Remote Wet to Wet Differential Pressure Transmitter

Installation and Operation

#NSA-HH/WPR2-100-10-C, NSA-HH/WPR2-100-10-LCD-C, NSA-HH/WPR2-300-10-C, NSA-HH/WPR2-300-10-LCD-C
NSA-HH/WPR2-30-10-C, NSA-HH/WPR2-30-10-LCD-C – 11/14/2019

Overview

The Carrier WPR2 Series Remote Wet to Wet Differential Pressure Transmitter is designed to reduce installation time and provide mounting flexibility, often eliminating the need for additional plumbing. They accurately measure wet media pressures in a variety of applications. Commonly used for monitoring pumps, these devices are also ideal for measuring pressure across filters, heat exchangers and compressors. The dual remote sensors are based on a ceramic capacitive sensing element with ¼"-18 NPT male (304 stainless steel) fittings. The WPR2's enclosure opens conveniently to allow it to be reconfigured between three additional ranges (see Specifications) and outputs of 4 to 20 mA, 0 to 5 VDC, or 0 to 10 VDC (default). The different configurations in this series can measure both uni or bi-directional pressure ranges as low as 3 psi and as high as 300 psi, depending on the unit. The WPR2 also features a push button auto zero function for remote calibration. The LCD option will display pressure values for both the High and Low side pressures, a differential pressure value, "OVR" for values over the specified range, "ERROR" for differential pressures out of range, and "ZERO" when the auto-zero is in process.

Applications: Monitoring Pumps, Compressors, Filters, Heat Exchangers, Flow

Part Numbers

NSA-HH/WPR2-100-10-C	**NSA-HH/WPR2-100-10-LCD-C**	**NSA-HH/WPR2-300-10-C**
NSA-HH/WPR2-300-10-LCD-C	**NSA-HH/WPR2-30-10-C**	**NSA-HH/WPR2-30-10-LCD-C**

Specifications

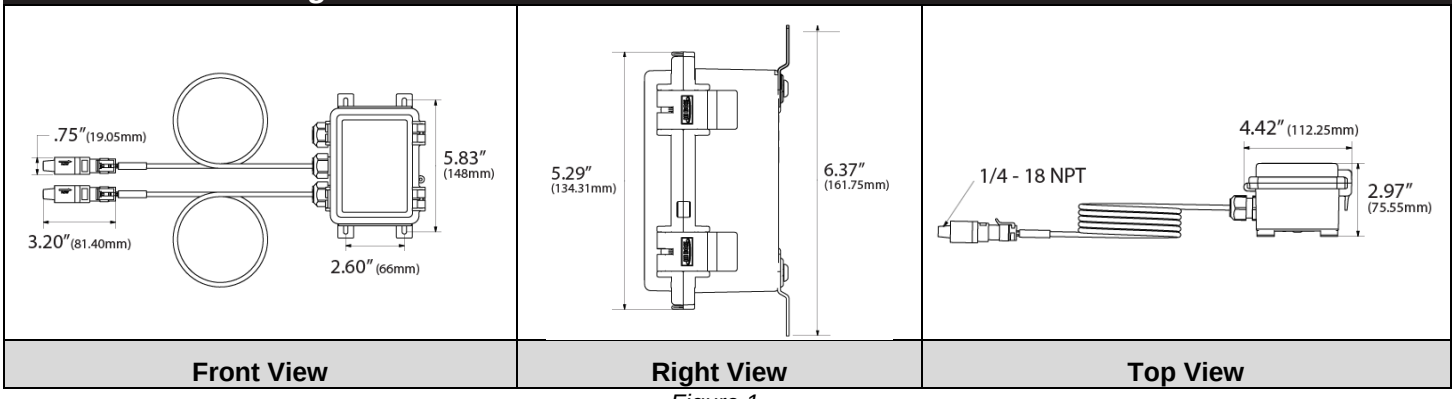
Supply Voltage:	**4 to 20 mA Output**: 250Ω Load: 18 to 36 VDC **| 500Ω Load**: 20 to 36 VDC **0 to 5 / 0 to 10 VDC Output**: 16 to 36 VDC, 21.6 to 26.4 VAC, 50/60 Hz
Supply Current:	**4-20 mA Output**: 24 mA minimum; 0-5 VDC | 0-10 VDC Outputs: 6 mA maximum
Output Signals:	**2-wire**: Linear 4-20 mA DC Current (Field Selectable) **3-wire**: 0-5 VDC; 0-10 VDC (Default)
Response Time (0-100% FSO):	8 seconds
Output Update Rate:	1 second
Output Load Resistance:	**4 to 20 mA**: 500 ohms maximum **| 0-5 VDC/0-10 VDC**: 5K ohms minimum
Field Selectable Ranges:	**NSA-HH/WPR2-100-10 Series**: Uni-Directional: 0-100, 0-50, 0-25 and 0-10 psid | Bi-Directional: +/-100, +/-50, +/-25 and +/-10 **NSA-HH/WPR2-300-10 Series**: Uni-Directional: 0-300, 0-150, 0-75 and 0-30 psid | Bi-Directional: +/-300,+/-150, +/-75 and +/-30 **NSA-HH/WPR2-30-10 Series**: Uni-Directional: 0-30, 0-15, 0-7.5 and 0-3 psid | Bi-Directional: +/-30, +/-15, +/-7.5 and +/-3
Warm Up Time:	15 minutes (wait 15 minutes before zeroing)
Accuracy[1](Three Highest Ranges):	±1.0% FSO
Accuracy[1](Lowest Range):	±1.5% FSO
Thermal Effects[2]:	±2.0% FSO from 32-140°F (0-60°C)
Operating Temperature:	**Transducer**: -40 to 257ºF (-40 to 125ºC) **Electronics/Housing/Cables**: 32-167°F (0-75°C)
Compensated Temperature Range:	32 to 140°F (0 to 60°C)
Storage Temperature:	-13 to 176ºF (-25 to 80ºC)
Operating Humidity:	10 to 90% RH non-condensing
Proof Pressure:	**NSA-A/WPR2-30 Series and NSA-A/WPR2-100 Series**: 3X FS **NSA-A/WPR2-300 Series**: 2X FS
Burst Pressure:	1500 psi
Media Types:	Any liquids or gases compatible with Neoprene seal

