

Wireless Sentinel Exd (WS-1100-WF Series)

WiFi Universal Serial Converter & WiFi Micro "RTU"

Data Sheet

Features

- Comply with RS-485 and IEEE 802.11b/g/n (WiFi) standards.
- Converts RS-485 (two wires) to WiFi.
- As a wireless converter supports any asynchronous byte oriented serial protocol (i.e. Modbus RTU, DF1, etc.) in transparent mode (Tunneling).
- Serial data rates from 2400 bps to 38.4 Kbps.
- WiFi data rates up to 72 Mbps.
- Allows remote access to RS-485 networks, and point to point RS-232 connections thru WiFi.
- Supports Ad Hoc WiFi wireless point to point connections, as well as, infrastructure point to multipoint networks.
- Different I/O options (depending on the model). Two 0 to 20 mA (10 bits resolution) analog inputs, up to 2 discrete input (0 to 30 DC), 2 discrete output (0 to 30 DC @ 250 mA), one 0-20 mA analog output (8 bits resolution).
- Two fail safe, de-energize to trip discrete outputs.
- Discrete outputs with field wiring monitoring capability to be used in Fire and Gas detection systems.
- "Pressure type" terminal blocks for fast installation and removal.
- Protection against reverse power supply polarity, surges and transient protection for all inputs and outputs.
- Low power option for battery less operation powered from solar panel and supercapacitors (Coming soon).
- WiFi Radio with built-in or external antenna.
- Explosion proof enclosure with explosion proof antenna isolator ready to be installed in Hazardous Locations (HAZLOC) Class 1 Division 1, or Zone 1.
- IP66 ingress protection enclosure.
- LEDs to indicate status, fail and alarm conditions.
- 2 Lines, 16 characters LCD display for monitoring, diagnostic, and configuration functions.
- Over the air configuration.
- Designed for industrial use.
- Works as wired or Wireless Micro RTU supporting Modbus RTU slave protocol and Modbus TCP server.
- Built-in HART to Modbus TCP gateway for up to 5 Hart devices.
- Modbus TCP to Modbus RTU bridge.
- Allows multiple MODBUS TCP clients (master) connections.
- Wireless communication redundancy (switching over two different Access Points with different SSID is allowed if lost of communication is detected)
- Works as a MODBUS TCP wireless gas detector transmitter, by connecting up to two Sentinel (SGD-1000 series) hydrocarbon gas detectors.
- Works as Fire and Gas Radio Alarm Transmitter (RAT) as per NFPA 72 definition.



Typical applications

- **Modbus TCP WiFi Micro RTU with Modbus Serial (RS485) or Hart capability**

In this application (see figure 1) the WS-1100-WF works as a Remote Terminal Unit (RTU) using Modbus TCP over WiFi. Standard I/O signals from sensors and final elements, as well as Modbus RTU serial devices (RS-485) can be connected to the WS-1100-WF. Also, instead of serial devices, up to 5 Hart enabled instruments can be connected to each RTU. Hart devices are seen as Modbus RTU devices.

WS-1100-WF can be installed in hazardous locations (HAZLOC) classified as Class 1, Division 1 (C1D1) or zone 1.

A PLC or SCADA system works as a master unit, sending Modbus TCP commands to the RTUs. More than one master are allowed to be connected to each WS-1100-WF.

In this configuration, the WS-1100-WF features two (0-20mA) analog inputs, two (0-24 DC) discrete inputs and two (0-24 DC) fail safe (de-energize to trip) discrete outputs.

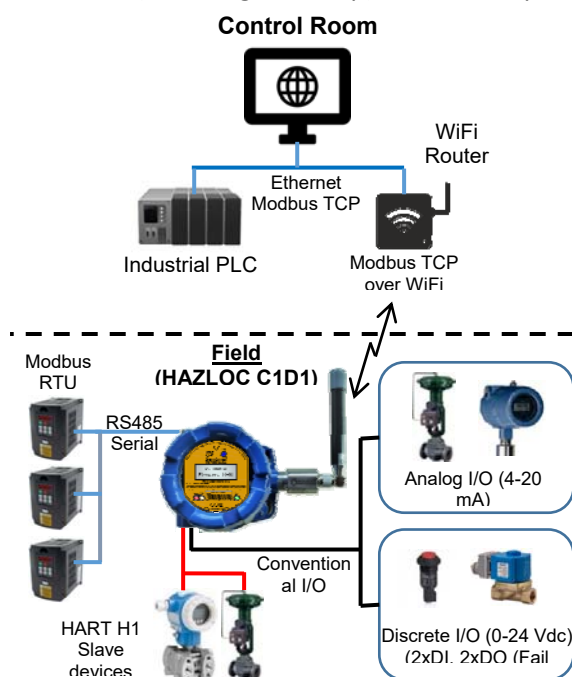


Figure 1. Typical application

- **Battery-less, solar powered F&G detection systems (Coming soon).**

In this application (see figure 2) the WS-1100-WF works as a Radio Alarm Transmitter (RAT) as per NFPA72 definition.

