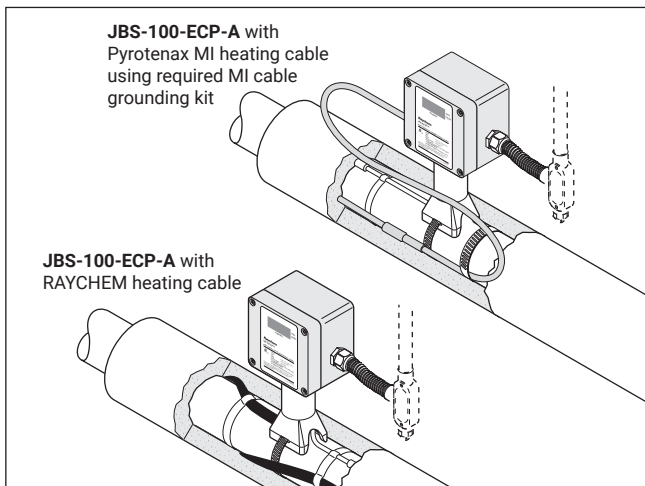




RAYCHEM

JBS-100-ECP-A

Combination Power Connection Box And Digital Electronic Controller Installation Instructions



DESCRIPTION

The nVent RAYCHEM JBS-100-ECP-A is an electric heat-tracing power connection / electronic controller combination housed in a NEMA 4X rated enclosure. It is designed for use only with RAYCHEM BTV-CR, XL-Trace, BTV-CT, QTVR-CT, XTV-CT, VPL-CT, KTV-CT, and Pyrotex MI heating cables in nonhazardous locations.

These kits may be installed at temperatures as low as -40°F (-40°C). For easier installation store above freezing until just before installation.

The controller can be programmed to maintain temperatures of 425°F (220°C). It operates at voltages from 100 to 277 Vac and can switch current up to 30 Amps.

For technical support call nVent at (800) 545-6258.

TOOLS REQUIRED

- Wire cutters
- Utility knife
- Needle nose pliers
- Wire stripper (for VPL-CT)
- Pliers or adjustable wrench
- Large slotted screwdriver
- Small slotted screwdriver

ADDITIONAL MATERIALS REQUIRED

- Pipe strap
- GT-66 or GS-54 fiberglass tape
- MI cable grounding kit (for MI cable installations)
Catalog No: MI-GROUND-KIT
- AT-180 aluminum tape
- Small pipe adapter (for 1 in (25 mm) and smaller pipes)
Catalog No: JBS-SPA

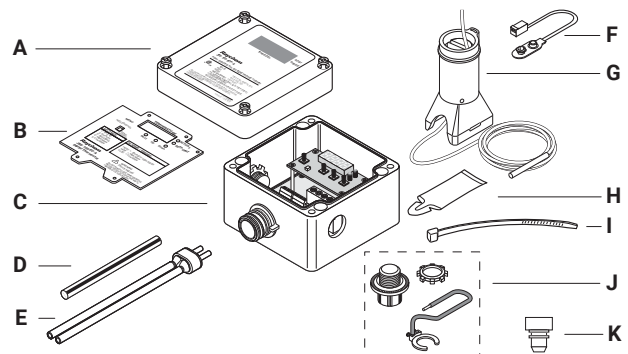
APPROVALS

Nonhazardous locations



KIT CONTENTS

Item	Qty	Description
A	1	Lid
B	1	Wire cover
C	1	Box with electronics
D	1	Green/yellow tube
E	1	Core sealer (for use with RAYCHEM heating cables only)
F	1	Battery connector
G	1	Stand with RTD
H	1	Cable lubricant (for use with RAYCHEM heating cables only)
I	1	Cable tie
J	1	MI cable grounding kit (ordered separately; P000000279)
K	1	Plug (for use with MI cable installations only)



⚠ WARNING:

This component is an electrical device that must be installed correctly to ensure proper operation and to prevent shock or fire. Read these important warnings and carefully follow all of the installation instructions.

- To minimize the danger of fire from sustained electrical arcing if the heating cable is damaged or improperly installed, and to comply with the requirements of nVent, agency certifications, and the National Electrical Code, ground-fault equipment protection must be used. Arcing may not be stopped by conventional circuit breakers.

⚠ CAUTION:

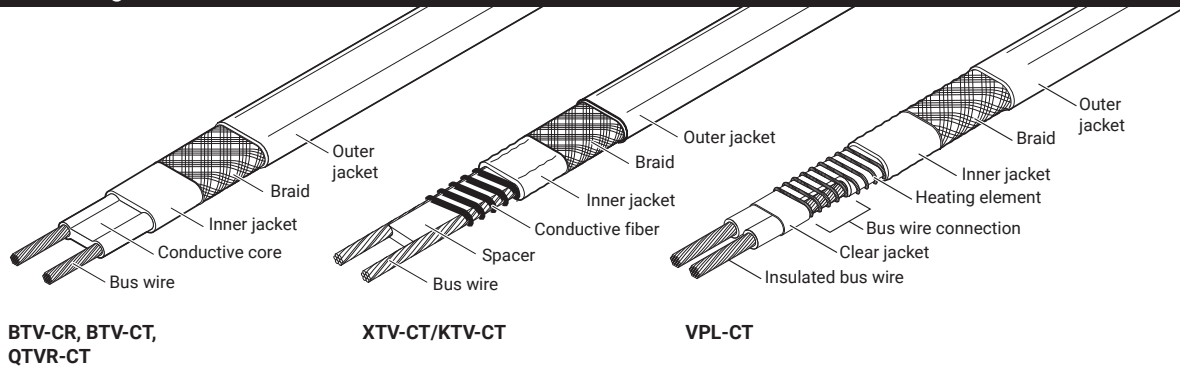
HEALTH HAZARD: Prolonged or repeated contact with the sealant in the core sealer may cause skin irritation. Wash hands thoroughly. Overheating or burning the sealant will produce fumes that may cause polymer fume fever. Avoid contamination of cigarettes or tobacco. Consult MSDS VEN 0058 for further information.

CHEMTREC 24-hour emergency telephone: (800) 424-9300

Non-emergency health and safety information: (800) 545-6258.

- Component approvals and performance are based on the use of nVent-specified parts only. Do not use substitute parts or vinyl electrical tape.
- The black heating cable core and fibers are conductive and can short. They must be properly insulated and kept dry.
- Damaged bus wires can overheat or short. Do not break bus wire strands when scoring the jacket or core.
- Keep components and heating cable ends dry before and during installation.
- Use only fire resistant insulation materials, such as fiberglass wrap or flame-retardant foam.