Process Fitting Material:	304 SS
Process Fitting Size:	1/4"-18 NPT Male; Pressure Snubber included for light oils/water (NSA-WPR2-30/NSA-WPR2-100 Models)
Recommend Torque Specification:	150 lbs-in (16.95 Nm)
Transducer Cable Rating | Connector Type:	Type CMP – Plenum Rated (UL Standard 444), NEC Article 800 | Packard Connector
Enclosure Material | Flammability Rating:	Flame Retardant PC | PBT Alloy | UL94V-0
Enclosure Rating:	NEMA 4X/IP66
Approvals:	CE, RoHS2, WEEE, Reach
Product Dimensions (L x W x D):	5.30" x 5.07" x 3.00" (13.46 cm x 12.88 cm x 7.62 cm)
Product Weights:	**NSA-A/WPR2(0-xxx psid)-10'-C**: 2.1 lbs (0.953 kg) **NSA-A/WPR2(0-xxx psid)-10'-LCD-C**: 2.2 lbs (0.998 kg)

[1]Accuracy includes Linearity, Hysteresis, and Repeatability @ 71ºF (21.5ºC)

[2]Shift Relative to 71ºF (21.5ºC)

Dimensional Drawing



Front View	Right View	Top View

Figure 1

Installation

- Remove power before wiring. Never connect or disconnect wiring with the power applied. Do not allow live wires to touch the circuit board.
- An Isolation Transformer Is Recommended When Powering The Device With 24vac.
- Do Not Run The Wiring In Any Conduit With Line Voltage.
- Failure to wire devices with the correct polarity when using a shared transformer may result in damage to any device powered by the shared transformer.
- Do not switch pressure range and output mode when power is on. Make sure to power off the unit first, then move jumpers to the right positions and then power on the transmitter.
- Do not apply any external voltage to zero terminals.
- Do not replace pressure sensors with any other sensors. Do not interchange the high and low sensors. The high and low sensors are specifically calibrated to the WPR2 unit.
- Any changes to the sensors will void the product warranty.

