

Software

NT21/31/631

NT20S/600S

NT1S

NT2S

Technical Highlights

Get the Most from Your Omron PLCs

The NT21/NT31/NT631 operator interface products create superior Omron PLC solutions by taking advantage of features that other HMI products simply cannot offer in an Omron system. Our HMI products are designed with the same attention to quality and performance that go into our broad line of industry leading PLCs. Omron's NT21/31/631 also offer significant programming flexibility in object layout and PLC controls, allowing you to create the program needed to realize your operator interface vision.

- **High-Speed NT Link** - This 115 kbaud serial Omron protocol allows rapid data exchange with Omron CJ1 and CS1 PLCs.
- **NT Link 1:N** - At 38.4 and 115 kbaud, NT Link 1:N allows 8 screens to be connected to a single serial port on CJ1 and CS1 PLCs with minimal impact to performance.
- **PLC Programming Console** - Simulate a hand-held programming device right on the HMI screen and monitor, set PLC values, and make minor ladder program changes.
- **PLC Device Monitor** - This function allows the NT31 and NT631 to function as watch windows, where the user can specify and view banks of PLC addresses, change values, and view errors without opening the panel.
- **Pop-Up Windows** - Present up to two pop-up windows at a time on the HMI screen to control critical information in a timely manner.
- **Window Control Area** - Control pop-up windows from the PLC memory by manipulating the window control area.
- **Parent/Child Windows** - Create screen segments that can be used again and again throughout a project. This conserves both screen memory and programming effort.
- Same programming functionality available in 5.2", 5.7", 10.4", and 11.3" screen sizes.
- DeviceNet communication module available for NT31 and NT631.
- Supports multi-vendor communication, allowing Omron touch screens to be the standard HMI.
- Memory module can be set to automatically upload or download both screen data and system firmware.
- Analog data can be displayed in chart, bar graph, and needle gauge objects.
- Binary status can be shown with lamps, animated bitmaps, and alarm bits.



Multi-Vendor Communications

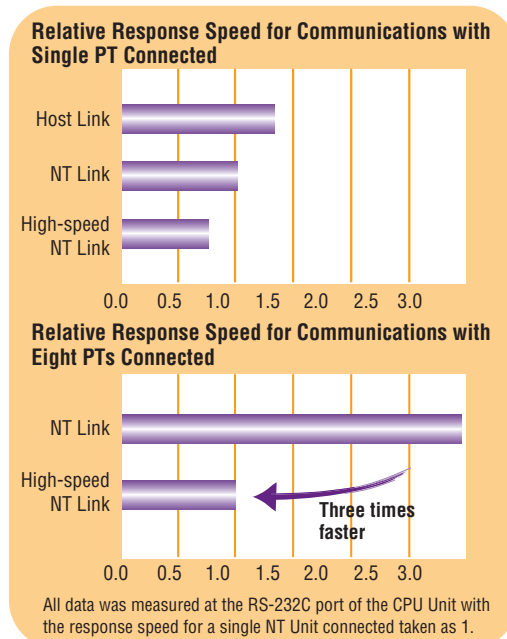
Standardize on Omron's high quality touch screens regardless of which PLC vendors you use. Our drivers and vendor-specific cables allow Omron's NT31 and NT631 touch screens to communicate with the PLCs from the following vendors:

- Omron (CV, CS1, CJ1, CPM1A, CPM2□, SRM1)
- Allen-Bradley (ML1000/1200/1500, SLC 5/00, 5/01, 5/02, 5/03, 5/04, 5/05)
- GE Fanuc Series 90-20 and 90-30 PLCs
- Mitsubishi A and FX series PLCs
- Siemens S7-300 and S7-400 PLCs
- Modicon Micro, Premium, Quantum, Momentum

High-Speed NT Link

High-speed NT Link highlights the advantages that come when you partner an Omron PLC with an Omron touch screen. Combine Omron's CS1-EV1 PLCs with NT21/31/631 to benefit from 115k baud serial communications tailored exclusively for PLC to touch screen data. It is almost twice as fast as Host Link and 25% faster than standard NT Link when a single NT unit is connected to a PLC serial port. High-speed NT Link is three times faster than standard NT Link with 8 NT units connected to a single CS1 or CJ1 serial port.

