PDW90
Point To Multi-Point Wireless

1 MILE OUTDOOR LINE-OF-SIGHT

500 FT INDOOR RANGE

PRECISION DIGITAL ÷ WIRELESS

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, 500 Ft Indoor

FIELD UNITS

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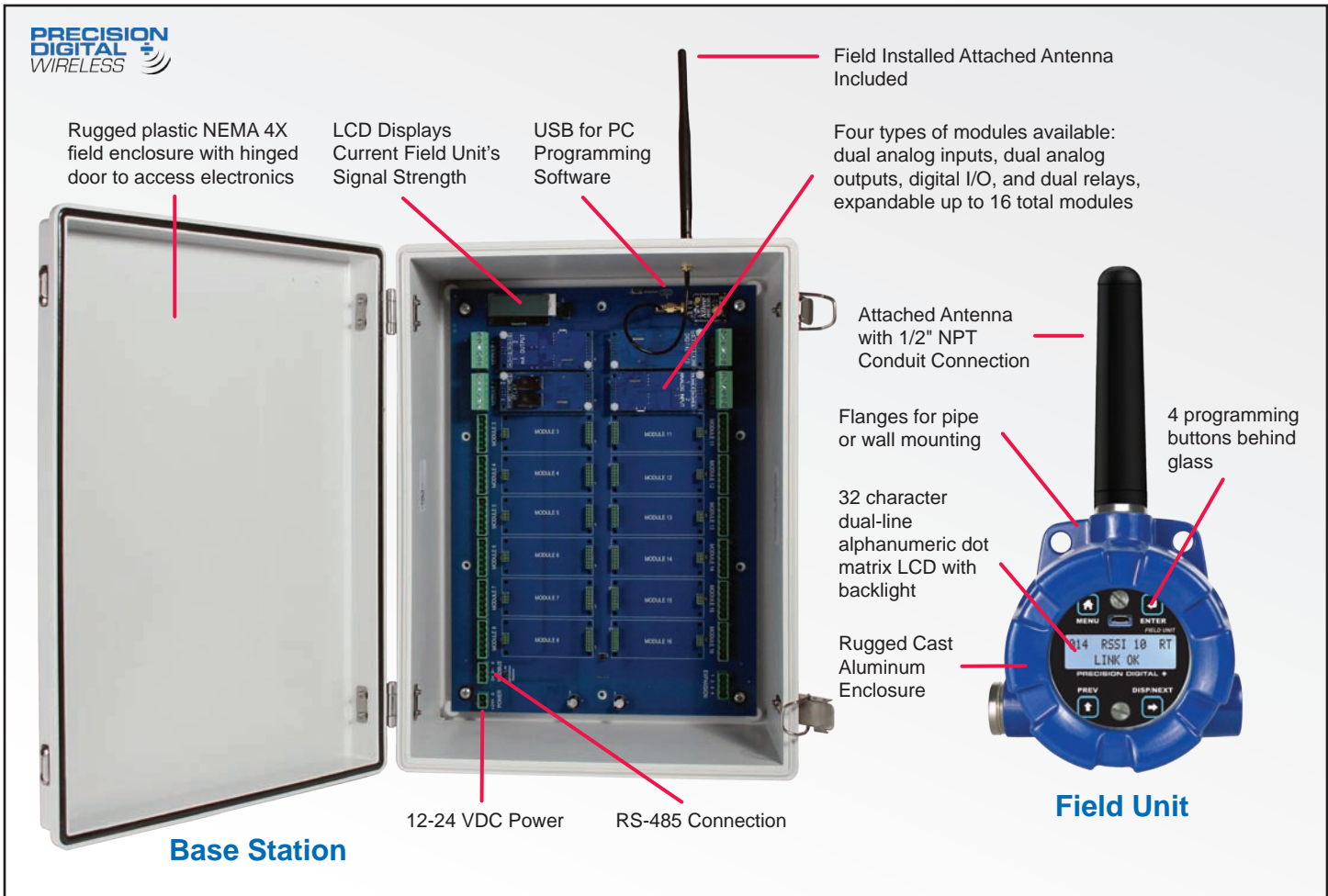- Flanges for Wall or Pipe Mounting

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)

