

ETM-2020 Service Manual

Introduction

Novar’s Electronic Thermostat Modules (ETMs) are intelligent control modules that provide local, direct digital control of unitary, packaged, staged HVAC systems. This document:

- Describes the ETM-2020.
- Lists precautions that those servicing the ETM must observe.
- Explains the wiring connections.
- Explains how to check the ETM’s operating status and how to set its address.
- Explains how to replace the ETM and/or its baseplate, if necessary.
- Explains how Novar’s Wall-Mount Temperature Sensor (WTS-10) and Duct Temperature Sensor (DTS-30) are used with the ETM.
- Provides troubleshooting guidelines for the following items:
 - Communications loss
 - Rooftop unit (RTU)
 - WTS-10
 - DTS-30

Description

The ETM-2020 (Figure 1) is designed to be mounted on a baseplate for use in a rooftop unit that supplies its power. It provides confirmation inputs for all output stages (except damper) and a second temperature input.

- A remote temperature sensor can be mounted in a controlled zone and wired to the ETM.
- A duct temperature sensor can be mounted in a supply-air duct and wired to the ETM.

If two sensor inputs are applied, any one of several control strategies can be selected.

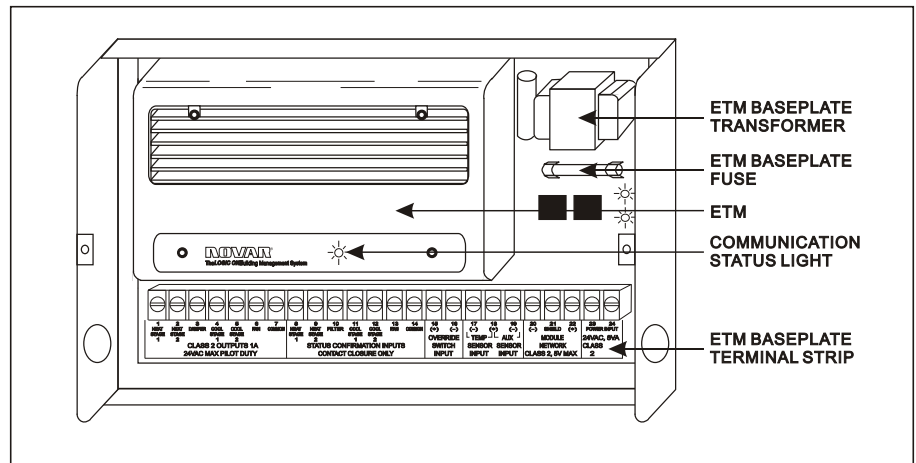


Figure 1. ETM-2020 with baseplate

Precautions

NOTE! To perform any of the operations outlined in this manual, a person must meet *both* of the following qualifications:

- Be a licensed electrician or a licensed HVAC technician.
 - Have experience in troubleshooting building automation and HVAC controls.
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WARNING! Some service and maintenance checks in this manual require that the unit’s power be turned on. Multiple voltages at the HVAC unit present an electrical shock hazard that can cause injury or death. Before attempting to service an ETM-2020, turn off power to the HVAC unit at the disconnect switches. When performing the service checks that require power, turn on the power as necessary but be aware that the electrical shock hazard exists. No one should perform the operations outlined in this manual unless he or she meets the qualifications specified above and is trained and experienced in working with the following voltages:

- 24-VDC
 - 24-VAC
 - 110-VAC
 - 208-VAC
 - 277-VAC
 - 480-VAC
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Wiring Connections

The ETM-2020 terminal strip (Figure 2) draws 0.12 amps current and provides connections for the following items.

Table 1. ETM-2020 Terminal Connections	
TERMINALS	CONNECTIONS FOR
1–7	HVAC control wires
8–14	Status confirmation inputs
15–16	Remote override switch input
17–19	Temperature sensor inputs <ul style="list-style-type: none"> ■ 17–18: Wall-mount temperature sensor power (24-VDC) ■ 18–19: Duct temperature sensor power (24-VDC)
20–22	ETM communications (2.5-VDC)
23–24	ETM power (24-VAC)