Wiring Instructions

Shielded cable with 16 to 22AWG conductors is recommended. Each WPR2 unit can be configured to three output modes: 4-20mA, 0-5V and 0-10V. Use the Wiring Connections table below to determine the proper wiring for your application. See Figure 1 below for Output Mode and Output Signal switch positions.

NOTE The WPR2 units are shipped from the factory set up with a 0-10 VDC output.

NSA-HH/WPR2-100-10-C | NSA-HH/WPR2-100-10-LCD-C | NSA-HH/WPR2-30-10-C | NSA-HH/WPR2-30-10-LCD-C					
Output Mode (SW8)	**Output Signal (SW7 Position 2)**	**Supply Voltage**	**Wire Connections**		
Vout	0-5 VDC (5V)	VAC/VDC	V+	COM	VOUT
Vout	0-5 VDC (5V)	VAC/VDC	V+	COM	VOUT
mA	4-20 mA	VDC	V+		IOUT

NSA-HH/WPR2-300					
Output Mode (SW8)	**Output Signal (SW7 Position 2)**	**Supply Voltage**	**Wire Connections**		
Vout	0-5 VDC (5V)	VAC/VDC	V+	COM	VOUT
Vout	0-10 VDC (5V)	VAC/VDC	V+	COM	VOUT
mA	4-20 mA	VDC	V+		IOUT

Wiring Connections

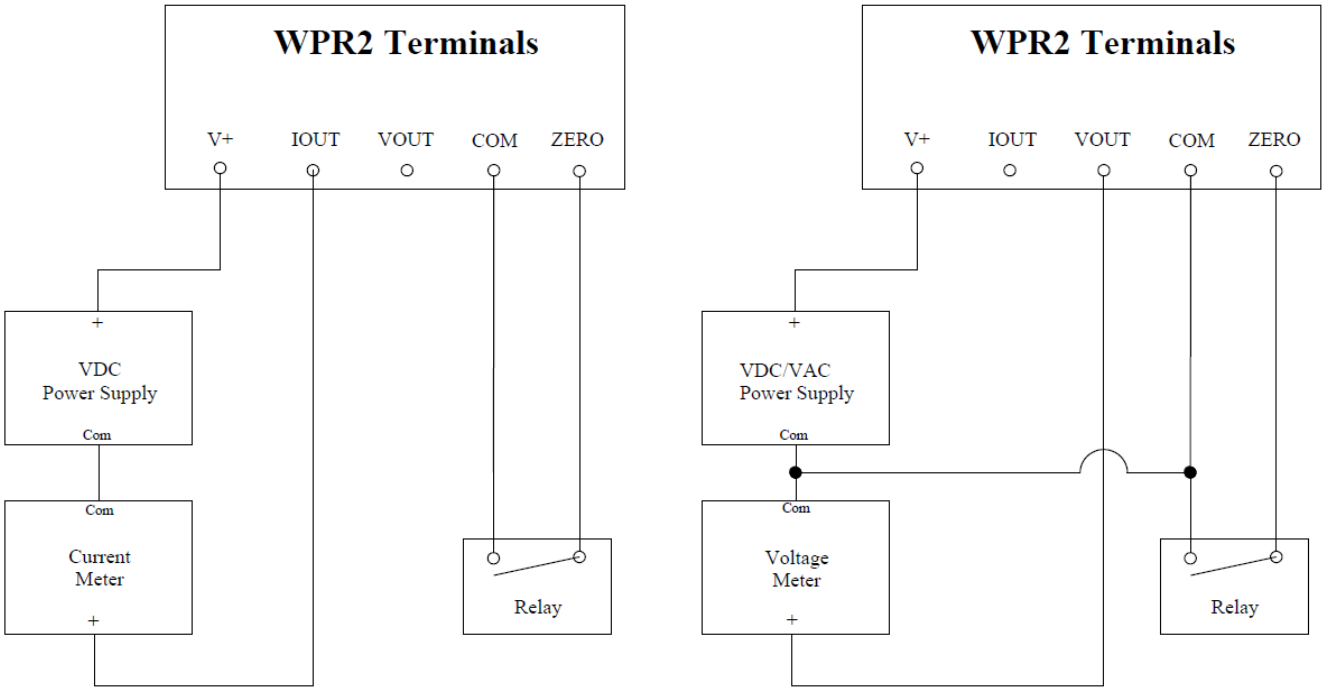


Figure 2

Auto Zero

The WPR2 unit should be "**ZEROED**" before the pressure transducers are installed on the pipes. The Auto zero button and remote zero are both used to cancel out the offsets caused by installation and sensor drift.

