors.
- If a faulty NTH25/NTH25C is returned for repairs, write as detailed a description of the fault as possible and send this description together with the NTH25/NTH25C to the OMRON address indicated on the back cover of this book.

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APPENDIX A

Specifications

General Specifications

Item			Specification	
Rated power supply voltage			24 V(DC)	
Allowable power supply voltage range			20.4 V(DC) to 26.4 V(DC) (24 V(DC) −15% to +10%)	
Allowable power interruption time			No regulation	
Power consumption			15 W max	
Operating ambient temperature			0 to +50	
Storage ambient temperature			−20 to +60 (with no icing)	
Operating ambient humidity			35 to 85% RH (with no condensation)	
Operating environment			No corrosive gases	
Dielectric strength			1000 V(AC) for 1 minute (between power terminal and FG)	
Noise resistance			Noise voltage: 1000 Vp-p (across power supply terminals and panel) Pulse width of 100 ns to 1 μs (by noise simulator)	
Vibration resistance (operating)			10 to 57 Hz with 0.075 mm amplitude 57 to 150 Hz with 9.8 m/s^2 acceleration for 60 minutes in each of X, Y, Z directions	
Dimensions			205 (W) x 140 (H) x 71.2 (D) mm (excluding cables)	
Weight			0.7 kg max (excluding cables), 1.2 kg max (including cables)	
Enclosure ratings			Equivalent to IP65 dust-proof/drip-proof structure or equivalent*	
Applicable EC directives or standards	EC directives		EMC directive 89/336/EEC, 92/31/EEC Low voltage directive 73/23/EEC	
		Standards	EMI	EN50081-2: 1993
			EMS	EN61131-2: 1995
			Electrical safety	EN61131-2: 1995

* The NTH25/NTH25C may not be used at a location where it is exposed to splashing oil for a long period.

Performance Specifications

Display Specifications

Item	Specification	
Display panel	Display device	NTH25: Monocrome STN LCD (with backlight) NTH25C: Color STN LCD (with backlight)
	Number of dots (resolution)	320 dots horizontally x 240 dots vertically
	Size of a double-width character	4.8 mm
	Effective display area (H) x (V)	96 x 72 (4.7 inches)
	View angle	NTH25: Up: 30° Down: 20° Left/right: ±30° NTH25C: Up: 30° Down: 30° Left/right: ±50°
	Display color	NTH25: Black, white (2 colors) NTH25C: 8 colors (and intermediate colors can be displayed with tiling patterns)
	Life expectancy (until contrast is reduced by half)	50,000 hours minimum
	Contrast adjustment	Adjustable in 3 levels by operation at the touch panel
Backlight (white cold cathode tube)	Life expectancy*	10,000 minimum
	Replacement	Not possible
Indicators	POWER (green LED)	Lit while power is being supplied
	+ (green LED)	Switched between alternate and momentary by settings on NTH Screen Data Converter.
	- (green LED)	

* Time taken for brightness to reduce to half at normal temperature and humidity

Panel Specifications

Item	Specification
Touch panel	Type: Resistive type
	Number of switches: 192 (16 horizontally x 12 vertically) Maximum number that can be registered to one screen: 192
	Cell size: 6 x 6 mm
	Input: Pressure-sensitive type
	Operating force: 1 N minimum
	Life expectancy: 1 million operations minimum
Function switch	No. of switches: 13
Push lock switch	No. of switches: 1

External Interface Specifications

Item	Specification
Serial interface	Conforms to EIA RS−232C D−SUB 9−pin connector (female)
Operation output	Open collector (sink type) 12 to 24 V(DC) 50 mA
Emergency stop output	Normally closed condition (1 circuit output) 24 V(DC) 1A, positive opening operation IEC60947−5−1 compliant

Programming environment

Item	Specification
Programming System	Programming support software
Programming Tool	• Programming support software NT−series Support Tool for Windows 95/98 (Ver. 3.0), made by OMRON NTH Screen Data Converter, made by OMRON • Personal Computer Use a personal computer which can run Microsoft Windows 95 or 98 RAM: At least 32 MB Free area in hard disk: At least 25 MB for Support Tool (To install sample collection, more 12 MB is required.) At least 5 MB for NTH Screen Data Converter Input device: Keyboard, mouse Communication port: At least one RS−232C capable of 38.400 bps communications must be free on ports COM1 to 4

Display Specifications

Item			Specification
Display elements	Text data (fixed display)		Fixed character data (character strings registered to each screen) Maximum combined total with other fixed display elements of 65535 per screen (same applies to window screens)
	Character string displays		Up to 50 per screen (not possible for window screens) (40 bytes per string)
	Numeral displays		Up to 120 per screen (not possible for window screens), max. 8-digit display
	Mark displays (fixed display)		Up to 65535 per screen (same applies to window screens)
	Bar graph displays		Up to 30 per screen (not possible for window screens)
	Trend graphs		Eight lines per frame, one frame per screen (not possible for window screens) With the data logging function: 40 graphs per screen data file
	Graphic displays (fixed display)		Can be displayed wherever required Maximum combined total with other fixed display elements of 65535 per screen (same applies to window screens)
	Standard lamps		Up to 64 per screen (not possible for window screens) 64000 lamps per screen data file
	Image/library lamps		Up to 64 per screen (not possible for window screens) 12800 lamps per screen data file (Note, however, that screen numbers 201 onwards cannot be used.)
	Touch switches		Up to 192 per screen (same applies to window screens)
	Image data		Up to 64 per screen (not possible for window screens)
	Library data		Up to 256 per screen (not possible for window screens)
	Numeral inputs	Numeral key type	Total of 80 numeral key types and thumbwheel types per screen (Only one numeral key type numeral input can be registered to one window screen.)
		Thumbwheel type	
	Alarm lists		One alarm list or alarm history group per screen (not possible for window screens)
	Alarm histories		
Screen types	Standard screen		The standard screen display
	Window screens		Only one window screen can be displayed at the same time. Fixed display elements, touch switches and numeral input field (only one numeric type) can be registered.
Screen attributes			Keyboard screen number
Number of screens	Max. number of registered screens		1000 screens
	Screen number		0: No display 1 to 1000: User registered screens 9020: Programming console function screen
Screen registration method			By transmitting screen data created using the Support Tool to the NTH25/NTH25C by the NTH Screen Data Converter
Screen saving method			Flash memory (screen data memory in the PT)

Display Element Specifications

Item	Specification
Display characters	– Standard characters (8 x 16): Alphanumeric and symbols – Marks (16 x 16 dots): User–defined pictographs
Character enlargement function	Wide, high, 2 x 2, 4 x 4, 8 x 8
Character display attributes	Standard, flash, inverse flash, transparent
Image data	Pictographs composed of dots Size: One of 32 x 32, 32 x 64, 64 x 64 or 128 x 64 dots (according to code) Enlarged display and display attributes such as inverse and flash cannot be set.
Library data	Combinations of any graphics Size: Min. 1 x 1 dots, max. 320 x 240 dots (Any size can be set within this range.) Enlarged display and display attributes such as inverse and flash are implemented according to the setting registered.
Graphics	Polyline, circle, arc, sector, rectangle, polygon
Line type	4 types only for polylines (solid line, broken line, dot–dash, dot–dot–dash)
Tiling	7 types
Graphic display attributes	Standard, inverse, flash, inverse flash
Display colors	NTH25: 2 colors (black, white) NTH25C: 8 colors (black, blue, red, magenta, green, cyan, yellow, white)
Color specification	Foreground color, background color

Special Features

Item	Specification
Maintenance function	– Registered screen data test display function
Data retention	– Alarm history data – Clock data setting The period of time the data can be retained is not guaranteed since the data is backed up not by a battery but by a capacitor. (2 or 3 days)
Calendar and clock function	– Displays the current date and time in accordance with the built–in clock – Displayed and set with ”Clock Setting” in the ”CHECK” menu
Programming console function	Executes functions equivalent to those of a programming console (model C200H–PRO27–E) with C series CPM1, CPM1A, CQM1 (–EV1 only), C200HX/HG/HE(–Z)E, and SRM1 (C02–V1 only).
Screen data transmission functions	Function for receiving screen data from the NTH Screen Data Converter

Communications Specifications

S For a Host Link

Item	Specification
Communications standard	EIA RS–232C
Communications settings	Start–stop synchronization Communications speed: 1200, 2400, 4800, 9600, 19200 bps Data length: 7, 8 bits Stop bit: 1, 2 bits Parity: Even, odd, none
Connector	9–pin D–SUB connector (female)
Number of units connected	1:1
Transmission distance	Max. 15 m*
Communications protocol	C–series SYSWAY (1:N)

* When using an NT–AL001, the specifications are as follows:
- RS–232C cable: Max. 2 m
- RS–422A cable: Total length 500 m max.