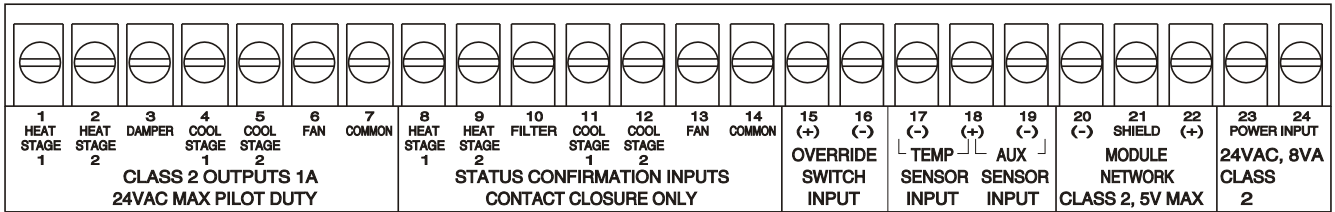


Figure 2. ETM-2020 terminal strip

NOTE! All inputs except Terminal 10, Filter, must be jumped to the Common, Terminal 14.

NOTE! The ETM is a Class 2, low voltage device. Do not connect 115 volts to any terminal. The outputs are controlled by low-voltage triacs. Do not exceed 24-VAC at 1 amp.

Troubleshooting the ETM-2020

WARNING! The precautions listed on Page 2 of this document must be observed when any of the operations outlined in this document are performed.

Before performing service on an ETM, service technicians should locate and check the following items :

- ETM communication status light-emitting diode (LED) located on the front of the module (see Figure 1)
- ETM load status lights visible behind the ETM’s front grill (see Figure 3)
- ETM address switches located on the back of the ETM (see Figure 4)
- Rooftop unit (RTU) communicating with the ETM

The communication status light indicates if the module is currently receiving electrical power and its current mode of operation. The following table explains the light’s operation.

Table 2. ETM Communication Status Light Operation	
IF THE COMMUNICATION STATUS LIGHT	EXPLANATION
Is completely off	The ETM has no power.
Blinks off approximately every 15 seconds	The ETM is operating in normal/occupied mode.
Blinks on every 5 seconds for 3 minutes before switching to normal mode	The ETM is going through its initial power up.
Blinks on approximately every 15 seconds	The ETM is in unoccupied mode.
Blinks off 3 times approximately every 15 seconds	The ETM address is incorrect.
Blinks on and off steadily	The ETM has power but is not communicating.

The load status lights located behind the grill on the front of the module (Figure 3) indicate if the ETM is currently calling for the cooling loads (C2, C1), fan, heating loads (H1, H2), or damper.

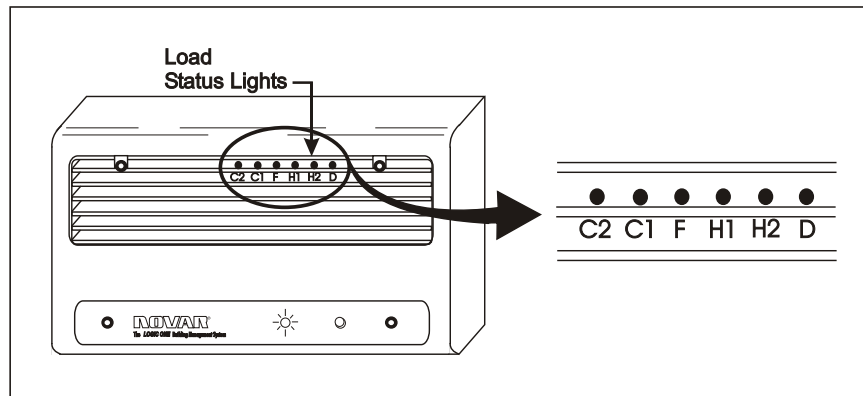


Figure 3. ETM's load status lights

The ETM's address switches (Figure 4) must be set accurately for it to communicate with the appropriate rooftop unit and executive module.

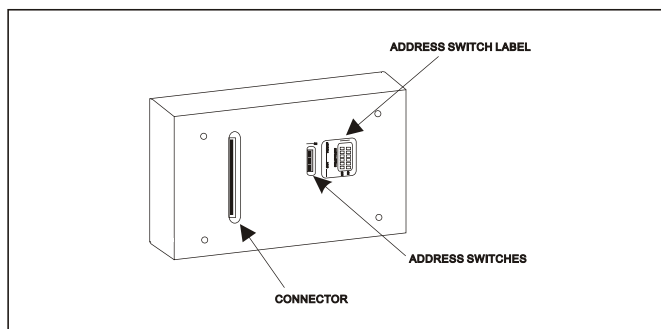


Figure 4. ETM address switches on the back of the ETM

Typical ETM addresses coincide with the RTU number, as shown in Figure 5.