NOTE Make sure a minimum of 10 minutes of warm-up time before adjustment to the ZERO.

The Auto Zero adjustment should only be performed with NO pressure applied to both sensors.

- Shut off your main pressure valve and open a shutoff valve with hose drain to equalize the pressure in the line to your atmosphere.
- Remove the sensors from the system to remove pressure from each sensor to achieve equal pressure.
- Push "**ZERO**" button or "**SHORT ZERO PIN**" for 2 seconds to "**COM PIN**" before installation or when it is necessary.

For units with LCD display:

"**ZERO**" icon will be on when the push button is released. If auto zero is successful, "**ZERO**" icon will flash twice, otherwise "**ERROR**" and "**OVR**" icons will flash twice.

Pressure Connections

The WPR2 Series have 1/4"-18NPT male fittings. The sensors are labeled "SENSOR HIGH" and "SENSOR LOW"; **MAKE SURE THE SENSORS ARE WIRED TO THE CORRESPONDING TERMINAL BLOCK INSIDE THE HOUSING.** Otherwise Carrier will not guarantee the accuracy specifications. **DO NOT REPLACE SENSORS WITH ANY OTHER SENSORS. THE WPR2 UNITS ARE CALIBRATED WITH THE HIGH AND LOW SENSORS SUPPLIED WITH THE UNIT.**

NSA-WPR2-300 units can handle a proof pressure of 600 psi for both HIGH and LOW pressure sensors. All other **NSA-WPR2** units can handle a proof pressure of **3X THE MAXIMUM LINE PRESSURE** for both HIGH and LOW pressure sensors. If after connecting the pipe, the unit outputs out-of-range signal **OVR** on display only turn off the unit, disconnect the pipe or shut down the valves immediately and check the pressure input with a gauge or other test instrument.

A Pressure Snubber* is included with each sensor to dampen pressure surges. A pigtail siphon should be used to lower the media temperature below 230°F (110°C) to prevent damage to the pressure sensor.

***NSA-WPR2-300** Pressure Snubbers are optional.

Installation: NSA-HH/WPR2-100-10-C, NSA-HH/WPR2-100-10-LCD-C, NSA-HH/WPR2-30-10-C NSA-HH/WPR2-30-10-LCD-C