S For an NT Link

Item	Specification
Communications standard	EIA RS–232C
Connector	9–pin D–SUB connector (female)
Number of units connected	1:1
Transmission distance	Max. 15 m*

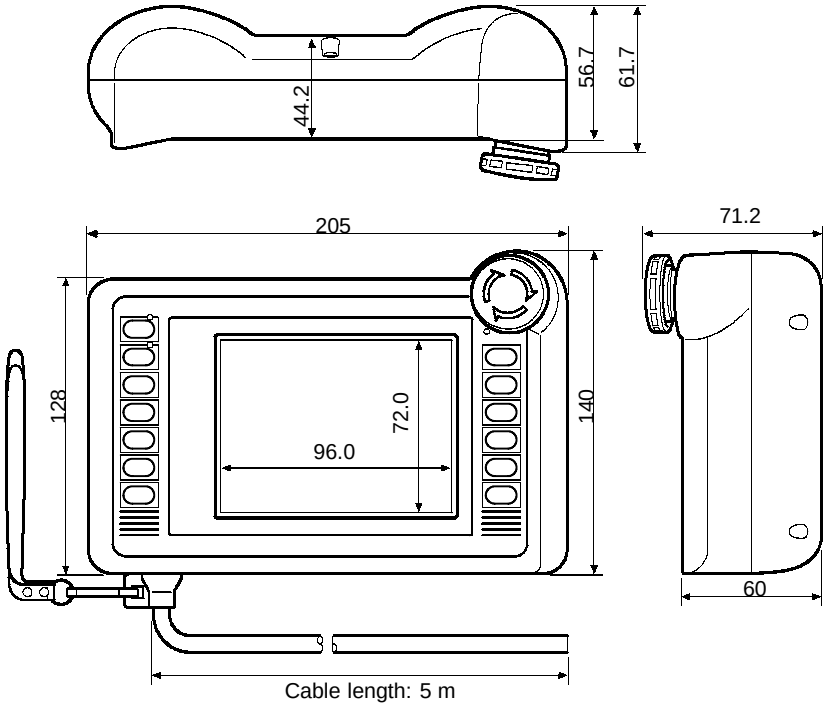
* When using an NT–AL001, the specifications are as follows:
- RS–232C cable: Max. 2 m
- RS–422A cable: Total length 500 m max.

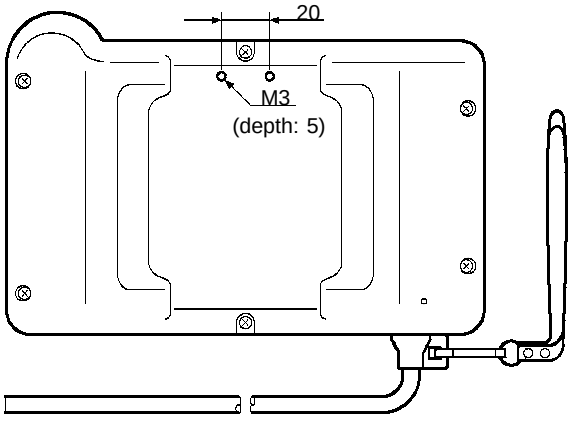
S For a Memory Link (RS–232C Type)

Item	Specification
Communications standard	EIA RS–232C
Communications settings	Start–stop synchronization Communications speed: 1200, 2400, 4800, 9600, 19200 bps Data length: 7, 8 bits Stop bit: 1, 2 bits Parity: None, even, odd
Connector	9–pin D–SUB connector (female)
Number of units connected	1:1
Transmission distance	Max. 15 m
Communications protocol	Memory link (NTH)

APPENDIX B

Dimensions





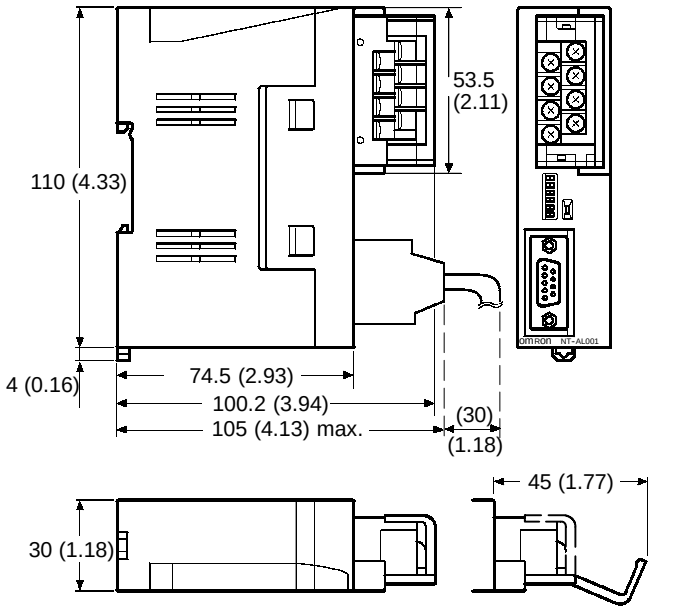
Unit: mm

APPENDIX C

Using an RS-232C/RS-422A Converter Unit

This appendix outlines the external dimensions, procedure for mounting and removal, and specifications of the RS-232C/RS-422A converter unit (NT-AL001). Refer to this information when designing the control panel. For details, refer to the instruction manual supplied with the NT-AL001.

Dimensions



Units: mm (inch)

30 (W) × 114 (H) × 100.2 (D) mm: with the RS-422A terminal block cover closed

30 (W) × 114 (H) × 119.5 (D) mm: with the RS-422A terminal block cover open

Methods for Mounting and Removal

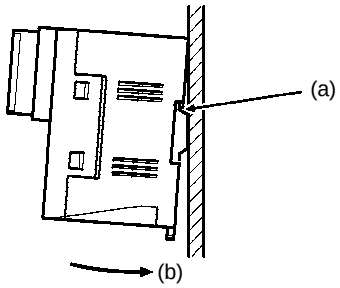
The RS-232/RS-422 convertor unit (NT-AL001) can be mounted on a DIN rail or in an operation panel.

The RS-422A terminal block of the convertor unit can be easily removed.

Mounting to a DIN Rail

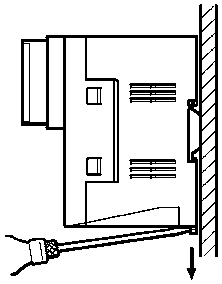
Latch the top part of the rear face of the convertor unit ("a" in the figure) onto the top edge of the DIN rail, and push the unit in the direction indicated by "b" in the figure.

Now fit end plates at the right and left of the convertor unit to secure it and ensure that it cannot shift laterally.



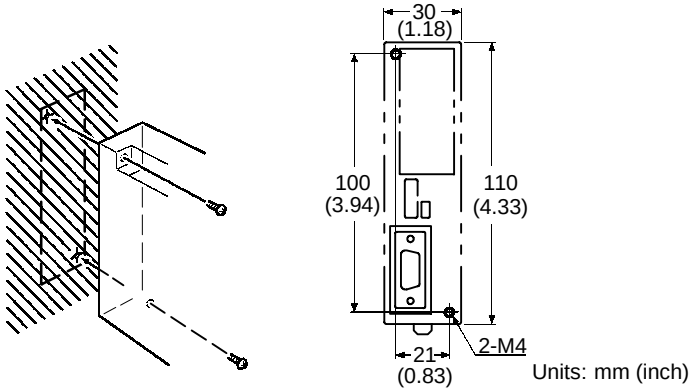
Removal from a DIN Rail

Remove the end plates at right and left of the convertor unit and, as shown in the figure below, insert a flat blade screwdriver into the rail stopper at the bottom face of the convertor unit and prize it free.



Mounting to an Operation Panel

Drill two mounting screw holes in an operation panel with a thickness of at least 2 mm (0.08 inch) and secure the convertor unit with screws.



Notice In order to ensure a secure and strong mount, mount the convertor unit in an operation panel with a thickness of at least 2 mm (0.08 inch).

Specifications

The general specifications and communications specifications of the convertor unit are shown below.

