



SMT Research received the NRC-IRAP 2007 New Technology Award for the WiDAQ.

## Industrial Wireless Data Acquisition Node

### General Description

The Industrial Wireless Data Acquisition Node (WiDAQ) is a high precision measurement device designed for distributed remote sensor data acquisition. The built-in 24-bit A/D converter and low noise high precision measurement circuitry facilitates data acquisition from a wide variety of precision sensors used in Building Science research.

The Industrial WiDAQ has the ability to communicate both wireless and wired to the SMT Building Intelligence gateway. When wired, the Industrial WiDAQ can serve as a CAN coordinator for other wireless WiDAQs. This configuration offers several benefits over a wireless only system as wired nodes act as coordinators for remote nodes resulting in increased battery life and facilitates wireless deployment in areas where wireless communication is not sustainable. The wired backbone operates over the industry standard Controller Area Network (CAN) permitting dense sensor deployments in harsh environments.

### Applications

Building Science Research (long term)

- Window and wall module evaluation.
- External façade sensing.

Green Roof Research

- Mass moisture and temperature sensing

Field Applications/Research

- Long term structure monitoring
- Targeted repair monitoring

See the Mobile WiDAQ datasheet for fast deployment, short term monitoring solutions.

### Features

- Eight resistance channels capable of reading wide moisture content ranges and precision thermistors.
- Two voltage channels for reading 0-5V sensors.
- Circuitry is housed in a NEMA IP66 rated enclosure suitable for outdoor installations.
- Sensor inputs use screw down terminal connectors for universal field configurations. No special crimp tools required.
- Resistance measurements can be performed in either positive or negative polarity for the purpose of negating half cell voltages or diode effects in monitored structures.
- Each input is optically isolated from each other and earth ground preventing ground loops and external noise influences on the measurement (wireless mode operation).
- Integrated Temperature Sensor
- Internal 1Mbit EEPROM used for data logging.
- Communicates to SMT Building Intelligence Gateway (BiG) via USB WiKey or wired CAN USB device.
- Powered by 4 AA batteries for long term monitoring.
- Optional built in solar panel for long term monitoring when used outdoors.
- Can be configured to measure up to eight differential voltage channels.

**Performance/Functional Specifications**
**Communication Electrical/Performance**
Wired CAN mode per repeater

Max Distance	1000m 22 AWG control wire
Max Nodes	128 nodes
CAN Interface	CAN 2.0B (ISO 11898)
CAN Speed	10kbps
Input Power	6VDC to 12VDC

Wireless

Specification	IEEE 802.15.4
Max Distance from coordinator	30m (with included antenna, extended ranges up to 350m available with optional external antennas)
Max Nodes per coordinator	32 (depends on application density and acquisition speed)
Battery Life	2 years (depends on sampling frequency)

Other

Memory	1Mbit EEPROM for data logging
--------	-------------------------------

**Environmental**

Operating Temperature	0° to 40°C / 32° to 104°F
Storage Temperature	-25° to 70°C / -13° to 158°F
Humidity	5% to 90% RH non-condensing
Electrostatic Discharge (ESD)	8kVdc air, 4 kVDC contact (exposed inputs)

**Mechanical**
Watertight Enclosure

Dimensions	118mm (L) x 90mm (W) x 60mm (H)
Weight	200g
Rating	IP66

Connections

CAN in/out	Single RJ45
Sensors	Terminal Block

Interface

LEDs	Red/Green LEDs
Button	Power/Config Button

**Measurement Electrical/Performance**
Internal Temperature – Input 2

Sensor	Panasonic ERT-J1VS104FA Beta 4390K
Range	-40°C to +70°C
Resolution	0.1°C
Accuracy	±1°C

Resistance – Input 17 to 24

Range	100Ω to 1KΩ
Resolution	10Ω
Accuracy	±5%
Range	1KΩ to 10KΩ
Resolution	100Ω
Accuracy	±5%
Range	10KΩ to 100KΩ
Resolution	1KΩ
Accuracy	±5%
Range	100KΩ to 1MΩ
Resolution	10KΩ
Accuracy	±5%
Range	1MΩ to 10MΩ
Resolution	100KΩ
Accuracy	±5%
Range	10MΩ to 100MΩ
Resolution	1MΩ
Accuracy	±10%
Range	100MΩ to 1GΩ
Resolution	10MΩ
Accuracy	±10%