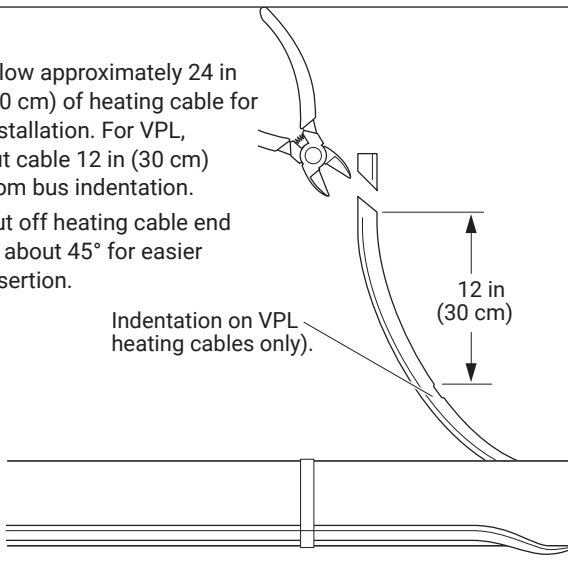
For RAYCHEM Heating Cables



1

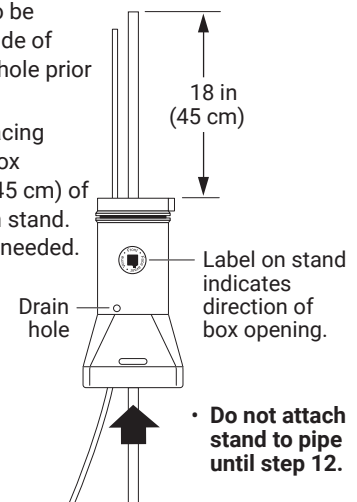
- Allow approximately 24 in (60 cm) of heating cable for installation. For VPL, cut cable 12 in (30 cm) from bus indentation.
- Cut off heating cable end at about 45° for easier insertion.

Indentation on VPL heating cables only.



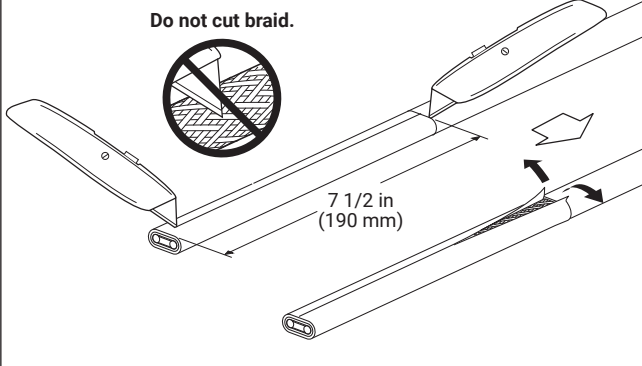
2

- Optional: If stand is to be installed on bottom side of pipe, knock out drain hole prior to inserting cable.
- With label on stand facing desired direction of box opening, push 18 in (45 cm) of heating cable through stand. Use cable lubricant if needed.
- Square off cable end with 90° cut.

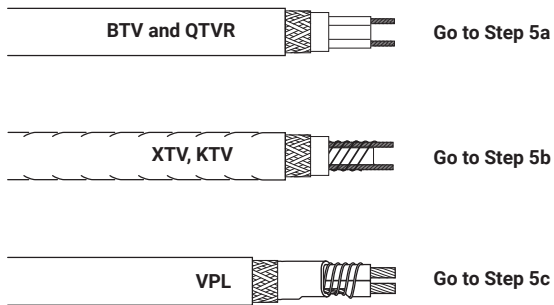


3

- Lightly score outer jacket around and down as shown.
- Bend heating cable to break jacket at score, then peel off jacket.



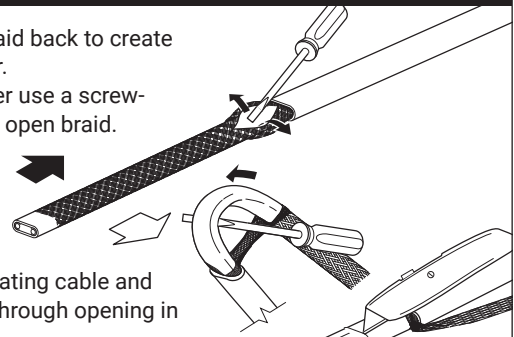
4



5A

BTV and QTVR

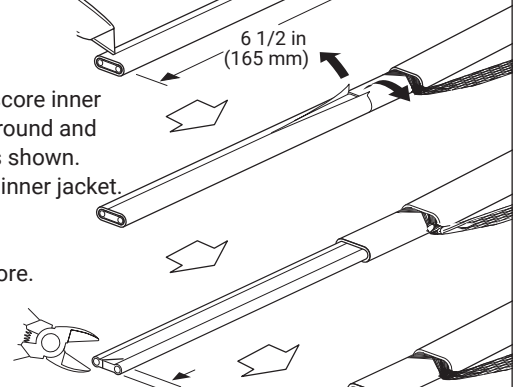
- Push braid back to create a pucker.
- At pucker use a screwdriver to open braid.



- Bend heating cable and work it through opening in braid.

- Lightly score inner jacket around and down as shown.
- Peel off inner jacket.

- Notch core.



- Peel bus wire from core.

- Score core between bus wires at inner jacket.

- Bend and snap core.
- Peel core from bus wire.
- Remove any remaining core material from bus wires.

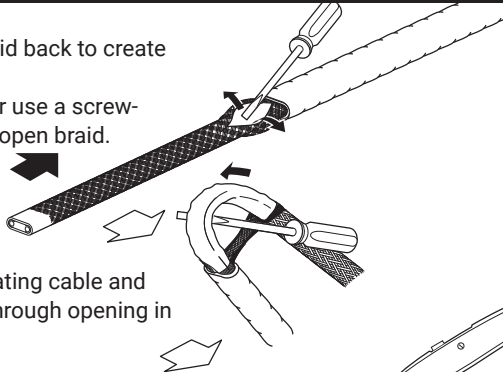
- Pull braid tight to make pigtail.

Go to Step 6

5B

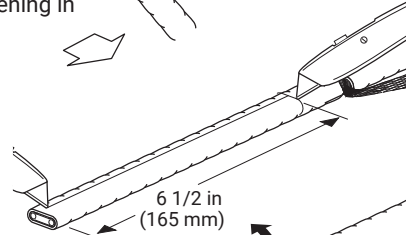
XTV, KTV

- Push braid back to create a pucker.
- At pucker use a screwdriver to open braid.