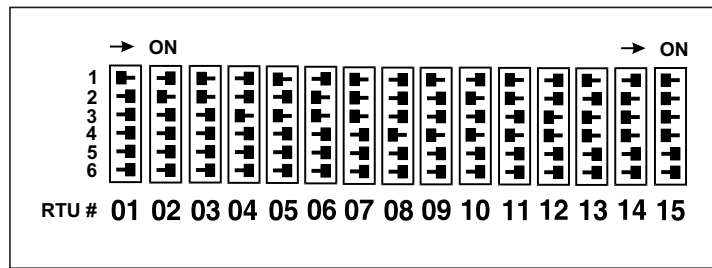
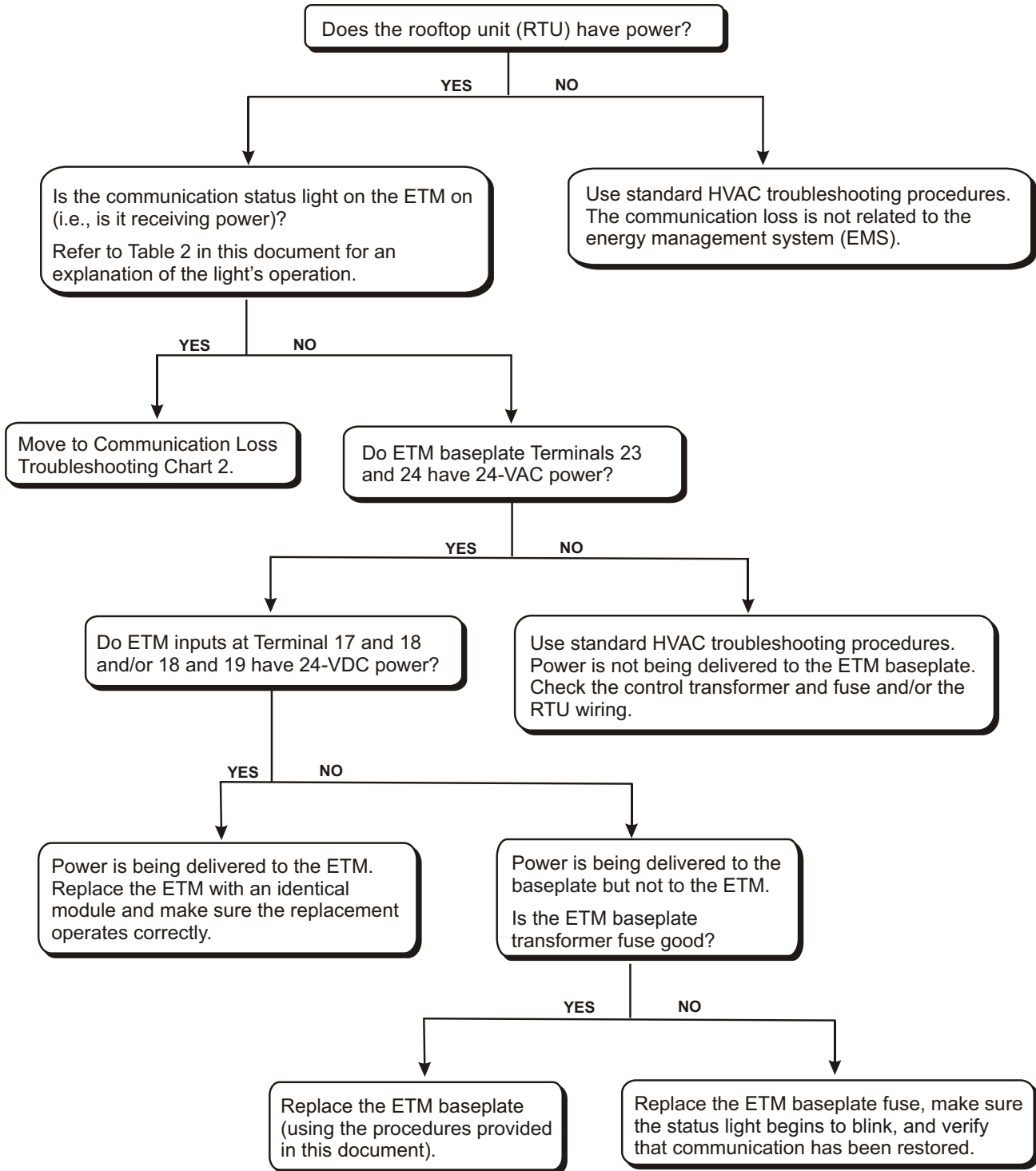