PRECISION DIGITAL CORPORATION

PRECISION DIGITAL ÷

www.predig.com

PRECISION DIGITAL WIRELESS

Rugged plastic NEMA 4X field enclosure with hinged door to access electronics

LCD Displays Current Field Unit's Signal Strength

USB for PC Programming Software

Field Installed Attached Antenna Included

Four types of modules available: dual analog inputs, dual analog outputs, digital I/O, and dual relays, expandable up to 16 total modules

Attached Antenna with 1/2" NPT Conduit Connection

Flanges for pipe or wall mounting

4 programming buttons behind glass

32 character dual-line alphanumeric dot matrix LCD with backlight

Rugged Cast Aluminum Enclosure

12-24 VDC Power

RS-485 Connection

Base Station

Field Unit

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 an analog, digital, or Modbus® signal 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, or Modbus® inputs and wirelessly broadcast it 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.

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 antennae 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 instrumention 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 kit 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.

Range: 500 Ft. (152.4 m) Indoor, 1 miles (1.6 km) Outdoor Line-of-Sight
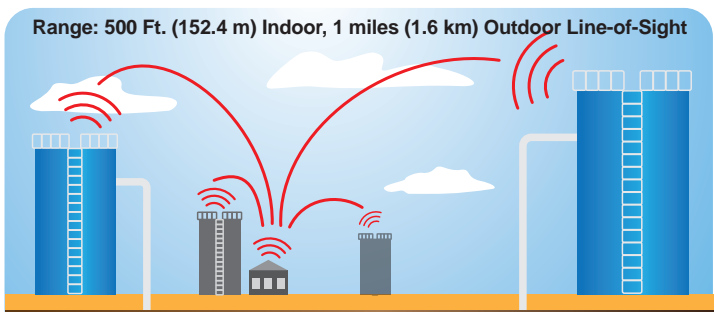
PDW Manager Software for Easier Setup

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 www.predig.com/PDWManager. Once the software is running, power the unit using a 12/24 VDC power supply and connect the device to the PC using the provided USB cable.
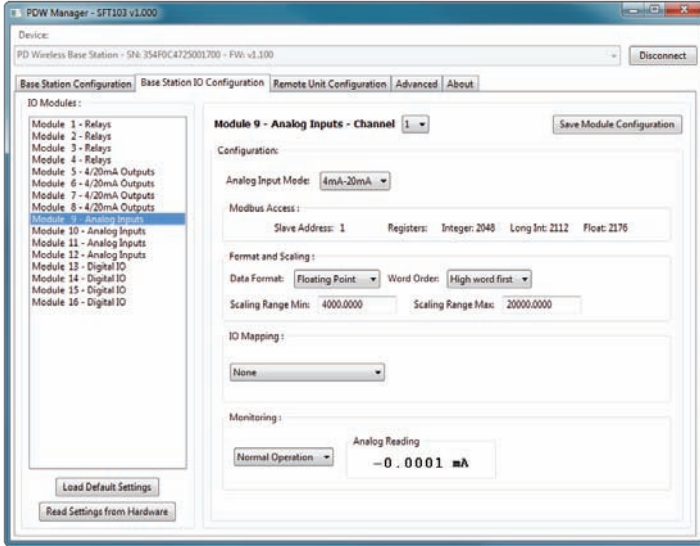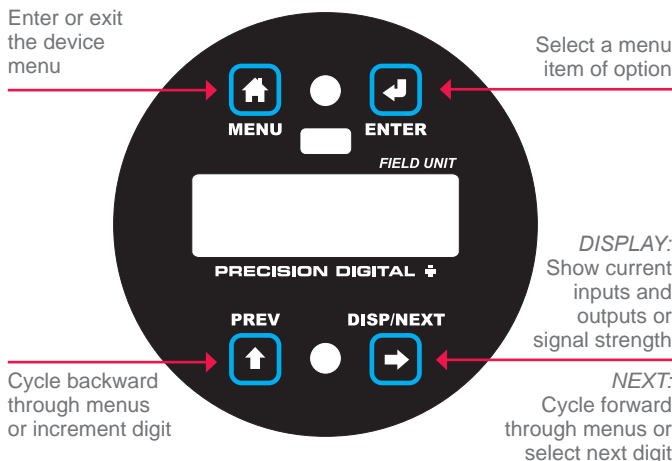

▲ *Configuration Window of the PDW Manager Software*

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.

