ORION® Water Endpoints

Image shown represents ORION Cellular C endpoint installed, as per instructions, through non-metal pit lid

Badger Meter

ORI-UM-00025-EN-36_HLG (August 2025)

Installation Manual

CONTENTS

SCOPE OF THIS MANUAL

This manual contains installation instructions for ORION® water endpoints: ORION Cellular endpoints—C, HLD, HLG, CS, LTE-M, LTE-MS, HLA, HLB, HLC, LTE— and the ORION Mobile M, ME, Fixed Network (SE) and Classic (CE) endpoints.

ORION endpoints installation must comply with all applicable federal, state and local rules, regulations and codes.

Failure to read and follow these instructions can lead to misapplication or misuse of this product, resulting in personal injury and damage to equipment.

Proper performance and reliability of ORION endpoints depend upon installation in accordance with these instructions. Endpoints not properly installed may not be covered under warranty.

WARNING: The operation of transmitters and receivers on airlines is strictly prohibited by the Federal Aviation Administration. As such, the shipping of radios and endpoints via air is prohibited. Please follow all Badger Meter return and/or shipping procedures to prevent exposure to liability.

Additional Resources

These related documents are available at *www.badgermeter.com*

- *ORION Water Endpoint Installation Kits Ordering Guide*
- *ORION Water Endpoint Parts List*
- *Product Configuration Utility Manual for ORION Endpoints*
- *ORION Endpoint Utility Software Manual*
- *ORION Cellular HLB Endpoint Installation Manual*
- *IR Communication Device Quick Start Guide*

PRODUCT UNPACKING AND INSPECTION

Upon receipt of the product, perform the following unpacking and inspection procedures.

NOTE: If damage to shipping container is evident upon receipt, request the carrier to be present when product is unpacked.

Carefully open the shipping package, following any instructions that may be marked on the exterior. Remove all cushioning material surrounding the product.

ORION Endpoints: Carefully remove the pre-wired ORION endpoint or ORION endpoint encoder assembly from the container and inspect for damage. Retain the contents of the installation kit for use in mounting the endpoint in the field.

Other products: Carefully lift the product from the package. Visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts or any other sign of damage that may have occurred during shipment. Retain the package and all packing material for possible use in reshipment or storage.

NOTE: If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

LICENSE REQUIREMENTS

ORION Cellular C, HLD, HLG, CS, LTE-M, LTE-MS, HLA, HLB, HLC, LTE endpoints comply with Part 15, Part 22, Part 24, and Part 27 of FCC Rules. ORION Mobile M, ME, SE and CE endpoints comply with Part 15 of FCC Rules. Operation is subject to the following conditions: (1) These devices may not cause harmful interference, and (2) these devices must accept any interference received, including interference that may cause undesired operation of the device.

In accordance with FCC Regulations, "Code of Federal Regulations" Title 47, Part 2, Subpart J, Section 1091, transmitters pass the requirements pertaining to radiation exposure. However, to avoid public exposure in excess of limits for general population (uncontrolled exposure), a 20 centimeter distance between the transmitter and the body of the user must be maintained during operation.

No FCC license is required by a utility to operate an ORION meter reading system.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IDENTIFICATION

Endpoints

The ORION water endpoint is a three-wire metering device for indoor/outdoor use. Each endpoint has a unique numeric serial number on the tag attached to the cable harness (wire) and etched on the endpoint housing. Endpoints require connection to an encoder to complete the assembly. Badger Meter encoders are shown in *Figure 3*.

Refer to *"ORION Cellular Endpoints" on page 5*, *"ORION Mobile M, ME and SE Endpoints" on page 7* and *"ORION Classic Endpoints" on page 9* to see endpoint photos.

Endpoint Dimensions

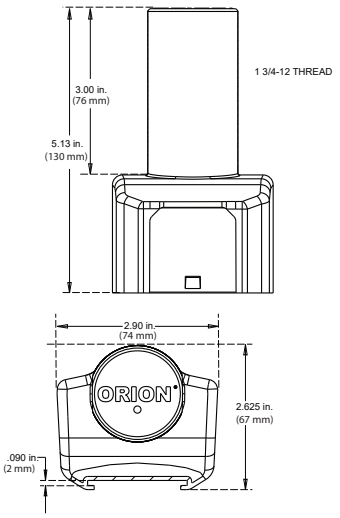


Figure 1: ORION Cellular and ORION Mobile M endpoint dimensions

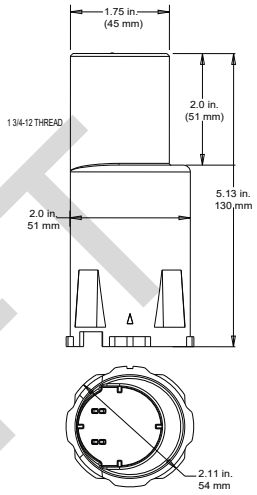


Figure 2: ORION ME, SE, CE endpoint dimensions

Encoders/Register

The encoder connects to the endpoint to complete the assembly. Each Badger Meter encoder is identified on the face of the register with an assembly number, unit of measure and meter model. Current and legacy products are shown below.

Current Products ***Legacy Products***

High Resolution LCD Encoder (HR-E® LCD) | *E-Series® Ultrasonic Meter with High Resolution LCD Encoder* | *High Resolution 8-Dial Encoder (HR-E®)* | *Absolute Digital Encoder (ADE®)* | *Recordall® Transmitter Register (RTR®)*

Figure 3: Encoders and register

ORION CELLULAR ENDPOINTS

This section discusses configuration, encoder compatibility and installation for ORION Cellular endpoints.

ORION Cellular endpoints: HLG, C, HLD, CS, LTE-M, LTE-MS, HLA, HLB and HLC (charcoal gray)

ORION Cellular LTE endpoint (medium gray)

Figure 4: ORION Cellular endpoints

Serial Number Ranges and FCC Labels

ORION Cellular Endpoint	Serial Number Range	FCC Label Color	ORION Cellular Endpoint	Serial Number Range	FCC Label Color
HLG	180000000…189999999	pink/blue	C	130000000…139999999	yellow
HLD	160000000…169999999	white	CS	130000000…139999999	white
HLB	150000000…159999999	yellow	LTE-M	120000000…129999999	yellow
HLC	149000000…149999999	green	LTE-MS	120000000…129999999	white
HLA	140000000…148999999	orange	LTE	110000000…119999999	yellow

The serial number is engraved on one side of the endpoint base, and the FCC label is displayed on the other.

Figure 5: ORION Cellular endpoints FCC labels

Endpoint Configurations

Endpoint Configurations	Encoder Connection
Endpoint only with inline connector (Twist Tight® or Nicor®)	Connect the endpoint to an encoder using the inline connector. See *"Inline Connectors" on page 30*.
Endpoint only with flying lead for field splice	See *Field Wiring, Encoder Connectivity and Read Resolution* below.
Endpoint/encoder assembly with inline connector	Endpoint/encoder assemblies (endpoints connected by an inline connector to a Badger Meter encoder) are shipped from the factory, ready for installation. See *Field Wiring, Encoder Connectivity and Read Resolution* and *"Inline Connectors" on page 30*.

