

Introduction

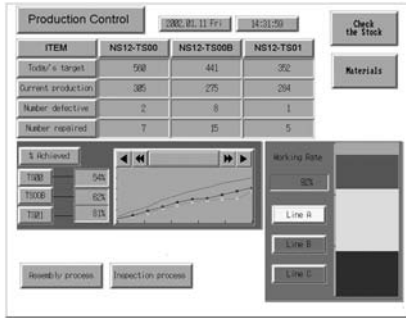
What Is a Programmable Terminal?

Programmable Terminals (PTs) are sophisticated operator interfaces that can automatically display information and perform operations as required at automated production sites.

Operation of PT at FA production sites

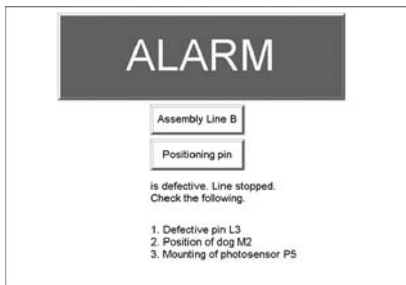
Monitoring Line Operating Status

The system and device operating status can be displayed in real time. Graphs can be used to improve visual expressions to display data in an easy-to-understand format.



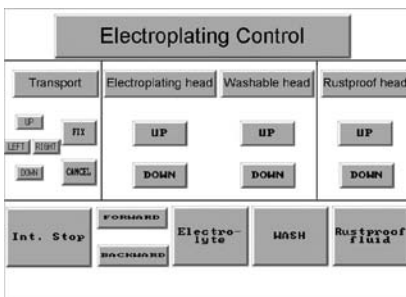
Instructions for FA Staff

PTs can be used to notify operators if there is a system or device error and provides information on appropriate countermeasures.



Control Panel Switches

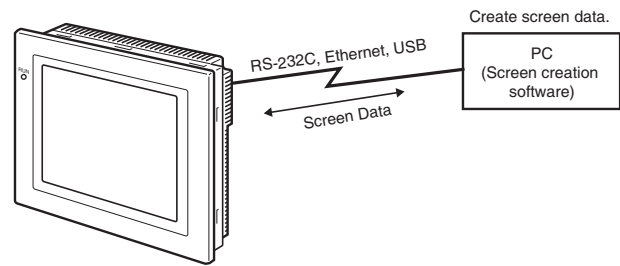
On the PT screen, a variety of switches can be created, and the data entered on the touch panel can be sent to the host as a result of the operation.



PT Operation

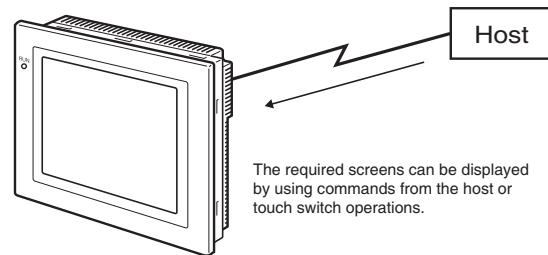
Transmission of Screen Data

Screen data displayed on the PT is created by a screen creation software on a PC, and is transmitted to the PT through RS-232C, Ethernet, or USB.



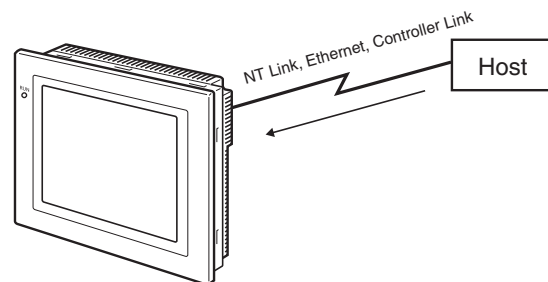
Display a screen

Create a content to be displayed (screen data) using a screen creation software on the PC, and transmit it to the PT. A required screen can be displayed upon a command from the host or by touch switch operation.