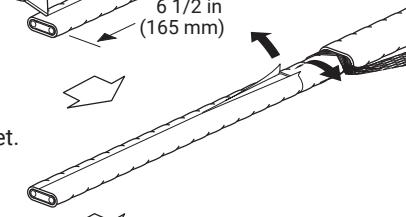


- Bend heating cable and work it through opening in braid.

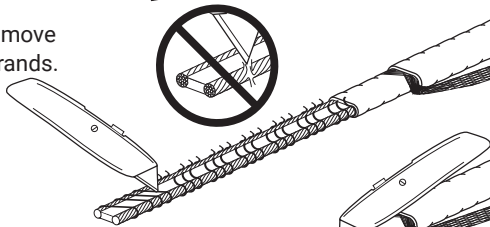
- Lightly score inner jacket around and down as shown.



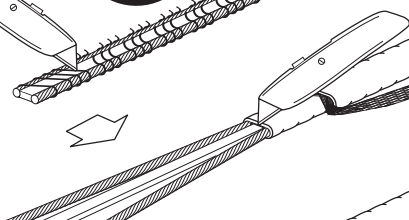
- Peel off inner jacket.



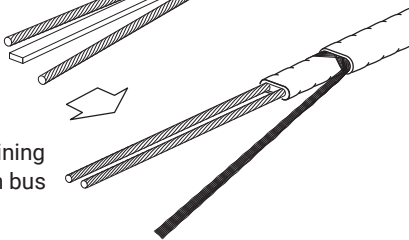
- Cut and remove all fiber strands.



- Score and remove center spacer.



- Remove any remaining fiber material from bus wires.
- Pull braid tight to make pigtail.

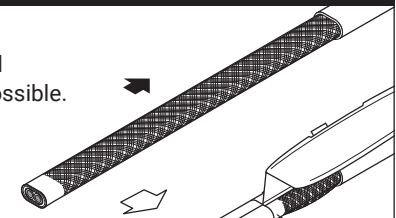


Go to Step 6

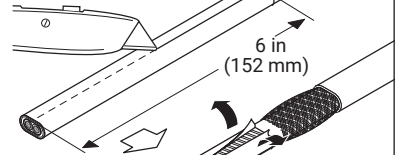
5C

VPL

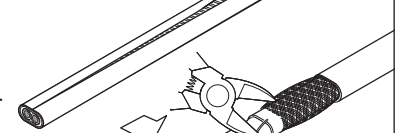
- Push braid back and bunch as tight as possible.



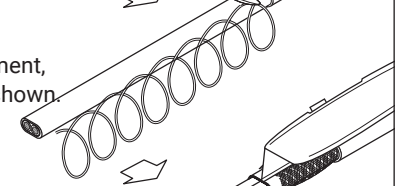
- Lightly score inner jacket around and down as shown.



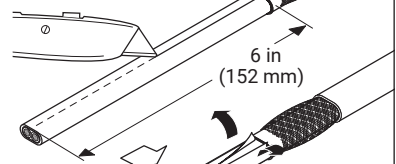
- Peel off inner jacket.



- Unwind heating element, cut and remove as shown.



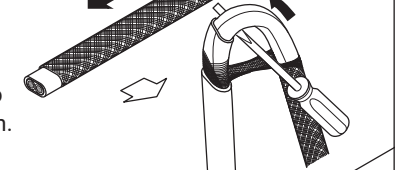
- Lightly score clear jacket around and down as shown.



- Bend heating cable to break jacket at the score then peel off jacket.



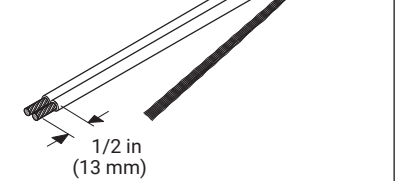
- Push braid forward. Use a screwdriver to open braid as shown.



- Bend heating cable and work it through opening in braid.



- Remove insulation from ends of bus wires.
- Pull braid tight to make pigtail.



Go to Step 6

6

- Mark the jacket as shown.

5/8 in (15 mm)

7

⚠ Caution: Health Hazard.
Wash hands after contact with sealant. Consult material safety data sheet VEN 0058.

- If needed, re-twist and straighten bus wires, then insert into the guide tubes as shown.

Make sure all strands go into the tubes.

Tubes

8

- Push core sealer onto the heating cable to the mark made in Step 6.

Note: Extra force may be required for larger cables or at lower temperatures.

Make sure the bus wires do not kink, bunch, or crossover

9

- Remove the guide tubes and dispose of them in a plastic bag.

10

- Slip the green/yellow tube onto the braid. Heat-shrinking is not required.
- Trim bus wires and braid.

1/2 in (13 mm)

1/2 in (13 mm)

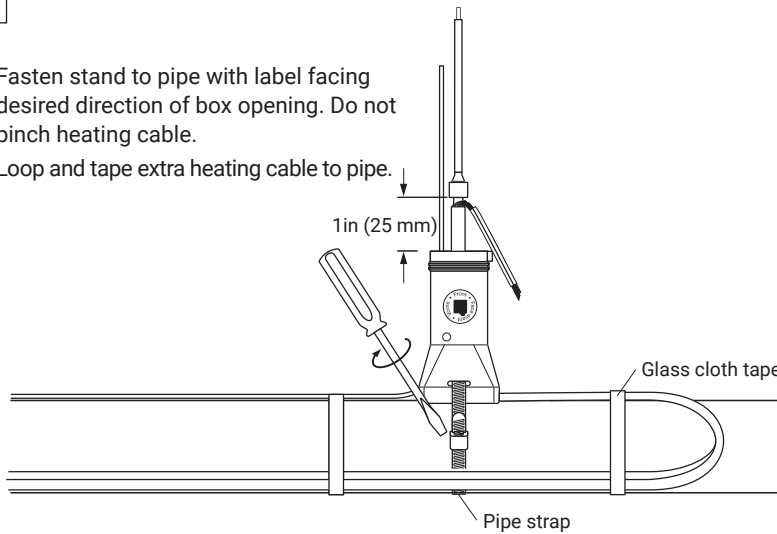
11

- Pull heating cable back into stand so 1 in (25 mm) is exposed as shown. Use cable lubricant if needed.

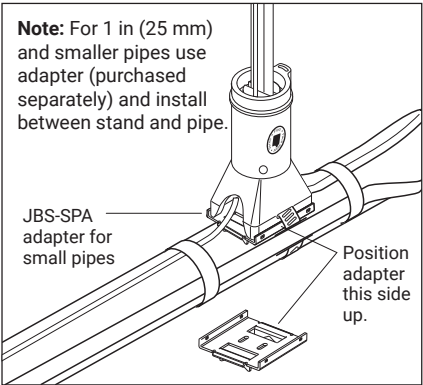
1 in (25 mm)

12

- Fasten stand to pipe with label facing desired direction of box opening. Do not pinch heating cable.
- Loop and tape extra heating cable to pipe.