OMRON Data Comparison



DeviceNet

The NT31 and NT631 can be quickly configured for DeviceNet communications, integrating seamlessly into your open DeviceNet network. This is truly a multi-vendor PLC solution, since no modifications need to be made to the screen data when changing the brand of the DeviceNet master. (See the DeviceNet Technical Discussion in the Technical Highlights of this catalog for detailed specifications.)

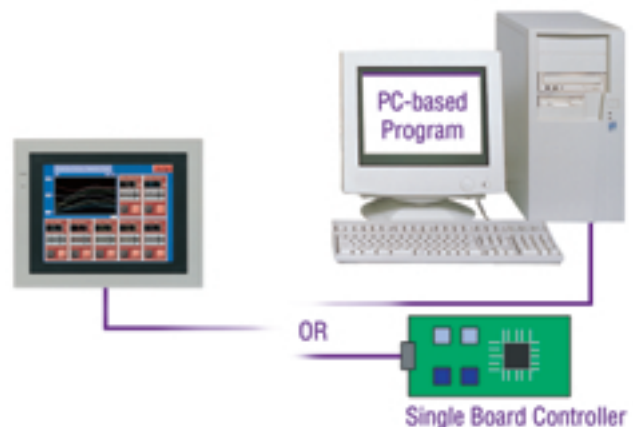


NT Link 1:N Communication

This protocol allows multiple interfaces to be connected to one PLC communication port. It is available with both standard and high speed NT Link. This protocol allows you to create a multi-drop system that puts up-to-the-second data at locations along the production line. (See the NT Link section in the Technical Highlights of this catalog for more details and specifications.)

Memory Link

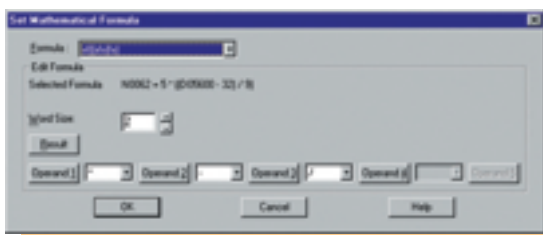
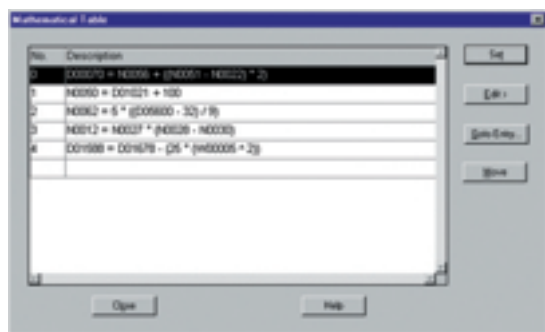
Directly connect the NT with a single board computer, PLC or personal computer via RS-232C or RS-422 communications using Memory Link. This protocol allocates a virtual memory area within the operator interface to store data values. The screen program references this internal memory area for all screen objects, just as though this memory area belonged to a PLC. This means your PC based device only has to be concerned with referencing this memory area to read and write data values. (See the Memory Link section in the Technical Highlights at the end of this catalog for more details.)



Recipe Data

Recipes store rows of values within the NT memory and operators can send that information down to the PLC to configure it for a batch operation. The new Recipe Table editor in NTST v4.6 creates and manages recipe information, allowing recipe data to be up- or downloaded from the NT hardware. NTST can also work with comma separated variable files to read in large recipe tables, or store uploaded recipe data for future reference or use.

No.	Cake	Cream	Sugar	Egg	Milk
1	Cheese cake	1000	300	20	300
2	Almond cake	300	200	10	250
3	Fondant cake	1000	200	10	300
4	Carrot cake	800	150	10	250
5	Butter cake	700	150	20	300
6	Apple cake	500	300	5	300
7	Banana cake	500	300	10	150
8	Layer cake	1000	450	10	300
9	Cream cake	1000	300	15	100
10	Coconut cake	0	0	0	0

