Emerson Smart Wireless Gateway Solutions

IEC

Wireless HART®

- Gateway connects the *Wireless*HART® self-organizing networks with any host system

- Easy configuration and management of self-organizing networks

- Easy integration into control systems and data applications through serial and Ethernet connections

- Seamless integration into AMS® Device Manager

- Greater than 99% data reliability with industry proven security

- Smart Wireless capabilities extend the full benefits of PlantWeb® architecture to previously inaccessible locations

EMERSON.
Process Management

Introduction

Gain real-time process information with greater than 99% wireless data reliability

- The Emerson Smart Wireless Gateway 1410 automatically manages wireless communications in constantly changing environments

- Native integration with Ovation automation system provides simple and fast commissioning for wireless field networks

- Connect to data historians, legacy host systems, and other applications through Ethernet, Modbus®, Serial, OPC, EtherNet/IP, and HART® outputs

Complete wireless network configuration tools provided with each Emerson Smart Wireless Gateway Solution

- The integrated web interface allows easy configuration of the wireless network and data integration without the need to install additional software

- Complimentary AMS Wireless Configurator software provides Emerson Device Dashboards to configure devices and view diagnostic data

- Drag and drop device provisioning enables a secure method to add new wireless devices to the wireless field network

Contents

Specifications

Self-organizing network specifications

Protocol

- IEC 62591(*Wireless*HART), 2.4 - 2.5 GHz DSSS

Maximum network size

- 100 wireless devices @ 8 sec. or greater

Supported device update rates

- 1, 2, 4, 8, 16, 32 seconds or 1 - 60 minutes

- For information on network size and update rate, please see the capacity estimator tool on the Smart Wireless homepage http://www.emersonprocess.com/Wireless

Network size/latency

- 100 Devices: less than 10 seconds

- 50 Devices: less than 5 seconds

Data reliability

- Greater than 99%

System security specifications

Ethernet

- Secure Sockets Layer (SSL) enabled (default) TCP/IP communications

Emerson Smart Wireless Gateway access

- Role-based Access Control (RBAC) including Administrator, Maintenance, Operator, and Executive. Administrator has complete control of the Gateway and connections to host systems and the self-organizing network.

Self-organizing network

- AES-128 Encrypted *Wireless*HART, including individual session keys. Drag and Drop device provisioning, including unique join keys and white listing.

Internal firewall

- User configurable TCP ports for communications protocols, including Enable/Disable and user specified port numbers. Inspects both incoming and outgoing packets.

Third party certification

- Wurldtech: Achilles Level 1 certified for network resiliency

- National Institute of Standards and Technology (NIST): Advanced Encryption Standard (AES) Algorithm conforming to Federal Information Processing Standard Publication 197 (FIPS-197)

Emerson's Smart Wireless Solution

IEC 62591 (*Wireless*HART)... the industry standard

Self-organizing, adaptive mesh routing

- No wireless expertise required, network automatically finds the best communication paths

- The self-organizing, self-healing network manages multiple communication paths for any given device. If an obstruction is introduced into the network, data will continue to flow because the device already has other established paths. The network will then lay in more communication paths as needed for that device.

Reliable wireless architecture

- Standard IEEE 802.15.4 radios

- 2.4 GHz ISM band sliced into 15 radio-channels

- Time Synchronized Channel Hopping to avoid interference from other radios, WiFi, and EMC sources and increase reliability

- Direct sequence spread spectrum (DSSS) technology delivers high reliability in challenging radio environment

Emerson's Smart Wireless

Seamless integration to all existing host systems

- Native integration into Ovation is transparent and seamless

- Gateways interface with existing host systems using industry standard protocols including OPC, Modbus TCP/IP, and Modbus RTU

Layered security keeps your network safe

- Ensures that data transmissions are received only by the Smart Wireless Gateway

- Network devices implement industry standard Encryption, Authentication, Verification, Anti-Jamming, and Key Management

- Third party security verification including Achilles and FIPS197.

Model 1410 Ordering Information

Table 1. Smart Wireless Gateway Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
  The Expanded offering is subject to additional delivery lead time.