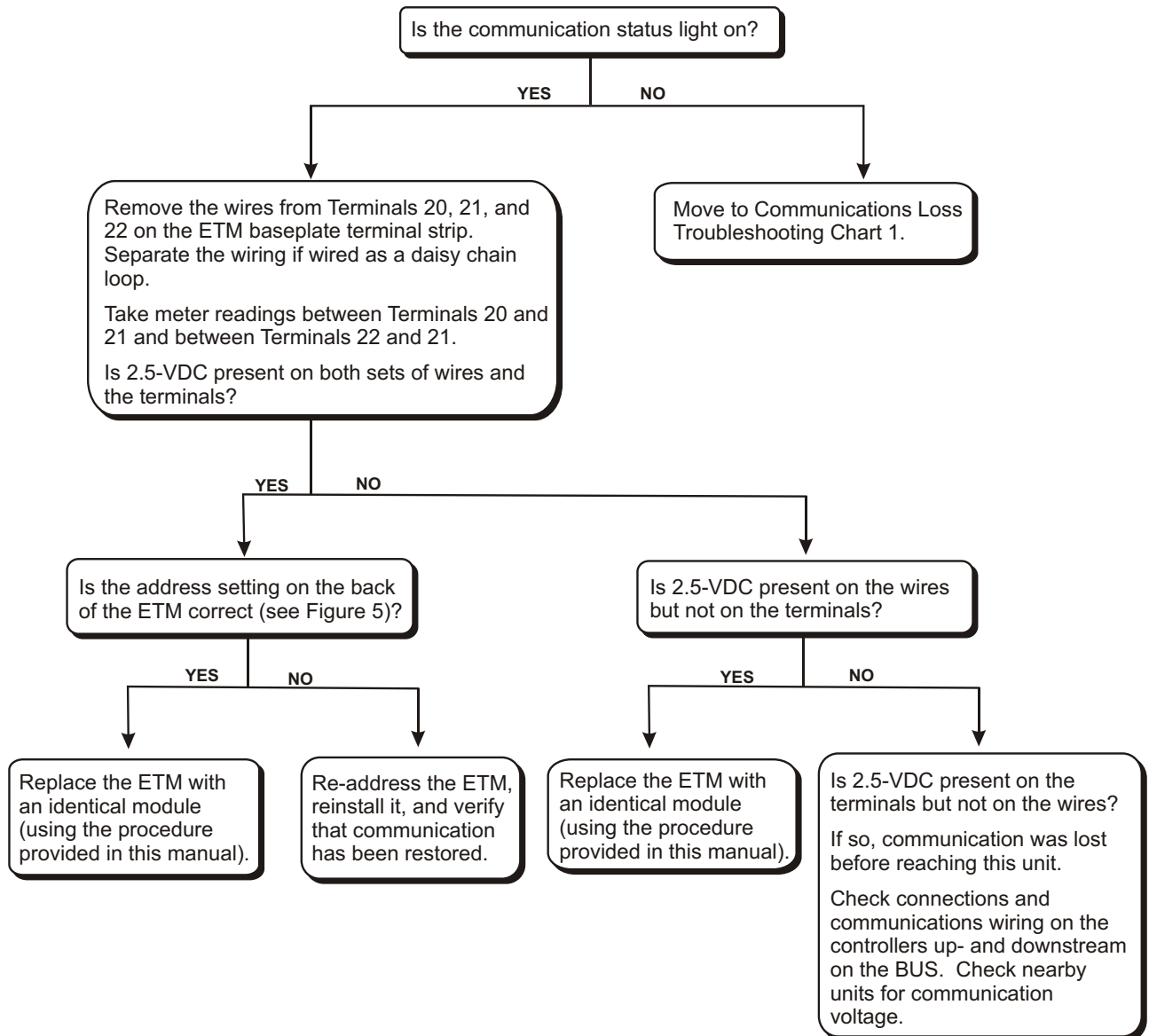
Figure 5. ETM address settings

The following charts can be used to troubleshoot communications loss.

