Technical Information
WirelessHART Fieldgate SWG70



Intelligent WirelessHART gateway with Ethernet and RS-485 interface

Application

Fieldgate SWG70 is a gateway for WirelessHART networks. It enables WirelessHART field devices to communicate with each other and manages network security and connectivity. Fieldgate converts and saves the wireless field device data to a format that is compatible with other systems.
It has Ethernet and serial interfaces to connect to host applications such as SCADA tools.

Your benefits

- Easy commissioning and diagnosis of a self-organized WirelessHART network
- Seamless integration of field device information into higher-order system applications using standardized protocols such as MODBUS, EtherNet/IP, HART-IP or OPC
- Wireless configuration and management of smart field devices in a facility using FieldCare
- Flexible use of Fieldgate in hazardous areas of a facility

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Function and system design

WirelessHART

WirelessHART adds wireless capabilities to the HART protocol, while guaranteeing compatibility with existing HART devices, commands and tools.

A WirelessHART network comprises:
- WirelessHART field devices
- Wired field devices with a connected WirelessHART Adapter
- Fieldgate

The WirelessHART protocol may not be used to replace the wiring in the case of safety applications with a control function.

WirelessHART Fieldgate SWG70

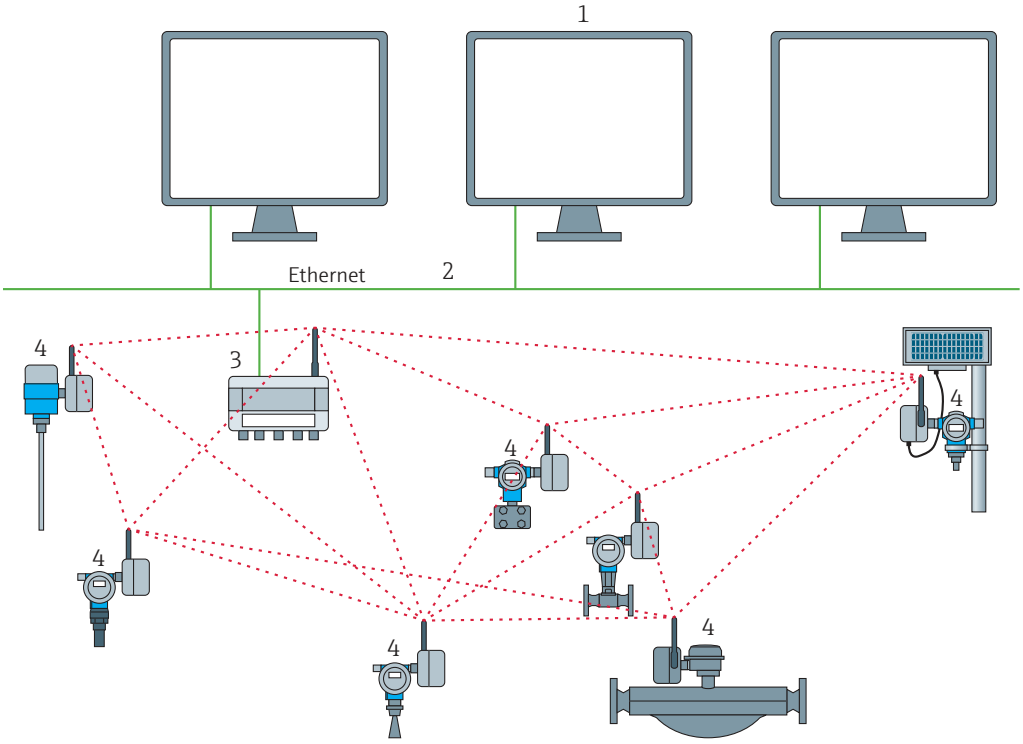
The WirelessHART Fieldgate SWG70 acts as an interface between the WirelessHART network and a system that has an Ethernet or RS-485 connection.

The WirelessHART Fieldgate SWG70 supports the following functions:
- Wireless network configuration and management
- Acquisition of data from the field devices and presentation to connected systems
- MODBUS, HART, HART-IP, OPC and EtherNet/IP support for system integration
- Configuration of network, Fieldgate and field devices via Web interface or FDT/DTM.

