

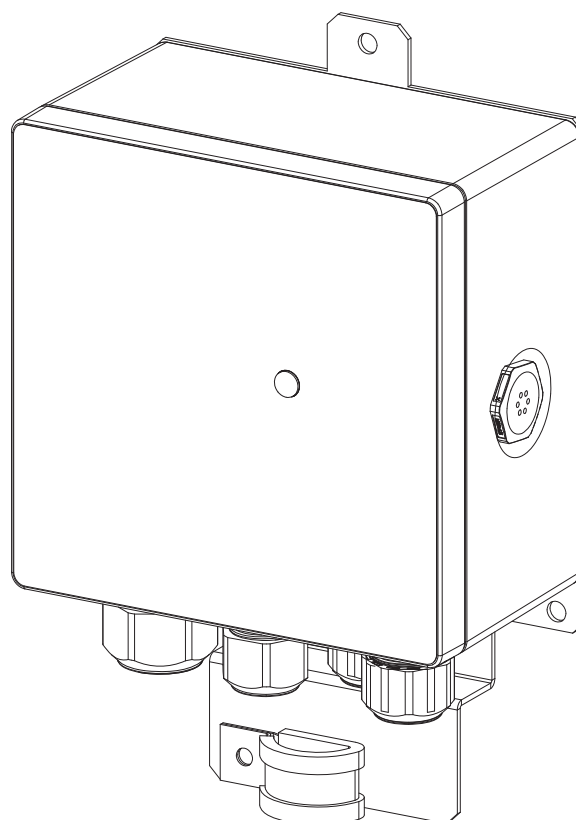


DISTRIBUTION TRANSFORMER MONITOR

INSTALL GUIDE

10000008964 r5

MODEL
DTM-4



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For technical support, please contact:

Franklin Electric Technical Support

Web: franklinfueling.freshdesk.com/support/home

Tel: +1 800 984 6266

For additional questions and concerns, please contact:

Franklin Electric

3760 Marsh Rd

Madison, WI 53718 USA

Web: franklingrid.com

Tel: USA & Canada +1 800 225 9787 • Tel: UK +44 (0) 1473 243300

Tel: Mex 001 800 738 7610 • Tel: DE +49 6571 105 380 • Tel: CN +86 10 8565 4566

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CONVENTIONS USED IN THIS MANUAL

This document includes safety precautions and other important information presented in the following format:

NOTE: This provides helpful supplementary information.

IMPORTANT: This provides important supplementary information and instructions to avoid damaging hardware or a potential hazard.

▲ CAUTION: This indicates a potentially hazardous situation that could result in minor or moderate injury if not avoided. This may also be used to alert against unsafe practices.

▲ WARNING: This indicates a potentially hazardous situation that could result in severe injury or death if not avoided.

▲ DANGER: This indicates an imminently hazardous situation that will result in death if not avoided.

OPERATING PRECAUTIONS

▲ WARNING: Important safety instructions. Before installing any Franklin Electric equipment, read this document and follow safety and operating instructions. Save these instructions.

▲ WARNING: Do not disassemble any equipment; contact Franklin Electric when a repair is required. Incorrect reassembly may result in a risk of electric shock or fire.

▲ WARNING: To avoid electric shock, abide by your company's safety practices and the following guidelines:

▲ WARNING: Before working with electricity, remove personal metal items such as rings, bracelets, necklaces, watches, etc. A short-circuit current can be high enough to weld such items, causing a severe burn.

▲ WARNING: Service work may only be performed by authorized personnel for procedures which they have satisfactorily been trained to execute.

▲ WARNING: To avoid a risk of serious injury or death, DO NOT come into contact with ANY source of live, electric current.

▲ WARNING: Avoid simultaneous contact with live conductors and enclosures, racks, or hardware that may be grounded.

▲ WARNING: Refer to NFPA 70E for electrical safety guidelines and requirements including (but not limited to) use of Personal Protection Equipment (PPE). Examples include (but not limited to) electrical-insulating clothing/footwear and electrical-insulating rescue hooks (equipment).

▲ WARNING: Always wear safety glasses with side shields.

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1 Introduction

The INCON™ Distribution Transformer Monitor (DTM-4) provides continuous, meter-grade precision performance monitoring of high-value, mission critical, low voltage pad mount transformers and conventional pole mounted transformers.

1.1 Documentation

- This document is intended for qualified and certified installation persons.
- Instructions of this document are in English. All other language versions are translations of this original document.
- Illustrations in this document show a typical setup and are for instruction and description purposes only.
- The information given in this document is given as a guide only. It is the installer's responsibility to ensure that correct and safe procedures are followed at the worksite.
- This document and related documents are available from: Franklin Electric at www.franklingrid.com.

1.1.1 Symbol Legend



Wear Protective Headwear



Wear Eye Protection



Wear Protective Clothing



Wear High-Visibility Clothing



Wear Protective Gloves



Wear Safety Footwear



Refer to instruction guide



Connect an earth terminal to the ground



Lockout/Tagout Electrical Equipment



Disconnect main plug from electrical outlet



Disconnect before carrying out maintenance or repair



General Warning



Warning: Electricity



Warning: Flammable Material



No open flame; Fire, open ignition source and smoking prohibited

2 Safety/Security

2.1 General Safety Information

- Only perform procedures in this document that you are qualified and certified to perform.
- Personnel working on or with energized equipment must be authorized by relevant regulatory bodies to carry out such work and must have the appropriate training. Check with your employer and relevant regulatory body's rules for working with energized equipment.
- Obey all local laws, rules, regulations, and instructions in this document. In case of inconsistency or contradiction between information contained in this document and any laws, rules and regulations, obey the stricter of the two.
- Keep unqualified personnel at a safe distance during installation.
- Always wear all required PPE on-site and during installation.
- If it is necessary to remove safety/security devices, immediately reinstall the safety/security devices after completing the work.

2.2 Documentation Availability

2.2.1 Owner or Operator

Save this guide for future use, and make sure to provide it to anyone who services this equipment.

2.2.2 Miscellaneous

Always reference the guide(s) that came with the equipment for the most current and complete list of installation and safety precautions.

2.3 Hazard Assessment

Prior to beginning work and prior to recommencing work after leaving and returning to the worksite, a worksite, *pre-job hazard assessment* must be performed to identify safety and environmental needs. At a minimum, this hazard assessment should:

- Identify possible hazards and risks.
- Identify the safety needs of the job.
- Identify the correct procedures, practices and equipment.
- Eliminate unsafe conditions and actions from the worksite.
- Identify the need for personal protective equipment.
- Inspect equipment before use.
- Confirm sheaths of all cables are secured and undamaged.
- Confirm plugs and connectors are properly connected and serviceable.
- Perform ongoing risk assessment during the project.

2.4 Required Personal Protective Equipment (PPEs)

These PPEs are required during all phases of installation.



Wear Protective Clothing



Wear Eye Protection



Wear High-Visibility Clothing



Wear Protective Gloves



Wear Protective Headwear



Wear Safety Footwear

2.5 Cyber Security

This product is designed to be connected to and to communicate information and data via a network interface. It is solely the owner's responsibility to provide and continuously ensure a secure connection between the product and the Owner's network or any other network (as the case may be).

The Owner shall establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ***The Owner shall also ensure that the device and/or any connecting devices have the latest firmware version available to ensure device security features are up to date.***

The manufacturer, Franklin Electric, and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

3 Pre-Installation Overview

3.1 Upon Receipt of Item(s)

- Verify all items are in accordance with the order.
- Check all items for damage.
- If any item shows damage or is not in accordance with the order, inform Franklin Electric *immediately*.
- Remove the packaging material.
 - Follow all local laws, rules and regulations regarding disposal of discarded parts, packaging material or items and any subsequent components.

3.2 Technical Overview

The Distribution Transformer Monitor (DTM-4) is an online continuous performance monitor designed for low voltage transformers. It provides information for the process of Condition-Based Maintenance performing these primary functions:

1. Measurement of transformer output line voltage (direct connection).
2. Measurement of transformer loading (current) by phase (Rogowski Coils).
3. Measurement of top and bottom temperature (magnetic temperature sensors).