A 5W solar cell suitable to be installed in Class 1 Division 2 (C1D2) charges a cell of supercapacitors during day time. The capacitors cell delivers power to the WS-1100-WF and the low power F&G detectors. Batteries are not required, as the bank of capacitors are able to hold enough charge (between 16 and 24 hours depending on loading conditions) without light. Alternatively, external power (24 DC) can be used instead of solar power.

In low power mode, up to two Sentinel Gas Detectors (SGD-1000), one fire detector and one Manual Alarm Call Point can be connected to the WS-1100-WF.

The complete arrangement, except the solar cell, can be installed in C1D1 Hazardous locations.

If low power operation is not needed, conventional 4-20 mA F&G detectors can be used in addition to the two SGD-1000 detectors. Also, two discrete 24 DC outputs can be used for sounders and beacons or to activate a deluge or other fire extinction system. Field wiring integrity monitoring and alarming (broken wire detection) is included for the discrete output. One additional discrete output (not monitored) is also available.

The Wireless Sentinel works in RTU mode as a Modbus RTU Slave or MODBUS TCP server reporting the F&G detectors status to a master PLC or SCADA.

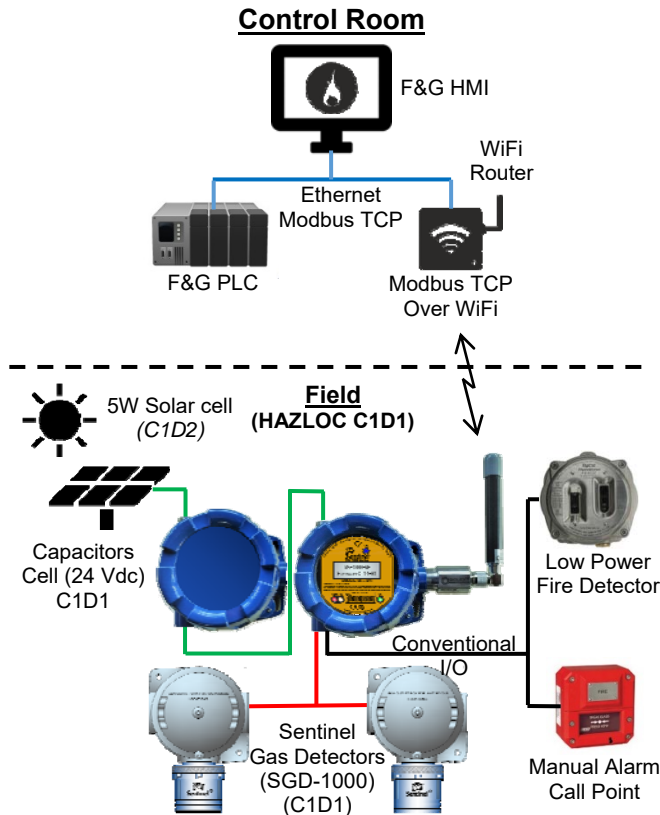


Figure 2. Solar Powered F&G detection system

Specifications

Power Supply

- **Input Voltage:** 18-36 VDC. Reverse polarity protected.
- **Isolation from external power:** 1500 V.
- **Power consumption:** 1W peak, 450 mW average transmitting at maximum power each second.
- **Power Output to Sensors:**
 - Output Voltage: 24 VDC
 - Output Current: 250 mA (Continuous or Peak)
 - Output Power: 6W
 - Isolation from input supply: 1500 V
- **Low power model:**
 - Input Voltage: 4.5 to 28 DC
 - Power consumption: 28 mW reporting each 60 seconds.

Serial Communication

- **Electrical interface:** EIA RS-485 / 2 wires (A/B). 120 Ω end of line termination resistor can be

enabled via switch. +80V over-voltage protection between terminals A/B to ground. 40V (clamping) over-voltage protection between ground and shield

- **Data rates:** 2.400, 4.800, 9.600, 19.200, 38.400 bps
- **Transmission mode:** Asynchronous "Half Duplex"
- **Data format:** 8 Bits, even parity, odd parity or no parity, one start bit, 1 or 2 stop bits

Wireless Specifications

- **WiFi radio:** XBee® Wi-Fi (IEEE 802.11 bgn) compatible radio operating between 2.4 to 2.5 GHz (13 channels available). +28.75 dbm (0.75 Watts) peak power
- **Radio receiver sensitivity:** -93 dBm to -71 dBm
- **RF Range:**
 - 100m Indoors
 - 1 Km or more outdoors (Line of sight) depending on antenna gain