Fieldgate is designed for installation in hazardous areas Zone 2. You can mount the antenna directly on the Fieldgate or remotely depending on the requirements of the application.

System design

The WirelessHART Fieldgate stores information received from the WirelessHART Adapter SWA70 or other WirelessHART field devices in a buffer which can be accessed by a host application via an Ethernet or RS-485 connection. The figure shows a Fieldgate operating in a typical meshed WirelessHART network architecture.



1 Host application
2 Ethernet
3 WirelessHART Fieldgate
4 Field devices with WirelessHART

Input

Communication interface	WirelessHART communication interface (IEC 62591)
Transmission rate	Nominal 250 kbits/s
Transmission range	2.4 GHz (ISM band)
Range	Up to 250 m outdoors, up to 50 m indoors
Transmission power	Configurable to 0 dBm or 10 dBm, for adapting to national regulations
Input variables	▪ Process variables according to HART standard are sent to the network by the field devices in the burst mode. ▪ Up to 250 WirelessHART-based devices can be connected.

Output

Overview of versions and protocols

All Fieldgate SWG70 versions feature an Ethernet interface and a serial interface. Depending on the device version, this interface can support different protocols.

Fieldgate SWG70 version	Interface	Protocol			
		MODBUS	EtherNet/IP	HART-IP	AMS
SWG70-xx-1 Modbus	Ethernet	X	–	X	X
	Serial (RS-485)	X	–	X	–
SWG70-xx-2 MODBUS + OPC [1]	Ethernet	X	–	X	X
	Serial (RS-485)	X	–	X	–
SWG70-xx-3 EtherNet/IP	Ethernet	–	X	X	X
	Serial (RS-485)	–	–	X	–

1) For OPC, there is an OPC DA server. The software is included in the scope of delivery and must be installed on a Windows PC.

Ethernet (via MODBUS-TCP or OPC)

Communication interfaces	Configurable for HART-IP and MODBUS-TCP communication
Protocols	HART-IP, MODBUS-TCP and also OPC server
Physical layer	Ethernet 10 BASE-T/100 BASE-TX, complete galvanic isolation
Transmission rate	100 Mbit/s (max. cable length 100 m at 25 °C ambient temperature)
Type of protection	None
Maximum bus length	100 m (110 yds) depending upon cable
Connection facilities	▪ 7-port terminal block ▪ Screw terminals: 0.2 mm^2 to 4 mm^2 for solid wire and 0.2 mm^2 to 2.5 mm^2 for stranded wires

Ethernet (via EtherNet/IP)

Communication interfaces	Configurable for HART-IP and EtherNet/IP communication
Protocols	HART-IP and EtherNet/IP
Physical layer	Ethernet 10 BASE-T/100 BASE-TX, complete galvanic isolation
Transmission rate	100 Mbit/s (max. cable length 100 m at 25 °C ambient temperature)
Type of protection	None
Maximum bus length	100 m (110 yds) depending upon cable
Connection facilities	M12 connector

RS-485 serial interface

Communication interfaces	Configurable for HART Version 7.0 or MODBUS RTU communication
Transmission rate	Hardware or software configurable between 1200 Bit/s to 115200 Bit/s
Type of protection	None
Galvanic isolation	Fully isolated from all other circuits
Maximum bus length	1200 m (1230 yds), depending upon cable and transmission rate
Terminal resistor	Integrated, settable by hardware (DIP-switch) or software
Connection facilities	▪ Two 3-port terminal blocks, allowing series connection of several Fieldgates ▪ Screw terminals: 0.2 mm^2 to 4 mm^2 for solid wire and 0.2 mm^2 to 2.5 mm^2 for stranded wires

Power supply

Power supply	20 VDC to 30 VDC SELV / PELV
Power	<5 W
Connection facilities	▪ Two 2-port terminal blocks, 2nd port for redundant power supply ▪ Screw terminals: 0.2 mm^2 to 4 mm^2 for solid wire, 0.2 mm^2 to 2.5 mm^2 for stranded wires

Operating conditions

Application range

The Fieldgate SWG70 serves as a gateway for WirelessHART networks.