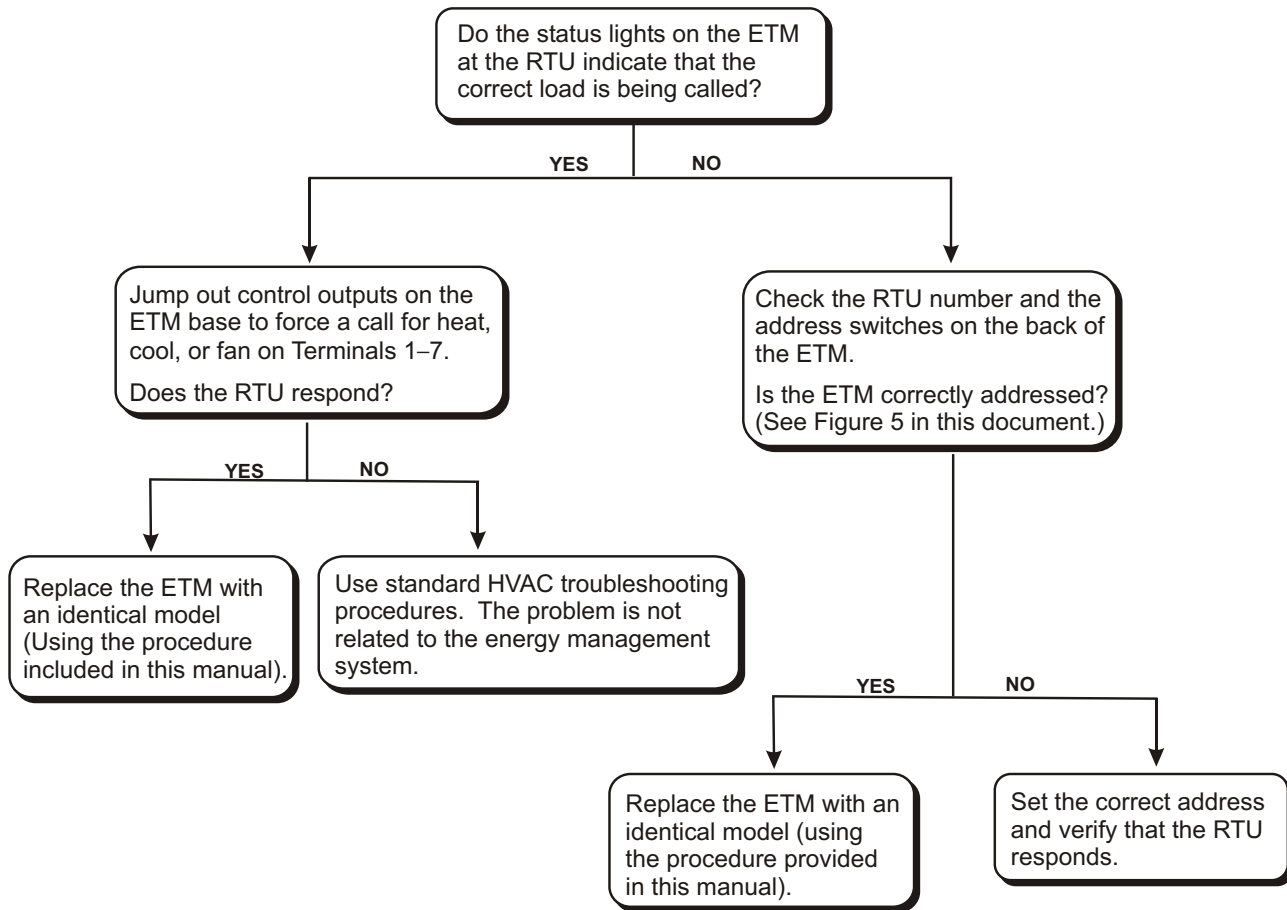
**Communications Loss
Troubleshooting Chart 1
Checking the ETM and Its Baseplate for Power**



Communications Loss Troubleshooting Chart 2 Checking the Wires, Baseplate Terminals, and Address



Rooftop Unit Does Not Respond to ETM Calls Troubleshooting Chart 3



Replacing the ETM

Use the procedure provided below to replace an ETM.