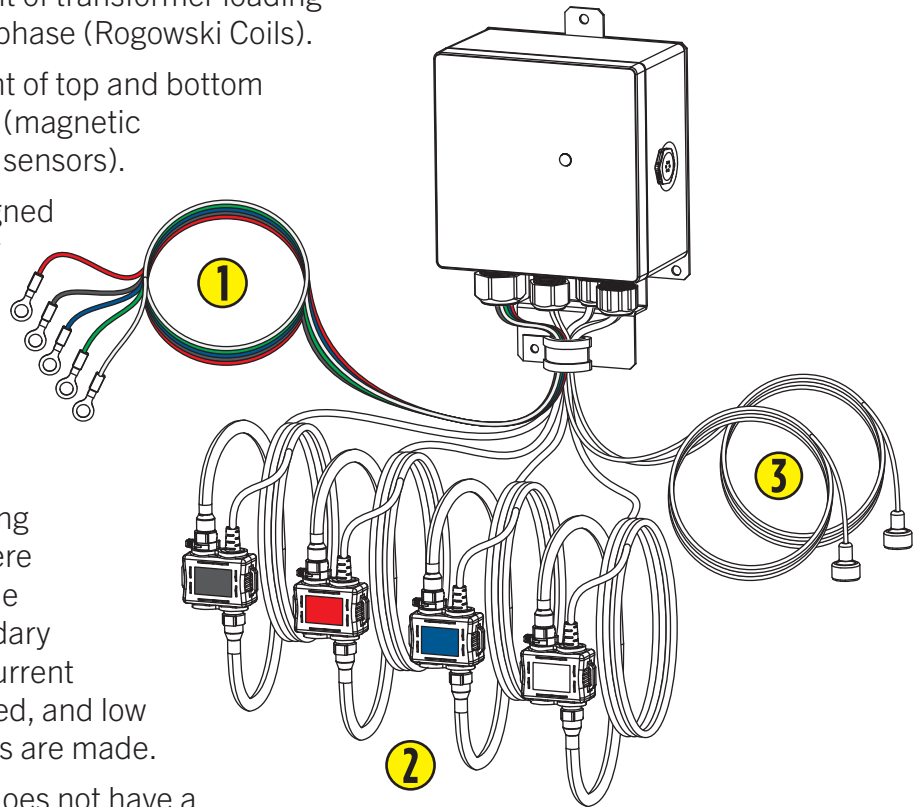
The DTM-4 is designed to be installed near the transformer's control cabinet or mounted near the transformer. Usually, these are the most convenient mounting places because there is easy access to the transformer secondary terminals, where current sensors are mounted, and low voltage connections are made.

If the transformer does not have a control cabinet, the DTM-4 may also be installed in a separate enclosure or mounted to the exterior of the transformer housing. The DTM-4 itself is weather-proof.

The DTM-4 can be applied to any type of distribution transformer with an output of 480 volts or less, phase to neutral. The DTM-4 is used on larger 3-phase transformers.

The DTM-4 Installation has been kept simple, with few connections required to the transformer. Direct connection (1) to transformer secondary to measure line voltage and Rogowski Coils (2) to measure load current. Magnetically mounted RTD temperature sensors (3) are used to measure top and bottom transformer temperature.

Most attributes can be compared to static alarm settings for assertion when they go out of tolerance. The DTM-4 issues alarms via cellular network, through HTTPS web service, locally or remotely.



3.2.1 Specifications

Table 3.1 – Transformer Monitor

Feature	Description
Model DTM-4 Applications	3-Phase Wye, 100–480 V Line-Neutral, 50/60 Hz 3-Phase (3 and 4-wire) Delta, 480 V Line-Line, 50/60 Hz 3-Phase Corner-Grounded Delta, 100–480 V Line-Line, 50/60 Hz
Tolerances	Voltage $\pm 10\%$, Frequency $\pm 5\%$
Power Source	Powered from the transformer secondary via Phase A & N voltage leads
Temperature Sensors	2 each RTDs, 25 lb. Magnetic-mounted, 5-foot lead length
Current Sensors	4 (DTM-4) each, Rogowski Coils, 5-foot lead length
Fuses	Internal fuses on phase A and neutral leads (2 Amps)

Table 3.2 – Communications

Feature	Description
Local Communication	Wi-Fi (TCP/IP)
User Interface	Embedded web server running on Linux platform accessible via standard web browser. The default URL is https://192.168.170.170
Protocols	MQTT, DNP3, and MODBUS available for Ethernet
Embedded Device Options	Cat M1 Cellular
Ethernet	cat5 10/100
LED Indicator	Tri-color LED indicating running and alarm states (can be deactivated)

Table 3.3 – Environmental

Feature	Description
Enclosure IP Rating	IP65 (with Internet)/IP66
Ethernet IP Rating	IP65
Operating Temperature/Humidity	-40° C to +60° C / 0 – 90% RH
Storage Temperature/Humidity Range	-40° C to +85° C / 0 – 95% RH

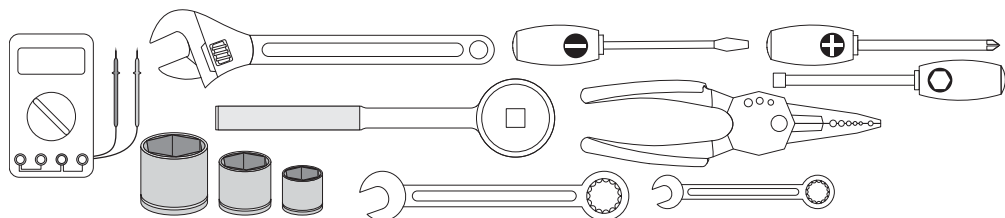
Table 3.4 – Mechanical

Feature	Description
Size (W x L x H)	6.25 x 7.75 x 3.75 in
Weight	5.5 Pounds
Mounting	Magnet-mount provided

3.2.2 Required Tools

⚠ WARNING: Ensure that all tools used are properly insulated and rated for the task being performed to prevent the risk of electrical damage or harm.

- Assorted Tools (wrenches, socket wrench / sockets, screwdrivers, etc.)



4 Installation



4.1 Mounting

Mount the DTM in a location where the Voltage Leads and Rogowski Coils can reach their intended positions on the transformer. Recommended Mounting Locations are listed below. Always check with your local utility to confirm approved DTM mounting locations before installing.

Pad Mounted Transformers:

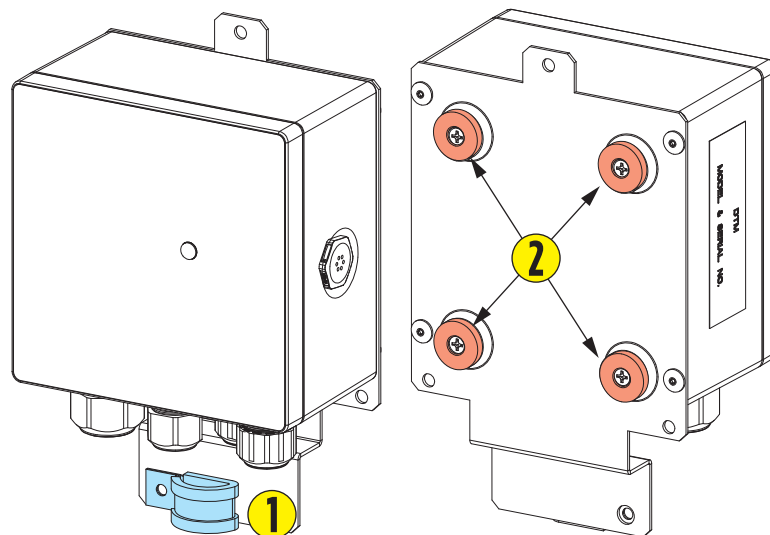
- Inside the transformer control/wiring cabinet.
- On the outside of the transformer enclosure.
- In a separate enclosure, mounted to the side of the transformer.

Pole Mounted Transformers:

- On the under-side of the transformer housing.
- On the supporting structure, below or behind the transformer.

NOTE: The DTM-4 has an attached mounting plate with a **cable loop (1)**, to prevent cable fatigue and has **four strong magnets (2)**. *Do not remove the DTM from the mounting plate!*

⚠WARNING: Under no circumstance should the DTM-4 be opened, severe injury or death could result.

