

# PDW90

Point To Multi-Point Wireless



**1 MILE**  
OUTDOOR LINE-OF-SIGHT  
**500 FT**  
INDOOR RANGE



**PRECISION  
DIGITAL**  
WIRELESS

**WIRELESS SYSTEM**

## FEATURES

- Point to Multi-Point Signal Wire Replacement
- Simple to Configure Using PDW Manager Programming Software and Onboard USB
- Range: 1 Mile Line-of-Sight Outdoor, 500 Feet Indoor

## FIELD UNITS

- Analog Input and Output, Four Digital I/O, and RS-485 Modbus® Standard
- NEMA 4X, IP68 Enclosure
- Remote Antennas Available
- Flanges for Wall or Pipe Mounting

## • BASE STATION

- Field or Wall Mounted
- Rugged Plastic NEMA 4X Field Enclosure
- RS-485 Modbus Standard
- Supports a Maximum of 32 Field Units and 16 Base Station Modules
- Base Station Modules Include Dual Analog Input, Dual Analog Output, Dual Relay Output, and Digital I/O)

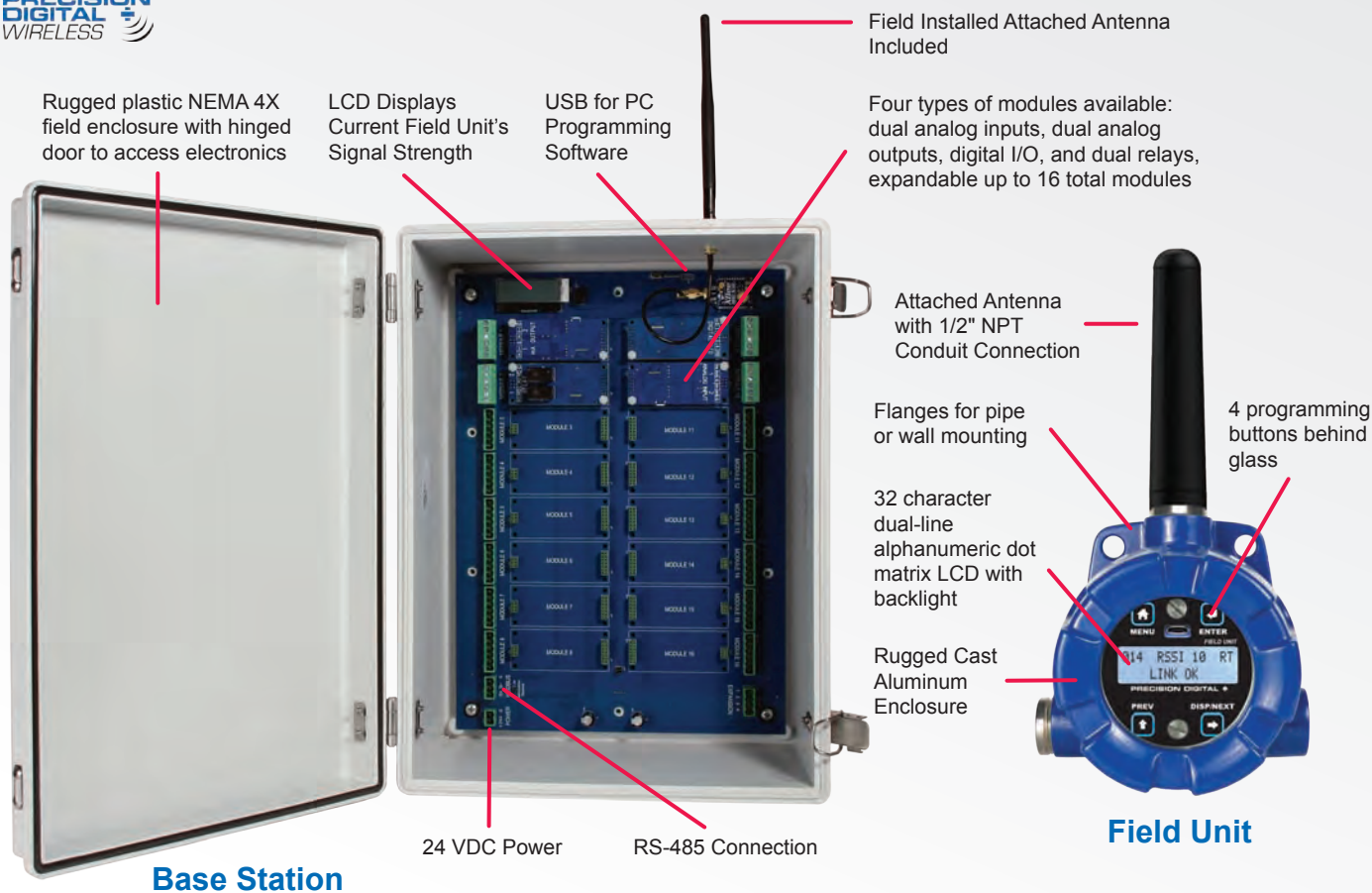
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# PDW90 Point To Multi-Point Wireless



## INTRODUCTION

The Precision Digital PDW90 is a rugged, customizable, point to-multipoint wireless bridge that can be configured for a variety of inputs and outputs including a maximum of 32 analog inputs. It offers a highly-flexible means of getting analog, digital, and Modbus® signals from where you have it to where you need it. Modular input/output cards and expandable field units mean that the PDW90 can be customized to meet the needs of just about any wireless application.

