

ETM-2040 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-2040.
- Lists precautions to be taken when servicing an ETM.
- Provides status and addressing information needed to troubleshoot the ETM
- Explains how to replace the ETM and its baseplate
- Explains how Novar’s Duct Temperature Sensor and Zone Temperature Sensor are used with the ETM

In addition, this document provides troubleshooting charts for:

- Communications loss
- Rooftop unit (RTU) response
- Duct Temperature Sensor Faults

Description

The ETM-2040 is designed to be mounted on the wall in the space being controlled. A zone temperature sensor is factory-mounted on the ETM (Figure 1). A duct temperature sensor (DTS-30) can be mounted in the supply-air duct and wired to the ETM.

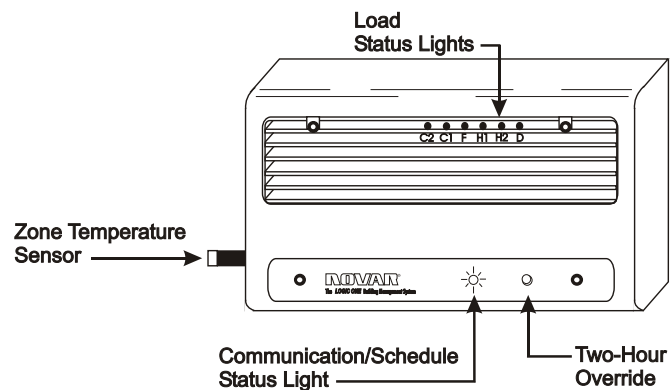


Figure 1. ETM-2040

The module uses 24-VDC power and draws 0.12 amps.

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.

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-2040, 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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Troubleshooting the ETM-2040

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

Anyone performing service on an ETM-2040 should locate and check the following items before beginning any troubleshooting procedures:

- ETM communications status light-emitting diode (LED) located on the front of the module (see Figure 1)
- Load status lights located behind the grill on the front of the module (see Figure 1)
- ETM address switches located on the back of the module
- ETM wiring harness connection on the ETM's baseplate
- 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 1. 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 1) indicate if the ETM is currently calling for the cooling loads (C2, C1), fan, heating loads (H1, H2), or damper.

The ETM's address switches are located on the back of the module (Figure 2).

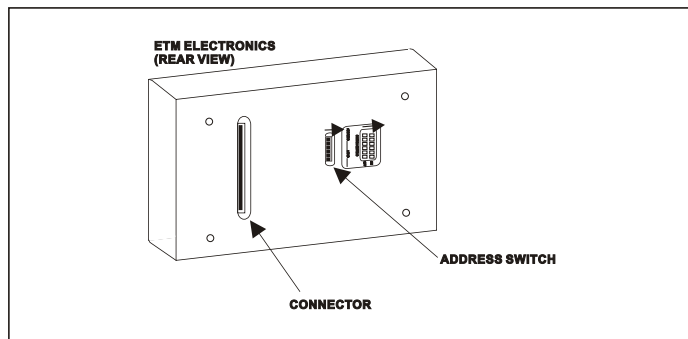


Figure 2. Back of the ETM

The address must be set accurately for the ETM to communicate with the appropriate rooftop unit and executive module. Typical ETM addresses coincide with the RTU number, as shown in Figure 3.

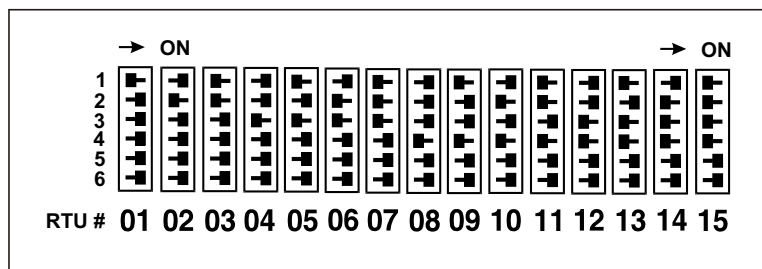


Figure 3. ETM address settings

The baseplate used for mounting the ETM (Figure 4) has a quick-connect wiring harness.