Field Wiring, Encoder Connectivity and Read Resolution

ORION Cellular endpoints with flying leads are shipped from the factory pre-programmed. Connect all three endpoint wires to an encoder to complete installation. The endpoint can be connected to existing wires from the encoder or directly to the encoder terminal screws, depending on the application and manufacturer. Endpoints can be connected to Badger Meter high resolution encoders and E-Series Ultrasonic meters as well as a number of competitive encoders. See the wiring chart on the next page.

NOTE: For instructions on field wiring using gel connectors, see *"Using Gel Caps to Connect an Encoder" on page 32*. Follow the manufacturer's instructions provided with the gel cap/field splice kit you are using.

ORION endpoint wires: Red = Power/Clock; Black = Ground; Green = Data

Endpoint Label	Encoder Connectivity		Endpoint Wire Colors Red	Black	Green	Reading Resolution
ORION Cellular C, HLD, HLG, CS, LTE-M, LTE-MS, HLA, HLB, HLC, LTE	Badger Meter HR-E LCD or HR-E encoders or E-Series Ultrasonic and Ultrasonic Plus Meter with High Resolution output	Encoder Wire/Termination Colors	Red	Black	Green	Up to nine (9) most significant digits
	Honeywell® (Elster/ABB) ScanCoder, evoQ4 meter with Sensus® protocol module*		Green	Black	Red	Up to nine (9) most significant digits
	Metron-Farnier Hawkeye*		Red	Black	Green	Up to nine (9) most significant digits
	Mueller Systems 420 Solid State Register (SSR) LCD*		Red	Black	Green	Up to nine (9) most significant digits
	Neptune ProRead, E-coder, ARB-V* or ProCoder with encoder output		Black	Green	Red	Up to nine (9) most significant digits
	Neptune registers with Nicor connector		Red	Black	Green	Up to nine (9) most significant digits
	Sensus iPerl®		Red	Black	Green	Up to nine (9) most significant digits
	Kamstrup flowIQ®		Red	Black	Green	Up to nine (9) most significant digits
	Master Meter® Octave® Ultrasonic meter (encoder output)*		Red	Black	Green	Up to eight (8) most significant digits
	Hersey Translator*		Due to the customized, factory wire configurations of the Hersey Translator, the terminal posts may not match the ORION endpoint wire colors. Please contact Hersey for the terminal post wiring schematic of your encoders to determine how the posts correspond to ORION endpoint wires.			

NOTE: Competitive encoder output is determined by the encoder configuration.

*ORION Cellular endpoints are compatible with the encoders/meters noted above that have a manufacture date within 10 years of the current date as long as the encoder has three wires connected to it and is programmed into the three-wire output mode for AMR/AMI. Encoder registers with two-wire mode of operation require programming by the Utility, including registers that support auto two- or three-wire detection systems that do not automatically switch to three-wire mode of operation when a compatible endpoint is connected for ORION connectivity.

Installation Guidelines (Indoor, Outdoor, Pit)

Install the endpoint/encoder assembly according to these guidelines:

Always install endpoint antenna straight up—not on an angle or upside down. Antenna is located in the top 1/3 of the threaded tube.

- **Indoor Installation:** Mount endpoints in the floor joist on an outside wall, near a window, if possible, and away from large metal objects.
- **Outdoor Installation:** See *"64394-032 Wall Cover Install Kit" on page 14* for mounting kit information.
- **Pit Installation:**

IMPORTANT

- Mount ORION Cellular endpoints through a NON-METAL pit lid—**REQUIRED**.
- **Install at or above grade level**.

NOTE: See the installation troubleshooting document, *ORION Cellular Endpoint Installation Do's and Don'ts*, available at *www.badgermeter.com*. Endpoints not properly installed may not be covered under warranty.

Endpoint Activation

See *"Activating Endpoints" on page 11* for details of the process.

ORION MOBILE M, ME AND SE ENDPOINTS

This section discusses configuration, encoder compatibility and installation information for ORION Mobile M, ME and ORION Fixed Network (SE) endpoints.

ORION Endpoint	Serial Number Range	FCC Label Color
Mobile M	60000000…69999999	blue
ME	30000000…59999999	white
SE	30000000…59999999	white

On the ORION Mobile M endpoint, the serial number is engraved on one side of the endpoint base, and the blue FCC label is displayed on the other side (*Figure 6*).
On ORION ME and SE endpoints, the serial number is engraved along the side of the endpoint body. The white FCC label is also displayed on the endpoint body.

Mobile solutions deployed prior to February 1, 2023 include ORION ME endpoints that are migratable to fixed network. BEACON SaaS Mobile solutions deployed after February 1, 2023 include ORION ME endpoints that operate in mobile mode only.

Figure 6: ORION Mobile M endpoint (medium gray)

Figure 7: ORION ME, SE endpoint

Endpoint Configurations

The following configuration options are available.

Endpoint Configurations	Encoder Connection
Endpoint only with inline connector (Twist Tight, Nicor, 308)	Connect the endpoint to an encoder using the inline connector. See *"Inline Connectors" on page 30*.
Endpoint only with flying lead for field splice	See *Field Wiring, Encoder Connectivity and Read Resolution* below.
Endpoint/encoder assembly with inline connector	Endpoint/encoder assemblies (endpoints connected by an inline connector to a Badger Meter encoder) are shipped from the factory, ready for installation.
Prewired integral endpoint/encoder assembly	Mount the assembly on the bayonet of the meter. See *"Integral Endpoint Installation" on page 24 for details.*

Field Wiring, Encoder Connectivity and Read Resolution

ORION Mobile M, ME and SE endpoints with flying leads are shipped from the factory pre-programmed. Connect all three wires to an encoder to complete installation. The endpoint can be connected to existing wires from the encoder or directly to the encoder terminal screws, depending on the application and manufacturer. Endpoints can be connected to Badger Meter high resolution encoders and E-Series Ultrasonic meters as well as a number of competitive encoders. See the wiring chart on the next page.

NOTE: For instructions on field wiring using gel connectors, see *"Using Gel Caps to Connect an Encoder" on page 32*. Follow the manufacturer's instructions provided with the gel cap/field splice kit you are using.

