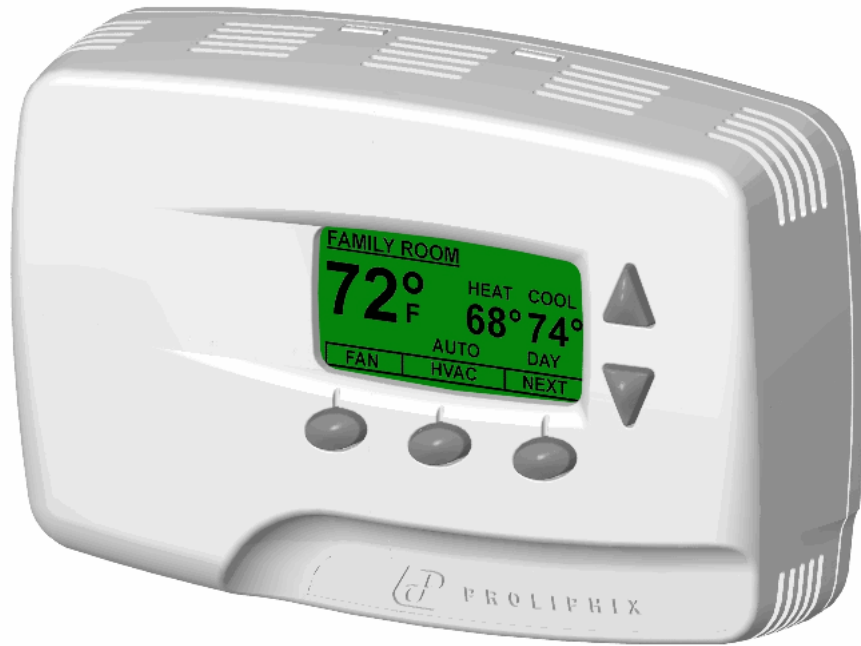


Proliphix Thermostat Installation Guide

Release 2.0



P R O L I P H I X

Part No. 600-01000-100

July 2006

Technical Support

When contacting Proliphix for technical assistance, please have the following information available:

- Product model and serial number.
- Type of heating/cooling system (example: gas, oil, or electric; warm air, hot water, heat pump, steam or gravity).
- Location and number of wires attached to your Proliphix thermostat.

For additional assistance, please contact Proliphix Technical Support,
9:00 AM to 5:00 PM Eastern Standard Time Monday to Friday:

Web: www.proliphix.com
Email: support@proliphix.com
Telephone: 1-866-IPLIVING
Fax: 978-692-3378

Warranty Information

Proliphix, Inc. warrants its products to be free from manufacturing defects in materials and workmanship under normal use for a period of 1 Year from the date of purchase for Professional Series thermostats and 90 Days from the date of purchase for Basic Series thermostats.

Proliphix shall not be liable to honor the terms of this warranty if the product has been used in any other application other than that for which it was intended, or if it has been subjected to misuse, accidental damage, modification, or improper installation procedures. Furthermore, this warranty covers only products which have all original and unaltered markings and labels (serial numbers, model numbers, etc.) of manufacture.

This warranty shall be the sole and exclusive remedy to the original purchaser. In no event will Proliphix be liable for incidental or consequential damages (including property and economic) of any kind arising from the sale and use of this equipment. Proliphix is not liable for any claim made by a third party or made by a purchaser for a third party.

Proliphix, shall, at its option, repair or replace any product found defective, without charge for parts and labor. Repaired or replaced equipment or parts supplied under this warranty shall be covered only by the unexpired period of the warranty.

In no event shall Proliphix's liability exceed the price paid for the product from direct, indirect, special, incidental, or consequential damages resulting from the use of the product, its accompanying software, or its documentation. Proliphix offers no refunds for its products.

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Material Return Procedure

No merchandise may be returned for credit, exchange, or service without prior authorization from Proliphix. To obtain warranty service for Proliphix products, contact Proliphix Customer Service (1-866-IP-LIVING) and request a Return Material Authorization (RMA) number.

Products may be returned for credit, exchange, or service with a Proliphix RMA number. Enclose a note explaining the symptoms of the problem, stating the RMA number, and the name, address and phone number of the company or individual contact.