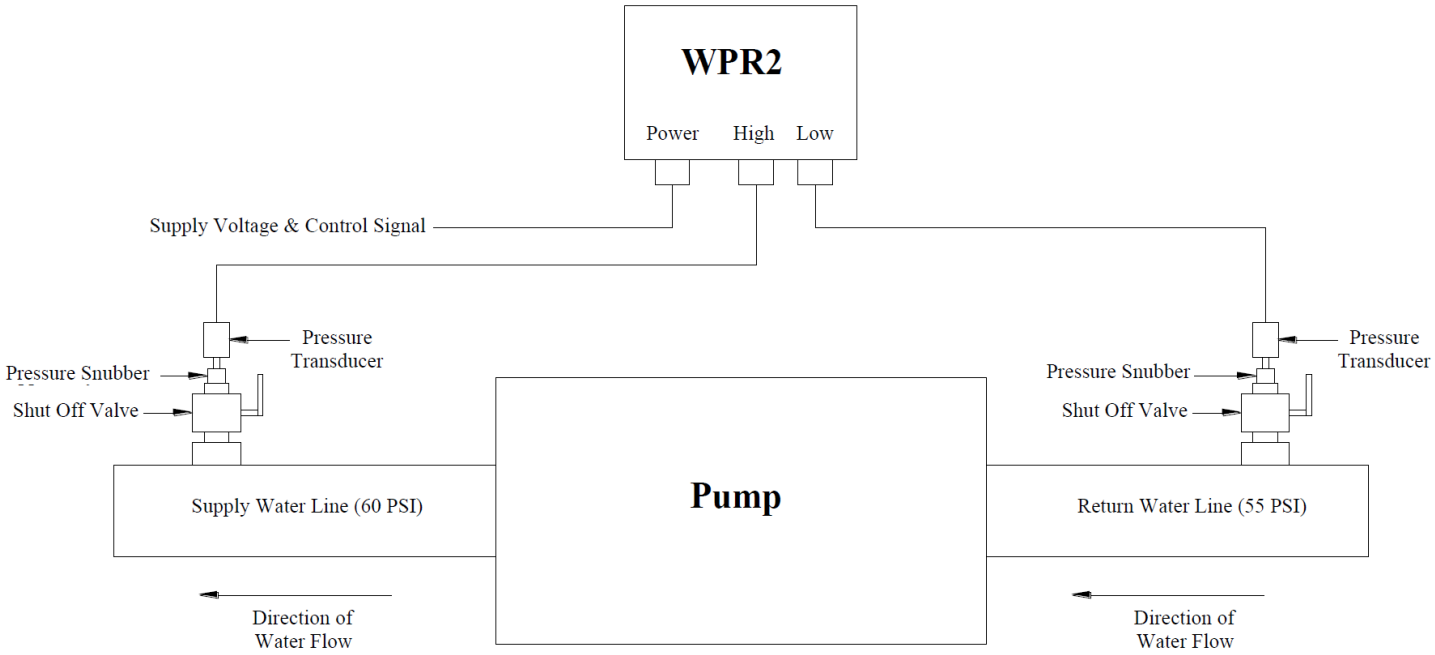


Figure 3

Installation: NSA-HH/WPR2-300

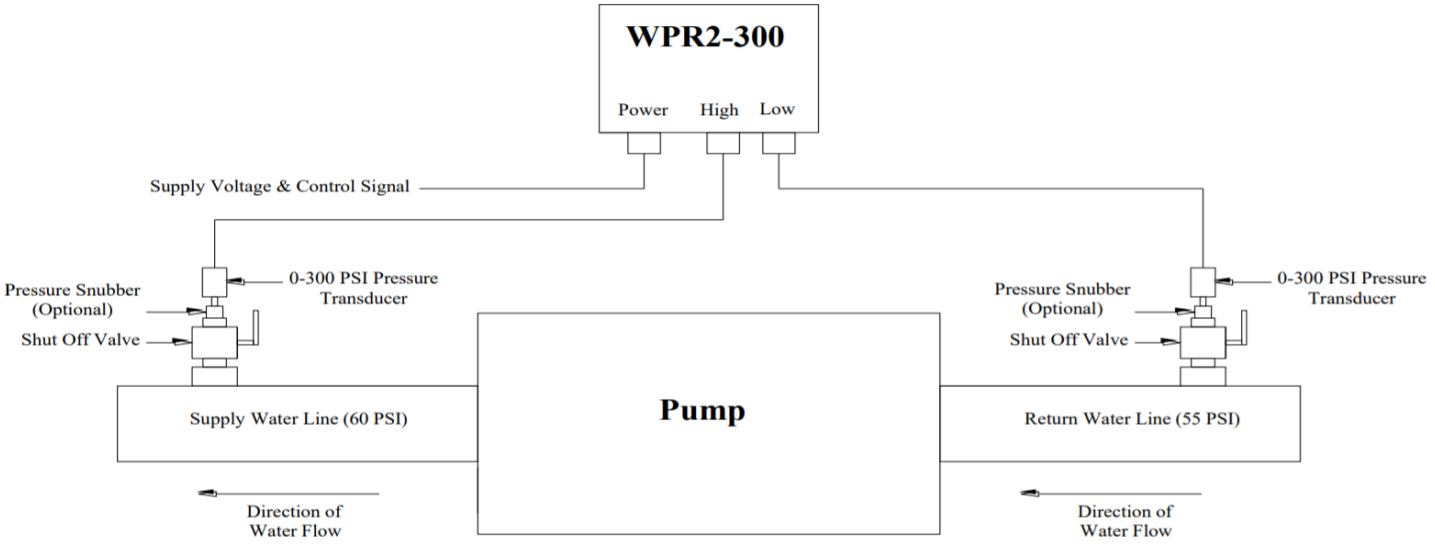


Figure 4

Input Range Adjustment

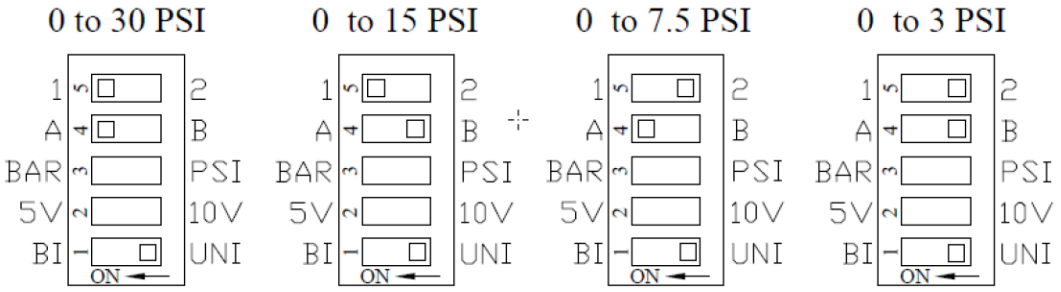
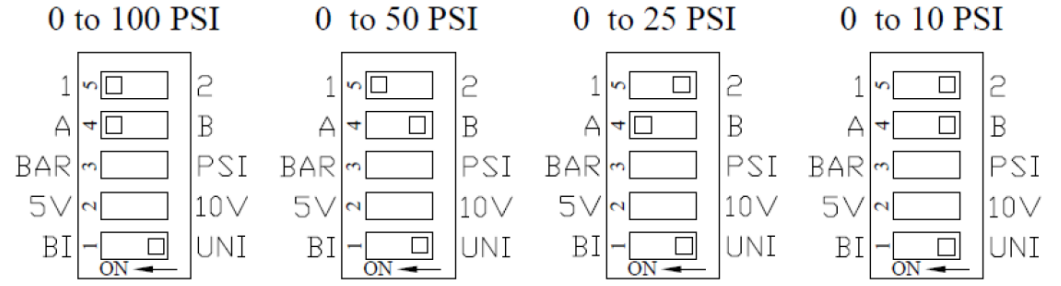
- Do not switch pressure range and output mode when power is on. Make sure power to the unit is off. Failure to do so will not allow any new switch settings to take place.