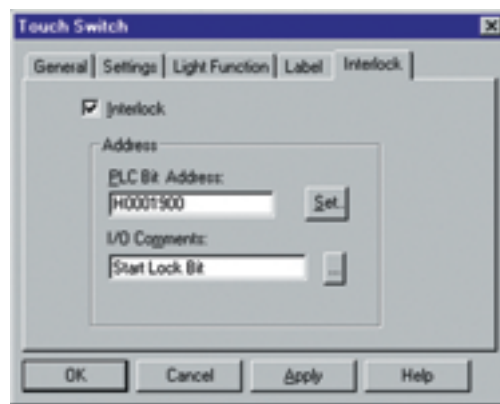


Background Math Function

NT31/631 units store a Mathematical Table that allows functions of different formats to run in the background of the NT31/631 units. The equations can be constructed of constants, values from NT31/631 memory, or values from PLC memory locations. Calculation results can be sent to NT31/631 internal memory or directly to the PLC memory. Now you can convert values for display purposes within the display device, leaving the PLC to worry about calculations that affect your process.

Input Enable - Bit Interlock Function

This function is suited for use as a password protection function. The interlock function denies access to input objects (touch switches, thumb-wheels, numeric input fields, and string input fields) based on the status of a bit in the PLC. Each input object within an NT31/631-EV2 project can be assigned to a unique bit or the same bit within the PLC. If the bit is ON, the input object will function. Turn the bit OFF and the input object is locked out. An excellent application of this feature would be login security. When the operator enters a password using a keypad, the PLC will compare the entered number to the values in certain PLC memory registers. The PLC can then change the referenced bits from 0 to 1 accordingly, granting access to different screen areas or input objects as designated by the user's access level.



Pop-Up Windows

Two window screens can be displayed in one standard screen, maximizing screen space and application efficiency. All objects (except thumb-wheel switches) can be displayed within these pop-up windows allowing operators to simultaneously view different aspects of the process as needed. Create a variety of pop-up window screens and call them up for display in your application as needed, either manually or from PLC memory.



Alarm History, Frequency, and Activity

Track your process and create a fault record using the alarm history, frequency and activity functions. These pop-up windows graphically convey problems in your process and allow you to make corrections to save time and materials. Simply drag the alarm object into the touch screen project, create a PLC bit reference in an alarm bit table, add a message to that bit, and the NT21/NT31/NT631 are ready to track and report alarms. The complete alarm history and frequency reports can be printed from the system menus.

Memory Unit

This portable FLASH memory module includes two 1MB banks. Each bank can store the screen data from a fully loaded operator interface, or the firmware program for the NT21, NT31 or NT631. The module can be set for manual or automatically triggered upload or download of data. In fact, the module can be configured to first download a new firmware program and then to automatically download new screen data. Imagine how easy it would be to update customers in the field! No PC connection is needed. Just plug on the module, power up the touch screen and transfer the programs.



Programming Console

When using an Omron PLC and NT-Link communications, this feature allows you to adjust mnemonic programming and access, monitor, and change individual memory addresses using the operator interface instead of a laptop or hand-held programmer. Now, maintenance personnel no longer need to carry a hand-held programmer or laptop from PLC to PLC to perform diagnostics. It can be performed right from the front of the operator interface without ever opening the control panel.

Software

NT21/31/631

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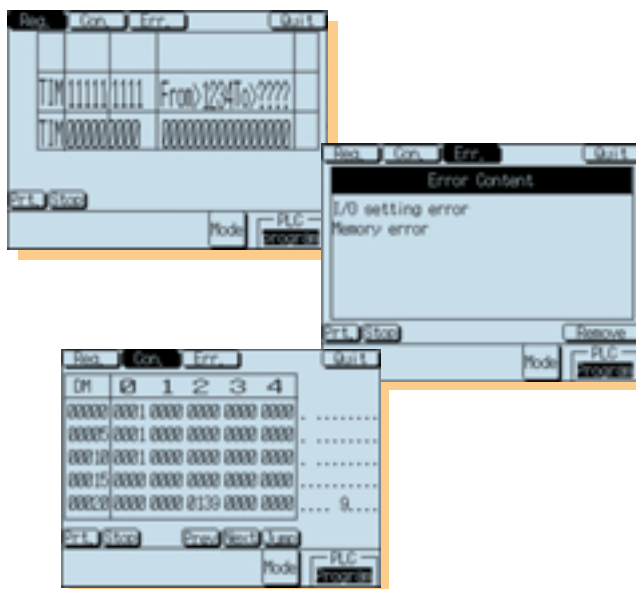
Device Monitor Function

Another feature available on the NT31/631 when using an Omron PLC, the Device Monitor Function allows the NT to monitor tables of individually selected PLC values, or entire ranges of a PLC memory area. Once the values or ranges are selected, data values can be viewed in real time as they change. There is also a window to view errors currently active within PLC memory. Previously, only the PLC programming software could perform these diagnostics. Now, no laptop is needed for these basic debugging tools.

