HYPERSPROUT™ SMARTHUB / HYPERHUB™ ACCESS POINT
INSTALLATION & USER MANUAL

Product Name: DEC-H-H-003-10 / DEC-H-H-005-10
Document Revision: A0-01
Date: 20 April 2022

DELTA
ENERGY & COMMUNICATIONS, INC.

The information provided in this document contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining the suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation, and testing of the products with respect to the relevant specific application or use thereof. Neither Delta Energy & Communications, Inc. nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product.

For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed. Failure to observe this information can result in injury or equipment damage.

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TABLES

FIGURES

DELTA

DELTΔ

## 1.1   ABOUT DELTA ENERGY & COMMUNICATIONS, INC.

Delta Energy & Communications is a network, smart grid, and big data company that provides a transformative technology to connect millions around the globe. Delta's novel and patented approach brings connective technology wherever there is electricity. In doing so, Delta helps utilities realize the benefits of data analytics to identify and mitigate both technical losses and non-technical losses while aiding in enterprise-wide utility optimization strategies and revenue enhancement. Delta's core values of dignity, empowerment, transparency, and innovation are the foundation for working with its partners and improving the communities it serves.

The Internet of Things (IoT) is the fastest-growing opportunity for global municipalities, but these municipalities and their associated utilities are often stuck in outdated infrastructure. Recognizing the unique opportunity afforded by converging power distribution with a pioneering network deployment, our Delta Smart Grid Network (DSGN™) offers a singular, standardized, scalable, patented, and secure solution that tackles all four elements of a power network: distribution and communication, smart metering, utility optimization, and installation and servicing. In addition, Delta concurrently brings connectivity to millions by providing a 5G comparable Wi-Fi 6 mesh network.

Our comprehensive and patented product portfolio, inclusive of hardware, software, mesh networking, and cloud architecture technologies, provides our customers with a full-service solution. As Delta stands for ongoing innovation, our portfolio will continue to expand across new IoT solutions, including but not limited to smart street lighting, demand response devices, virtual utility systems, as well as smart connected drones.

1.1.1   Delta Smart Grid Network (DSGN™)

The Delta Smart Grid Network (DSGN™) represents a step-change in utility infrastructure analytics, control, and networking systems. Converging historical smart grid methodologies, advanced Wi-Fi mesh networking, and leading cloud architecture configurations, the DSGN™ addresses national and international infrastructure concerns while delivering upon local power and connectivity commitments. Delta's communications network connects the dots in delivering a truly transformative execution addressing our customer needs, mitigating their pain-points, and delivering upon prior unrealized customer delights.
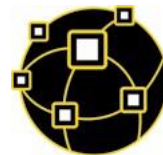
The following graphic pictorially defines the technology components comprising this revolution in utility and community infrastructure. The ongoing summaries below further define these exciting technologies.
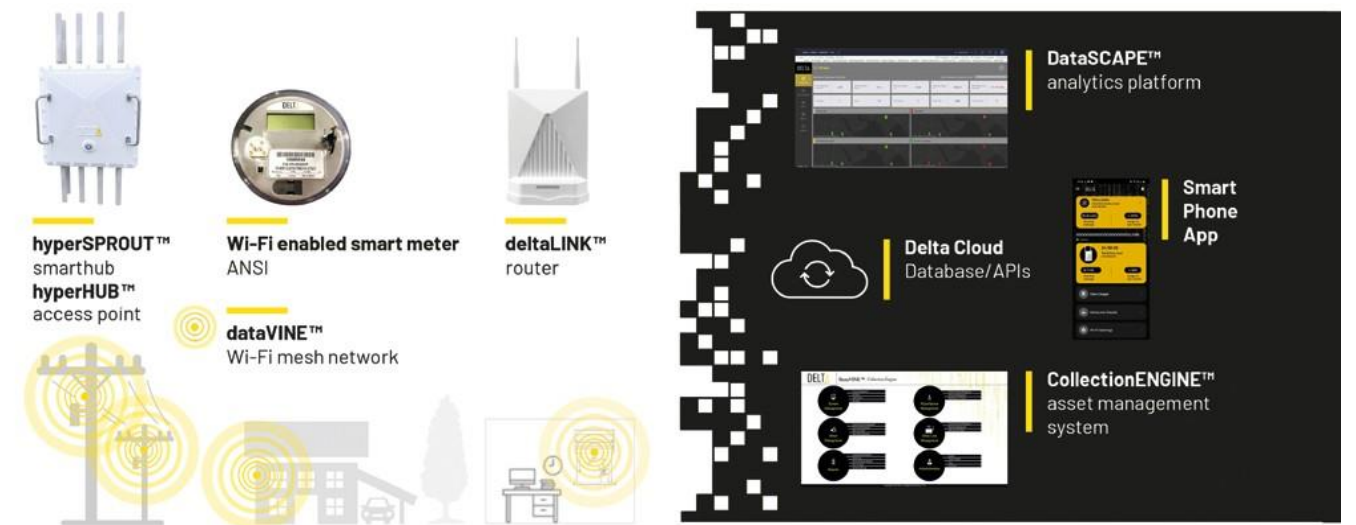

Figure 1: Delta Smart Grid Network (DSGN™)

1.1.2   hyperSPROUT™ & hyperHUB™

Delta's patented hyperSPROUT™ 5G comparable Wi-Fi smarthub is a transformer monitoring, networking, and backhauling device that forms a ubiquitous, efficient, and flexible Wi-Fi-based WWAN mesh, capturing all operational and IoT data. It provides utilities with an effective way to monitor transformer electrical and health characteristics while collecting and collating system-wide electrical performance analytics in real-time. Typical benefits include the identification of energy theft, location of hardware and outage issues, and utility asset health reporting, all while creating a ubiquitous Wi-Fi 6 mesh network.

In companionship with our hyperSPROUT™ smarthub, our hyperHUB™ 5G comparable Wi-Fi access point provides additional network build-out capability, where necessary, supplementing our hyperSPROUT™ smarthub in geographically complex and obstruction-rich deployments.

Features:
• Comprehensive data capture, network communication, and Wi-Fi-based WWAN mesh build-out
• Best-in-class transformer monitoring
• Strict ergonomic and human factors focus
• Robust enclosure & packaging

1.1.3   dataVINE™

Delta's dataVINE™ Wi-Fi-based mesh network, included in our hyperSPROUT™ smarthub, deltaLINK™ router, and Wi-Fi mesh card, brings real-time data capability and active IoT device integration wherever there is electricity. Delta's dataVINE™ Wi-Fi mesh card is the world's first Wi-Fi-based WWAN Mesh AMI smart metering solution, allowing utilities to maximize operational efficiency and expand into adjacent revenue enhancing business models. Typical benefits include the reduction in call center volume, truck rolls, bill complaints, meter rereads, system failures, and vehicle maintenance.
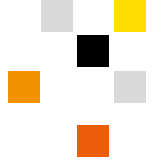
Features:
- Industry-leading 2.4GHz and 5GHz Wi-Fi-based WWAN mesh architecture
- Proprietary, modular, and universal component design
- Scalable with the DSGN™ infrastructure solution
- Optimized for the dataSCAPE™ analytics platform
- Utilized with the collectionENGINE™ asset management system
- Multiple levels of network and cloud security

1.1.4   deltaLINK™

Delta understands that addressing utility grid management and connectivity concerns mandates the realization of local efficiency and broadband commitments. We uniquely champion these commitments through instituting robust grid management while ensuring community Internet connectivity. Our deltaLINK™ consumer router delivers upon this connectivity as the wireless bridge between our hyperSPROUT™ smarthub and residential/consumer Internet access.

Features:
- Industry-leading 2.4GHz and 5GHz Wi-Fi-based WWAN mesh architecture
- Companion simple, intuitive, and elegant iOS and Android smart applications
- Residence meter power reporting
- Residence deltaLINK™ router data reporting
- Full device operational control
- Multiple levels of network security

1.1.5   dataSCAPE™ & collectionENGINE™

Our dataSCAPE™ analytics platform and synergistic collectionENGINE™ asset management system build a single source software capability that provides prediction and identification capabilities with actionable intelligence through an enhanced, geo-spatial graphical user interface (GUI) representations and a robust, secure cloud-based deployment scheme. Collectively, these systems enable utilities to decrease system costs, increase operational efficiency, and grow revenue. Typical benefits include identification of technical and non-technical losses, real-time asset health notifications, and ensured remote distributed system access and control — aiding in overall revenue enhancement and both preemptive and proactive action strategies.

Features:
- Enterprise-enabled "big data" analytics platform
- Industry-leading graphical user interface (GUI)
- Optimized for hyperSPROUT™ smarthub, dataVINE™ Wi-Fi mesh network, and deltaLINK™ router
- Robust and secure cloud architecture with associated data storage

For more information on Delta, please visit www.deltaglobalnetwork.com.
For more information on Delta's patents, please visit www.deltaglobalnetwork.com/patents.

1.2   ABOUT THE MANUAL

This User Manual provides detailed information on the hyperSPROUT™ smarthub and hyperHUB™ access point devices and their installation.

1.3   OVERVIEW

The Delta Smart Grid Network (DSGN™) couples a Wi-Fi based WWAN mesh with an advanced power metering solution to deliver electrical distribution monitoring and pioneering analytics within a robust and secure, cloud-based network. Through this same network, the DSGN™ facilitates a secure Internet delivery scheme to both residential and commercial customers.

1.4   INTENDED AUDIENCE

The user manual addresses the following target groups:
- Field installation technicians and operators
- Maintenance and repair personnel

1.5   ABBREVIATIONS

Following table lists all abbreviations used throughout the manual.

