

INSTRUMENTATION NORTHWEST, INC.

Typical Specification for *PT2X Smart Sensor* and *Aqua4Plus Host Software*

1.0 Scope

- 1.1 The system shall collect and store pressure, temperature and time data.
- 1.2 The sensor shall fit inside 1-inch, schedule 40 and schedule 80 PVC casing or larger.
- 1.3 The system shall be able to network up to 32 sensors, which can be controlled from one location.
- 1.4 The system shall accommodate a combined cable run of up to 4000 feet.
- 1.5 The system shall use MODBUS[®] RTU interface protocol.
- 1.6 The system shall be delivered fully assembled and custom-sized for each well.
- 1.7 The system shall be a *PT2X Smart Sensor with Aqua4Plus Host Software*, manufactured by Instrumentation Northwest.

2.0 Sensor/Datalogger Design

- 2.1 The sensor/datalogger shall measure and record pressure, temperature and time.
- 2.2 Pressure measurements shall be accurate to $\pm 0.05\%$ FSO at 25° C (typical).
- 2.3 The sensor/datalogger shall have at least one megabyte of non-volatile memory, with the ability to collect at least 130,000 records of pressure, temperature and time.
- 2.4 The sensor/datalogger shall be available in absolute or gauge pressure versions.
- 2.5 All pressure readings shall be compensated for variation in fluid temperature.
- 2.6 The sensor/datalogger shall be able to use user-replaceable AA batteries and be capable of collecting at least 130,000 records before replacement is needed.
- 2.7 The sensor shall monitor remaining battery life.
- 2.8 The sensor shall be no larger than .84" in diameter.

3.0 Software Design

- 3.1 The software shall be capable of communicating with the sensor or sensor network via a serial or USB port at 38.4K Baud.
- 3.2 The software shall display real time readings from the sensor.
- 3.3 The software shall be able to create and save multi-phased, variable-interval test sequences and send these test sequences to the sensor/datalogger.
- 3.4 The software shall upload and save test data from the sensor/datalogger.
- 3.5 The software shall display uploaded test data.
- 3.6 The software shall export test data to a format easily accessed by common Windows[®] based spreadsheets and databases.
- 3.7 The software shall print uploaded test data.
- 3.8 The software shall control up to 32 sensors/dataloggers.

4.0 Cable Assembly Design

- 4.1 The cable shall be polyurethane, Teflon®, or polyethylene jacketed.
- 4.2 The cable shall be vented to atmosphere, with a dessicant assembly at the well-head to prevent buildup of moisture in the vent tube, for gauge version sensors.
- 4.3 The cable shall be continuous with no splices.
- 4.4 The cable connection to the sensor shall be waterproof up to a pressure of at least 325 psi to prevent leakage of fluid inside the sensor housing.
- 4.5 The cable shall have a breaking strength of at least 138 lbs.
- 4.6 All connecting fittings shall be capable of supporting a working tensile load of 50 lbs.

5.0 Well Seal Design

- 5.1 The well seal shall provide a water-tight barrier at the top of the monitoring well casing.
- 5.2 The well seal shall be capable of installation without the use of special tools.
- 5.3 When installed in two-inch or four-inch PVC casing, no component of the well seal shall protrude more than 3.5" inches above the top of the monitoring well. A low-profile option shall also be available.
- 5.4 The well seal shall have a minimum of two ports, one port for a communication connection to the sensor, and one port to allow access to the well.
- 5.5 Each port on the well seal shall have a water-tight cap that provides a barrier against water infiltration to the well when attached by hand. The caps shall be secured to the top surface of the well seal with a flexible lanyard.
- 5.6 Connection to the communication leads shall be of a quick-disconnect type.
- 5.8 The well seal design shall provide an eye-bolt or equivalent method for load transfer from the cable assembly to the top of the monitoring well casing and some method for suspending the cable from the eye-bolt to provide strain relief.
- 5.9 The well seal shall have a non-corrosive identification tag bearing at least the following information: well I.D., installation depth, system serial number, and model number.

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