

# Instrument Area Network

## Central Concentrator and End Nodes

### Master Instruction

MI 020-750

Release date September 3, 2020



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# Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that accompany this symbol to avoid possible injury or death.

<b>⚠ DANGER</b>
<b>DANGER</b> indicates a hazardous situation which, if not avoided, <b>will result in</b> death or serious injury. <b>Failure to follow these instructions will result in death or serious injury.</b>
<b>⚠ WARNING</b>
<b>WARNING</b> indicates a hazardous situation which, if not avoided, <b>could result in</b> death or serious injury.
<b>⚠ CAUTION</b>
<b>CAUTION</b> indicates a hazardous situation which, if not avoided, <b>could result in</b> minor or moderate injury.
<b>NOTICE</b>
NOTICE is used to address practices not related to physical injury.

## Please Note

Electrical equipment should be installed, operated, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.



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# Introduction

The Instrument Area Network consists of up to eight physically separated wireless end nodes for measurement and control; a wireless central concentrator for relaying data to and from a plant area wireless network (either a sensor network or the upstream network); and a customer-supplied device that has a standard web browser and Wi-Fi capability, such as a tablet, computer, or smartphone.

## Safety Messages

<b>▲ WARNING</b>
<p><b>RISK OF EXPOSURE</b></p> <ul style="list-style-type: none"> <li>• When installing or removing equipment, wear appropriate protective clothing including safety goggles.</li> <li>• Follow your local site safety procedures regarding hazardous substances if you are using the product to measure a process with hazardous substances.</li> <li>• When processing hazardous substances, follow the recommended procedures.</li> </ul> <p><b>Failure to follow these instructions can result in death, serious injury, or equipment damage.</b></p>

## Identification

The device's model code is shown on the data label.

**Figure 1 - Data Label**



## Radio Equipment Directive (RED)

Complies with Radio Equipment Directive (RED) requirements tested to the following standards:

- ETSI EN 300 328 V2.1.1 (2016-11)

Under RED Article 3, 1(a) covering essential safety requirements of 2014/35/EU:

- EN 62311:2008
- EN 61010-1:2010

Under RED Article 3, 1(b) covering essential EMC requirements of 2014/30/EU:

- ETSI EN 301 489-1 V2.2.0 (2017-03)
- ETSI EN 301 489-3 V2.1.1 (2017-03)
- ETSI EN 301 489-17 V3.2.0 (2017-03)
- IEC 61000-6-2 Edition 3.0 (2016-08)

- IEC 61000-6-4 Edition 3.0 (2018-02)

## Specifications

### RF Characteristics

- 2.4 GHz spread spectrum, ISM license-free band
- 58 mW maximum operational RF transmit power
- Link margin (LKM):

Wireless Communication Type	Transmitter Power (TxP)	Receiver Sensitivity (RS)
Bluetooth Low Energy	+5 dBm	-97 dBm
Wi-Fi	+15 dBm	-90 dBm
WirelessHART	+10 dBm	-96 dBm

### Operating Limits

Operative Limits for measurement and transmission are defined in accordance with ANSI/ISA 51.1-1979 (R1993).

Description	Operative Limits
Ambient Temperature	-40 and +80°C (-40 and +176°F)
Silicone Fill Fluid	-46 and +121°C (-50 and +250°F)
Relative Humidity	0 and 100%
Vibration	1 g constant acceleration input over a frequency range of 5 to 200 Hz
Mounting Position	No limit

### Physical Specifications

Description	Specification
Enclosure Materials	304 ss; polycarbonate; PTFE antenna cover (WCC10 only)
Process Wetted Materials (End Nodes only)	316L ss
Sensor Fill Fluid (Pressure End Nodes only)	Silicone oil
Ingress Protection	The enclosure has the rating of IP54 as defined by IEC 60529
Dimensions (including Mass)	See Nominal Dimensions, page 32
Mounting Position	See Mounting Brackets, page 13

### Range Limits

End Node	Limits
Temperature with RTD	-200°C and +885°C (-328°F and +1625°F)
Temperature with Thermocouple	-100 mV and +100 mV



End Node	Limits												
Absolute Pressure	Error is 0.25% of full scale, across -40°C to +80°C (-40°F to +176°F)												
	<table border="1"> <thead> <tr> <th>Code</th> <th>Range Limits</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>0 and 0.21 MPaa (0 and 30 psia)</td> </tr> </tbody> </table>	Code	Range Limits	C	0 and 0.21 MPaa (0 and 30 psia)								
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Gauge Pressure	Error is 0.25% of full scale, across -40°C to +80°C (-40°F to +176°F)												
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J	0 and 68.95 MPag (0 and 10000 psig)												
Differential Pressure	Error is 0.25% of full scale plus static pressure offset error												
	<table border="1"> <thead> <tr> <th>Code</th> <th>Range Limits</th> </tr> </thead> <tbody> <tr> <td>B</td> <td>-50 and +50 kPa (-7.25 and +7.25 psi)</td> </tr> <tr> <td>C</td> <td>-210 and +210 kPa (-30 and +30 psi)</td> </tr> <tr> <td>D</td> <td>-0.21 and +2.10 MPa (-30 and +300 psi)</td> </tr> </tbody> </table>	Code	Range Limits	B	-50 and +50 kPa (-7.25 and +7.25 psi)	C	-210 and +210 kPa (-30 and +30 psi)	D	-0.21 and +2.10 MPa (-30 and +300 psi)				
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D	-0.21 and +2.10 MPa (-30 and +300 psi)												

## Maximum Static, Overrange, and Proof Pressure Ratings

### **⚠ DANGER**

#### **HAZARD OF EXPLOSION**

Exceeding the proof pressure can cause the sensor to rupture forcefully. Avoid exposing end nodes to the proof pressure limit.

**Failure to follow these instructions will result in death or serious injury.**

### **NOTICE**

#### **POTENTIAL EQUIPMENT DAMAGE**

Exceeding the overrange pressure limit for the end nodes can cause damage to the end nodes, degrading their performance. The end node could become nonfunctional after exceeding the overrange pressure. Avoid exposure to the overrange pressure limit.

**Failure to follow these instructions can result in equipment damage.**

**Table 1 - Absolute Pressure Transmitters**

Code	Maximum Overrange Pressure	Maximum Proof Pressure
C	2.1 MPa (300 psi)	5.51 MPa (800 psi)

**Table 2 - Gauge Pressure Transmitters**

Code	Maximum Overrange Pressure	Maximum Proof Pressure
C	2.1 MPa (300 psi)	5.51 MPa (800 psi)
D	20.7 MPa (3,000 psi)	55.1 MPa (8,000 psi)
E	34.5 MPa (5,000 psi)	52.4 MPa (7,600 psi)
F	59.1 MPa (8,580 psi)	152 MPa (22,000 psi)
J	99 MPa (14,300 psi)	180 MPa (26,015 psi)

**Table 3 - Differential Pressure Transmitters**

Code	Maximum Static Pressure	Maximum Proof Pressure
B	25 MPa (3,626 psi)	100 MPa (14,500 psi)
C		
D		

## Process Connections

End Node	Process Connection
Temperature (WRT10)	Without thermowell: Connects directly to the process using an external 1/2 NPT male thread.
	With thermowell: Thermowell connects directly to the process.
Absolute Pressure (WAP10) Gauge Pressure (WGP10)	Connects to the process using an external 1/2 NPT male thread.
Differential Pressure (WDP10)	Connects to the process with a 1/4-18 NPT female process connection and fixing thread 7/16"-20 UNF at 41.3 mm (1.625 inches) center distance.

## End Node Connections

Up to eight end nodes can be wirelessly connected with the central concentrator. Together, the end nodes and the central concentrator comprise an Instrument Area Network. The end nodes of the Instrument Area Network relay their measurements to upstream networks, such as WirelessHART and the Wi-Fi administrator interface.

The end nodes are designed to be placed anywhere within 10 m (33 ft) of the central concentrator in harsh metal-obstructed environments (TX Power +5 dBm, RX Sensitivity -97 dBm link margin at 2.4 GHz).

## Measurement Update Rate

1 to 60 seconds, configurable. End nodes ship with a default update rate of 16 seconds, corresponding to a report rate of 1/30 Hz.