Read data from host

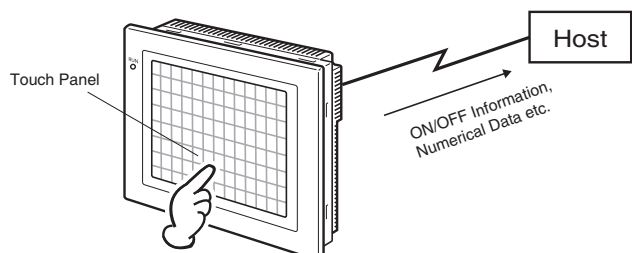
Connect with the host using a transmission method such as NT link, Ethernet or Controller Link etc., and read required data from the host.



Note: Some models do not support Ethernet or Controller Link.

Send Data to Host

Send data (button ON/OFF status, numerals, and character strings) entered on the touch panel to the host.



Communication with the HOST

Communication Method

In addition to using it as a host in connection to the PLC with the direct access, connection can be made using the memory link with a SBQ(Single Board Computer) etc. The features are as follows.

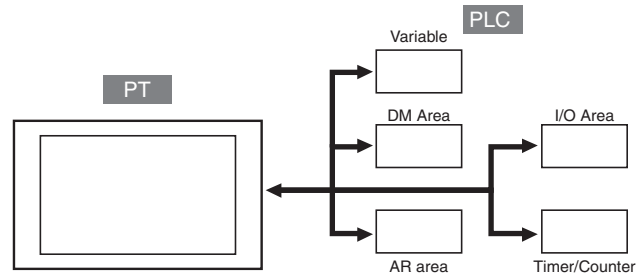
Communication Method	Feature Overview	PT Supported
Direct Access Method	A method that allocates in any area and variable of the PLC words or bits used for referring to the required contents for display with a PLC memory or for storing the entered data. This method does not require the ladder program that is necessary to move data in the DM method, enabling an introduction of a easier program and better maintenance.	NA Series NB Series NS Series NV Series NT Series
Memory Link Method	A method that sends a command from the host to display data and when data is entered, notifies the input as a command to the host from the PT.	NS Series NT Series

Direct Access Method

With the direct access method, content in the PLC memory that is needed for display can be referred to, and freely allocated to words and bits to save input data in the PLC area.

This method also directly reads/writes the allocated words/bits, changes the display conditions of objects shown on the screen of PT, and controls and notifies the PT status.

Also a PT has a function to communicate with a number of PLC. All the connected PLCs are registered with a host name and the PLC area can be accessed by specifying the host name, address, and variable.



Under the direct access method, one of the following methods is used to connect a PT with the host.

Method	Details
Host Link	The host link connects a host PLC with a PT 1 to 1 and reads and writes words/bits using the serial communications (host communication mode). This method allows a variety of PLC models to be connected.
NT Link (1 : 1)	NT Link is a communication method that performs a high-speed communication between OMRON PT and OMRON PLC, using a proprietary protocol. "NT Link (1 : 1)" method refers to the connection of 1 PLC with 1 PT.
NT Link (1 : N) (Standard, High Speed)	"NT Link (1 : N)" is a method that can connect max. 8 NS units to 1 PLC port. This method also can use the "High Speed NT Link (1 : N)", which performs a high speed communication with CS/CJ Series PLC.
Ethernet*1	A PT can easily read and write data including words/bits using a PLC Ethernet Unit that can be connected to the PT. The Omron standard communication protocol FINS (Factory Interface Network Service) and other protocols enable a PT to perform a high-speed communication regardless of a protocol.
Controller Link*2	The Controller Link is an FA network that can transmit a large volume of data between OMRON PLC and an FA computer. This unit can easily read and write data including words/bits with a Controller Link I/F Unit (NS-CLK21) which is equipped with an NS Series PT and a connectable PLC Controller Link Unit. The Controller Link can use the "Data Link Function" which constantly shares the proper data for the Controller Link, or the "Message Service Function" which transmits data when required.
CompoWay/F	The CompoWay/F unit can be connected to an OMRON temperature controller using RS-485. Mounting a RS-422A adapter to the serial port of a PT enables the RS-485 communication method for the connection.
Other	A PT can be connected to Mitsubishi PLC and SIEMENS PLC etc.