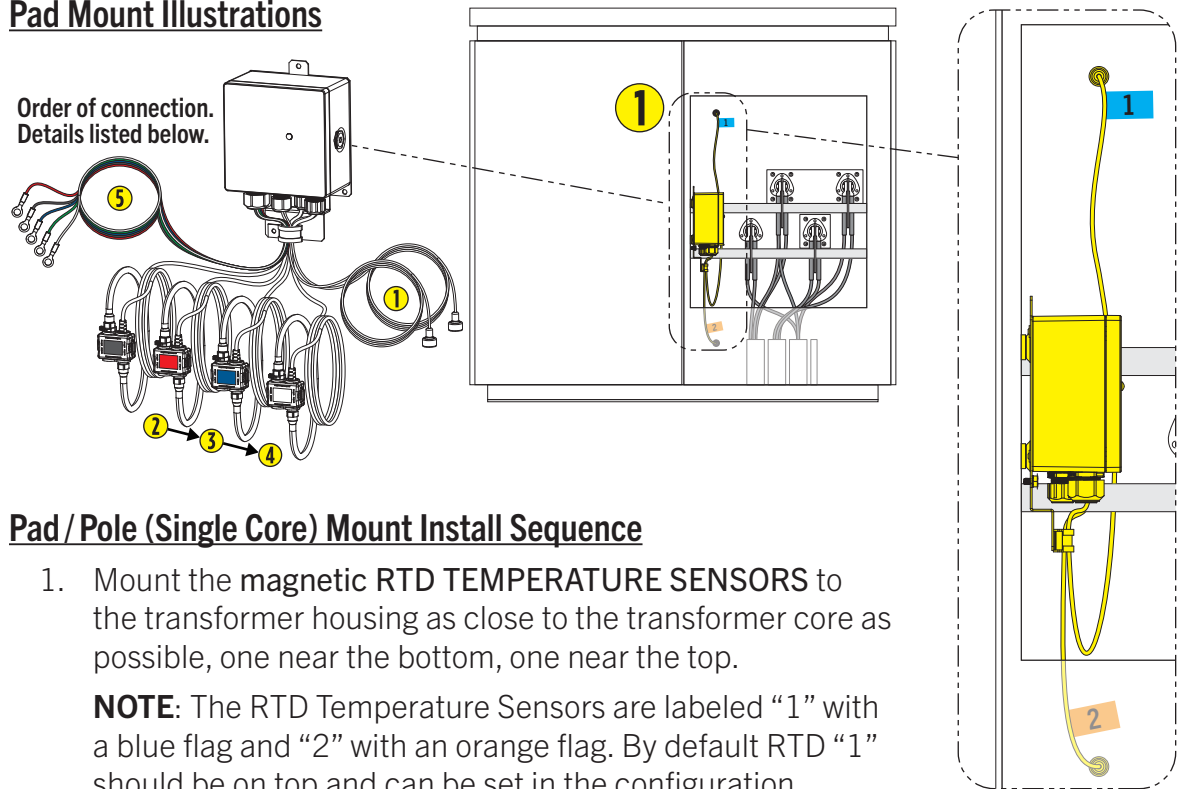


4.2 DTM-4 Transformer Connections

NOTE: Pad mount connection illustrations are shown on pages 6 and 7. Pole mounted transformer (single core) connections are shown on page 8.

IMPORTANT: Do not cut or attempt to alter the length of the temperature sensors, Rogowski Coil cables or voltage leads. *Roll excess cable into bundles as needed and securely fasten in a safe location.*