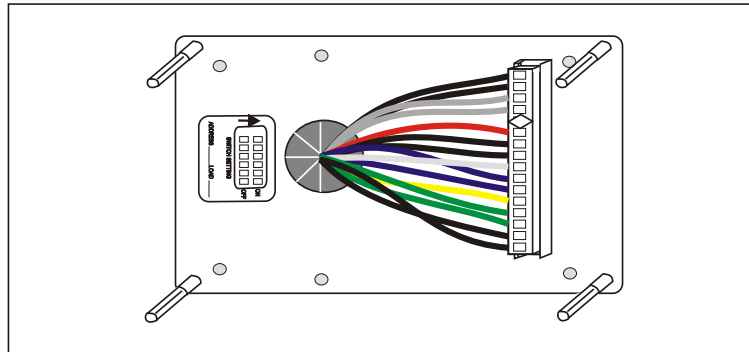


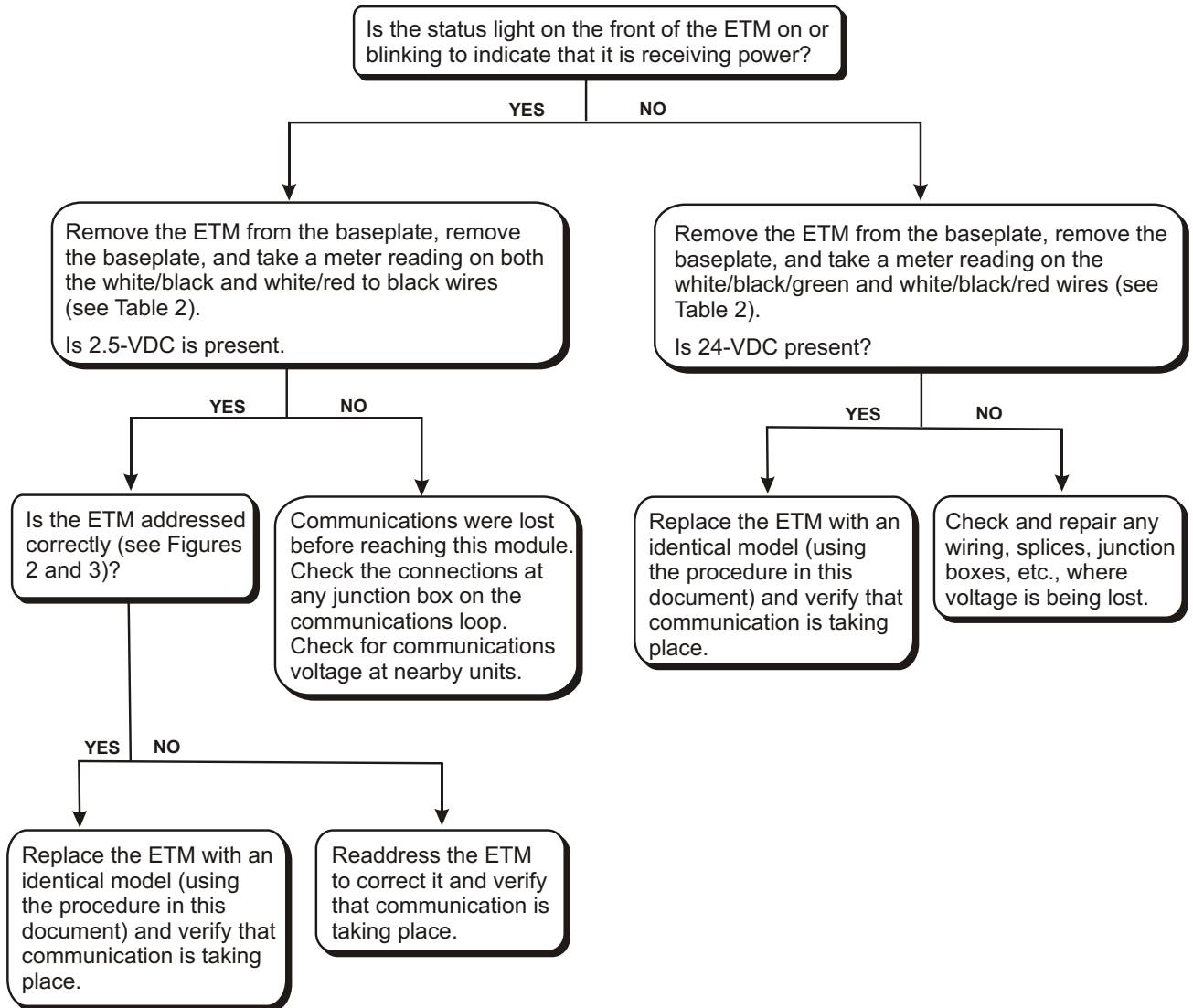
Figure 4. Baseplate used to mount the ETM-2040 in the zone to be

Table 2 shows the ETM wiring connections.