The PDW90 is simple to order, simple to configure, and can help simplify your device installation. It can be ordered as either preassembled kits or as individual, modular components. Guaranteed ranges assure it will work with your application or you can send it back - no questions asked. A wireless survey tool is available to perform a site survey or troubleshoot installations, making it easy to verify the setup will work the first time.

Field units accept analog, discrete, and Modbus® inputs and wirelessly broadcast them to the PDW90 base station. The base station can recreate these signals with its onboard RS-485 or analog and digital I/O cards. It can also be programmed to activate relays or output analog/digital signals to the field units. Just put the field units wherever there are process signals and power, and the base station in the control room.

Fixed or remote antenna modules as well as a wide range of accessories are available, including mounting kits, antenna-related accessories, and repeaters. The antenna may be directly attached or remotely located. High gain directional antennas are also offered.

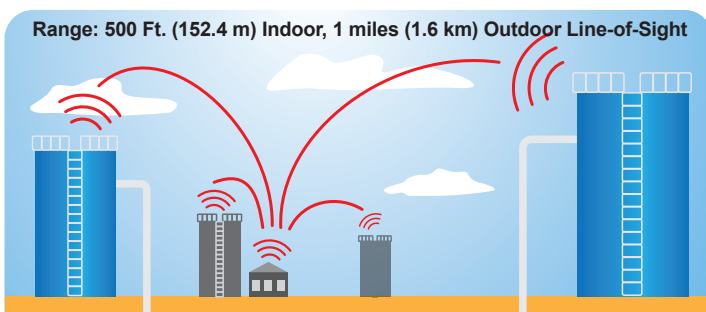
## KEY FEATURES

### Economical Signal Wire Replacement

The PWD90 point to multi-point wireless bridge system is a smart, economical choice when you need multiple devices to communicate over long distances and you don't want to spend the time and money to hard wire your instrumentation throughout your facility.

### Wireless Solutions in Complex Areas

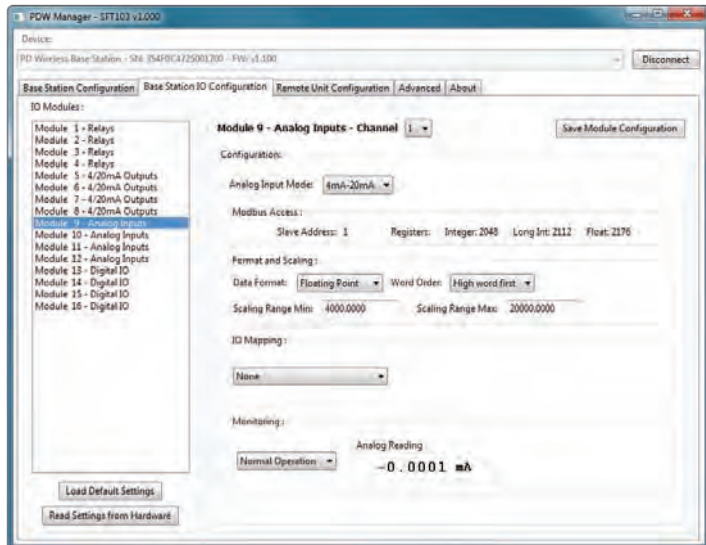
The PDW90 has a range of 500 ft. indoors and an outside line-of-sight range of 1 mile. Any wireless network can be negatively affected by certain factors, such as physical obstacles and improper equipment placement. Precision Digital sells a number of solutions for tricky wireless installations, such as remote antennae and repeater field units. Our PDA10 wireless survey tool allows you to gauge wireless signal strength prior to installation so that you know your wireless units will connect the first time. Check the PDW90 installation guide for tips on how to avoid common installation mistakes.



# PDW90 Point To Multi-Point Wireless

## PDW Manager Software for Easier Setup

PDW Manager allows you to program the PDW90 wireless base station and field units from a PC with a USB connection. Field units connect to a PC via the micro USB connection on their face, underneath the enclosure cover and for the base station, on the electronic board behind the enclosure door. Use of PDW Manager is required for programming advanced settings such as wireless encryption and analog signal calibration. PDW Manager can be found on the included CD or downloaded from PDWManager. Once the software is running, power the unit using a 24 VDC power supply and connect the device to the PC using the provided USB cable.