Table 1: Abbreviations

Acronym	Definition
collectionENGINE™	Delta asset management system
dataSCAPE™	Delta analytics platform
dataVINE™	Delta Wi-Fi mesh network, node, and meter integrated communications card
deltaLINK™	Delta router, access point, and repeater
DDR	Double Data Rate
DFMEA	Design Failure Mode and Effects Analysis
DSGN™	Delta Smart Grid Network
EVT	Engineering Validation and Testing

Acronym	Definition
GPS	Global Positioning System
GUI	Graphical User Interface
hyperSPROUT™	Delta 5G comparable Wi-Fi smarthub
hyperHUB™	Delta 5G comparable Wi-Fi access point
IoT	Internet of Things
IP67	Ingress Protection or International Protection
iTM	Intelligent Transformer Module
LED	Light Emitting Diode
LTE	Long Term Evolution
PCB	Printed Circuit Board
PPE	Personal Protective Equipment
PTS	Production Technical Specification
RMA	Return Materials Authorization
USB	Universal Serial Bus
Wi-Fi	Wireless Fidelity
TBA	To Be Added

2. SPECIFICATIONS

2.1 PRODUCT SPECIFICATION

The following table gives an overview of all product specifications.

Table 2: Product Specifications

Features	Parameters
MEASUREMENT	
Accuracy	1.0 per IEC 61869-2
Service Type	• Single phase: 1 secondary line, 1 neutral, 1 ground • Single phase: 2 secondary lines, 1 neutral, 1 ground • Three phase: 3 secondary lines, 1 neutral, 1 ground
ELECTRICAL	
Nominal voltage	110VAC / 240VAC / 440VAC ± 10%
Frequency	50Hz / 60Hz ± 5%
Rated AC current	Up to 1,000A (using Rogowski coil)
CONNECTIVITY & SPEED	
Wi-Fi	• Dual-band Wi-Fi 802.11ax and IEEE 802.11s mesh • Wi-Fi radio 4×4 on 2.4GHz, 8×8 or dual 4x4 on 5GHz • Wi-Fi speed up to 1147Mbps on 2.4GHz, up to 4804Mbps on 5GHz for 802.11ax mode (throughput numbers are based on IEEE 802.11ax standard) • Wi-Fi mesh and Wi-Fi hotspot simultaneous operation • Backwards compatibility to 802.11a/b/g/n/ac • Reference notation about data rate speeds on back cover of this document
Ethernet & SFP+	1G / 2.5G / 5G / 10G - (2) x external IP-67 connectors. One for Ethernet and one for fiber. There will be a cable from each external connector to the appropriate internal connections.
Cellular	• GSM / 3G / 4G LTE • Customer to validate the appropriate cellular carrier and provide a properly provisioned SIM card
LED	
LED indicators	• **Red**: During board boot-up • **Green**: Internet connection established, communicating with cloud server and radios are up • **Blue**: Backhaul up and radios are down

Features	Parameters
MECHANICAL	
Dimensions (without antennas)	451 (L) x 350 (W) x 170 (H) mm 17.75 (L) x 13.77 (W) x 6.69 (H) in
Weight	8.3kgs (18lbs)
Enclosure material	Aluminum ADC12 & polycarbonate UL94 (5VA)
ENVIRONMENTAL	
Operating temperature	-30°C to +50°C
Storage temperature	-30°C to +85°C
Relative humidity range	0 - 95% relative humidity, non-condensing
Wind resistance	Cat 5 hurricane winds
ENVIRONMENTAL RATINGS	
IP rating	IEC 60529 IP67
NEMA rating	NEMA 4X
Corrosion	Salt spray test
Vibration	MIL 810G with packaging
MOUNTING & HUMAN FACTORS	
Methodology	Mounting bracket is designed for both pole and wall mount
Pole Size	152mm (6in) to 406mm (16in) diameter pole
Pole mount accessories	3 each, 25mm (1in) width metal strapping
Wall thickness	19mm (3/4in) thickness wall (concrete and brick wall)
Wall mount accessories	Wedge anchor bolt and hex nut
Installation	• Adjustable wrench • Torque power screwdriver - M3 (torque - 0.35Nm)
Ergonomics	Two large handles are provided handling the device to assist mounting and unmounting
BACK-UP	
Rechargeable battery backup	30mins (for dying gasp messaging)

| Features	Parameters
SECURITY	
Security	hyperSPROUT™ smarthub/hyperHUB™ access point: • module removal detection • module cover removal detection • module security break-in attempts log
STANDARD	
FCC	Part 15.247 BT, part 15.247 Wi-Fi, part 15.407 Wi-Fi 5GHz B1~4 (4 bands), DFS testing, part 22 (4G B2/4/5/12/13), part 24 (4G B2/4/5/12/13), part 27 (4G B2/4/5/12/13), part 22/24 3G B2/5, part 15 subpart B
Environmental	IEC 60529, IEC 60255-21-1A:1988IEC 60255-5:2000, IEC 62206, IEC 60068-2-14, IEC 6068-2-1:2007, IEC 60068-2-2,IEC 60068-2-2:2007, IEC 60068-2-5, IEC 60068-2-11(NEMA 4X), IEC 60068-2-30:2005,IEC 60068-2-31, MIL-STD-810 (drop, shock, vibration), IEC/UL60950-22, SN-62-1008d, ASTMB117, IEEE C62.38-1994, EMP test – RS 105
cNus	UL61010-1, IEC61010-1
Europe-CE	EN300 328 Wi-Fi + BT, EN301 893 Wi-Fi 5GHz B1~3, DFS testing, EN301 908-1 (4G B1/3/8/20), EN301 908-1 (3G B1/3/8), EN303 413, EN301 489-1/-17/-19/-52, EN50385/62311

2.2 PRODUCT IDENTITY

The hyperSPROUT™ smarthub & hyperHUB™ access point serial numbers are on the side of the devices as noted in *Figure 2* and *Figure 3*.

Figure 2: Product label located on side of device
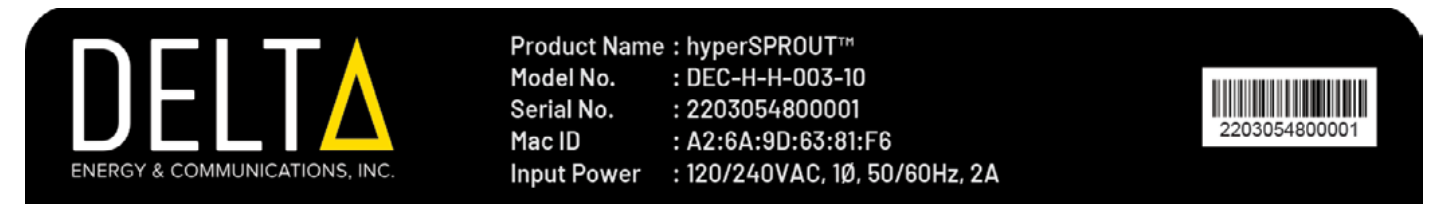
Figure 3: Product label incl. serial number

The serial number label contains the following information:
• Model number, such as DEC-H-H-003-10
• Serial number, such as YYMMCCCCSSSSS [2203054800001] (11 digits)

The serial number format is shown below with an example:

Serial no format - YYMMCCCCSSSSS
YY - First two digits correspond to year of manufacturing
MM - Next two digits correspond to the month of manufacturing
CCCC - Customer and device-specific, 4-digit code
SSSSS - Serial number of that month

Example:
2203054800001
22 - the year 2022
03 - month March
0548 – Customer and device-specific code
00001 - Serial number of that month

The hyperSPROUT™ smarthub and hyperHUB™ access point MAC addresses are located under the serial number, for example, 68BDABF54600 (12 hexadecimal digits).
Use the specific device's serial number when requesting support from Delta Energy & Communications, Inc.

3. SAFETY

3.1 WARNINGS

This section contains important safety information.

3.1.1 Before You Begin

Read and understand these instructions before performing any installation procedure.

DANGER
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH   • Only qualified personnel familiar with the content of this manual and who understand all other pertinent product documentation and safety guidelines necessary for recognizing and avoiding hazards are authorized to work on and with this system. • Installation, adjustment, repair, and maintenance must be performed by qualified personnel. • The system integrator is responsible for compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment. • Many components of the product, including the printed circuit boards, operate with mains voltage. Do not touch. Use only electrically insulated tools. • Do not touch unshielded components or terminals with voltage present. • Before performing work on the module disconnect the system from all sources of power, including external control power that may be present. • Install and close all covers before applying voltage.   **Failure to follow these instructions may result in death or serious injury.**

WARNING
DAMAGED EQUIPMENT   • Do not operate any accessory that appears damaged. • Any changes made to the parameter settings must be performed by qualified personnel.   **Failure to follow these instructions may result in death, serious injury, or equipment damage.**

WARNING
LOSS OF CONTROL   • The designer of any control scheme must consider the potential failure modes for the designated control paths and control functions. Further, a means to achieve a safe state during and after a control path failure must be defined. Examples of critical control functions are emergency stops, power outages and restarts. • Separate or redundant control paths must be provided for critical control functions. • Observe all accident prevention regulations and local safety guidelines. • Each implementation of the product must be individually and thoroughly tested for proper operation before being placed into service.   **Failure to follow these instructions may result in death, serious injury, or equipment damage.**

3.1.2 Important Information

The hyperSPROUT™ smarthub or hyperHUB™ access point shall not pose any danger when operating under rated conditions in its normal working position. An operator should pay particular attention to the following:

• Usage of personal protection against electrical shock
• Usage of personal protection against the effect of excessive temperature
• Protection against the spread of fire
• Protection against the adverse penetration of the device by solid objects, dust, or water
• Protection against the use of corrosive agents
• Protection against the damaging of the device's protective coatings due to miss-handling

3.2 DOS AND DON'TS

Read and understand the following table of dos and don'ts before performing any installation procedure.

