N30 Supervisory Controller Installation

Code No. LIT-6891100

www.johnsoncontrols.com
Software Release 5.1

N30 Supervisory Controller Installation

Introduction

This technical bulletin describes the installation of the N30 Supervisory Controller and provides information regarding the Local Display Terminal (LDT), an optional display device installed in the N30.

This technical bulletin describes how to:

- install or replace the MS-NET1300 card
- mount the N30
- configure a VT100 Terminal for the N30
- configure a printer for the N30

For information on setting up an N30 site and using an N30, see the *N30 Supervisory Controller Quick Start Technical Bulletin (LIT-6891200)* and the *N30 Supervisory Controller User's Manual*.

Key Concepts

Installation Site Considerations

Consider the following when selecting an installation site for the N30 Supervisory Controller. The N30:

- measures 168 x 236 x 64 mm (6.6 x 9.3 x 2.5 in.)
- requires an actual mounting area measuring approximately 244 x 236 x 64 mm (9.6 x 9.3 x 2.5 in) to allow sufficient space for cable connections
- weighs approximately 0.7 kg (1.5 lb)

Figure 1 shows the N30 dimensions with wiring allowances

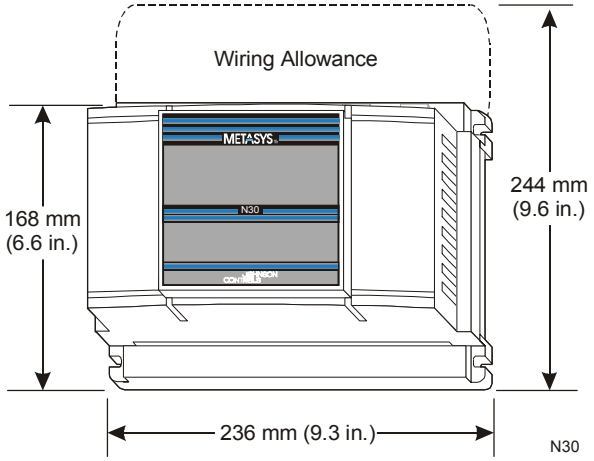
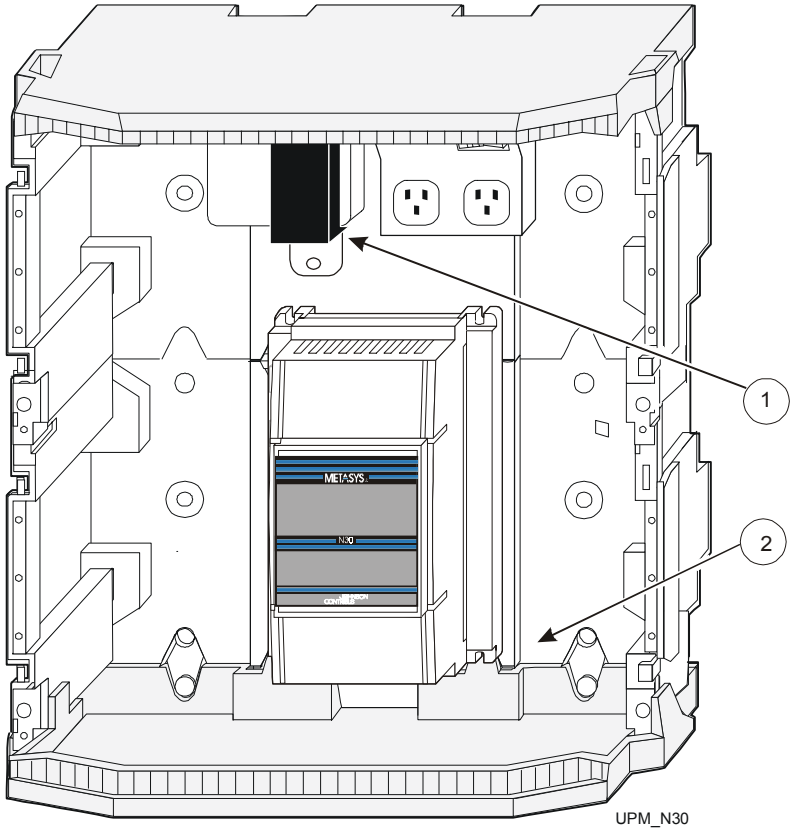


Figure 1: N30 Supervisory Controller Dimensions

You can mount the N30 in an EN-EWC25-0 enclosure. The EN-EWC25-0 is a dual-high unit with a power box and 50 VA transformer.



1. If the transformer has plastic end bells (as illustrated), it must be mounted at the highest hole in the enclosure to fit the N30 in the enclosure. A TORX® (T-20) screwdriver is required to move the transformer.
2. If you must mount the N30 at the bottom of the enclosure, you need only three screws to attach the N30 to the enclosure. The bottom right mounting hole on the N30 will not be over a hole in the enclosure.

Figure 2: N30 and EN-EWC25-0 Enclosure

Consider the following when selecting an installation site for the EN-EWC25-0 enclosure:

- the enclosure measures 406 x 406 x 190 mm (16 x 16 x 7.5 in.)
- wooden surfaces generally only require bolting the enclosure to the wall; drywall surfaces require anchors for the bolts
- the pull-out value of the screw holes in the backbone of the enclosure is 90.7 kg (200 lb)
- the weight resting on the bottom of the enclosure must not exceed 22.6 kg (50 lb)
- the load-bearing capacity of the wall must be able to support the full configuration weight

N30 Port Connections

The N30 Supervisory Controller has an N2 port, an Ethernet port, and three serial ports. All three serial ports support a printer. The N30 also supports simultaneous serial port connection of two VT100s. A dial-out connection can be made to a printer, pager, or e-mail message. Dial-in/dial-out connections can be made to/from an M-Series Workstation or a VT100. The N30 supports multiple dial-in and/or dial-out connections to M-Series Workstations.