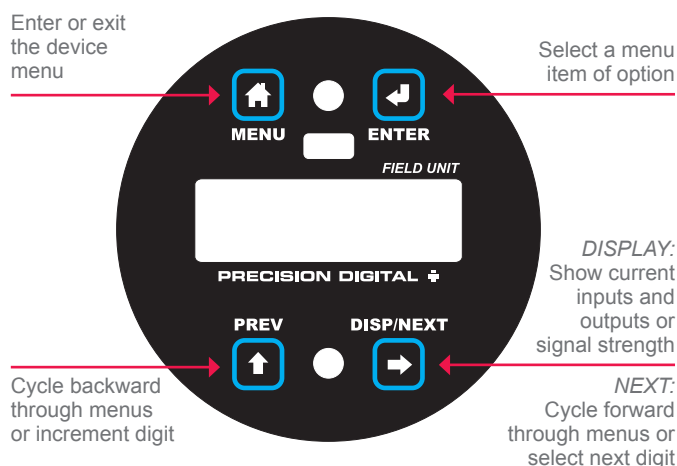


▲ Configuration Window of the PDW Manager Software

**Note:** The base station can configure the field modules. You only need to power the field units and associate them to the base station using the Remote Unit Configuration tab; then configure the field units wirelessly with the PDW Manager software.

## Programming The Field Units is a Snap

The PDW90 field units can be programmed using the buttons located behind the enclosure cover or using PDW Manager. Because of the simplicity of field unit configuration, it is easier in most cases to use the programming buttons. All you have to do is wire the inputs and outputs, set the network ID and Modbus address, then connect them to the base station. See the PDW90 Installation guide for details.



## Inputs and Outputs

The PDW90 base station and field units accept an analog input (4-20 mA, 0-10 V, 0-5 V, or 1-5 V), up to four discrete digital inputs, and RS-485 Modbus Communications. They also come with analog (4-20 mA), digital, and RS-485 Modbus outputs.

## Wall or Pipe Mounting for Field Units

The PDW90 field units have flanges with two mounting holes that may be used for a 1.5" pipe mounting or wall mounting. Alternatively, the unit may be supported by the conduit using the conduit holes provided. It can also be mounted by using the PDA3000 mounting bracket in order to orient the device antenna away from the pipe.

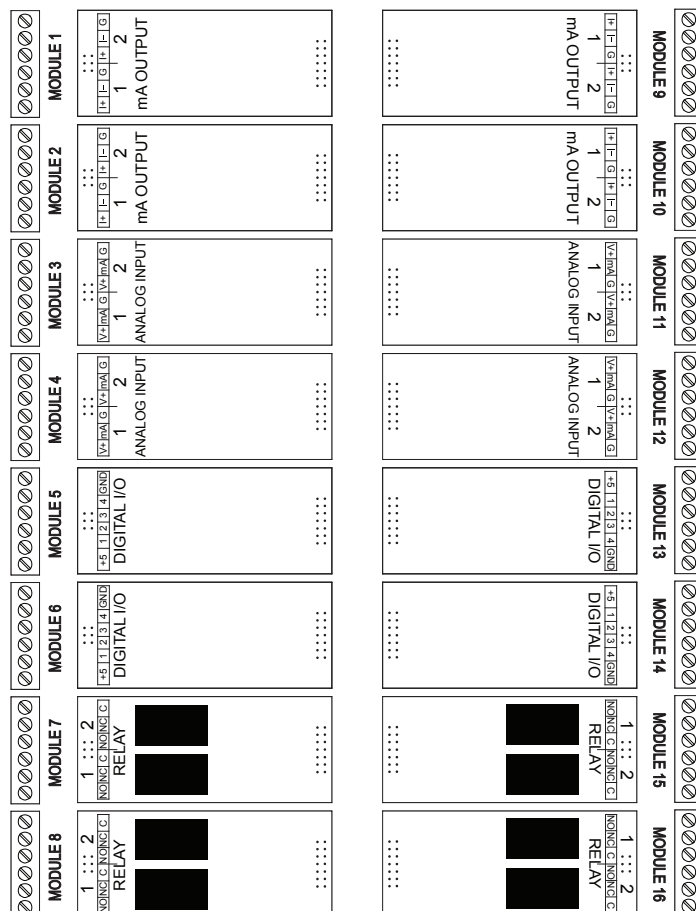
## IP68, NEMA 4X Enclosure

The PDW90 field units not only look great with their modern, smooth die cast aluminum enclosures, but they can be installed virtually anywhere. The NEMA 4X / IP68 provides serious protection from the elements, high impact, corrosion and electrical interference.

## CONNECTIONS

### Base Station Connections

The connectors for the base station are located behind the enclosure door. Signal connections are made to removable screw terminal connectors. The PDW90 base station can utilize up to 16 modules including relay modules, digital I/O modules, analog input modules, and analog output modules.