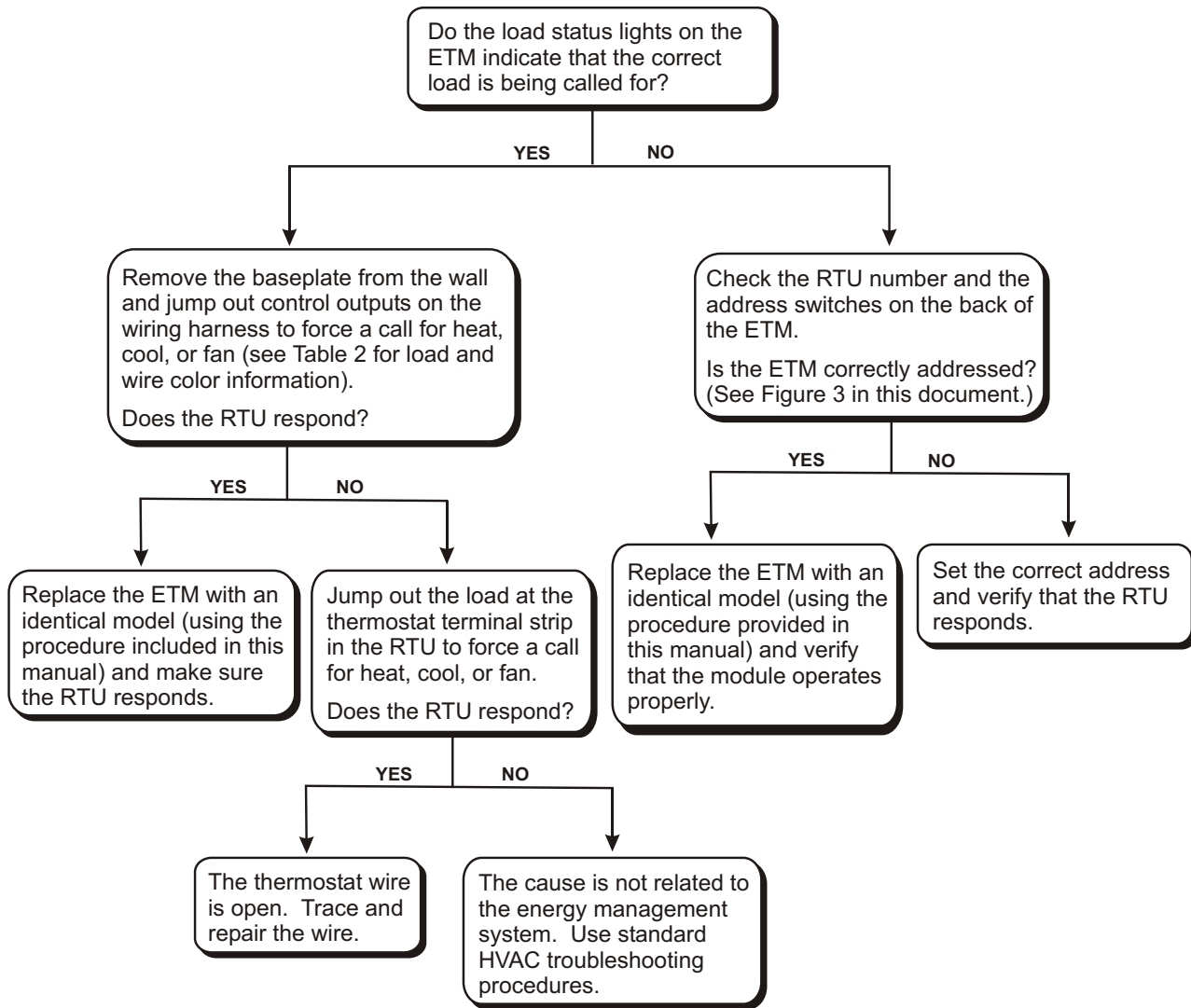
Table 2. ETM-2040 Connections		
PIN NO./COLOR	FUNCTION	
1 White/Blue	Heat Stage 2, W2	
2 White	Heat Stage 1, W1	
3 White/Black	Module communications (-) 2.5-VDC	
4 White/Red	Module communications (+) 2.5-VDC	
5 Dark Blue	Heat/cool return, R	
6 Yellow	Cool Stage 1	
7 Orange	Cool Stage 2	
8 White/Black/Green	Module power (-)	
9 White/Black/Red	Module power (+)	
10 Light Blue	Heating Stage 3 or Damper	
11 Green	Fan	
12 Brown	Fan Status	
13 White/Brown	Filter Status	
14	Polarizing key	
15 Black	Status Return	
16 Black	Status Return	
17 Black	Module Communications (Shield)	
18 Violet	Temperature sensor (+)	
19 Gray	Temperature sensor (-)	

The following charts can be used to troubleshoot communications loss.