- Choose differential range based on the expected differential pressure in your application. Move switches to the correct positions and then power on the transmitter.
- Maximum line pressure

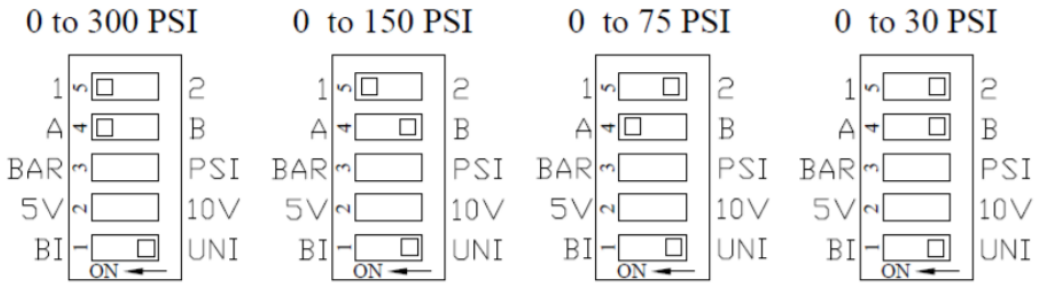
Part No.	Maximum Line Pressure
NSA-WPR2-30	30 PSI
NSA-WPR2-100	100 PSI
NSA-HH/WPR2-300	600 PSI

The WPR2 can operate in either unidirectional mode (0 – X PSI) or bidirectional mode (± X PSI). The unit will set at unidirectional mode after factory calibration.