## Battery Life

- Central concentrator: 5+ years
- End node: 10+ years

These estimates assume 25°C (77°F) ambient temperature and 16-second update rates for each end node, with eight end nodes connected to each concentrator. Actual battery life depends on ambient temperature and precipitation, configured update rates, and device positioning. For greater battery efficiency and ease of use, position field units for best connectivity, and monitor the low battery alarm feature. You can

further optimize battery life by configuring for longer interval measurement update rates if they are suitable for your application.

All Instrument Area Network devices are shipped with a battery installed. The Wi-Fi interface is disabled by default, and normally remains active for only five minutes when connecting and disconnecting end nodes.

## Electrical Certifications

This equipment has been designed to meet the electrical safety descriptions listed in this table. Contact Global Customer Support for information or status of testing laboratory approvals or certifications.

Refer to *Model Codes*, page 27 for availability of electrical safety design codes with each field unit.

Agency Certification, Types of Protection, and Area Classification	Application Conditions	Model Code Option
<b>North America Intrinsically Safe Certified</b> Canada: Ex ia IIC T4 Ga Ex ia IIIC T135°C Da United States: Class I Zone 0 AEx ia IIC T4 Ga Zone 20 AEx ia IIIC T135°C Da	$-40^{\circ}\text{C} \leq T_a \leq +80^{\circ}\text{C}$ , IP54	CU
<b>ATEX Intrinsically Safe Certified</b> II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T135°C Da	$-40^{\circ}\text{C} \leq T_a \leq +80^{\circ}\text{C}$ , IP54	EU
<b>No certification (ordinary locations only)</b>		ZZ

# Installation

## ⚠ DANGER

### HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

The main electronics enclosure base is manufactured from stainless steel. In rare cases, ignition sources due to impact and friction sparks could occur. This must be considered during installation, particularly if the equipment is installed in a Zone 0 hazardous location.

**Failure to follow these instructions will result in death or serious injury.**

## ⚠ WARNING

### HAZARD OF PERSONAL INJURY AND EQUIPMENT DAMAGE

These products must be installed to meet all applicable local installation regulations, such as hazardous location requirements, electrical wiring codes, and mechanical piping codes. Persons involved in the installation must be trained in these code requirements to ensure that the installation takes maximum advantage of the safety features designed into the product.

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

## ⚠ WARNING

### HAZARD OF CORROSION

These transmitters are built using materials that are corrosion-resistant to a wide variety of fluids. However, with aggressive fluids, a potential exists for corrosive failure. Verify the material compatibility with the NACE guidelines and/or user knowledge of the material compatibility with the process fluid at operating conditions.

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

## NOTICE

### POTENTIAL EQUIPMENT DAMAGE

To avoid damage to the field units, do not use any impact devices, such as an impact wrench or stamping device, on the field units.

**Failure to follow these instructions can result in equipment damage.**

## Mounting Locations

The central concentrator has an integral antenna that allows communication to the upstream wireless network and to all connected end nodes. Choose a mounting location where the central concentrator is positioned above any metal structures, and where the integral antenna has optimal connectivity to the upstream wireless network. You can mount the central concentrator with the supplied band strap, or with an optional mounting bracket. See *Mounting Brackets*, page 13.

Each end node housing has an integral process related sensor located on the bottom center of the unit's base. Select a mounting location for each end node based on the application and the process measurement location.

For end nodes with protruding sensors, fully install the sensor to the process connection.

The distance between the central concentrator and each end node should not exceed 10 m (33 ft). This specification does not require the central concentrator and end node to be installed in a straight line or without obstruction. End nodes can communicate with the central concentrator even in harsh metal-obstructed environments (refer to RF Characteristics, page 8).

## **NOTICE**

### **POTENTIAL EQUIPMENT DAMAGE**

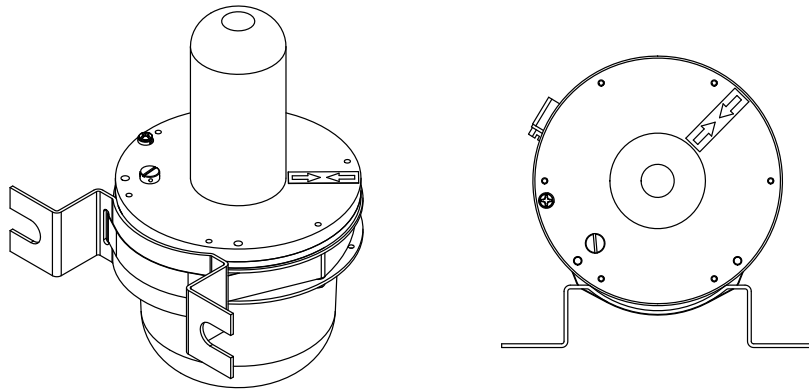
Do not expose mounting locations to forceful impacts like heavy falling objects that could damage the field unit enclosures.

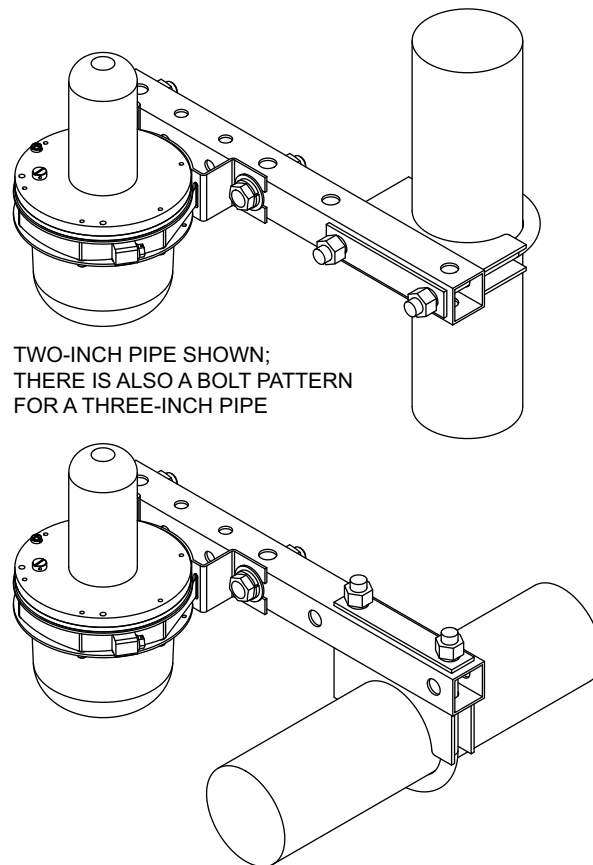
**Failure to follow these instructions can result in equipment damage.**

## Mounting Brackets

The field unit enclosures allow for mounting to a wall or to a two- or three-inch pipe, using the brackets shown in the diagrams. End nodes can also connect directly to the process port threads.

**Figure 2 - Wall Mounting Bracket (Shown with WCC10)**



**Figure 3 - Pipe Mounting Bracket (Shown with WCC10)**

## Mounting a Differential Pressure End Node Using a Bracket

You can mount a DP end node to a vertical or horizontal DN 50 or 2 in pipe or surface using a mounting bracket (Model Code option -M1 or -M2).

Secure the mounting bracket to the end node using the screws provided. Mount the bracket to the pipe. Or, secure the bracket to a wall using the u-bolt mounting holes.

## Additional Steps for DP End Node Installation

### Venting and Draining

Sensor cavity venting and draining is provided for both vertical and horizontal mounting.

- For vertically mounted units, draining is via a vent and drain screw.
- For horizontally mounted units, the unit is self-draining. Venting is via a vent and drain screw.

### Installation of Flow Measurement Piping

If the process fluid being measured must not come into contact with the end node, fill the end node lines with a suitable seal liquid as described in the next section. In such a case, mount the end node below the level of the pressure connections at the pipe. With steam flow, fill the lines with water to protect the end node from the hot steam.

Add the seal liquid or water to the lines through the filling tees. To prevent unequal heads on the end node, the tees must be at the same elevation, and the end node

must be mounted vertically. If a seal liquid is not required, you can use elbows in place of the tees.

Tighten drain plugs and optional vent screws to 20 N-m (15 lbf-ft). Tighten the four process connector bolts to a torque of 61 N-m (45 lbf-ft).

The low and high pressure sides of the end node are identified by an L-H marking on the side of the sensor above the label.

With medium viscosity seal liquids and/or long end node lines, use larger valve sizes.