Voltage – Input 5 and 6

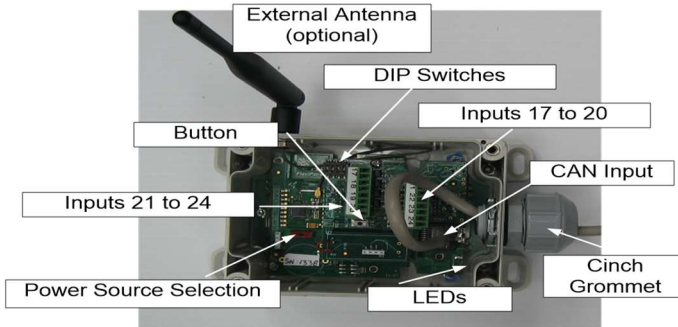
Range	0-5V
Resolution	0.1mV
Accuracy	5mV
Range (differential)	-2.5V to +2.5V
Resolution	1uV
Accuracy	1uV (field calibration required)
Max Current per Sensor	4mA

**Safety**

Safety Requirements	12V SELV Separated Extra Low Voltage. See CAN power supply for cULus rating.
---------------------	------------------------------------------------------------------------------

### WiDAQ Connections

In applications where IP66 rating is important, ensure all cables are passed through the cinch grommet and the grommet tightened.



### Power Source Selection Switch

Action	Result
LEFT (toward battery connector)	Battery Selection (if CAN Is not present, switch RIGHT to power OFF)
RIGHT (toward CAN connector)	CAN Power selection

### DIP Switches

Resistance or voltage selection – Note: Not all versions have the DIP switch installed. Some models may be hard wired to resistance only.

Action	Result
Resistance (default)	1-ON 2-OFF 3-ON 4-OFF
Voltage	1-OFF 2-ON 3-OFF 4-ON

### Push Button/LED Interface

(Software version 2.02 and higher)

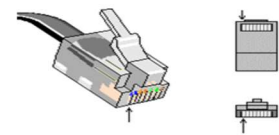
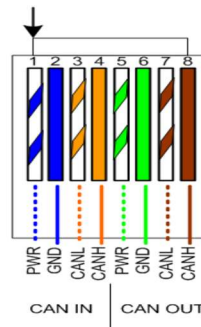
Action	Result
Turn ON/OFF	<b>Press button twice</b> ON – Green Flashes OFF – Red Flashes
Force Reading	<b>Press button once</b> Blink Green followed by communication status: Green – Taking Reading Red – Failed communication
State	Result
Powered ON	Green Blink – Taking Reading Red Blink – Failed communication
Powered OFF	<b>After pressing the button once:</b> Red – Unit OFF

### Sensor Input Configuration

WiDAQ inputs show up as Autonomous nodes with default values in resistance (ohms) or voltage (uV) depending on the sensor. Select the appropriate sensor type to have the converted units displayed.

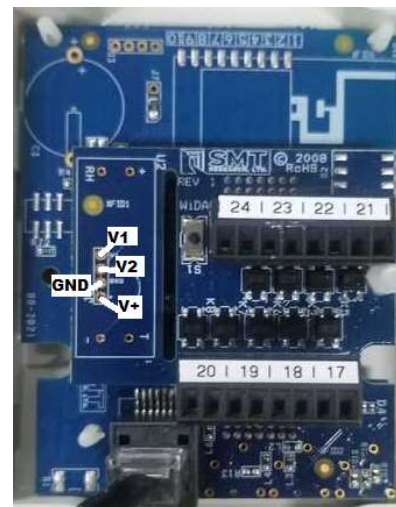
WiDAQ Input	Input	Sensor Type
Internal Device Temperature	2	Temperature 104JT (ohms)
Voltage	5	Voltage (uV)
Voltage	6	Voltage (uV)
RSSI	15	RSSI (radio strength)
Battery Voltage	16	Default (mV)
Resistance	17-24	Resistance - ohms Change to specific sensor