Unidirectional Mode

- DIP switch SW7 position 1 set at **UNI** side.
- DIP switch SW7 positions 4 and 5 are for Range Selection

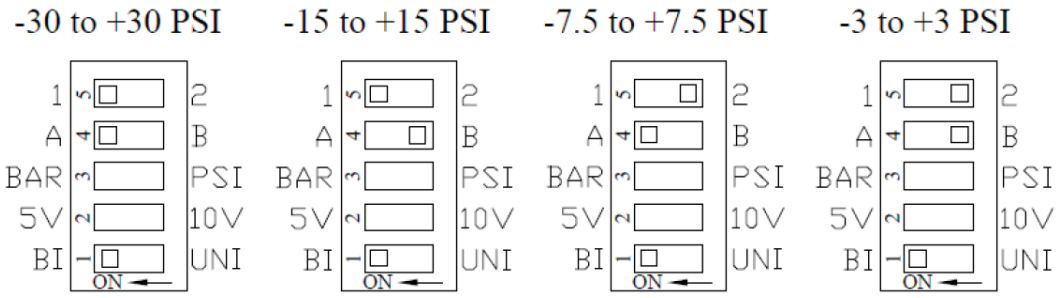
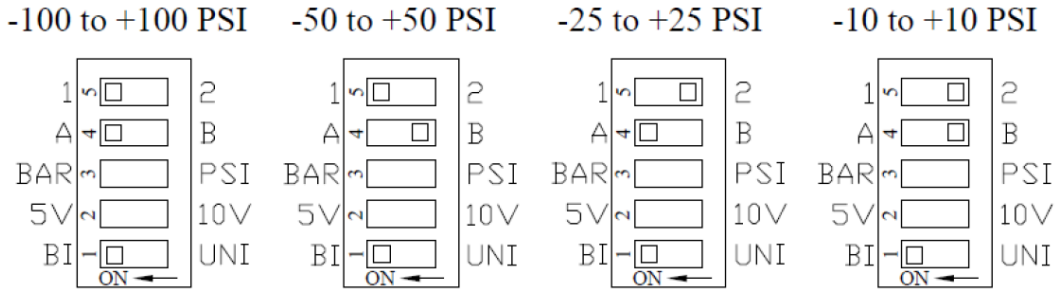
NSA-WPR2-30	
NSA-WPR2-100	