*1. The NA Series supports Ethernet only.

*2. The Controller Link is supported only by the NS Series.

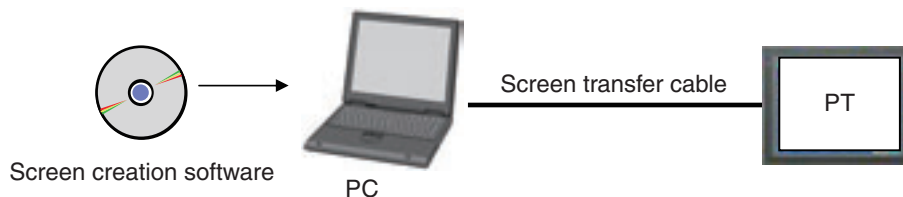
Memory Link Method

A micro computer or personal computer can use the Memory Link to also connect to a PT. The PT uses a serial board to connect the host. The host sends commands to PT so that the PT can change the screen status or inform an input of data to the host when the data is entered.

System Configuration Examples

Screen Creation

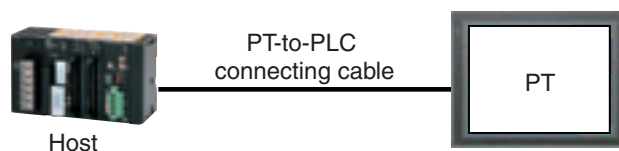
To use a PT, it is necessary to design screens with screen creation software.



Screen creation software

PT	Screen creation software	Remarks
NA Series	Sysmac Studio	-
NB Series	NB-Designer	Can be downloaded free of charge from your regional OMRON website
NS Series	CX-Designer	Included in the FA Integrated Tool Package CX-One
NV Series	NV-Designer	Included in the FA Integrated Tool Package CX-One
NT631C	Support Software	NT-ZJCAT1-EV4

Operation



Host: Controls the PT as necessary while controlling machines and monitoring production lines.

You can connect to the CS- (-V1 or later), CJ-, CP-, C-, or CVM1/CV-series Programmable Controller or NJ/NX-series Machine Automation Controller.

For details, refer to the user's manual or setup manual for the PT.

PT-to-PLC connecting cable: Used to connect the PT to the PLC for communications.

OMRON RS-232C cable: XW2Z-200T/-500T (2 m/5 m)

Note: 1. Use the following cables for NV-series PTs.

XW2Z-200T-4/-200T-3/-500T-3 (2 m/5 m)

2. PTs that support Ethernet can communicate via Ethernet.

Sensors

Switches

Safety Components

Relays

Control Components

Automation Systems

Motion / Drives

Energy Conservation Support / Environment Measure Equipment

Power Supplies / In Addition

Others

Common

Communications Methods between OMRON PLCs and PTs

Communications method	1:1 NT Link	1:N NT Link (Standard, High Speed)	Host Link
System configuration	<p>PLC</p> <ul style="list-style-type: none"> • RS-232C cable (15 m max.) • RS-422A cable (500 m max.) 	<p>PLC</p> <p>RS-422A cable (500 m max.)</p> <p>CJ1W-CIF11 RS-422A Adapter</p> <p>8 PTs max.</p>	<p>PLC</p> <ul style="list-style-type: none"> • RS-232C cable (15 m max.) • RS-422A cable (500 m max.)
Feature	1:1 connection with an older model of PLC	Connection of multiple PTs	Most popular communications method
Number of connected PTs	1 per port	Up to 8 per port	1

Communications method	Ethernet	Controller Link
System configuration	<p>PLC (Ethernet unit required)</p> <p>PLC</p> <p>Ethernet</p> <p>HUB</p>	<p>PLC (Controller Link unit required)</p> <p>Controller Link</p> <p>NS-CLK21 Controller Link Interface Unit</p>
Feature	N:N connections between PLCs and PTs	N:N connections between PLCs and PTs
Number of connected PTs	Up to the number of nodes on each network	

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PT Types and Features

You can select from the following five series of PTs according to price, performance, and functionality.