The WirelessHART protocol may not be used to replace the wiring in the case of safety applications with a control function.

Installation conditions

Installation instructions

Location:	Avoid mounting the WirelessHART Fieldgate near a pipe or high-voltage equipment wherever possible. Where possible, the WirelessHART Fieldgate should be in radio contact with at least 20 % of all wireless field devices or adapters. Under typical conditions, the maximum spacing is 250 m outdoors and 50 m indoors.
Installation:	A remote antenna can be mounted outside a cabinet.
Orientation:	With vertical antenna.
Protection against lightning:	If there is a risk of lightning, install suitable antenna accessories. See “Accessories” on page 7. Connect the protective ground to the protective ground connection of the Fieldgate housing. The minimum cross-section of the protective ground is 2.5 mm^2.
Hazardous area:	Fieldgates with the appropriate certification (see ordering information) can be mounted in Zone 2. The housing cover can be removed in Zone 2 to view the LEDs. It is not permitted to operate any switches in an explosive atmosphere.

Environment

Ambient temperature range

−20 °C to +60 °C (−4 °F to 140 °F)

Storage temperature

−40 °C to +85 °C (−40 °F to +185 °F)

Relative humidity

5% to 95%, non-condensing

Vibration resistance

EN 60068-2-6: 10 Hz ≤ f ≤ 150 Hz/1g

Shock resistance

EN 60068-2-27: 15 g, 11 ms

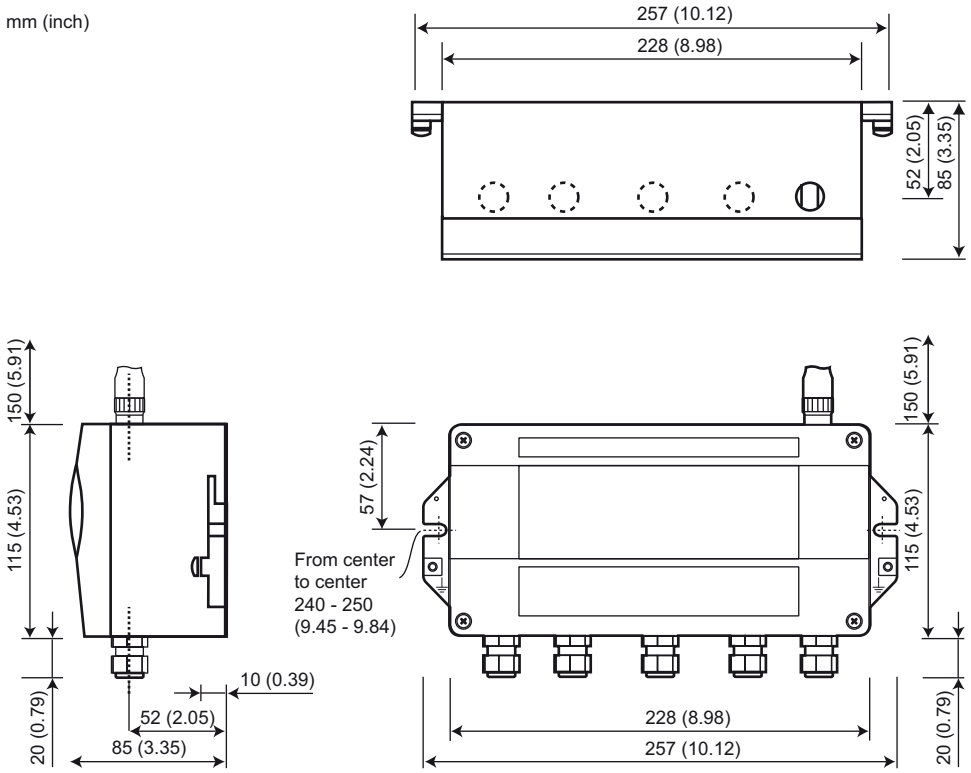
Electromagnetic compatibility

The WirelessHART Fieldgate meets EU Directive 2004/108/EC "Electromagnetic compatibility"

- EN 61326:
  - Interference immunity: EN 61326-1, 2006, Industry
  - Interference emission: EN 61326-1, 2006, Class A

Mechanical Construction

Overall dimensions



Weight	Approx. 1.6 kg
Housing	▪ Material: Painted aluminum ▪ Color: Light gray, RAL 7035
Degree of protection	IP 66 / IP 67
Antenna	▪ Omnidirectional dipole antenna ▪ Remote antennas: See “Accessories” on page 7.