Registration Monitor – Manually create a list of PLC addresses and simultaneously monitor them. Update the different values by touching the address and entering a new value with a popup keypad.

PLC Error Screen – View the current errors in the PLC.

Continuous Monitor - Create a table of 50 PLC addresses to monitor and change. Simply select the initial address, and the table automatically fills in with the next (25 for NT31, 50 for NT631) sequential addresses.



Images and Art Objects

Bitmap images can be displayed as fixed objects or image lamps. Image lamps have an ON state and OFF state, each represented by a different bitmap. Image objects display bitmap images from the image table stored within the operator interface. This can be a fixed reference to one image table location, or the reference can be controlled by the PLC. This is an excellent way to quickly achieve animation.

Touch Switches and Lamps

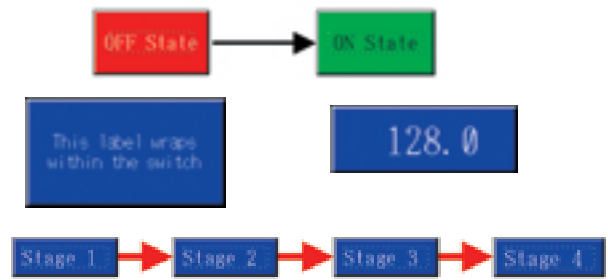
The original purpose of touch screens was to provide a cost effective replacement for hardwired pushbutton and selection switches and indicator lamps. This is still one of the primary motivations on panels today. The NT31 and NT631 include a variety of touch switch and lamps, as well as a library of image objects to lend that special touch. Omron touch switches and lamps include a higher degree of control than most touch screen products, allowing the objects to be sized, colored, and positioned as needed. There are also many labeling options available:

- Control bits
- Control pop-up windows
- Switch screens
- Copy values
- Input numeric & text characters
- Move the cursor
- Execute a screen print



Dynamic Labels

The labels within touch switches and lamps can change with bit state, display a numeric value from PLC memory, or display any number of messages directly from a string table as commanded by the PLC. The string table is a numbered list where each table entry represents a different string message. The PLC can specify a string table entry number and change the message displayed within a switch or lamp, creating a great deal of application flexibility.



Numeric and String Display

Numeric values can be displayed as bar graphs, needle meters, or simple formatted numerals. All of these options are highly customizable, and can be located anywhere on the screen. Strings can be displayed as alphanumeric characters read from the string table in the operator interface memory as directed by the PLC, or taken directly from PLC memory.

Graphical Data Display

Use colorful charts and graphs to convey complex data to your operators at a glance. Chart data can be logged for review of previous activity.

Communication Ports

The NT31 and NT631 series interfaces have a dedicated printer port, an RS-232C port with a 5vdc pin, and a port that is configured to RS-232C, RS-422/485 (the NT631 uses a terminal block for RS-422/485 connection). The dedicated RS-232C port is generally left available to ensure a free port for program transfer. The dedicated RS-232C port is also available for connection to a bar-code reader (Omron serial driver only). The NT21 series interface has two RS-232C ports. One port can be converted to RS-422/485 using the NS-AL002 adapter.



NT21



NT31



NT631



NT21



NT31



NT631

Compact Design

The shallow depths, efficient face dimensions, and small panel cutout requirements make this NT series ideal for mounting in confined spaces.