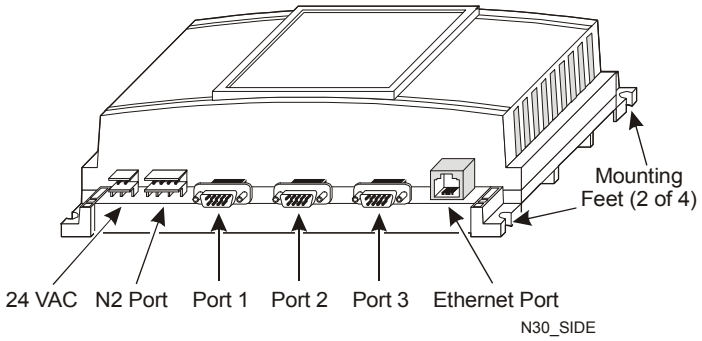
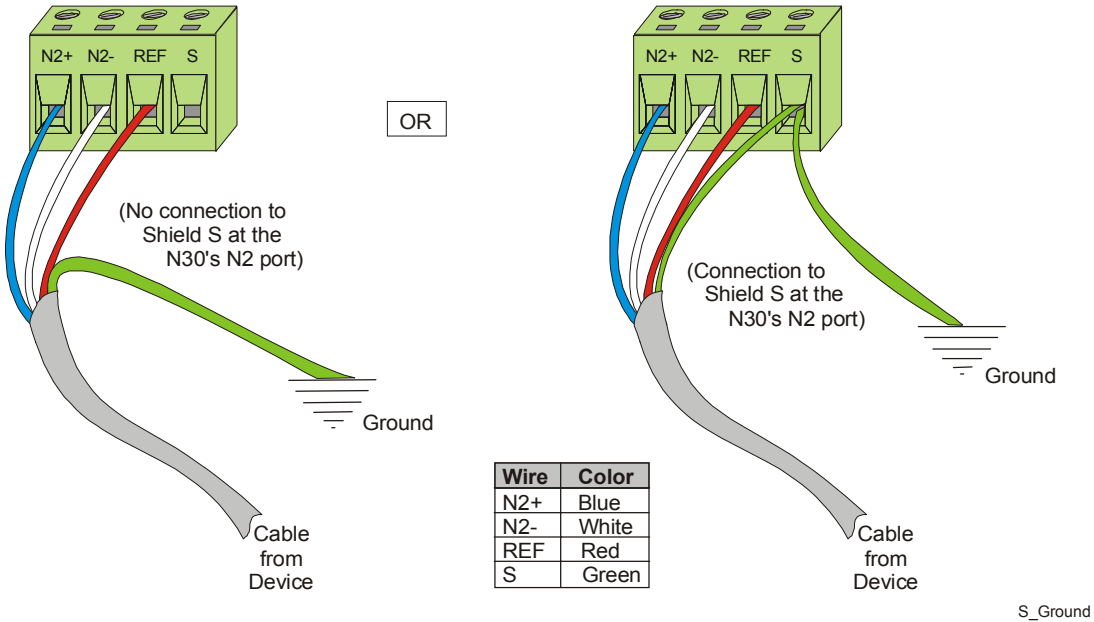


Figure 3: N30 Supervisory Controller

IMPORTANT: For baud faster than 19,200 bits per second (bps), the serial cables must be shorter than 4 m (13 ft).

Note: The Shield connection S on the N2 port of the N30 is not connected to any Ground connection. S is an open terminal that can be used as a splice connection. To ground the connection, see Figure 4. You must connect the Shield wire to ground at one point only, preferably at the N30 controller (see Figure 4).



Wire	Color
N2+	Blue
N2-	White
REF	Red
S	Green

Figure 4: N2 Port - Grounding Shield Connection S

Cabling Overview

Figure 5 shows an overview of the cables needed to connect various devices to an N30, computer, VT100, printer, or modem.