Enter or exit the device menu

Select a menu item of option

MENU **ENTER**

FIELD UNIT

PRECISION DIGITAL

DISPLAY: Show current inputs and outputs or signal strength

PREV **DISP/NEXT**

Cycle backward through menus or increment digit

NEXT: Cycle forward through menus or select next digit

Inputs and Outphuts

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 Communincations. 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.
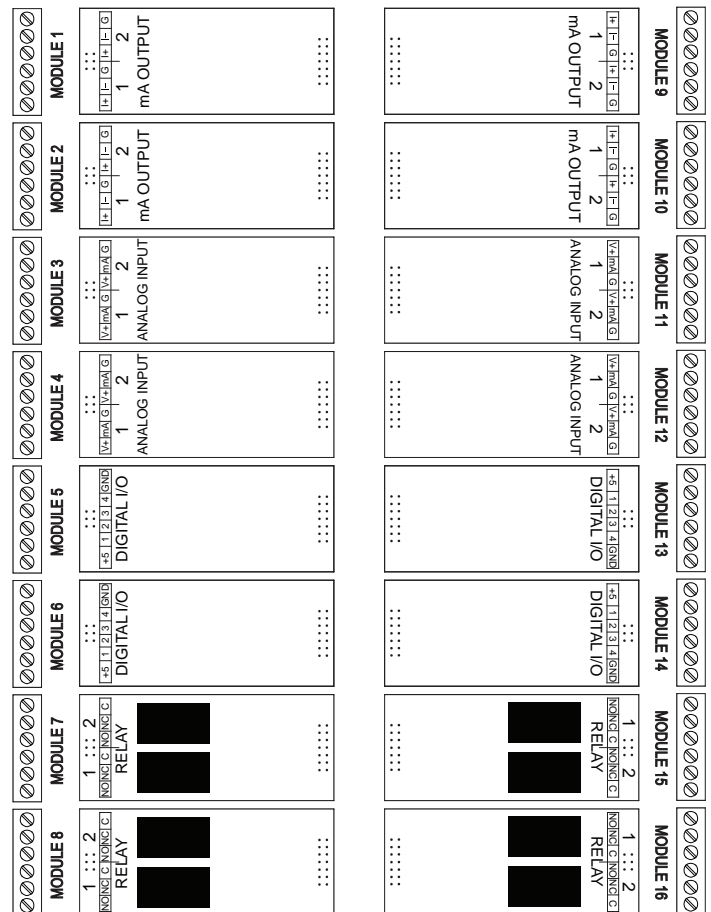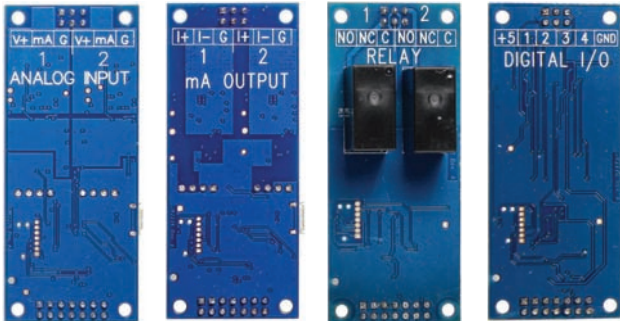

▲ *16 Module Connectors Inside the Base Station*

# 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.
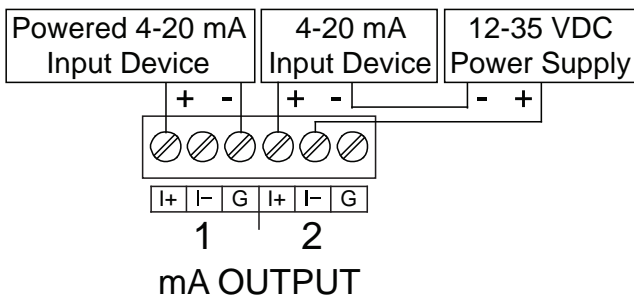
Analog Input Module Connector