### Wired CAN Connectivity



Arrow indicates pin 1  
RJ45 Connector

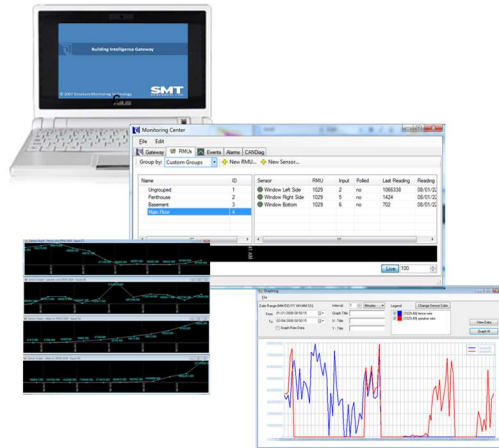
- Connect gateway computer to the RJ45 connector on the WiDAQ. Daisy chain additional WiDAQs using the CAN IN and CAN OUT pin out as specified above.



Pin	Type
V1	Custom
V2	Custom
GND	GND
V+	+5V

**Data collection and analysis**

Data from WiDAQs are collected by the *Building Intelligence Gateway* (BiG) and forwarded to the *Analytics* server database for further analysis and user access. See the BiG user manual for sensor configuration and data analysis capabilities.

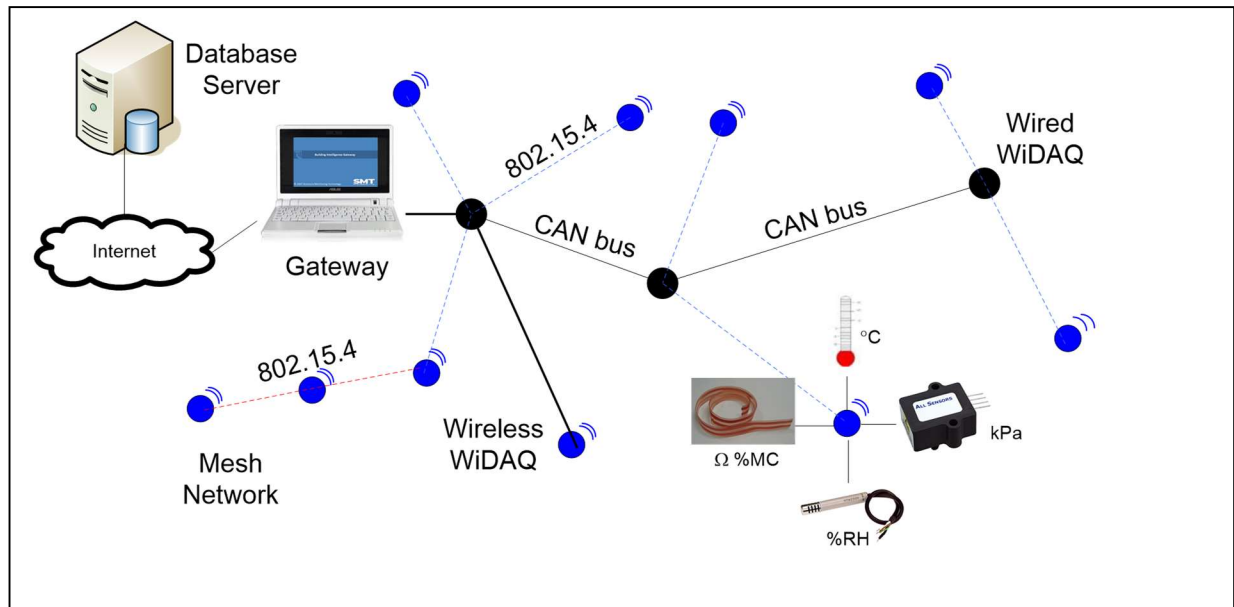


**Ordering Information**

Industrial WiDAQ 8 Resistance 2 Voltage Internal Antenna	WiDAQ-022-820-E
Industrial WiDAQ 8 Resistance 2 Voltage External antenna	WiDAQ-022-820-EL
Industrial WiDAQ 8 Resistance 2 Voltage Internal Antenna Solar Panel	WiDAQ-032-820-E
Industrial WiDAQ 8 Resistance 2 Voltage External Antenna Solar Panel	WiDAQ-032-820-EL
Industrial WiDAQ 8 Differential Voltage Internal Antenna	WiDAQ-032-080-E

Replace L for R for Remote Antenna

Specifications are subject to change without notice



*Typical Application*