Operation

Configuration	▪ Web browser via Ethernet ▪ FieldCare via Ethernet (HART IP CommDTM) or RS-485 (serial CommDTM)
Operating elements	▪ 2x Pushbuttons within housing for selecting operating mode during local configuration ▪ 5x LEDs within housing for indicating current operating mode during local configuration ▪ 1x 8-position DIP switch for HART device address (1 to 4), baudrate of RS485 interface (5 to 6), terminating resistor (7) and security mode (8) hardware settings can be overwritten by software settings.
IP address	▪ Configurable via Web browser or DTM, default 192.168.1.1 ▪ The EtherNet/IP version of Fieldgate uses DHCP to assign the IP address
Configurable functions	▪ Wireless network ▪ HART, MODBUS and Ethernet communication interfaces

Diagnosis

- Display of wireless field device list with process values of selected field device
- Display of wireless field device list with burst message identification of selected field device
- Network monitoring of wireless communication events
- Diagnostic function

Accessories

Antenna accessories

Note the following when selecting accessories for the antenna:

- The Ex approval for Fieldgate SWG70 is only valid for the 2 dBi antenna supplied.
- The antenna must comply with the rules for the usage of 2.4 GHz equipment that apply in the country of installation. In case of doubt, please contact a regional expert for radio approvals.
- The gain is calculated from the difference in the antenna gain and the losses of the individual components such as the cables and surge arrester. The gain may not exceed the 2 dBi limit.
- The WirelessHART range of the Fieldgate SWG70 depends on the coaxial cable used (attenuation) between the Fieldgate and the antenna.

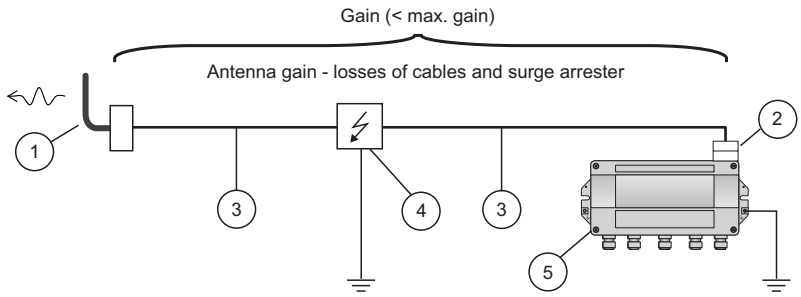


Fig. 1: *Calculating the maximum gain of a remote antenna*

1 Antenna
2 Coaxial adapter
3 RF coaxial cable with connectors
4 Surge arrester, λ/4, without mechanical fixing
5 Fieldgate SWG70

Order No.	Description	Fig. No.	Antenna gain (Gain)	Loss (attenuation)
71131503	Remote panel antenna Kit incl. coaxial adapter and mounting bracket	1 and 2	8.5 dBi	–
71131502	Remote dipole antenna Kit incl. coaxial adapter	1 and 2	6.0 dBi	–
71131504	Remote cabinet antenna Kit incl. coaxial adapter	1 and 2	6.0 dBi	–
71131509	Coaxial cable 2.5 m	3	–	0.5 dB
71131508	Coaxial cable 5 m	3	–	1.1 dB
71131507	Coaxial cable 10 m	3	–	2.1 dB
71131506	Coaxial cable 15 m	3	–	3.2 dB
71131505	Surge arrester (protection against lightning)	4	–	0.2 dB

Ordering information

Product structure

Detailed information about the product structure is available:
- On the Endress+Hauser website: www.endress.com/SWG70
- From your Endress+Hauser Sales Center: www.addresses.endress.com

Accessories

- Remote antennas and antenna accessories: See “Accessories” on page 7.
- Additional accessories on request