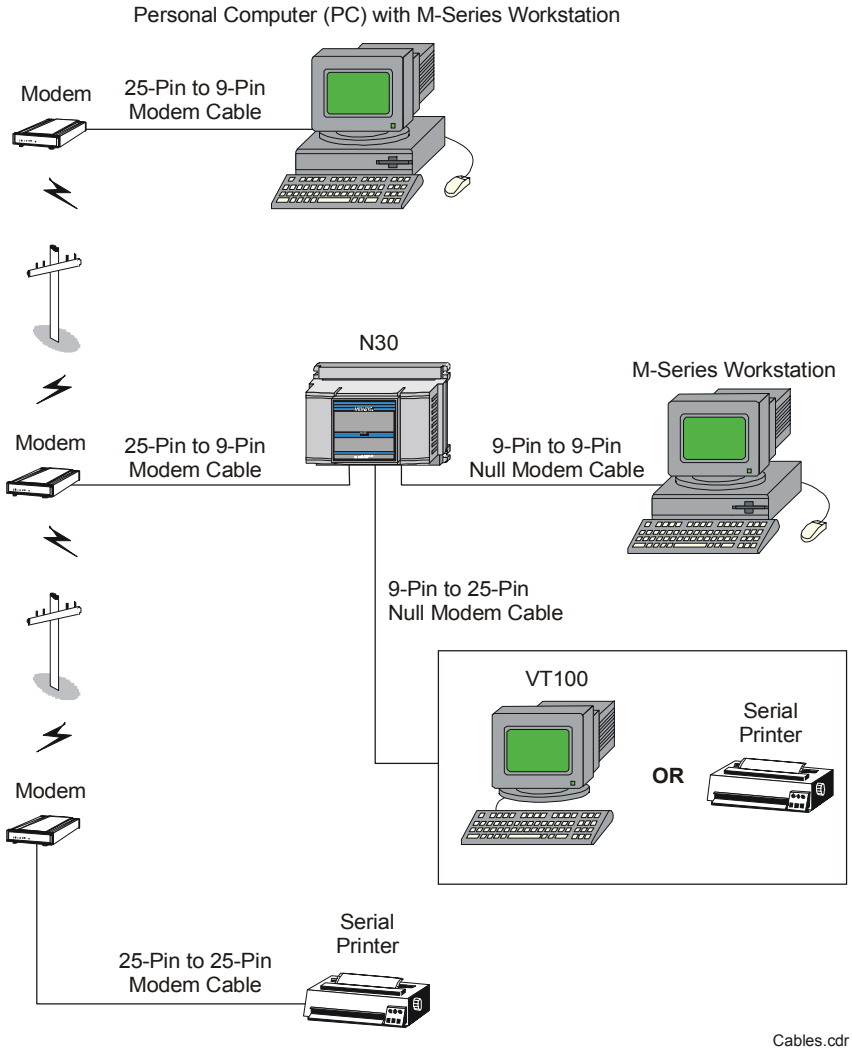


Figure 5: Cabling Overview

Figure 6, Figure 7, Figure 8, and Figure 9 describe the individual cable pinouts for each of the cables shown in Figure 5.

PC Serial Port Cabling

To connect the N30 to the serial port of a PC running VT100 emulation software, use a standard 9-pin female to 9-pin female, Data Terminal Equipment (DTE) to DTE null modem cable (Figure 6).

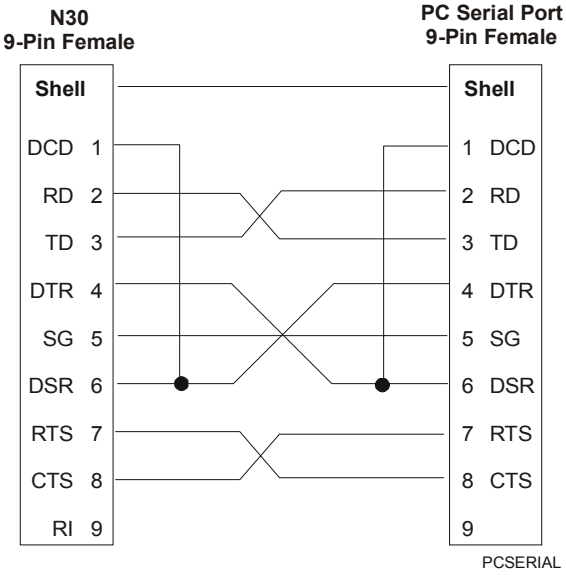


Figure 6: 9-Pin to 9-Pin Null Modem Cable

Modem (Remote N30 or PC) Cabling

To connect a modem to a remote N30 or PC, use a standard 9-pin female to 25-pin male, DTE to Data Communication Equipment (DCE) modem cable (Figure 7).

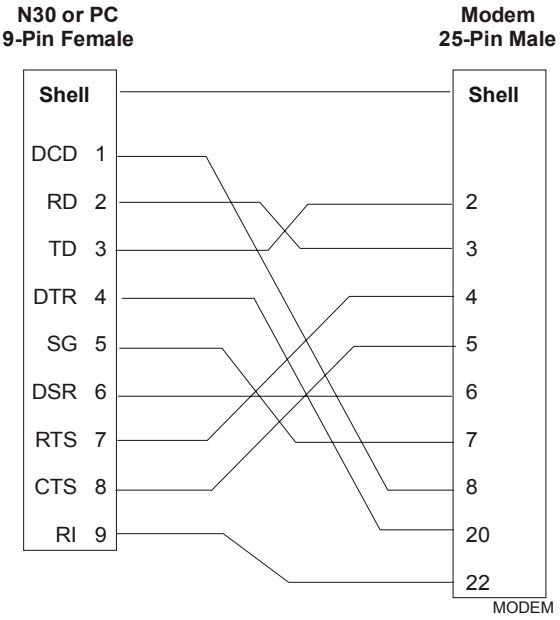


Figure 7: 9-Pin to 25-Pin Modem Cable

Serial Printer and VT100 Cabling

To connect the N30 to a VT100 or serial printer, use a standard 9-pin female to 25-pin male, DTE to DTE null modem cable (Figure 8).

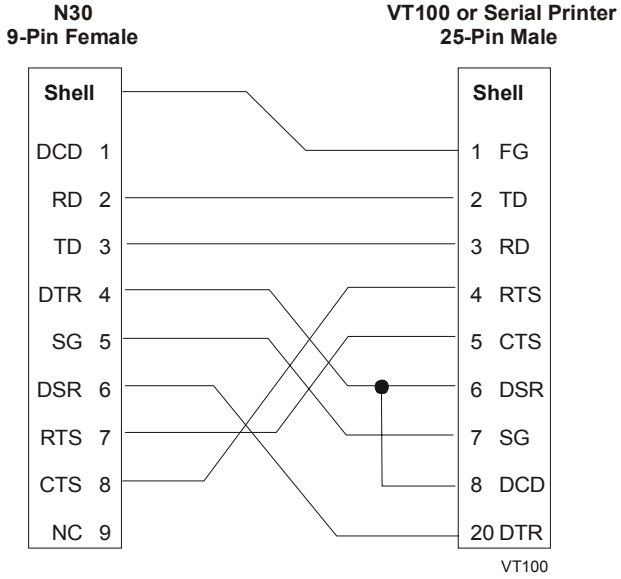


Figure 8: 9-Pin to 25-Pin Null Modem Cable

Modem (Remote VT100 or Printer) Cabling

To connect a modem to a remote VT100 or serial printer, use a standard 25-pin male to 25-pin male, DTE to DCE modem cable (Figure 9).

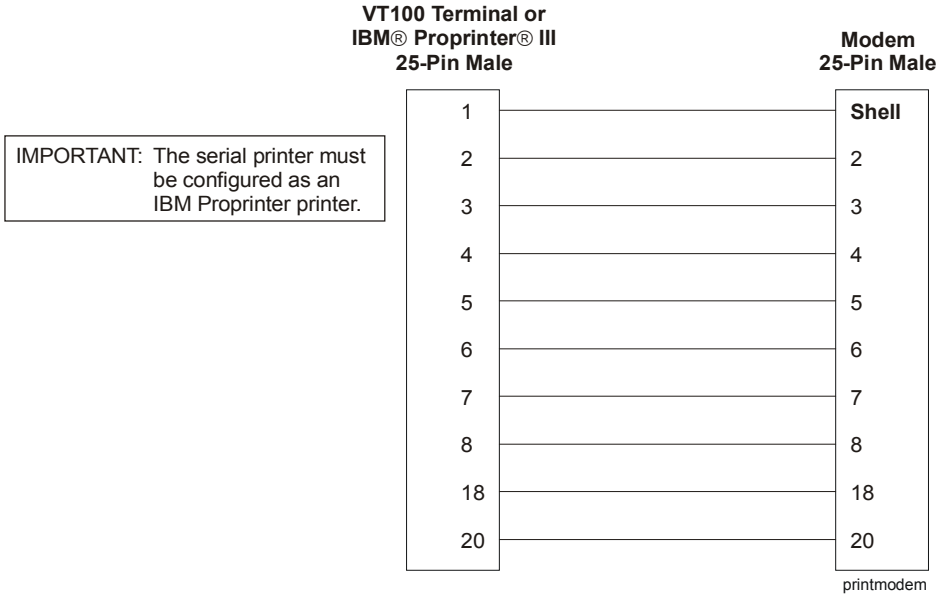


Figure 9: 25-Pin to 25-Pin Modem Cable

Local Display Terminal (LDT)

The LDT is an optional display device installed in the N30 Supervisory Controller. The LDT provides alarm notification and navigation and access to data in the controller. The device also allows display and modification of operating conditions, such as temperature, heating and cooling setpoints, and fan override.

The Liquid Crystal Display (LCD) of the LDT displays up to four lines of twenty alphanumeric characters. The keypad contains navigational and functional pushbuttons. See Figure 10 and Table 1.

Order the LDT separately for installation into existing N30s or as part of a preassembled N30/LDT package. See *Product Code Numbers* in this document.

For troubleshooting the LDT, refer to Table 7 in this document. For information on how to install and operate the LDT, see the *Local Display Terminal (LDT) Installation Instructions (LIT-12023).*

To avoid possible equipment damage due to Electrostatic Discharge (ESD), do **not** use the LDT as a handheld or portable device.

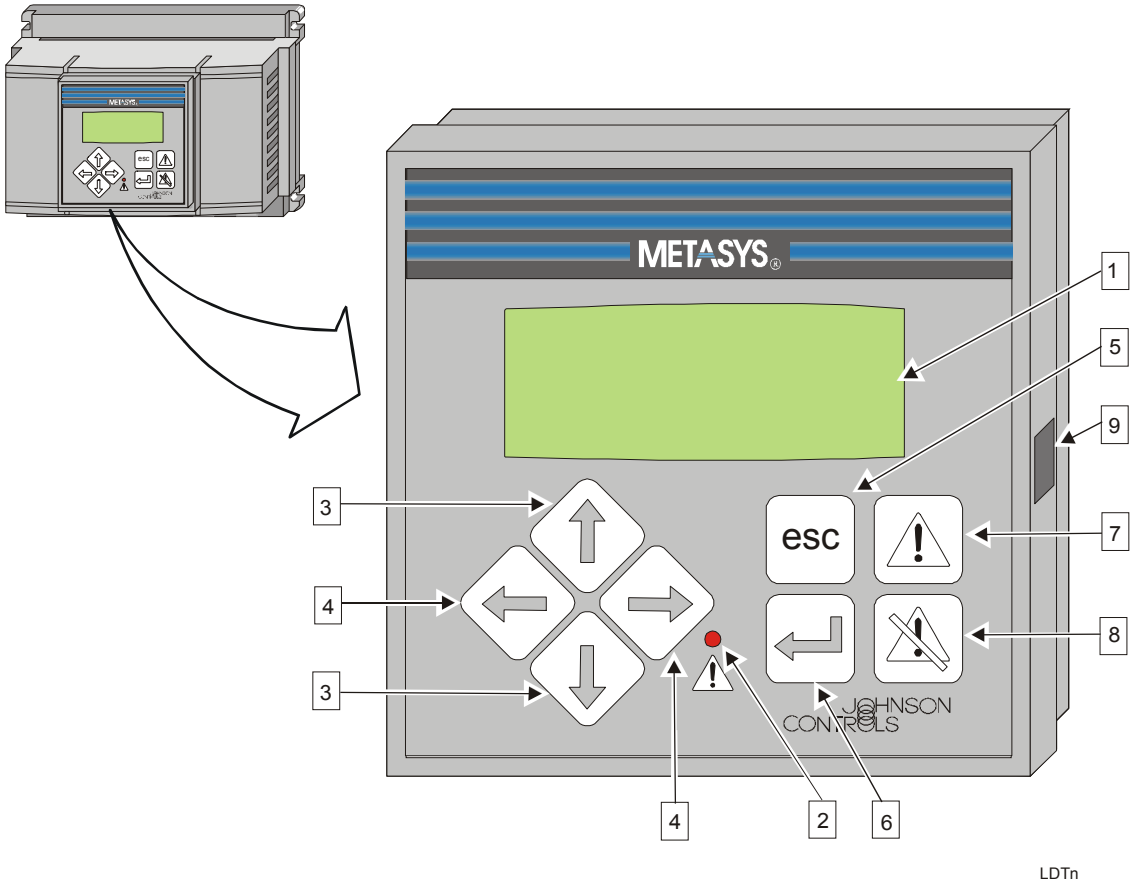


Figure 10: Local Display Terminal

Table 1: LDT Display

Callout	Feature	Description	
1	Liquid Crystal Display (LCD) with Backlight	Displays the menus and parameters associated with objects. The backlight turns on at startup and remains on until it times out (10 minutes after a key press or startup).	
2	Alarm Light-Emitting Diode (LED)	Indicates the presence of an alarm when the light is on.	
3	Up/Down Arrows	Navigation Mode:	Scrolls upward/downward through menu and submenu items.
		Edit Mode:	Increases/decreases the parameter value shown.
4	Right/Left Arrows	Navigation Mode:	Scrolls right/left through menu and submenu items.
		Edit Mode:	Positions the cursor to the next editable field to the right/left within the displayed line.
5	Escape (Esc)	Navigation Mode:	Returns to the previous menu.
		Edit Mode:	Exits Edit Mode.
		Note:	If in Password mode and at the Main Menu, Esc logs the user out of Password mode.
6	Enter	Navigation Mode (Main Menu):	Selects the submenu in which the cursor is positioned and displays that submenu.
		Navigation Mode (Submenus):	Selects the submenu item and switches to Edit Mode.
		Edit Mode:	Writes the changed parameter value to the controller memory.
7	Get Alarms	Displays the highest priority alarm if the Alarm LED is on.	
8	Clear Alarms	Acknowledges the displayed alarm.	
9	DIP Switches	Sets the N2 Address.	

Passwords

The LDT prompts the user to enter a password before entering Edit Mode. The password remains in effect until the LCD times out 10 minutes after the last key press. Passwords contain four numeric characters. For more information, refer to *Project Builder User's Guide*.

DIP Switches

Two DIP switches configure the N2 Address of the LDT. The N2 Address ranges from 32 to 35 using a base address of 32 and two DIP switches (Switch 1 and Switch 2) to increase the address. Although four DIP switches exist on the LDT, Switch 3 and Switch 4 are not accessible and are set to factory defaults that should not be changed.

The N2 Address equals the sum of the base address and each DIP switch set to the ON position. For example, Figure 11 shows the first DIP switch (1) set to ON and the second switch (2) set to OFF; the N2 Address for that controller is 33 (32 + 1 = 33).

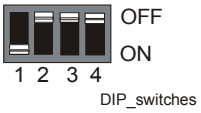


Figure 11: LDT DIP Switches

Initialization

Once power is applied to the N30 controller, the LDT automatically begins initialization. An initialization message briefly appears when complete. See Figure 12 and Table 2.

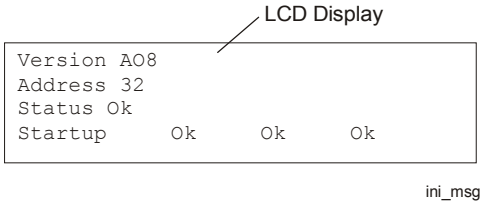


Figure 12: LDT Initialization Message

Table 2: LDT Initialization Message

Message	Description
Version	Version of firmware
Address	N2 Address 32, 33, 34, or 35
Status	Ok (normal startup) or No Comm (no communication between the controller and the LDT)
Startup	Ok (normal startup) or RAM (internal RAM test failed on startup)
	Ok (normal startup) or XRAM (external RAM test failed on startup)
	Ok (normal startup) or ROM (calculated ROM checksum does not match stored checksum)

Light-Emitting Diodes (LEDs)

Each port on the N30 has its own LED to indicate the status of operation (Figure 13).

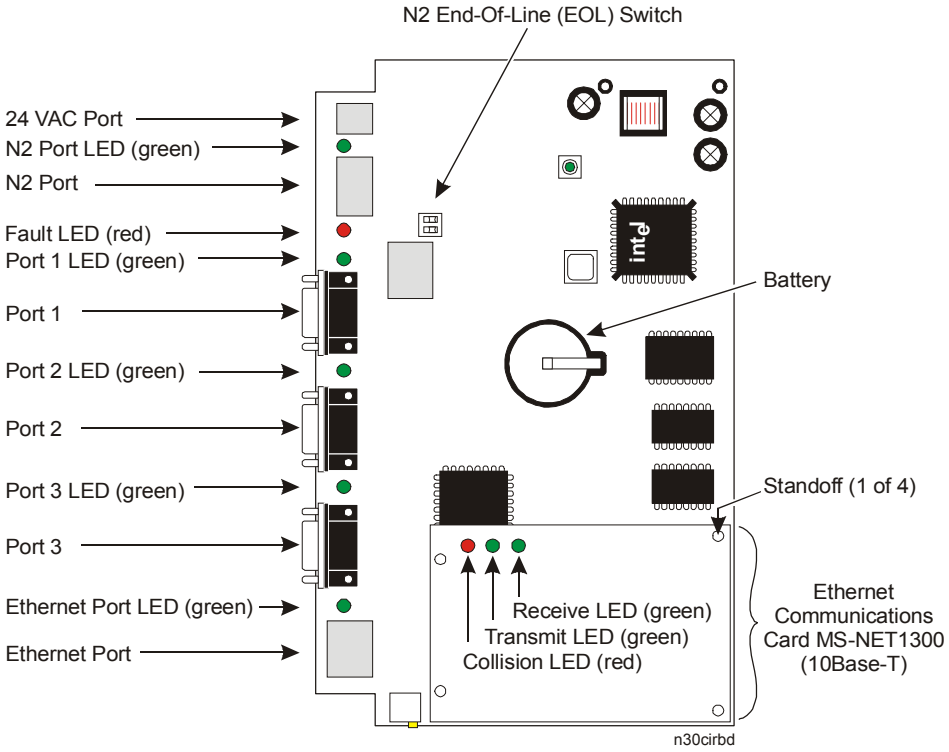


Figure 13: N30 Port and LED Locations

During startup, the N30 automatically runs an LED test to verify the operational status of the LEDs. Immediately after a reset, the LED lighting sequence occurs as follows:

- all LEDs turn on
- all LEDs shut off
- each LED turns on for one-half second, in sequence
- all LEDs shut off, or any startup errors display

Note: If startup errors display, the red fault LED lights, along with an associated binary combination of the five port LEDs. See Table 3.

- the operational status of the N30 appears (active ports are indicated by flashing port LEDs) or the current diagnostic test displays (if in diagnostic test mode)

Port failures are indicated during startup by the red fault LED and the LED assigned to the particular failed port. For example, a failure on Port 1 is indicated when the red fault LED and the Port 1 LED are illuminated.

During startup, the fault LED lights steadily to indicate a non-catastrophic failure. A non-catastrophic failure displays for 3 seconds, and then the startup process is resumed. The fault LED flashes to indicate a catastrophic error (Static Random Access Memory [SRAM] failure) or a Flash Cyclic Redundancy Check (CRC) failure.

During operation, the N30 performs a battery test at midnight and on a manual command to test the battery. If the battery is bad, the red fault LED flashes. The fault LED continues to flash until the battery is replaced and another battery test is initiated or power is cycled to the N30.

The N30 uses 3-volt polycarbonmonofluoride lithium batteries. These batteries are used for extended reliability and safety. The N30 battery life lasts approximately 3 years when the N30 is not powered. It is unlikely that the battery will need to be replaced.

Under normal circumstances when downloading code into the N30, the red fault LED lights steadily indicating that the N30 is running in Boot code. Table 3 describes the failures indicated by the LEDs during startup.

Table 3: LED Displays for Startup Failures

LED	Startup Failures								
	Battery	Flash CRC (All)	RAM Hi Byte	RAM Lo Byte	N2 Port	Port 1	Port 2	Port 3	Ethernet Port
N2 Port			On		On				
Fault	On	Flash	Flash	Flash	On	On	On	On	On
Port 1	On	On				On			
Port 2	On		On	On			On		
Port 3	On							On	
Ethernet									On

Figure 13 shows the location of the ports and their corresponding LEDs.

Note: The N2 End-of-Line (EOL) Switch (SW1) is a two-position slide switch provided to switch in a 220-ohm EOL resistor and 1200-ohm bias resistor to terminate the N2 Bus. The EOL resistors are switched in when both switches are in the On position. This is the default position. To remove the EOL terminations, move both switches to the opposite side.

Procedure Overview

Table 4: N30 Supervisory Controller Installation

To Do This	Follow These Steps:
Install or Replace the MS-NET1300 Card (MS-N30101x-x controllers ship without the MS-NET1300 card)	Detach the N30 from its mounting location. Remove the N30 cover. If necessary, pull out the existing card after releasing the tabs on the standoffs. Push the MS-NET1300 card onto the standoffs until it clicks into place. Replace the cover. Mount the controller.
Mount the N30	
Wall Mount	Position the N30 over the proposed mounting space, and mark the locations of the four mounting feet (at the corners of the N30). Remove the N30 from the wall, and drill a hole in the wall at each of the four mounting feet locations. Align the four mounting feet of the N30 with the holes in the wall. Insert screws at each of the four mounting feet. Connect 24 VAC power and cables to the N30.
DIN Rail	Snap the N30 onto the DIN rail. Connect 24 VAC power and cables to the N30.
Universal Packaging Module (UPM) Enclosure	Mount the enclosure. Align the four mounting feet at the corners of the N30 with the holes in the backbone of the enclosure. Insert screws at each of the four mounting feet. Connect 24 VAC power and cables to the N30.
Configure a VT100 Terminal for the N30	Same baud rate as N30, 8, N, 1, Hardware flow control. Set terminal emulation to Auto Detect, especially if using special characters from Western European languages in the N30 database.
Configure a Printer for the N30	Same baud rate as N30, 8, N, 1, Hardware flow control, Normal operation

Detailed Procedures

Installing or Replacing the MS-NET1300 Card

Note: MS-N30131x-x controllers come with the MS-NET1300 card factory installed. Use these steps only if you need to replace the card or if you want to install the card in an MS-N30101x-x controller that does not have the card factory installed.

To install or replace the MS-NET1300 card:

1. Remove the N30 from the wall, DIN rail, or enclosure.
2. Turn over the N30 so that the back faces you and locate the screwdriver slots (Figure 14).

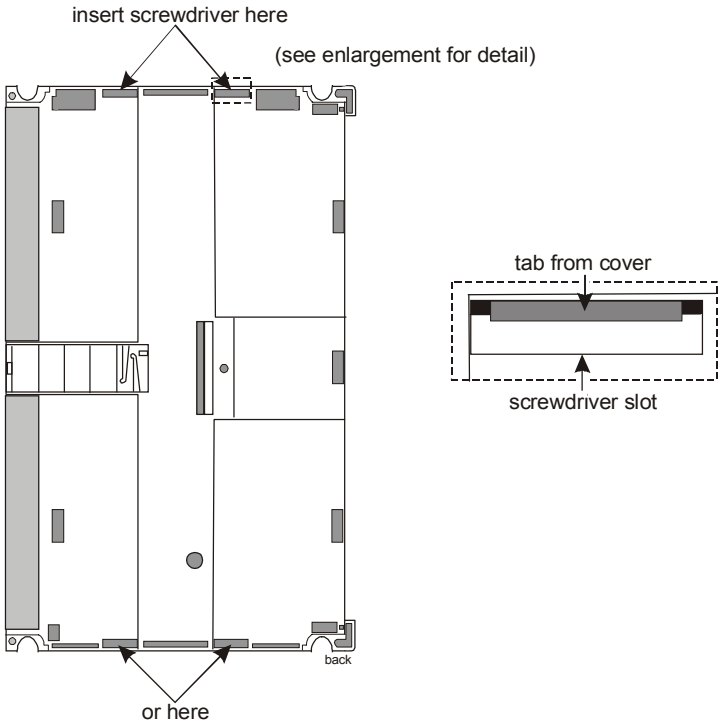


Figure 14: Back of the N30

3. Hold onto the N30 base and insert a flat-head screwdriver into each of the four slots at either end of the controller in turn. Release the cover tab by twisting the screwdriver blade, and carefully prying the cover off the base (Figure 15).

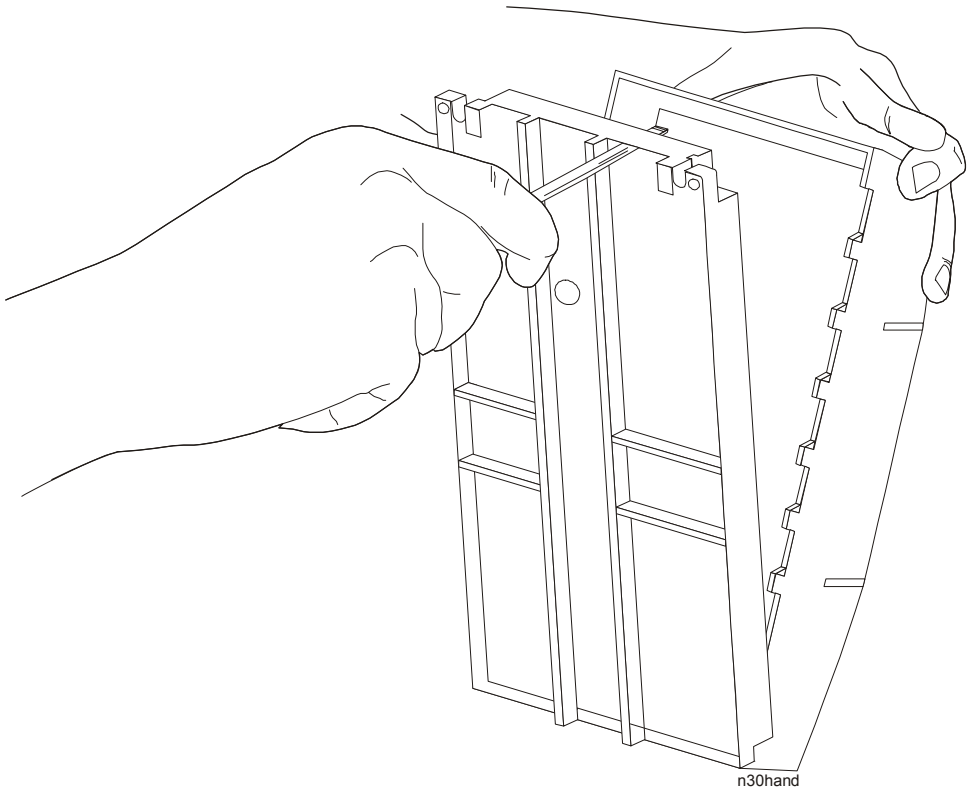


Figure 15: Pry Off the Cover

4. Remove the existing card (if present) by pressing in the tabs of the standoffs so that they pass through the holes in the card, and pulling the card out of the controller circuit board.

5. Place the new card over the four standoffs (Figure 16). Make sure the card mounting holes center over the standoffs and the integrated circuitry faces down. Press down firmly on the card to snap it into place.

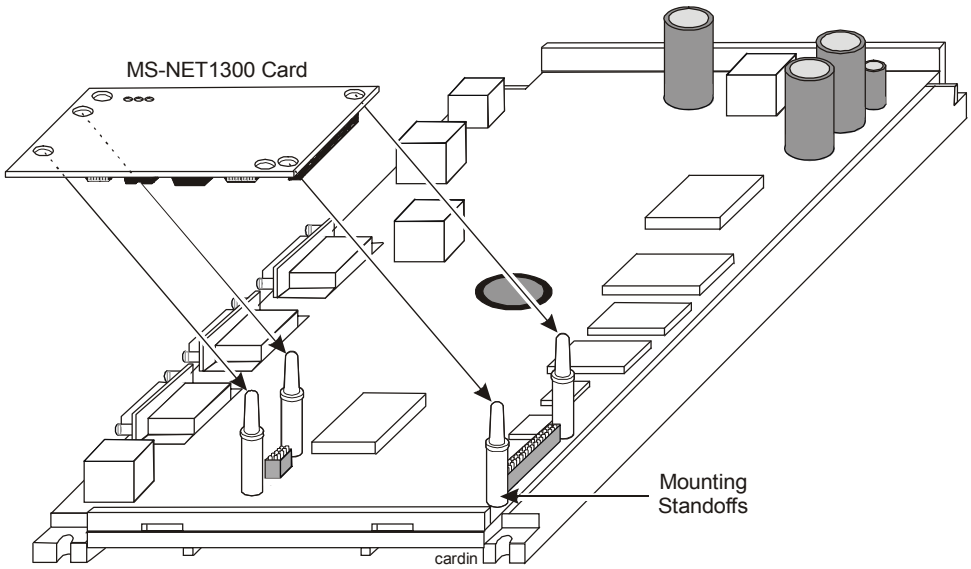


Figure 16: N30 Circuit Board

6. Press the cover back onto the N30 and mount the controller following the instructions in *Mounting the N30.*

Mounting the N30

There are several options when mounting the N30.

Note: If you are installing or replacing an MS-NET1300 card, complete that task before mounting the N30. See *Installing or Replacing the MS-NET1300 Card* for details.

Wall Mount

To mount the N30 by itself on a wall:

1. Position the N30 over the proposed mounting space, and mark the locations of the four mounting feet (at the corners of the N30).

Note: Allow enough space to make cable connections to the N30. The proposed mounting space should be at least 244 x 236 x 64 mm (9.6 x 9.3 x 2.5 in.).

2. Remove the N30 from the wall, and drill a hole in the wall at each of the four mounting feet locations.
3. Align the four mounting feet of the N30 with the holes in the wall.
4. Insert screws at each of the four mounting feet.
5. Connect 24 VAC power and cables to the N30.

DIN Rail

To mount the N30 on a DIN rail:

1. Snap the N30 onto the DIN rail.
2. Connect 24 VAC power and cables to the N30.

UPM Enclosure

To mount the N30 in an EN-EWC25-0 enclosure:

1. Mount the EN-EWC25-0 enclosure according to the procedures described in the *Universal Packaging Module Technical Bulletin (LIT-6363070)*.
2. Align the four mounting feet (at the corners of the N30) with the holes in the backbone of the enclosure.

Note: Allow enough space for making cable connections to the N30. The proposed mounting space should be at least 244 x 236 x 64 mm (9.6 x 9.3 x 2.5 in.).

3. Insert screws at each of the four mounting feet.
4. Connect 24 VAC power and cables to the N30.

Note: The hot and common lines can be connected to either terminal of the 24 VAC. Maintain polarity on subsequent devices.

Configuring a VT100 Terminal for the N30

To configure a VT100 Terminal for the N30, use the settings in Table 5.

Table 5: VT100 Terminal Configurations

Setting	Configuration
Data Bits	8
Parity	No
Stop Bits	1
Baud Rate	Same baud rate as the N30 (9600 default)
Flow Control	Hardware flow control

Note: If using a VT100 Terminal emulator, set the emulation setting to Auto Detect.

Connect the VT100 Terminal to Port 1.

Configuring a Printer for the N30

To configure a printer for the N30, set the mode and DIP switches to the configurations shown in Table 6.

Table 6: Printer Configurations

Setting	Configuration
Card	Serial Interface
Mode	RS-232
Polarity	No reverse polarity (typically)
Baud Rate	Set to the rate established in N30
Data Bits	8
Parity	No
Stop Bits	1
Protocol	Hardware flow control
Operation	Normal

Troubleshooting

Refer to Table 7 for troubleshooting the LDT.

Table 7: LDT Troubleshooting

Problem	Solution
The LDT does not display values for the parameters.	Check that the LDT communication cable is installed properly. Refer to the *Local Display Terminal (LDT) Installation Instructions (LIT-12023).* Configure the Display object using Project Builder. Refer to *Project Builder User's Guide.*
The LDT's initialization message remains on the LCD Display with a status of `No Comm`.	Check that the LDT communication cable is installed properly. Refer to the *Local Display Terminal (LDT) Installation Instructions (LIT-12023).* Configure the Display object using Project Builder. Refer to *Project Builder User's Guide.*
The LDT's Alarm menu does not display when pressing the Get Alarms key.	Check that an alarm menu is defined in the Display object. Check that the Alarm menu is the last menu in the hierarchy of the Display object.
The Initialization Message Startup attribute shows RAM, XRAM, or ROM instead of Ok.	Replace the LDT device.

Product Code Numbers

Refer to Table 8 for Metasys® Network N30 product code numbers.

Table 8: Product Code Numbers

Product Code Number	Description
MS-N301010-1	Supervisory controller, base unit with N2 field bus
MS-N301012-1	Supervisory controller, base unit with N2 field bus and factory-installed Local Display Terminal (LDT)
MS-N301310-1	Supervisory controller, base unit with N2 field bus and Ethernet peer bus
MS-N301312-1	Supervisory controller, base unit with N2 field bus, Ethernet peer bus, and factory-installed LDT
MS-NET1300-0	Ethernet communication card for N30/N31 unit
MS-N301010-701	Repair unit for supervisory controller, base unit with N2 field bus
MS-N301012-701	Repair unit for supervisory controller, base unit with N2 field bus and LDT
MS-N301310-701	Repair unit for supervisory controller, base unit with N2 field bus and Ethernet peer bus
MS-N301312-701	Repair unit for supervisory controller, base unit with N2 field bus, Ethernet peer bus, and LDT
MS-LDT1102-0	LDT Panel Kit for N30 (cable included)
MW-MTOOL-0	Programming tool set for N30 and related Application Specific Controllers (ASCs) (replaces Configuration Tools). Includes System Tools and Configuration Tools software and M-Tool tutorial.
MW-MTOOL-6	Upgrade to Programming tool set for N30 and related ASCs (replaces Configuration Tools). Includes System Tools and Configuration Tools software and M-Tool tutorial.
MW-MTCBT-0	M-Tool tutorial package

Technical Specifications

Feature	Specification
Power	Nominal 24 VAC ±10% at 50/60 Hz
Power Consumption	5 VA maximum
Ambient Operating Temperature	0 to 50°C (32 to 122°F)
Ambient Operating Conditions	10 to 90% RH 30°C (86°F) maximum dew point
Ambient Storage Temperature	-30 to 70°C (-22 to 158°F)
Ambient Storage Conditions	5 to 90% RH 30°C (86°F) maximum dew point
Internal Battery	3 V polycarbonmonofluoride lithium battery; Panasonic® BR2325 or equivalent
Serial Interfaces	One optically isolated RS-485 interface for N2 connection; 9600 baud pluggable, three-position connector Three RS-232-C Serial ports (9600 19.2 K or 57.6 K) One Ethernet connection (RJ45)
Processor	Intel® 386 @ 16 MHz
Memory	2 MB FLASH; 1 MB SRAM
Display (LDT)	4 x 20 character alphanumeric display module with LED backlight
Keypad (LDT)	Membrane keypad with navigational and functional buttons and red LED alarm indicator
Dimensions (L x W x H)	N30 = 168 x 236 x 64 mm (6.6 x 9.3 x 2.5 in.) Area required for mounting the N30 is approximately 244 x 236 x 64 mm (9.6 x 9.3 x 2.5 in.) LDT (optional) = 108 mm (4.25 in.) x 108 mm (4.25 in.) x 27 mm (1.07 in.)
Shipping Weight	N30 = Approximately 0.68 kg (1.5 lb) N30 with LDT = Approximately 0.87 kg (1.93 lb) LDT (cable included) = Approximately 0.19 kg (0.43 lb)
Agency Listings	UL Listed, CSA Certified, CE Mark, and C-Tick Directive UL 916, CSA C222.2 No. 205, CFR47 FCC Part 15 Class A, CE Directive 89/336/EEC (EN50081/1, EN50082/1)

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

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