ORION endpoint wires: Red = Power/Clock; Black = Ground; Green = Data

Endpoint Label	Encoder Connectivity	Encoder Wire/Termination Colors	Endpoint Wire Colors Red	Black	Green	Reading Resolution
ELCD or ENC	Badger Meter HR-E LCD or HR-E encoders, or E-Series Ultrasonic Meter with High Res output		Red	Black	Green	Up to eight (8) most significant digits
ADE or ENC	Badger Meter ADE or E-Series Ultrasonic Meter with ADE output		Red	Black	Green	Up to six (6) most significant digits
RTR	Badger Meter RTR or E-Series Ultrasonic Meter with RTR output		Red	Black	Green	Up to seven (7) most significant digits
ADE or ENC	Honeywell (Elster)/AMCo ScanCoder or InVISION*and evoQ4 meter (encoder output)*		Green	Black	Red	Up to eight (8) most significant digits
C700D	Honeywell (Elster)/AMCo C700 Digital*		Red	Black	Not used – cut green wire flush with outer sheath	Up to seven (7) most significant digits
ADE or ENC	Master Meter Octave Ultrasonic meter (encoder output)*		Red	Black	Green	Up to eight (8) most significant digits
ADE or ENC	Metron Hawkeye*		Red	Black	Green	Up to eight (8) most significant digits
ADE or ENC	Mueller Systems 420 Solid State Register (SSR) LCD*		Red	Black	Green	Up to eight (8) most significant digits
ADE or ENC	Neptune ProRead, E-coder or ARB-V*		Black	Green	Red	Up to eight (8) most significant digits
ADE or ENC	Sensus Electronic Register encoder (ECR) or ICE*		Red	Black	Green	Up to eight (8) most significant digits
ADE or ENC	Hersey Translator*		Due to the customized, factory wire configurations of the Hersey Translator, the terminal posts may not match the ORION endpoint wire colors. Please contact Hersey for the terminal post wiring schematic of your encoders to determine how the posts correspond to ORION endpoint wires.			

NOTE: Competitive encoder output is determined by the encoder configuration.

*ORION ME and SE ADE or ENC endpoints are compatible with the encoders/meters noted above with a manufacture date within 10 years of the current date as long as the encoder is programmed into the three-wire output mode for AMR/AMI and has three wires connected to it. Encoder registers with two-wire mode of operation require programming by the Utility, including registers that support auto two- or three-wire detection systems that do not automatically switch to three-wire mode of operation once a compatible endpoint is connected for ORION connectivity.

Installation Guidelines (Indoor, Outdoor, Pit)

Install the endpoint/encoder assembly according to these guidelines:

Always install endpoint antenna straight up—not on an angle or upside down. Antenna is located in the top 1/3 of the threaded tube.

- **Indoor/Outdoor Installation:** Mount outside the building, or indoors in the floor joist near an outside wall and away from large metal objects.
- **Pit Installation, ORION Mobile M, ME Endpoints**: Mount through a NON-METAL pit lid—**Recommended**.
- **Pit Installation, ORION SE Endpoints**: Mount through a NON-METAL pit lid—**REQUIRED**.

NOTE: Endpoints not properly installed may not be covered under warranty.

Endpoint Activation

See *"Activating Endpoints" on page 11* for details of the process.

ORION CLASSIC ENDPOINTS

This section discusses configuration, encoder compatibility and installation information for ORION Classic (CE) endpoints.

ORION Endpoint	Serial Number Range	FCC Label Color
CE	70000000…89999999	white

On the ORION CE endpoint, the serial number and FCC information are engraved on the top of the endpoint.

Figure 8: ORION Classic (CE) Endpoint

Endpoint Configurations

The following configuration options are available.

Endpoint Configurations	Encoder Connection
Endpoint only with inline connector (Twist Tight, Nicor, 308)	Connect the endpoint to an encoder using the inline connector. See *"Inline Connectors" on page 30*.
Endpoint only with flying lead for field splice	See *Field Wiring, Encoder Connectivity and Read Resolution*.
Endpoint/encoder assembly with inline connector	Factory prewired endpoints, connected to a Badger Meter encoder, are shipped, ready for installation. No splicing required.
Prewired integral endpoint/encoder assembly	Mount the assembly on the bayonet of the meter. See *"Integral Endpoint Installation" on page 24 for details.*

Field Wiring, Encoder Connectivity and Read Resolution

ORION CE endpoints with flying leads are shipped from the factory pre-programmed. Connect all three wires to an encoder to complete installation. The endpoint can be connected to existing wires from the encoder or directly to the encoder terminal screws, depending on the application and manufacturer. Endpoints can be connected to Badger Meter high resolution encoders and E-Series Ultrasonic meters as well as a number of competitive encoders. See the wiring chart on the next page.

NOTE: For instructions on field wiring using gel connectors, see *"Using Gel Caps to Connect an Encoder" on page 32*.

ORION endpoint wires: Red = Power/Clock; Black = Ground; Green = Data

Endpoint Label	Encoder Connectivity	Encoder Wire/Termination Colors	Endpoint Wire Colors Red	Black	Green	Reading Resolution
ADE	Badger Meter ADE, HR-E LCD or HR-E encoders, or E-Series Ultrasonic Meter with High Res or ADE output		Red	Black	Green	Up to seven (7) most significant digits
RTR	Badger Meter RTR or E-Series Ultrasonic Meter with RTR output		Red	Black	Green	Up to seven (7) most significant digits
UNIV*	Honeywell (Elster)/AMCo ScanCoder or InVISION		Green	Black	Red	Up to seven (7) most significant digits
UNIV*	Master Meter Octave Ultrasonic meter (encoder output)		Red	Black	Green	Up to seven (7) most significant digits
UNIV*	Metron Hawkeye		Red	Black	Green	Up to seven (7) most significant digits
UNIV*	Mueller Systems 420 Solid State Register (SSR) LCD		Red	Black	Green	Up to seven (7) most significant digits
ARB-V*/**	Neptune ARB-V for connectivity to ORION endpoint > serial number 80000000		Black	Green	Red	Up to seven (7) most significant digits
ARB-V*/**	Neptune ARB-V for connectivity to ORION endpoint < serial number 79999999		Red	Black	Green	Up to seven (7) most significant digits
UNIV*	Neptune ProRead or E-coder		Black	Green	Red	Up to seven (7) most significant digits
UNIV*	Sensus Electronic Register Encoder (ECR) or ICE		Red	Black	Green	Up to seven (7) most significant digits
UNIV*	Hersey Translator		Due to the customized, factory wire configurations of the Hersey Translator, the terminal posts may not match the ORION endpoint wire colors. Please contact Hersey for the terminal post wiring schematic of your encoders to determine how the posts correspond to ORION endpoint wires.			

NOTE: Competitive encoder output is determined by the encoder configuration.

*ORION Classic UNIV and ARB-V endpoints are compatible with the encoders/meters noted above with a manufacture date within 10 years of the current date as long as the encoder is programmed into the three-wire output mode for AMR/AMI and has three wires connected to it. Encoder registers that are currently in two-wire mode of operation require programming by the Utility, including registers that support auto two- or three-wire detection systems that do not automatically switch to three-wire mode of operation once a compatible endpoint is connected for ORION connectivity.

**A separate ORION CE Universal endpoint is available for connectivity to the Neptune ARB-V encoder. Make sure the ORION Classic endpoint has "ARB-V" on the harness label when wiring to an ARB-V encoder. Wiring differs depending on the serial number of the ORION endpoint you are connecting to the ARB-V encoder, so make sure to verify wiring is correct per the above chart.