Authorized returns must be shipped prepaid to Proliphix:

Proliphix, Inc.
Suite #1
66 Tadmuck Road
Westford, MA 01886

Mark the RMA number on the outside of the package. Products received without an RMA number or without shipping prepaid will be subject to refusal by Proliphix.

Return shipping charges following repair of items under warranty shall be paid by Proliphix via standard ground carrier. In the event that repairs are found to be non-warranty, return shipping charges will be paid by the purchaser.

FCC

Model: NT10e/NT20e, NT100e/h, NT120e/h, NT150e/h, TM220e/h, and TM250e/h
Made in the USA

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CSA

Power: 24VAC 45mA 60Hz
48VDC 22mA 60Hz
Switched power each contact: 24VAC 2A 60Hz



Overview

The Proliphix family of Network Thermostats (NT) provide a rich set of innovative features including the ability to configure settings through a graphical interface either locally or from any remote location. The thermostats can be connected via secure wired Ethernet to a home, small business, or light commercial data network.

This guide describes how to physically install the basic series (NT10e and NT20e), the professional series (NT100e/h, NT120e/h, and NT150e/h), and the thermal management series (TM150e/h and TM250e/h) of thermostats. Any instructions or guidelines that apply to a specific thermostat model are noted within this guide. The following model-specific features are important to note during the installation:

NT10e/NT20e (Basic Series)

- Powered by Proliphix Ethernet Power Adapters (EPA20/60).
- (NT20e only) Two remote thermal sensors; either Analog or Thermistor.
- Single-stage HVAC (1h/1c).
- Heat pump HVAC with auxiliary heat (2h/1c).

NT100e/h, NT120e/h, and NT150e/h (Professional Series)

- Powered by Proliphix Ethernet Power Adapters (EPA20/60) or Power over Ethernet (PoE, 802.3af) power injector equipment. The “h” version models support HVAC system power with 24VAC.
- Two remote thermal sensors; either Analog or Thermistor on the NT120e/h, and NT150e/h.
- Dual-stage HVAC (2h/2c).
- Heat pump HVAC with auxiliary heat (2h/1c).

TM220e/h and TM250e/h (Thermal Management)

- Powered by Proliphix Ethernet Power Adapters (EPA20/60) or Power over Ethernet (PoE, 802.3af) power injector equipment. The “h” version models support HVAC system power with 24VAC.
- Two remote thermal sensors; either Analog or Thermistor on the TM220e/h, and TM250e/h.
- Dual-stage HVAC (2h/2c).
- Heat pump HVAC with auxiliary heat (2h/1c).
- Independent alarm notification on external sensors.

Installing the Thermostat

This section describes the required tools, guidelines, and installation instructions for all models of Proliphix thermostats.



Caution

Preventing electrostatic discharge (ESD) — *Static electricity may cause damage to the components on the thermostat's circuit module. Do not remove the thermostat from the protective bag until you are ready to install the thermostat.*

Required Tools

The following tools are required to install the Proliphix thermostat:

- #1 or #2 Phillips head screwdriver.
- Drill with a 3/16" or 7/32" bit.

Installation Guidelines

Use the following guidelines to install the Proliphix thermostat:



Tip

If you are replacing an existing thermostat, mount the Proliphix thermostat in the same location as the thermostat in which you are replacing.

- Install the thermostat on an inside wall, about 5 feet (1.5m) above the floor, and in a room that is used often.
- Install the CAT5/CAT5E/CAT6 cabling from the wiring center to the thermostat installation site.
- Install the thermostat in an area or room with adequate air circulation and where there are no unusual heating/cooling conditions, such as: sunlight, near a lamp, radio, television, radiator register, or fireplace; near hot water pipes in a wall; near a stove on the other side of the wall, on a wall separating an unheated room; or in a draft from a stairwell, door, or window; in a corner or alcove; or behind an open door.
- Install the unit after all construction work and painting is complete.
- Install the unit in an unobstructed location where there are no objects on the wall above or below the thermostat or other obstructions (such as furniture) restricting vertical airflow.
- It is not necessary for the thermostat to be level.