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.
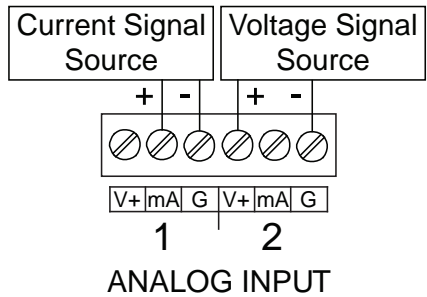

Analog Output Module Connector

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.
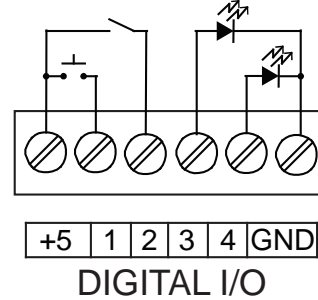

Relays Module Connector

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.
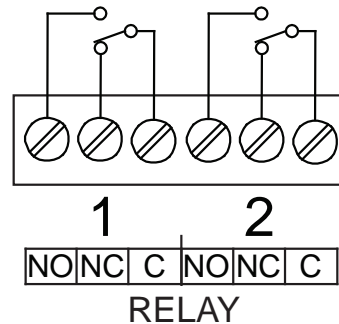
Field Unit Connections

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.*

PRECISION DIGITAL   *4*   *www.predig.com*
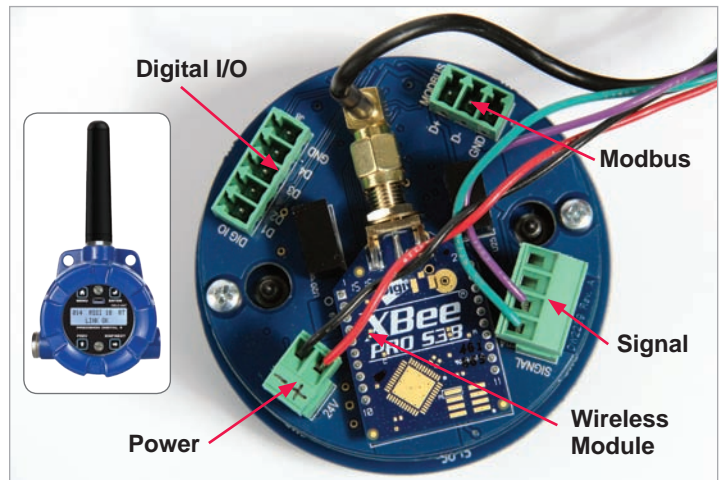
ACCESSORIES

Extend the Range of the PDW90

Optional accessories for the PDW90 are available to expand the 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 ±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 ± 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: ±0.03% of calibrated span ±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
Calibration Range:

Input Range	Minimum Span Input 1 & Input 2
4-20 mA	0.15 mA
±10 V	0.01 V

An error message will appear if the input 1 and input 2 signals are too close together.
Signal Loss: Inputs will remain off (open circuit) until wireless units are reconnected.
Input Impedance: *Voltage ranges:* greater than 500 kΩ
Current ranges: 50 - 100Ω (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: ± 0.1% of span ± 0.004 mA
Isolation: 500 V
Recalibration: All ranges are calibrated at the factory. Recalibration is recommended at least every 12 months.
Temperature Drift: 0.4 µA/°C max from 0 to 65°C ambient, 0.8 µA/°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 Ω	900 Ω

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

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 1.25 VDC
Digital Output Logic High: 3.1 to 3.3 VDC
Digital Output Logic Low: 0 to 0.4 VDC
Source Current: 0.5 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 (≈ 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 ranges 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 12 to 22 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 PWD90 manual for mounting space requirements.
Signal Connector Tightening Torque: 2.2 lb-in (0.25 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: ±0.03% of calibrated span ±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
Calibration Range:

Input Range	Minimum Span Input 1 & Input 2
4-20 mA	0.15 mA
±10 V	0.01 V

An error message will appear if the input 1 and input 2 signals are too close together.
Input Impedance: *Voltage ranges:* greater than 500 kΩ
Current ranges: 50 - 100Ω (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: ± 0.1% of span ± 0.004 mA
Output Loop Power: Sinking output, requires external 24 VDC power
Temperature Drift: 0.4 µA/°C max from 0 to 65°C ambient, 0.8 µA/°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 Ω	900 Ω