Installation Guidelines (Indoor, Outdoor, Pit)

Install the endpoint/encoder assembly according to these guidelines:

Always install endpoint antenna straight up—not on an angle or upside down. Antenna is located in the top 1/3 of the threaded tube.

- **Indoor/Outdoor Installation**: Mount outside the building, or indoors in the floor joist, near an outside wall, and away from large metal objects.
- **Pit Installation**: Mount through a NON-METAL pit lid—**Recommended**.

NOTE: Endpoints not properly installed may not be covered under warranty.

Endpoint Activation

See *"Activating Endpoints" on page 11* for details of the process.

ACTIVATING ENDPOINTS

Activation is dependent on whether the endpoint is in "Pause" (soft sleep) or "Stop" (hard sleep) radio mode. The Product Configuration Utility software can be used to identify the endpoint radio mode.

Smart Activation for Endpoints in Pause Mode

All ORION endpoints offer a Smart Activation feature which utilizes consumption to automatically start an endpoint in Pause mode. After installation, the endpoint radio "wakes up" and begins broadcasting data when the encoder to which it is connected detects enough water usage from the register. No field programming or special tools are required, but the amount of water consumption depends on the encoder output and meter size so activation times will vary. Infrared (IR) activation tools are available for use if immediate activation is desired. See the *Product Configuration Utility for ORION Endpoints* software manual, available at *www.badgermeter.com*.

NOTE: Using the IR Alignment Tool (68779-001) is recommended for IR activation.

Endpoint/Encoder Assemblies

An initial encoder read is stored by the endpoint at the time the encoder and endpoint are factory connected and the endpoint is placed in Pause mode. While in Pause mode, the endpoint monitors the encoder for consumption, checking once every fifteen minutes. When the endpoint/encoder assembly is installed and sufficient water is running through the meter, the endpoint automatically "wakes up" and transitions to its operational mode when the required consumption is registered (see table below).

Encoder Output	Dial Change Required to Activate
7-dial	Any 1 unit change in the least significant digit
8-dial	Any 5 unit change in the least significant digit
9-dial	Any 5 unit change in the least significant digit

Table 1: Activation consumption thresholds

Endpoint Only

Like endpoint/encoder assemblies, ORION endpoint only configurations can be shipped in Pause mode. The initial encoder read will be established the first time an endpoint is field connected to an encoder.

NOTE: It may take up to fifteen (15) minutes for an endpoint to recognize the initial encoder read. To expedite this process, Badger Meter recommends connecting an ORION endpoint to an encoder in advance of field installation so the baseline encoder read can be captured before installing the endpoint.

After the initial encoder read is stored, the endpoint monitors the encoder for consumption, checking for a change in the encoder read once every fifteen minutes thereafter. The endpoint automatically "wakes up" and transitions to its operational mode once the required amount of consumption is registered (see *Table 1*).

Activation for Endpoints in Stop Mode

Endpoints in Stop mode must be manually activated via IR communication using either the Badger Meter IR Communication Device (68891-001) or the Product Configuration Utility software. The software can also be used to identify the endpoint radio mode. For more information, see the *Product Configuration Utility for ORION Endpoints* software manual at *www.badgermeter.com*.

IMPORTANT

*Badger Meter IR Communication Devices that shipped **prior to March 8, 2021** require a firmware update to support use with ORION Cellular C endpoints. Contact Badger Meter Utility Technical Support (800-616-3837) for help.*

Confirming Installation - ORION Cellular C, HLD, HLG, CS, LTE-M, LTE-MS, HLA, HLB, HLC, LTE

Before leaving the installation site, the installer can confirm endpoints are active and communicating.

1. BEACON® Software as a Service (SaaS) users can check ORION Cellular endpoint activation status with the ***ORION Endpoint Status*** tool. Endpoints do not need to be provisioned in BEACON SaaS to display using the tool. See *"Endpoint Status Tool for ORION Cellular Endpoints" on page 28* for more information.
2. The IR Communication Device (68891-001) can be used to confirm endpoint activation and verify the encoder connection. Instructions are included with the device. See the **IMPORTANT** note on *page 11* regarding required device firmware update.

Active endpoints automatically transition to the appropriate network.

Confirming Installation - ORION Mobile M, ME, SE, CE

Before leaving the installation site, the installer can use an ORION handheld or ORION Mobile Reading system to confirm the endpoint is broadcasting RF data for reading. See the appropriate handheld or ORION Mobile Reading system user manuals, available at *www.badgermeter.com,* for more information.

Active Endpoints

ORION Cellular C, HLD, HLG, CS, LTE-M, LTE-MS, HLA, HLB, HLC, LTE endpoints	When the endpoint transitions to *Active* mode, it begins the network registration process. BEACON assigns a daily call-in time to the endpoint as part of this process. An active operating ORION Cellular endpoint obtains a current encoder read every 15 minutes.
ORION ME endpoints used in a mobile solution deployed prior to February 1, 2023 and ORION SE	When the endpoint transitions to *On-Mobile* mode, it begins broadcasting its message for fixed network or mobile data collection. An active operating ORION endpoint obtains a current encoder read once an hour.
ORION ME endpoints used in a BEACON SaaS Mobile solution deployed on or after February 1, 2023, ORION Mobile M and CE	Once activated, the endpoint begins transmitting. An active operating ORION ME, Mobile M and CE endpoint obtains a current encoder read once an hour.

CHANGING REGISTRATION FOR AN EXISTING ENDPOINT ASSEMBLY

ORION Cellular C, HLD, HLG, CS, LTE-M, LTE-MS, HLA, HLB, HLC, LTE

If you change the encoder connected to an ORION Cellular endpoint, the endpoint will recognize the new encoder, once connected, and report previous and current interval data.

ORION Mobile M, ME, SE, CE

If you change the encoder connected to an ORION Mobile M, ME, SE or CE endpoint that has previously logged historical profile data, best practice recommends following this process:

1. Extract and save the historical profile data from the endpoint. See the *Product Configuration Utility for ORION Endpoints software manual*, available at *www.badgermeter.com*, if you need help.
2. Clear the profile data from the endpoint.
3. Connect the new encoder. Follow applicable installation instructions in this manual.
   The endpoint will recognize the new encoder, once connected, and record interval data.