NOTE! The replacement ETM must be identical to the ETM being replaced.

Step	Procedure
1	<p>Remove the four Phillips-head screws on the front of the ETM (Figure 6).</p> <div data-bbox="773 699 1482 1087" style="text-align: center;"> </div> <p>Figure 6. Front view of the ETM</p>
2	Remove the ETM from its baseplate.
3	<p>Set the address switches on the back of the replacement ETM to match the address setting on the original ETM.</p> <ul style="list-style-type: none"> ■ Refer to Figure 5, if necessary.
4	Align the replacement ETM over the PEMs and the connector on the baseplate and gently push into place.
5	Reinsert and tighten the screws on the front of the module.
6	Check the status light to make sure power has been restored.
7	Make sure that communication has been restored.

Any Novar Technology Center (NTC) or Novar Controls account representative can provide instructions for returning the defective ETM.

Wall-Mount Temperature Sensor

Novar Controls' Wall-Mount Temperature Sensor (WTS-10; Figure 8) can be used with the ETM-2020.

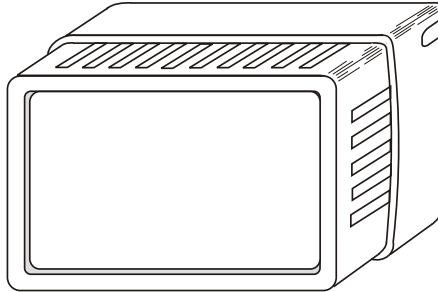


Figure 8. WTS-10

The sensor is mounted in the zone controlled by the RTU and uses a shielded two-wire cable to:

- Receive 24-VDC power from the ETM.
- Send the ETM a 4- to 20-milliamp signal proportional to the zone temperature. The ETM translates the signal into a 20° to 120°F reading as shown in Table 3.

MILLIAMP READING	APPROXIMATE TEMPERATURE (IN DEGREES FAHRENHEIT)
11.2	65
11.36	66
11.52	67
11.68	68
11.84	69
12.0	70
12.16	71
12.32	72
12.48	73
12.64	74
12.80	75
12.96	76
13.12	77
13.28	78
13.44	79
13.60	80