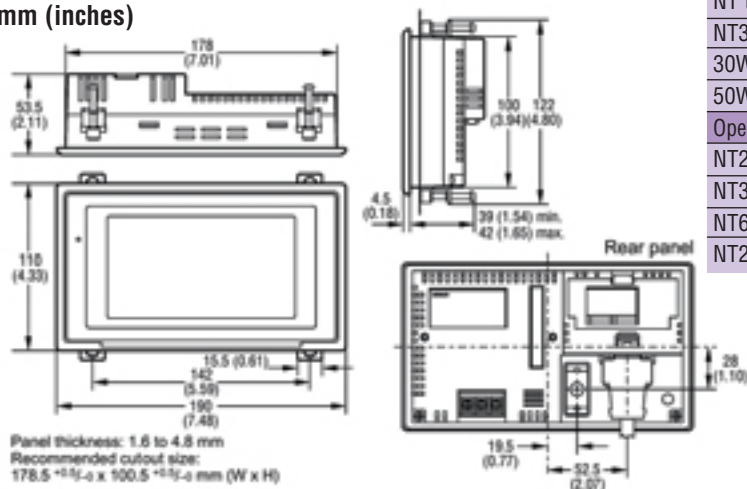
Ordering Information

Description	Part Number
NT21 Display	
Monochrome STN LCD 5.2" touch screen	NT21-ST121□-E
NT21 Accessories	
5 NT21 Protective Screen Sheets	NT20M-KBA04
NT21 Chemical Resistant Cover	NT20S-KBA01
RS232C to RS422A Adapter	NS-AL002
NT31 Display	
Monochrome STN LCD 5.7" touch screen	NT31-ST121□-EV2
8 Color STN LCD 5.7" touch screen	NT31C-ST141□-EV2
NT31 Accessories	
NT30/NT31 Chemical Resistant Cover	NT30-KBA01
5 NT30/NT31 Protective Screen Sheets	NT30-KBA04
NT31/NT31C Replacement Backlight	NT31C-CFL01
50 cm 25-9PIN Cable, NT to Omron PLC	NT31C-CN510-EU
3 m 25-9PIN Cable, NT to Omron PLC	NT31C-CN320-EU
5 m 25-9PIN Cable, NT to Omron PLC	NT31C-CN520-EU
3 m 25-9PIN Cable, NT to AB PLC	NT31C-CN321-EU
3 m 25-9PIN Cable, NT to GE PLC	NT31C-CN322-EU
3 m 25-9PIN Cable, NT to Siemens	NT31C-CN323-EU
3 m 25-9PIN Cable, NT to Mitsu-A	NT31C-CN324-EU
3 m 25-9PIN Cable, NT to Mitsu-FX	NT31C-CN325-EU

Description	Part Number
NT631 Display	
Electroluminescent 10.4" touch screen	NT631-ST211□-EV2
8 Color STN LCD 11.3" touch screen	NT631C-ST141□-EV2
8 Color TFT LCD 10.4" touch screen	NT631C-ST151□-EV2
NT631 Accessories	
NT631C-ST141 Replacement Backlight	NT631C-CFL01
NT631C-ST151 Replacement Backlight	NT631C-CFL02
NT631 Chemical Resistant Cover	NT625-KBA01
5 NT631 Protective Screen Sheets	NT610C-KBA04
General Accessories	
NT Series Support Tool v 4.6	NT-ZJCAT1-EV4
Programming Cable 9-9 pin	C200H-CN229-EU
50 cm 9-9PIN Cable, NT to Omron PLC	C200H-CN510-EU
3 m 9-9PIN Cable, NT to Omron PLC	C200H-CN320-EU
5 m 9-9PIN Cable, NT to Omron PLC	C200H-CN520-EU
2 m 9PIN Cable, NT to AB DH-485 Port	NT631C-CN221-485
3 m 9-9PIN Cable, NT to AB PLC	NT631C-CN321-EU
3 m 9-9PIN Cable, NT to GE PLC	NT631C-CN322-EU
3 m 9-9PIN Cable, NT to Siemens	NT631C-CN323-EU
3 m 9-9PIN Cable, NT to Mitsu-A	NT631C-CN324-EU
3 m Term-25PIN Cable, NT to Mitsu-FX	NT631C-CN325-EU
2 m CS1/CJ1/CPM2C Peripheral Com. Cable	XW2Z-200T-2
5 m CS1/CJ1/CPM2C Peripheral Com. Cable	XW2Z-500T-2
NT to Printer Cable	NT-CNT121
NT31/NT631 Program Transfer Module	NT-MF261
30W, 24 VDC, 1.3 A Power Supply	S82K-03024
50W, 24 VDC, 2.1 A Power Supply	S82K-05024
Operation Manuals	
NT21 Set-Up Manual	V068-E1-1
NT31 Set-Up Manual	V062-E1-1
NT631 Set-Up Manual	V063-E1-1
NT21/31/631 Reference Manual	V069-E1-1