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



Rooftop Unit Does Not Respond to ETM Calls Troubleshooting Chart 2



Replacing the ETM

The following procedure should be used to replace an ETM. Refer to Figure 5, as necessary.

NOTE! The replacement ETM must be the same model as the original.

Step	Procedure
1	Remove the four Phillips-head retaining screws on the front of the ETM electronics.
2	Remove the electronics from its baseplate.
3	Set the address switches on the back of the replacement ETM electronics to match the address setting on the original module. <ul style="list-style-type: none"> ■ Refer to Figures 3 and 4, as necessary.
4	Align the replacement electronics over the PEMs and the connector on the baseplate and gently push it 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.

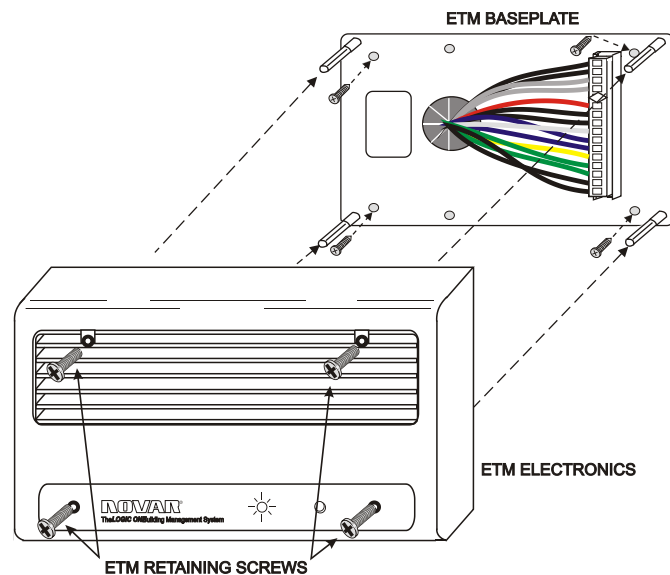


Figure 5. Replacing an ETM and its baseplate

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

Replacing the ETM Baseplate

The following procedure should be used to replace the ETM baseplate. Refer to Figure 5, as necessary.

Step	Procedure
1	Turn off the RTU's power at the disconnect. <hr/> NOTE! 24-VDC power is still present from the ETM modular power supply. <hr/>
2	Remove the four Phillips-head retaining screws from the front of the ETM and remove the ETM from the baseplate.
3	Remove the four screws used to mount the baseplate <hr/> CAUTION! Do not damage or disconnect the wiring harness when removing the screws. <hr/>
4	Tag each wire terminated on the baseplate.
5	Remove all wires from the ETM's baseplate.
6	Attach each wire to the new baseplate.
7	Position the new baseplate over the mounting holes and insert and tighten the four mounting screws.
8	Reinstall the ETM on the baseplate.
9	Restore power to the RTU and verify that communication has been restored.

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

Duct Temperature Sensor

Novar's Duct Temperature Sensor (DTS-30, Figures 9 and 10) 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 duct temperature. The ETM translates that signal into a 20° to 170°F reading.

Polarity is not required when the DTS is wired.

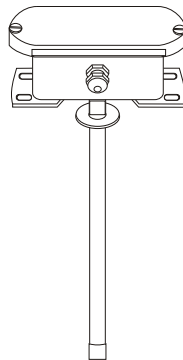


Figure 9. DTS-30

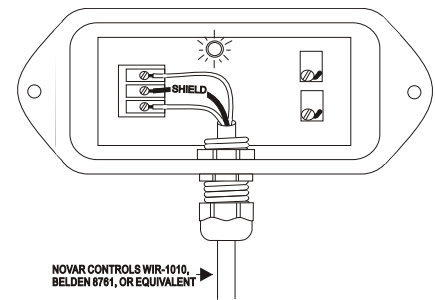


Figure 10. Close-up of DTS-30 interior

The sensor is permanently calibrated at the factory.

If it is necessary to troubleshoot DTS faults, the following procedure should be used to take milliamp readings at the sensor. Refer to Figure 11, as necessary.

Step	Procedure
1	Remove the sensor's positive wire from the terminal strip.
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.