General Specifications

Item	Specification
Dimensions	30 (W) × 114 (H) × 100.2 (D) mm: with the RS-422A terminal block cover closed 30 (W) × 114 (H) × 119.5 (D) mm: with the RS-422A terminal block cover open
Weight	200 g max.
Operating ambient temperature	0 to 55_C
Operating ambient humidity	10 to 90% RH (with no condensation)
Rated power supply voltage	+5 V(DC) ± 10% (using pin No. 6 of the RS-232C connector)
Rated power supply current	150 mA max.
Rush current	0.8 A max.
Insulation resistance	20 MΩ or higher, measured between all RS-422A terminal signal lines collectively and functional ground terminal with a 500 V(DC) megger
Dielectric strength	1500 V(AC) for 1 minute between all RS-422A terminal signal lines collectively and functional ground terminal Leakage current: 10 mA max.
Operating environment	No corrosive gases
Storage ambient temperature	–20 to +75_C
Vibration resistance	60 minutes in each of X, Y, and Z directions
Shock resistance	47m/s^2, 3 times in each of X, Y, and Z directions

Communications Specifications

S RS-232C Interface

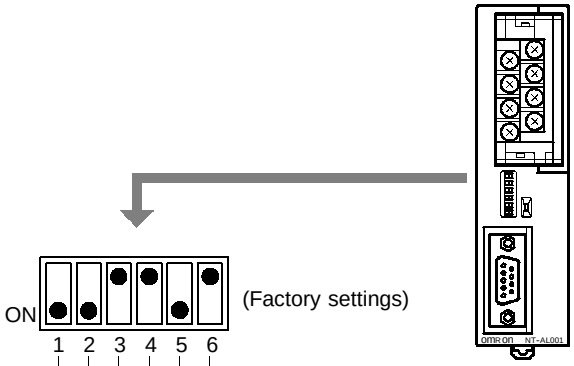
Item	Specification
Communications speed	Max. 64k bps
Transmission distance	Max. 2 m
Connector	9-pin D-SUB connector (female)

S RS-422A/485 Interface

Item	Specification
Communications speed	Max. 64k bps (depends on the RS-232C communications speed)
Transmission distance	Max. 500 m
Connector	8-terminal detachable terminal block, M3.0

DIP Switch Settings

The convertor unit has 6 digits DIP switch for setting the RS-422A/485 communication conditions.
Before connecting the cable to the convertor unit, make the DIP switch settings.



[SW1-1] Not used (always ON)

[SW1-2] Setting for built-in terminal resistance
- OFF Terminator not set
- ON Terminator set

[SW1-3, 4] Selection of 2-wire type/4-wire type

	SW1-3	SW1-4	
OFF / ON	ON	OFF	2-wire type (RS-485)
OFF / ON	OFF	ON	4-wire type (RS-422A)

[SW1-5, 6] Selection of the RS-422A send mode

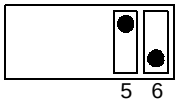
	SW1-5	SW1-6	
OFF / ON	OFF	OFF	Continual sending
OFF / ON	ON	OFF	Complies with CS control of RS-232C (Data sent at CS “H”)
OFF / ON	OFF	ON	Complies with CS control of RS-232C (Data sent at CS “L”)

When using the host link or NT link (1:1), set the RS-422A send mode to “continual sending” (set both SW1-5 and 6 “OFF”).

When using the NT link (1:N), set the RS-422A send mode to “complies with CS control of RS-232C” (i.e., one of SW1-5 and SW1-6 must be ON).

Caution

- Do not set both SW1-5 and SW1-6 ON at the same time. This may damage internal circuits.
- The power supply to the device supplying +5 V must be turned OFF before starting wiring work.
- Before connecting the RS-232C cable and turning on the power to an RS-232C device such as a PT (i.e., turning on the power to the convertor unit), check that the cable is wired correctly and that the DIP switch settings are correct. If the power is turned on while there is a wiring fault, the internal circuits of the convertor unit or the RS-232C device may be damaged.
- When the convertor unit is connected to a C200HX/HG/HE (-ZE) model of OMRON PC as an RS-422A device, set DIP switches SW1-5 and SW1-6 as indicated below.



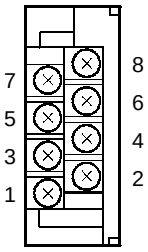
SW1-5 OFF SW1-6 ON

Pin Arrangement

The convertor unit has a terminal block for an RS-422A/485 interface connection and a connector for an RS-232C interface connection.

The pin arrangements for the RS-422A/485 terminal block and the RS-232C connector are as follows.

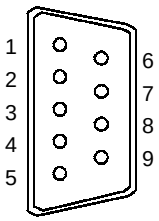
RS-422A/485 Terminal Block



Terminal block pin No.	Signal name	Abbreviation	Signal direction (convertor unit ⇔ RS-422 device)
8	Request to send (–)	CSA	→
7	Request to send (+)	CSB	→
6	Receive data (–)	RDA	←
5	Receive data (+)	RDB	←
4	Send data (–)	SDA	→
3	Send data (+)	SDB	→
2	Signal ground	SG (GND)	–
1	Functional ground		–

* The CSB and CSA signals are for specialized applications.

RS-232C Connector

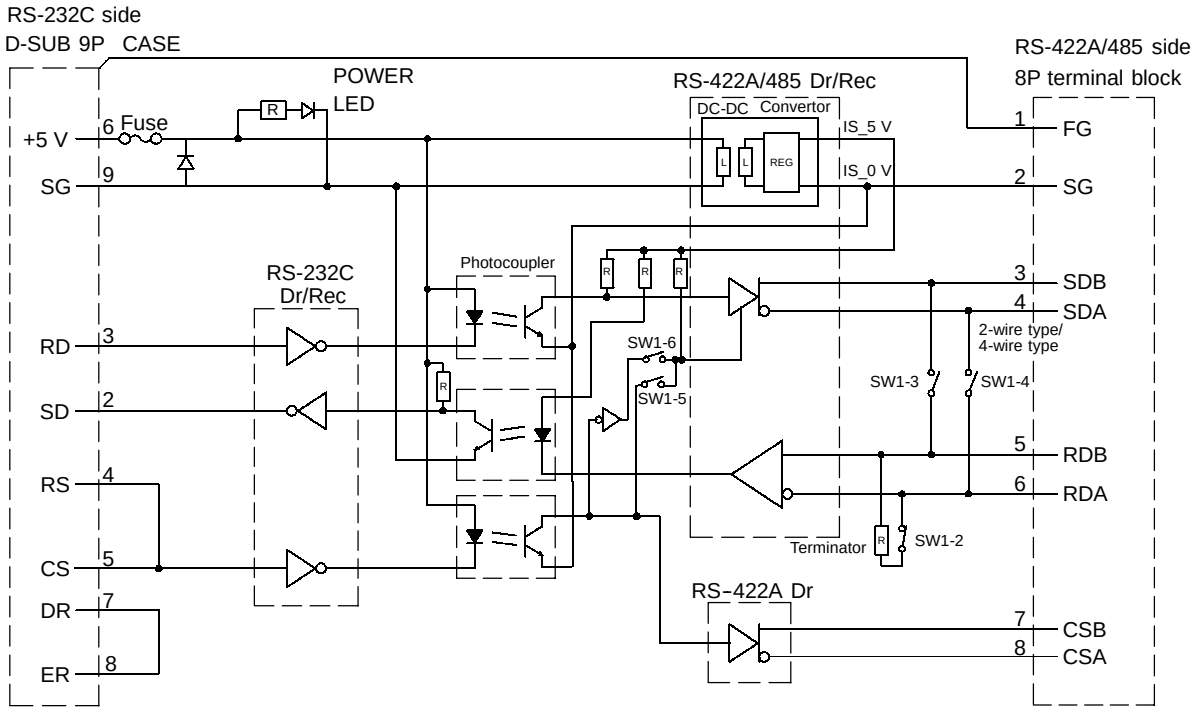


Connector pin No.	Signal name	Abbreviation	Signal direction (convertor unit ⇔ RS-232C device)
1	Not used	–	–
2	Send data	SD	←
3	Receive data	RD	→
4	Request to send (shorted to CS internally)	RS	←
5	Clear to send (shorted to RS internally)	CS	→
6	+5 V (150 mA) input for convertor unit	+5 V	→
7	Data set ready (shorted to ER internally)	DR	→
8	Data terminal ready (shorted to DR internally)	ER	←
9	Signal ground	SG	–

* The hood is connected to the functional ground terminal of the RS-422A terminal block.

Block Diagram

A diagram showing the internal blocks of the convertor unit is shown below. Refer to this diagram when making cables yourself, or when connecting devices with special interfaces.



APPENDIX D

Transporting and Storing the NTH25/NTH25C

- When transporting the NTH25/NTH25C, use the packaging intended for it.
- When storing the NTH25/NTH25C, observe the following conditions.

Storage ambient temperature: –20 to +60_C
Storage ambient humidity: 35 to 85% RH

APPENDIX E

Making the Cable

The procedure for making up the cable (PC connector cable, tool connector cable) yourself is described below.

Also refer to this procedure for making a connecting cable for use with RS-422A/485 type connections.

Cable Preparation

The preparation of the cable differs according to whether or not the shielding wire is to be connected to the FG.

S Cable with shielding wire connected to FG

(1) Cut the cable to the required length.