Table 3: Dos and Don'ts

DOS	DON'TS
Place Safety Tagging or other warning boards on main switch before commencing work.	Do not close any switch unless you are familiar with the circuit which it controls and know the reason for its being open.
Before working on any circuit/any parts, make sure that the controlling switches are open and locked.	Do not tamper with any parts of the hyperSPROUT™ smarthub without express permission from an authorized agent.

RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

FCC PART 15 STATEMENT

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.

This equipment has been verified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. See 47 CFR Sec. 15.105(b). These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and the receiver.

Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

FCC CAUTION STATEMENT FOR MODIFICATIONS

CAUTION: Any changes or modifications not expressly approved by Delta Energy and Communication, Inc. could void the user's authority to operate the equipment

DOS	DON'TS
Guard against arcs as well as high voltage; remember that burns from arcs are very severe	Do not tamper with the meter board and cut-outs unless you are authorized to do so.
See that all splices and connections are securely made.	Do not expose your eyes to an electrical arc. Painful injury may result even with short exposure.
Thoroughly discharge all the cables to earth before working on cores.	Do not place any part of your body in circuit either to ground or across the terminal when making a connection or doing an operation.
Always use appropriate insulated rubber gloves and goggles while working on any branch circuit or any other electrical circuit.	Do not touch an electrical circuit when your hands are wet, bleeding from a cut or have an abrasion.
Use a bamboo, wooden, or fiberglass ladder while installing a hyperSPROUT™ smarthub onto a transformer.	Do not use an aluminum or steel ladder during the installation of a hyperSPROUT™ smarthub onto a transformer. An electrical surge will ground and the whole electric current will pass through the body.

3.3 PERSONAL PROTECTIVE EQUIPMENT

This section contains important information on personal protective equipment. Read and understand these instructions before performing any installation procedure.

3.3.1 Importance of Personal Protective Equipment

To make the workplace safe, you must provide instructions, training, supervision, and procedures. This will encourage people to work responsibly and safely. Even after applying engineering controls and safety systems some hazards remain. To reduce this risk, PPE equipment is important.

3.3.2 When to Wear Personal Protective Equipment

Personal protective equipment is required in following situations:

• Working with energized circuits
• Within proximity of energized circuits
• Troubleshooting of energized circuits
• Removing covers of products operating in energized circuits
• Ensuring a zero energy state of prior energized circuits
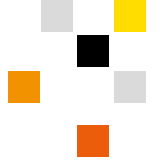
3.3.3   Personal Protective Equipment Usage

Figure 4 provides further information on when to use gloves and/or wear a helmet.

	DO wear gloves whenever working with your hands (raising ladders, testing wires, or working with wires).
	DO wear your helmet whenever working with ladders or wire (training, testing, or managing).

Figure 4: Personal Protective Equipment Usage

4. INSTALLATION

4.1 INSTALLATION FLOW

The following steps show the proposed process for installing the hyperSPROUT™ smarthub & hyperHUB™ access point represented in *Figure 5*:

Step 1	▯	Unpack the box
Step 2	▯	Verify the package contents
Step 3	▯	Install the antennas
Step 4	▯	Install the SIM card
Step 5	▯	Install the mounting bracket
Step 6	▯	Mount the device to the installed mounting bracket
Step 7	▯	Connect fiber backhaul cabling
Step 8	▯	Connect sensor cabling
Step 9	▯	Connect voltage tapping cabling

Figure 5: Installation Flow

4.2 *STEP 1*. UNPACK THE BOX

a. Before unpacking, ensure that the box has not been damaged during shipment or is wet. Stop unpacking if the equipment is rusted or wet. If product is damaged or wet, investigate the causes and contact the supplier.
b. Unpack the box.
c. After unpacking, check the items in the box against the packing list. If any item(s) are missing, contact the supplier or agent.
d. Grasp by the handles while handling the device as shown in *Figure 6*.

Figure 6: Grasping the device using the handle bars

4.3 *STEP 2*. VERIFY THE PACKAGE CONTENTS

Package contains the following items listed and shown below (also refer to *Figure 7*).

A. Delta hyperSPROUT™ smarthub or hyperHUB™ access point – 1 each
B. Optical Cable Mount Assembly - 1 each
C. RJ-45 Cable Mount Assembly – 1each
D. Voltage Tapping Cable Assembly - 1 each
E. Rogowski Current Sensor and Temperature Sensor Cable Assembly - 1 each
F. Antenna - 16 each
G. M10x16mm Bolt - 10 each
H. Mounting Bracket - 1 each
I. Anchor Bolt and Nut - 4 each
J. M10 Lock Nut - 10 each
K. Installation Guide
L. Rogowski Coils - attached to cable assembly (E) – 3 each
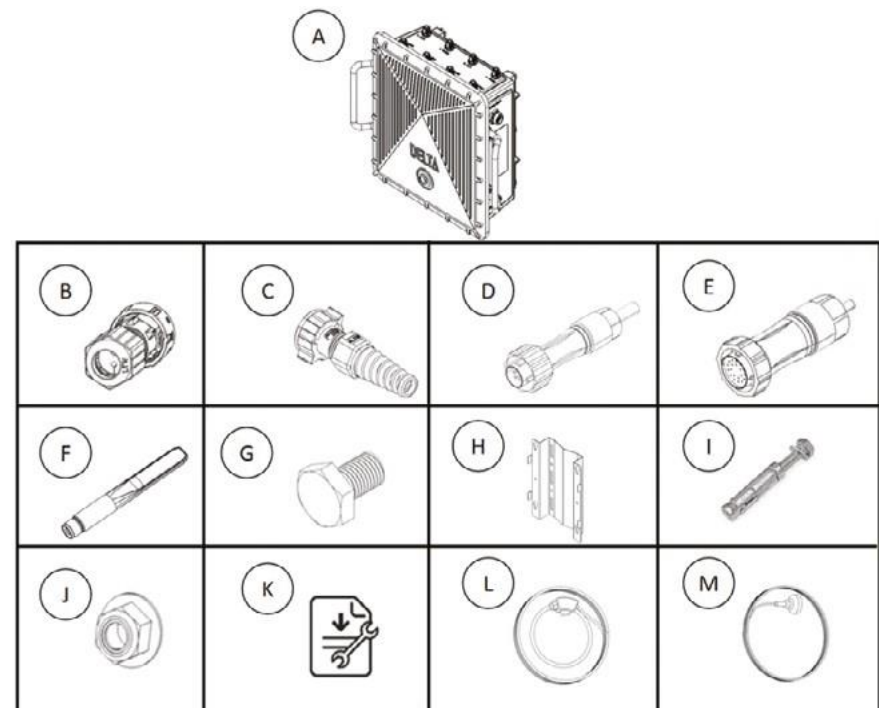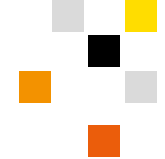M. RTD Temperature Sensors - attached to cable assembly (E) – 1 each

Figure 7: Package content

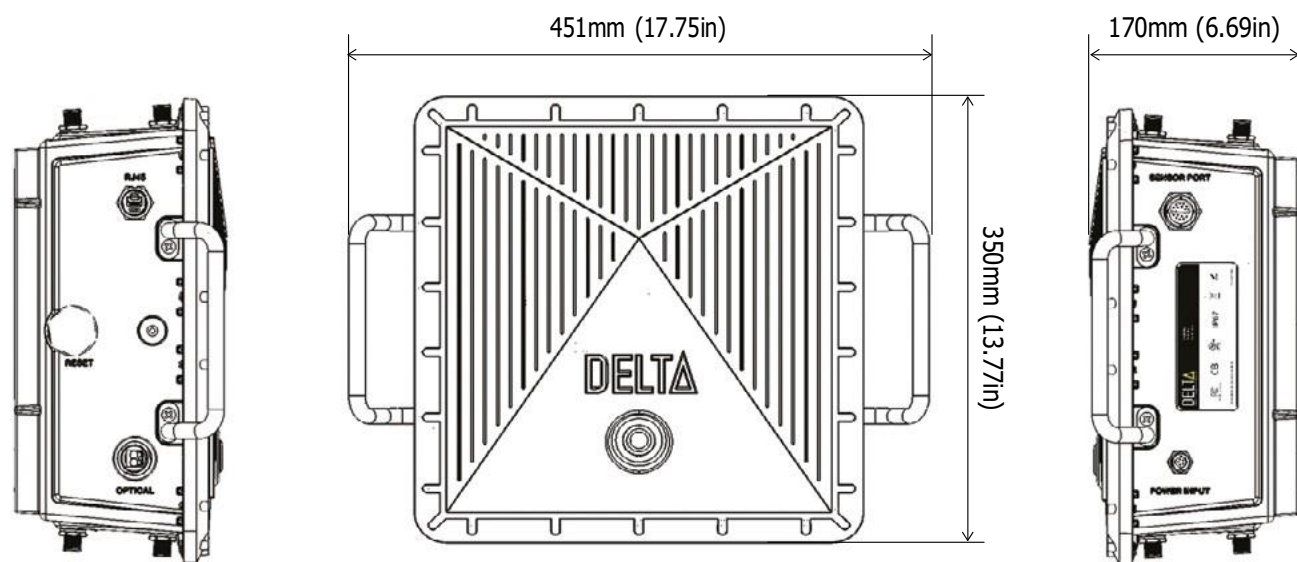View *Figure 8* for device dimensions and *Figure 9* for details on connector locations.