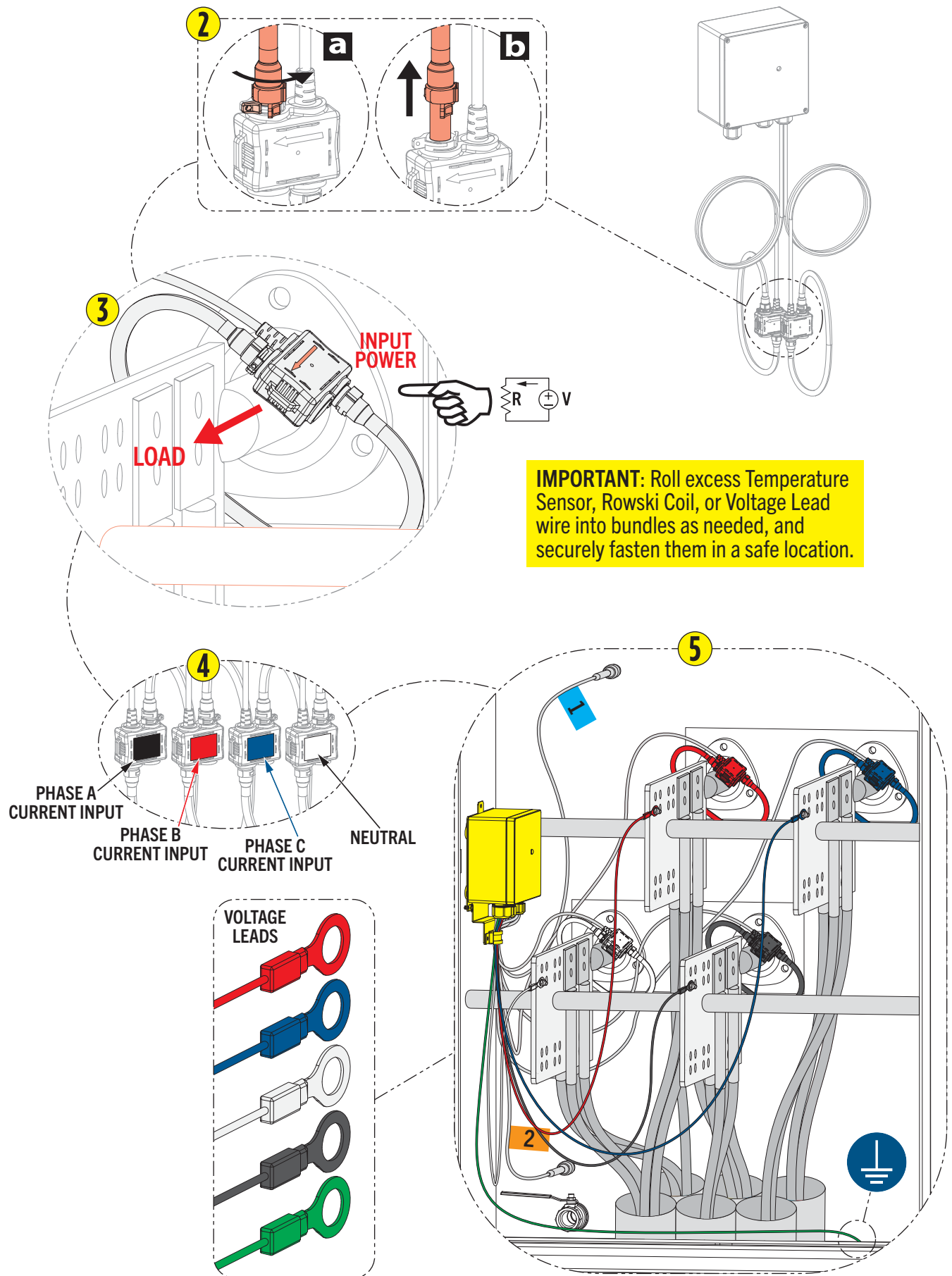
Pad Mount Illustrations



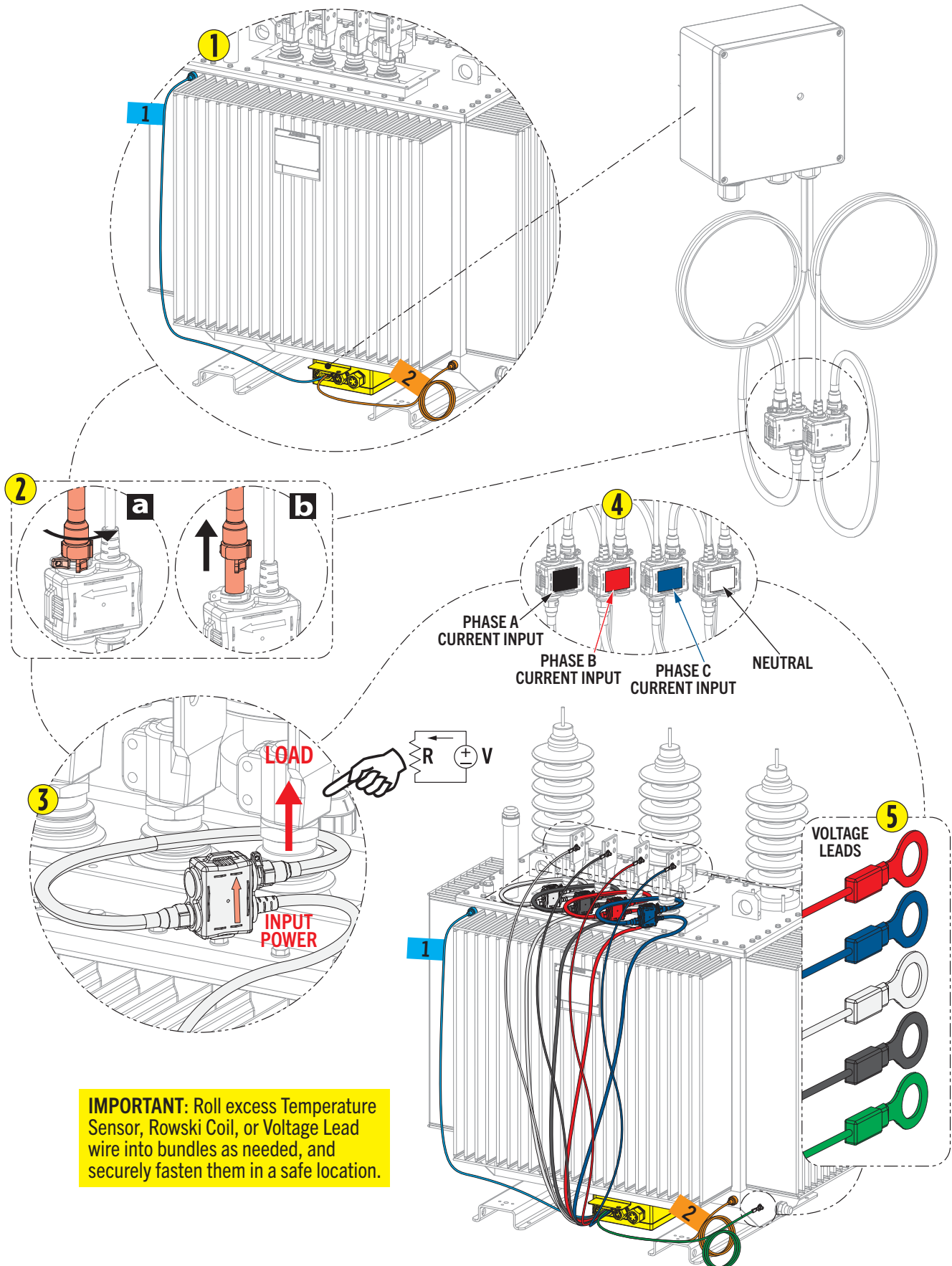
Pad / Pole (Single Core) Mount Install Sequence

1. Mount the magnetic RTD TEMPERATURE SENSORS to the transformer housing as close to the transformer core as possible, one near the bottom, one near the top.
2. Open the ROGOWSKI COILS by twisting the loop where it meets the hub on the side where the wire connects it to the DTM.
3. Make sure the arrow on the hub of the ROGOWSKI COIL points towards the load.
4. The ROGOWSKI COILS are labeled by phase. Make sure the coils are on the correct phase conductors.
5. Connect the appropriate VOLTAGE LEADS to the output (secondary) terminals using the proper hardware.

NOTE: The Voltage Leads are color-coded:
Phase A=BLACK; Phase B=RED; Phase C=BLUE; Neutral=WHITE; Ground=GREEN.



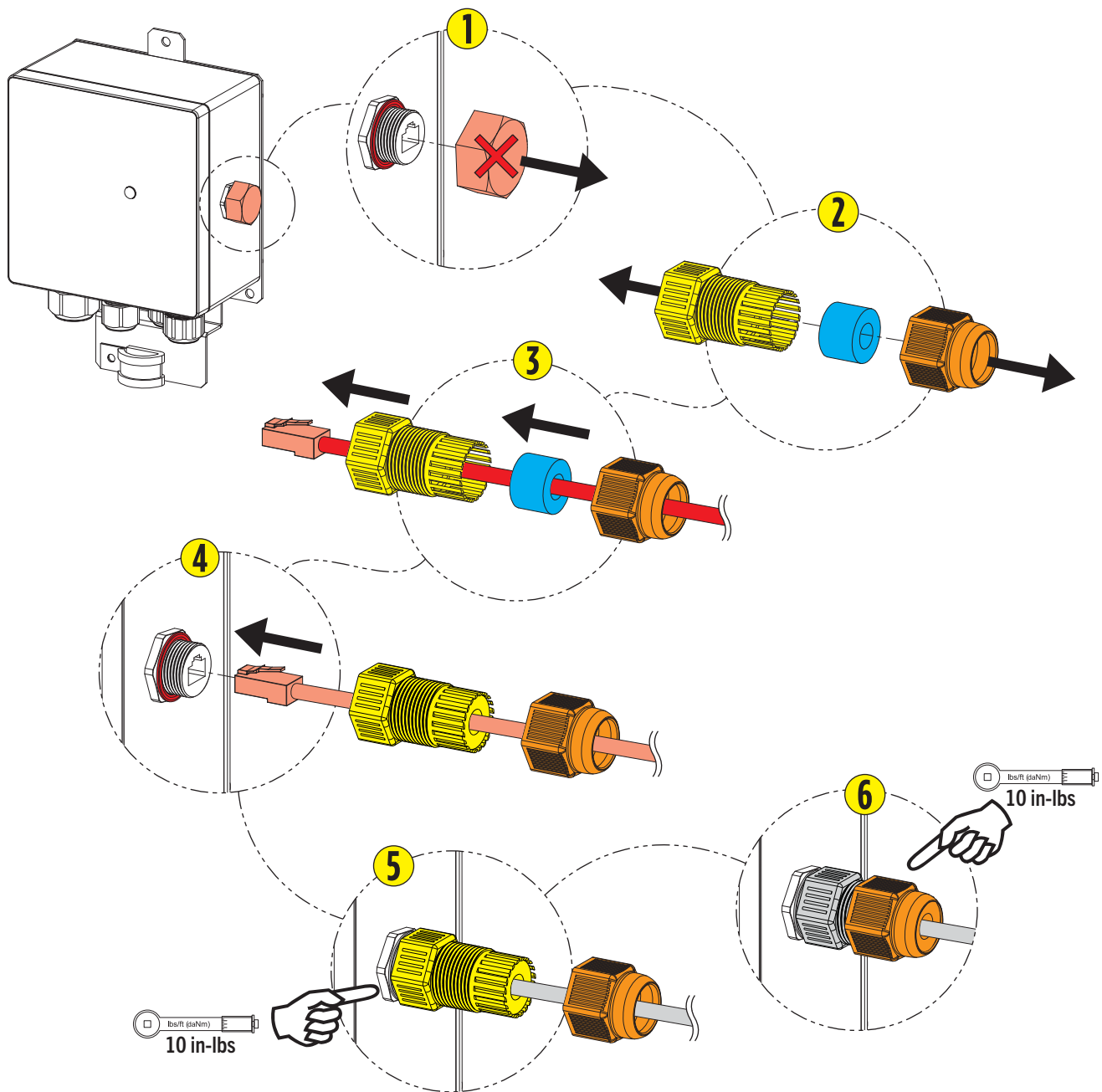
Pole Mount (Single Core) Illustrations



4.3 Ethernet

DTM-4-ETH Ethernet Cord Grip Field Installation

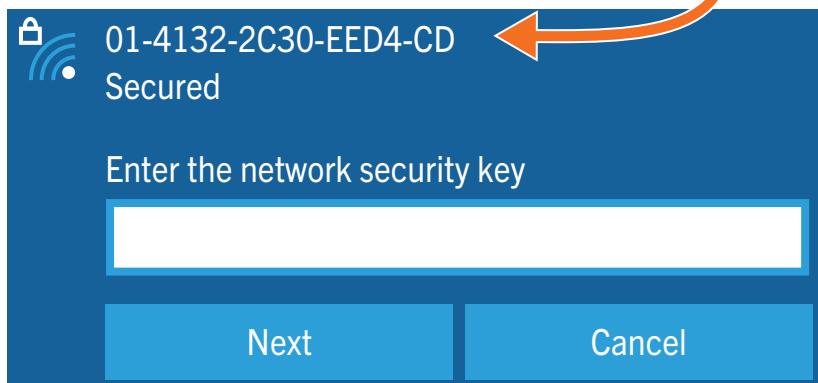
1. Remove the dust cover that comes installed from the factory. *Ensure the red gasket is left on the threaded portion of the connector.*
2. Disassemble the cord grip as shown.
3. Feed the RJ45 connector and cable through the sealing nut, grommet and cord grip as shown. *The cable must have an outside diameter of 7–9.5 mm.*
4. Plug the cable into the **DTM-4-ETH**.
5. Tighten the cord grip body to 10 in-lbs.
6. Tighten the sealing nut to 10 in-lbs.



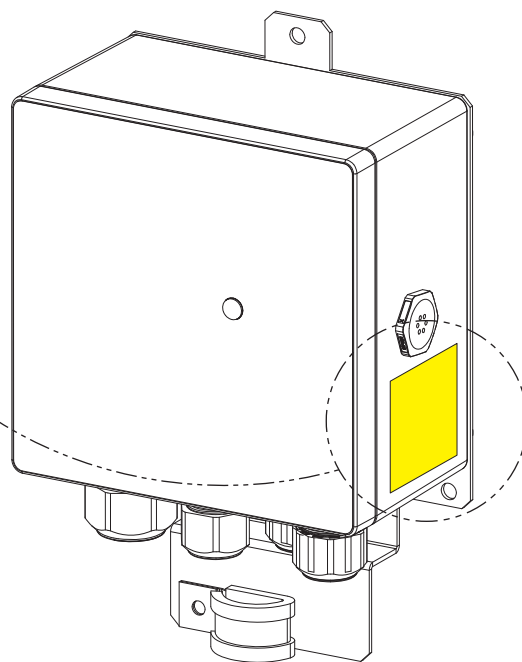
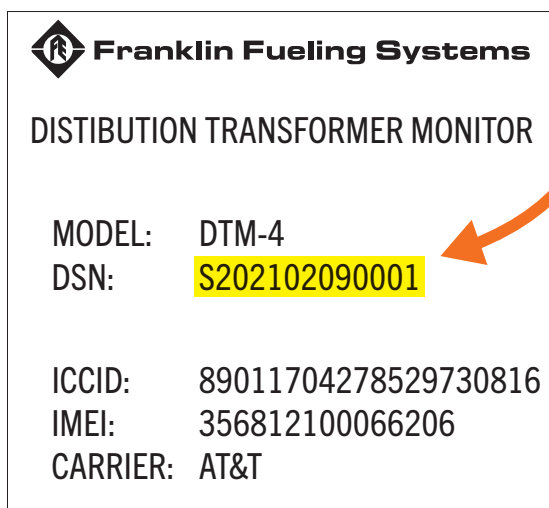
4.4 DTM Setup

All user interface communication including configuration of alarms and settings, data viewing, and alarm resetting is made via the CONVERGE™ web interface. Configuration can be done locally via Wi-Fi using a web browser.

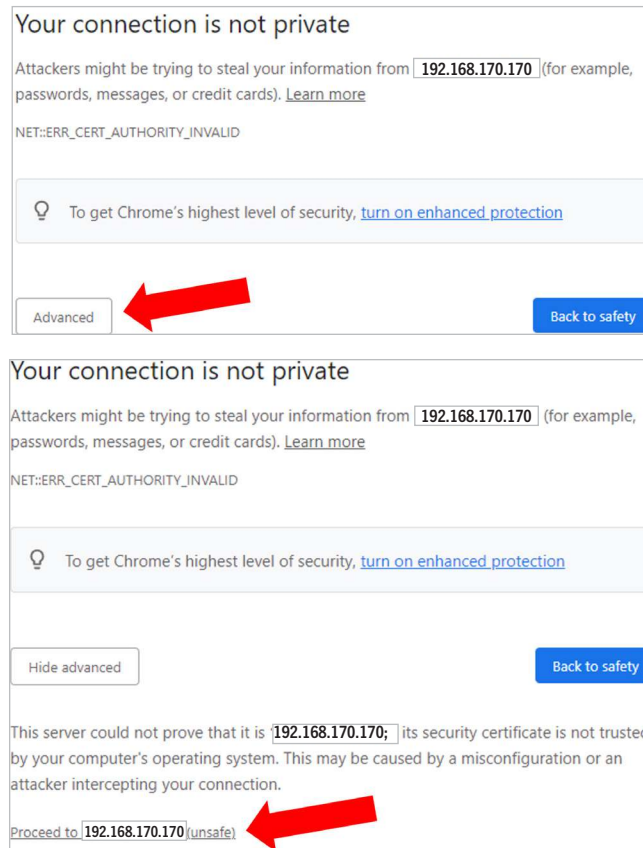
1. The default Wi-Fi name is the DTM's Device ID, a 16-digit, hyphenated hex string (as shown below).



2. The default Wi-Fi pass phrase is the serial number on the label.



3. The default URL is https://192.168.170.170.
 - a. A warning will appear saying "No Certificate."
 - b. Click "Accept risks and continue" to access the DTM interface.



4. The first time connecting to the device, a prompt to create a password will appear. This will create the password for the username: **admin**. The following password criteria is required:
 - 12-36 characters including at least one each of the following.
 - Uppercase letter.
 - Lowercase letter.
 - Number
 - Symbol.
5. After creating the password, log in using the username admin and the password just created.

A screenshot of a web interface titled "HOME". It contains a form for creating a password. The form has fields for "User admin" (with a yellow circle containing the number 4), "New Password", and "Repeat Password". There is a "Set new password" button at the bottom.

A screenshot of a web interface titled "HOME". It contains a form for logging in. The form has fields for "User" (with a yellow circle containing the number 5) and "Password". There is a "Login" button at the bottom.

5 Configuration

5.1 Overview

Navigation: System > Configuration.

NOTE: You must press **ENTER** after typing information in text boxes or *data will not be saved*.

The Configuration page after initial log in:

Expand / Collapse Section Levels

CONFIGURATION

Drag and drop: Move Download Upload... Merge... Revert Save Show errors

Group	Parameter Name	Parameter Value
System ID »		...
System Preferences »		...
System Configuration »		...
Date/Time »		...
User Roles +		
Users »		...
Address Book »		...
Networking »		...
Communications »		...
Diagnostics »		...
Transformer »		...
Temperature Inputs »		...
Modbus	Mode	Disabled
DNP3	Mode	Disabled

- To fully expand / collapse all sections, subsections, and items of the configuration, *click on the double arrows or anywhere within the "Group" title box.*
- To expand / collapse all subsections within an individual section of programming, *click on the double arrows or anywhere within the title box of the section.*
- To fully expand / collapse all subsections and items within an individual section of programming, *click on the double arrows or anywhere within the title box while holding the CTRL key on the keyboard.*

Add / Remove Items

The configuration information in this section is presented in the following format:

To add an item within a subsection:

- Click on the "+" (📍) in the subsection title box.

To remove an item within a subsection:

- Click on the "-" (📍) in the subsection title box.

Group	Parameter Name	Parameter Value
Configuration Section »		
Subsection +		
Subsection Item # +		
Subitem # -	Selection 1	Information/Options
	Subsequent Selection 1	Information/Options
	Subsequent Selection 2	Information/Options
	Selection 2	Information/Options

5.2 System ID

Navigation: Settings > Configuration > System ID.

■ Group	Parameter Name	Parameter Value
□ System ID	Site Name	Physical name of site. NOTE: Information is used to identify the site.
	ID Line 1	Contains physical address of site. NOTE: Typically references transformer number or other unique identifier. <i>Other data can be entered such as:</i> *IP address *Serial number *Phone numbers
	ID Line 2	*
	ID Line 3	*
	ID Line 4	*
	ID Line 5	*

5.3 System Preferences

Navigation: Settings > Configuration > System Preferences.

- **Language:** Set system language.
- **Regional Formats:** Set Regional Format.
- **Units:** Set units of measurement for temperature, density, pressure, length, volume, mass, and power.

■ Group	Parameter Name	Parameter Value
□ System Preferences	Language	English
	Regional Formats	United States
□ Units	Temperature	Fahrenheit
	Temperature Rate	Fahrenheit/Minute
	Temperature Difference	Fahrenheit
	Density	Kilograms per cubic meter
	Pressure	Pounds per square inch
	Length	Inches
	Volume	Gallons
	Mass	Pounds
	Power	Watts
	Reactive Power	Volt amps reactive
	Apparent Power	Volt amps

5.4 System Configuration

Navigation: Settings > Configuration > System Configuration.

- Set up with the information of the transformer being monitored.

■ Group	Parameter Name	Parameter Value
☐ System Configuration	Frequency	Select the operating frequency of the transformer.
	Transformer Mode	Select the type of transformer configuration being monitored (delta, wye, single phase, split phase).
	Temperature Input Assignment	Select locations for the two temperature sensors on the transformer housing. » 1 - Top (blue label) » 2 - Bottom (orange label)
	Auto Clear	Select “Yes” or “No”. NOTE: Set to Yes to automatically clear latching alarms (Dip/Swell, etc.) after 24 hours. <i>These alarms can be cleared manually using the UI or MQTT polling.</i>
	HAL Logging Level	0 NOTE: For Debugging only, leave set to 0.

5.5 Date/Time

Navigation: Settings > Configuration > Date/Time.

■ Group	Parameter Name	Parameter Value
☐ Date/Time	Time Zone	Select the applicable time zone. NOTE: Always set Time Zone first and save changes before setting the clock time on the DTM. <i>Doing so will avoid the time changing to match time zone change.</i>
	NTP Servers	Enter the URL/IP address of one or more Network Time Protocol servers (used for time synchronization). If NTP servers are programmed, the ability to set the date and time will be suspended until the NTP servers are removed (NTP server must be removed to manually set Date/Time).

5.6 User Roles

Navigation: Settings > Configuration > User Roles.

- Use +/- to add or remove user roles (see § 5.1).

■	Group	Parameter Name	Parameter Value
☐	User Roles		
	☐ Role 1	Name	Role 1*
			*Enter name of user role to define (user role or position type).
		Administrator	Select “Yes” or “No” to grant specific permissions for each user.
		Firmware upgrade	No
		System reboot	No
		Erase all configuration and data	No
		Erase data	No
		Set Date/Time	No
		Change preferences	No
		Diagnostics	No
		Generate Reports	No
		View events	No
		Annotate events	No
		Autodetect & configure printers	No
		Change configuration	No

5.7 Users

Navigation: Settings > Configuration > Users.

Individual user account creation with associated role, preferences, and units.

NOTE: Admin does not require name but does require a password.

- **Name:** Enter name of user.
- **Preferences:** Selected language, regional formats, and home web page screen for each user.
- **Units:** Set specific units for each user.

■	Group	Parameter Name	Parameter Value
☐	Users		
	☐ Admin	Password	Enter the password for the user.
		Password Requirements	12-36 characters including one each of: A-Z, a-z, 0-9, - _!&@?*.()
		Session Timeout	10 minutes
		Session Number Limit	3
	☐ Preferences	Language	English
		Regional Formats	United States
		Home Web Page	Configuration
	☐ Units		

5.8 Address Book

Navigation: Settings > Configuration > Address Book.

- Contact list used to email notifications or reports.
- Select “+” to add additional contacts (see §5.1).
- **Name:** Enter name of contact.
- **Email Address:** Enter contact email address.

■	Group	Parameter Name	Parameter Value
☐	Address Book		
☐	John D - Manager	Name	John D - Manager
		Description	Facility Manager
		Email Address	Johndoe@email.com

5.9 Networking

Navigation: Settings > Configuration > Networking.

- Network connection settings must be defined for the type of network utilized.
- DO NOT use overlapping IP addresses.
- The DTM4 may be ordered from the factory with either a Cellular network module or an Ethernet network module, which determines which network method settings must be programmed for to operate a specific DTM4.

■	Group	Parameter Name	Parameter Value
☐	Networking		
☐	Ethernet		
☐	Wi-Fi		
☐	Cellular		
☐	USB		

5.9.1 Ethernet

Navigation: Settings > Configuration > Networking > Ethernet.

- Enabling “Ethernet” provides access for additional IPv4 settings that must be configured to operate the DTM4 in a networked environment.

■	Group	Parameter Name	Parameter Value
☐	Networking		
☐	Ethernet	Enabled	Yes
☐	IPv4	Method	» Manual: Enter IP address manually. » DHCP: Obtain a valid IP address.
		Address	IP address must either be address on network or static IP provide by service provider.

■	Group	Parameter Name	Parameter Value
		Netmask	The mask must match that of the network the DTM4 is connected to.
		Gateway	Logical address to the nearest router port.
		DNS Servers	Domain Name Systems: Required if using email functionality of the DTM4.
		Search Domains	Enter the search domains of the connecting network if required.
		DHCP Server	» Enable/Disable » Start: 2–254 » Limit: 1–50 » Lease Time: 2–1440 (in minutes)

5.9.2 Wi-Fi

Navigation: Settings > Configuration > Networking > Wi-Fi.

- All User Interface communication including configuration of alarms and settings, data viewing and alarm resetting can be done locally, via the Wi-Fi network including:
- See §4.3 “DTM Setup” for the default Wi-Fi name and pass phrase.

■	Group	Parameter Name	Parameter Value
	☐ Networking		
	☐ Ethernet		
	☐ Wi-Fi	Enabled	Yes
		Mode	Access Point
		SSID	01-4CD9-80C1-E4E8-0F
		Broadcast SSID	Yes
		Channel	1 - 2412 MHz
		Security	WPA2-Personal
		Encryption	AES
		Passphrase	*****
	☐ IPv4	Address	192.168.170.170 (default URL)
		Netmask	255.255.255.0
		DHCP Server	Enabled Select “Disabled” or “Enabled” (only if instructed by IT dept.)
	☐ DHCP Server	Start	Enter the starting IP address of the DHCP server to assign (2–254).
		Limit	Enter the limit of IP addresses for the DHCP server to assign (1–50).
		Lease	Enter the lease time of the assigned IP address (2–1440). NOTE: In most cases, the default values in the DHCP Server section should not be changed.

5.9.3 Cellular

Navigation: Settings > Configuration > Networking > Cellular.

- All User Interface communication including configuration of alarms and settings, data viewing and alarm resetting can be done remotely, via the cellular network including:
- Data transfer using MQTT protocols.
- Firmware upgrades.

■	Group	Parameter Name	Parameter Value
☐	Networking		
☐	Ethernet		
☐	Wi-Fi		
☐	Cellular	Enabled	Yes
		PPP	Enabled
		Communication Test Hosts	Enter DNS IP addresses separated by spaces to allow the DTM to ensure it always has a connection by pinging those servers. NOTE: Recommended addresses are: 8.8.4.4 and 8.8.8.8
		Debugging	Disabled

5.9.4 USB 1

Navigation: Settings > Configuration > Networking > USB 1.

■	Group	Parameter Name	Parameter Value
☐	Networking		
☐	Ethernet		
☐	Wi-Fi		
☐	Cellular		
☐	USB 1	Enabled	Yes
	☐ IPv4	Address	192.168.171.171
		Netmask	255.255.255.0
		DHCP Server	Enabled Select “Disabled” or “Enabled” (only if instructed by IT dept.)
	☐ DHCP Server	Start	Enter the starting IP address of the DHCP server to assign (2–254).
		Limit	Enter the limit of IP addresses for the DHCP server to assign (1–50).
		Lease	Enter the lease time of the assigned IP address (2–1440). NOTE: In most cases, the default values in the DHCP Server section should not be changed.

5.10 Communications

Navigation: Settings > Configuration > Communications.

The main protocol used is Message Queuing Telemetry Transport (MQTT) which can be set up to a custom MQTT broker or to Franklin Electric's UNITE™ Platform by entering the appropriate information.

- **Service:** Select **UNITE** (📍), which sets machine to machine telemetry transport (recommended by Franklin Electric).
- **Password** (🔑) is a custom 12 digit entry consisting of one each of the following alphanumeric characters: **A-Z, a-z, 0-9, -_! &@?*+.()**

■	Group	Parameter Name	Parameter Value
☐	Communications		
☐	Protocols		
☐	MQTT		
☐	Connection 1	Name	Connection 1
		Service	Unite 
		Host	unite1.franklingrid.com
		Password	***** 
		Connection Retries	Unlimited
		Connection Retry Interval	1 minute
		Connection Alarm	Enabled

5.11 Email

Navigation: Settings > Configuration > Email.