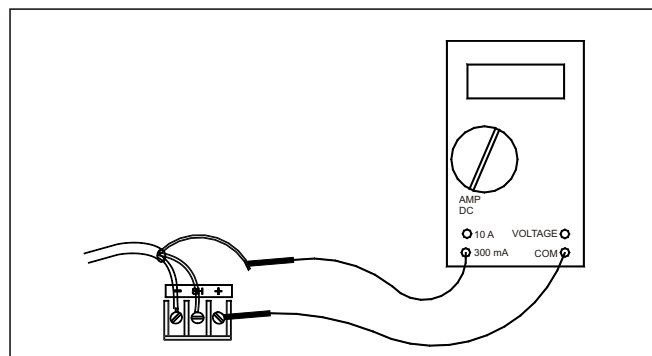
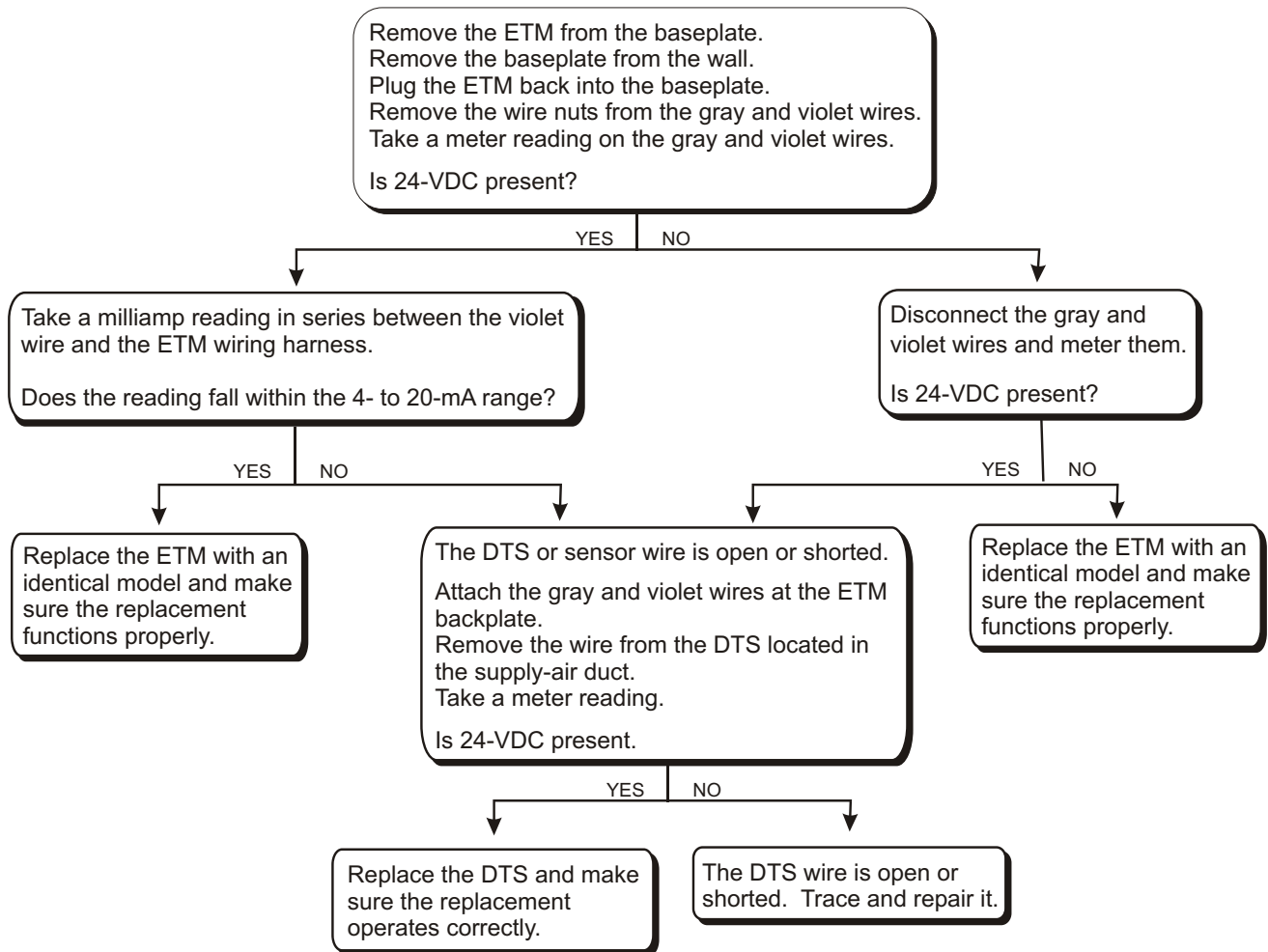


Figure 11. Taking a milliamp reading

The following chart should be used to troubleshoot DTS faults.

Duct Temperature Sensor Faults Troubleshooting Chart



**Zone Temperature
Sensor**

A zone temperature sensor is directly connected to the ETM (see Figure 1). If the sensor is in open or shorted fault, the ETM should be replaced with an identical model. Once the ETM is replaced, the zone temperature sensor should function properly.

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