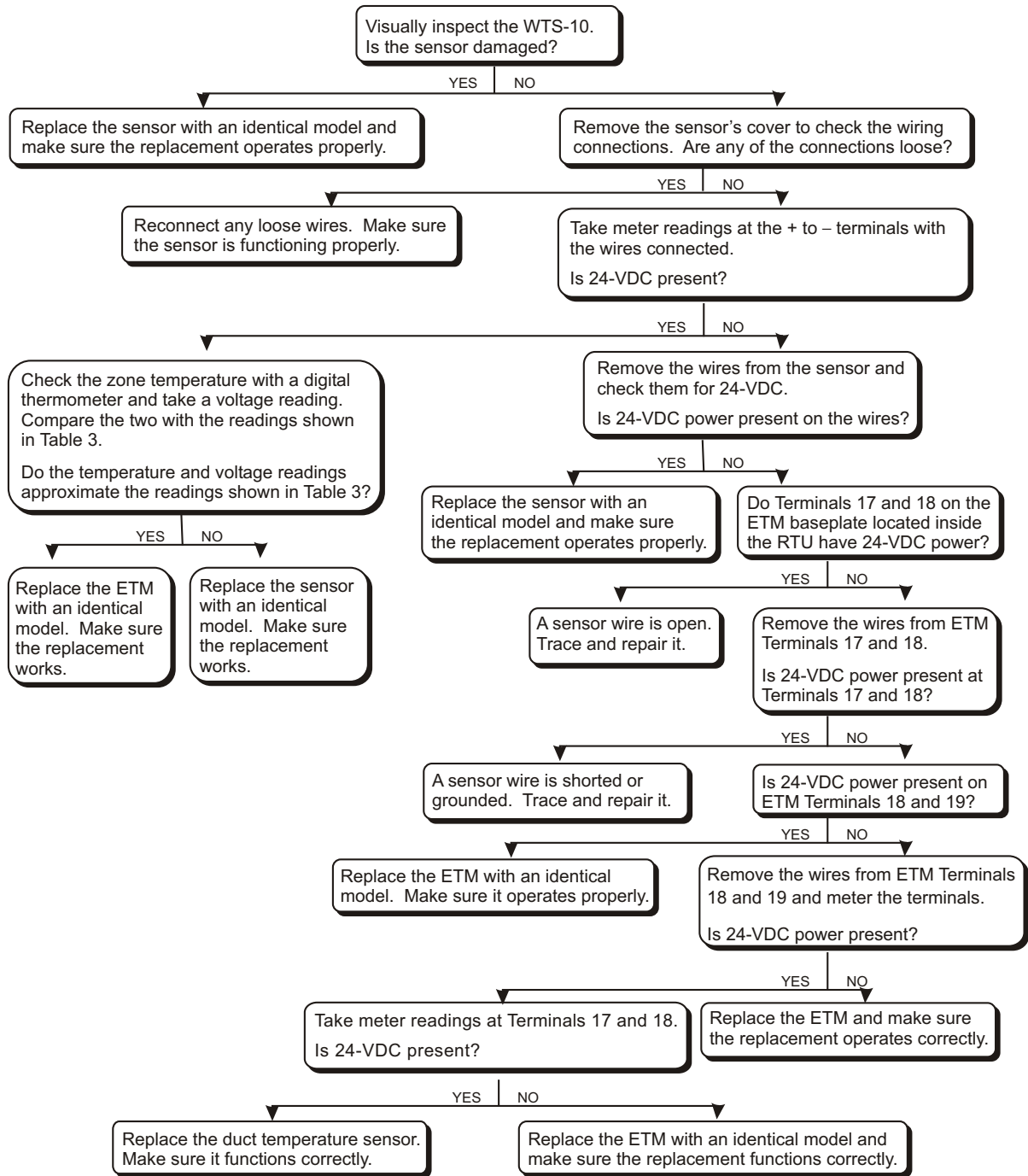
NOTE! When the sensor is mounted, the pigtail extending from the back of the sensor must be tucked inside the wall, away from the sensor. The circuitry inside the pigtail tends to become hot. If it is tucked inside the sensor, it could cause inaccurate readings.

When the sensor is wired, polarity must be observed.

The sensor is permanently calibrated at the factory.

The following chart should be used to troubleshoot WTS-10 faults.

**WTS-10 Sensor Faults
Troubleshooting Chart**



Duct Temperature Sensor

Novar's Duct Temperature Sensor (DTS-30, Figure 9) uses a shielded two-wire cable to:

- Receive 24-VDC from the ETM.
- Send the ETM a 4- to 20-milliamp signal proportional to the duct temperature. The ETM translates that signal into a 20° to 170°F reading.

Polarity does not have to be observed when the DTS is wired.

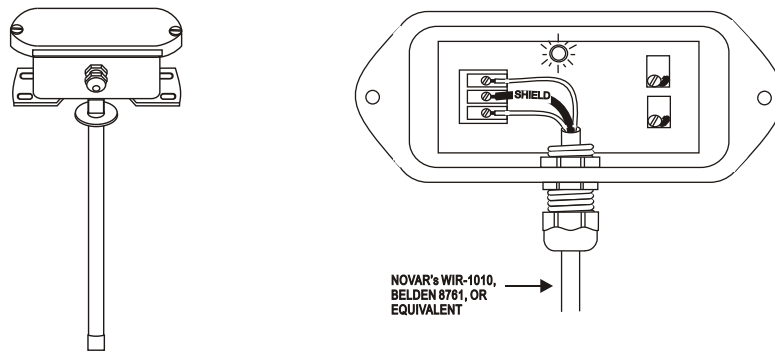


Figure 9. DTS-30 exterior and interior

If it is necessary to troubleshoot DTS faults, the following procedure should be used to take milliamp readings at the sensor.

Step	Procedure
1	Remove the sensor's positive wire from the terminal strip (Figure 10).
2	Move the meter leads to the meter's amp socket and set the meter to an amp range that will accommodate a 4- to 20-mA DC reading.
3	Place the meter in series with the sensor and read the milliamps.