451mm (17.75in)

170mm (6.69in)

350mm (13.77in)

Figure 8: External dimensions

Item-D
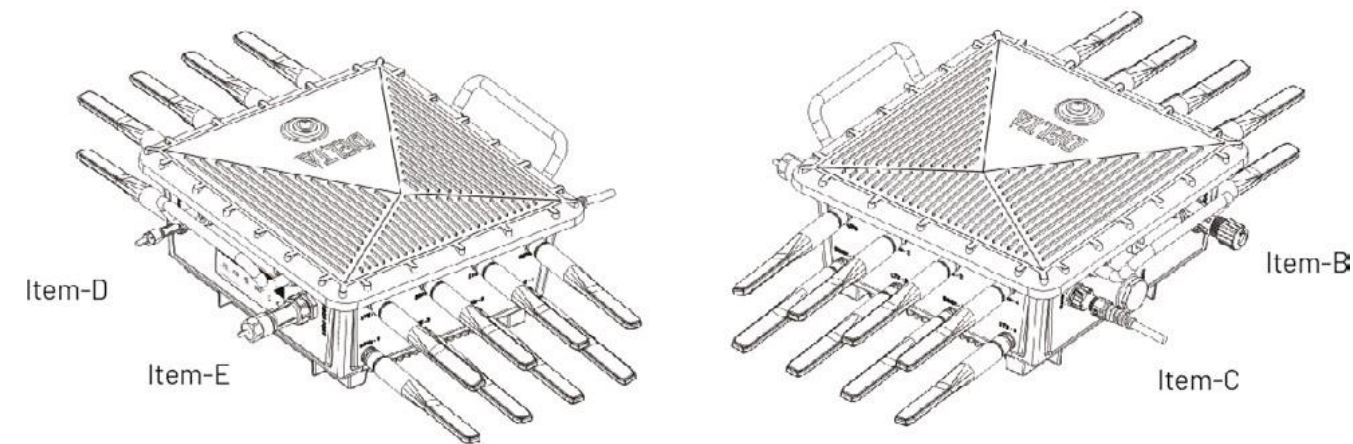
Item-E

Item-B

Item-C

Figure 9: Side view and connector's representation

4.4 *STEP 3.* **INSTALL THE ANTENNAS**

Next, install the antennas.
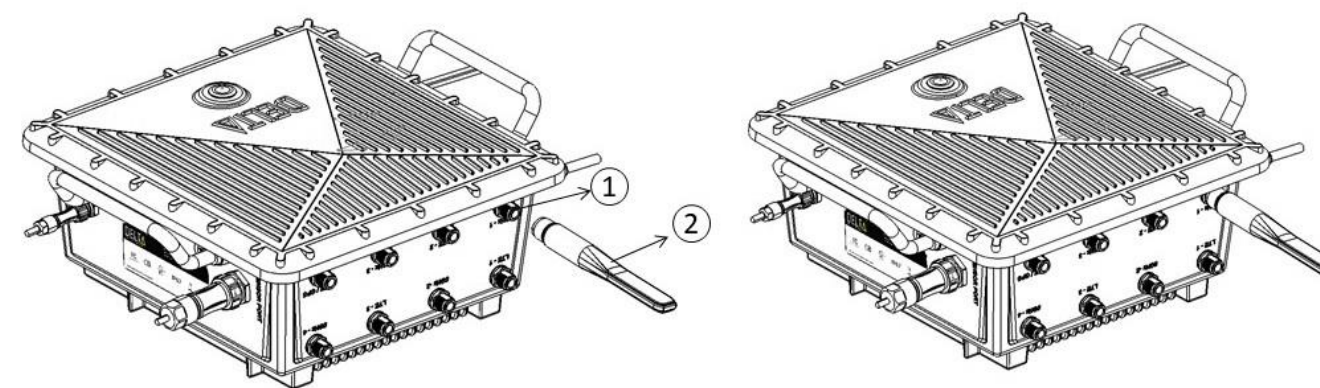
Figure 10: Antenna installation

a. Locate the antennas (Item-F). Connect the antenna (2) to the panel mount N-type connector (1) on the hyperSPROUT™ smarthub or hyperHUB™ access point as shown in *Figure 10*. Tighten it by hand.
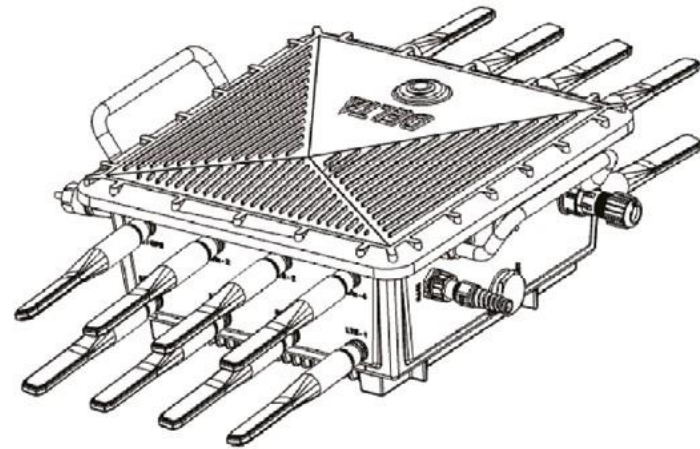
Figure 11: Representation of antennas after installation

b. Install and tighten all 16 antennas (2) to all 16 N-type panel mount connectors (1) on the top and bottom of the hyperSPROUT™ smarthub or hyperHUB™ access point as shown in *Figure 11*.

4.5 *STEP 4.* **INSTALL THE SIM CARD**

Customers have the option to choose between three backhaul methodologies (cellular, fiber optic cabling, Ethernet cabling) across three particular points of device access (covered cellular SIM card slot, fiber optic connection port, Ethernet connection port). Using the collectionENGINE™ asset management system, the customer may also set both a "primary" backhaul and a "secondary" backhaul to provide redundancy in the event of a "primary" backhaul outage. Note that this dual selection can consist of only the following combinations: cellular + fiber Optic or cellular + Ethernet. A customer cannot choose both fiber optic and Ethernet. Follow below steps to install the SIM card into the hyperSPROUT™ smarthub or hyperHUB™ access point, for cellular backhaul.
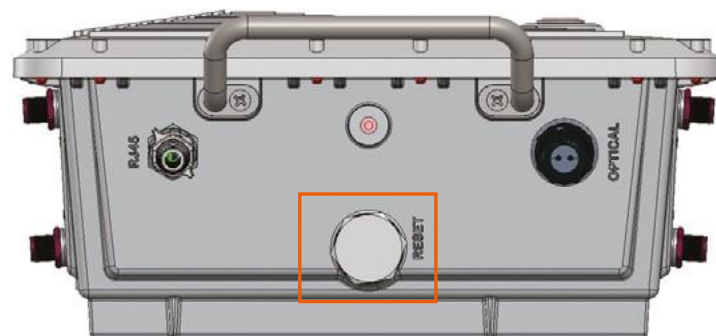
a. Remove the M32 end cap shown in *Figure 12*.

Figure 12: M32 end cap

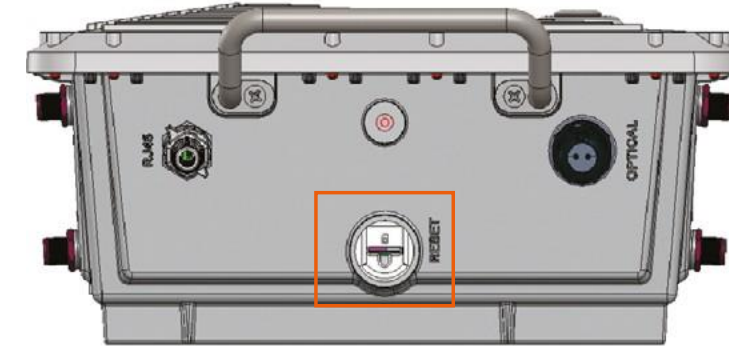b. Insert the SIM card in the SIM slot noting the SIM pin for recording into the GUI.

Figure 13: Uncovered SIM card slot

c. Reinstall and snug the end cap to the uncovered SIM card slot as shown in *Figure 13*.

4.6 *STEP 5.* **INSTALL THE MOUNTING BRACKET**

⚠ **WARNING**

Follow all high voltage installation precautions by using life-saving instruments as transformer cannot be turned off and installation must be done on a live system.

Failure to follow these instructions may result in death, serious injury, or equipment damage.