- With a **horizontal** line, pressure connections at the pipe should be at the side of the line. However, with gas flow without a seal liquid, connections should be at the top of the line.
- With a **vertical** line, flow should be upwards.
- For **liquid** or **steam** flow, the end node should be mounted lower than the pressure connections at the pipe.
- For **gas** flow *without* a seal liquid, the end node should be mounted higher than the pressure connections at the pipe.
- For **gas** flow *with* a seal liquid, the end node should be mounted lower than the pressure connections.
- Use snubbers in installations prone to high levels of fluid pulsations.

## Filling the System with Seal Liquid

If the process fluid being measured must not come into contact with the end node, fill the end node lines with a suitable seal liquid.

### **NOTICE**

#### **POTENTIAL EQUIPMENT DAMAGE AND PROCESS FLUID CONTAMINATION**

To help prevent loss of seal liquid and contamination of process fluid, never open both process shutoff valves and manifold shutoff valves if the bypass valve is open.

**Failure to follow these instructions can result in equipment damage and process fluid contamination.**

1. If the end node is in service, follow the procedure in [Taking a DP End Node out of Operation](#), page 16.
2. Close both process shutoff valves.
3. Open all three valves on the 3-valve manifold.
4. Partially open the vent screws on the end node until all air has been forced out of the end node body and lines. Close the vent screws.
5. Refill the tee connections. Replace the plugs and close the bypass valve. Check for leaks.
6. Follow the procedure in [Putting a DP End Node into Operation](#), page 15.

## Putting a DP End Node into Operation

This procedure explains how to sequence the valves in your flow measurement piping or optional bypass manifold to help ensure that the end node is not overranged and that seal liquid is not lost.

**NOTE:** This procedure assumes that the process shutoff valves are open.

1. Make sure that both upstream and downstream manifold valves are closed.

2. Make sure that the bypass valve is open.
3. After installing the end node, slowly open the upstream manifold valve.
4. Close the bypass valve.
5. Slowly open the downstream manifold valve.

## Taking a DP End Node out of Operation

This procedure explains how to sequence the valves in your flow measurement piping or optional bypass manifold to help ensure that the end node is not overranged and that seal liquid is not lost.

**NOTE:** This procedure assumes that the process shutoff valves are open.

1. Close the downstream manifold valve.
2. Close the upstream manifold valve.
3. Open the bypass valve.
4. Carefully open the vent screw to release any residual pressure before disconnecting lines.

### **WARNING**

#### **RISK OF EXPOSURE**

When venting pressure from the end node, wear suitable protective equipment to prevent possible injury from process material, temperature, or pressure.

**Failure to follow these instructions can result in death or serious injury.**

5. Remove the end node, if applicable.



# Operation

## The Push Command

“Push” refers to physically pushing an end node’s process fitting or central concentrator’s antenna toward the arrows on the domed cover, then holding that position for one second or more.

**NOTE:** It is also possible to issue a push command remotely from the Network Overview page.

Pushing activates the Instrument Area Network for connecting end nodes to the central concentrator, so that the central concentrator can relay the end nodes’ data to the WirelessHART network.

With properly timed pushes, you can connect end nodes to the central concentrator to form a persistent association which will continue across temporary interruptions of the RF link. Similarly, you can also disconnect an end node from a central concentrator through a sequence of pushes.

**NOTE:** If you push a device by mistake, the device flashes. If it is connected, the rest of the group flashes as well. If there are no more pushes within the next 30 seconds, the flashing stops and activation is cancelled.

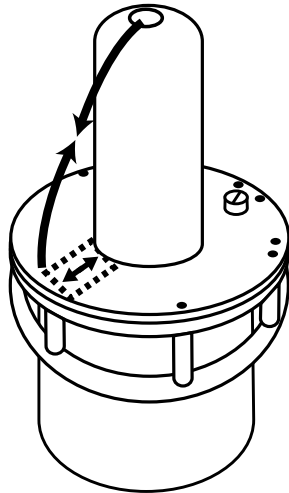
## Wi-Fi Connection

The web interface’s Wi-Fi name has a SSID of IAN\_[x], where x is the 802.11 MAC address. This SSID is broadcast and therefore easily seen to connect a device to the central concentrator’s Wi-Fi network. There is no Wi-Fi encryption; you can activate the Wi-Fi by “pushing” a connected unit.

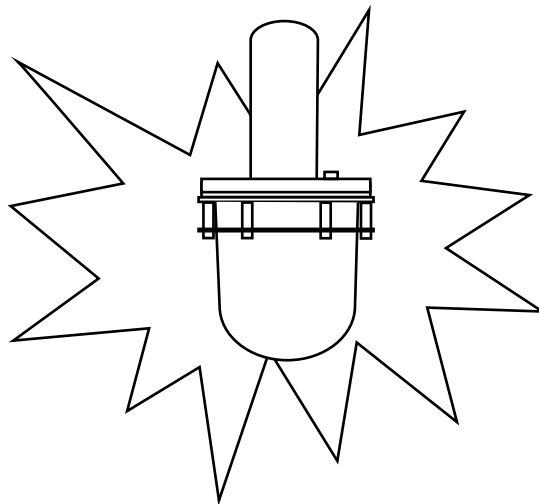
- To conserve battery life, the Wi-Fi interface is off by default.
- Pushing any connected member of the group enables the Wi-Fi interface for five minutes.
- Once a web browser is open, receiving updates from the web interface, the time enabled is extended to one hour.
- After five minutes of inactivity with no web browser interaction, or one hour since Wi-Fi power on, the Wi-Fi interface is powered off.
- The central concentrator can support Wi-Fi connections to up to eight user devices.

## Activating the Central Concentrator

1. “Push” the central concentrator by flexing the antenna toward the arrows on the base. Hold this position for 1.5 seconds.

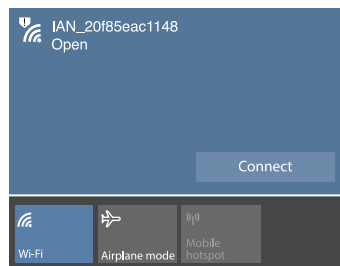


The central concentrator flashes and turns Wi-Fi on for five minutes.



2. Using your device’s Wi-Fi interface, make a wireless connection to the central concentrator.

The central concentrator’s SSID begins with “IAN\_” followed by several characters.



3. When the wireless connection is established, open the browser to the Network Overview page:  
<http://10.10.10.10/ian/page>
4. Add end nodes, if applicable (see [Connecting End Nodes, page 20](#)), or set up your wireless gateway connection.

## Browser Interface

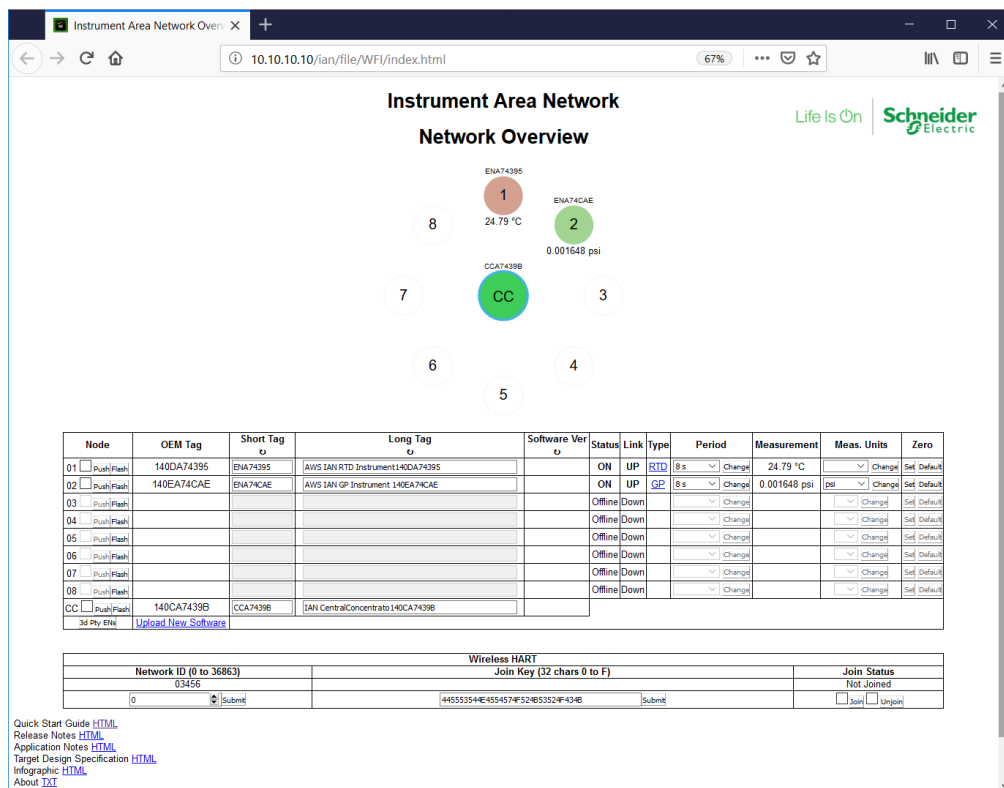
A simple web interface allows you to work with the network from a standard web browser with JavaScript enabled. Once you have connected to the network’s Wi-Fi signal, you can access the Network Overview web page at <http://10.10.10.10/ian/> page.

The Network Overview page shows a representation of the Instrument Area Network, with the concentrator in the center and all connected end nodes around it. You can read each end node’s hardware ID and most recent measurement; the measurements update approximately once per second.

When the update rate for an end node is longer than one second, values from end nodes refresh at the longer period; third-party end nodes may refresh more frequently than the specified period.

From the Network Overview page, you can configure network parameters, connect the WirelessHART network, and configure each end node’s sampling period and measurement units. In addition, you can access release notes, user documentation, and end node calibration certificates.

**Figure 4 - Network Overview Page**



You can identify each end node by pushing it — either physically, or remotely by sending a push command from the Network Overview page. Pushing the end node causes it to flash.

Each Instrument Area Network device (central concentrator and end node) appears on the web interface as a colored circle. End nodes are displayed in a circle around the centrally displayed central concentrator. End nodes that are connected are color-coded by type; any end nodes that are connected but experiencing a link interruption are shown as white circles with lines through them, and the link status column in the end node table reads **Down**.

Depending on the RF environment, occasional brief intervals of link interruption are normal. Also, connecting an additional end node to a central concentrator may sometimes cause a brief link interruption for the other connected end nodes.

To reset the web interface, close the browser window, allow the five-minute timeout to occur, then push to wake up the network and reconnect to the Wi-Fi interface.

**NOTE:** If you upload files to the CC, do not include spaces in the file names.

## Working with End Nodes

You can connect end nodes to a central concentrator one at a time by pushing the end node and the central concentrator. When connecting is complete, the central concentrator and all connected end nodes flash rapidly in sync.

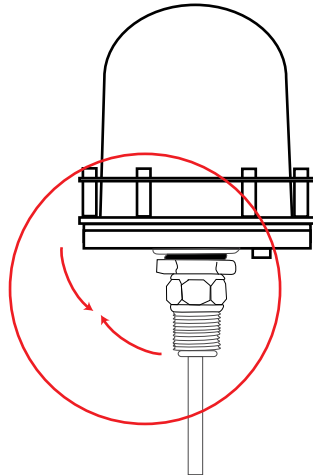
To disconnect an end node, push any device in the group to activate the Instrument Area Network group (the group begins flashing in sync), then push the end node to be disconnected.

For example, you can disconnect an end node by pushing it to wake up the group. Wait for the other devices in the group to begin flashing (showing that the group is awake), then push the end node you wish to remove (in this case, the same one again). The end node leaving the group flashes out of sync with the other devices in the group to indicate that it has disconnected successfully.

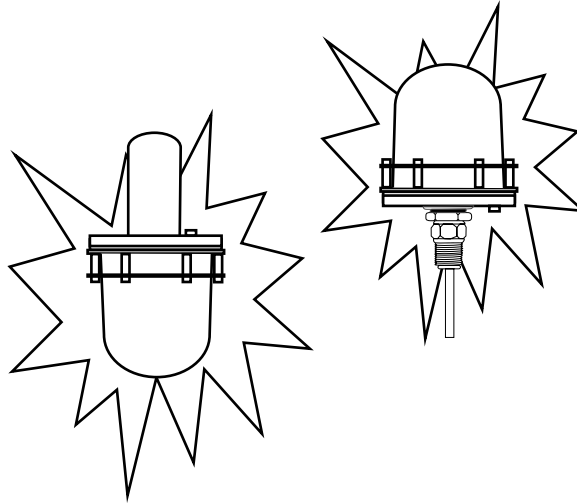
If you push a connected end node while it is out of the central concentrator's RF range, the end node forgets that it was connected to the central concentrator. The next time you push the end node, it searches for any activated central concentrator to connect.

## Connecting End Nodes

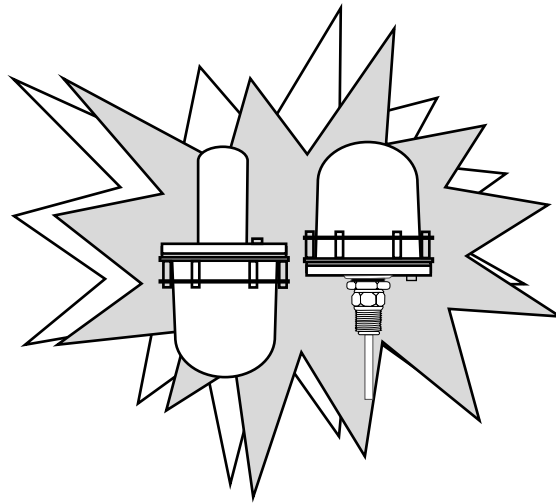
1. "Push" a disconnected end node by flexing it toward the arrows on the base. Hold this position for 1.5 seconds.



2. The central concentrator and end node begin flashing, out of sync at first, then synchronizing as they connect.



3. The central concentrator and end node then flash rapidly together to confirm that they are connected.



## Confirming Membership

It can take up to 15 seconds for all connected end nodes to begin flashing. Flashing stops 30 seconds after all devices have begun flashing.

You can view the group members on the web page at <http://10.10.10.10/ian/page>.

## Waking Up the Network

You can “wake up” an entire Instrument Area Network group by pushing the central concentrator or any end node in the group.

The device that you push flashes almost immediately, but the Instrument Area Network is not fully awake until all the associated devices begin to flash as well. This may take several seconds.

## Disconnecting the End Node

1. Push any connected device (concentrator or end node) in the group to “wake up” the group.  
You can “push” the device physically, or remotely from the Network Overview page.
2. Wait five seconds, then “push” the end node to be disconnected.  
You can “push” the device physically, or remotely from the Network Overview page.

The lights flash out of sync, and then the remaining group flashes without the disconnected end node.

## Reconnecting after an Interruption

If the RF link between a central concentrator and connected end node is interrupted, the devices attempt to reconnect. If the devices cannot reconnect, the end node and central concentrator continue to reconnect at increasingly longer intervals. An end node can automatically reconnect only to the central concentrator it was connected to. The end node and central concentrator do not flash to indicate that reconnection is in progress.

## Substituting End Nodes

If an end node is carried out of its central concentrator’s RF range, the slot in the central concentrator allocated for the out-of-range end node becomes available for connecting a different end node, even though the central concentrator was attempting to reconnect to the out-of-range end node. Once a new end node connects in the slot of an out-of-range end node, the out-of-range end node will no longer be able to reconnect. Therefore, although it is not essential to disconnect an end node when removing it from its Instrument Area Network, removing it prevents battery power from being consumed by the automatic reconnect attempts.

## HART Commands

The HART 7 standard was referenced to develop all HART commands.

The HART Communication Foundation test definitions used to test the universal commands have the format **UALUnnn**; test definitions used for common practice commands have the format **CALUnnn**.

**Table 4 - HCF\_SPEC-127 Universal Commands Supported**

Command	Description
Command 0	Read Unique Identifier
Command 1	Read Primary Variable
Command 2	Read Loop Current <sup>1</sup>
Command 3	Read Dynamic Variables <sup>1</sup>
Command 6	Wire Polling Address <sup>1</sup>
Command 7	Read Loop Configuration <sup>1</sup>
Command 8	Read Dynamic Variables Classifications

1. Although this command request yields a valid HART response, there is no loop current support within the Instrument Area Network. The Loop Current Mode is fixed as Disabled.