■ Group	Parameter Name	Parameter Value
□ Email	Enabled	Select “Yes” or “No” to enable email.
	Server	Enter the server URL. » Example: mail.tanksmtp.com or a static IP address.
	Port	Enter the port address for SMTP. » Example: Port 25.
	Sender Host Name	Enter SMTP host address (address of sender (DTM)).
	Full Sender Name	“From” address (email format YourFrom@address.com).
	“From” Address	Enter IP address of SMTP host (address of sender (DTM)).
	Return Address	Enter address where email goes to if not accepted by receiver.
	Connection Security	Select from: » None » STARTTLS » SSL/TLS
	Authentication	Select from: » None » Plain Password » CRAM-MD5
	Account Name	<not set>
	Password	<not set>
	Maximum Queue Size	Maximum megabyte size of emails held when connection is lost. » Example: 20
	Retry Timeout	Wait time in seconds before message is resent. » Example: 3600 sec
	Enable Debugging	No

5.12 Diagnostics

Navigation: Settings > Configuration > Diagnostics.

Diagnostics functions to be used only with Franklin Electric Technical Service for troubleshooting purposes. These functions can be used to disable the external LED on the DTM. Setting the LED to **NO** (disabled) will stop the light from blinking during normal operation. The LED may blink once during boot. See §6.2 for additional information.

■ Group	Parameter Name	Parameter Value
□ Diagnostics		
□ Remote Syslog	Mode	Disabled
□ Secure Shell	Enabled	No
□ LED	Enabled	Yes

5.13 Transformer

Navigation: Settings > Configuration > Transformer.

Configurable alarm limits are set for the electrical properties of the transformer.

Transformer Properties

- **Rated Winding Load:** The rated line current for the connected transformer.
- **Winding Hot Spot Over Top Oil:** The temperature rise of the hottest spot of a transformer over the top oil temperature at rated current.
- **Hours Used Before Installation:** Hours the transformer has been in service before the DTM was installed.
- **Rated Life Span (hours):** The rated life of the coil insulation of the transformer.
- **Cooling Type:** The cooling type of the transformer.

Alarm Limits

- **Winding Load Limit:** Limit in Amps that winding load limit will alarm.
- **Fault Current Limit:** Limit in Amps that Fault Current will alarm.
- **Fault Cycles:** Number of fault cycles reached that will trigger alarm.
- **Voltage Sag Limit:** Voltage level of voltage sag that will trigger alarm.
- **Sag Cycles:** Number of cycles in voltage sag that will trigger alarm.
- **Voltage Swell Limit:** Max voltage of swell that will trigger alarm.
- **Swell Cycles:** Number of cycles in swell that will trigger alarm.
- **K-Factor Harmonic Limit:** Value triggering an alarm when the total harmonic current which a transformer can withstand goes beyond its specified temperature threshold limit. Under normal circumstances the value of K-Factor ranges from 1-50.
- **Voltage Current Lead Lag Limit:** Value triggering an alarm when the circuit's Power Factor goes above or below the defined threshold.

Alarms

- **Voltage Signal Delta Enable:** Voltage deviation (high or low) of one phase from the other two when reached will trigger alarm.
- **Current Signal Delta Enable:** Current deviation (high or low) of one phase from the other two when reached will trigger alarm.

☐	Group	Parameter Name	Parameter Value
☐	Transformer	Winding Hot Spot Load Ratio	5.00000 to 1
☐	Alarm Limits	Winding Load Limit	10,000.0 A
		Fault Current Limit	10,000.0 A
		Fault Cycles	300 cycles
		Voltage Sag Limit	100.0 V
		Sag Cycles	300 cycles

■	Group	Parameter Name	Parameter Value
		Voltage Swell Limit	100.0 V
		Swell Cycles	300 cycles
		K-Factor Harmonic Limit	100 deg
		Voltage Current Lead Lag Limit	0
	☐ Alarms	Voltage Signal Delta Enable	No
		Current Signal Delta Enable	No

5.14 Temperature Inputs

Navigation: Settings > Configuration > Temperature Inputs.

Alarm limits are set for the thermal properties of the transformer.

- **Temperature Warning Limit:** Temperature in °F or °C that will trigger alarm.
- **Temperature Danger Limit:** Temperature in °F or °C that will trigger alarm.
- **Temperature Delta Warning Limit:** Temperature change in °F or °C that will trigger alarm.
- **Temperature Delta Danger Limit:** Temperature change in °F or °C that will trigger alarm.
- **Winding Hot Spot Warning Limit:** Temperature in °F or °C that will trigger alarm.
- **Winding Hot Spot Danger Limit:** Temperature in °F or °C that will trigger alarm.

■	Group	Parameter Name	Parameter Value
	☐ Temperature Inputs		
	☐ Top Oil Temperature Inputs	Enabled	Yes
	☐ Alarm Limits	Temperature Warning Limit	302.0 °F*
		Temperature Danger Limit	302.0 °F*
		Temperature Delta Warning Limit	0.0 Δ°F*
		Temperature Delta Danger Limit	0.0 Δ°F*
		Winding Hot Spot Warning Limit	302.0 °F*
		Winding Hot Spot Danger Limit	302.0 °F*
	☐ Bottom Oil Temperature Inputs	Enabled	Yes

NOTE: *Values shown are default values, and will require changes based on each location's transformer specifications.

5.15 DNP3

FEGRID-0084
DTM4 Device
Profile Document



SCAN / CLICK

Navigation: Settings > Configuration > DNP3.

- Binary and Analog DNP3 variables* can be added by entering the desired number of fields in the “Number of measurements” parameter value (📍).
- Under “Source” (📍) the desired variable from the DNP3 list* can be selected.
- Select **Save** when finished.

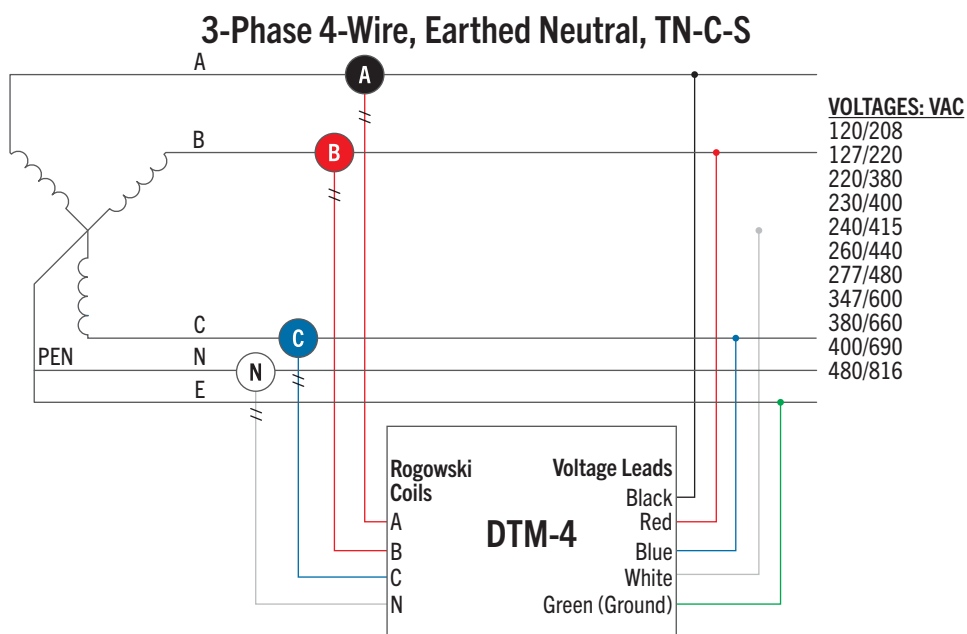
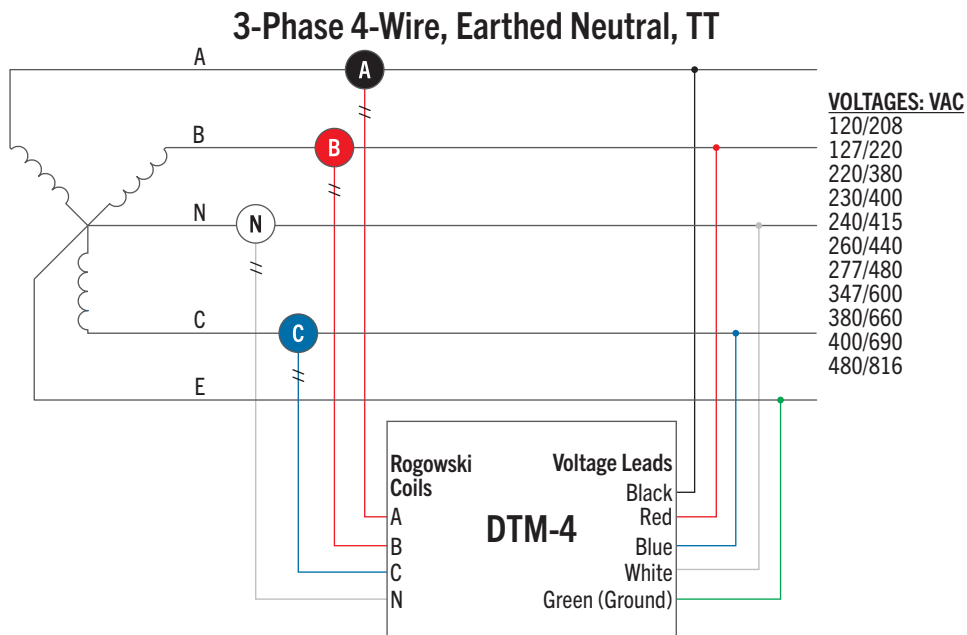
■ Group	Parameter Name	Parameter Value
☐ DNP3	Mode	TCP/IP
	TCP/IP Port	20000
	TCP/IP Communication Timeout	60 min
	Secondary Address	10
	Primary Address	1
	Enable Unsolicited Messages	No
	Enable Units Conversion	No
	Logging Level	Normal
☐ Binary	Default static variation	Group 1 Variation 2 - with flags
	Override defaults	No
	Number of measurements	1 📍
☐ 1	Catagory	Status
	Source	None 📍
☐ Analog	Default static variation	Group 30 Variation 1 - 32-Bit with flags
	Override defaults	No
	Number of measurements	1 📍
☐ 1	Catagory	Any
	Source	None 📍