Prior to installing or servicing the thermostat, turn off electricity to the HVAC system; do not turn electricity back on until all work is complete.

Do not jumper wires together to test the system. This may cause harm to your HVAC system and damage the thermostat, and therefore void the warranty.

All wiring must conform to local codes and ordinances. The distance between CAT5/CAT5E/6 cables and HVAC cables should be a minimum of one inch.

Before You Begin

If you are removing an existing thermostat, Proliphix recommends that you label each connection as you remove the wiring. You will use these same wires (and labels) when you connect the Proliphix thermostat ([page 4](#)).

Use the following steps to remove an existing thermostat:

- 1** Turn off power to the HVAC system or the fuse/circuit breaker panel.
- 2** Remove the cover from the existing thermostat. If the cover does not snap off when pulled firmly from the top or bottom, check for a screw(s) that may be used to secure the cover.
- 3** Disconnect each wire. Label the wires with the terminal designation from the existing thermostat. Place the label about 1/2" away from the end of the wire to allow for stripping of the ends. **Note:** *If this is a new installation, obtain the wire designations from the HVAC installer.*
- 4** Remove the existing thermostat from the wall.

Installing and Wiring the Thermostat

This section describes a two-step installation process in which you install (or mount) the thermostat base plate and wire the thermostat.

Installing the Base Plate

Perform the following steps to mount the thermostat base plate on the wall:

- 1 Review the [Installation Guidelines](#) on [page 2](#) and position the base plate in an appropriate location on the wall. Ensure the location allows you to access and pull the wires through the opening in the base plate.
- 2 Using a pencil, mark the center of the screw holes on the left and right side, and bottom center of the base plate.
- 3 Remove the base plate from the wall and drill three holes at the marked locations: for drywall, drill 3/16" holes; for plaster, drill 7/32" holes.
- 4 Gently tap the wall anchors (included in the packaging) into the drilled holes until they are flush with the wall.
- 5 Pull the wires through the base plate and position the base plate over the screw holes.
- 6 Attach the base plate to the wall using three 1" screws (included in the packaging).

Wiring the Base Plate Terminals

Use the instructions in this section to wire the base plate terminals as follows:

- Wire the NT10e/NT20e base plate for *fuel burner* HVAC ([page 4](#)) and heat pump HVAC ([page 7](#)).
- Wire the NT100e/h, NT120e/h, NT150e/h, TM220e/h, and TM250e/h for *fuel burner* HVAC ([page 4](#)) and heat pump HVAC ([page 7](#)).

Fuel Burner HVAC

Use the instructions in this section and refer to [Table 1](#) and [Figure 1](#) to wire the base plate for fuel burner HVAC. Refer to the labels you placed on the wires when you removed the existing thermostat ([page 2](#)).

Table 1 lists the standard HVAC terminal label and the corresponding Proliphix label required to support the single-stage and dual-stage application.

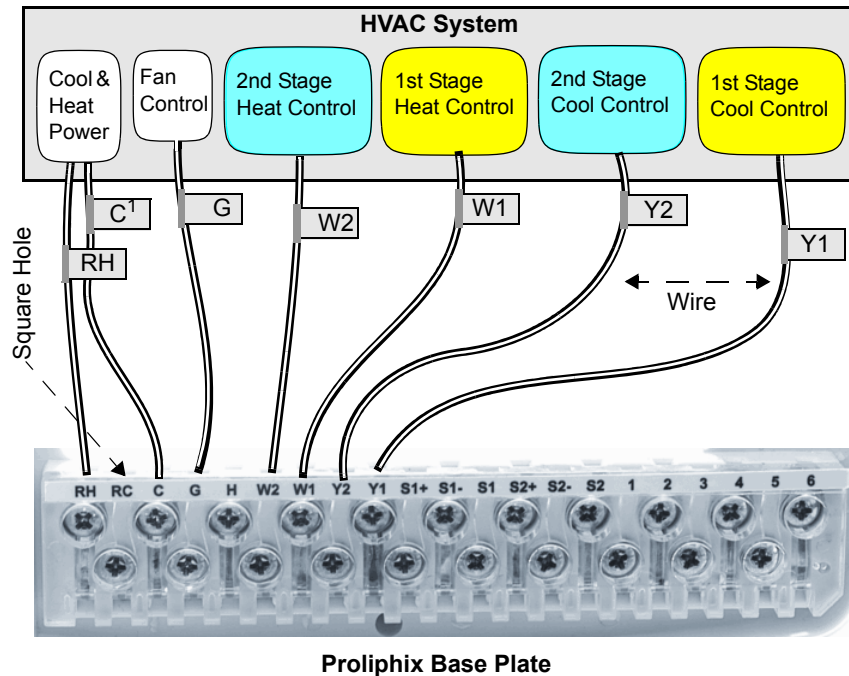
Table 1 Fuel Burner Terminal Conversion Chart

Standard Terminal	Proliphix Terminal	NT10e/NT20e	NT100e/h, NT120e/h, NT150e/h, TM220e/h, and TM250e/h
R, RH	RH	24VAC source	24VAC source
RC	RC	24VAC source	24VAC source
C	C	Not used	Not used or 24VAC common ^a
W, W1	W1	Heat relay	Stage 1 heat relay
Y, Y1	Y1	Cool relay	Stage 1 cool relay
W2	W2	Not used	Stage 2 heat relay
Y2	Y2	Not used	Stage 2 cool relay
G	G	Fan relay	Fan relay
-	S1+ or CM	Not used	Contact closure common (NT150 and TM250 only)
-	H	Not used	Contact closure, Normally Open or Normally Closed (NT150 and TM250 only). See Table 7.

^a For “h” thermostat models only, the 24VAC common must be in the same AC phase as the 24VAC source (RH or RC). If the thermostat is connected to RH only, or RH and RC then C must be the RH common. If the thermostat is connected to RC only then C must be the RC common.

Figure 1 shows an example of a single-stage (shown in yellow) and dual-stage (shown in blue) HVAC system connecting to a Proliphix base plate.

Figure 1 Single/Dual Stage HVAC Connections



¹. Applies to "h" models only

- 1 Use [Table 1](#) to match the letter of your existing thermostat wire to the corresponding terminal letter on the Proliphix base plate.
- 2 Strip the wire insulation 3/8" (9.5 mm) from the wire ends. Verify that the wire ends are straight. To avoid damaging the labels, use caution when handling the wires and push any excess wire back into the wall.
- 3 Using [Figure 1](#) as a guide, connect the labeled wires to the terminal post with the corresponding letter on the Proliphix base plate. For example, connect the wire labeled "W1" to the W1 terminal post.

If necessary, unscrew the terminal post screw used to secure the wires. Insert the wire straight down into the square hole and secure the corresponding screw to the wire.



To avoid damage to the Proliphix base plate, stop unscrewing the terminal post screws when you feel a slight stop or resistance.

- 4 Verify that the wire is securely attached to the terminal post in the base plate by gently tugging on the wire.

Heat Pump HVAC

Use the instructions in this section to wire the base plate terminals for heat pump HVAC on all models of Proliphix thermostats.



Note

You must know the type of Reverse Valve (RVS) in your heat pump. See the user manual for your heat pump for more information.

To wire the base plate terminals for heat pump HVAC on the Proliphix thermostat, refer to the labels you placed on the wires when you removed the existing thermostat (page 2). Refer to the procedure in [Fuel Burner HVAC](#) and use [Table 2](#) and [Figure 2](#) to complete the wiring.

[Table 2](#) lists the standard HVAC terminal label and the corresponding Proliphix label required to support the heat pump application.

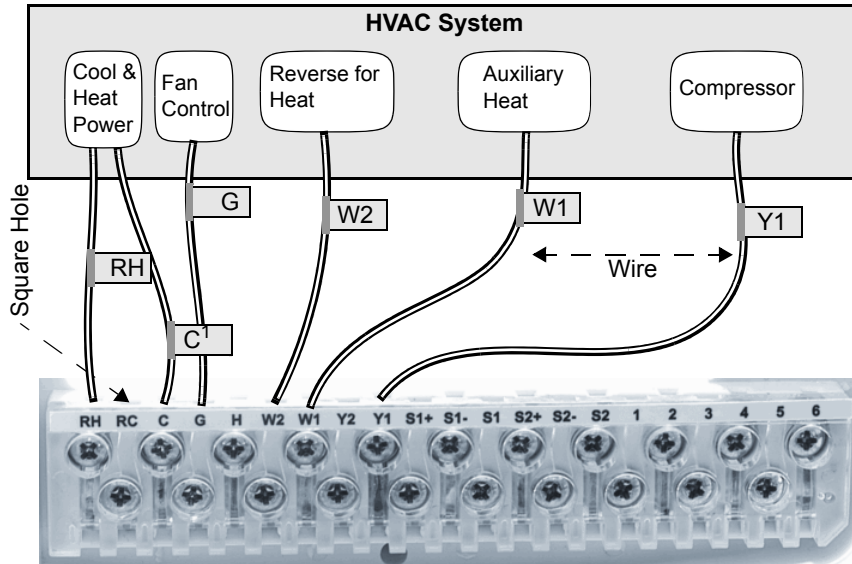
Table 2 Heat Pump Terminal Conversion Chart

Standard Terminal	Proliphix Terminal	NT10e/NT20e	NT100e/h, NT120e/h, NT150e/h, TM220e/h, and TM250e/h
R, RH	RH	24VAC source	24VAC source
RC	RC	24VAC source	24VAC source
C	C	Not used	Not used or 24VAC common ^a
W, W1	W1	Auxiliary heat relay	Auxiliary heat relay
Y, Y1	Y1	Compressor relay	Compressor relay
B	W2	RVS activate for heat relay	RVS activate for heat relay
O	Y2	RVS activate for cool relay	RVS activate for cool relay
G	G	Fan relay	Fan relay
-	S1+ or CM	Not used	Contact closure common (NT150 and TM250 only)
-	H	Not used	Contact closure, Normally Open or Normally Closed (NT150 and TM250 only). See Table 7 .

^a For “h” thermostat models only, the 24VAC common must be in the same AC phase as the 24VAC source (RH or RC). If the thermostat is connected to RH only, or RH and RC then C must be the RH common. If the thermostat is connected to RC only then C must be the RC common.

Figure 2 shows an example of a heat pump HVAC system, with reverse activate for heat, connecting to a Proliphix base plate.

Figure 2 Heat Pump HVAC Connections



¹. Applies to "h" models only

Proliphix Base Plate

Note: A heat pump is either a reverse for heat or reverse for cool model. Y2 (not shown in Figure 2) is used for reverse cool.

Configuring Remote Sensors for the NT20, NT120, NT150, TM220, and TM250

The Proliphix thermostat provides two remote (external) sensor ports. This release supports Analog and Thermistor sensors (go to Proliphix.com for a complete list of supported sensors).

Analog sensors convert temperature measurements as Fahrenheit degrees to a voltage which can be sensed by the thermostat. Analog sensors are active devices which require power from the thermostat. The Analog sensor is polarized and must be connected as shown in Table 3.

Thermistor sensors are passive devices which represent thermal measurements as electrical resistance. Thermistors do not require power from the thermostat. The Thermistor sensor is not polarized; either lead can be connected as shown in Table 3.

Table 3 lists the external sensor port Analog and Thermistor connections. Only one sensor can be connected to each port.

Table 3 Remote Sensor Port Connections

Proliphix Terminal	Analog Sensor		Thermistor Sensor ^a
S1+	Do Not Use	or	Do Not Use
S1-	COM	or	Sensor 1, Either lead
S1	T20	or	Sensor 1, Either lead
S2+ or S+	+V for S1 and S2 sensors		Do not use
S2-	COM	or	Sensor 2, Either lead
S2	T20	or	Sensor 2, Either lead

^a Do not connect either lead to the S1+, S2+ or S+ terminal when using a Thermistor sensor.

Connecting CAT5/CAT5E/6 Wiring for Ethernet Networks

The label located on the inside of the base plate (see Figure 3) shows several color-coded wiring schemes for Ethernet CAT5/CAT5E/6 connections.

To wire the Ethernet network, refer to Figure 3 and match the label number to the Proliphix base plate number for CAT5/CAT5E/6 color coding.



Note

If the other end of the CAT5/CAT5E/6 cable is connected to a Proliphix EPA-20/60 Ethernet Power Adapter, follow the wiring scheme for T568A.



Caution

All wiring must conform to local codes and ordinances. The distance between CAT5/CAT5E/6 cables and HVAC cables should be a minimum of one inch.

Figure 3 shows an Ethernet CAT 5 wiring example.

Figure 3 Ethernet CAT5/CAT5E/6 Wiring

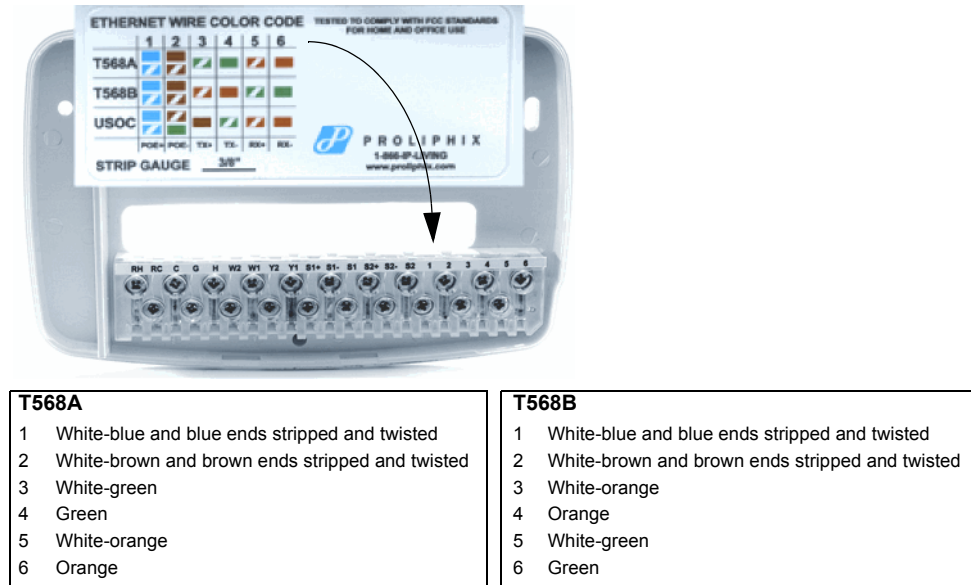


Figure 4 shows the RJ-45 Ethernet plug pinout assignments for the T568A and T568B wiring standards.

Figure 4 RJ-45 Ethernet Plug Pinout Assignments for T568A and T568B

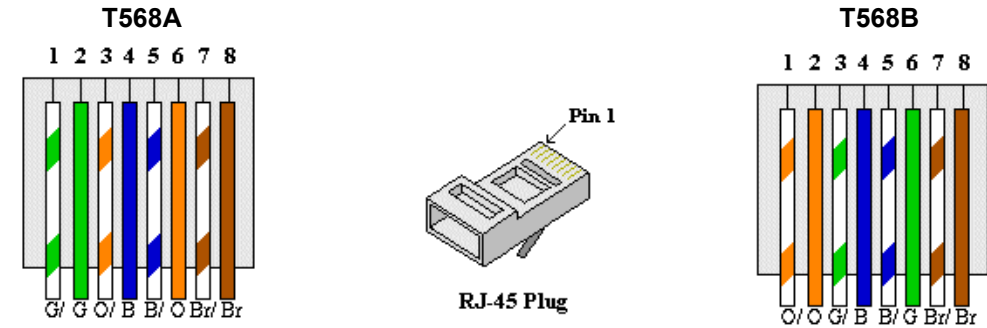


Table 4 describes the pinout assignments for the T568A and T568B wiring standards.

Table 4 T568A and T568B Pinout Assignments

Pin Number	T568A Wire Color	T568B Wire Color
1	Green/White	Orange/White
2	Green	Orange
3	Orange/White	Green/White
4	Blue	Blue
5	Blue/White	Blue/White
6	Orange	Green
7	Brown/White	Brown/White
8	Brown	Brown

Mounting the Thermostat into the Base Plate

The Proliphix thermostat contains jumpers to configure the HVAC power settings. The power settings determine which HVAC power source (RH or RC) is configured to turn on each HVAC system (cool, heat and fan). Most applications use only RH power. The Proliphix thermostat is shipped from the factory with the “RH Only” configuration.

Table 5 lists the possible HVAC power configurations. RC and RH are connected with J1 inserted.

Table 5 HVAC Power Configuration

HVAC Power Configuration	J2	J1
<i>RH only (default)</i> – Supplies W1, W2, Y1, Y2, G	POS1	IN
<i>RC only</i> – Supplies W1, W2, Y1, Y2, G	POS1	IN
<i>RH and RC</i> – RH supplies W1, W2, G and RC supplies Y1 and Y2	POS1	OUT
<i>RH and RC</i> – RH supplies W1 and W2 and RC supplies Y1, Y2, G	POS2	OUT

The NT100e, NT120e, NT150e, TM220e, and TM250e can be powered from different sources presented on the following Ethernet CAT5/5E/6 interface:

- A Power over Ethernet (PoE) source is an Ethernet router, switch, or mid-span device that complies with the 802.3af Power over Ethernet standard.
- Proliphix Ethernet Power Adapters (EPA) are multi-port power injectors capable of supplying power to either two (EPA-20) or six (EPA-60) Proliphix Network Thermostats.

Table 6 shows how to configure the NT100e, NT120e, NT150e, TM220e, and TM250e for two different power sources.

Table 6 NT100e, NT120e, and TM220e Power Source Configuration

HVAC Power Configuration	J3
<i>PoE Power Source</i>	Out
<i>EPA-20/60 Power Source</i>	In

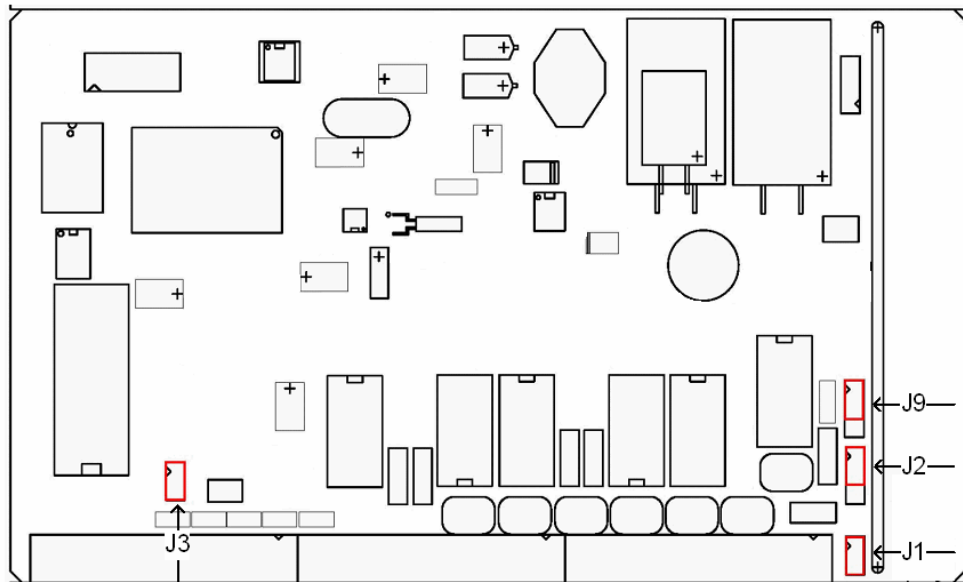
Figure 5 shows the location of the jumpers on the thermostat circuit module. The jumper in J2 supports an Up (POS1) or Down (POS2) position. The example in Figure 5 shows the J2 jumper in the Up position. If necessary, move the jumper downward to the POS2 position.

The general purpose contact closure can be configured for Normally Open or Normally Closed. The contact closure will be in these states upon power failure or deactivation of an event. Table 7 shows the configuration of jumper J9. Figure 5 shows the location and positions of jumper J9 on the NT150 and TM250.

Table 7 Contact Closure Configuration for Jumper J9

Configuration	J9	Pins
Normally Closed	POS1	Top and middle
Normally Open	POS2	Middle and bottom

Figure 5 Thermostat Jumper Locations



Prior to mounting the thermostat into the base plate, verify that the jumpers on the thermostat are configured for your application (see Table 5).

To mount the thermostat into the base plate:

- 1 Mount the thermostat into the base plate (see page 4) by inserting the top two hinges into the corresponding receptacle holes in the top of the base plate.
- 2 Snap the bottom of the thermostat securely into the base plate.

Verifying the Thermostat's Operating Status

This section describes the procedures you can use to verify that the heat, cool, and fan controls are operating properly on your thermostat. Before you begin, verify that the HVAC system's power is set to "On" and press **HVAC** on the thermostat panel.

Testing the Heat Controls

- 1 Press **HVAC**.
- 2 Press **Mode**. A menu list appears.
- 3 Use the **Up** and **Down** arrows on the right side of the panel to select **Heat**.
- 4 Press **Select**.
- 5 Press **Back**.
- 6 Continuously press the **Up** arrow until the heat set point is higher than the temperature reading. The heat relay should click and the HVAC system should activate the heat.

Testing the Cool Controls

- 1 Press **HVAC**.
- 2 Press **Mode**. A menu list appears.
- 3 Use the **Up** and **Down** arrows on the right side of the panel to select **Cool**.
- 4 Press **Select**.
- 5 Press **Back**.
- 6 Continuously press the **Down** arrow until the cool set point is lower than the temperature reading. The cool and fan relays should click and the HVAC system should activate the cool and fan.

Testing the Fan Operation

- 1 Press **HVAC**.
- 2 Press **Fan**. A menu list appears.
- 3 Use the **Up** and **Down** arrows on the right side of the panel to select **On**.
- 4 Press **Select**. The fan relay should click and the fan should turn on.

Troubleshooting

Use [Table 8](#) to troubleshoot potential issues with your thermostat.

Table 8 Troubleshooting Tips

Condition	Possible Cause
LCD display is blank	<p>If using a Proliphix EPA to power your thermostat:</p> <ul style="list-style-type: none"> ■ Check power to the EPA. ■ Check the wiring on the EPA punchdown terminal (use the T568A wiring scheme). ■ Use a 110 block punchdown tool to ensure proper connection. ■ Check the blue and brown pairs on the Ethernet cable connected on screw terminals 1 and 2. ■ Verify that jumper J3 is on both pins (In position) <p>If using PoE to power your thermostat:</p> <ul style="list-style-type: none"> ■ Verify that jumper J3 is not connected to both pins (Out position). ■ Verify the PoE equipment is sending power to the thermostat. See your PoE equipment documentation. ■ Verify that Ethernet wiring is securely attached to terminal screws. <p>If using an “h” model thermostat:</p> <ul style="list-style-type: none"> ■ Verify that the Common from the primary transformer source (either RH or RC) is connected to the C terminal. ■ Either RH or RC (24v source) must be connected. ■ Verify the HVAC system is powered on.
LCD display is active but no network link indication exists	<p>If using a Proliphix EPA to power your thermostat:</p> <ul style="list-style-type: none"> ■ Check the wiring on the EPA punchdown terminal (use the T568A wiring scheme). ■ Use a 110 block punchdown tool to ensure proper connection. ■ Verify that the Ethernet patch cable is in the correct RJ45 port of the EPA (port 1 connects to punchdown 1, etc.) ■ Verify that the Ethernet patch cable is connected to a working hub, switch, or router.
HVAC heat does not activate when tested	<ul style="list-style-type: none"> ■ Verify you increased the heat set point higher than the temperature reading and the thermostat is in heat mode (see page 13). ■ Verify the HVAC system is powered on (page 13).
HVAC cool does not activate when tested	<ul style="list-style-type: none"> ■ Verify you decreased the cool set point lower than the temperature reading and the thermostat is in cool mode (see page 13). ■ Verify the HVAC system is powered on (page 13).
HVAC fan does not activate when tested	<ul style="list-style-type: none"> ■ Check the base plate wiring (see page 4 or page 7). ■ Verify the HVAC system is powered on (page 13).

After you install the thermostat, continue with the *Remote Management Guide* and the *Configuration Guide* to manage the thermostat locally or remotely and configure thermostat settings.