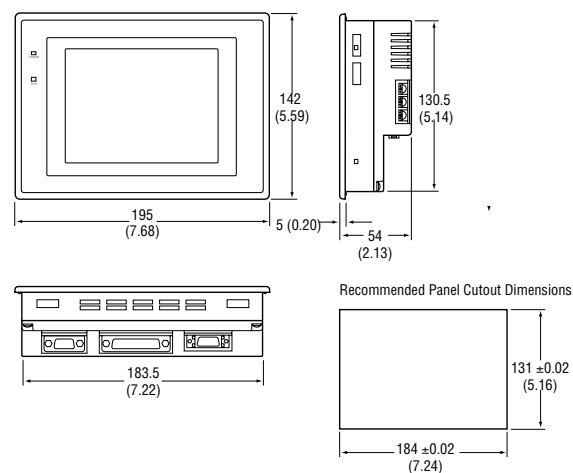
NT21 Dimensions

mm (inches)

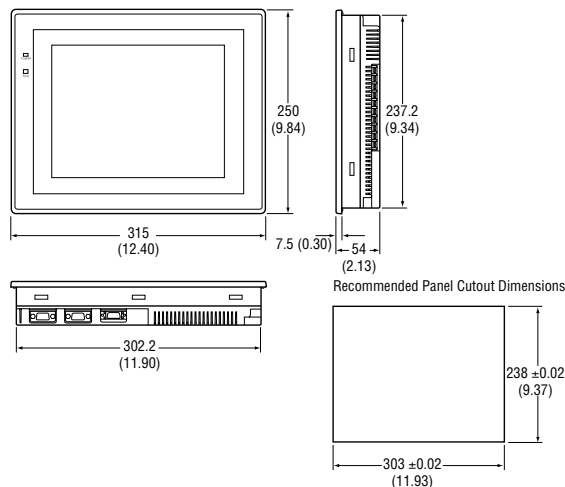


NT31 Dimensions

mm (inches)