Model	Product description	
1410	Smart Wireless Gateway, 2.4 GHz DSSS, *Wireless*HART, Webserver, AMS Ready, HART IP	★
Wireless configuration		
D[1]	100 Device Network with Rosemount Field Link 781 (10.5-30 VDC)	★
Ethernet communications - physical connection		
1[2][3]	Single Ethernet Connection	★
2[4][5]	Dual Ethernet Connection	★
Serial communication		
N	None	★
A[6]	Modbus RTU via RS-485	★
Ethernet communication - data protocols[7]		
D1	Modbus TCP/IP	★
D2	OPC	★
D3	EtherNet/IP	★
D4[7]	Modbus TCP/IP, OPC	★
D5[7]	EtherNet/IP, Modbus TCP/IP	★
D6[7]	EtherNet/IP, OPC	★
E2	Ovation Ready	★
E3[8]	Webserver Only	★
Antenna options		
WNA	For use with the 781 Remote Field Link	★
1410 product certifications		
NA	No Approvals	★
Redundancy options		
RD	Gateway Redundancy	★

(1)   Must order the remote field link (781). Reference Model 781 Ordering Information on page 6 for details.

(2)   Single active 10/100 baseT Ethernet port with RJ45 connector.

(3)   Additional ports disabled.

(4)   Dual active 10/100 baseT Ethernet ports with RJ45 connectors.

(5)   Multiple active ports have separate IP addresses, firewall isolation, and no packet forwarding.

(6)   Convertible to RS232 via adapter, not included with Gateway.

(7)   Selection of Dual Ethernet option code 2 is recommended.

(8)   Requires (A) Modbus RTU via RS-485 Communication protocol.

Model 781 Ordering Information

Table 2. Smart Wireless Gateway Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
  The Expanded offering is subject to additional delivery lead time.

Model	Product description	
781	Smart Wireless Field Link	★
Physical connection		
A1	RS485	★
Housing		
D	Dual Compartment Housing - Aluminum	★
E	Dual Compartment Housing - Stainless Steel	★
Conduit threads		
1	$^1/_2$ - 14 NPT	★
2	M20 (included thread adapter required for M20 use)	★
781 product certifications		
I5[1]	FM Intrinsically Safe, Non-incendive	★
I6[1]	CSA Intrinsically Safe	★
I1[1]	ATEX Intrinsically Safe	★
I7[1]	IECEx Intrinsic Safety	★
KL[1]	FM & CSA Class 1 Division 1, ATEX Zone 0 Intrinsically Safe	★
NA	No Approvals	★
Wireless update rate, operating frequency, and protocol		
WA3	User Configurable Update Rate, 2.4 GHz DSSS, *Wireless*HART	★
Omnidirectional wireless antenna and SmartPower™		
WK3	External Antenna, Line Power 10 - 30 VDC	★
WM3	Extended Range, External Antenna, Line Power 10 - 30 VDC	★
Display		
M5	LCD Display	★
Gland and connector options		
G2	Cable Gland (7.5 mm - 11.9 mm)	
G4	Thin Wire Cable Gland (3 mm - 8 mm)	
Typical model number: 781 A1 D 1 KL WA3 WK3 M5		

(1) Use of the 781 with a 1410 Smart Wireless Gateway requires the use of an appropriate Intrinsically Safe Barrier.

Accessories

Table 3. Accessories

Item description	Part number
Serial Port HART Modem and Cables only	03095-5105-0001
USB Port HART Modem and Cables only	03095-5105-0002

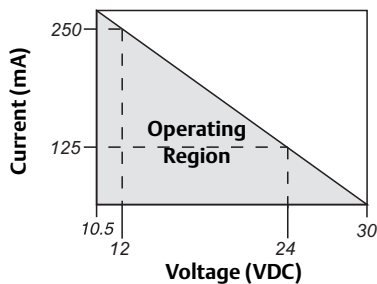# 1410 Gateway Product Specifications

Functional specifications

Input voltage

10.5-30 VDC

Current draw

Operating current draw is based on 3.6 Watts power consumption.

Environmental

Operating temperature range:
-40 to 167 °F (-40 to 75 °C)

Operating humidity range:
0-100% relative humidity

EMC performance

Complies with EN61326-1:2006.

Antenna options

See 781 specifications.

Physical specifications

Weight

0.70 lb. (0,318 kg)

Material of construction

Housing

Polycarbonate

Rail mount

Top hat rail EN 50022 35 mm X 7.5 mm and 35 mm x 15 mm

Communication specifications

Isolated RS-485

2-wire communication link for Modbus RTU multidrop connections

Baud rate: 57600, 38400, 19200, or 9600

Protocol: Modbus RTU

Wiring: Single twisted shielded pair, 18 AWG. Wiring distance is approximately 4000 ft. (1,524 m)

Ethernet

10/100base-TX Ethernet communication port

Protocols: Modbus TCP, OPC, EtherNet/IP, HART-IP, https (for Web Interface)

Wiring: Cat5E shielded cable. Wiring distance 328 ft. (100 m).