Documentation

WirelessHART Fieldgate SWG70

- ❑ WirelessHART Fieldgate SWG70 Operating Instructions BA00064S/04/en
- ❑ WirelessHART Fieldgate SWG70 Safety Instructions ATEX /IECEx XA00001S/04/a3
- ❑ WirelessHART-Fieldgate SWG70 Control Drawing XA01565S/04/en
- ❑ Wireless Adapter and Fieldgate Competence Brochure CP00013S/04/en
- ❑ WirelessHART Adapter SWA70 Operating Instructions BA00061S/04/en

Certificates and Approvals

CE Mark

The WirelessHART Fieldgate SWG70 meets the legal requirements of the relevant EU directives. Endress+Hauser confirms successful testing of the WirelessHART Fieldgate SWG70 by affixing to it the CE mark.

Hazardous area approvals

See the "Documentation" section.

IT security

Ethernet interface

The Fieldgate SWG70 is equipped with security mechanisms to protect it against any inadvertent changes to the device settings. Additional IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

If network firewalls are used, the following TCP/IP ports must be specifically open:

Port	Service	Use	Access to
67/UDP, 68/UDP	Client	IP address assignment via DHCP	Fieldgate IP address (write)
53/UDP, 53/TCP	Client	DNS: name resolution	
443/TCP	Server	HTTPS over SSL: Web server – Fieldgate configuration	Fieldgate (read and write), AES-128-bit-SSL-encrypted, additionally password-protected
502/TCP	Server	System integration via MODBUS/ TCP	Process values (read only)
5094/TCP 5094/UDP	Server	Operation via DTM and OPC server system integration via HART-IP	Fieldgate and WirelessHART devices (read and write)
33333	Server	AMS system integration	Fieldgate and WirelessHART devices (read and write)
44818/TCP, 2222/UDP	Server	System integration via EtherNet/IP	Fieldgate and WirelessHART devices (read and write)

WirelessHART interface

Security is implemented with end-to-end sessions utilizing industry standard AES-128-bit encryption

For more information see: http://en.hartcomm.org/hcp/tech/wihart/wihart_security.html

Radio approvals

Telecommunication approvals

- Europe: Radio Equipment Directive
- USA and Canada: FCC Part 15.247 for wireless applications in the 2.4 GHz frequency band
- Brazil: ANATEL UL-BR 15.0983 (EAN Number: 7898994191414)
- China: CMIIT ID (SRRC)
- Japan: Ministry of internal affairs and communication
- Mexico: COFETEL RCEPNSW12-0651
- Other national certificates are available on request.

Additional national guidelines to be observed:

Country	Guideline
Bulgaria	General authorization required for outdoor use and public service
Italy	If used outside of own premises, general authorization is required.
Norway	May be restricted in the geographical area within a 20 km radius from the center of Ny-Alesund.
Romania	Use on a secondary basis. Individual license required
Latvia	The outdoor usage of the 2.4 GHz band requires an authorization from the Electronic Communications Office.

Europe

This device complies with the requirements of the EC Radio Equipment Directive 2014/53/EU.

- ETSI EN 300 328: V1.8.1:2012

USA and Canada

This device complies with part 15 of the FCC Rules.

This device complies with CFR 47, Part 15 of the FCC Rules. The operation of this device 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.

Brazil

ANATEL UL-BR 15.0983 (EAN Number: 7898994191414)
"Este produto está homologado pela ANATEL, de acordo com os procedimentos regulamentados pela Resolução 242/2000, e atende aos requisitos técnicos aplicados."
Para maiores informações, consulte o site da ANATEL www.anatel.gov.br



Chinese

This device has been granted a type approval by the SRRC (State Radio Regulatory Commission of P. R. China): CMIIT ID 2011DJ5309

Indonesia

71784/SDPP1/2020

4962

Japanese

This device has been granted a designation number by the Japanese Ministry of Internal Affairs and Communications according to the Ordinance concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment (特定無線設備の技術基準適合証明等に関する規則)

- Article 2 clause 1 item 19
- Approval n°: 202WW09117712

This device should not be modified (otherwise the granted designation number will be invalid).

Mexico

COFETEL Approval No.: RCPENSW12-0651
La operación de este equipo está sujeta a las siguientes dos condiciones:
(1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

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