NT631 Dimensions



Specifications

	NT21	NT31/31C	NT631/631C
Rated power supply voltage	24 VDC		
Power consumption	7 W max.	15 W max.	ST211□ 30 W max.; ST141□ & ST151□ 18 W max.
Operating ambient temperature	0 to +50°C (with no icing)	0 to +50°C	ST211□ & ST151□ 0 to +50°C; ST141□: 0 to +40°C
Operating ambient humidity	35 to 85% (0 to 40°C) 35 to 60% (40 to 50°C) (with no condensation)	35% to 85% (with no condensation)	
Noise resistance	Conforms to IEC61000-4-4; Power supply line: 2 kV	Common mode: 1000 Vp-p (between power supply terminals & panel); Normal mode: 300 Vp-p; Pulse width of 100 ns to 1 μs, pulse rise time of 1 ns	
Vibration resistance (operating)	10 to 57 Hz with 0.075 mm amplitude; 57 to 150 Hz with 1G (9.8 m/s ²) acceleration for 60 min. in each of X, Y, Z directions	10 to 57 Hz with 0.075 mm amplitude; 57 to 150 Hz with 1G (9.8 m/s ²) acceleration for 60 min. in each of X, Y, Z directions	ST211□: 10 to 57 Hz with 0.075 mm amplitude for 30 min. in each of X, Y, Z directions; ST141□ & ST151□: 10 to 57 Hz with 0.075 mm amplitude, 57 to 150 Hz with 1G (9.8 m/s ²) acceleration for 30 min. in each of X, Y, Z directions
Shock resistance (operating)	147 m/s ² (15G); 3 times in each of X, Y, Z directions		
Dimensions	190 (W) x 110 (H) x 53.5 (D) mm (thickness inside panel: 49 mm)	195 (W) x 142 (H) x 54 (D) mm (w/ expansion unit: 74 D)	315 (W) x 250 (H) x 54 (D) mm (w/ expansion unit: 74 D)
Weight	0.6 kg max.	1 kg max.	2.5 kg max.
Enclosure ratings	Front panel: equivalent to IP65F (NEMA4)*		
Display panel		Monochrome or Color STN LCD with backlight	ST211□: EL (monochrome); ST141□: Color STN LCD with backlight; ST151□: Color TFT LCD with backlight
Number of dots (resolution)	260 dots horizontally x 140 dots vertically	320 dots horizontally x 240 dots vertically	640 dots horizontally x 480 dots vertically
Effective display area	117 (H) x 63 (V) mm (5.2 inches diagonal)	118.2 (H) x 89.4 (V) mm (5.7 inches diagonal)	ST211□ & ST151□: 211 (H) x 158 (V) mm (10.4 inches diagonal) ST141□: 229 (H) x 172 (V) mm (11.3 inches diagonal)
View angle	Left/right direction: 30°; Up/down: 30°	NT31: Up: 20, Down: 30, Left/right: 30; NT31C: Up: 45, Down: 60, Left/right: 50	ST211□: No restriction; ST141□: Up/down: 30, Left: 55, Right: 45; ST151□: Up: 40, Down: 55, Left/right: 55
Display color	ST121□: 2 color black/white	ST121□: 2 color black/white; ST141□: 8 color	ST211□: 2 color black/gold; ST141□ & ST151□: 8 color
Life expectancy	50,000 hours minimum	50,000 hours minimum	ST211□: 30,000 hrs min.; ST141□ & ST151□: 50,000 hrs min.
Contrast adjustment	Knob on back of unit	NT31 & NT631-ST141□ only: Adj. in 100 levels by touch switch operation at panel	
Max. number of registered screens	3999 screens		
Backlight			
Life expectancy	50,000 hours min.	25,000 hours min.	ST141□: 25,000 hours min.; ST151□: 30,000 hours min.
Replacement	Non-replaceable	NT31, NT631-ST141□ & NT631-ST151□: Can be replaced from the rear	
Brightness adjustment	–	NT31 & NT631-ST141□ only: Adj. in 3 levels by operation at the touch panel	
Automatic turn-off function	Can be set to turn off in 1 to 255 minutes, or to remain on with screen saver		
Touch panel			
Type	Resistive type		
Number of switches	91 (13 horizontally x 7 vertically)	192 (16 horizontally x 12 vertically)	768 (32 horizontally x 24 vertically)
Max. number registered on one screen	91	192	256
Life expectancy	One million operations minimum		
Serial communication			
Serial port A	Conforms to EIA RS-232C; D-SUB 9-pin connector (female); +5 V (250 mA max.) output at pin No. 6		
Serial port B	Conforms to EIA RS-232C; D-SUB 9-pin connector (female); +5 V (250 mA max.) output at pin No. 6	EIA RS-232C or RS-422A/485 (selectable, by memory switch setting); D-SUB 25-pin connector (female)	EIA RS-232C (serial port B terminal block selectable by memory switch setting); D-SUB 9-pin connector (female)
Serial port B terminal	–	–	EIA RS-422A/485 (serial port B connector selectable by memory switch setting); Terminal block
Battery backup	Numeral/character string memory tables data in the NT unit; Alarm history data table in the NT unit; Recipe tables in the NT unit; Real time clock and calendar (NT31/31C/631/631C only)		
Screen print function	–	"ESC/P", "Color": Color printing conforming to ESC/P 24-J83C; "PC-PR201H", "Color": Color printing conforming to PC-PR201PL; "ESC/P", "Tone": Monochrome printing in 8 grayscale levels, conforming to ESC/P 24-J82; "PC-PR201H", "Tone": Monochrome printing in 8 grayscale levels, conforming to PC-PR201PL; "PCL-5", "Tone": Monochrome printing in 8 grayscale levels, conforming to PCL 5; however, the NT31 & NT631 supports monochrome printing only	
Calendar & clock function	–	Displays the current time in accordance with the built-in clock; Displayed and set with "Calendar Check" in the MAINTENANCE MODE" menu	

Software

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Programmable Controllers – Control Problem? Omron leads the industry in controller technology. Producing advanced machines of all sizes from micro to large with varying power, I/O, communications, and processing speed options.



Industrial Networking – Omron is a founding member of Open DeviceNet Vendor's Association (ODVA), offering the broadest selection of masters, slaves, specialty products and accessories for DeviceNet available from a single supplier.



Servo Motors and Drives – Omron's W-Series servo motors and drives deliver precise control, maintaining the highest resolution control at very high speeds. Their wide power range (up to 5.5 kW) provides maximum flexibility with easy set up.