Modbus

Supports Modbus RTU and Modbus TCP with 32-bit floating point values, integers, and scaled integers.

Modbus Registers are user-specified.

OPC

OPC server supports OPC DA v2, v3

EtherNet/IP

Supports EtherNet/IP protocol with 32 bit Floating Point values and Integers. EtherNet/IP Assembly Input-Output instances are user configurable. EtherNet/IP specifications are managed and distributed by ODVA. For details on capabilities please see the Smart Wireless Gateway to Allen Bradley Integration Manual (document number 00809-0500-4420) on rosemount.com.

1410 Gateway Product Certifications

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA
Emerson Process Management Asia Pacific Private Limited - Singapore

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

European Directive Information

The EC declaration of conformity can be found on page xx. The most recent revision can be found at www.emersonprocess.com.

Ordinary Location Certification from FM Approvals

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM Approvals, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Model 781 Product Specifications

Functional specifications

Output
IEC 62591 (*Wireless*HART), 2.4 GHz DSSS

Local display
The optional five-digit integral LCD Display can display wireless information.

Humidity limits
0–99% Non-condensing Relative Humidity

Radio frequency power output from antenna
External Antenna (WK1 option): Maximum of 10 mW (10dBm) EIRP

Field link wiring distance
Wiring distance between field link and gateway
up to 200m using single twisted shielded pair, 18 AWG.

Physical specifications

Materials of construction
Enclosure
Housing - Low-copper aluminum or stainless steel
Paint - Polyurethane
Cover O-ring - Buna-N
Terminal block and power module
PBT
Antenna
PBT/Polycarbonate (PC) integrated omni-directional antenna

Mounting
Mounting brackets also permit remote mounting. Figure 6 on page 14.

Weight
Low-copper aluminum:
    781 without LCD display - 4.1 lb. (1.9 kg)
    781 with M5 LCD display - 4.2 lb. (2.0 kg)
Stainless steel:
    781 without LCD display - 8.0 lb. (3.5 kg)
    781 with M5 LCD display - 8.1 lb. (3.6 kg)

Enclosure ratings (781)
Housing Style option codes D and E are Type 4X and IP66/67 rated dual-compartment housings.

Performance specifications

ElectroMagnetic Compatibility (EMC)
All Models:
Meets all relevant requirements of EN 61326-1; 2006

Vibration effect
No effect when tested per the requirements of IEC60770-1 (1999):
        High Vibration Level - field or pipeline (10-60 Hz 0.21 mm displacement peak amplitude / 60-2000 Hz 3g).

Model 781 Product Certifications

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Ordinary location certification for FM

As standard, the Gateway has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

North American certifications

I5 FM Intrinsically Safe, Non-Incendive, and Dust Ignition-proof
Certificate Number: 3040398; Intrinsically
Safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G. Zone Marking: Class I, Zone 0, AEx ia llC; Temperature Codes T4 (Tamb = -40 to 70 °C); Non-Incendive for Class I, Division 2, Groups A, B, C, and D. Dust Ignition-proof for Class II,III, Division 1, Groups E, F, and G. Ambient temperature limits: -40 to 70 °C; Enclosure Type 4X, IP66/67, when installed per Rosemount Drawing 00781-1010

Certification standards

3600:1998, 3610:2010, 3611:2004, 3810:2005, ANSI/NEMA 250:2003, ANSI/IEC 60529:2004

Special Conditions of Certification:

1. The Model 781 transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.

2. The surface resistivity of the unit is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

3. The Model 781 transmitter will not pass the 500Vrms dielectric strength test and this must be taken into account during installation.

I6 CSA Intrinsically Safe
Certificate Number: 2330424
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. Temp Code T3C
Enclosure Type 4X, IP66/67, when installed per Rosemount Drawing 00781-1011

European Union Directive information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. Reference the Quick Start Guides for a hard copy.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

Electro magnetic compatibility (EMC) (2004/108/EC)

Emerson Process Management complies with the EMC Directive.