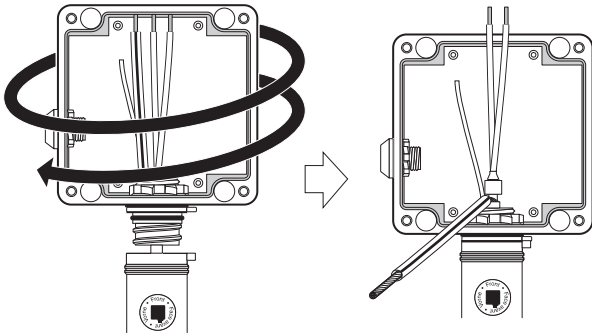


Note: For 1 in (25 mm) and smaller pipes use adapter (purchased separately) and install between stand and pipe.



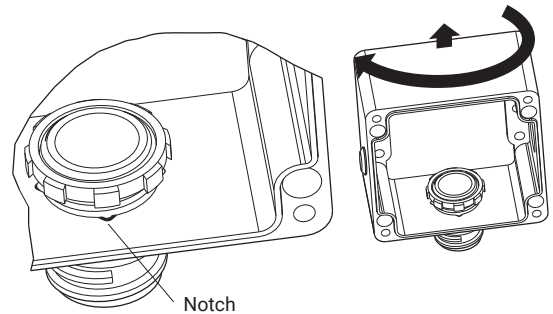
13

- Screw box onto stand until it stops. Do not overtighten.



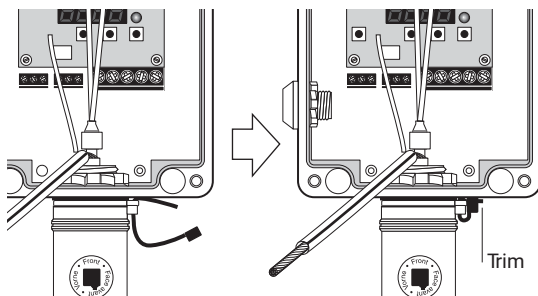
14 (Optional) To change direction of box opening:

- Loosen locknut.
- Lift box and rotate. Make sure tab on threaded piece fits into one of the four notches in box.
- Tighten locknut.



15

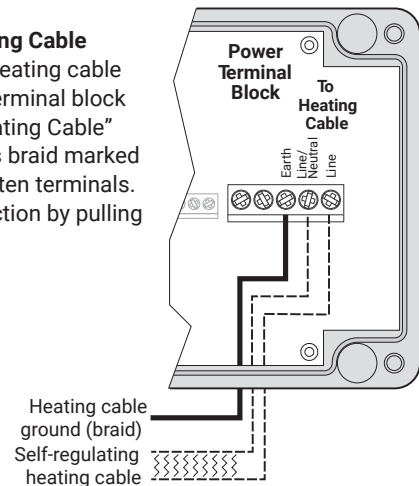
- Insert cable tie through slots on stand and box, and tighten firmly to prevent box rotation.



16

Connecting Heating Cable

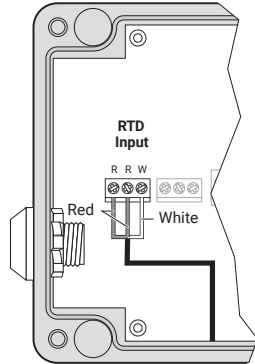
- Insert the two heating cable wires into the terminal block marked "To Heating Cable" and the heater's braid marked "Earth" and tighten terminals. Confirm connection by pulling on the wires.



17

Connecting RTD

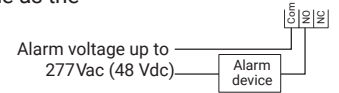
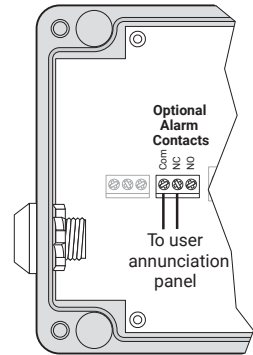
- Insert the three RTD wires into the terminal block marked "RTD Input." Match the colors (Reds to R, White to W), and tighten terminals. Confirm connection by pulling on the wires.



18

Connecting Alarm

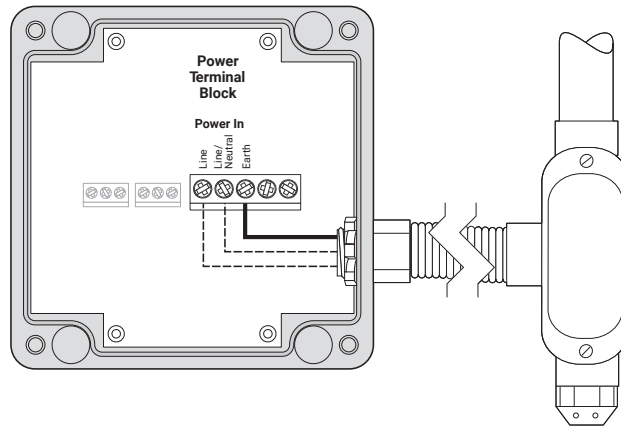
- The controller has a form C contact for remote annunciation of RTD failure and low/high temperature alarms. If an external alarm is required, then alarm wiring can exit the enclosure via the 1/2 inch plugged hole or the 3/4 inch power conduit hole as long as the insulation rating of the control wiring is the same as the power wiring.



Normally energized; changes state upon an alarm.