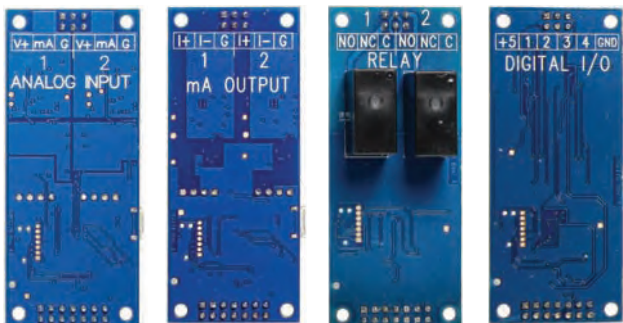
▲ 16 Module Connectors Inside the Base Station



# PDW90 Point To Multi-Point Wireless

## Modules

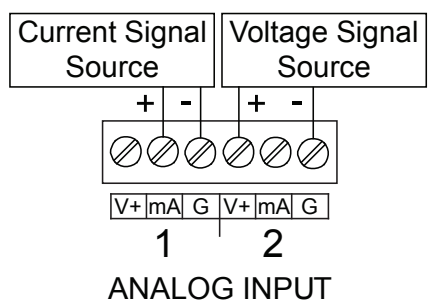
Modules for the PDW90 base station are easy to install and add functionality to the wireless system. There are four types of modules available: dual analog inputs, dual analog outputs, digital I/O, and dual relays. The analog outputs module allows the base station to output two independent analog signals from any two field unit analog inputs. The analog inputs module allows the base station to accept two analog signals and transmit them wirelessly to any of the connected field units. The digital I/O module contains four channels which can be programmed to correspond with any of the field units' digital inputs or outputs. The dual relays module can also be controlled from any of the connected field units' digital I/O.



▲ Above: Available base station modules include dual analog input module, dual analog output module, relay module, and Digital I/O module.

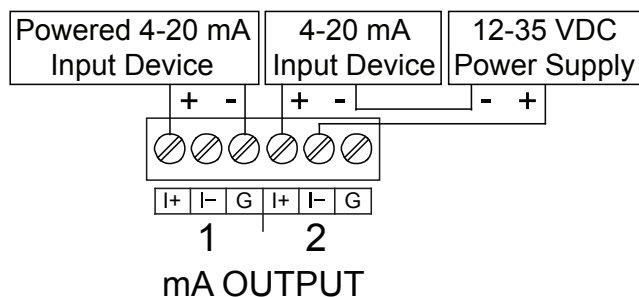
## Analog Input Module Connector

The analog input module can accept either 4-20 mA, 0-10 V, 0-5 V, or 1-5 V. The appropriate input type must be independently programmed for each input channel.



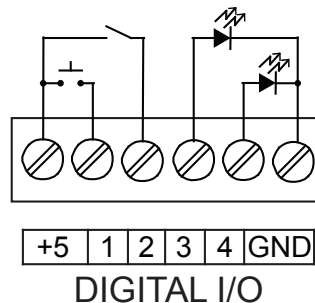
## Analog Output Module Connector

The mA output module can be programmed to output a 4-20mA analog signal associated with a remote field unit's analog input or Modbus register. The signal can be transmitted to any device scaled to read a 4-20 mA signal as shown below.



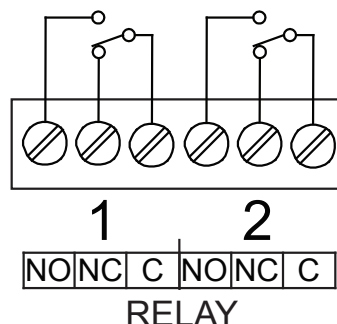
## Digital I/O Module Connector

The digital input module includes four independently programmable I/O channels. Digital input connections are wired to +5 and digital output connections are wired to GND. Each connection may be set as either an input or an output. In the diagram below, D1 & D2 are digital inputs and D3 & D4 are digital outputs.



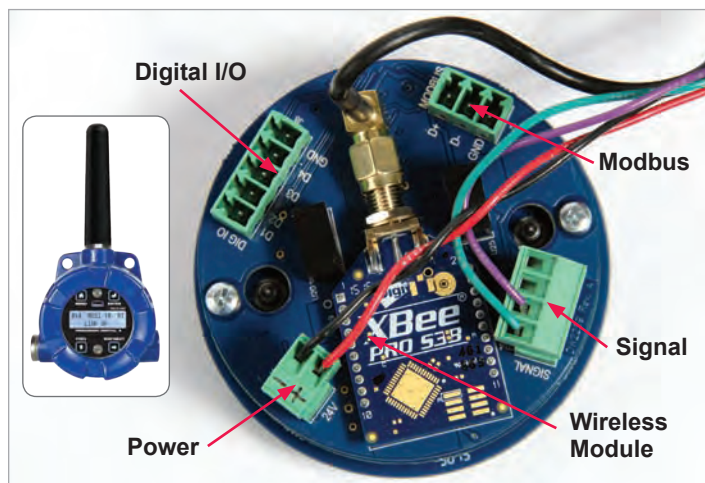
## Relays Module Connector

The relays module includes two mechanical relays. Relay connections are made to the six-terminal connector shown below. Each relay's C terminal is common only to the normally open (NO) and normally closed (NC) contacts of the corresponding relay.



## Field Unit Connections

Signal connections are made to removable screw terminal connectors on the back of the device assembly. To access the connectors for the field units, remove the enclosure cover and unscrew the two captive stainless steel screws. Remove the device assembly from the enclosure. See PDW90 manual for more details.



# PDW90 Point To Multi-Point Wireless

## ACCESSORIES

### Extend the Range of the PDW90

Optional accessories for the PDW90 are available to expand the capabilities of the PDW90 wireless system. (See back page for ordering information) They include **High Gain Directional Antennae (PDA3900)** which allows the PDW90 wireless units to broadcast wireless signals over multiple miles with a clear line of sight.

Use **Antenna Extension Cables (PDA3120 or PDA3140)** to mount the device antenna high above the ground in order to clear obstacles that could hinder signal strength.

Wireless **Repeater (PDW30-RNA)** modules are available for especially long range applications or when connectivity is an issue. They are incredibly simple to install as they only require power and a network ID. Any units in range of the repeater with the same network ID will retransmit through it, thus increasing signal strength. Use repeaters to broadcast over very long distances or around permanent obstacles.



▲ Close-up of PDW30-RNA Repeater Display



▲ PDW30-RNA Repeater

### Wireless Survey Toolkit (PDA10)

This handy toolkit which includes a handheld unit and target unit is used to survey wireless signal strength throughout a facility prior to PDW30 or PDW90 equipment installation. The target unit is set in a desired installation location and the handheld is brought to another installation location. The handheld unit will provide an indication of signal strength between the two units. The PDW10 may also be used to troubleshoot existing installations. The handheld unit will scan through network IDs until it discovers wireless devices on one of them. It will then provide an indication of connected signal strength to the discovered units. This may prove useful if you are attempting to install additional field units to your PDW90 system or trying to troubleshoot connectivity issues.



▲ PDA10 Wireless Survey Toolkit includes two (2) handheld units, carrying case, Instructions, and CD manual.

## SPECIFICATIONS

Except where noted all specifications apply to operation at +25°C.

### PDW90 Base Station Specifications:

#### General

**Maximum Connected Field Units:** 32 field units

**Network ID:** Programmable: 0 - 99

**Programming Methods:** Via PC with PDW Manager software

**Power:** 24 VDC  $\pm 10\%$ , 36 W max, 2.4 W min. Power consumption is dependent on type and number of modules installed

**Non-Volatile Memory:** All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

**Environmental:** *Operating temperature range:* -40 to 65°C

*Storage temperature range:* -40 to 85°C

*Relative humidity:* 0 to 90% non-condensing

**Connections:** Removable screw terminal blocks accept 12 to 22 AWG wire.

**Peak Antenna Gain:** 2.15 dBi  $\pm 1.0$

**Enclosure:** 15.75" x 11.81" x 7.03" (40 cm x 30 cm x 17.9 cm)

(W x H x D); NEMA 4X; Thermoplastic Polyester; Color: Gray

**Tightening Torque:** Screw terminal connectors: 5 lb-in (0.56 Nm)

**Shipping Dimensions:** 17" x 14" x 9"

(43.2 cm x 35.6 cm x 22.9 cm) (W x H x D)

**Shipping Weight:** 6.5 lbs (2.95 kg)

**Warranty:** 3 years parts & labor

#### Dual Analog Input Module

**Inputs:** (2) Field selectable: 4-20 mA, 0-10 V, 0-5 V, 1-5 V

**Accuracy:**  $\pm 0.03\%$  of calibrated span  $\pm 1$  count

**Isolation:** 500 V

**Recalibration:** All ranges are calibrated at the factory.

Recalibration is recommended at least every 12 months.

**Temperature Drift:** 0.005% of calibrated span/°C max from 0 to 65°C ambient, 0.01% of calibrated span/°C max from -40 to 0°C ambient

**Signal Loss:** Inputs will remain off (open circuit) until wireless units are reconnected.

**Input Impedance:** *Voltage ranges:* greater than 500 k $\Omega$

*Current ranges:* 50 - 100 $\Omega$  (depending on resettable fuse impedance)

**HART Transparency:** Analog input will not interfere with existing HART communications on the wired 4-20 mA signal.

#### Dual 4-20 mA Output Module

**Output Source:** Analog input from connected wireless unit

**Calibration:** Factory calibrated: 4.000 to 20.000 = 4-20 mA output

**Accuracy:**  $\pm 0.1\%$  of span  $\pm 0.004$  mA

**Isolation:** 500 V

Recalibration is recommended at least every 12 months.

**Temperature Drift:** 0.4  $\mu$ A/°C max from 0 to 65°C ambient, 0.8  $\mu$ A/°C max from -40 to 0°C ambient

*Note: Analog output drift is separate from input drift.*

**Output Loop Resistance:**

| Power Supply | Minimum     | Maximum      |
|--------------|-------------|--------------|
| 24 VDC       | 10 $\Omega$ | 900 $\Omega$ |

**Signal Loss:** After approximately 25 seconds of trying to reconnect, mA output will become 3.2 mA

# PDW90 Point To Multi-Point Wireless

## Digital Input / Output Module

**Channels:** Four (4) digital connections, independently field selectable as either inputs or outputs

**Digital Input Logic High:** 3 to 5 VDC

**Digital Input Logic Low:** 0 to 1.1 VDC

**Digital Output Logic High:** 3.1 to 3.3 VDC

**Digital Output Logic Low:** 0 to 0.4 VDC

**Source Current:** 10 mA maximum output current

**Sink Current:** 1.5 mA minimum input current

**Signal Loss:** Digital output goes to logic high

## Dual Relays Module

**Rating:** 2 SPDT (Form C); rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP ( $\approx 50$  W) @ 125/250 VAC for inductive loads

**Noise Suppression:** Noise suppression is recommended for each relay contact switching inductive loads; see PDW90 manual for details.

**Initialization:** After power failure, relays will initialize to default state before reconnecting to wireless units.

**Signal Loss:** If mapped to digital input channel, the relay energizes.

## PDW90 Field Unit Specifications:

### General

**Display:** 32-character dual-line alphanumeric dot matrix LCD display with backlight (4.68mm x 2.21mm characters)

**Display Orientation:** Display may be mounted at 90° increments up to 270° from default orientation

**Network ID:** Field selectable: 0 - 99

**Programming Methods:** Four programming buttons (behind glass) or PC with PDW Manager software.

**Recalibration:** All inputs and outputs are calibrated at the factory. Recalibration is recommended at least every 12 months.

**Process/ Digital I/O Display:** Press the *display* button once to display the present analog input and output. Press the *display* button again to display digital I/O states.

**Password:** A programmable password restricts modification of programmed settings.

**Power:** 12-28 VDC, 5 W max

**Non-Volatile Memory:** All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

**Isolation:** 500 V

**Environmental:** Operating temperature range: -40 to 65°C (display inoperable < -20 °C)

Storage temperature range: -40 to 85°C

Relative humidity: 0 to 90% non-condensing

**Connections:** Removable screw terminal blocks accept 16 to 30 AWG wire.

**Enclosure:** Cast aluminum with glass window, 0.30% max copper content, corrosion resistant powder coating, color: blue. IP68. Two ½" NPT threaded conduit openings. One ½" NPT stainless steel conduit plug with 10 mm hex key fitting installed.

**Mounting:** May be mounted directly to conduit. Two mounting holes for 1.5" pipe or wall mounting. See Mounting Dimensions in the PDW90 manual for mounting space requirements.

**Signal Connector Tightening Torque:** 2.5 lb-in (0.28 Nm)

**Shipping Dimensions:** 17" x 14" x 9"

(43.2 cm x 35.6 cm x 22.9 cm) (L x W x H)

**Shipping Weight:** 5 lbs. (2.27 kg)

**Warranty:** 3 years parts & labor

## Analog Input

**Inputs:** Field selectable: 4-20 mA, 0-10 V, 0-5 V, 1-5 V

**Accuracy:**  $\pm 0.03\%$  of calibrated span  $\pm 1$  count

**Temperature Drift:** 0.005% of calibrated span/°C max from 0 to 65°C ambient, 0.01% of calibrated span/°C max from -40 to 0°C ambient

**Input Impedance:** Voltage ranges: greater than 500 k $\Omega$

Current ranges: 50 - 100 $\Omega$  (depending on resettable fuse impedance)

**Signal Loss:** Inputs will remain off (open circuit) until wireless units are reconnected.

**HART Transparency:** Analog input will not interfere with existing HART communications on the wired 4-20 mA signal.

## Isolated 4-20 mA Transmitter Output

**Output Source:** Analog input from connected wireless unit

**Calibration:** Factory calibrated: 4.000 to 20.000 = 4-20 mA output

**Accuracy:**  $\pm 0.1\%$  of span  $\pm 0.004$  mA

**Output Loop Power:** Sinking output, requires external 24 VDC power

**Temperature Drift:** 0.4  $\mu$ A/°C max from 0 to 65°C ambient,

0.8  $\mu$ A/°C max from -40 to 0°C ambient

Note: Analog output drift is separate from input drift.

### Output Loop Resistance:

| Power Supply | Minimum     | Maximum      |
|--------------|-------------|--------------|
| 24 VDC       | 10 $\Omega$ | 900 $\Omega$ |