The hyperSPROUT™ smarthub or hyperHUB™ access point may be mounted to an electrical power pole or to a flat surface (wall/post) by using the mounting bracket (Item-H) and attaching hardware as shown in *Figure 14*.
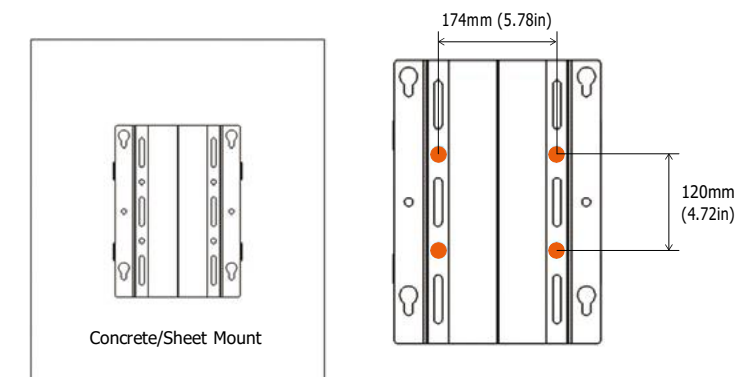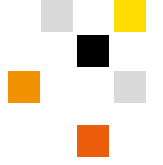

Concrete/Sheet Mount

174mm (5.78in)

120mm (4.72in)

Figure 14: Mounting bracket

4.6.1 Install the Mounting Bracket to a Pole

Follow below instructions for mounting the hyperSPROUT™ smarthub or hyperHUB™ access point to an electrical power pole.
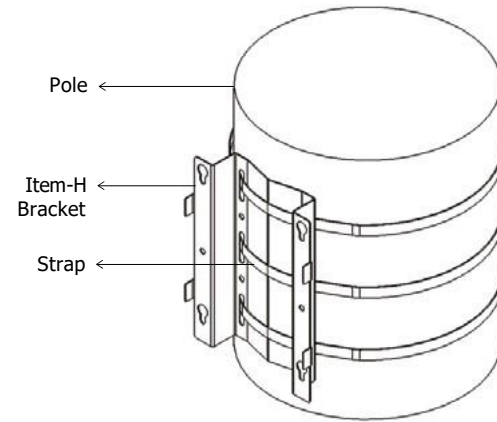

Figure 15: Installation of mounting bracket on pole

a. Identify the location on the pole for installation. Place the mounting bracket against the pole with the flanges facing away from the pole as shown in *Figure 15*.
b. The bracket can be installed to the pole with banding straps or 4 bolts or both per local standards and the pole material. Install the center banding strap through the slots in the mounting bracket and tighten the strap. Verify the location and install, then tighten the other 2 banding straps and bolts or both.

4.6.2 Install the Mounting Bracket to a Post or Wall

Follow below instructions for mounting the hyperSPROUT™ smarthub or hyperHUB™ access point to a post or wall.

a. Identify the location for installation. Place the mounting bracket against the surface with the flanges facing away from the pole as shown in the following *Figure 16*.
b. Attach the mounting bracket (Item-H) using bolts and nuts or anchors. If the back of the mounting surface is accessible, install with 4 M10 bolts (Item-G) and locknuts (Item-J) as shown in the following *Figure 16* (make sure that the maximum torque applied does not exceed 46Nm).
c. If the back of the mounting surface is not accessible, use the anchors (Item I) or other screws or lag bolts.
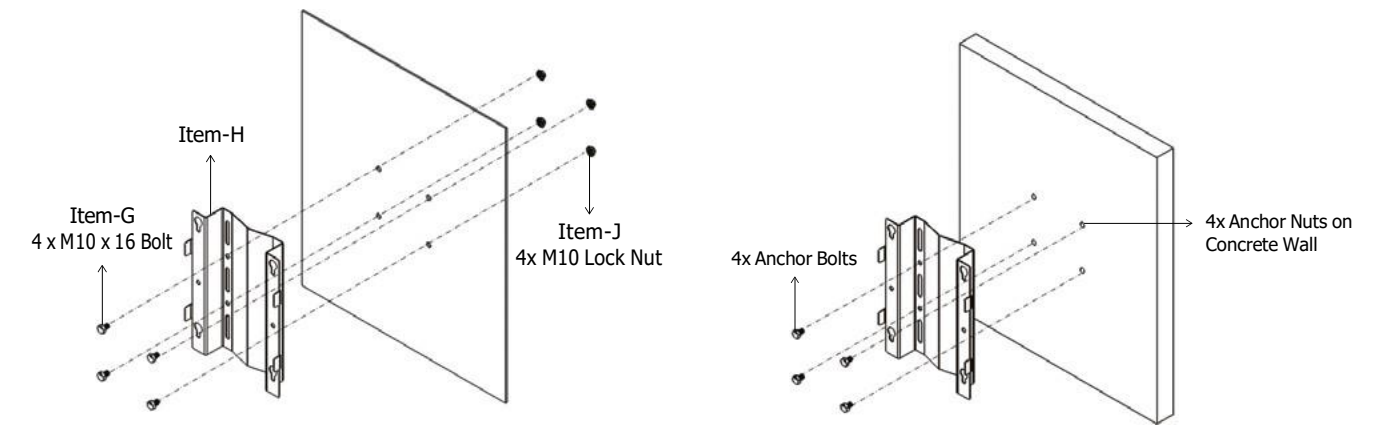

Figure 16: Installation of mounting bracket to sheet (*left*) and wall (*right*)

4.7 *STEP 6.* **MOUNT THE DEVICE TO THE MOUNTING BRACKET**

After installing the mounting bracket, follow instructions below to mount the hyperSPROUT™ smarthub or hyperHUB™ access point to the mounting bracket.

a. Install 4 M10x16 bolts (Item-G) to the back of the hyperSPROUT™ smarthub or hyperHUB™ access point as shown in *Figure 17*.
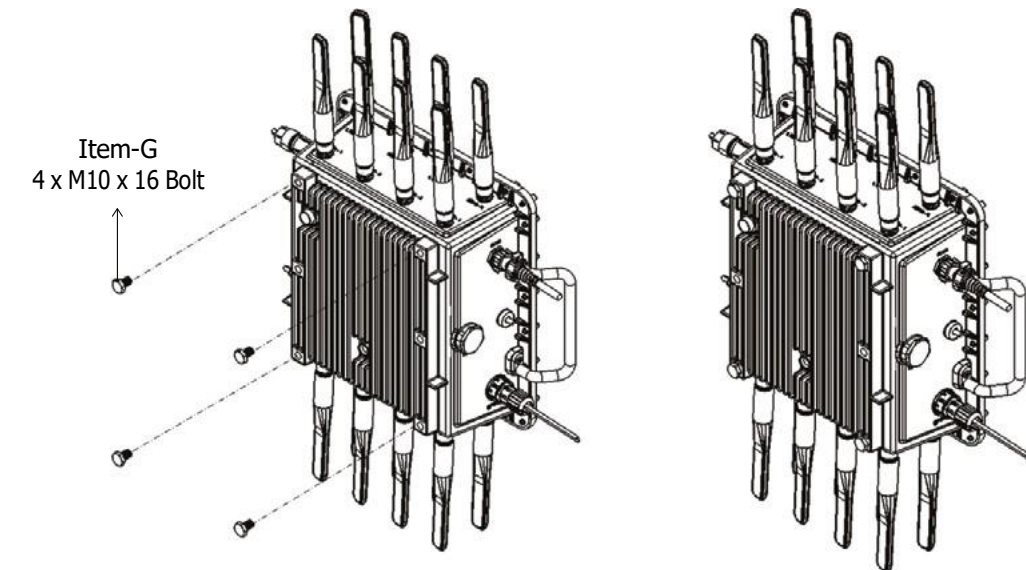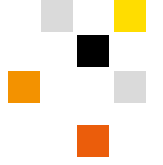

Figure 17: Device mounting

b. Align the 4 bolts in the back of the hyperSPROUT™ smarthub or hyperHUB™ access point to the 4 slots in the mounting bracket. Push the hyperSPROUT™ smarthub or hyperHUB™ access point bolts into the slots and slide the hyperSPROUT™ smarthub or hyperHUB™ access point down to lock it in the position as shown in *Figure 18* and *Figure 19*.
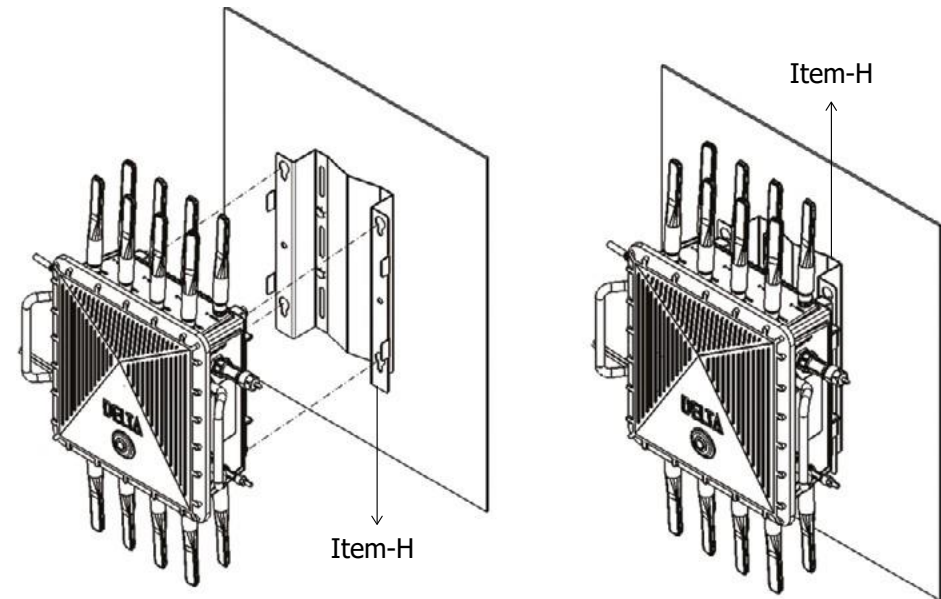