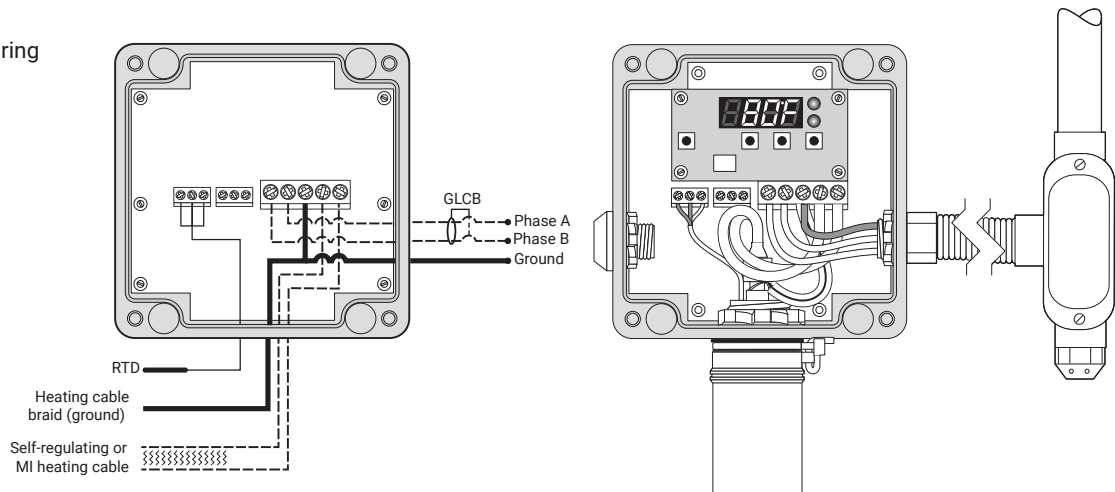
19

- Install conduit and fittings as shown. To minimize loosening due to pipe vibration, use flexible conduit.
- Pull in power and ground wires, strip off 1/2 in (13 mm) of insulation and terminate.

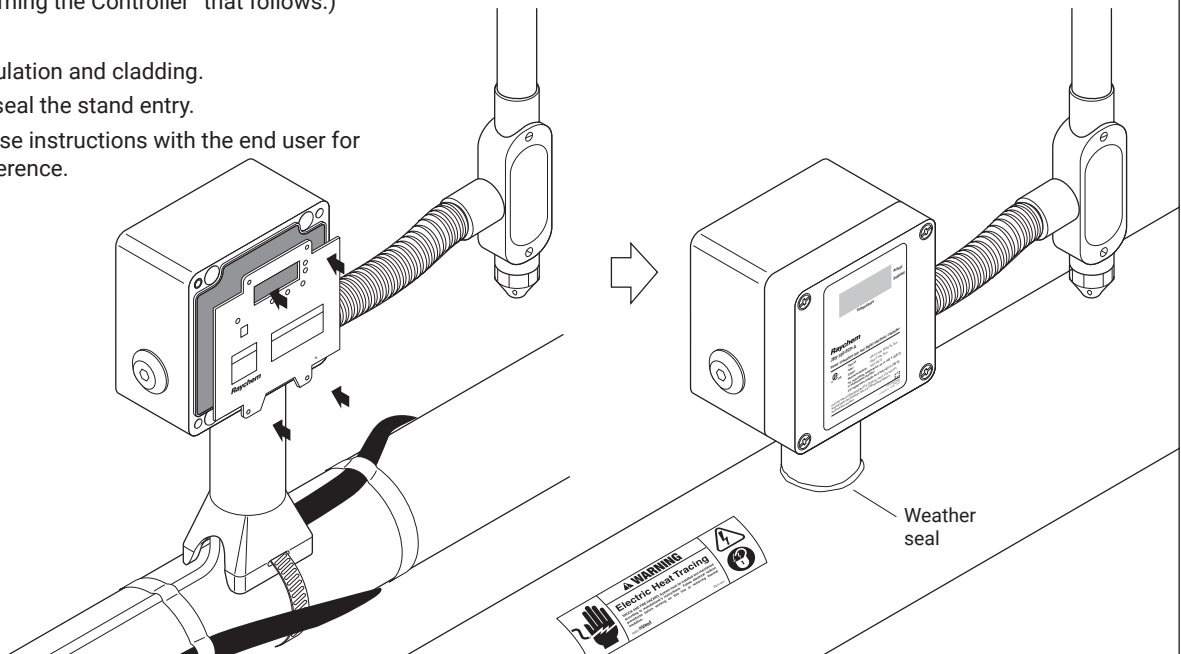


20

- Finished wiring diagram.



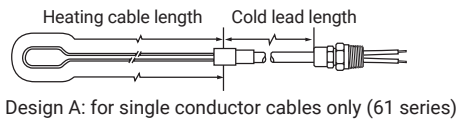
- Install wire cover.
- Program the controller. (See the section "Programming the Controller" that follows.)
- Install lid.
- Apply insulation and cladding.
- Weather-seal the stand entry.
- Leave these instructions with the end user for future reference.



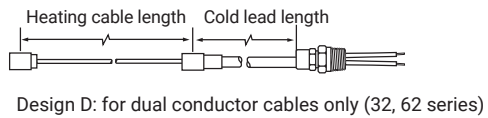
For Pyrotenax MI Heating Cables

Note: To ensure the MI heating cable is properly grounded, all MI cables must be installed with a grounding kit which is ordered separately (P000000279). Failure to use the grounding kit will void the warranty and can create a safety hazard by preventing normal operation of the ground fault circuit breaker.

Design A

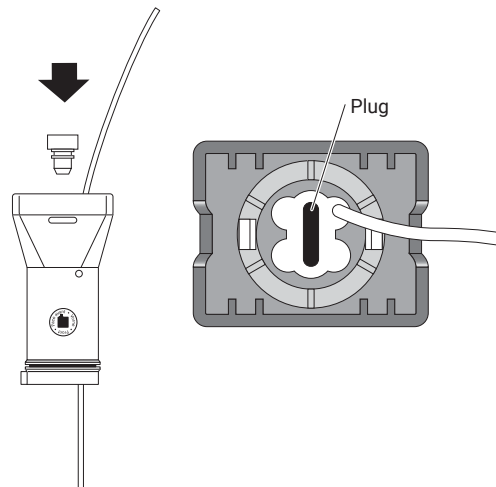


Design D



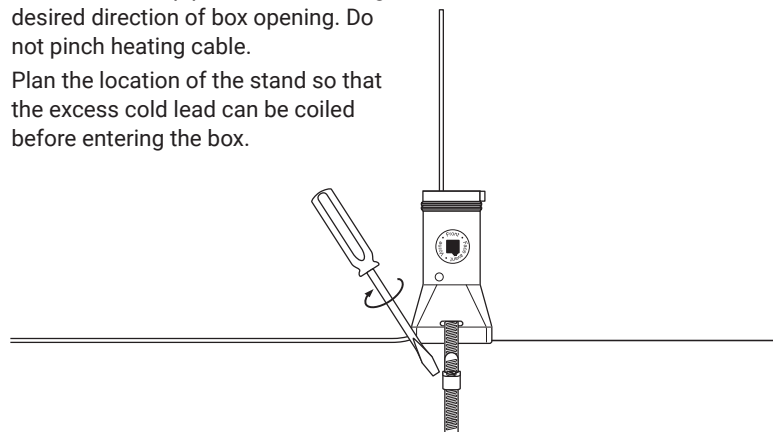
1

- Insert plug (Item K) into slot in grommet through bottom of stand.