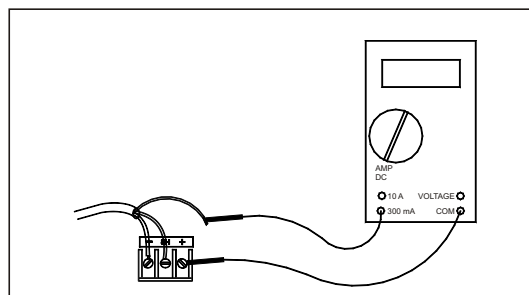
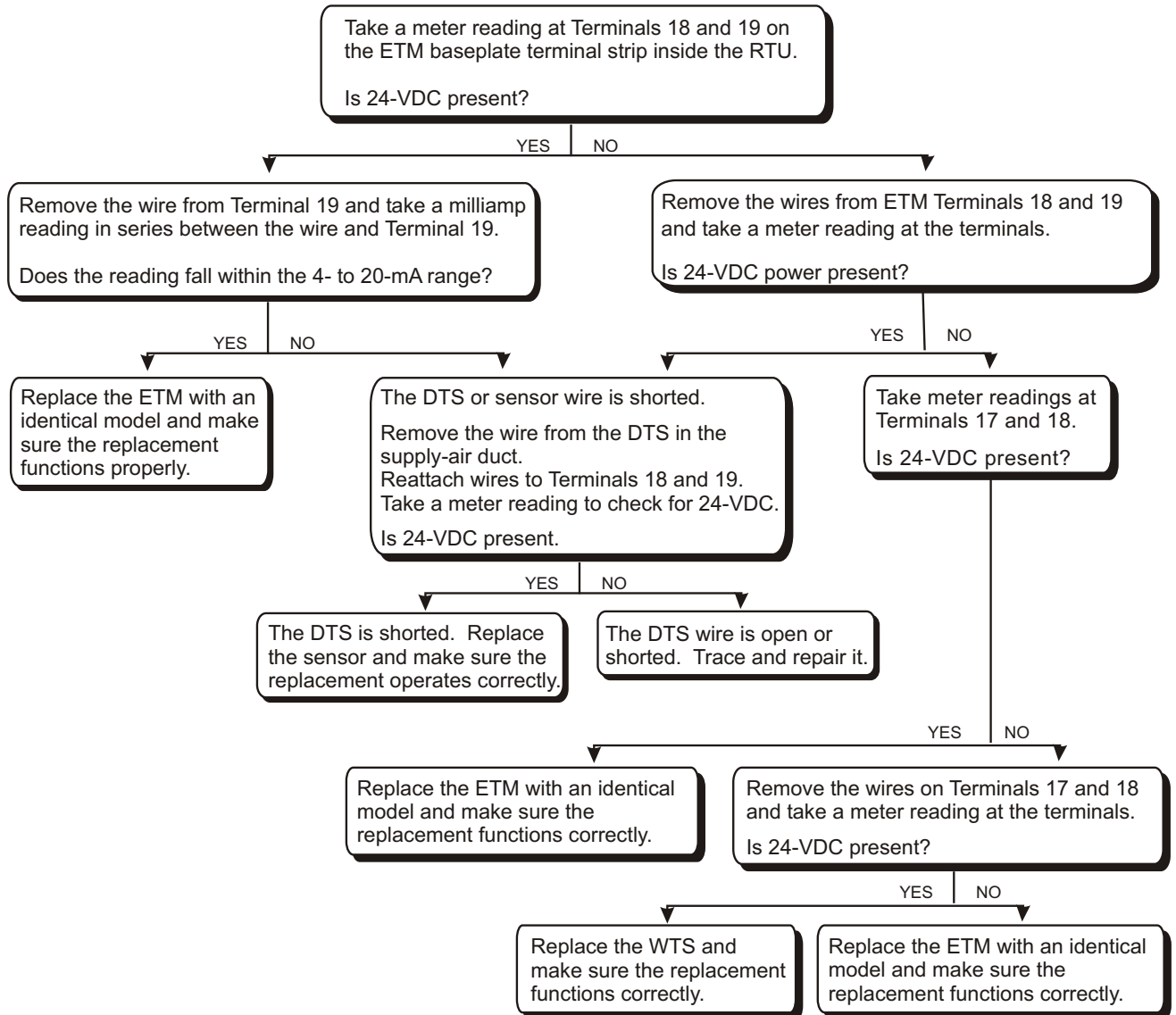


Figure 10. Taking a milliamp reading

The following chart should be used to troubleshoot DTS faults.

Duct Temperature Sensor Faults Troubleshooting Chart



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