Figure 18: Device locking mechanism - 1

Figure 19: Device locking mechanism - 2

c. After the hyperSPROUT™ smarthub or hyperHUB™ access point bolts are in the mounting bracket slots and locked, install 2 M10x16 bolts (Item-G) through the mounting bracket holes and into the hyperSPROUT™ smarthub or hyperHUB™ access point to secure the install as shown in *Figure 20*.
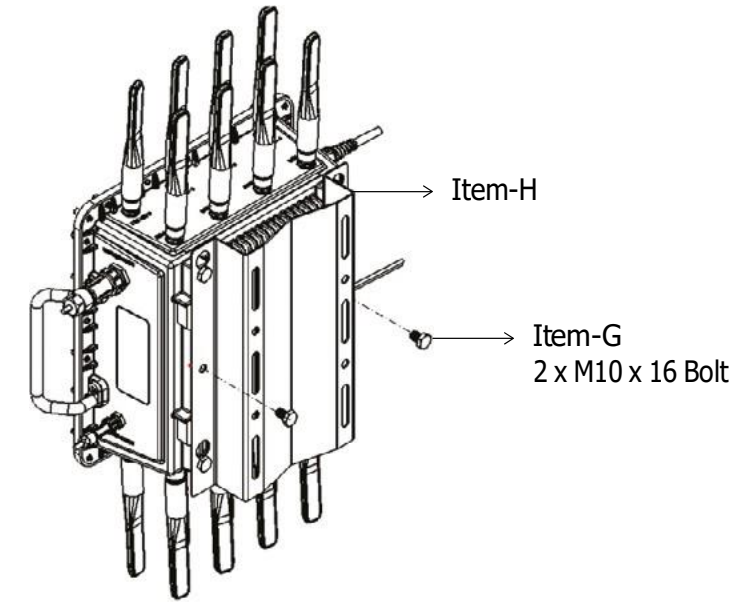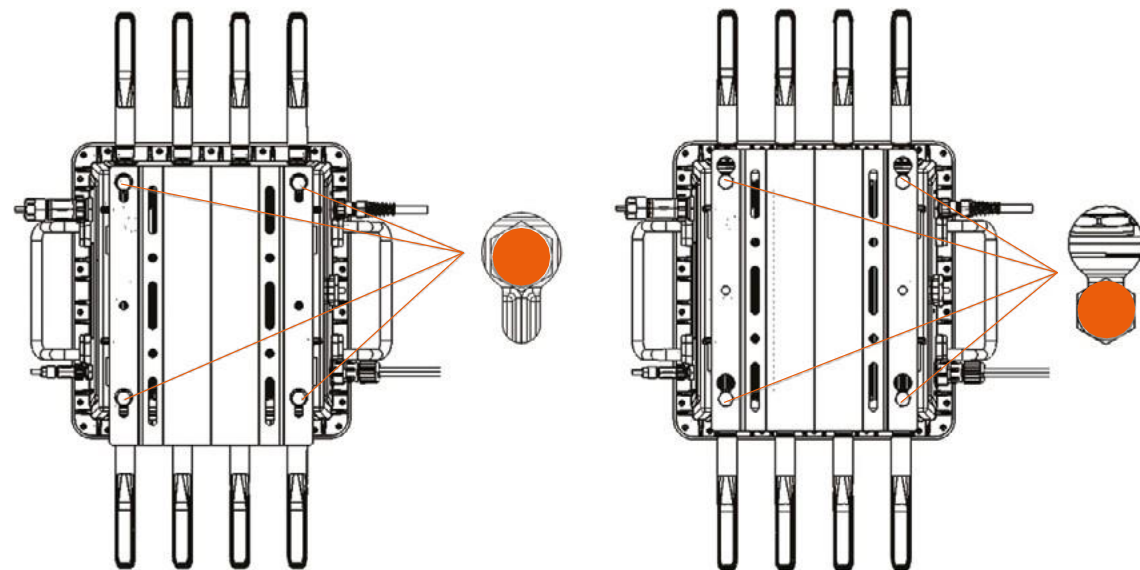

Figure 20: Securing the device

After the device is secured by its appropriate mounting selection, begin the installation of the selected backhaul (cellular, fiber optic, or Ethernet) and the installation of both the sensor and electrical connections (Rogowski sensors, temperature sensors, voltage tapping cables, neutral, and grounding). The following diagram shows a typical, polyphase transformer installation, including all sensors and electrical cabling. The next sections will overview each of the noted selections individually.
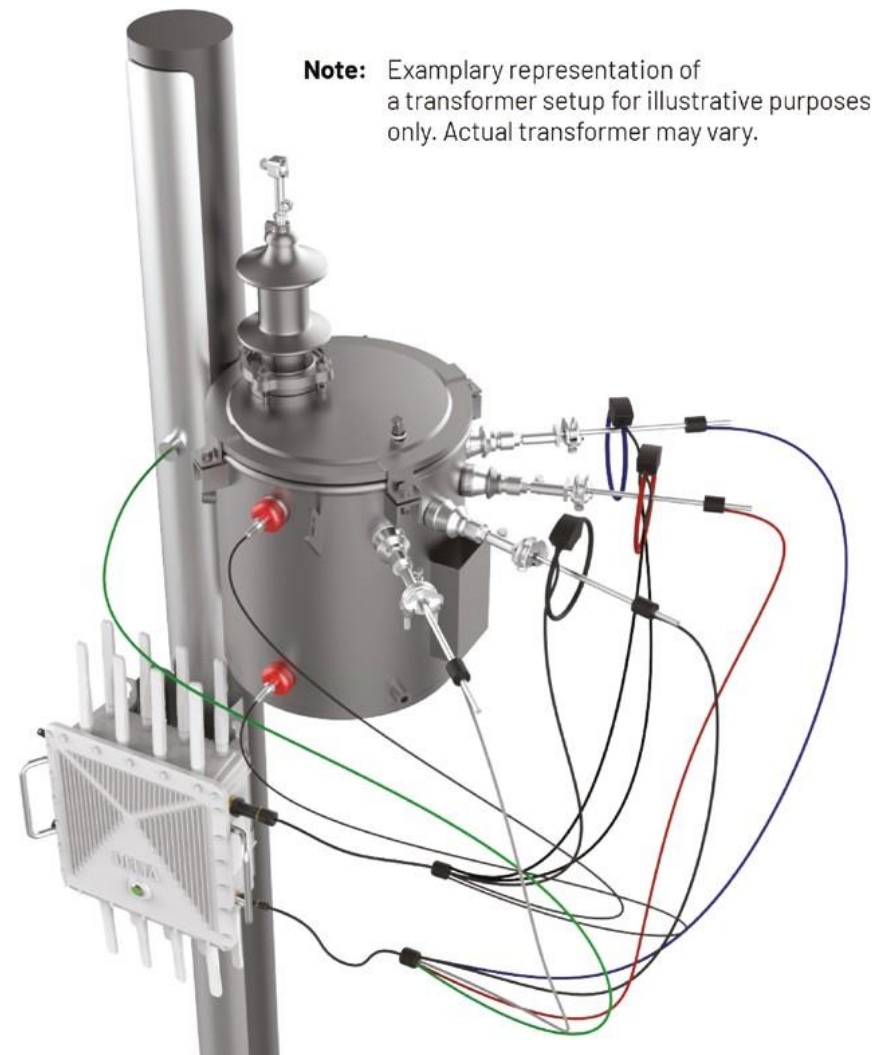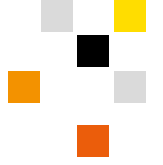
Note: Examplary representation of a transformer setup for illustrative purposes only. Actual transformer may vary.

Figure 21: Representation of full cable assembly

4.8 *STEP 7.* **CONNECT FIBER BACKHAUL CABLING**

⚠ WARNING

Follow all high voltage installation precautions by using life-saving instruments as transformer cannot be turned off and installation must be done on live system.

Failure to follow these instructions may result in death, serious injury, or equipment damage.

As noted prior, a customer may choose either fiber optic backhaul or Ethernet backhaul. Both backhaul configurations cannot be used at the same time. *Figure 22* shows both the fiber optic connection port and the Ethernet connection port.

For fiber optic backhaul, the baseline device is configured for two strand, multi-mode drop fiber. For connection to the device, drop fiber should be terminated with Tripp-Lite 10Gb Duplex Multi-mode 50/125 OM3 LsZH Fiber Patch Cable (LC/LC). The appropriate interconnect, for which to pass and seal the appropriately terminated drop fiber, will be provided with the device. It is the customer's responsibility to provide both the appropriate fiber optic cabling and associated termination, in line with the guidance above.

For Ethernet backhaul, the baseline device is configured to accept 1G/2.5G/5G/10G Ethernet Patch cable. For connection to the device, the cable should be terminated with a standard RJ-45 termination. The appropriately terminated and sealed patch cable will be supplied as a custom product assembly with the device.