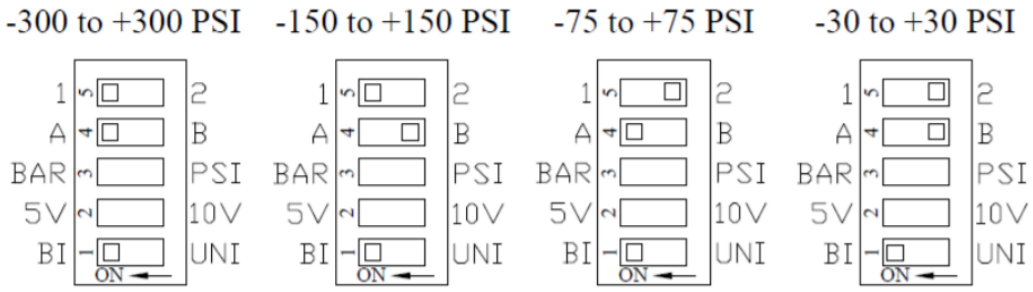
NSA-WPR2-300	

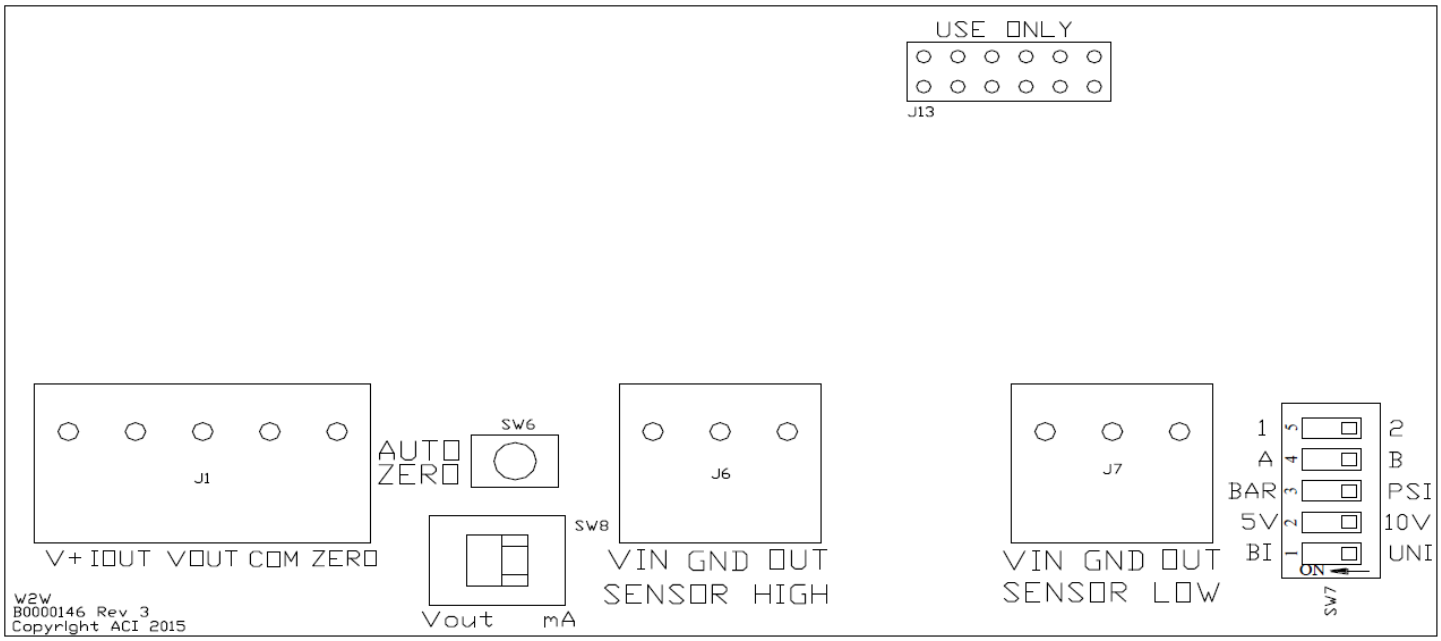
Bidirectional Mode

- DIP switch SW7 position 1 set at **BI** side.
- DIP switch SW7 positions 4 and 5 are for Range Selection

NOTE In Bidirectional mode, a value of 0 PSID will have an output equal to 50% of the full output range (12mA, 2.5V, 5V).

NSA-WPR2-30	
NSA-WPR2-100	

NSA-WPR2-300	



Engineering Units Adjustment

This option is ONLY for units with LCD display. Switch DIP switch SW7 position 3 to select PSI or BAR.

Advanced Features

For units with LCD display:

- **ERROR** icon will be on when differential pressure is out of range.
- **OVR** icon will be on when gage pressure is out of range on either the high or low port.

Troubleshooting

Problem	Trouble Shooting Steps
"ERROR" icon on Display will be on when differential pressure is out of range. The differential pressure could be lower or higher than the selected range. "OVR" icon on Display will be on when the input pressure is > than Max Line Pressure. Check pressure input with a gauge or other test instrument. The WPR2-300 Series is available for pressures over 100 PSI.	1. Verify the HIGH Sensor Voltage is between 0.5 VDC (0 PSI) and 4.5 VDC (Max. Line Pressure) When measuring from the HIGH Sensor terminal Block "GND" to "OUT". If out of range call Carrier for Technical support. 2. Verify the LOW Sensor Voltage is between 0.5 VDC (0 PSI) and 4.5 VDC (Max. Line Pressure) When measuring from the LOW Sensor terminal Block "GND" to "OUT". If out of range call Carrier for Technical support. 3. Verify in Uni-Directional Mode that the HIGH Sensor Voltage is ≥ the LOW Sensor Voltage. If voltage is anything different call Carrier for Technical support.
Output reading @ 4mA or 0 VDC ll the time	1. Verify proper Supply Voltage at the transducer meets the Product Specifications. 2. Verify 5 VDC Reference voltage across "VIN" to "GND" terminals for both the HIGH & LOW Sensor terminal blocks. If voltage is anything different than 5VDC call Carrier for Technical support.
Erroneous Readings	1. Bleed Air from System. 2. Repeat the Auto Zero calibration on page 2.