2

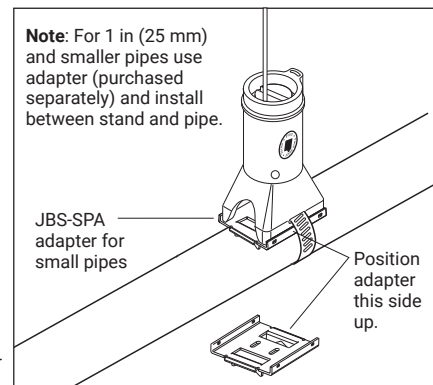
- Fasten stand to pipe with label facing desired direction of box opening. Do not pinch heating cable.
- Plan the location of the stand so that the excess cold lead can be coiled before entering the box.



Note: For 1 in (25 mm) and smaller pipes use adapter (purchased separately) and install between stand and pipe.

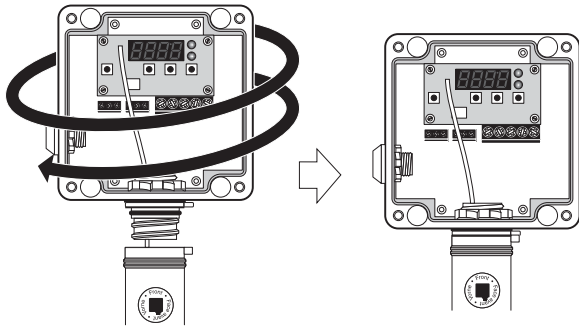
JBS-SPA adapter for small pipes

Position adapter this side up.



3

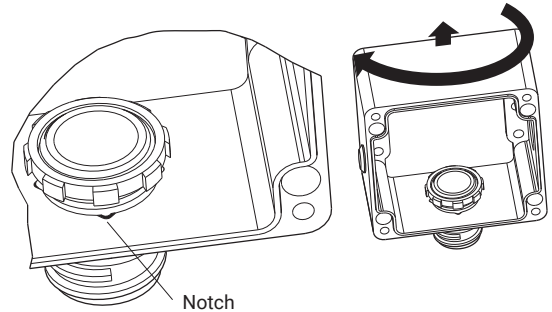
- Screw box onto stand until it stops. Do not overtighten.



4

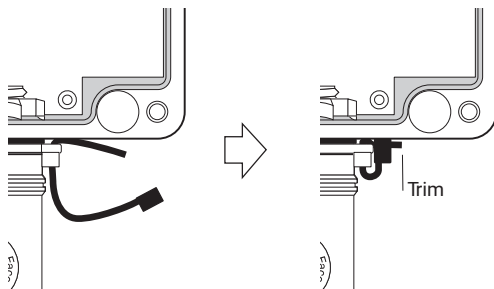
(Optional) To change direction of box opening:

- Loosen locknut.
- Lift box and rotate. Make sure tab on threaded piece fits into one of the four notches in box.
- Tighten locknut.



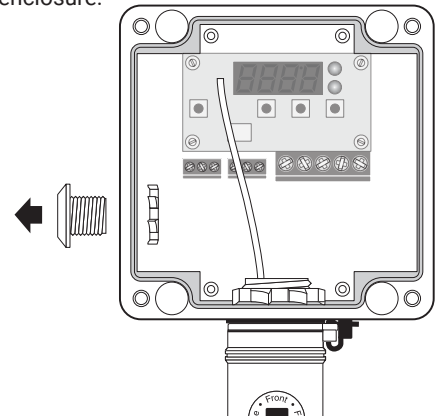
5

- Insert cable tie through slots on stand and box, and tighten firmly to prevent box rotation.



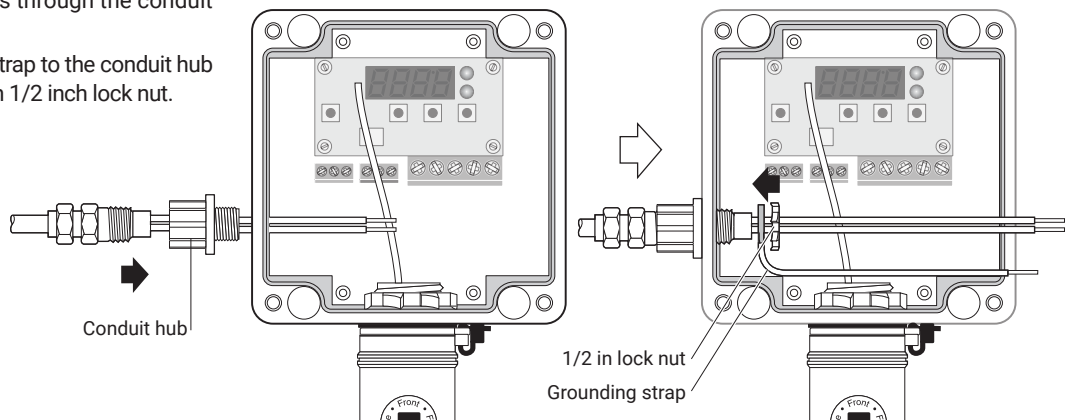
6

- Remove 1/2 in (13 mm) plug and 1/2 in lock nut from side of enclosure.



7

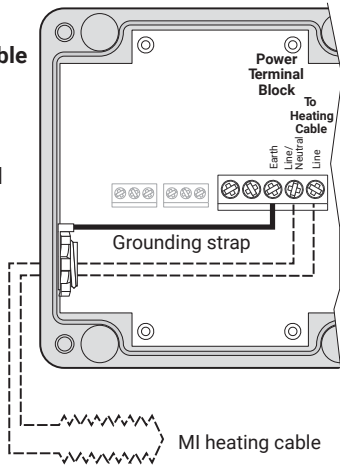
- Use the MI Cable grounding kit (ordered separately).
- Insert the cold leads through the conduit hub and secure.
- Add the grounding strap to the conduit hub and then secure with 1/2 inch lock nut.



8

Connecting Heating Cable

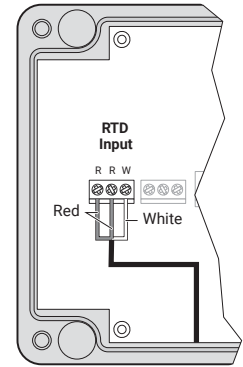
- Insert the two heating cable wires into the terminal block marked “To Heating Cable” and the grounding strap to “Earth” and tighten terminals. Confirm connection by pulling on the wires.



9

Connecting RTD

- Insert the three RTD wires into the terminal block marked “RTD Input”. Match the colors (Reds to R, White to W), and tighten terminals. Confirm connection by pulling on the wires.

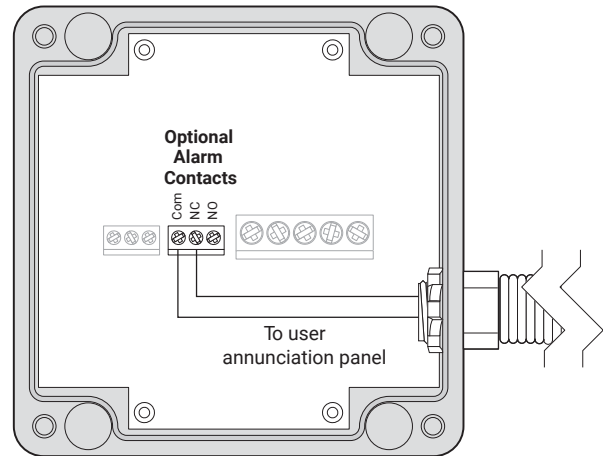


10

Connecting Alarm

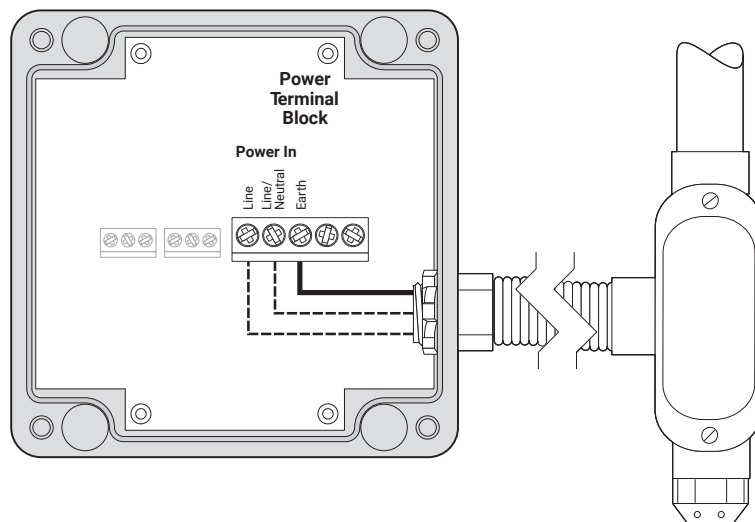
- The controller has a form C contact for remote annunciation of low and high alarms. If an external alarm is required, then alarm wiring can exit the enclosure via the 3/4 inch power conduit hole, as long as the insulation rating of the alarm wire is equal to the power wire. (Per NEC 303-3 (c)).

Alarm Relay
Form C: 2 A at 277 Vac, 2 A at 48 Vdc
Normally energized; changes state upon an alarm.



11

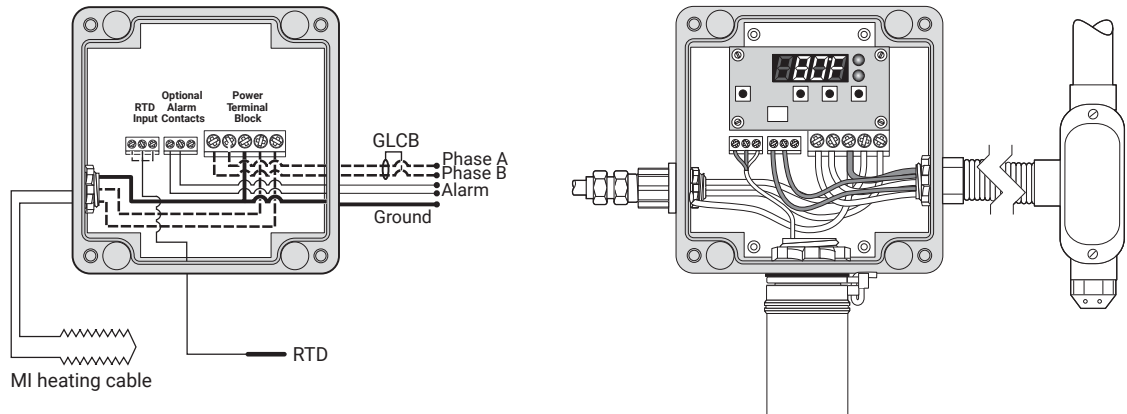
- Install conduit and fittings as shown. To minimize loosening due to pipe vibration, use flexible conduit.
- Pull in power and ground wires, strip off 1/2 in (13 mm) of insulation and terminate.



nVent recommends the use of a conduit drain to prevent water condensation build-up

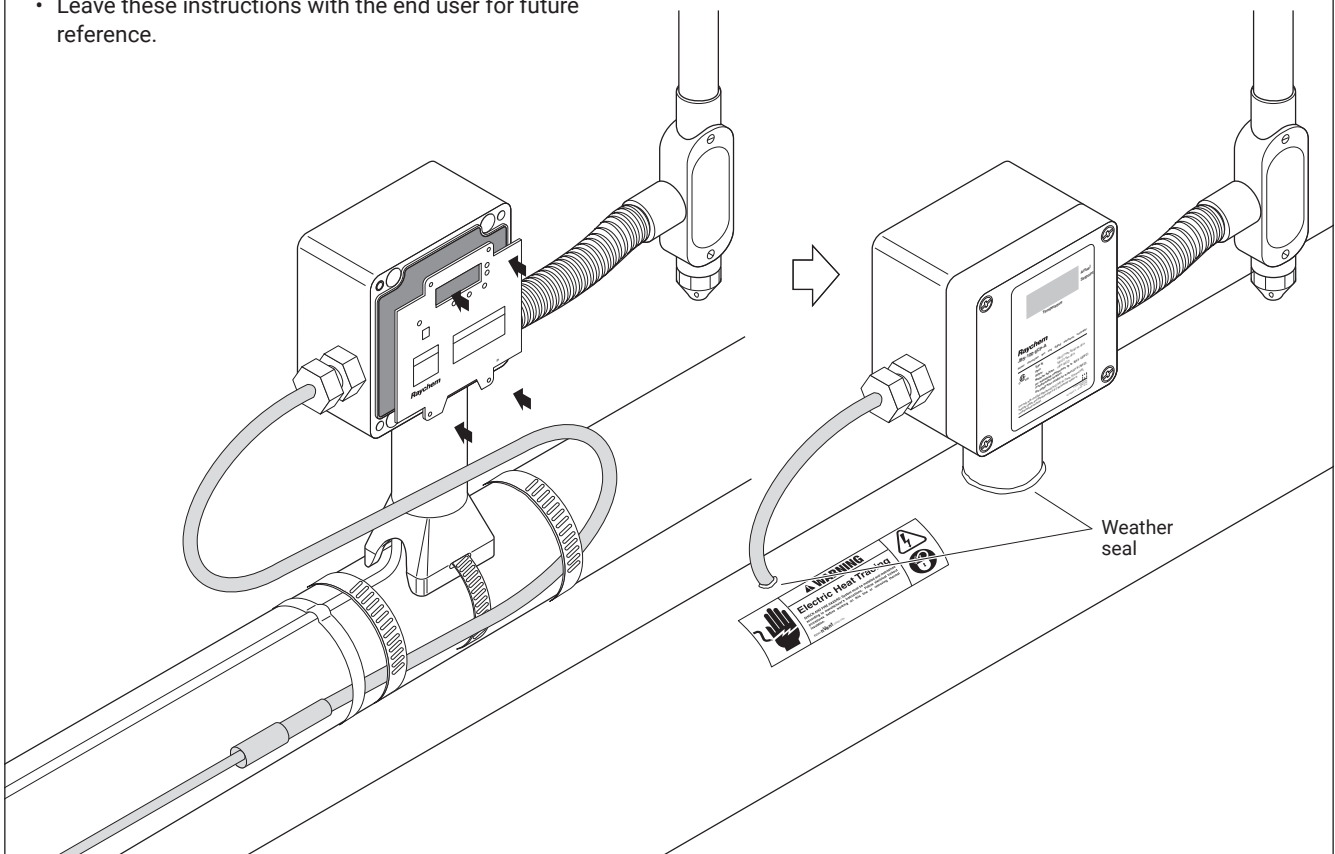
12

- Finished wiring diagram.



13

- Install wire cover.
- Program the controller. (See the section “Programming the Controller” that follows.)
- Install lid.
- Apply insulation and cladding.
- Weather-seal the stand entry.
- Leave these instructions with the end user for future reference.



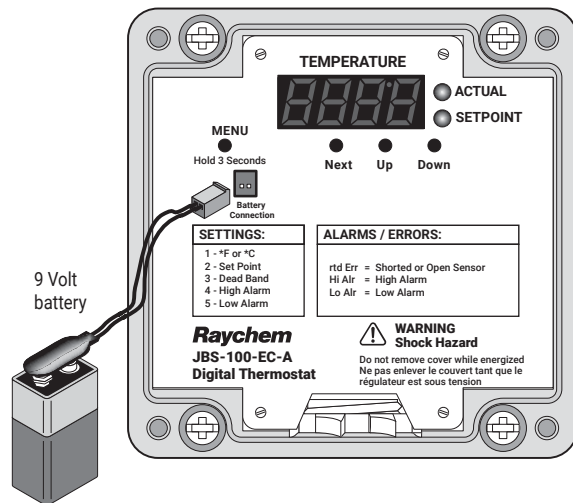
Programming the Controller

To program the controller, supply voltage to the controller in either of the following ways.

1A

Powering Controller via Battery

- Connect 9 VDC battery (not provided) to the supplied battery connector.
- Plug the the battery connector onto the two pins on the controller marked “Battery Connector.”

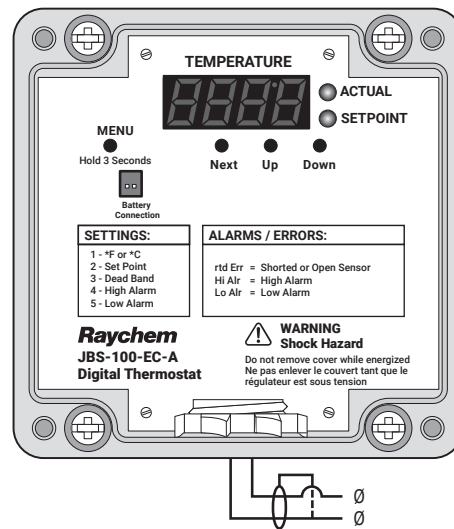


1B

Powering Controller via Line Power

⚠ WARNING: Shock Hazard.
Secure the wire cover in place with the four screws before proceeding.

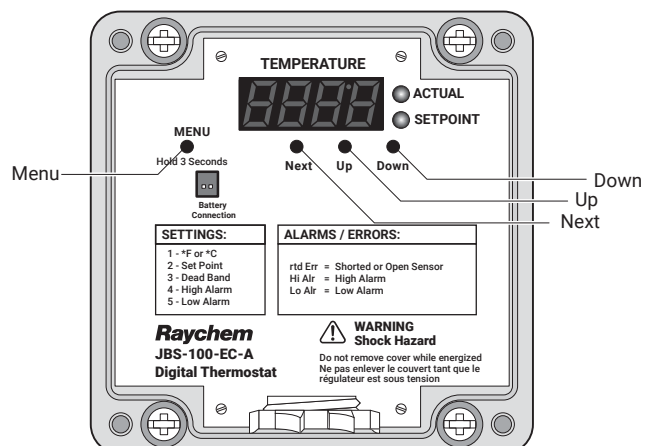
- Turn on branch circuit breaker that supplies power to the controller and heating cable.



2

Activating and Navigating the Menu in Set-up Mode

- To activate set-up mode, press **Menu** button for approximately 5 seconds.
- The display will change to the default mode for units.
- Use the **Up** and **Down** buttons to change values. Use the **Next** button to change to next display code/parameter.
- When completed, secure the enclosure cover.



Parameters

The first parameter displayed during set-up mode is units (°F or °C). Other parameters, their default values, and minimum and maximum values, are shown in the following table.

Display Code	Parameter	Default	Min.	Max.
1	Units °F or °C	°F	—	—
2	Maintain set point	40°F	32°F (0°C)	425°F (218°C)
3	Deadband	5°F	2°F (2°C)	10°F (10°C)
4	High Alarm ¹	Off	38°F (3°C)	482°F (250°C)
5	Low Alarm ²	Off	20°F (-6°C)	420°F (216°C)

Note:

1. The minimum high temperature alarm set point must always be larger than the maintain set point plus the deadband plus 5°F (3°C).
2. The maximum low temperature alarm set point must always be smaller than the maintain set point minus the deadband.

Alarms

The following table lists the error or alarm codes and their respective faults:

Alarm Relay

Form C: 2 A at 277 Vac, 2 A at 48 Vdc

Normally energized; changes state upon an alarm.

Alarm / Error Codes	Fault
rtd Err	Shorted or open RTD sensor
Hi Alr	High Temperature Alarm
Lo Alr	Low Temperature Alarm

North America

Tel +1.800.545.6258
Fax +1.800.527.5703
thermal.info@nvent.com

Europe, Middle East, Africa

Tel +32.16.213.511
Fax +32.16.213.603
thermal.info@nvent.com

Asia Pacific

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