Input and Output (I/O) Specifications

- **Discrete Inputs (DI):**
 - Number of inputs: 2
 - Nominal Voltage: 24 VDC
 - On state voltage: 8 to 30 VDC
 - Off state voltage: 0 to 1 VDC
 - On state current: 0.3 mA @ 8Vdc, 1.4 mA @30Vdc
 - Off state current: < 0.25 mA
 - Response time: 20 mS (de-bouncing filter)
 - Reverse polarity protected.
 - Isolation: 1500 V from external power supply
- **Discrete Outputs (DO):**
 - Number of outputs: 2 sink, 1 source (depending on the model).
 - Maximum voltage: 30 VDC
 - Maximum current per channel: 240 mA
 - Maximum current all channels: 250 mA
 - Off state current: < 1 μA
 - Response time: 3 mS
 - Current protection: 250 mA @ 2s
 - Output impedance: 10 Ω
 - Isolation: 1500 V from external power supply
- **Analog Inputs (AI):**
 - Number of inputs: 2
 - Input range and resolution:
 - 0 to 21 mA – 21 μA/Count (10 bits)

- Input impedance: 49.9 Ω
- Low pass filter: 30 Hz compatible with HART protocol transmitters
- Scan time: 3 mS minimum
- Accuracy: +- 0,5% measured value
- Current protection: 100 mA @ 5s (resettable fuse)
- Isolation: 1500V from input power
- Analog Output (AO):
 - Number of outputs: 1
 - Output range and resolution: 0 to 22 mA – 86 μ A/Count
 - Output impedance: 22 Ω
 - Low pass filter: 60 Hz
 - Accuracy: +- 0,5% of actual output (between 4mA and 20 mA)
 - Current protection: 100 mA @ 5s (resettable fuse)
 - Isolation: 1500V from input power

Environmental conditions

- Operating temperature: -30°C to 70°C
- Humidity: 95% no condensing

Mechanical specifications

- Explosion Proof Enclosure Version:
 - Dimensions: 143.5 mm (Height) x 133.4 mm (Width) x 123.5 (depth)
 - Material: Copper free aluminum
 - Surface finish: Epoxy coated for aluminum
 - Ingress Protection: IP66 / Nema 4X
 - Weight: 2.8 kg
 - Conduit Connections: Three ¾" NPT
 - Window Size: 85.0mm diameter
 - Color: Blue
- Plastic Enclosure version:
 - Dimensions: 144 mm (Height) x 133.3 mm (Width) x 106.1 (depth)
 - Material: UL94V-2 polycarbonate plastic with UV stabilizers
 - Ingress Protection: IP66 / Nema 4X
 - Weight: 0.84 kg
 - Conduit Connections: Three ¾" NPT
 - Window Size: 84.5mm diameter
 - Color: Grey

Display and Led indicators

- LEDs indicators:
 - Powered and running: Green steady

- Not associated to an Access Point: Green blinking
- Internal failure or wiring failure: Amber
- Alarm condition detected
- LCD:
 - 2 lines, 16 characters
- Switches:
 - Hall effect magnetic configuration sensor
 - Push button configuration switch

Approvals

Radio approvals:

FCC ID: MCQ-XBS6B

The Wireless Sentinel contains an XBee® WiFi radio that complies with Part 15 of the FCC rules and regulations. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Warning: To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance are not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter.

Enclosure approvals:

FM: Explosion-proof for Class I, Division 1, Groups B, C and D; dust ignition-proof for Class II/III, Division 1, Groups E, F and G, hazardous (classified) locations, indoors and outdoors (Type 4X/IP66)

CSA: Explosion-proof for Class I, Division 1, Groups B, C and D; dust ignition-proof for Class II/III, Division 1, Groups E, F and G, hazardous (classified) locations, indoors and outdoors (Type 4X/IP66)

ATEX: II 2 G D, Ex d IIC, Ex tD A21, IP68, Ta = -40°C to +85°C

IEC EX: Ex d IIC, Ex A21 tD, IP68, Ta = -40°C to +85°C

Antenna Isolator approvals:

ATEX/IECEX/ANZEx apparatus certification:

I M2 (M1) Ex db mb [ia Ma] I Mb
II 2 (1) G Ex db mb [ia Ga] IIA/IIB/IIC T5/T6 Gb
II 2 (1) D Ex tb mb [ia Da] IIC T100°C/T80°C
Db

ATEX certificate nr: EXA 15 ATEX 0042

IECEX certificate nr: IECEX EXA 15 0005

cULus certification: Class I, Division 1 & 2, Group A,B,C,D and Class II, Division 1 & 2, Group F&G (UL File E492911)

Ordering information and support

Ordering information (Only available models are shown):

Series: WS-1100-WF (Explosion proof / Modbus TCP)

Model	Description
WS-1110-WF	<i>Standard configuration</i> 2 AI, 2 DI, 2 DO (Fail safe), 1 AO, Modbus TCP to Modbus RTU bridge (RS-485)
WS-1111-WF (Note 1)	<i>Standard configuration + HART gateway</i> 2 AI, 2 DI, 2 DO (Fail safe), 1 AO, Modbus TCP to HART bridge (Up to five hart devices)
WS-1115-WF	<i>F&G+ Modbus bridge</i> 2 AI, 2 DO (with line monitoring), Modbus TCP to Modbus RTU bridge (RS-485)
WS-1117-WF	<i>SGD-1000 only</i> Up to two SGD-1000 (Sentinel Gas Detectors)

Note 1: Coming soon

Support

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