ENDPOINT INSTALLATION KITS

Type	For Use With	Description	Kit Part Number
REMOTE	All ORION endpoints	*64394-032 Wall Cover Install Kit*	64394-032
REMOTE	64394-032	*67625-001 IR Holder for Wall Cover Install Kit*	67625-001
REMOTE	ORION Cellular C, HLD, HLG, CS, LTE-M, LTE-MS, HLA, HLB, HLC, LTE, and ORION Mobile M	*64394-031 Wall Bracket Install Kit - ORION Cellular LTE*	64394-031
REMOTE	ORION ME, SE, CE	*69406-001 Mounting Bracket Install Kit for ORION Endpoint and E-Series Ultrasonic Meter*	69406-001
REMOTE or PIT	ORION ME, SE, CE	*64394-029 Wall Bracket Install Kit - ORION*	64394-029
REMOTE	All ORION endpoints	*64394-008 C-Clamp Wall Bracket Install Kit - ORION*	64394-008
REMOTE or PIT	All ORION endpoints	*64394-003 Pipe Install Kit-ORION*	64394-003
REMOTE	All ORION endpoints	*64394-023 Commercial Meter Mounting Bracket Install Kit-ORION*	64394-023
PIT	All ORION endpoints	*64394-030 Thru-the-Lid Install Kit*	64394-030
PIT	ORION ME, SE, CE	*64394-009 Integrated Pit Lid Hanger Install Kit*	64394-009

Instructions for using each installation kit follow in this section.

Refer to the *ORION Water Endpoints Installation Kit Ordering Guide* and the *ORION Water Endpoint Parts List* for individual endpoint kit components. Both documents are available at *www.badgermeter.com*.

64394-032 WALL COVER INSTALL KIT

Wall Cover Install Kit (64394-032) is recommended for proper mounting of an endpoint for indoor and outdoor remote applications, and is designed to provide an environmentally protected area for gel splice connections (if needed). Outside dimensions are shown in *Figure 10*.

For use with: All ORION endpoints

Figure 9: 64394-032 wall cover enclosure

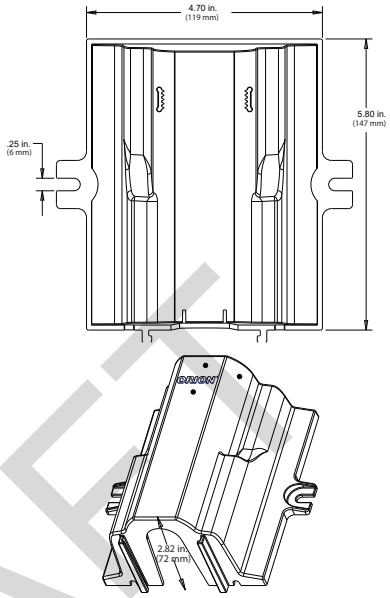


Figure 10: 64394-032 Outside dimensions

To install an ORION endpoint, follow these steps.

1. Choose an appropriate installation location within the limits of the endpoint cable/connector harness.
2. Verify the proper orientation (*Figure 11*). The bottom of the enclosure has an opening for IR programming. The opening gives access to the endpoint IR LED port (*Figure 14* and *Figure 15*) without having to disassemble the unit.
3. Place the endpoint into the wall cover enclosure, antenna (threaded portion) up.

   Cellular endpoints: *Figure 11* shows the correct endpoint placement.

   All other ORION endpoints: Make sure the flat side of the endpoint faces in and fits up against the inside wall of the enclosure.

   NOTE: If double-sided tape is included in the kit, you can use the tape to temporarily secure the endpoint inside the enclosure before mounting.

4. Position the endpoint cable.

   - Route the endpoint cable through the cutout on the bottom of the wall cover.

     NOTE: If you are drilling a hole through the wall behind the enclosure for the endpoint cable, the cable does not need to route through the cutout at the bottom.

Figure 11: ORION Cellular LTE endpoint orientation

- If the endpoint has an inline connector, place the connector *inside* with the endpoint and route the connector cable through the cutout on the bottom.

  NOTE: If used, place gel splice connections inside the enclosure.

  NOTE: See *"Outdoor Installation for Endpoint with Inline Connector" on page 16* for additional information about installing the endpoint outdoors with the wall cover enclosure.

5. Make sure the wall cover is properly positioned, with the endpoint antenna straight up and the endpoint IR LED port visible through the bottom opening.
6. Secure the wall cover using customer-supplied screws.
   Installation is complete.

Figure 12: 64394-032 installation complete

67625-001 IR Holder for Wall Cover Install Kit

IR Holder for Wall Cover Install Kit (67625-001) is an optional part which can be ordered for use with the Wall Cover install kit (**64394-032**). The IR holder bracket fits on the wall cover adapter rails to hold an IR programming head in correct alignment with the endpoint LED port.

1. Place the optical head of an IR programming cable into the holder. The nubs on the optical head fit into the cutouts on the holder.

(67625-001) IR holder bracket

Optical head of the IR programming cable

Optical head in the bracket

Figure 13: IR holder and programming cable optical head

2. Slide the bracket into the adapter rails at the bottom of the wall cover enclosure (64394-032) so the IR optical head is aligned with the endpoint LED port. See *Figure 14* and *Figure 15*.
3. Connect the IR programming cable to a Badger Meter mobile reading device to perform IR functions. Refer to the *Product Configuration Utility for ORION Endpoints software manual*, available at *www.badgermeter.com*, for IR programming instructions.

Figure 14: IR LED port ORION Cellular LTE endpoint (bottom up view)

Figure 15: IR LED port ORION ME endpoint (bottom up view)

Outdoor Installation for Endpoint with Inline Connector

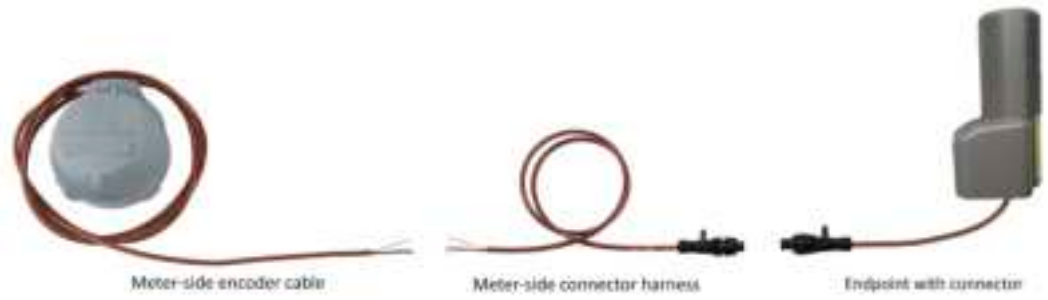


Figure 16: Outdoor endpoint installation

Meter-side connector harnesses are available with Twist Tight and Nicor connectors in the following lengths.

Harness with Twist Tight Connector	
Part Number	*Harness Lead Length*
68307-006	10 ft harness
68307-003	25 ft harness

Harness with Nicor Connector	
Part Number	*Harness Lead Length*
66488-006	10 ft harness
66488-003	25 ft harness

Follow these recommended installation steps for an outdoor endpoint installation and refer to the image in *Figure 16*.

NOTE: The Twist Tight connector is pictured above. The installation steps also apply to endpoints with Nicor and 308 connectors as well. See *"Inline Connectors" on page 30* for more information.

1. Choose an appropriate outdoor location, within the limits of the connector harness, and mount the endpoint.

   NOTE: If using a wall cover enclosure, see *"64394-032 Wall Cover Install Kit" on page 14* for additional information on mounting.