NOTE: *See Franklin Electric document, p/n FEGRID-0084 “DTM4 Device Profile Document” for information on DNP3 points.

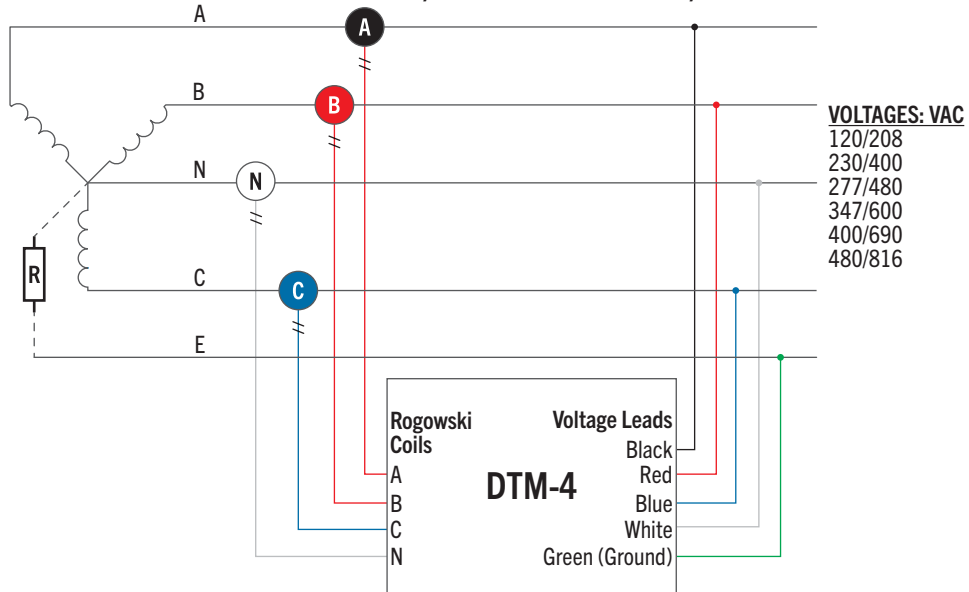
6 Appendix

6.1 Wiring Diagrams

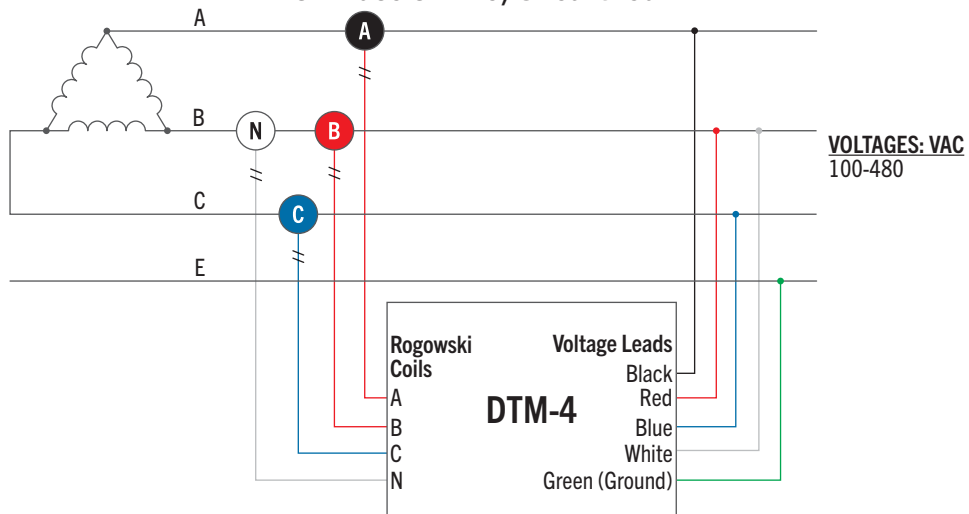
- Wiring must conform to all applicable federal, state, and local codes.
- Control panels are for non-hazardous, indoor use only.
- Route RS485 wiring (where applicable) a minimum of 1/4" (6 mm) away from power wiring.



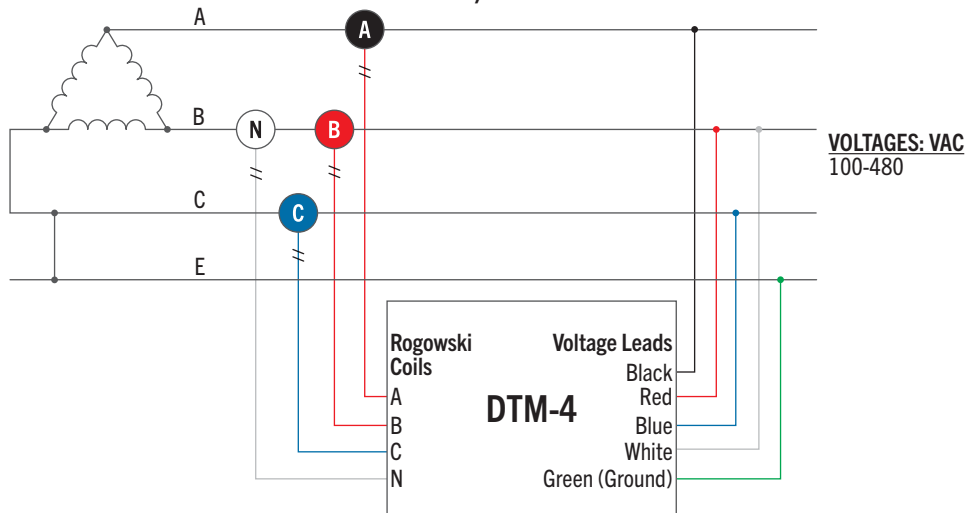
3-Phase 4-Wire, Unearthed Neutral, TT



3-Phase 3-Wire, Unearthed



3-Phase 3-Wire, Earthed Phase



6.2 Status Indicator

A multi-colored LED is used to indicate the status of the DTM and the transformer it monitors, as shown in the following table. This LED can be programmed to remain OFF, if desired (see § 5.12).

LED Color	Status
Slow Blinking Green	System OK, No Alarms. No action needed.
Slow Blinking Yellow	Warning Condition Exists. Check condition--correct if needed.
Slow Blinking Red	Alarm Condition Exists. Correct condition.

6.3 Related Documents

Part Number	Description
FEGRID-0084	DTM4 Device Profile Document



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