Radio and telecommunications terminal equipment directive (R&TTE)(1999/5/EC)

Emerson Process Management complies with the R&TTE Directive

C€European certification

I1 ATEX Intrinsic Safety
Certificate Number: Baseefa11ATEX0059X
⟨Ex⟩II 1G Ex ia IIC T4 Ga (Tamb = -40 °C to 70 °C) Enclosure Type IP66/67
CE 1180

Input/output parameters

| Input/power |
| --- |
| $U_i = 30$ V |
| $I_i = 200$ mA |
| $P_i = 1.0$ W |
| $C_i = 0$ |
| $L_i = 0$ |
| **Input/RS485** |
| $U_i = 11$ V |
| $I_i = 300$ mA |
| $P_i = 1.0$ W |
| $C_i = 5.1$ nF |
| $L_i = 0$ |
| **Output/RS485** |
| $U_o = 7.14$ V |
| $I_o = 112$ mA |
| $P_o = 1.0$ W |
| $C_o = 0$ |
| $L_o = 0$ |
| $C_o = 13.9$ μF |
| $L_o = 1000$ μH |

Special Conditions for Safe Use (X):

1. The plastic antenna may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.

2. The Model 781 enclosure is made of aluminum alloy and is given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a Zone 0 environment.

3. The device is not capable of withstanding the 500V isolation test required by EN 60079-11:2007 Clause 6.3.12. This must be taken into account when installing the device.

I7   IECEx Intrinsic Safety
          Certificate Number: IECEx BAS11.0028X
          Ex ia IIC T4 Ga (Tamb = -40 °C to 70 °C)
          Enclosure Type IP66/67

Input/output parameters

Input/power
U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0
L_i = 0
Input/RS485
U_i = 11 V
I_i = 300 mA
P_i = 1.0 W
C_i = 5.1 nF
L_i = 0
Output/RS485
U_o = 7.14 V
I_o = 112 mA
P_o = 1.0 W
C_o = 0
L_o = 0
C_o = 13.9 μF
L_o = 1000 μH

Special Conditions for Safe Use (X):

1. The plastic antenna may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.

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3. The device is not capable of withstanding the 500V isolation test required by IEC 60079-11:2006 Clause 6.3.12. This must be taken into account when installing the device.