NA Series

Faster, more efficient control and monitoring
Widescreen in all models: 7, 9, 12, and 15 inches

An HMI that is dynamic, intuitive and predictive makes industrial machines more attractive and competitive.

The OMRON HMI enables faster, more efficient control and monitoring - and a more natural, proactive relationship between operator and machine.

The design has been based on real applications and customer requirements, a future-proofed, scalable platform that will evolve with their ever-changing needs, allowing real time reaction to events. As part of the system family, the NA Series is fully aware of the total machine.



Model	Display device	Screen size	Resolution	Touch panel method	Colors
NA5-7W	Color TFT	7 inches	800 × 480 dots	Analog resistive membrane type	16,670,000 colors
NA5-9W		9 inches			
NA5-12W		12.1 inches	1,280 × 800 dots		
NA5-15W		15.4 inches			

NB Series

The feature-rich, economic programmable terminal

OMRON's new NB HMI series is simply as smart and as dependable as it looks. A feature-rich HMI with OMRON's high quality extending throughout the complete series, this new HMI generation offers you the utmost in reliability. The logical choice for use with OMRON's popular CP1 family of compact machine controllers, the NB series has just the right model to suit your application, no matter for what branch of industry.

Available with screen sizes from 3.5 to 10 inches, the NB series is not only complete, but also has many outstanding design features that will make it easy to create attractive HMI applications. The combination of high quality and rich features add up give outstanding value for an HMI in the economy class.

The NB-Designer software to create your HMI application is free of charge and can be downloaded from our website.



Model	Display device	Screen size	Resolution	Touch panel method	Colors
NB3Q	Color TFT	3.5 inches	320 × 240 dots	Analog resistive membrane type	65,536 colors
NB5Q		5.6 inches	320 × 234 dots		
NB7W		7 inches wide	800 × 480 dots		
NB10W		10.1 inches wide			

NS Series

Even simpler equipment operation with outstanding synergy

The amount of work and cost of connecting to OMRON PLCs and components have been greatly reduced. The results is an incredible range of features that is possible only when unifying to one manufacturer. Connecting to the NJ-series Machine Automation Controller allows the machine designer to quickly achieve the features required by the user through support for improved troubleshooting and structured programming with structures and other new data types.



Model	Display device	Screen size	Resolution	Touch panel method	Colors
NS5/NSH5	Color TFT	5.7 inches	320 × 240 dots	Matrix resistive membrane type	4,096 colors
NS8		8.4 inches	640 × 480 dots		
NS10		10.4 inches	800 × 600 dots		
NS12		12.1 inches	800 × 600 dots	Analog resistive membrane type	
NS15		15 inches	1,024 × 768 dots		

NV Series

Compact and simple, extremely high cost performance

The NV Series of compact Programmable Terminals meet the basic needs for enhanced visibility, simplicity, and cost, and they go even further to provide superior PLC compatibility, easy operation, and cost performance.



Model	Display device	Screen size	Resolution	Touch panel method	Colors
NV3W-V1	Monochrome TFT	3.8 inches	240 × 96 dots	Analog resistive membrane type	3-color backlight
NV4W	Monochrome TFT	4.6 inches	320 × 120 dots		3-color backlight
NV3Q-MR	Monochrome TFT	3.6 inches	320 × 240 dots		3-color backlight
NV3Q-SW	Color TFT				4,096 colors

Sensors

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Safety Components

Relays

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Automation Systems

Motion / Drives

Energy Conservation Support / Environment Measure Equipment

Power Supplies / In Addition

Others

Common

NT Series

Better compatibility and easier-to-use support software

Device monitoring and I/O comment loading functions facilitate system construction.

Greatly enhanced NT Support Software with reusable screen data and powerful simulation on editing screens.

Transfer the system program and screen data to ensure smooth on-site system maintenance and improve the efficiency of onsite work.

A wide range of communications interfaces are available.