The following sections will describe the installation of both backhaul options to the device.
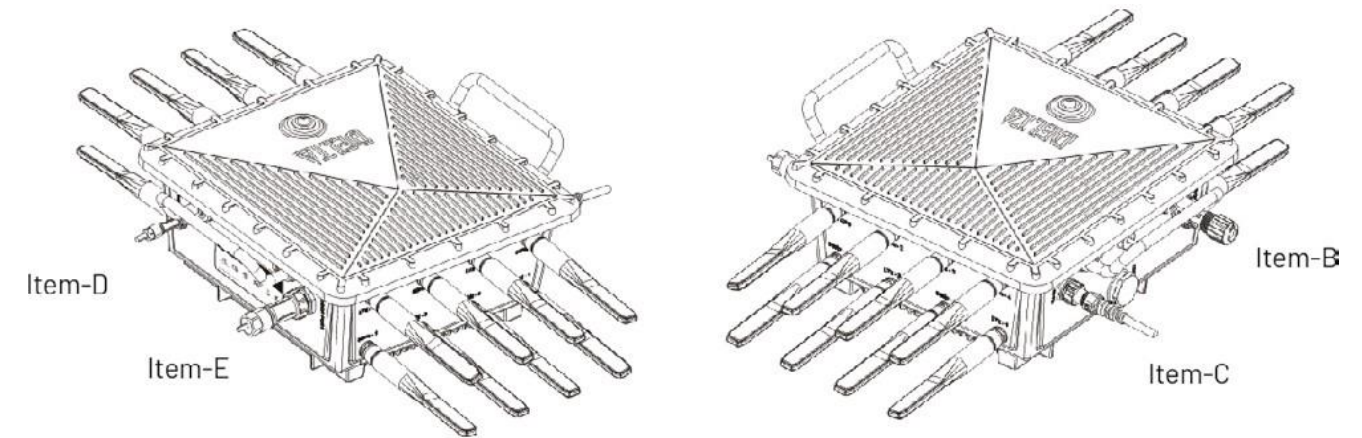

Figure 22: Backhaul cabling representation

4.8.1   Connect Cabling to Fiber Cable Directly

Follow below instructions when connecting the hyperSPROUT™ smarthub or hyperHUB™ access point to fiber cable.

a.   Locate the optical cable mount assembly (Item-B). Feed the end of the optical cable (2) through the optical gland main body (1), optical rubber part (3), and optical gland end cap (4), as shown in *Figure 23*.
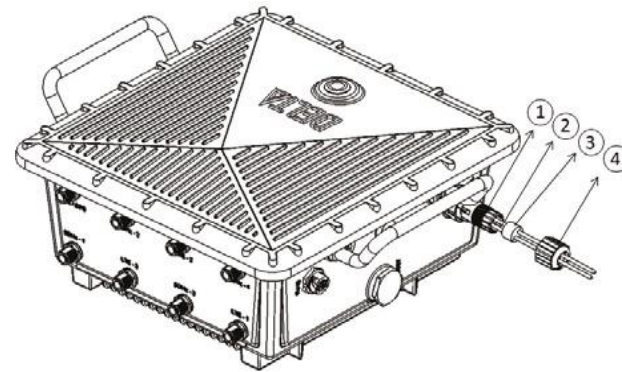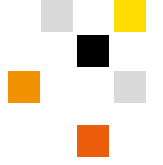
Figure 23: Connecting fiber optic cabling - 1

b. Tighten the optical gland main body (1) into the device mating connector (optical connector). Make sure that the maximum torque applied does not exceed 2Nm, as shown in *Figure 24*.

Note: The optical rubber part (3) has two holes that can accommodate a cable diameter range from 5-7mm (0.20-0.27in).
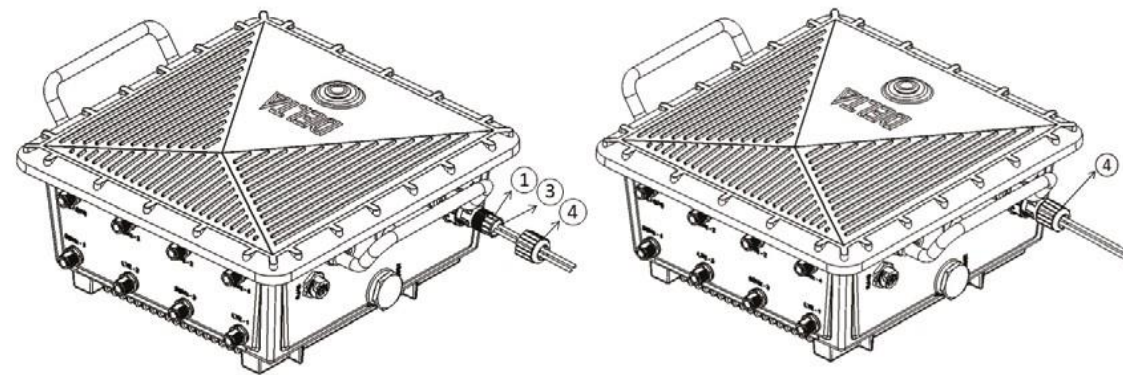

Figure 24: Connecting fiber optic cabling - 2

c. Hand-tighten the entire assembly with optical gland end cap (4).

4.8.2   Connect Cabling to Ethernet

Follow below instructions when connecting the hyperSPROUT™ smarthub or hyperHUB™ access point to Ethernet using an RJ-45 cable.

a. Locate the RJ-45 cable mount assembly (Item-C). Insert the RJ-45 cable into the connector before plugging the connector into the hyperSPROUT™ smarthub or hyperHUB™ access point as shown in *Figure 25*.

Note: The RJ-45 cable is not part of the standard product and must be ordered/purchased separately.
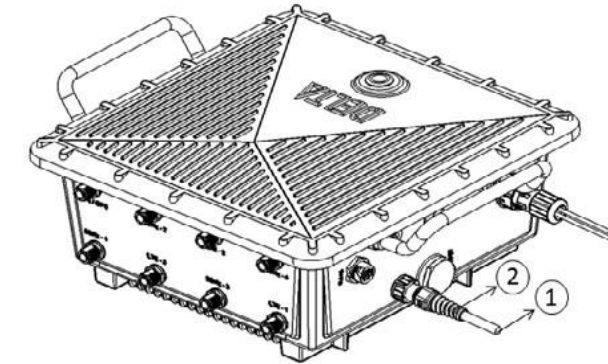

Figure 25: Connecting RJ-45 cabling - 1

b. Feed the end of the RJ-45 cable (1) through the main RJ-45 cable connector (2) as shown in *Figure 26*.
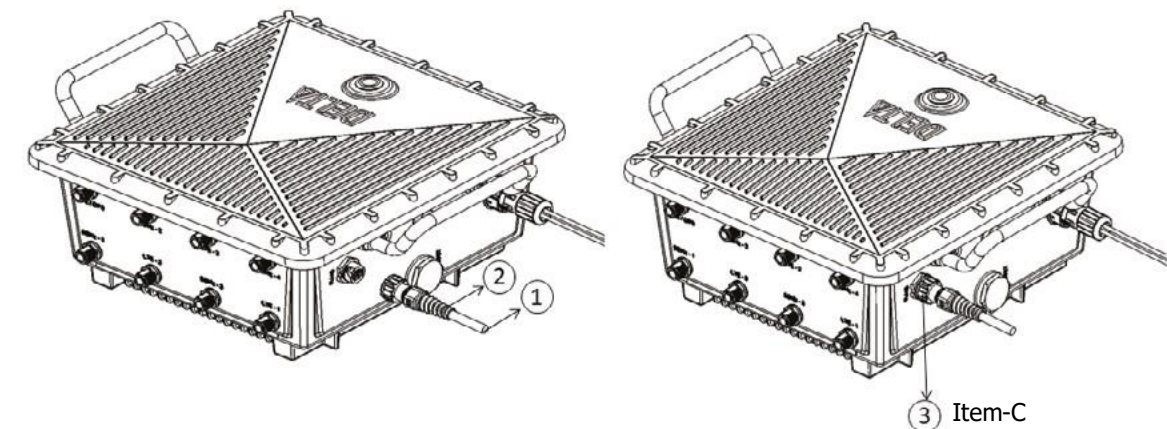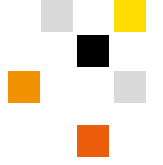

Figure 26: Connecting RJ-45 cabling - 2

c. Tighten the main RJ-45 cable connector main body (2) mating RJ-45 connector (3) into the hyperSPROUT™ smarthub or hyperHUB™ access point. Make sure that the maximum torque applied does not exceed 2Nm.
d. Connect the unattached end of the RJ-45 cable to the Ethernet source.

4.9 *STEP 8.* **CONNECT SENSOR CABLING**

The sensor connector and wire bundle contains 20 individual wires. 10 wires are connected to the temperature sensors and 10 wires are connected to Rogowski coils through the IP67 inter-connector.

4.9.1   Install the RTD Temperature Sensors

Follow below instructions to install the temperature sensors.

a.   Locate the Rogowski current sensor and temperature sensor cable assembly (Item-E) and temperature sensors (Item-M) as shown in *Figure 27*.

Figure 27: RTD temperature sensor

b.   Temperature sensor magnets are specifically labeled to indicate the proper mounting location on the transformer. Place the magnet labeled "top" at the top of the transformer and the magnet labeled "bottom" at the bottom of the transformer.

c.   Route and secure the temperature sensor connector cabling from the transformer to the hyperSPROUT™ smarthub connector. See *Figure 30*. Note that the hyperHUB™ access point does not include a sensor cabling.

4.9.2   Install the Rogowski Current Sensor

The Rogowski current sensors and cabling are either single phase or three phase. Match the current sensor(s) required for the phasing (single or polyphase) of the transformer secondary.

Note: A single phase transformer may have one or two secondary lines and a neutral. Use one Rogowski sensor for the single line and two for the two line configuration. Three phase transformers will use three Rogowski sensors.

Note: The color coding on the Rogowski sensor(s) and voltage tapping cabling must be matched to the same colors. This color coding will be used in an identical fashion to properly define the wiring in the dataSCAPE™ analytics platform.

Single Phase, 1 secondary line:	**Black**
Single Phase, 2 secondary lines:	**Black** and **Red**
Three Phase, 3 secondary lines:	**Black**, **Red**, and **Blue**
Neutral:	**White**
Ground:	**Green**

Follow below instructions to install the Rogowski sensors.