Combination certification

KL   Combination of I5, I6, I1, and I7

Dimensional Drawings

Figure 4. Smart Wireless Gateway
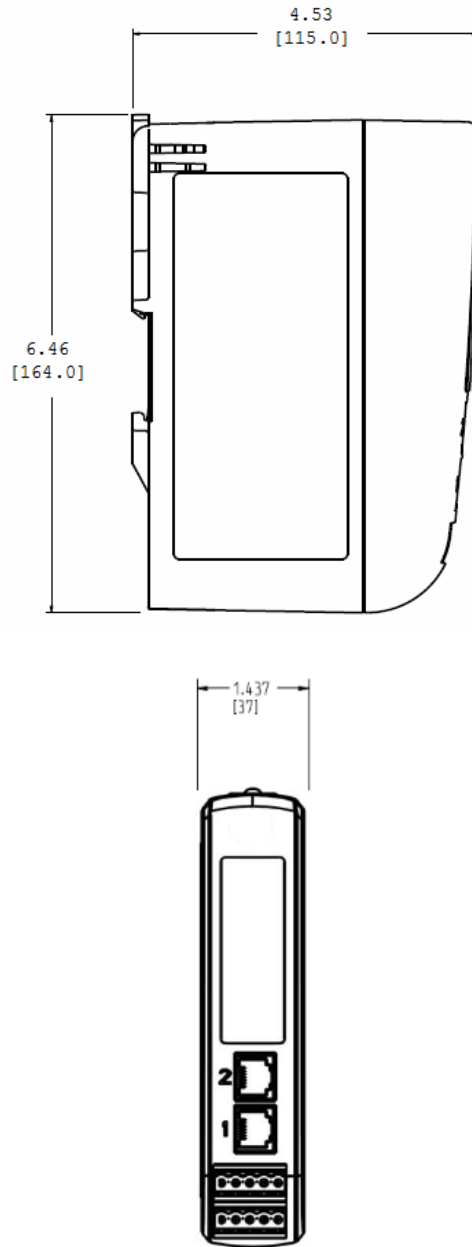
Dimensions are in inches (millimeters).
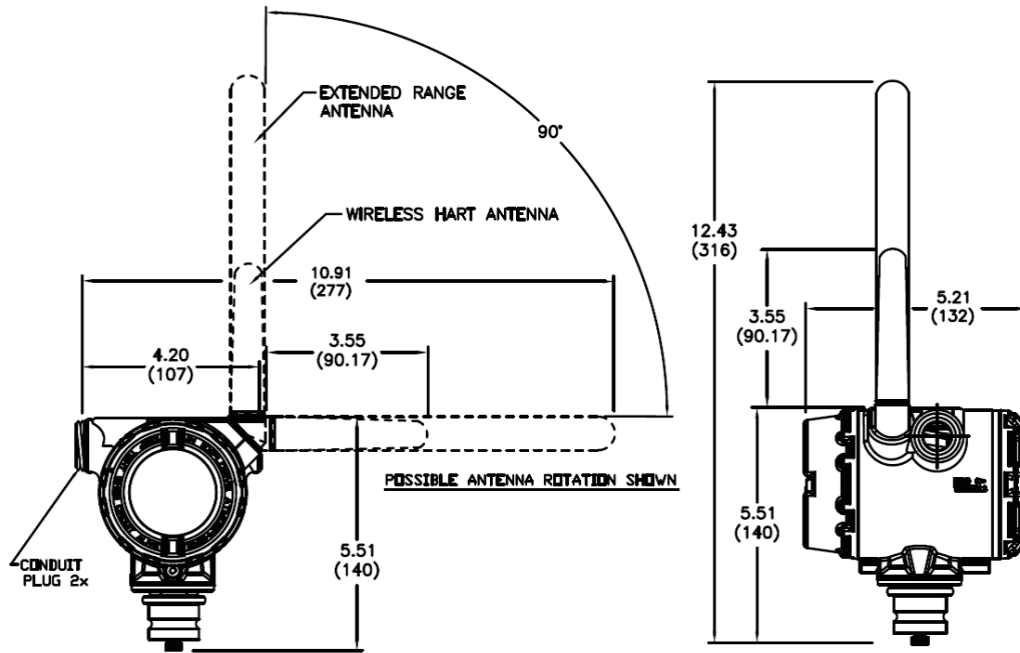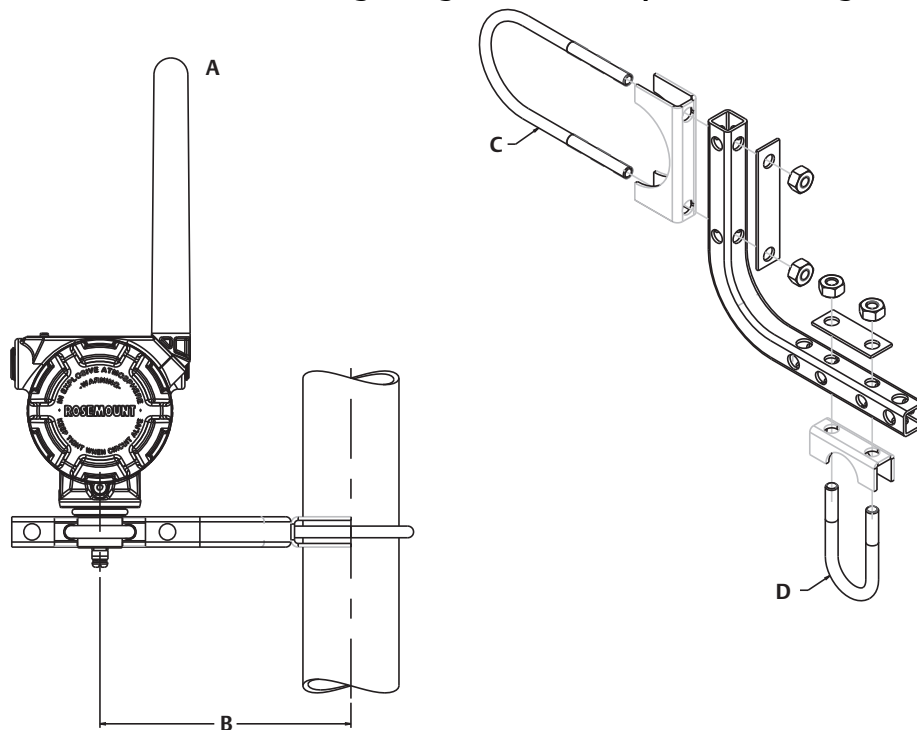
Figure 5. Smart Wireless Field Link

Figure 6. Rosemount 781 Transmitter Mounting Configurations with Optional Mounting Bracket

A. Pipe mounting
B. 6.20 (158)
C. 2-in U-bolt for pipe mounting
D. 1-in U-bolt for transmitter mounting

Dimensions are in inches (millimeters).

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