**Table 4 - HCF\_SPEC-127 Universal Commands Supported (Continued)**

Command	Description
Command 9	Read Device Variables
Command 11	Read Unique Identifier Associated with Tag
Command 12	Read Message
Command 13	Read Tag, Descriptor, Date
Command 14	Read Primary Variable Transducer Information
Command 15	Read Device Information
Command 16	Read Final Assembly Number
Command 17	Write Message
Command 18	Write Tag, Descriptor, Date
Command 19	Write Final Assembly Number
Command 20	Read Long Tag
Command 22	Write Long Tag
Command 38	Reset Configuration Changed Flag
Command 48	Read Additional Device Status <sup>2</sup>

**Table 5 - HCF Test HART Commands Included in Testing and Passed (HCF\_SPEC-127)**

HCF Test	Command
UALU000	0, 1, 2, 3, 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 38, 48
UALU005	0, 12, 15, 17, 20
UALU006	0, 11, 13, 18, 20
UALU008	0, 15, 16, 19, 20
UALU011a	0, 9, 20
UALU012	0, 3, 8, 20
UALU013	0, 1, 15, 20, 21, 22
UALU048a	0, 20, 48

**Table 6 - HCF\_SPEC-151 Common Practice Commands Supported**

Command	Description
Command 43	Set Primary Variable Zero <b>NOTE:</b> Lower trim limits are not enforced.
Command 44	Write Primary Variable Units
Command 50	Read Dynamic Variable Assignments
Command 54	Read Device Variable Information
Command 72	Squawk

2. The central concentrator acts as a WirelessHART adapter to provide end node and central concentrator Command 48 responses to the WirelessHART gateway. The concentrator bursts Command 48 responses to the gateway once per hour, or whenever there is a change in concentrator or end node information. The WirelessHART gateway caches all Command 48 Additional Information bursts and therefore has a copy of the latest information for each device. Command 48 Additional Information should be read by periodically issuing a HART-IP Command 48 Pass-Through Request to the gateway. The gateway immediately responds with the cached information from the most recent burst. A device signals Low Battery Alarm via two Command 48 Additional Information bytes: Extended Device Status - Maintenance Required (0x01), and Standardized Status 1 - Battery or Power Supply needs Maintenance (0x08).

**Table 6 - HCF\_SPEC-151 Common Practice Commands Supported (Continued)**

Command	Description
Command 74	Read I/O System Capabilities
Command 77	Send Command to Sub-Device <sup>3</sup>
Command 84	Read Sub-Device Identity Summary
Command 90	Read Real-Time Clock <sup>4</sup>
Command 101	Read Sub-Device to Burst Message Map <sup>3</sup>
Command 103	Write Burst Period <sup>3</sup>
Command 105	Read Burst Mode Configuration <sup>3</sup>
Command 143	Reset Zero of Primary Variable

**Table 7 - HCF Test HART Commands Included in Testing and Passed (HCF\_SPEC-151)**

HCF Test	Command
CALU0000	44, 50, 54, 72, 74, 77, 84, 90, 101, 103, 105
CALU072	72

## HCF\_SPEC-155 Wireless Commands Supported (Central Concentrator Only)

- WirelessHART commands are supported per the Linear Technology LTP5902-WHM WirelessHART Mote Module. See *Linear SmartMesh WirelessHART User's Guide*, Section HCF\_SPEC-155 Commands for details.
- Commands supported include: 768, 769, 770, 771, 772, 773, 774, 777, 778, 779, 780, 781, 782, 783, 784, 785, 787, 794, 795, 796, 797, 798, 800, 801, 802, 804, 805, 806, 808, 810, 811, 812, 813, 819, 820, 823, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 973, 974, 975, 64512.

## Unsupported HART Features

Contact Global Customer Support for availability.

- Device Status bits (Primary Variable Out of Limits, Non-Primary Variable Out of Limits, Loop Current Saturated, Loop Current Fixed, Cold Start, and Device Malfunction)
- Real-Time Clock management
- Additional HART Common Practice commands

## End Node Notes

- HART Device Variable Code 0 represents the measured process value.
- The unit of measure is configurable.
- The measurement update rate is configurable; the default is 16 seconds.
- User Trim/Span operations are not supported.
- The end node operates as a multidrop device with loop current signaling disabled.

3. HART Adapter Command is supported only by the central concentrator.

4. Real-Time Clock is not yet supported.



## Central Concentrator Notes

- HART Device Variable Code 0 nominally represents the Battery Life (days battery in operation), but this value is fixed and does not reflect the actual value.
- Burst Message configuration for the central concentrator is fixed as:
  - Burst Message ID = 0
  - Burst Mode Control Code = Off
- Burst Message configuration for each end node is fixed as:
  - Burst Message IDs 1 through 8 map one-to-one for each device.
  - Burst Mode Control Code = TDMA Data-Link Layer only
  - Extended Command Number assignment = HART Command 3
  - Burst Trigger Mode = Continuous
- The publish period to the WirelessHART gateway is configurable; the default is 16 seconds.

## WirelessHART Connect/Disconnect Time Delays

- Central concentrator
  - The time for a connect request that transitions from Connect Requested to Connect Succeeded is approximately five minutes. An automatic retry occurs if the connect is not successful.
  - The time for a disconnect request that transitions from Connect Succeeded to Not Connected is approximately one minute. However, the registration within the WirelessHART gateway servlet may take as long as ten minutes before the Central Concentrator HART status changes to offline.
- End nodes
  - The time for an end node connect operation to register within the Emerson WirelessHART gateway servlet ranges from three to 10 minutes.
  - The time for an end node disconnect operation to register within the Emerson WirelessHART gateway servlet ranges from three to 10 minutes.

**NOTE:** The delay is approximately three minutes if there are no other devices already connected. With seven devices connected, adding an eighth device requires approximately 10 minutes. During this time, existing measurement values in the gateway servlet may temporarily disappear (blank out), then reappear during the device connect process.

# Maintenance

## ⚠ WARNING

### HAZARD OF ESCAPING CHEMICALS

If process-containing parts are to be disassembled, make sure that the process fluid is not under pressure or at high temperature. Take proper precautions concerning leakage or spillage of any toxic or otherwise dangerous fluid. Follow any Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) recommendations.

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

## ⚠ WARNING

### RISK OF EXPOSURE

- Follow your local site safety procedures regarding hazardous substances if you are using the field unit to measure a process with hazardous substances.
- When processing hazardous substances, follow the recommended procedures.
- Properly dispose of lithium batteries in accordance with local regulations.

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

## ⚠ CAUTION

### MAINTENANCE AND INSPECTION SCHEDULES

Follow all recommended inspection schedules.

**Failure to follow these instructions can result in injury or equipment damage.**

## NOTICE

### POTENTIAL EQUIPMENT DAMAGE

Do not clean the equipment with abrasive cleaners or coarse wipes. Clean with a damp cloth.

**Failure to follow these instructions can result in equipment damage.**

## Yearly Equipment Inspections

Perform a yearly inspection for the following:

- Verify that the field unit is still mounted securely.
- Look for evidence of corrosion, cracks, or residue buildup on the unit.
- Consider whether the application has changed from the original intended use.
- Review chemical compatibility with the integral probe material (stainless steel) and the overall enclosure materials (stainless steel and polycarbonate plastic).

# Model Codes

**Table 8 - Central Concentrator (WCC10)**

Code	Description
<b>Model</b>	
WCC10	Central Concentrator <sup>5</sup>
<b>Wireless Communication</b>	
-WH	WirelessHART
<b>Electrical Certifications<sup>6</sup></b>	
ZZ	No certification (ordinary locations only)
<b>Optional Selections</b>	
-M2	304 ss Bracket, Clamps, and Bolts <sup>7</sup>
Example: WCC10-WHZZ-M2	

**Table 9 - Temperature End Node (WRT10)**

Code	Description
<b>Model</b>	
WRT10	Temperature End Node
<b>Wireless Communication</b>	
-W1	Wireless Sensor
<b>Sensor Type</b>	
1	RTD (Pt100, ASTM A, 4-Wire)
2	Thermocouple (Type J)
<b>Sensor Construction</b>	
W	Fixed 1/2 NPT
S	Spring-Loaded for Thermowell Insertion
<b>Sensor Insertion Length<sup>8</sup></b>	
020	2.0 inches (50.8 mm)
025	2.5 inches (63.5 mm)
030	3.0 inches (76.2 mm)
035	3.5 inches (88.9 mm)
040	4.0 inches (101.6 mm)
045	4.5 inches (114.3 mm)
050	5.0 inches (127.0 mm)
055	5.5 inches (139.7 mm)
060	6.0 inches (152.4 mm)
065	6.5 inches (165.1 mm)
070	7.0 inches (177.8 mm)

5. Order WirelessHART gateways separately with part number 217229 or 252863.

6. Refer to *Electrical Certifications*, page 11 for details. Contact Global Customer Support for availability.

7. This bracket is required and included with the WCC10.

8. The Sensor Insertion Length must equal the Thermowell Insertion Length + Thermowell Lagging Length + 1.5 inches.

**Table 9 - Temperature End Node (WRT10) (Continued)**

<b>Code</b>	<b>Description</b>
075	7.5 inches (190.5 mm)
080	8.0 inches (203.2 mm)
085	8.5 inches (215.9 mm)
090	9.0 inches (228.6 mm)
095	9.5 inches (241.3 mm)
100	10.0 inches (254.0 mm)
105	10.5 inches (266.7 mm)
110	11.0 inches (279.4 mm)
115	11.5 inches (292.1 mm)
120	12.0 inches (304.8 mm)
125	12.5 inches (317.5 mm)
130	13.0 inches (330.2 mm)
135	13.5 inches (342.9 mm)
140	14.0 inches (355.6 mm)
145	14.5 inches (368.3 mm)
150	15.0 inches (381.0 mm)
155	15.5 inches (393.7 mm)
160	16.0 inches (406.4 mm)
165	16.5 inches (419.1 mm)
170	17.0 inches (431.8 mm)
175	17.5 inches (444.5 mm)
<b>Thermowell Attached to Sensor</b>	
N	No Thermowell
T	Threaded 3/4 NPT
S	Socket Weld 1.05 inches
W	Weld-In 1.5 inches
<b>Thermowell Insertion Length<sup>9</sup></b>	
000	0.0 inches (0 mm)
020	2.0 inches (50.8 mm)
025	2.5 inches (63.5 mm)
030	3.0 inches (76.2 mm)
035	3.5 inches (88.9 mm)
040	4.0 inches (101.6 mm)
045	4.5 inches (114.3 mm)
050	5.0 inches (127.0 mm)
055	5.5 inches (139.7 mm)
060	6.0 inches (152.4 mm)

9. The Sensor Insertion Length must equal the Thermowell Insertion Length + Thermowell Lagging Length + 1.5 inches.

**Table 9 - Temperature End Node (WRT10) (Continued)**

Code	Description
065	6.5 inches (165.1 mm)
070	7.0 inches (177.8 mm)
075	7.5 inches (190.5 mm)
080	8.0 inches (203.2 mm)
085	8.5 inches (215.9 mm)
090	9.0 inches (228.6 mm)
095	9.5 inches (241.3 mm)
100	10.0 inches (254.0 mm)
105	10.5 inches (266.7 mm)
110	11.0 inches (279.4 mm)
115	11.5 inches (292.1 mm)
120	12.0 inches (304.8 mm)
<b>Thermowell Lagging Length<sup>10</sup></b>	
000	0.0 inches (0 mm)
020	2.0 inches (50.8 mm)
025	2.5 inches (63.5 mm)
030	3.0 inches (76.2 mm)
035	3.5 inches (88.9 mm)
040	4.0 inches (101.6 mm)
<b>Electrical Certifications<sup>11</sup></b>	
CU	North America Intrinsically Safe Certified
EU	ATEX Intrinsically Safe Certified
<b>Optional Selections</b>	
-WF	Wake Frequency Calculation <sup>12</sup>
Example: WRT10-W1S055T020020CU-WF	

**Table 10 - Absolute Pressure End Node (WAP10)**

Code	Description
<b>Model</b>	
WAP10	Absolute Pressure End Node
<b>Wireless Communication</b>	
-W1	Wireless Sensor
<b>Structure Code, Materials, and Type</b>	
22	316L ss Process Connection, 316L ss Diaphragm, Silicone Fill Fluid, FKM O-ring, 1/2 NPT External Thread Connection Type
<b>Upper Range Limits</b>	
C	0.21 MPa, 30 psi, 2.1 bar or kg/cm <sup>2</sup>

10. The Sensor Insertion Length must equal the Thermowell Insertion Length + Thermowell Lagging Length + 1.5 inches.

11. Refer to Electrical Certifications, page 11 for details. Contact Global Customer Support for availability.

12. Requires a completed wake frequency data form. Obtain this form by typing "wake frequency" in the Search box at <http://www.schneider-electric.com/en/download/>.

**Table 10 - Absolute Pressure End Node (WAP10) (Continued)**

Code	Description
<b>Electrical Certifications<sup>13</sup></b>	
CU	North America Intrinsically Safe Certified
<b>Optional Selections</b>	
-00	None
Example: WAP10-W122CCU-00	

**Table 11 - Gauge Pressure End Node (WGP10)**

Code	Description
<b>Model</b>	
WGP10	Gauge Pressure End Node
<b>Wireless Communication</b>	
-W1	Wireless Sensor
<b>Structure Code, Materials, and Type</b>	
22	316L ss Process Connection, 316L ss Diaphragm, Silicone Fill Fluid, FKM O-ring, 1/2 NPT External Thread Connection Type
<b>Upper Range Limits</b>	
C	0.21 MPa, 30 psi, 2.1 bar or kg/cm <sup>2</sup>
D	2.1 MPa, 300 psi, 21 bar or kg/cm <sup>2</sup>
E	13.79 MPa, 2000 psi, 138 bar or kg/cm <sup>2</sup>
F	41.37 MPa, 6000 psi, 414 bar or kg/cm <sup>2</sup>
J	68.95 MPa, 10000 psi, 690 bar or kg/cm <sup>2</sup>
<b>Electrical Certifications<sup>13</sup></b>	
CU	North America Intrinsically Safe Certified
<b>Optional Selections</b>	
-00	None
Example: WGP10-W122CCU-00	

**Table 12 - Differential Pressure End Node (WDP10)**

Code	Description
<b>Model</b>	
WDP10	Differential Pressure End Node
<b>Wireless Communication</b>	
-W1	Wireless Sensor
<b>Structure Code, Materials, and Type</b>	
22	316L ss Process Connection, 316L ss Sensor, Silicone Fill Fluid
<b>Upper Range Limits</b>	
B	50 kPa, 200 inH <sub>2</sub> O, 500 mbar
C	210 kPa, 30 psi, 2100 mbar
D	2.1 MPa, 300 psi, 21 bar

13. Refer to Electrical Certifications, page 11 for details. Contact Global Customer Support for availability.

**Table 12 - Differential Pressure End Node (WDP10) (Continued)**

Code	Description
<b>Process Connector<sup>14</sup></b>	
0	No Connectors; Both Covers Tapped for 1/4 NPT
1	1/4 NPT
2	1/2 NPT
<b>Electrical Certifications<sup>15</sup></b>	
CU	North America Intrinsically Safe Certified
<b>Optional Selections</b>	
-M1	Painted Steel Mounting Bracket with Plated Steel Bolts <sup>16</sup>
-M2	316 ss Bracket with 316 ss Bolts
Example: WDP10-W122C0CU-M1	

14. The material used for the process connector is the same material used for the process cover.

15. Refer to *Electrical Certifications*, page 11 for details. Contact Global Customer Support for availability.

16. Contact Global Customer Support for availability.

# Nominal Dimensions

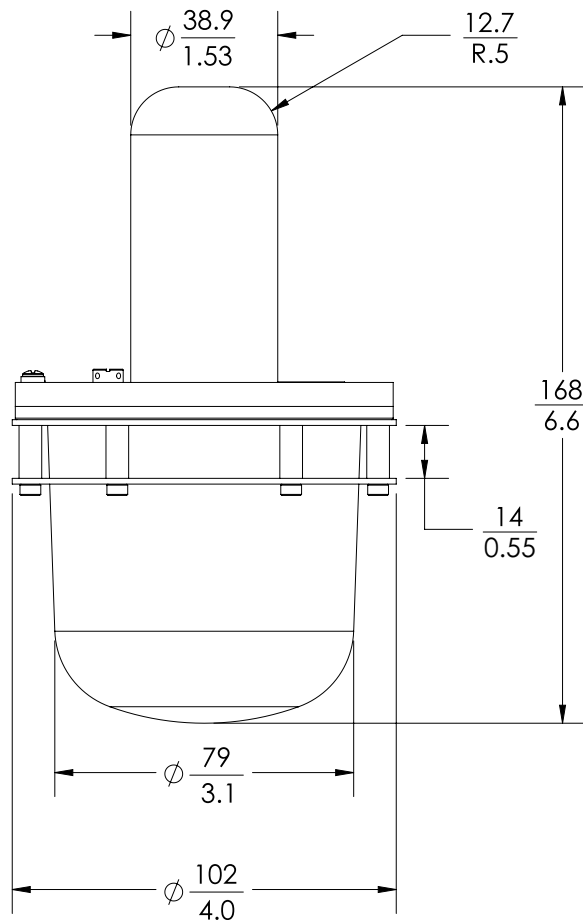
For dimensional information specific to your sales order, contact your sales representative to order a Certified Dimensional Print (CDP).