2. Join the endpoint connector with the connector mate of the encoder cable.
   If you are using a wall cover enclosure, place the inline connector inside the enclosure.
3. Drill a small hole in the wall of the house/structure to accommodate the endpoint/encoder cable.
4. Pass the cable end with the flying leads through the wall of the house.
5. Inside the house, connect the encoder wires. Depending on the encoder connection, use a field splice kit or connect the wires directly to the encoder terminal screws. See the appropriate wiring charts in this manual if you need help.

NOTE: Refer to the *Field Splice Kit Application Data Sheet*, available at *www.badgermeter.com*, for field splice instructions.

When the meter, encoder and endpoint are installed and connected, installation is complete.

64394-031 WALL BRACKET INSTALL KIT - ORION CELLULAR LTE

Wall Bracket Kit 64394-031 (*Figure 17*) is available for mounting ORION Cellular endpoints.

Figure 17: 64394-031

For use with: ORION Cellular C, HLD, HLG, CS, LTE-M, LTE-MS, HLA, HLB, HLC and LTE endpoints

The bracket clips into the slot on the endpoint and can be used to attach the endpoint to a wall. A screwdriver and two (2) customer-supplied screws are required. Drill pilot holes for the screws (**recommended**) before attaching the wall bracket and endpoint.

The bracket can also be used to mount the endpoint to a pole with cable ties (customer supplied) threaded through the bracket openings.

69406-001 MOUNTING BRACKET INSTALL KIT FOR ORION ENDPOINT AND E-SERIES ULTRASONIC METER

Mounting Bracket Install Kit (69406-001) is designed to securely install an ORION endpoint to an E-Series Ultrasonic meter for non-submerged indoor and outdoor remote applications.

For use with: ORION ME, SE, CE endpoints

Figure 18: Mounting bracket with locking clip in place

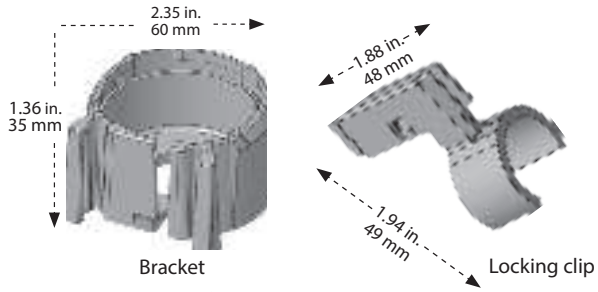


Figure 19: Mounting bracket and locking clip dimensions

To connect the bracket to the meter and endpoint, follow these steps.

NOTE: The kit components are the mounting bracket (**68789-001**) and the locking clip (**68790-001**). Keep the two pieces separate when you start.

1. Feed the endpoint wiring cable through the mounting bracket central opening.

   You will see a small triangle on the underside of the bracket (*Figure 20*) and at the bottom of the endpoint.

   Align the triangles, push the bracket and endpoint together and twist the endpoint clockwise until the endpoint clicks into place.

Figure 20: Triangle on underside of bracket

2. Align the tabs of the mounting bracket to the tabs on the side of the E-Series register (*Figure 21*). Then slide the mounting bracket/endpoint down into place on the register.
3. Once the endpoint is mounted on the E-Series register, insert the locking clip underneath the mounting bracket in the space between the mounting bracket and the register. The flat side of the locking clip should face the mounting bracket and fit in the mounting bracket grooves. It will click into place and lock.

Figure 21: E-Series Ultrasonic meter register tabs

   NOTE: The endpoint is secure and cannot be removed until you remove the locking clip.

4. Make sure the endpoint antenna is upright in its final position.

Figure 22: ORION endpoint mounted on E-Series meter register

64394-029 WALL BRACKET INSTALL KIT

Wall Bracket Install Kit (64394-029) can be used to securely install an ORION endpoint. For non-submerged indoor and outdoor applications, the bracket can be used in any indoor or outdoor *nonmetallic* joist, wall or pit application.

For use with: ORION ME, SE, CE endpoints

You will need the following items.

- Wall Bracket install kit
- Two customer-supplied screws
- Screwdriver and drill

To connect the bracket to the endpoint and mount, follow these steps.

1. Using the screw holes of the wall bracket as a guide, drill two pilot holes on the joist or wall where the bracket is to be installed.

Figure 23: Endpoint wall bracket

Connect the endpoint

2. Carefully slide the encoder cable harness through the slit in the bracket with the screw holes at the bottom (*Figure 24*).
3. Locate the small triangle and hole underneath the bracket (*Figure 25*). The triangle is used to align the bracket with the endpoint.

Figure 24: Threading cable harness

4. Locate the small raised triangle at the bottom of the ORION endpoint housing (*Figure 26*).

Figure 25: Aligning triangle

Figure 26: Housing triangle

5. Align the endpoint and bracket triangles. Then push the bracket and endpoint together. This should be easy.
6. With one hand holding the bracket, use the other hand to twist the endpoint approximately 1/4 turn clockwise until you feel it lock into place (*Figure 28*).

Figure 27: Align triangles and push bracket onto endpoint

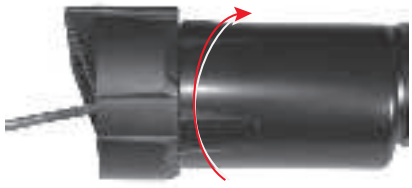


Figure 28: Twist endpoint to lock

Mount the endpoint assembly

7. Make sure the endpoint antenna is upright (*Figure 29*) when you place it into its final position.
8. Using two customer-supplied screws, secure the bracket assembly using the pilot holes you drilled in Step 1.

   Installation is complete.

Figure 29: Endpoint positioning

64394-008 C-CLAMP WALL BRACKET INSTALL KIT

C-Clamp Wall Bracket Install Kit (64394-008) can be used when mounting an endpoint to a wall.

For use with: All ORION endpoints. For ORION Cellular endpoints, the kit can be used for indoor and remote installations, but should NOT be used in a vault.

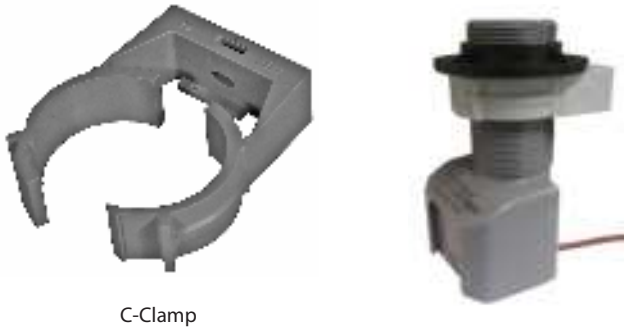
To mount an ORION endpoint using this kit, follow these steps and refer to *Figure 30*.

1. Choose an appropriate location on the wall for the endpoint. Using an appropriate size fastener and washer (customer-supplied), mount the C-clamp to the wall through the opening at the back. When mounting in a vault, install the C-clamp close to the top to prevent damage when accessing the meter is required.