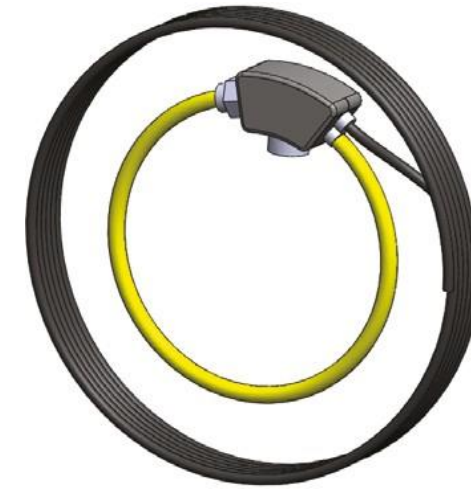a.   Locate the Rogowski current sensor cable (Item-E), Represented in below *Figure 28*.

Figure 28: Rogowski coil

b.   Install each coil around the secondary cable noting the direction of current flow and the color for each secondary line.

c.   Route and secure the Rogowski sensor cables to the connector on the hyperSPROUT™ smarthub.

d.   Connect the sensor connector to the hyperSPROUT™ smarthub as shown in *Figure 29*. See *Figure 30* for final assembly representation.
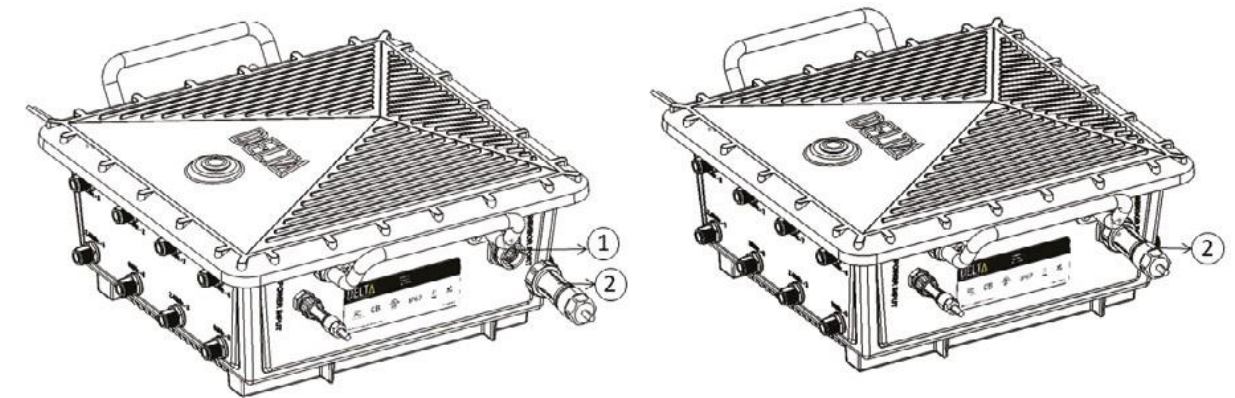

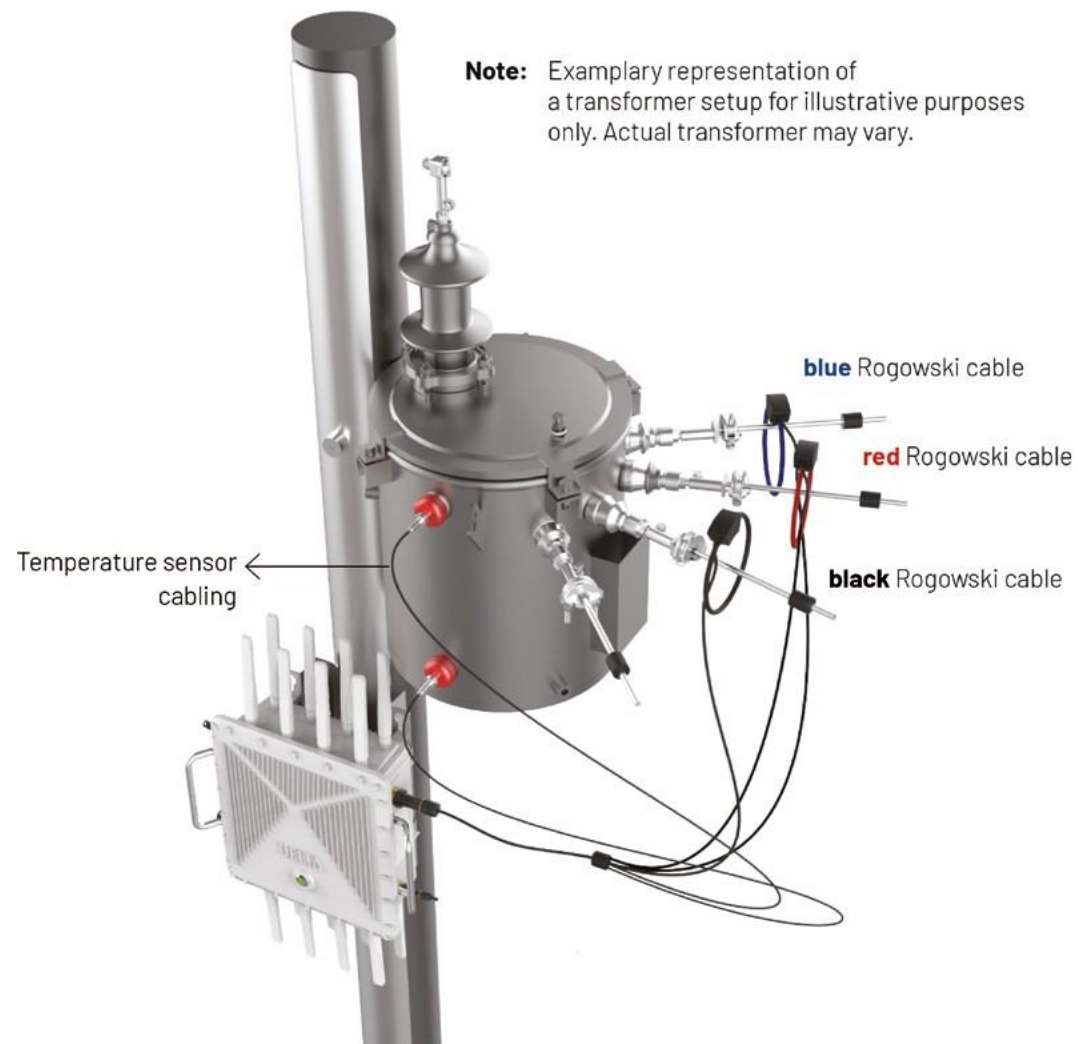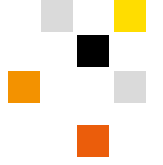*Figure 29:* Connecting sensor cabling

Note: Examplary representation of a transformer setup for illustrative purposes only. Actual transformer may vary.

blue Rogowski cable

red Rogowski cable

black Rogowski cable

Temperature sensor cabling

Figure 30: Representation of sensor & Rogowski cabling

Figure 31: Connecting voltage tapping connector to power input

c.   Twist and tighten the connector by hand to lock the connector in place.
d.   Route and secure the voltage tapping cable from the hyperSPROUT™ smarthub or hyperHUB™ access point to the transformer secondary. Adjust for length as necessary.
e.   Connect the voltage tapping wires to the transformer secondary as follows.

Note: The color coding on the Rogowski sensor(s) and voltage tapping cabling must be matched to the same phase of the transformer secondary:

Single Phase, 1 secondary line:	**Black**
Single Phase, 2 secondary lines:	**Black** and **Red**
Three Phase, 3 secondary lines:	**Black**, **Red**, and **Blue**
Neutral:	**White**
Ground:	**Green**

4.10 *STEP 9.* CONNECT VOLTAGE TAPPING CABLING

The voltage tapping cable includes a green ground wire. hyperSPROUT™ smarthub or hyperHUB™ access point is properly grounded by externally connecting the green ground wire to the transformer/pole ground.

Follow below instructions to connect the voltage tapping cabling.

a.   Locate the voltage tapping cable mount assembly (Item-D).
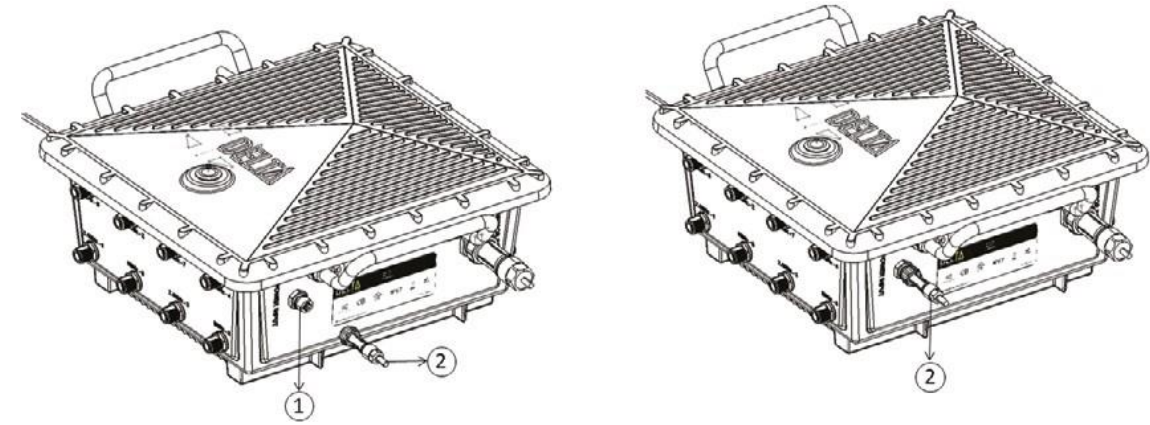b.   Connect the voltage tapping connector (2) to the power input connector on the hyperSPROUT™ smarthub or hyperHUB™ access point as shown in following *Figure 31*.