All dimensions in diagrams are shown in millimeters over inches ( $\frac{mm}{in}$ ).

**Table 13 - Approximate Mass**

Model	Mass
WCC10, with standard wall mount bracket and clamp only	0.9 kg (2.0 lbs)
WRT10, welded (6" probe)	0.9 kg (1.9 lbs)
WRT10, spring-loaded (6" probe)	1.1 kg (2.4 lbs)
WAP10	0.8 kg (1.7 lbs)
WGP10	
WDP10	3.7 kg (8.2 lbs)

**Figure 5 - Central Concentrator (WCC10)**





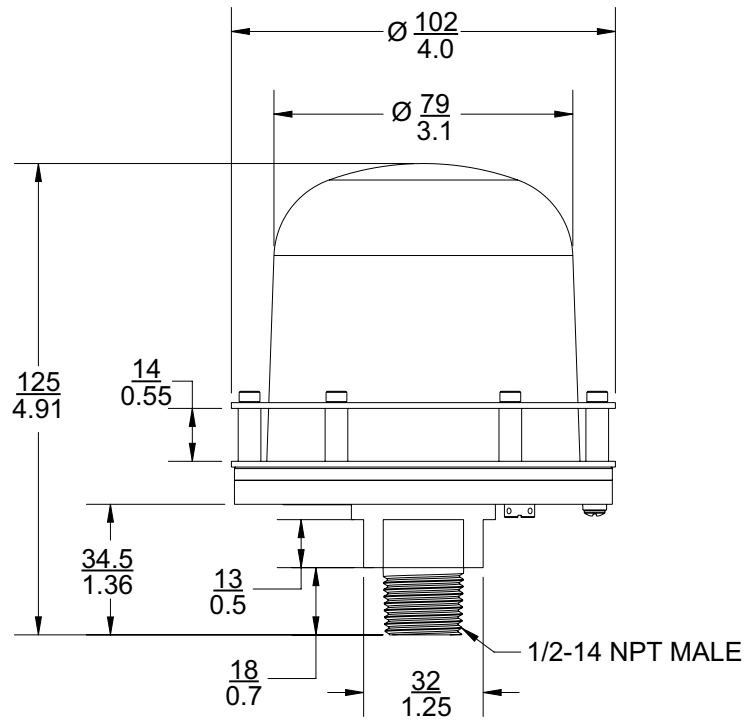
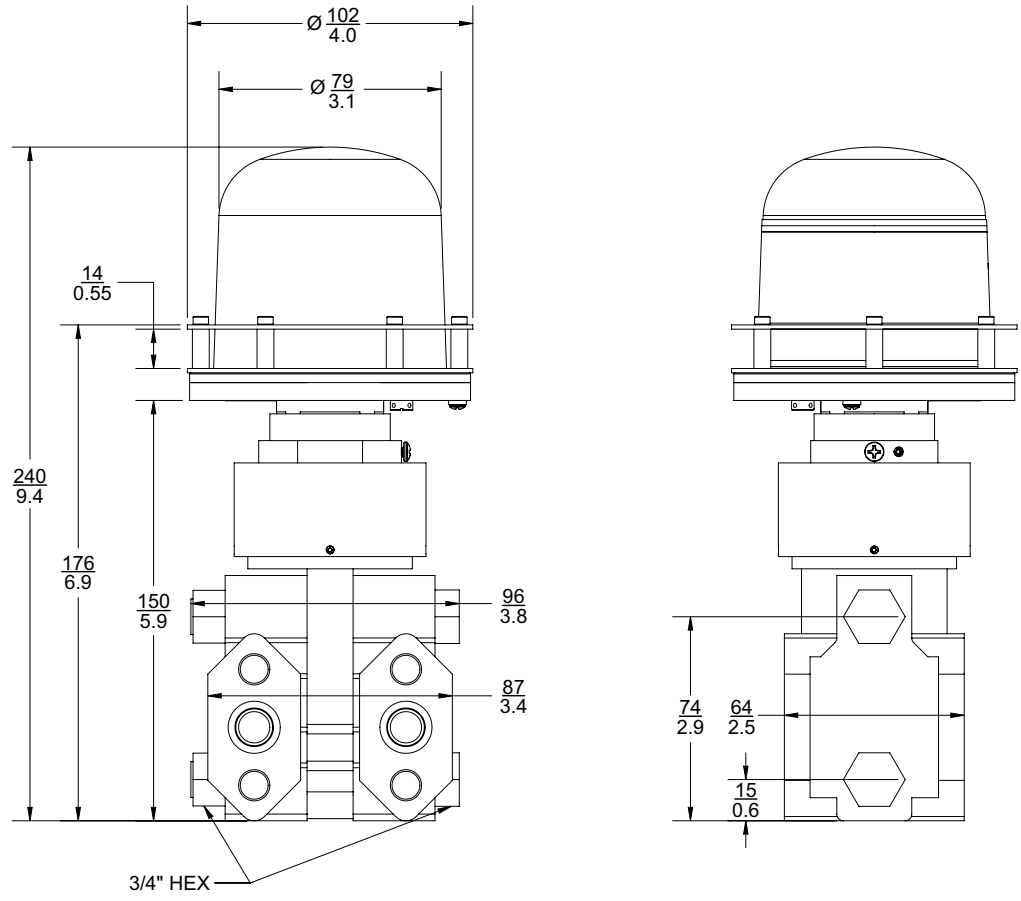
**Figure 6 - End Node: Absolute Pressure (WAP10) or Gauge Pressure (WGP10)**

Figure 7 - End Node: Differential Pressure (WDP10)