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 1.25 VDC
Digital Output Logic High: 3.1 to 3.3 VDC
Digital Output Logic Low: 0 to 0.4 VDC
Source Current: 0.5 mA maximum output current
Sink Current: 1.5 mA minimum input current
Signal Loss: Digital output goes to logic high

RS485 Modbus® RTU Serial Communications Terminal

Compatibility: EIA-485
Connectors: Removable screw terminal connector
Max Distance: 3,937' (1,200 m) max
Baud Rate: 1200 – 57,600 bps
Transmit Time Delay: Programmable between 0 and 199 ms
Data: 8 bit (1 start bit, 1 or 2 stop bits)
Parity: Even, Odd, or None with 1 or 2 stop bits
Byte-To-Byte Timeout: 0.01 – 2.54 second
Turn Around Delay: Less than 2 ms (fixed)

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
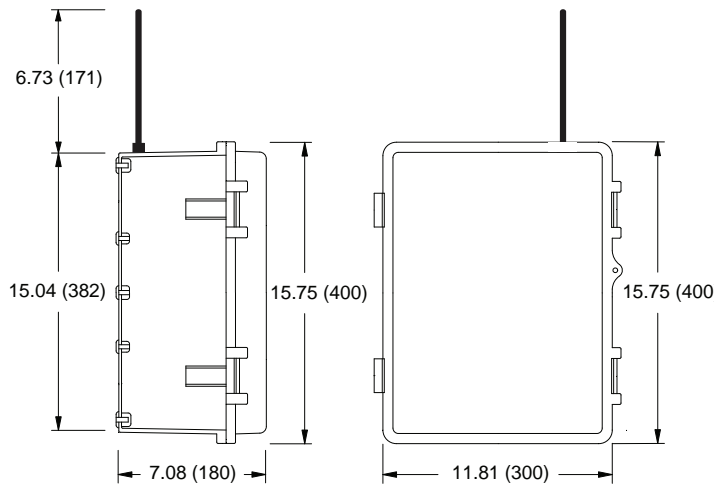**Sensitivity:** -101 dBm

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
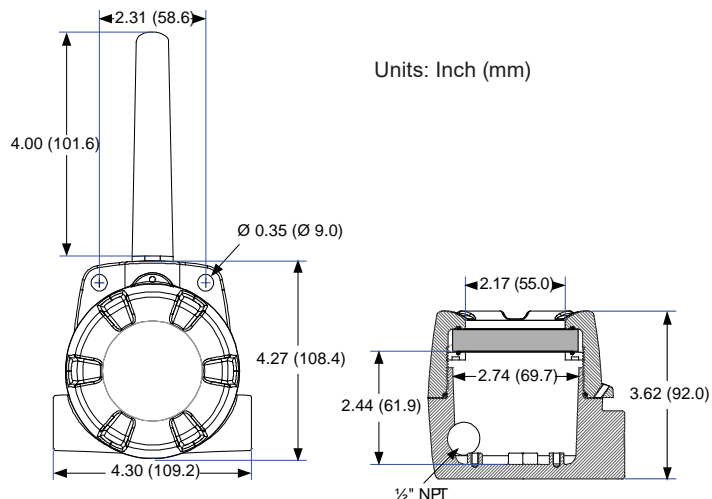
RS-485 Modbus® RTU Serial Comms

Compatibility: EIA-485
Connectors: Removable screw terminal connector
Max Distance: 3,937' (1,200 m) max
Baud Rate: 1200 – 57,600 bps
Transmit Time Delay: Programmable between 0 and 199 ms
Data: 8 bit (1 start bit, 1 or 2 stop bits)
Parity: Even, Odd, or None with 1 or 2 stop bits
Byte-To-Byte Timeout: 0.01 – 2.54 second
Turn Around Delay: Less than 2 ms (fixed)

DIMENSIONS

Base Station Dimensions

6.73 (171)
15.04 (382)
15.75 (400)
15.75 (400)
7.08 (180)
11.81 (300)