   NOTE: ORION Cellular endpoints should NOT be mounted in a vault.
2. Place the neoprene spacer from the installation kit around the endpoint, approximately 1/2 inch (13 mm) from the top of the endpoint. Hold the neoprene spacer in place with your fingers.
3. Thread the lock nut onto the endpoint until it makes contact with the neoprene spacer.
4. Insert the endpoint into the C-clamp, making sure the neoprene spacer stays inside the C-clamp.
5. Close the C-clamp and lock it in place so that it closes over the neoprene spacer and securely holds the endpoint as shown in *Figure 30*.

   Installation is complete.

NOTE: ORION radio endpoints perform best with a clear line of sight. Performance varies with installation.



C-Clamp

C-Clamp around endpoint

Figure 30: C-Clamp and placement

64394-003 PIPE INSTALL KIT

Pipe Install Kit (64394-003) with mounting support bracket (*Figure 31*) is designed for pipe installations on a 3/8, 5/8 and 1/2 inch rebar or 1/2 inch schedule 40 PVC pipe.

For use with: All ORION endpoints. For ORION Cellular endpoints, the kit can be used for indoor and remote installations, but should NOT be used under a pit lid.

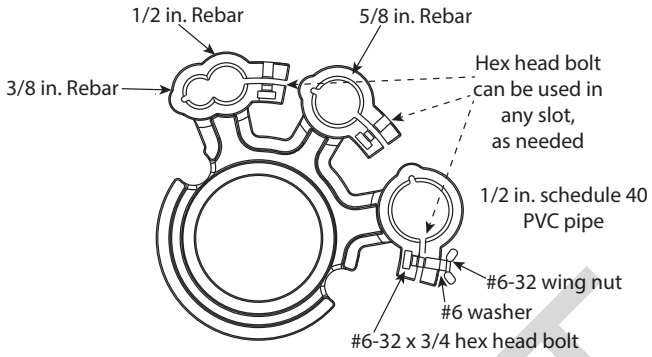


Figure 31: Support bracket (knuckles)

To install an ORION endpoint using the mounting support bracket, follow these steps.

1. Drive rebar or stake into the ground, or use a free-standing pipe or rebar.

   ⚠CAUTION

   DRIVE REBAR OR STAKE INTO THE GROUND PRIOR TO ATTACHING THE ENDPOINT TO AVOID DAMAGE.

2. Slide the mounting support bracket on the rebar/stake/pipe and secure using the enclosed washer, wing nut and hex head bolt provided with the bracket. The hex head bolt fits in any slot.

   NOTE: The bracket can be installed with either side up, but installing with the smooth side up is recommended if installed outdoors to avoid potential rainwater build up.

3. Insert the threaded end of the endpoint up through the bottom of the bracket opening. Then thread the lock nut onto the endpoint and tighten the lock nut to secure the bracket (*Figure 32*).
   For pit installations, mount the endpoint a maximum of 1…2 inches (25…51 mm) below the pit lid. *(*NOT for ORION Cellular endpoints!**)**

4. Install the bracket anywhere along the length of the endpoint threaded end, as long as it is at least 0.5 in. (13 mm) below the top where the antenna is located. Installation is complete.

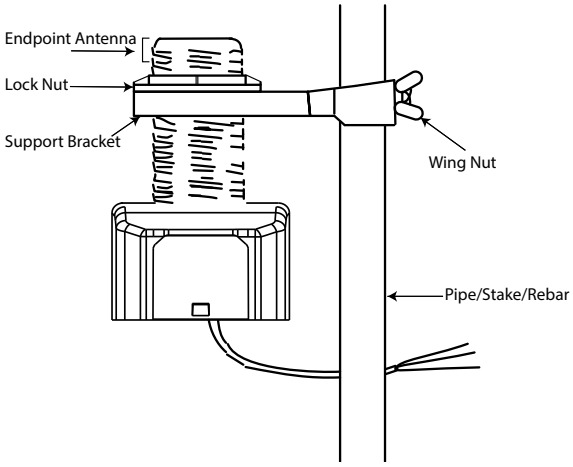


Figure 32: Pipe installation kit with ORION Cellular endpoints

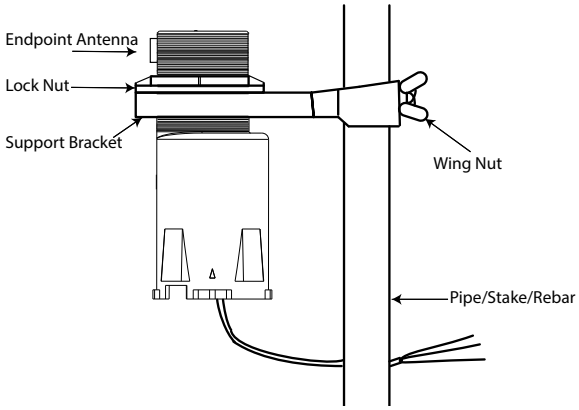


Figure 33: Pipe installation kit with ORION ME, SE, CE endpoints

64394-023 COMMERCIAL METER MOUNTING BRACKET INSTALL KIT

Commercial Meter Mounting Bracket Install Kit (64394-023) is designed for use with most Badger Meter Turbo, Compound Series and Fire Service Disc bypass meter lines. Use the kit to securely mount an ORION endpoint to a meter.

For use with: All ORION endpoints

You will need a torque wrench set for installation. The kit components are:

- Stainless steel mounting bracket 66360-001
- Lock nut 62825-001

To install the bracket, follow these steps:

Figure 34: Stainless steel mounting bracket

Figure 35: Lock nut with gussets

1. Verify that the water is turned off.
2. Slip the mounting bracket over the top of the ORION endpoint, as shown.
3. Screw the lock nut from the kit onto the threaded section of the endpoint. Hand tighten the lock nut to secure the bracket.
4. At the meter, unscrew the head assembly bolt at the location where you plan to mount the endpoint.
5. Position the bracket, reinsert the bolt and hand tighten it.

   NOTE: For visual clarity, the photo in *Figure 38* shows the bracket without the endpoint attached.

Figure 36: Mounting bracket over endpoint

Figure 37: Tighten lock nut

Figure 38: Bracket attached with bolt

6. Position the bracket so the endpoint is as far from the meter as possible to provide adequate space for the endpoint signal to propagate (*Figure 39*).

IMPORTANT

If two ORION endpoints are required for a fire series assembly or a compound meter application, mount the endpoints on OPPOSITE sides of the meter head assembly.

7. With the torque wrench, tighten the bolt as indicated in the chart that follows.

Figure 39: Endpoint connected to meter with bracket

Meter	Ft-lb		Meter	Ft-lb
2-inch Turbo Series Meter	10.9		2-inch Compound Series Meter	16.7
3-inch Turbo Series Meter	37.5		3-inch Compound Series Meter	33.3
4-inch Turbo Series Meter	37.5		4-inch Compound Series Meter	33.3
6-inch Turbo Series Meter	37.5		6-inch Compound Series Meter	33.3
			Heavy Duty Bypass M70	21.0
			Heavy Duty Bypass M170	50.0

Installation is complete. Turn the water back on.

64394-030 THRU-THE-LID INSTALL KIT

The ADA-compliant **Thru-the-Lid Install Kit (64394-030)** is designed for use with a NON-METAL PIT LID, 2 inches (51 mm) maximum thickness, with a standard hole diameter of 1-7/8 inches (48 mm).

For use with: All ORION endpoints

To install an endpoint through a non-metal pit lid, follow these steps and refer to *Figure 40*.

1. Screw the lock nut (large diameter side up) onto the endpoint tube threads.
2. Insert the endpoint tube through the bottom of the pit lid.
3. Screw the top nut onto the endpoint tube threads.
4. Tighten the lock nut and top nut to make sure the endpoint is secure.

   Installation is complete.

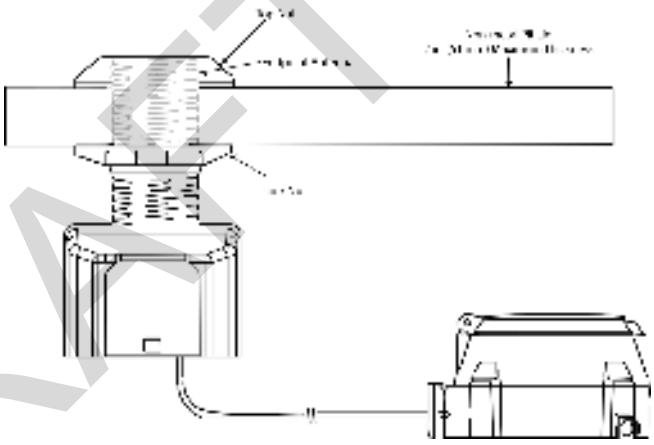


Figure 40: ORION endpoint thru non-metal pit lid

NOTE: When installing an endpoint through a thick lid, you can use a **Pit Tube Extender (67025-001)**. The Extender requires a 2 inch (51 mm) diameter hole. It screws onto the threaded portion of the endpoint. Radio frequency (RF) performance may be reduced when using the Pit Tube Extender.

Do not use Pit Tube Extender with ORION Cellular endpoints.

Figure 41: Endpoint pit tube extender – NOT for ORION Cellular endpoints

64394-009 INTEGRATED PIT LID HANGER INSTALL KIT

Integrated Pit Lid Hanger Install Kit (64394-009) is designed for ORION endpoints installed below composite and plastic lids that have an integrated AMR/AMI endpoint hanger.

For use with: ORION ME, SE, CE endpoints

To install an ORION endpoint with this kit, follow these steps and refer to *Figure 42*.

1. Thread the lock nut onto the top of the ORION endpoint as shown.
2. Slide the endpoint into the lid bracket.
3. Tighten the lock nut so that the endpoint is held firmly in place.

   Installation is complete.

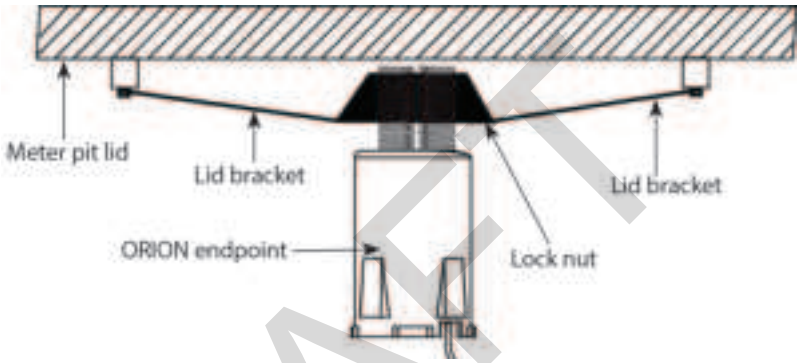


Figure 42: Integrated pit lid hanger installation

INTEGRAL ENDPOINT INSTALLATION

ORION ME, SE and CE endpoints are available in an integral configuration in which the endpoint and encoder are connected in one assembly. There are two types of integral configurations. This section includes instructions for mounting an integral endpoint on a meter and also provides instructions for disassembling both types of integrals.

Mounting an Integral Endpoint on the Meter

An integral endpoint can be installed on any Badger Meter Disc, Turbo, or Compound Series meter. Both integral configuration styles mount to the meter the same way, by placing the assembly onto the bayonet of the meter and rotating it into its locking position. See *Figure 43*.

1. Loosen the security screw on the endpoint encoder assembly.
2. Mount the assembly housing on the meter bayonet.
3. Turn the assembly clockwise 1/4 turn to lock the assembly into place on the meter.
4. After the assembly is mounted on the meter, tighten the security screw to secure the assembly to the register.

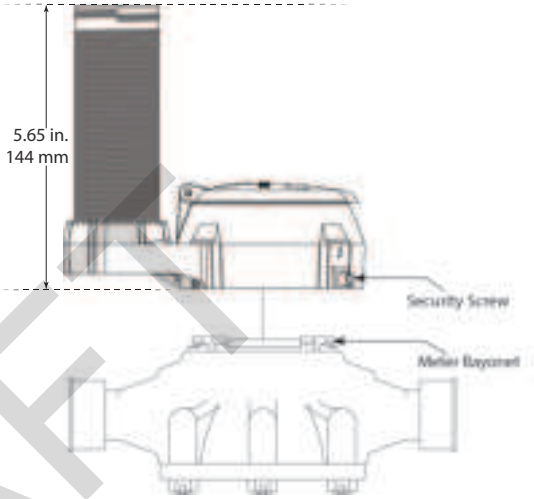


Figure 43: Integral assembly on meter

HR-E LCD Encoder Integral Configuration

Figure 44: HR-E LCD Integral

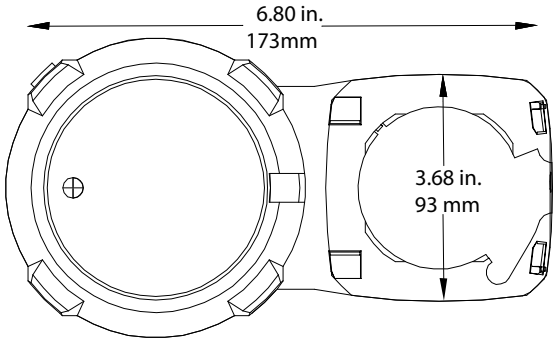


Figure 45: HR-E LCD Integral base dimensions

Configuration

The ORION HR-E LCD Integral Assembly is shown in *Figure 44*. In an HR-E LCD integral assembly, the endpoint is factory-wired to the encoder and both are mounted to the shroud bracket. Endpoints are available with a 3-foot or 10-foot wire that is wrapped around the body of the endpoint. The endpoint wire is contained under a removable cover. With this option, the endpoint can be removed from the housing, if necessary, and mounted away from the encoder. The endpoint can also be returned to the housing assembly without damage.