**Figure 8 - End Node: Temperature (WRT10)**

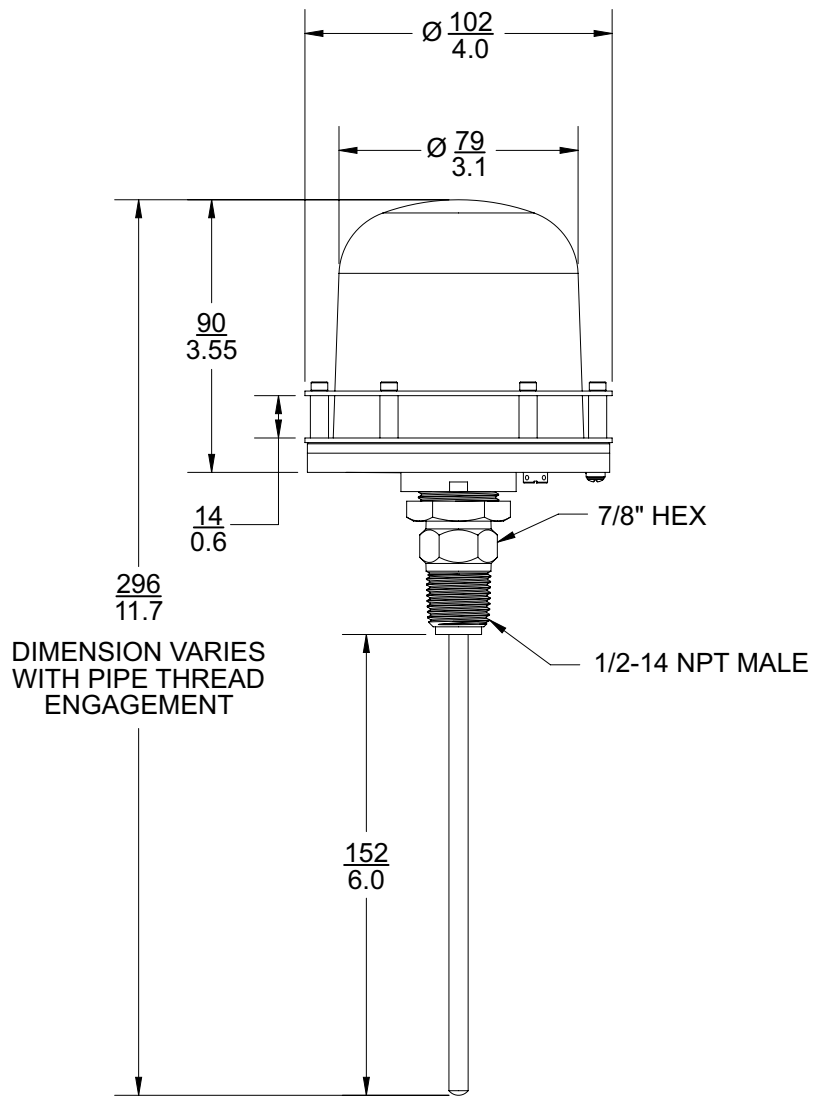
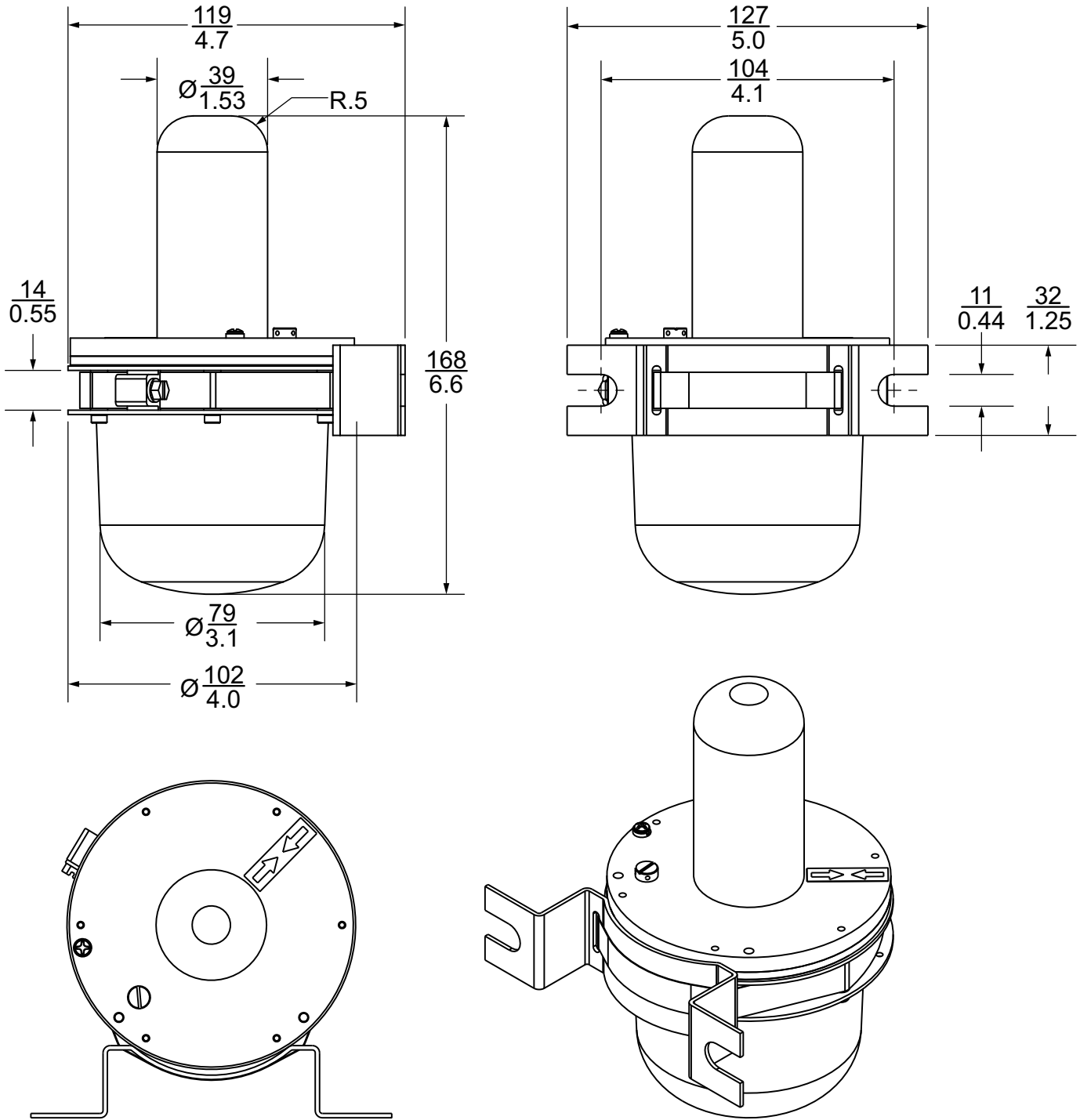
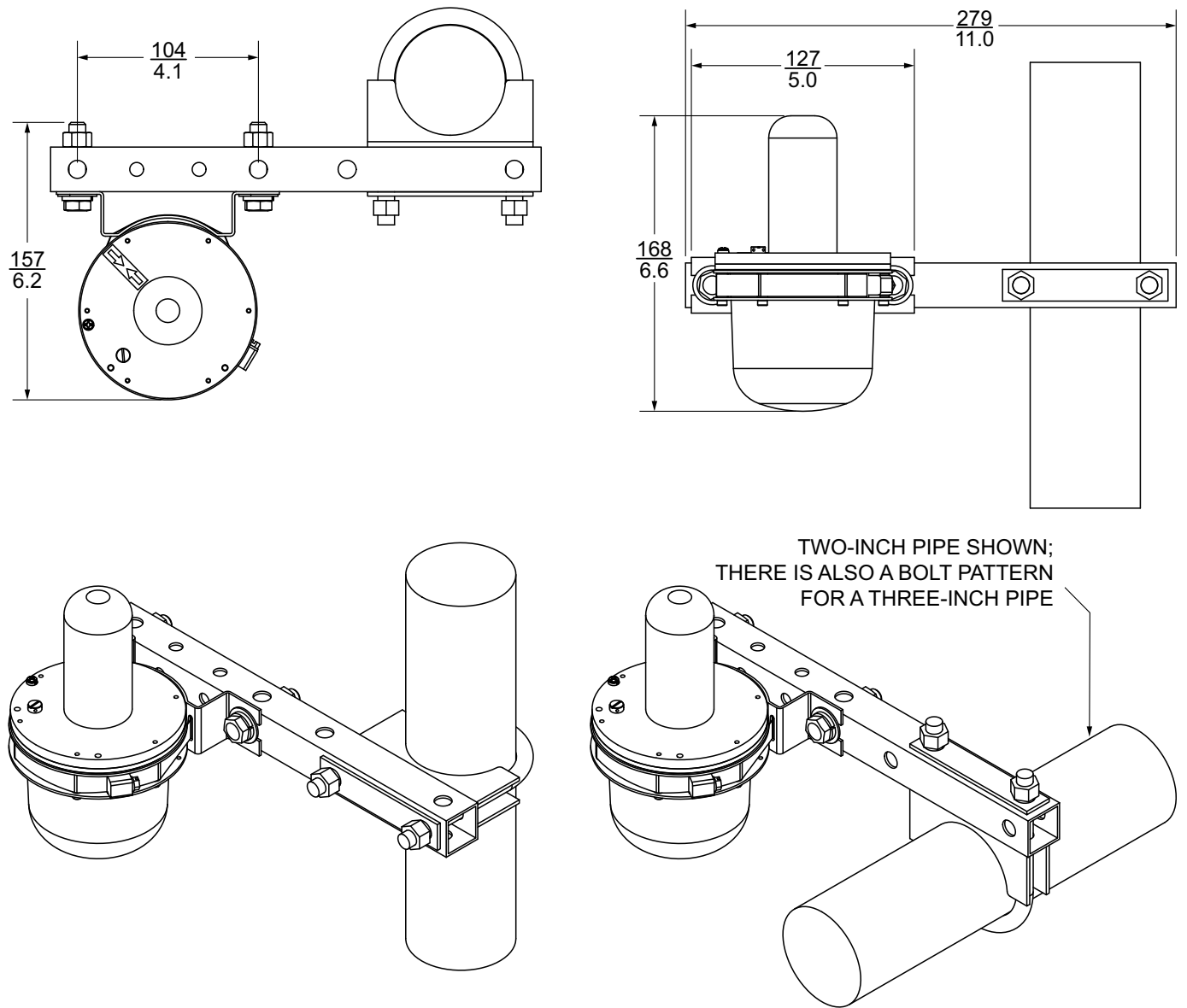


Figure 9 - Wall Mounting Bracket (Shown with WCC10)



**Figure 10 - Pipe Mounting Bracket (Shown with WCC10)**



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As standards, specifications, and design change from time to time,  
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