**Signal Loss:** After approximately 25 seconds of trying to reconnect, mA output will become 3.2 mA

## Digital Input / Output Terminal

**Channels:** Four (4) digital connections, independently field selectable as either inputs or outputs

**Digital Input Logic High:** 3 to 5 VDC

**Digital Input Logic Low:** 0 to 1.1 VDC

**Digital Output Logic High:** 3.1 to 3.3 VDC

**Digital Output Logic Low:** 0 to 0.4 VDC

**Source Current:** 10 mA maximum output current

**Sink Current:** 1.5 mA minimum input current

**Signal Loss:** Digital output goes to logic high

## RS-485 Modbus® RTU Serial Communications

**Compatibility:** EIA-485

**Connectors:** Removable screw terminal connector

**Max Distance:** 3,937' (1,200 m) max

**Baud Rate:** 1200 – 57,600 bps

**Data:** 8 bit (1 start bit, 2 stop bits)

**Parity:** Even, Odd, or None with 2 stop bits

**Modbus Timeout:** 0.5, 1, 2, 3, 4, 5 seconds; user selectable



# PDW90 Point To Multi-Point Wireless

## General Specifications:

### Wireless Radio

**Frequency:** 900 MHz

**Range:** 500 ft (152.4 m) indoor,  
1 mi (1.61 km) outdoor (line-of-sight)

**Encryption:** AES 128 bit encryption available using PDW Manager software

**Power Output:** 24 dBm

**Sensitivity:** -101 dBm

### PDW Manager Software

**System Requirements:** Microsoft® Windows® XP/Vista/7/8/10

**Communications:** USB 2.0 (Standard USB A to Micro USB B)

**Configuration:** Configure device settings one at a time

### RS-485 Modbus® RTU Serial Comms

**Compatibility:** EIA-485

**Connectors:** Removable screw terminal connector

**Max Distance:** 3,937' (1,200 m) max

**Baud Rate:** 1200 – 57,600 bps

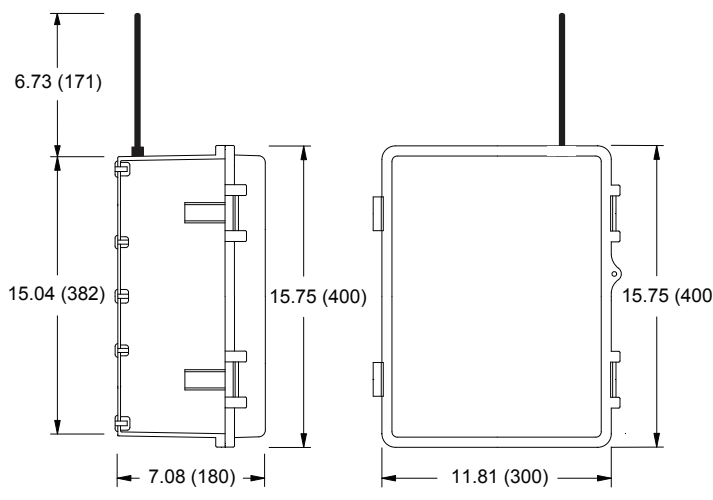
**Data:** 8 bit (1 start bit, 2 stop bits)

**Parity:** Even, Odd, or None with 2 stop bits

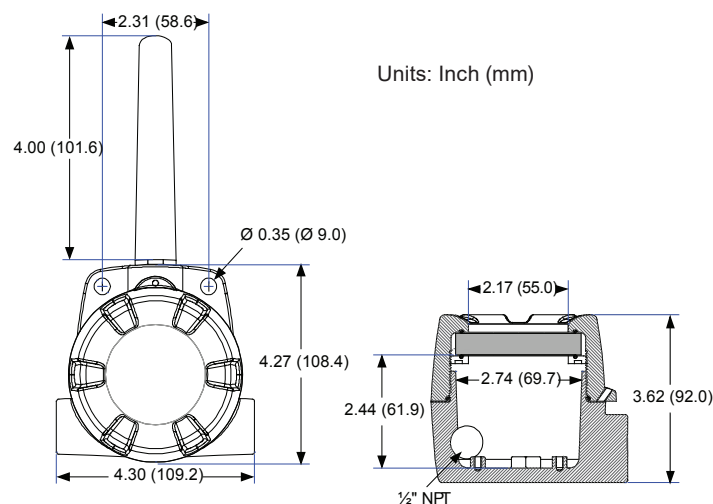
**Modbus Timeout:** 0.5, 1, 2, 3, 4, 5 seconds; user selectable

## DIMENSIONS

### Base Station Dimensions



### Field Unit Dimensions

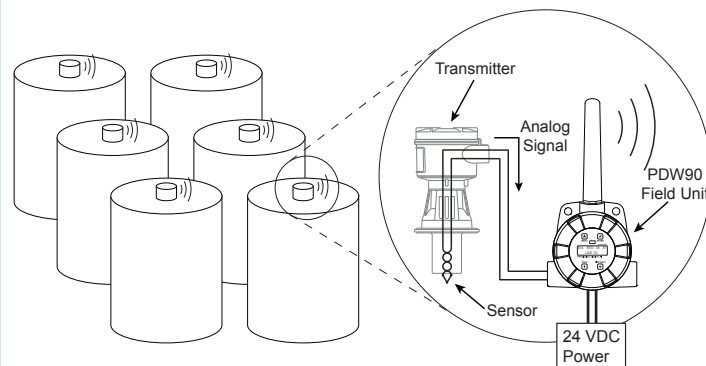


Units: Inch (mm)