Model	Display device	Screen size	Resolution	Touch panel method	Colors
NT631C	Color TFT	10.4 inches	640 × 480 dots	Matrix resistive membrane type	8 colors

Sensors

Switches

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Relays

Control Components

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Motion / Drives

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Power Supplies / In Addition

Others

Common

Further Information

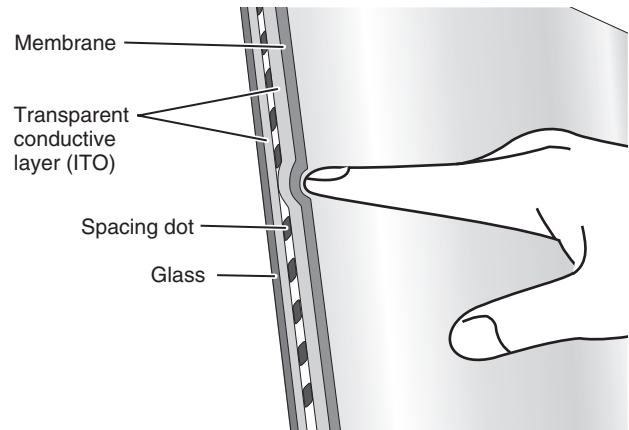
Features and Principles of Touch Panel Methods

Touch panel methods and features are listed below. OMRON PTs use Resistive Membrane Type.

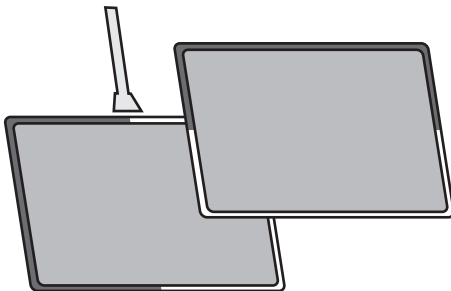
Touch panel method	Acoustic pulse recognition (APR)	Surface acoustic wave (ultrasonic wave)	Capacitive (analog capacitive)	Optic (infrared)	Resistance membrane
Features	Detects the acoustic wave generated upon a touch or dragging. Optics and durability of pure glass. Resistant to water and dust.	Senses soft objects. Scratch-resistance and optical clarity of glass overlay. Accurate touch response using a gloved finger.	Senses the touch of a finger. Does not sense water drops, insects, and other foreign matters, reducing input errors.	Consists of LED emitters and receivers. Not affected by scratches on the touch surface. Possibility of input errors caused by parallax between the sensors and display.	Works with a touch of anything. Relatively lower durability and light transmittance due to the membrane surface. Lower production cost than other methods.

Resistive Membrane Type

Two materials with transparent conductive layers (ITO) are placed with a gap between them so that transparent conductive layers are facing each other. When the touch panel is pressed down with a finger or pen and the transparent conductive layers contact, a touch input will be made. There are spacing dots (insulators) between the top and bottom conductive layers to prevent contacts between them when the touch panel is not pressed. Resistance membrane touch panels are divided into analog types and matrix types.

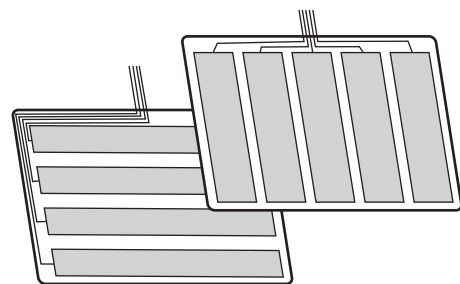


Analog type



Transparent conductive layers are formed over the entire surface of the top and bottom layers. One of the two layers constructs the X-coordinate circuit while the other layer constructs the Y-coordinate circuit. The resistance ratio at a touched position is detected as an analog value.

Matrix type



Transparent conductive layers strips formed on the top and bottom layers are at right angles to each other. When the panel is touched, the position is detected in the X and Y coordinates.

Resistance membrane touch panel	Analog	Matrix
Models	NA Series, NB Series, NV Series, and NS15	NS5, NS8, NS10, NS12, and NT631C