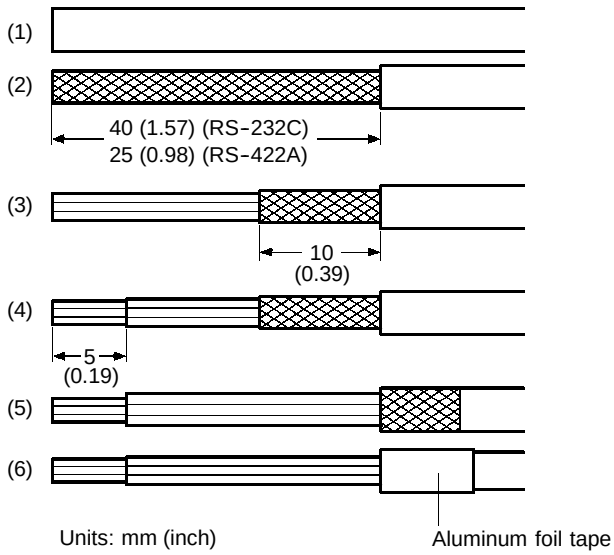
(2) Remove the external vinyl insulation from the cable with a razor blade. Take care not to damage the shielding underneath.

(3) Cut back the shielding wire with scissors.

(4) Use wire strippers to strip the insulation from each wire.

(5) Fold back the shielding wire.

(6) Wrap aluminum foil tape around the folded-back shielding wire.



S Cable with shielding wire not connected to FG

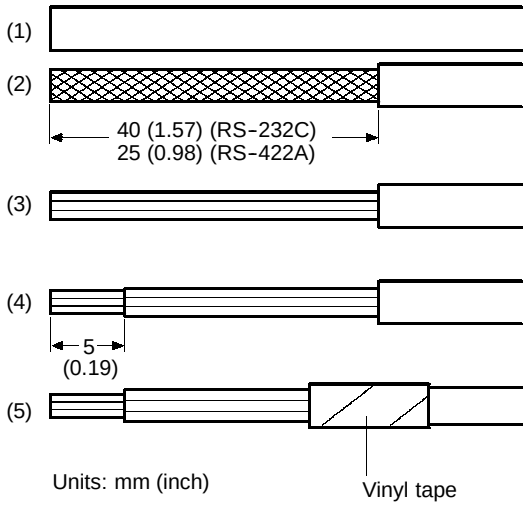
(1) Cut the cable to the required length.

(2) Remove the external vinyl insulation from the cable with a razor blade. Take care not to damage the shielding underneath.

(3) Cut back the shielding wire with scissors.

(4) Use wire strippers to strip the insulation from each wire.

(5) Wrap vinyl tape over the cut off end of the shielding wire.

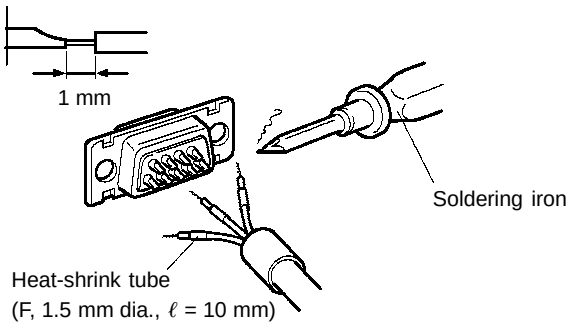


Soldering

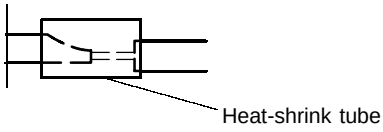
(1) Slide heat-shrink tube over each wire.

(2) Pre-solder each wire and connector terminal.

(3) Solder each wire to each connector terminal.

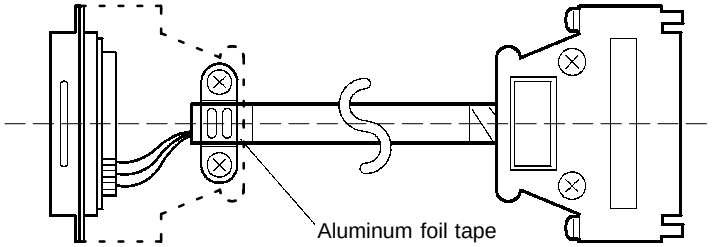


(4) Push the heat shrink tube over the soldered joint and heat the tube to shrink it in place.



Hood Assembly

Assemble the connector hood as shown below.



APPENDIX F

Differences with NT31/NT31C Screen Data

NTH25/NTH25C screen data is not completely compatible with screen data for the NT31/NT31C. So, NT31/NT31C screen data must be partially corrected so that it can be used on the NTH25/NTH25C.
This appendix mainly describes the differences in the Support Tool settings.

System Setting (PT Configuration)

Items		NTH25/NTH25C	NT31/NT31C
Initial Screen		1 to 1000	1 to 3999
Buzzer	Tone	(not supported)	Set on PT
	Key Input	(user settable functions not provided)	Set on PT
Resume Function		(not supported)	Set on PT
Backlight OFF		Backlight OFF function *1 (set on NTH Screen Data Converter)	Screen saver function *1 (set on PT)
Number of Table Entries-Numeral Table		(non-existent)	512, 1000, 2000
Number of Table Entries-String Table		(non-existent)	256, 1000, 2000
Number of Table Entries-Bit Memory Table		(non-existent)	250, 1000
Printer for PT	Printer	(cannot be connected)	
History Setting	Alarm	(fixed in latest order)	
	Screen	(not supported)	
Numeral Storage Type			
DAC Function		*2	*2

*1 The backlight OFF function is only for turning OFF the backlight. If the "screen saver function" is used, it is possible to display any string at a desired position in predetermined intervals in addition to turning OFF the screen/backlight.

*2 The programming console function is provided as standard on NTH25, NTH25C, NT31 and NT31C.

Data Transmission (Download/Upload)

Items		NTH25/NTH25C	NT31/NT31C
Download/Upload	Application		
	Screen		
	Direct Access Information		
	System Memory		
	Table		
Get History Log	Screen History		
	Alarm History		
Data and Time			

On the NTH25/NTH25C, downloading (transmitting) of screen data is performed from the NTH Screen Data Converter. Only downloading of application is possible, and uploading (receiving) of screen data in the NTH25/NTH25C cannot be performed.

Image Data, Library Data, and Marks

Items		NTH25/NTH25C	NT31/NT31C
Image	Total No.	Max. 30	Max. 4095
	Code	0001 to 001E Hex	0001 to 0FFF Hex
	Size	Determined by code (width x height: min. 32 x 32 to max. 128 x 64)	Any size in multiples of eight in both horizontal and vertical directions.
	Comp.	(Compression must be set to OFF.)	
	Comment		
Library	Total No.	Max. 3980	Max. 12288
	Code	1000 to 1F8B Hex	1000 to 3FFF Hex
	Comment		
Mark	Total No.	Max. 100	Max. 224
	Code	FF20 to FF72 Hex	FF20 to FFFF Hex
	Insert in Character String		

For details on the element properties of image, library and mark data, see ”Elements” (page 306).

Memory Tables

Items		NTH25/NTH25C	NT31/NT31C
Table-Numeral	No.	(non-existent)	512, 1000, 2000
	Value		
	Initial		
	Words	(determined by number of display digits of numeral displays and numeral inputs)	
	PC (PLC) Address		
	I/O Comment		
Table-String	No.	(non-existent)	256, 1000, 2000
	Value	(used only as alarm messages)	
	Initial		
	Words	(fixed to 21 channels)	
	PC (PLC) Address		
	I/O Comment		
Table-Bit Memory	No.	(non-existent)	256, 1000
	History	(sampled at all times)	
	String Table Entry	(fixed to 240)	
	Color	NTH25: NTH25C: (Only the setting of bit memory table number 0 is valid.)	NT31: NT31C:
	Image/Library Code	(image/library data cannot be displayed)	
	Switch Screen	(not supported)	
	Screen No.	(not supported)	
	PC (PLC) Address	(Only the setting of bit memory table number 0 is valid.)	
	I/O Comment		
Table-Extended I/O Input	No.		
	Cancel Backlight OFF		
	Function		
	Description		
Table-Extended I/O Output	No.		
	PC (PLC) Address		
	I/O Comment		
Table-I/O Comments	Total No.	3000	3000
	PC (PLC) Address		
	I/O Comments		

Screens

Items	NTH25/NTH25C	NT31/NT31C
Screen Size (Dots)	320 x 240	320 x 240
Max. No. of Screen	1000	3999
Standard Screen No.	1 to 1000	1 to 3999
Parent Screen No.		1 to 3999
Keyboard Screen No.	1 to 1000	1 to 3999
Extended Screen No.		
Occurrence History Screen No.		9001 (display only)
Frequency History Screen No.		9002 (display only)
Host Connect Screen (System Initializing Screen)	(Initial screen is displayed when connected to the host.)	9000

Screen Properties

Items		NTH25/NTH25C	NT31/NT31C
Buzzer		(user settable buzzer function not supported)	None, continuous, long, short
History		(screen display history function not supported)	
System Keypad			
Backlight	Type	(always lit)	
	Color		
Color–Background			NT31: NT31C:

Elements

Items		NTH25/NTH25C	NT31/NT31C
Alarm	Max. No. per screen	Max. 4	Max. 1
	Alarm List Start Bit Table Entry	(fixed to bit memory table number 0)	
	Alarm List No. of Bits Referenced	(fixed to 240)	
	Alarm History order of frequency/order of occurrence	(fixed to order of occurrence)	
	Alarm History History Info	(date of occurrence always displayed)	
	Alarm History Info Type	(fixed to Month/Day Hour:Minute)	
	Message–Display Line Qty	1 to 8	1 to 12
	Message–Length	1 to 39	1 to 39

Items		NTH25/NTH25C	NT31/NT31C
Alarm	Message–Smoothing	(fixed to No Smoothing)	
	Message–Scale	(fixed to Equal)	
	Display ImageLib	(image/library data cannot be displayed)	
	Color–Frame	(displays at OFF color)	NT31: NT31C:
	Color–Background–ON	(displays at OFF color)	NT31: NT31C:
	Color–Background–OFF	NTH25: NTH25C:	NT31: NT31C:
	Image & Library–Color–Foreground	(image/library data cannot be displayed)	NT31: NT31C:
	Image & Library–Color–Background	(image/library data cannot be displayed)	NT31: NT31C:
	Line Scroll Touch Switch		
	Page Scroll Touch Switch		
Standard Lamp	Max. No. per screen	Max. 64 (total of standard lamps and image/library lamps)	Max. 256 (total of standard lamps and image/library lamps)
	Max. No. in one screen data file	No limit	No limit
	Shape–Rectangle		
	Shape–Circle		
	Shape–Polygon	(displayed as rectangle)	
	Shape–Sector	(displayed as circle)	
	Frame		
	Color–Frame		NT31: NT31C:
	Lamp Attribute		
	Color–ON	NTH25: NTH25C:	NT31: NT31C:
	Color–OFF	NTH25: NTH25C: (”Transparent” is displayed as ”White” on the NTH25 and ”Black” on the NTH25C.)	NT31: NT31C:
	Label–Max. No. of characters	Max. 40	Max. 40
	Label–Font Type	(”Half Height” is displayed as ”Standard”)	
	Label–Scale	(3 x 3 is displayed as 2 x 2)	
	Label–Smoothing	(displays without smoothing)	

Items			NTH25/NTH25C	NT31/NT31C
Standard Lamp	Label–Attribute			
	Label–Color	ON	NTH25: NTH25C:	NT31: NT31C:
		OFF	NTH25: NTH25C:	NT31: NT31C:
	Label–Color–Background		(fixed to ”Transparent”)	(fixed to ”Transparent”)
	Insert Mark			
	Insert Image			
Image Lamp	Max. No. per screen		Max. 64 (total of standard lamps and image/library lamps) (usable only on screen numbers 1 to 200)	Max. 256 (total of standard lamps and image library lamps)
	Max. No. in one screen data file		Max. 12800 (64 x 200 screens)	No limit
	On State–Code			
	OFF State–Code			
Numeral Display	Max. No. per screen		Max. 120	Max. 256
	Indirect Reference			
	Table Entry			
	Display Type– Decimal/Hexadecimal			
	Format–Integer/Decimal		(max. 8 digits including sign and decimal point)	
	Zero Suppression			
	Display Sign		(fixed to ”with sign”)	
	Font Type		(”Half Height” is displayed as ”Standard”. ”Double Width” is displayed as ”Standard” with width doubled.)	
	Scale		(3 x 3 is displayed as 2 x 2)	
	Smoothing		(displays without smoothing)	
	Attribute			
	Color–Foreground		NTH25: NTH25C:	NT31: NT31C:
	Color–Background		NTH25: NTH25C:	NT31: NT31C:

Items	Items	NTH25/NTH25C	NT31/NT31C
String display	Max. No. per screen	Max. 50	Max. 256
	Indirect Reference		
	Table Entry		
	Length	Max. 40	Max. 40
	Font Type	(”Half Height” is displayed as ”Standard”.)	
	Scale	(set at first allocated word)	
	Smoothing	(displays without smoothing)	
	Attribute	(set at first allocated word)	
	Color–Foreground	NTH25: NTH25C:	NT31: NT31C:
	Color–Background	NTH25: NTH25C:	NT31: NT31C:
Data Input–Numeral (Numeric Key Type)	Max. No. per screen	Max. 80 (Total with thumbwheel type)	Max. 256
	Table Entry		
	Display Type–Decimal/Hexadecimal		
	Limit–Maximum		
	Limit–Minimum		
	Format–Integer/Decimal	(max. 8 digits including decimal point)	
	Zero Suppression		
	Display Sign	(Minus numbers cannot be input.)	
	Font Type	(”Half Height” is displayed as ”Standard”. ”Double Width” is displayed as ”Standard” with width doubled.)	
	Scale	(3 x 3 is displayed as 2 x 2)	
	Smoothing	(displays without smoothing)	
	Attribute		
	Color–Foreground	NTH25: NTH25C:	NT31: NT31C:
	Color–Background	NTH25: NTH25C:	NT31: NT31C:
	Focus Frame	(displays without cursor)	
	Focus Attribute	(displays without cursor)	

Items	Items		NTH25/NTH25C	NT31/NT31C
Data Input–String	Table Entry			
	Length			(40)
	Font Type			
	Scale			
	Smoothing			
	Attribute			
	Color–Foreground			NT31: NT31C:
	Color–Background			NT31: NT31C:
	Focus Frame			
	Focus Attribute			
Data Input–Numeral (Thumbwheel Type)	Max. No. per screen		Max. 64	Max. 64
	Table Entry			
	Display Type–Decimal/Hexadecimal		(8 digits including decimal point)	
	Limit–Maximum			
	Limit–Minimum			
	Display Sign		(Minus signs cannot be input.)	
	Attribute			
	Scale		(Shape differs slightly with NT31/NT31C.)	
	End Plate			
	Character Color–Foreground		NTH25: NTH25C:	NT31: NT31C:
	Character Color–Background		NTH25: NTH25C:	NT31: NT31C:
	Thumbwheel Color–Frame (+,– display color)		NTH25: NTH25C:	NT31: NT31C:
	Thumbwheel Color–Foreground (switch display color)		NTH25: NTH25C:	NT31: NT31C:
	Thumbwheel Color–Background (switch display color)		NTH25: NTH25C:	NT31: NT31C:
Graphic (Fixed Display)	Polyline			
	Rectangle			
	Polygon			
	Circle			
	Arc			
	Sector			
	Color–Foreground	Line Color	NTH25: NTH25C:	NT31: NT31C:

Items	Items		NTH25/NTH25C	NT31/NT31C
Text (Fixed Display)	Max. No. of Characters		Max. 40	Max. 40
	Font Type		("Half Height" is displayed as "Standard".)	
	Scale		(3 x 3 is displayed as 2 x 2)	
	Smoothing		(displays without smoothing)	
	Attribute			
	Color–Foreground		NTH25: NTH25C: ("Transparent" is displayed as "White" on the NTH25 and "Black" on the NTH25C.)	NT31: NT31C:
	Color–Background		NTH25: NTH25C:	NT31: NT31C:
	Insert Mark			
	Insert Image			
Tiling (Fixed Display)	Pattern		("Box", "Grid" and "Border" are displayed as "Uniform".)	
	Color–Foreground		NTH25: NTH25C:	NT31: NT31C:
	Color–Background		NTH25: NTH25C: ("Transparent" is displayed as "White" on the NTH25 and "Black" on the NTH25C.)	NT31: NT31C:
	Color–Border		(displays Foreground color)	NT31: NT31C:
Mark (Fixed Display)	Code		FF20 to FF72 Hex	FF20 to FFFF Hex
	Scale		(3 x 3 is displayed as 2 x 2)	
	Attribute			
	Smoothing		(displays without smoothing)	
	Color–Foreground		NTH25: NTH25C: ("Transparent" is displayed as "White" on the NTH25 and "Black" on the NTH25C.)	NT31: NT31C:
	Color–Background		NTH25: NTH25C:	NT31: NT31C:
Image Display (Fixed Display)				
		Color–Fore ground	(In the 2–Colors mode, displayed as black and white)	NT31: NT31C:
		Color–Back ground	(In the 2–Colors mode, displayed as black and white)	NT31: NT31C:
Library Display (Fixed Display)				

Items	Items	NTH25/NTH25C	NT31/NT31C
Touch Switch	Max. No. per screen	Max. 192 (overlapping of touch switches is not allowed)	Max. 256
	Function–Notify Bit	(On the host link or NT link (1:1), ”Set” and ”Reset” act as ”Momentary” switches, and on the memory link, all act as ”Momentary switches.)	
	Function–Switch Screen		
	Function–Input Key–Control	(Some keys cannot be used.)	
	Function–Input Key–Keyboard	(”Toggle” is operated as ”Open”.)	
	Function–Input Key–String	(not supported)	
	Function–Copy Setting	(no memory table)	
	Function–Cursor Move	(automatically generated for numeral key elements)	
	Function–Screen Print		
	PC (PLC) Bit Address (for lamp function)	(no lamp function)	
	Shape–Standard	(displayed as double frame)	
	Shape–Shadow	(normally displayed as ”double frame”)	
	Shape–3–Dimension	(normally displayed as ”double frame”)	
	Shape–Rectangle	(displayed as fixed display element)	
	Shape–Circle	(displayed as fixed display element)	
	Shape–Polygon	(displayed as fixed display element)	
	Shape–Sector	(displayed as fixed display element)	
	Frame		
	Color–Frame	(displays at OFF color)	NT31: NT31C:
	Show ON State	(valid only when shape is set to ”None” or ”Standard”)	
	Lamp Attribute	(fixed to ON)	
	Color–ON	(displayed at inverse color of ”OFF color”)	NT31: NT31C:
	Color–OFF	NTH25: NTH25C:	NT31: NT31C:
	Max. No. of Characters	40	40

Items	Items	NTH25/NTH25C	NT31/NT31C
Touch Switch	Label–Font Type	(”Half Height” is displayed as ”Standard”.)	
	Label–Scale	(3 x 3 is displayed as 2 x 2)	
	Label–Smoothing	(displays without smoothing)	
	Label–Attribute		
	Label–Color–ON	NTH25: NTH25C:	NT31: NT31C:
	Label–Color–OFF	NTH25: NTH25C:	NT31: NT31C:
	Label–Color–Background	(fixed to Transparent)	(fixed to Transparent)
	Label–Insert Mark		
	Label–Insert Image		
Trend Graph	No. of Displayed Lines in one graph	Max. 8	Max. 50
	No. of Registered Frames in one screen data file	Max. 20	No limit
	No. of Registered Lines in one screen data file	Max. 40 (all subject to data logging function)	No limit (Max. 8 lines subject to data logging function)
	Standard/Pen Reco		
	Drawing Width	2 to 320	2 to 320
	Sampling Cycle	(rounded up to nearest second)	
	Table Entry		
	100%–Table Entry		
	100%–Value	(Minus numbers are treated as 0.)	
	0%–Table Entry		
	0%–Value	(Minus numbers are treated as 0.)	
	–100%–Table Entry	(Minus range cannot be displayed.)	
	–100%–Value	(Minus range cannot be displayed.)	
	Line–Style		
	Line–Color	NTH25: NTH25C:	NT31: NT31C:
	Direction		
	Display Sign	(Minus range cannot be displayed.)	
	Frame	(fixed to With Frame)	
	Color–Frame	NTH25: NTH25C:	NT31: NT31C:

Items	Items	NTH25/NTH25C	NT31/NT31C
Trend Graph	Color– + Range	NTH25: NTH25C:	NT31: NT31C:
	Color– – Range	(Minus range cannot be displayed.)	NT31: NT31C:
	Display %	(% cannot be displayed.)	
	Display %–Font Type	(% cannot be displayed.)	
	Display %–Scale	(% cannot be displayed.)	
	Display %–Smoothing	(% cannot be displayed.)	
	Display %–Color–Foreground	(% cannot be displayed.)	NT31: NT31C:
	Display %–Color–Background	(% cannot be displayed.)	NT31: NT31C:
Broken–line Graph	Start Table Entry		
	No. of Points		2 to 320
	100%–Table Entry		
	100%–Value		
	0%–Table Entry		
	0%–Value		
	–100%–Table Entry		
	–100%–Value		
	Line–Style		
	Line–Color		NT31: NT31C:
	Direction		
	Display Sign		
	Frame		
	Color–Frame		NT31: NT31C:
	Color– + Range		NT31: NT31C:
	Color– – Range		NT31: NT31C:
Bar Graph	Max. No. per screen	30	50
	Table Entry		
	100%–Table Entry		
	100%–Value	(Minus numbers are treated as 0.)	
	0%–Table Entry		
	0%–Value	(Minus numbers are treated as 0.)	
	–100%–Table Entry	(Minus range cannot be displayed.)	
	–100%–Value	(Minus range cannot be displayed.)	

Items	Items	NTH25/NTH25C	NT31/NT31C
Bar Graph	Direction		
	Display Sign	(Minus range cannot be displayed.)	
	Frame	(fixed to No Frame)	
	Color–Frame	(fixed to No Frame)	NT31: NT31C:
	Color– + Range	NTH25: NTH25C:	NT31: NT31C:
	Color – –Range	(Minus range cannot be displayed.)	NT31: NT31C:
	Display %		
	Display %–Font Type	(”Half Height” is displayed as ”Standard”.)	
	Display %–Scale	(3 x 3 is displayed as 2 x 2)	
	Display %–Smoothing	(displays without smoothing)	
	Display %–Color–Foreground	NTH25: NTH25C:	NT31: NT31C:
	Display %–Color–Background	NTH25: NTH25C:	NT31: NT31C:

Function Switches

The NT31/NT31 do not have function switches. The NTH25/NTH25C, however, has function switches capable of bit notify (notification of switch state) and word notify (notification of specified value) to the host.

APPENDIX G

Model List

PT

Model	Specification
NTH25-ST121B	STN Black-and-white display, black
NTH25C-ST141B	STN color display, black

Host Link Unit

Model	Specification	Applicable PC
3G2A6-LK201-EV1	CPU-mounted type with RS-232C connector	C-series C200H C1000H C2000H
3G2A6-LK202-EV1	CPU-mounted type with RS-422A connector	
C200H-LK201-V1	Rack-mounting unit with RS-232C connector for C200H	C-series C200H C200HS C200HX/HG/HE(-Z)E
C200H-LK202-V1	Rack-mounting unit with RS-422A connector for C200H	
3G2A5-LK201-EV1	Features a selectable RS-232C/RS-422A connector	C-series C1000H C2000H
C500-LK203	Rack-mounting unit for C500	
CV500-LK201	Features an RS-232C connector and a selectable RS-232C/RS-422A connector Rack-mounting unit for CVM1/CV	CVM1/CV-series CV500 CV1000 CV2000 CVM1

CompoBus/S Master Control Unit

Model	Specification	Model Name
SRM1-C02-V1	Features an RS-232C port	SRM1

CPUs (For Connection via a Host Link)

Model	Specification	PC Type
CPM1-10CDR- j CPM1-20CDR- j CPM1-30CDR- j CPM1A-10CD j - j CPM1A-20CD j - j CPM1A-30CD j - j CPM1A-40CD j - j	RS-232C adapter/RS-422A adapter connected to the peripheral port	C-series CPM1
CQM1-CPU21-E CQM1-CPU41-EV1 CQM1-CPU42-EV1 CQM1-CPU43-EV1 CQM1-CPU44-EV1 CQM1-CPU45-EV1	Features a 9-pin connector for RS-232C connections	C-series CQM1
C200HS-CPU21-E C200HS-CPU23-E C200HS-CPU31-E C200HS-CPU33-E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HS
C200HE-CPU32-(Z)E(*) C200HE-CPU42-(Z)E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HE(-ZE)
C200HG-CPU33-(Z)E(*) C200HG-CPU43-(Z)E C200HG-CPU53-(Z)E(*) C200HG-CPU63-(Z)E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HG(-ZE)
C200HX-CPU34-(Z)E(*) C200HX-CPU44-(Z)E C200HX-CPU54-(Z)E(*) C200HX-CPU64-(Z)E C200HX-CPU65-ZE C200HX-CPU85-ZE	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HX(-ZE)
CS1G-CPU42-E CS1G-CPU43-E CS1G-CPU44-E CS1G-CPU45-E	Features a connector for RS-232C connections (9-pin)	CS1-series CS1G
CS1H-CPU63-E CS1H-CPU64-E CS1H-CPU65-E CS1H-CPU66-E CS1H-CPU67-E	Features a connector for RS-232C connections (9-pin)	CS1-series CS1H
CV500-CPU01-EV1 CV1000-CPU01-EV1 CV2000-CPU01-EV1 CVM1-CPU01-EV2 CVM1-CPU11-EV2 CVM1-CPU21-EV2	Features a connector for RS-232C connections (selectable/9-pin)	CVM1/CV-series CV500 CV1000 CV2000 CVM1

* One of communication boards C200HW-COM02/COM04/COM05/COM06-V1 is required.

CPUs (For Connection via an NT Link (1:1))

Model	Specification	PC Type
CPM1-10CDR- j CPM1-20CDR- j CPM1-30CDR- j CPM1A-10CD j - j CPM1A-20CD j - j CPM1A-30CD j - j CPM1A-40CD j - j	RS-232C adapter connected to the peripheral port (RS-422A adapter cannot be used)	C-series CPM1
CQM1-CPU41-EV1 CQM1-CPU42-EV1 CQM1-CPU43-EV1 CQM1-CPU44-EV1 CQM1-CPU45-EV1	Features a 9-pin connector for RS-232C connections	C-series CQM1
C200HS-CPU21-E C200HS-CPU23-E C200HS-CPU31-E C200HS-CPU33-E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HS
C200HE-CPU32-(Z)E(*) C200HE-CPU42-(Z)E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HE(-ZE)
C200HG-CPU33-(Z)E(*) C200HG-CPU43-(Z)E C200HG-CPU53-(Z)E(*) C200HG-CPU63-(Z)E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HG(-ZE)
C200HX-CPU34-(Z)E(*) C200HX-CPU44-(Z)E C200HX-CPU54-(Z)E(*) C200HX-CPU64-(Z)E C200HX-CPU65-ZE C200HX-CPU85-ZE	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HX(-ZE)
CV500-CPU01-EV1 CV1000-CPU01-EV1 CV2000-CPU01-EV1 CVM1-CPU01-EV2 CVM1-CPU11-EV2 CVM1-CPU21-EV2	Features a connector for RS-232C connections (selectable/9-pin)	CVM1/CV-series CV500 CV1000 CV2000 CVM1

* One of communication boards C200HW-COM02/COM04/COM05/COM06-V1 is required.

RS-232C/RS-422A Converter Unit

Model	Specification
NT-AL001	RS-232C: 9-pin connector RS-422A: 8-pin terminal block

RS-232C Adapter

Model	Specification
CPM1-CIF01	Links the RS-232C port of an NTH25/NTH25C and the peripheral port of a CPM1 (compatible with host link, and NT link (1:1))

Related Parts and Equipment for PT

Name	Model	Remark
Support Tool	NT-ZJ3MX1-EV3	Compatible with PC/AT personal computers For Windows95/98 (English version) 3.5 inch FD (1.44 MB)
	NT-ZJCM1-EV3	Compatible with PC/AT personal computers For Windows95/98 (English version) CD-ROM
NTH Screen Data Converter	Provided with NTH25/NTH25C unit	Compatible with PC/AT personal computers For Windows95/98 (English version) CD-ROM

Connection Parts

Connector for Control/Power Supply Cable

Name	Model	Remark
IL-M-10P-S3C2-SA	Relay plug housing	Made by JAE for relay
IL-M-C2-1-10000	Crimped pin contact (metal-plated) Required for relay plug housing	

Cables with Connectors (PT side 9-pin D-SUB ↔ PLC/NT-AL001)

Model	Cable Length	Applicable units	Communication Method	Specification
XW2Z-200S	2 m	Host link units with a 25-pin connector	Host link	9-pin ↔ 25-pin
XW2Z-500S	5 m			
XW2Z-200T	2 m	Host link units with a 9-pin connector	Host link, NT link (1:1)	9-pin ↔ 9-pin
XW2Z-500T	5 m			

Cables with Connectors (PT side 9-pin D-SUB ↔ Computer)

Model	Cable Length	Specification
CV500-CN228	2 m	25-pin (male) ↔ 9-pin (male)
XW2Z-S001	15 cm	25-pin (female) ↔ 14-pin (male)
XW2Z-S002	2 m	9-pin (female) ↔ 9-pin (male)

* XW2Z-S001 is the converter cable. A separate CV500-CN228 is required for connection to the personal computer.

Connection Cable

Model	Specification
AWG28 x 5P IFVV-SB	Multicore cable, manufactured by Fujikura, Ltd.
CO-MA-VV-SB 5P x 28AWG	Multicore cable, manufactured by Hitachi Cable, Ltd.

Applicable Connectors

Name	Model	Specification
Connector	XM2A-2501	25-pin type (male), made by OMRON
	XM2D-2501	25-pin type (female), made by OMRON (for personal computers)
	XM2A-0901	9-pin type (male), made by OMRON
	XM2D-0901	9-pin type (female), made by OMRON (for personal computers)
	DB-25P	25-pin type (male), made by JAE
Connector hood	XM2S-2511	25-pin type, mm pitch screw, made by OMRON
	XM2S-2513	25-pin type, inch pitch screw, made by OMRON
	XM2S-0911	9-pin type, mm pitch screw, made by OMRON
	XM2S-0911-E	9-pin type, mm pitch screw, made by OMRON
	XM2S-0913	9-pin type, inch pitch screw, made by OMRON
	DB-C2-J9	25-pin type, made by JAE
Connector fixture	XM2Z-0001	Millimeter screw type, made by OMRON

APPENDIX H

PC Memory Map

OMRON C-Series PC, SRM1 Memory Map

Area		Relay Area (CIO)	Holding Relays (HR)	Auxiliary Relays (AR)*1	Link Relays (LR)	Timer/Counter Present Values (TIM/CNT)	Data Memory (DM)	Extended Data Memory (Current Bank) (EM)
Ladder Type	C200H	00000 to 00255	00000 to 00099	00000 to 00027	00000 to 00063	00000 to 00511	00000 to 01999	–
	C200HS	00000 to 00511 *2	00000 to 00099	00000 to 00027	00000 to 00063	00000 to 00511	00000 to 06655 07000 to 09999	–
	C200HE(-ZE) C200HG(-ZE) C200HX(-ZE)							00000 to 06143 *3
	C500	00000 to 00063	00000 to 00031	–	00000 to 00031	00000 to 00127	00000 to 00511	–
	C1000H	00000 to 00255	00000 to 00099	00000 to 00027	00000 to 00063	00000 to 00511	00000 to 04095	–
	C2000H CQM1						00000 to 06655	–
	CPM1/CPM1A	00000 to 00019 00200 to 00255	00000 to 00019	00000 to 00015	00000 to 00015	00000 to 00127	00000 to 01023 06144 to 06655	–
Flow Type	C1000HF	00000 to 00255	00000 to 00099	00000 to 00027	00000 to 00063	00000 to 00511	00000 to 04095	–
SRM1		00000 to 00019 00200 to 00255	00000 to 00019	00000 to 00015	00000 to 00015	00000 to 00127	00000 to 02021 06144 to 06655	–

*1 Auxiliary relays (AR) cannot be used on the NTH25/NTH25C.

*2 The available area on the NTH25/NTH25C is 00000 to 00255.

*3 Extended data memory (EM) cannot be used on the NTH25/NTH25C.

OMRON CVM1/CV-Series PC Memory Map

Area	Relay Area (CIO)	Holding Relays (HR)*1	Auxiliary Relays (AR)*2	Link Relays (LR)	Timer/Counter Present Values (TIM/CNT)	Data Memory (DM)	Extended Data Memory (Current Bank) (EM)
CV500 CVM1-CPU01-EV j	00000 to 02555	–	00000 to 00511	–	00000 to 00511	00000 to 08191	–
CVM1-CPU11-EV j	00000 to 02555	–	00000 to 00511	–	00000 to 01023	00000 to 24575*3	–
CV1000 CVM1-CPU11-EV j CV2000 CVM1-CPU21-EV j	00000 to 02555	–	00000 to 00511	–	00000 to 01023	00000 to 24575*3	00000 to 32765*4

*1 On CMV1/CV series PCs, this relay is included in relay area (CIO).

*2 Auxiliary relays (AR) cannot be used on the NTH25/NTH25C.

*3 The available area on the NTH25/NTH25C is 00000 to 09999.

*4 Extended data memory (EM) cannot be used on the NTH25/NTH25C.

OMRON CS1-series CS1G/H PC Memory map (host link connection only)

Area	Relay Area (CIO)	Holding Relays (HR)*2	Auxiliary Relays (AR)*3	Link Relays (LR)	Timer/Counter Present Values (TIM/CNT)	Data Memory (DM)	Extended Data Memory (Current Bank) (EM)*6
CS1G CS1H	00000 to 06655*1	00000 to 00511	00000 to 00959	–	00000 to 04095*4	00000 to 32767*5	00000 to 32767

*1 The available area on the NTH25/NTH25C is 00000 to 02555.

*2 Holding relays (HR) cannot be used on the NTH25/NTH25C.

*3 Auxiliary relays (AR) cannot be used on the NTH25/NTH25C.

*4 The available area on the NTH25/NTH25C is 00000 to 01023.

*5 The available area on the NTH25/NTH25C is 00000 to 09999.

*6 Extended data memory (EM) cannot be used on the NTH25/NTH25C.

APPENDIX I

Special Characters

English Character Codes

Example: Hex code is represented by 30, decimal code by 48, and character by 0.

30	0
48	

Code 20 and 32 in the table represents a space, as indicated by “SP”.

Hex Digits 1st → 2nd ↓	**2-**		**3-**		**4-**		**5-**		**6-**		**7-**		**8-**		**9-**	
-0	20	SP	30	0	40	@	50	P	60	‘	70	p	80	Ç	90	É
	32		48		64		80		96		112		128		144	
-1	21	!	31	1	41	A	51	Q	61	a	71	q	81	ü	91	æ
	33		49		65		81		97		113		129		145	
-2	22	”	32	2	42	B	52	R	62	b	72	r	82	é	92	Æ
	34		50		66		82		98		114		130		146	
-3	23	#	33	3	43	C	53	S	63	c	73	s	83	â	93	ô
	35		51		67		83		99		115		131		147	
-4	24	$	34	4	44	D	54	T	64	d	74	t	84	ä	94	ö
	36		52		68		84		100		116		132		148	
-5	25	%	35	5	45	E	55	U	65	e	75	u	85	à	95	ò
	37		53		69		85		101		117		133		149	
-6	26	&	36	6	46	F	56	V	66	f	76	v	86	å	96	û
	38		54		70		86		102		118		134		150	
-7	27	’	37	7	47	G	57	W	67	g	77	w	87	ç	97	ù
	39		55		71		87		103		119		135		151	
-8	28	(	38	8	48	H	58	X	68	h	78	x	88	ê	98	ÿ
	40		56		72		88		104		120		136		152	
-9	29	)	39	9	49	I	59	Y	69	i	79	y	89	ë	99	Ö
	41		57		73		89		105		121		137		153	
-A	2A	*	3A	:	4A	J	5A	Z	6A	j	7A	z	8A	è	9A	Ü
	42		58		74		90		106		122		138		154	
-B	2B	+	3B	;	4B	K	5B	[	6B	k	7B	{	8B	ï	9B	¢
	43		59		75		91		107		123		139		155	
-C	2C	,	3C	<	4C	L	5C	\	6C	l	7C	|	8C	î	9C	£
	44		60		76		92		108		124		140		156	
-D	2D	-	3D	=	4D	M	5D	]	6D	m	7D	}	8D	ì	9D	¥
	45		61		77		93		109		125		141		157	
-E	2E	.	3E	>	4E	N	5E	^	6E	n	7E	~	8E	Ä	9E	Pt
	46		62		78		94		110		126		142		158	
-F	2F	/	3F	?	4F	O	5F	_	6F	o	7F	⌂	8F	Å	9F	*f*
	47		63		79		95		111		127		143		159	

Hex Digits 1st → 2nd ↓	A-		B-		C-		D-		E-		F-	
-0	A0	á	B0	⋮	C0	└	D0	╨	E0	α	F0	≡
	160		176		192		208		224		240	
-1	A1	í	B1	▯	C1	┴	D1	╤	E1	β	F1	±
	161		177		193		209		225		241	
-2	A2	ó	B2	▒	C2	┬	D2	╥	E2	Γ	F2	≥
	162		178		194		210		226		242	
-3	A3	ú	B3	┃	C3	├	D3	╙	E3	π	F3	≤
	163		179		195		211		227		243	
-4	A4	ñ	B4	┤	C4	─	D4	╘	E4	Σ	F4	⌠
	164		180		196		212		228		244	
-5	A5	Ñ	B5	╡	C5	┼	D5	╒	E5	σ	F5	⌡
	165		181		197		213		229		245	
-6	A6	a	B6	╢	C6	╞	D6	╓	E6	µ	F6	÷
	166		182		198		214		230		246	
-7	A7	o	B7	╖	C7	╟	D7	╫	E7	τ	F7	≈
	167		183		199		215		231		247	
-8	A8	¿	B8	╕	C8	╚	D8	╪	E8	Φ	F8	°
	168		184		200		216		232		248	
-9	A9	⌐	B9	╣	C9	╔	D9	┘	E9	Θ	F9	∙
	169		185		201		217		233		249	
-A	AA	¬	BA	║	CA	╩	DA	┌	EA	Ω	FA	•
	170		186		202		218		234		250	
-B	AB	1/2	BB	╗	CB	╦	DB	■	EB	δ	FB	√
	171		187		203		219		235		251	
-C	AC	1/4	BC	╝	CC	╠	DC	▬	EC	∞	FC	n
	172		188		204		220		236		252	
-D	AD	¡	BD	╜	CD	═	DD	▮	ED	ø	FD	2
	173		189		205		221		237		253	
-E	AE	«	BE	╛	CE	╬	DE	▐	EE	ε	FE	J
	174		190		206		222		238		254	
-F	AF	»	BF	┐	CF	╧	DF	▀	EF	∩	FF	*1
	175		191		207		223		239		255	

*1 Used as the prefix for mark data codes (2 bytes).

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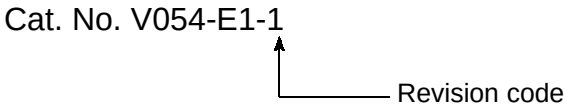
Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	May 1999	Original production

Corrections Insert

9650

Manual: **NTH25/25C Programmable Terminal Operation Manual**
Catalog No.: **V054-E1-1**
Date: **June 1999**

This corrections insert lists corrections made to this manual since it was printed. Only corrections that affect the proper and efficient operation of the device are listed; minor changes, such as those in spelling and syntax, have been omitted.

Please mark your manuals so that the corrections are noted on the pages concerned, and then securely add any required pages from the Corrections Insert to the rear of the manual.

7-1 Troubleshooting

The error message that is actually displayed may differ from the error message indicated in the Symptoms column in 7-1 Troubleshooting.

	Incorrect	Correct
276P	The "Data Communications Error" message is displayed.	The "ERROR" message is displayed.
277P	When an attempt is made to enter the RUN mode, the initial screen and the "No Reply from Host" message are displayed alternately.	When an attempt is made to enter the RUN mode, the initial screen and the "No Response from PLC" message are displayed alternately.
	The "Device Setup Error" is displayed.	The "CPU type Error" is displayed.
278P	Cannot communicate with the host Example) - The "No Reply from Host" message is displayed. - Communications error message is displayed during communications with the host.	Cannot communicate with the host Example) - The "No Response from PLC" message is displayed. - Communications error message is displayed during communications with the host.
	The "No Reply from Host" message is displayed from time to time during normal operation.	The "No Response from PLC" message is displayed from time to time during normal operation.
279P	The "Date Communications Error" message is displayed.	The "Error" message is displayed.
	The "Device Setup Error" is displayed.	The "CPU type Error" is displayed.

The following information was omitted from the description under "Display of lamps" on page 142:

• Display of lamps

Lamps are displayed as follows according to the state of the allocated bit.

0 (OFF): OFF
1 (ON): ON, or flashing

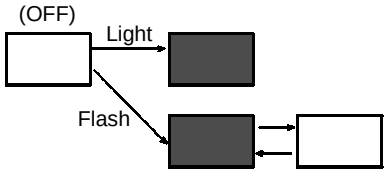
Whether a lamp is lit continuously or flashes when the lamp bit is set to "1" (ON) is determined by the "ON Type" attribute.
On the NTH25C, the light/flash display state changes according to whether or not the lamp is assigned a frame.
On the NTH25, the lamp stays lit and only labels flash regardless of whether or not the lamp is assigned a frame.

[NTH25C]

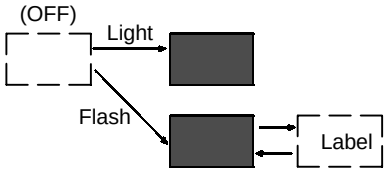
Frame: The frame is always displayed.

No frame: The lamp may be invisible when the frame is OFF or flashing depending on the OFF color.

[Frame]

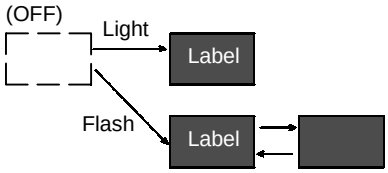


[No frame]



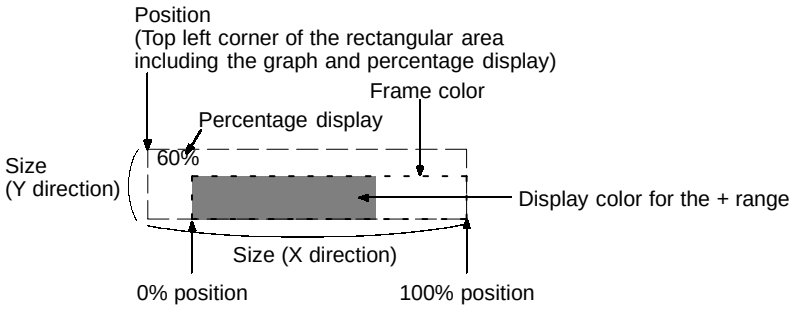
[NTH25]

The lamp stays lit and only labels flash regardless of whether or not the lamp is assigned a frame.



"Display result" on page 174:

• Display result



(The frame is not displayed on the NTH25/NTH25C.)

On the NTH25, the + range turns the same color as the graph area, resulting in the graph no longer being visible when the + range color is set to black.