## APPLICATION

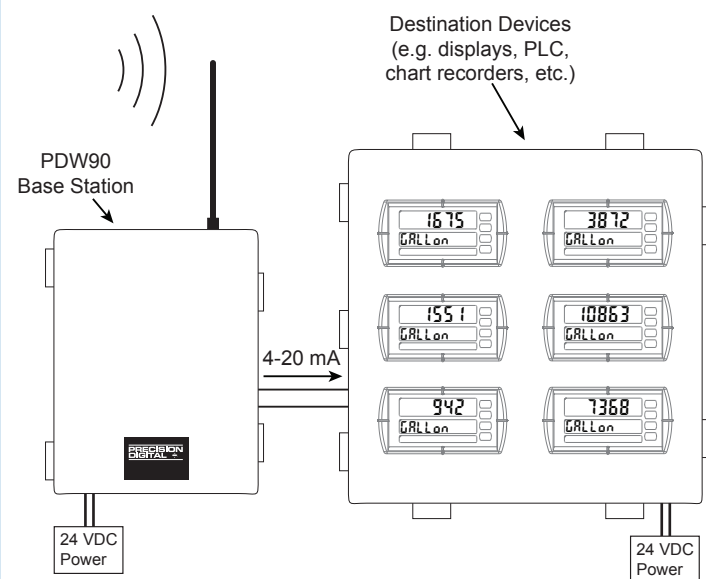
### Wireless Installation

The diagram below shows a typical PDW90 installation. Multiple transmitters are outputting analog signals to wireless field units. The analog signals are being wirelessly broadcasted to the PDW90 base station which then sends 4-20 mA signals to the destination devices. For installation and setup details see PDW90 instruction manual.



### Range:

500 ft (152.4 m) indoor,  
1 mi (1.6 km) outdoor/line-of-sight



# PDW90 Point To Multi-Point Wireless

## ORDERING INFORMATION

| PDW90 Wireless Components                                                                                     |                                                                |
|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Model                                                                                                         | Description                                                    |
| PDW90-BA                                                                                                      | PDW90 Point-to-Multipoint Wireless Process Signal Base Station |
| PDW90-FN                                                                                                      | PDW90 Point-to-Multipoint Wireless Process Signal Field Unit   |
| <b>Note:</b> Base station and all field units include antenna. Additional antennae can be ordered separately. |                                                                |

| Base Station Modules |                                              |
|----------------------|----------------------------------------------|
| Model                | Description                                  |
| PDM90-CA             | PDW90 Dual Analog Input Base Station Module  |
| PDM90-CT             | PDW90 Dual Analog Output Base Station Module |
| PDM90-CR             | PDW90 Dual Relay Output Base Station Module  |
| PDM90-CD             | PDW90 Dual Digital I/O Base Station Module   |

| Complete Systems |             |                      |                 |             |                  |
|------------------|-------------|----------------------|-----------------|-------------|------------------|
| Model Number     | Field Units | Base Station Modules |                 |             |                  |
|                  |             | Dual Analog In       | Dual Analog Out | Dual Relays | Quad Digital I/O |
| PDW90-S2N-0100   | 2           | 0                    | 1               | 0           | 0                |
| PDW90-S2N-1111   | 2           | 1                    | 1               | 1           | 1                |
| PDW90-S4N-0200   | 4           | 0                    | 2               | 0           | 0                |
| PDW90-S4N-2221   | 4           | 2                    | 2               | 2           | 1                |
| PDW90-S6N-0300   | 6           | 0                    | 3               | 0           | 0                |
| PDW90-S6N-3332   | 6           | 3                    | 3               | 3           | 2                |
| PDW90-S8N-0400   | 8           | 0                    | 4               | 0           | 0                |
| PDW90-S8N-4442   | 8           | 4                    | 4               | 4           | 2                |

**Note:** Whether you are buying a complete PDW90 wireless system, or just upgrading, you may customize it how you want and purchase only the parts needed.

| Accessories  |                                          |
|--------------|------------------------------------------|
| Model        | Description                              |
| PDA10        | PDW Wireless Signal Strength Survey Tool |
| PDA3900-12-N | PDW 900 MHz Antenna, 1/2" NPT            |
| PDA3900-34-N | PDW 900 MHz Antenna, 3/4" NPT            |
| PDA3900-6Y-N | Yagi Antenna 6dB                         |
| PDA3900-9Y-N | Yagi Antenna 9dB                         |
| PDA3120-S    | RP-SMA M/F Antenna Cable 20ft            |
| PDA3140-S    | RP-SMA M/F Antenna Cable 40ft            |
| PDA3120-N    | RP-SMA F to N Male Antenna Cable 20ft    |
| PDA3140-N    | RP-SMA F to N Male Antenna Cable 40ft    |
| PDA6963      | Stainless Steel Field Unit Mounting Kit  |
| PDA-MICROUSB | Micro-USB PC Programming Cable           |
| PDW30-RNA    | PDW30 Repeater Kit                       |

**Your Local Distributor is:**

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