Field Unit Dimensions

2.31 (58.6)
Units: Inch (mm)
4.00 (101.6)
Ø 0.35 (Ø 9.0)
2.17 (55.0)
4.27 (108.4)
2.74 (69.7)
3.62 (92.0)
2.44 (61.9)
4.30 (109.2)
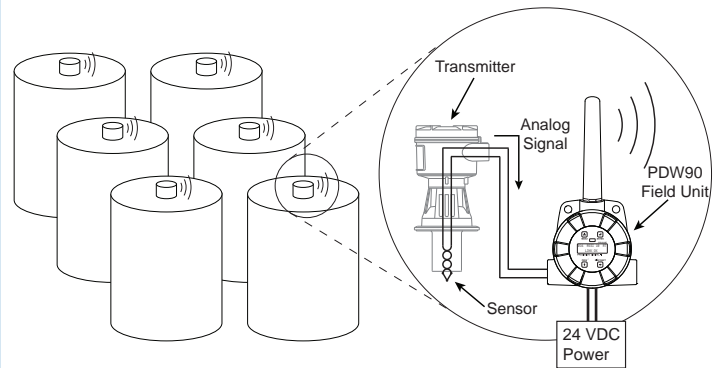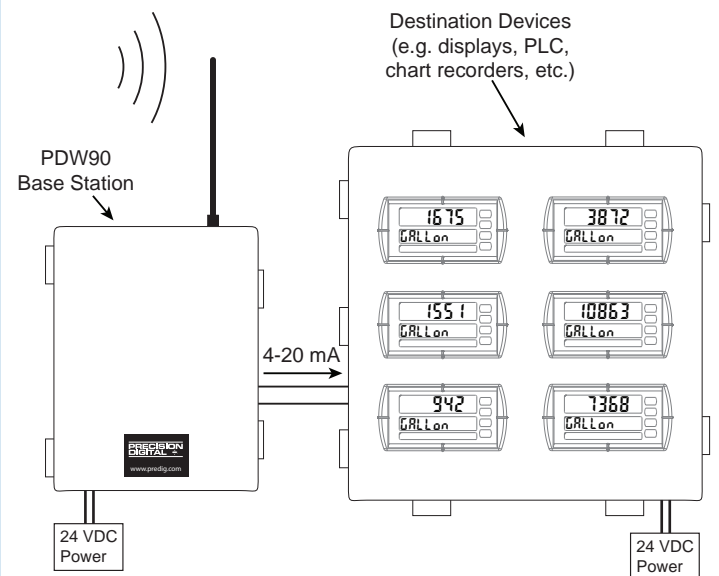½" NPT

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.*

Transmitter
Analog Signal
PDW90 Field Unit
Sensor
24 VDC Power

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

PDW90 Base Station
Destination Devices (e.g. displays, PLC, chart recorders, etc.)
4-20 mA
1675 GALLon
3872 GALLon
1551 GALLon
10863 GALLon
942 GALLon
7368 GALLon
24 VDC Power
24 VDC Power

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

Note: Base station and all field units include antenna. Additional antennae can be ordered separately.

Base Station Modules

Model	Description
PDA90-CA	PDW90 Dual Analog Input Base Station Module
PDA90-CT	PDW90 Dual Analog Output Base Station Module
PDA90-CR	PDW90 Dual Relay Output Base Station Module
PDA90-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	1	1	0	0
PDW90-S2N-1111	2	1	1	1	1
PDW90-S4N-0200	4	2	2	0	0
PDW90-S4N-2221	4	2	2	2	1
PDW90-S6N-0300	6	3	3	0	0
PDW90-S6N-3332	6	3	3	3	2
PDW90-S8N-0400	8	4	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 with Approvals, 1/2" NPT
PDA3900-12-A	PDA 2.4 GHz Antenna, 1/2" NPT
PDA3900-34-A	PDA 2.4 GHz Antenna with Approvals, 1/2" NPT
PDA3900-6Y-N	Yagi High Gain Directional Antenna 6dB
PDA3900-9Y-N	Yagi High Gain Directional Antenna 9dB
PDA3024-12-N	PDW 900 MHz Antenna, 3/4" NPT
PDA3024-34-N	PDW 900 MHz Antenna with Approvals, 3/4" NPT
PDA3024-12-A	PDA 2.4 GHz Antenna, 3/4" NPT
PDA3024-34-A	PDA 2.4 GHz Antenna with Approvals, 3/4" NPT
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

Your Local Distributor is:

Disclaimer

The information contained in this document is subject to change without notice. Precision Digital Corporation makes no representations or warranties with respect to the contents hereof, and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose.