Industrial communication technology – Industrial Wireless

Signals that could previously only be acquired with a great deal of effort, or not at all, can now be acquired and transmitted quickly and efficiently using wireless systems.

Wireless LAN

WLAN is a wireless standard in accordance with IEEE 802.11 a/b/g/n for creating wireless networks.

– High data rates of up to 300 Mbps
– Fast roaming
– Device mobility in wide area networks
– High degree of reliability, thanks to MIMO (multiple input, multiple output) technology

Trusted Wireless

Trusted Wireless is a form of wireless technology that has been designed specifically for industrial applications.

– Long range from a few hundred meters to several kilometers
– Robust and reliable communication in industrial environments
– License-free ISM band
– High local system density of several hundred networks possible
– Can be operated in parallel with WLAN 802.11 and Bluetooth systems without interference
– FHSS method for high immunity to interference

WirelessHART

WirelessHART is a transmission technology intended for process automation.

– Wireless module in accordance with IEEE 802.15.4
– Time-synchronized communication
– Supports fully meshed networks
– Secure data transfer

Bluetooth

With Bluetooth, you can configure local wireless networks with up to seven devices.

– Range of up to 100 m in industrial halls and up to 200 m outdoors
– Cyclic and fast data transmission of small data packets
– High local system density, i.e., WLAN 802.11 systems can be operated in parallel without interference
– High data security, thanks to 128-bit data encryption
– FHSS method for high immunity to interference

Product overview	**370**
Wireless Ethernet	
WLAN access points	**372**
Industrial WLAN – WLAN Ethernet adapter	**374**
Wireless I/O / Wireless Serial	
Radioline wireless system	
– Wireless transceivers (2.4 GHz, 900 MHz, 868 MHz)	**376**
– Multipoint multiplexer	**379**
Wireless I/O	
I/O extension modules	**380**
WirelessHART gateway and adapter (2.4 GHz)	**384**
Wireless multiplexer with antennas (2.4 GHz)	**386**
Trusted Wireless Ethernet	
RAD-Line wireless transceiver (900 MHz)	**387**
Antennas and cables	**388**
Remote communication	**402**

Wireless Ethernet

Industrial WLAN – 5110 series
WLAN access points
Page 372

Industrial WLAN – 1100 and 2100 series
WLAN access points
Page 373

Industrial WLAN –
WLAN Ethernet adapter
Page 374

Wireless I/O / Wireless Serial

2.4 GHz – Wireless transceiver for
serial interfaces
Page 376

868 MHz – Wireless transceiver for
serial interfaces
Page 377

900 MHz – Wireless transceiver for
serial interfaces
Page 377

900 MHz – Wireless transceiver for
outdoor installation (NEMA 4X)
Page 377

Fieldbus communication

Multipoint multiplexer for RS-485 bus system
Page 379

PROFIBUS PA I/O multiplexer
Page 461

Wireless I/O

Analog/digital I/O module,
2 digital I/Os and 1 analog I/O
Page 380

Digital I/O modules,
4 inputs or 4 relay outputs,
8 inputs or 8 transistor outputs
Page 380

Analog I/O modules,
4 inputs or 4 outputs
Page 382

Temperature I/O module,
4 Pt 100 inputs
Page 383

Trusted Wireless Ethernet

900 MHz – Wireless transceiver with Trusted Wireless, for Ethernet
Page 387

Wireless I/O

Wireless multiplexer with antennas
Page 386

WirelessHART

WirelessHART gateway
Page 384

WirelessHART adapter
Page 385

Wired HART

Ethernet HART multiplexer
Page 463

Remote communication

Alerts – Remote signaling and remote control system
Page 402

Remote maintenance – mGuard security router
Page 404

Remote control – Mobile router
Page 412

Antennas and cables

Antennas
Page 388

Adapters, extension cables
Page 396

5110 series WLAN access points

WLAN

WLAN access point / client
2.4 GHz / 5 GHz

The latest generation of WLAN modules offers maximum reliability, data throughput, and range.

Features:

– The **FL WLAN 5110** brings WLAN 802.11n to industrial applications and with it a data rate of up to 300 Mbps
– Central cluster management enables the entire wireless network to be set up in just minutes
– MIMO technology with two antennas for wireless communication that is more robust, faster, and covers a wider range
– Optimized for fast roaming under industrial conditions

Technical data

Wireless interface		
Wireless standard		IEEE 802.11 / a / b / g / n
Frequency band		2.4 GHz / 5 GHz
Transmission power		max. 20 dBm
Antenna connection method		RSMA (female)
Number		2
Antenna		
Assembly instructions		Antennas not included in scope of supply
Ethernet ports		
Number		2
Connection method		RJ45
Power supply for module electronics		
Supply voltage		24 V DC
Connection method		Via COMBICON
Supply voltage range		10 V DC ... 36 V DC
Supply current		200 mA (at 24 V DC)
Security		
		802.11i WPA PSK (preshared key) WPA2 AES TKIP Supports 802.1X/RADIUS MAC filter
Function		
Operating modes		Access Point / Client Adapter / Repeater
Basic functions		SNMP (V2/V3), CLI, WPS, DHCP, DCP, BootP, HTTP, HTTPS, Syslog, SD card, dual FW image, 1 x DI, 1 x DO, 2 x Ethernet 10/100 Mbit, auto crossover, auto negotiation, MODE button
Configuration		Cluster management, web-based management, WPS
General data		
Wireless licenses		EU, more countries in e-shop
Dimensions	W / H / D	40 mm / 109 mm / 109 mm
Degree of protection		IP20
Ambient temperature (operation)		-25°C ... 60°C (extended temperature range on request)
Permissible humidity (operation)		10% ... 95% (non-condensing)
Air pressure (operation)		800 hPa ... 1080 hPa (up to 2000 m above sea level)
Shock in acc. with EN 60068-2-27/IEC 60068-2-27		30g, 11 ms half-sine shock pulse
Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6		5g, 10 ... 150 Hz

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Wireless LAN access point			
- WLAN 802.11 a,b,g,n, frequency 2.4 GHz, 5 GHz, IP20	**FL WLAN 5110**	1043193	1
- Approval for the USA and Canada	**FL WLAN 5111**	1043201	1

Accessories

Parameterization memory, Flash card without license	**SD FLASH 2GB**	2988162	1
Control cabinet set, IP66, including DIN rail, plugs, and screw connections	**FL RUGGED BOX**	2701204	1
- With 3 omnidirectional antennas and antenna cables	**FL RUGGED BOX OMNI-1**	2701430	1
- With 3 omnidirectional antennas, antenna cables, and 100 ... 240 V AC power supply	**FL RUGGED BOX OMNI-2**	2701439	1
- With one panel antenna, antenna cable, and 100 ... 240 V AC power supply	**FL RUGGED BOX DIR-1**	2701440	1

1100 and 2100 series
WLAN access points

The **FL WLAN 1100** and **2100** make it easy to install a fast and stable WLAN network on machinery. The powerful integrated antennas enable space-saving and robust installation combined with low solution costs.

Features:

– Fast and easy connection, thanks to single-hole mounting
– Extremely robust housing, shockproof in accordance with IK08
– Optimized for fast roaming under industrial conditions

WLAN

WLAN access point / client – 2.4 GHz / 5 GHz, internal MIMO antennas, IP54 protection

EAC

WLAN

WLAN access point / client – 2.4 GHz / 5 GHz, internal MIMO antennas, IP65 / IP66 / IP67 / IP68 protection

EAC

Technical data

Wireless interface			
Wireless standard		IEEE 802.11 / a / b / g / n	IEEE 802.11 / a / b / g / n
Frequency band		2.4 GHz / 5 GHz	2.4 GHz / 5 GHz
Transmission power		max. 20 dBm (EIRP)	max. 20 dBm (EIRP)
Antenna connection method		(Internal)	(Internal)
Ethernet ports			
Number		1	1
Connection method		RJ45	RJ45
Power supply for module electronics			
Supply voltage		24 V DC (SELV)	24 V DC (SELV)
Connection method		Push-in spring connection	Push-in spring connection
Supply voltage range		18 V DC ... 32 V DC (PELV/SELV)	18 V DC ... 32 V DC (PELV/SELV)
Supply current		typ. 120 mA (at 24 V DC)	typ. 120 mA (at 24 V DC)
Security			
		802.11i WPA PSK (preshared key) WPA2 AES TKIP MAC filter	802.11i WPA PSK (preshared key) WPA2 AES TKIP MAC filter
Function			
Operating modes		Access Point / Client Adapter / Repeater	Access Point / Client Adapter / Repeater
Configuration		Web-based management, automated CLI	Web-based management, automated CLI
General data			
Wireless licenses		EU, more countries in e-shop	EU, more countries in e-shop
Dimensions	W / H / D	62.8 mm / 36.5 mm / 113.2 mm	62.8 mm / 36.5 mm / 113.2 mm
Degree of protection		IP54	IP65 / IP66 / IP67 / IP68
Ambient temperature (operation)		0°C ... 60°C	-40°C ... 60°C
Permissible humidity (operation)		5% ... 95% (non-condensing)	5% ... 95% (non-condensing)
Air pressure (operation)		800 hPa ... 1080 hPa (up to 2000 m above sea level)	800 hPa ... 1080 hPa (up to 2000 m above sea level)
Shock in acc. with EN 60068-2-27/IEC 60068-2-27		30g, 11 ms half-sine shock pulse	30g, 11 ms half-sine shock pulse
Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6		5g, 10 ... 150 Hz	5g, 10 ... 150 Hz

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Wireless LAN access point			
- WLAN 802.11 a,b,g,n, frequency 2.4 GHz, 5 GHz, IK08	**FL WLAN 1100**	2702534	1
- Approval for the USA and Canada	**FL WLAN 1101**	2702538	1

Accessories

Mechanical adapter, for protecting the rear connector when not mounted directly on control cabinets, etc.	**FL M32 ADAPTER**	2702544	1

Ordering data

Type	Order No.	Pcs./Pkt.
FL WLAN 2100	2702535	1
FL WLAN 2101	2702540	1

Accessories

Industrial WLAN – WLAN Ethernet adapter

The **FL EPA 2** modules wirelessly connect Ethernet-capable automation devices to the control network.

Features:

– Robust housing with M12 connections in IP65
– WLAN and Bluetooth in a single device as an option
– Particularly robust with integrated antenna or flexible use with external antenna connection

With external antenna connection, including antenna

Technical data

Wireless interface		
Wireless standard		Bluetooth 2.1 + EDR / IEEE 802.11 / b / g / a
Frequency band		2.4 GHz / 5 GHz
Transmission power		max. 16 dBm (Bluetooth: 10 dBm)
Antenna connection method		RSMA (female)
Antenna		
Connection method		RSMA (male)
Assembly instructions		External OMNI omnidirectional antenna supplied as standard, antennas can be exchanged
Ethernet ports		
Connection method		M12 connector (D-coded, female)
Power supply for module electronics		
Supply voltage		24 V DC
Connection method		M12 connector (A-coded, male)
Supply voltage range		9 V DC ... 30 V DC
Supply current		typ. 54 mA (at 24 V DC)
Security		
		802.11i WPA PSK (preshared key) WPA2 AES TKIP PIN Non-discoverable
Function		
Operating modes		Access point/client adapter for WLAN and Bluetooth
Configuration		Web interface, MODE button, AT commands (TCP/IP), SSC
General data		
Wireless licenses		Europe, USA, Canada, additional countries in the e-shop
Dimensions	W / H / D	67.8 mm / 92.7 mm / 33.2 mm
Degree of protection		IP65
Ambient temperature (operation)		-40°C ... 65°C
Permissible humidity (operation)		5% ... 93% (non-condensing)
Mounting type		Wall mounting

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Combined Ethernet wireless module, with Bluetooth and WLAN - External RSMA antenna connection (female) - Internal 2.4 GHz/5 GHz directional antenna	**FL EPA 2 RSMA**	1005957	1
Bluetooth/Ethernet wireless module			

Accessories

Mounting material, for wall or mast mounting	**FL EPA WMS**	2701134	1
Mounting material, for DIN rail mounting	**FL EPA RMS**	2701133	1

With internal panel antenna

With internal panel antenna

Technical data	
Bluetooth 2.1 + EDR / IEEE 802.11 / b / g / a 2.4 GHz / 5 GHz max. 16 dBm (Bluetooth: 10 dBm) (Internal)	Bluetooth 2.1 + EDR 2.4 GHz max. 10 dBm (Internal)
- Internal antenna	- Internal antenna
M12 connector (D-coded, female)	M12 connector (D-coded, female)
24 V DC M12 connector (A-coded, male) 9 V DC ... 30 V DC typ. 54 mA (at 24 V DC)	24 V DC M12 connector (A-coded, male) 9 V DC ... 30 V DC typ. 36 mA (at 24 V DC)
802.11i WPA PSK (preshared key) WPA2 AES TKIP PIN Non-discoverable	PIN Non-discoverable
Access point/client adapter for WLAN and Bluetooth Web interface, MODE button, AT commands (TCP/IP), SSC	- Web interface, MODE button, AT commands (TCP/IP), SSC
Europe, USA, Canada, additional countries in the e-shop 67.8 mm / 92.7 mm / 33.2 mm IP65 -40°C ... 65°C 5% ... 93% (non-condensing) Wall mounting	Europe, USA, Canada, additional countries in the e-shop 67.8 mm / 92.7 mm / 33.2 mm IP65 -40°C ... 65°C 5% ... 93% (non-condensing) Wall mounting

Ordering data

Type	Order No.	Pcs./Pkt.
FL EPA 2	1005955	1

Accessories

FL EPA WMS	2701134	1
FL EPA RMS	2701133	1

Ordering data

Type	Order No.	Pcs./Pkt.
FL BT EPA 2	1005869	1

Accessories

FL EPA WMS	2701134	1
FL EPA RMS	2701133	1

Radioline wireless system

Easy startup with I/O mapping

Radioline is the transmission system from Phoenix Contact for extended systems and networks with up to 250 stations.

Radioline transmits I/O signals as well as serial data.

With a slight turn of the thumbwheel, you can distribute and multiply I/O signals freely in your network.

The range* depends on the wireless system selected:
– 2.4 GHz - up to 5 km
– 868 MHz - up to 20 km
– 900 MHz - up to 32 km

Network applications

– I/O data mode: simple I/O signal distribution in the network
– PLC/Modbus RTU mode: I/O integration into the control level using the Modbus protocol
– PLC/Modbus RTU dual mode: I/O integration into the control level using the Modbus protocol. Parallel connection of additional Modbus/RTU slaves
– Serial data mode: networking of controllers and serial I/O devices, simple RS-232/RS-485 cable replacement

Radioline NEMA 4X

– For outdoor installation
– 2 digital inputs, 2 relay outputs, 1 analog input (cannot be extended)
– Interoperable with RAD-900-IFS

Notes:

*The range may be considerably above or below that stated. It is dependent on the environment, antenna technology, transmission power, and the product used.

The latest country registrations for the relevant product can be found on the Internet at phoenixcontact.com.

2.4 GHz wireless transceiver, for worldwide use

Ex:

Technical data

Wireless path			
Direction		Bi-directional	
Frequency range		2.4002 GHz ... 2.4785 GHz	
Data rate (adjustable)		16 kbps / 125 kbps / 250 kbps	
Number of channels		8 x 55	
Security		128-bit data encryption	
Connection method		RSMA (female)	
Serial port		RS-232	RS-485
Connection method		COMBICON plug-in screw terminal block	COMBICON plug-in screw terminal block
Serial transmission speed		0.3 ... 115.2 kbps	0.3 ... 187.5 kbps
Termination resistor (switchable via DIP switches)		-	390 Ω / 150 Ω / 390 Ω
Analog output		RSSI voltage output	
Signal range		0 V ... 3 V	
Digital output		RF link relay output	
Contact type		PDT	
Switching voltage		30 V AC/DC / 60 V DC	
Switching current		500 mA (30 V AC/DC)	
General data			
Supply voltage		19.2 V DC ... 30.5 V DC	
Current consumption		≤ 65 mA (at 24 V DC, at 25°C, stand-alone)	
Degree of protection		IP20	
Ambient temperature range		-40°C ... 70°C (>55°C derating) -40 °F ... 158 °F (>131°F derating)	
Permissible humidity (operation)		20% ... 85%	
Dimensions	W / H / D	17.5 / 116 / 114.5 mm	
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
EMC note		Class A product, see page 527	
Conformance/approvals			
ATEX		II 3 G Ex nA nC IIC T4 Gc	
IECEx		Ex nA nC IIC T4 Gc	
UL, USA/Canada		UL 508 Listed Class I, Div. 2, Groups A, B, C, D T4A Class I, Zone 2, IIC T4	

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Wireless module, can be extended with I/O extension modules			
	RAD-2400-IFS	2901541	1
- With Japan approval (no ATEX, IECEx or UL approval)	**RAD-2400-IFS-JP**	2702863	1
- For use in North America			
- For use in Australia			
Wireless module			
- For use in North America			

Accessories

CONFSTICK, configuration memory for the safe parallel operation of several wireless paths or networks			
RF band 1			
RF band 3	**RAD-CONF-RF3**	2902814	1
RF band 5	**RAD-CONF-RF5**	2902815	1
RF band 7	**RAD-CONF-RF7**	2902816	1
Memory stick, for saving custom configuration data	**RAD-MEMORY**	2902828	1
USB cable, for diagnostics and extended configuration	**RAD-CABLE-USB**	2903447	1

new

868 MHz wireless transceiver,
for license-free use in Europe

Ex:

900 MHz wireless transceiver,
for license-free use in America and Australia

Ex:

900 MHz wireless transceiver,
for outdoor installation (NEMA 4X)

Ex:

Technical data

Bi-directional	
869.4 MHz ... 869.65 MHz	
1.2 kbps / 9.6 kbps / 19.2 kbps / 60 kbps / 120 kbps	
14	
128-bit data encryption	
RSMA (female)	
RS-232	RS-485
COMBICON plug-in screw terminal block	COMBICON plug-in screw terminal block
0.3 ... 115.2 kbps	0.3 ... 115.2 kbps
-	390 Ω / 150 Ω / 390 Ω
RSSI voltage output	
0 V ... 3 V	
RF link relay output	
PDT	
30 V AC / 60 V DC	
500 mA	
19.2 V DC ... 30.5 V DC	
≤ 65 mA (at 24 V DC, at 25°C, stand-alone)	
IP20	
-40°C ... 70°C	
-40 °F ... 158 °F	
20% ... 85%	
17.5 / 116 / 114.5 mm	
0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Class A product, see page 527	
II 3 G Ex nA nC IIC T4 Gc	
Ex nA nC IIC T4 Gc	
-	

Ordering data

Type	Order No.	Pcs./Pkt.
RAD-868-IFS	2904909	1

Accessories

RAD-868-CONF-RF1	2702197	1
RAD-MEMORY	2902828	1
RAD-CABLE-USB	2903447	1

Technical data

RAD-900-IFS	RAD-900-IFS-AU
Bi-directional	Bi-directional
902 MHz ... 928 MHz	915 MHz ... 928 MHz
16 kbps / 125 kbps / 250 kbps / 500 kbps	16 kbps / 125 kbps / 250 kbps
-	-
128-bit data encryption	128-bit data encryption
RSMA (female)	RSMA (female)
RS-232	RS-485
COMBICON plug-in screw terminal block	COMBICON plug-in screw terminal block
0.3 ... 115.2 kbps	0.3 ... 115.2 kbps
-	390 Ω / 150 Ω / 390 Ω
RSSI voltage output	
0 V ... 3 V	
RF link relay output	
PDT	
30 V AC/DC	
500 mA	
10.8 V DC ... 30.5 V DC	
328 mA (@24 V DC)	
IP20	
-40°C ... 70°C	
-40 °F ... 158 °F	
20% ... 85%	
35 / 116 / 114.5 mm	
0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
-	
-	
Class I, Div. 2, Groups A, B, C, D	

Ordering data

Type	Order No.	Pcs./Pkt.
RAD-900-IFS	2901540	1
RAD-900-IFS-AU	2702878	1

Accessories

RAD-900-CONF-RF1	2702122	1
RAD-MEMORY	2902828	1
RAD-CABLE-USB	2903447	1

Technical data

Bi-directional
902 MHz ... 928 MHz
16 kbps / 125 kbps / 250 kbps / 500 kbps
-
128-bit data encryption
N (female)
-
-
RSSI voltage output
0 V ... 3 V
RF link relay output
PDT
30 V AC/DC
500 mA
10.8 V DC ... 30.5 V DC / 100 V AC ... 240 V AC
110 mA (120 V AC) / 368 mA (10.8 V DC)
NEMA 4
-40°C ... 70°C (DC)
-40°C ... 65°C (AC)
20% ... 85%
220 / 90 / 120 mm
0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14
-
-
ANSI/ISA/CSA 22.2 61010-2-201, UL 50E Type 4 Class I, Div. 2, Groups A, B, C, D T4 Class I, Zone 2, IIC T4

Ordering data

Type	Order No.	Pcs./Pkt.
RAD-900-DAIO6	2702877	1

Accessories

Radioline – I/O mapping now in wired format too

The popular, straightforward method of distributing I/O information using white thumbwheels on the front of the equipment is now also available for RS-485 networks.

Addressing the RS-485 front module is quick and easy too – all it takes is a turn of the yellow thumbwheel. This enhances the Radioline system's flexibility, allowing it to be used for solutions in even more applications.

The device supports three functions:

Supplementing a wireless system

A Radioline wireless system on an existing master can be expanded to include new RS-485 stations. RS-485 and wireless modules form a combined system.

Operation in a purely RS-485 network

In an RS-485 network with up to 99 Radioline stations, you can now distribute I/O signals between the stations. This is done without the need for software configuration by simply turning the thumbwheel.

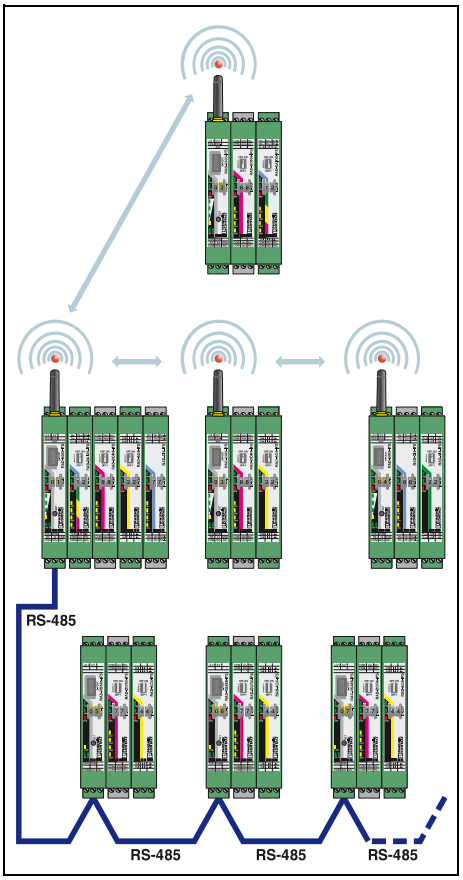
Stand-alone operation as a Modbus slave

The new Radioline RS-485 stations can also be operated on any Modbus/RTU master.

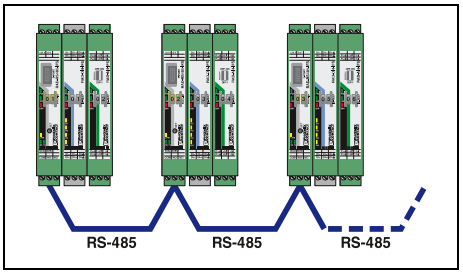
Alternative transmission media

To increase the range, it is of course possible to replace the RS-485 line with alternative transmission media.

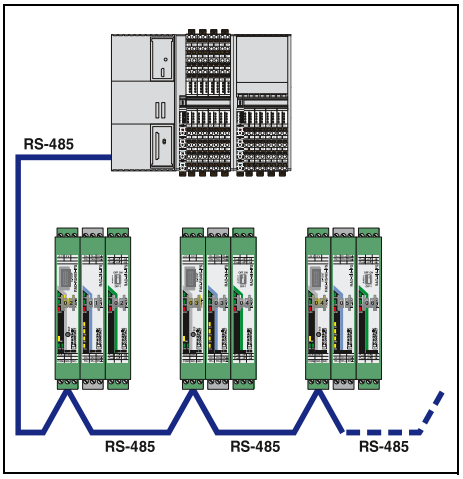
Phoenix Contact offers a range of converters for fiber optic cables, SHDSL, wireless or Ethernet technology.



I/O to I/O in a combined system



I/O to I/O via RS-485



I/O to serial (Modbus/RTU slave)

Multipoint multiplexer

Your advantages
– Up to 99 bus stations in the network
– Modular extension with up to 32 I/O extension modules supported
– Quick and easy startup without programming
– Can be combined with Radioline wireless modules

RS-485 serial interface

Ex:

Technical data

Serial port		RS-485
Connection method		COMBICON plug-in screw terminal block
Serial transmission speed		0.3 ... 115.2 kbps (default setting: 19.2/8/E/1)
Termination resistor (switchable via DIP switches)		390 Ω / 150 Ω / 390 Ω
Digital output		Link relay output
Contact type		PDT
Switching voltage		30 V AC/DC / 60 V DC
Switching current		500 mA (30 V AC/DC)
General data		
Supply voltage		19.2 V DC ... 30.5 V DC
Current consumption		≤ 65 mA (at 24 V DC, at 25°C, stand-alone)
Degree of protection		IP20
Ambient temperature range		-40°C ... 70°C (>55°C derating) -40 °F ... 158 °F (>131°F derating)
Permissible humidity (operation)		20% ... 85%
Dimensions	W / H / D	17.5 / 113 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
EMC note		Class A product, see page 527
Conformance/approvals		
ATEX		II 3 G Ex nA nC IIC T4 Gc
IECEx		Ex nA nC IIC T4 Gc
UL, USA/Canada		UL 508 Listed Class I, Div. 2, Groups A, B, C, D T4A Class I, Zone 2, IIC T4

Ordering data

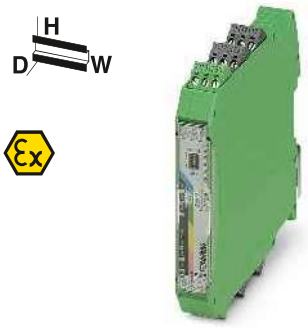
Description	Type	Order No.	Pcs./Pkt.
Multipoint multiplexer			
	RAD-RS485-IFS	2702184	1

Accessories

Shield connection terminal block, with snap-on foot, for mounting on NS 35... DIN rail, for shield support on busbars Ø 3-8 mm	**SKS 8-SNS35**	3062786	10
Plug-in terminal, for connecting the incoming and outgoing bus line	**TVFKC 1,5/ 3-ST**	1713842	50
USB cable, for diagnostics and extended configuration	**RAD-CABLE-USB**	2903447	1

I/O extension modules

- Easy I/O mapping via thumbwheel
- Digital wide-range inputs (0 ... 250 V AC/DC)
- 0 ... 100 Hz digital pulse inputs
- Relay or transistor outputs
- Easy module replacement even during operation (hot swap)
- Extended temperature range (-40°C ... +70°C)



2 digital inputs/outputs and 1 analog input/output

4 digital inputs

		Technical data		Technical data
Analog input				
Number of inputs		1		-
Resolution		16 bit		-
Signal range (configurable using the DIP switch)		0 mA ... 20 mA / 4 mA ... 20 mA		-
Accuracy		≤ 0.02% (at 25°C)		-
Supply voltage		≥ 12 V DC (for passive sensors (via terminal PWR1, +I1))		-
Digital input				
Number of inputs		2		4
Switching level	1 signal (“H”)	10 V AC/DC ... 50 V AC/DC (low-voltage input) 50 V AC/DC ... 250 V AC/DC (high-voltage input)		10 V AC/DC ... 50 V AC/DC (low-voltage input) 50 V AC/DC ... 250 V AC/DC (high-voltage input)
Switching level	0 signal (“L”)	0 V AC/DC ... 4 V AC/DC (low-voltage input) 0 V AC/DC ... 20 V AC/DC (high-voltage input)		0 V AC/DC ... 4 V AC/DC (low-voltage input) 0 V AC/DC ... 20 V AC/DC (high-voltage input)
Input frequency		≤ 2 Hz		≤ 2 Hz
Pulse input				
Number of inputs		-		-
Signal range		-		-
Input frequency		-		-
Pulse length		-		-
Analog output				
Number of outputs		1		-
Signal range		0 mA ... 20 mA 4 mA ... 20 mA	0 V ... 10 V	-
Accuracy		≤ 0.02% (at 25°C)	typ. 0.5%	-
Load R_B		≤ 500 Ω	≥ 10 kΩ	-
Digital output				
Contact type		2 x Relay output		-
Switching voltage		250 V AC 24 V DC		-
Switching current	min./max.	≥ 10 mA / 2 A (per channel)		-
Switching frequency		2 Hz		-
General data				
Supply voltage		19.2 V DC ... 30.5 V DC (DIN rail connector)		19.2 V DC ... 30.5 V DC (DIN rail connector)
Current consumption		≤ 95 mA (at 24 V DC, at 25°C)		≤ 11 mA (at 24 V DC, at 25°C)
Degree of protection		IP20		IP20
Ambient temperature range		-40°C ... 70°C		-40°C ... 70°C
Dimensions	W / H / D	17.5 / 113 / 114.5 mm		17.5 / 113 / 114.5 mm
EMC note		Class A product, see page 527		Class A product, see page 527
Conformance/approvals				
ATEX		II 3 G Ex nA nC IIC T4 Gc		II 3 G Ex nA IIC T4 Gc
IECEx		Ex nA nC IIC T4 Gc		Ex nA IIC T4 Gc
UL, USA/Canada		UL 508 Listed Class I, Div. 2, Groups A, B, C, D T4A Class I, Zone 2, IIC T4		UL 508 Listed Class I, Div. 2, Groups A, B, C, D T4A Class I, Zone 2, IIC T4

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Analog/digital I/O module	**RAD-DAIO6-IFS**	2901533	1
Digital input module Digital relay output module Digital/pulse input module Digital transistor output module			

Ordering data

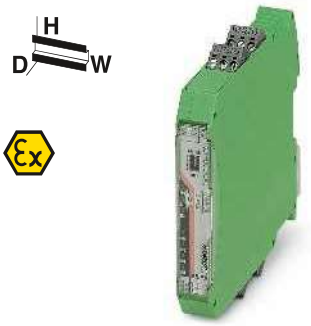
Type	Order No.	Pcs./Pkt.
RAD-DI4-IFS	2901535	1

Accessories

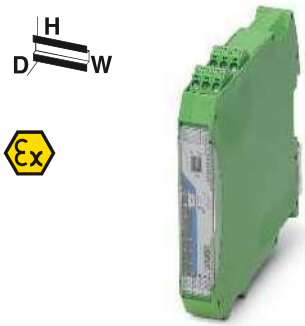
Analog/digital I/O module Digital relay output module Digital input module Digital transistor output module Digital/pulse input module	**RAD-DAIO6-IFS**	2901533	1

Accessories

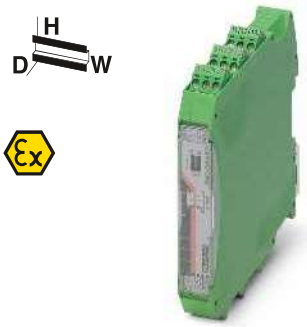
RAD-DOR4-IFS	2901536	1



4 digital relay outputs



8 digital inputs and 2 pulse inputs



8 digital transistor outputs

Ex:

Technical data		
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	8	-
-	10 V DC ... 30.5 V DC	-
-	0 V DC ... 4 V DC	-
-	≤ 10 Hz (Static mode)	-
-	2	-
-	0 V DC ... 30.5 V DC	-
-	< 100 Hz (Pulse counter mode)	-
-	≥ 5 ms (Pulse/pause ratio 1:1)	-
-	-	-
-	-	-
-	-	-
-	-	-
4 x Relay output	-	8 x Transistor output, active
250 V AC/DC	-	30.5 V DC
≥ 10 mA / 5 A (per channel)	-	- / 200 mA (per channel)
2 Hz	-	10 Hz
19.2 V DC ... 30.5 V DC (DIN rail connector)	19.2 V DC ... 30.5 V DC (DIN rail connector)	19.2 V DC ... 30.5 V DC (DIN rail connector)
≤ 55 mA (at 24 V DC, at 25°C)	≤ 18 mA (at 24 V DC, at 25°C)	≤ 22 mA (at 24 V DC, at 25°C)
IP20	IP20	IP20
-40°C ... 70°C	-40°C ... 70°C	-40°C ... 70°C
17.5 / 113 / 114.5 mm	17.5 / 113 / 114.5 mm	17.5 / 113 / 114.5 mm
Class A product, see page 527	Class A product, see page 527	Class A product, see page 527
II 3 G Ex nA nC IIC T4 Gc	II 3 G Ex nA IIC T4 Gc	II 3 G Ex nA IIC T4 Gc
Ex nA nC IIC T4 Gc	Ex nA IIC T4 Gc	Ex nA IIC T4 Gc
UL 508 Listed	UL 508 Listed	UL 508 Listed
Class I, Div. 2, Groups A, B, C, D T4A	Class I, Div. 2, Groups A, B, C, D T4A	Class I, Div. 2, Groups A, B, C, D T4A
Class I, Zone 2, IIC T4	Class I, Zone 2, IIC T4	Class I, Zone 2, IIC T4

Ordering data

Type	Order No.	Pcs./Pkt.
RAD-DOR4-IFS	2901536	1

Accessories

RAD-DI4-IFS	2901535	1

Ordering data

Type	Order No.	Pcs./Pkt.
RAD-DI8-IFS	2901539	1

Accessories

RAD-DO8-IFS	2902811	1

Ordering data

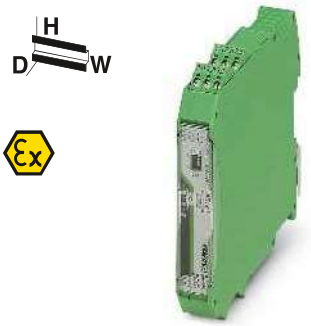
Type	Order No.	Pcs./Pkt.
RAD-DO8-IFS	2902811	1

Accessories

RAD-DI8-IFS	2901539	1

I/O extension modules

- Easy I/O mapping via thumbwheel
- Analog inputs (0/4 ... 20 mA)
- Temperature inputs for Pt 100 sensors
- Analog outputs (0/4 ... 20 mA or 0 ... 10 V)
- Easy module replacement even during operation (hot swap)
- Extended temperature range (-40°C ... +70°C)



4 analog current inputs

Ex:

Technical data

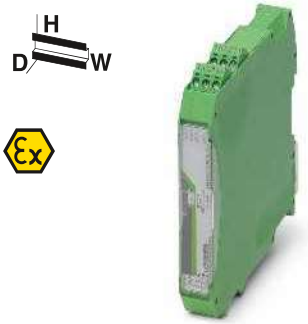
Analog input		
Number of inputs		4
Resolution		16 bit
Signal range (configurable using the DIP switch)		0 mA ... 20 mA / 4 mA ... 20 mA
Accuracy		≤ 0.02% (at 25°C)
Supply voltage		≥ 12 V DC (for passive sensors (via terminal PWR1, +I1))
Analog input		
Description of the input		-
Number of inputs		-
Temperature measuring range		-
Analog output		
Number of outputs		-
Signal range		-
Accuracy		-
Load R_B		-
General data		
Supply voltage		19.2 V DC ... 30.5 V DC (DIN rail connector)
Current consumption		≤ 120 mA (at 24 V DC, at 25°C)
Degree of protection		IP20
Ambient temperature range		-40°C ... 70°C
Dimensions	W / H / D	17.5 / 113 / 114.5 mm
EMC note		Class A product, see page 527
Conformance/approvals		
ATEX		II 3 G Ex nA IIC T4 Gc
IECEx		Ex nA IIC T4 Gc
UL, USA/Canada		UL 508 Listed Class I, Div. 2, Groups A, B, C, D T4A Class I, Zone 2, IIC T4

Ordering data

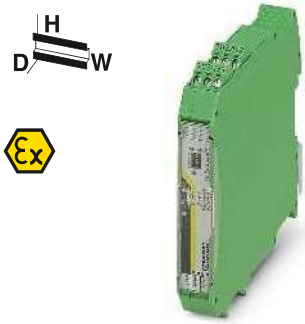
Description	Type	Order No.	Pcs./Pkt.
Analog input module Temperature input module Analog output module	**RAD-AI4-IFS**	2901537	1

Accessories

Analog output module Analog input module Temperature input module	**RAD-AO4-IFS**	2901538	1



4 temperature inputs



4 analog current/voltage outputs

Ex:

Ex:

Technical data

-	
-	
-	
-	
-	
Pt 100 input	
4	
-50°C ... 250°C	
-	
-	
-	
-	
19.2 V DC ... 30.5 V DC (DIN rail connector)	
≤ 38 mA (at 24 V DC, at 25°C)	
IP20	
-40°C ... 70°C	
17.5 / 113 / 114.5 mm	
Class A product, see page 527	
II 3 G Ex nA IIC T4 Gc	
Ex nA IIC T4 Gc	
UL 508 Listed	
Class I, Div. 2, Groups A, B, C, D T4A	
Class I, Zone 2, IIC T4	

Ordering data

Type	Order No.	Pcs./Pkt.
RAD-PT100-4-IFS	2904035	1

Accessories

RAD-AO4-IFS	2901538	1

Technical data

-	
-	
-	
-	
-	
-	
-	
-	
4	
0 mA ... 20 mA 4 mA ... 20 mA	0 V ... 10 V
≤ 0.02% (at 25°C)	typ. 0.5%
≤ 500 Ω	≥ 10 kΩ
19.2 V DC ... 30.5 V DC (DIN rail connector)	
≤ 115 mA (at 24 V DC, at 25°C)	
IP20	
-40°C ... 70°C	
17.5 / 113 / 114.5 mm	
Class A product, see page 527	
II 3 G Ex nA IIC T4 Gc	
Ex nA IIC T4 Gc	
UL 508 Listed	
Class I, Div. 2, Groups A, B, C, D T4A	
Class I, Zone 2, IIC T4	

Ordering data

Type	Order No.	Pcs./Pkt.
RAD-AO4-IFS	2901538	1

Accessories

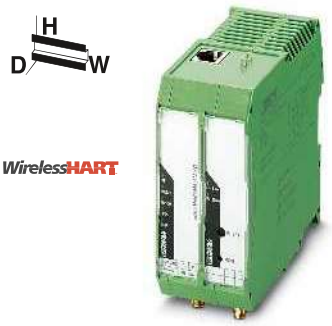
RAD-AI4-IFS	2901537	1
RAD-PT100-4-IFS	2904035	1

WirelessHART gateway

The **RAD-WHG/WLAN-XD** is a WirelessHART gateway with integrated 802.11b/g WLAN transceiver. It converts HART data to Modbus/TCP for easy integration into almost any host system.

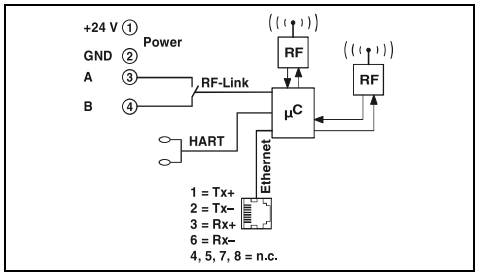
Features:

– Simple programming and diagnostics using an embedded web server or HART programmer
– WirelessHART gateway supports 250 WirelessHART devices
– 802.11b/g client can be used as WirelessHART backhaul connection with 802.11i (WPA2) 128-bit AES encryption
– Fully meshed routing (self-organizing and self-healing network) with WirelessHART
– WirelessHART uses channel hopping as a means of tolerating interference



WirelessHART gateway, for worldwide use

Ex:

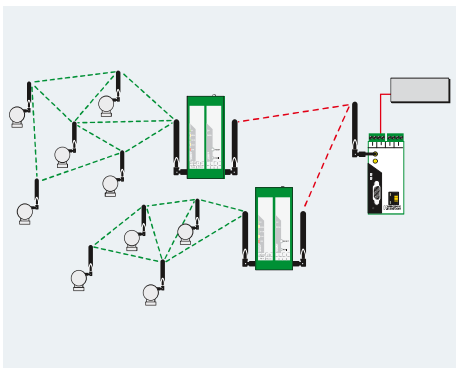


Technical data

Wireless path		
Interface description		WLAN in accordance with IEEE 802.11 b/g
Direction		Bi-directional
Frequency range		2.4 GHz ... 2.472 GHz
Number of channels		13
Connection method		RSMA (female)
Wireless path		
Interface description		WirelessHART
Frequency range		2.4 GHz ... 2.4835 GHz
Transmission power		0 ... 10 dBm
Number of channels		15
Connection method		RSMA (female)
Ethernet interface		
Connection method		RJ45
Transmission speed		10/100 Mbps
General data		
Supply voltage		9 V DC ... 30 V DC
Current consumption	typ. / max.	125 mA (at 24 V DC) / 300 mA (at 24 V DC)
Degree of protection		IP20
Ambient temperature range		-40°C ... 70°C
Housing material		Polyamide PA non-reinforced
Dimensions	W / H / D	45 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14
Conformance/approvals		
CSA, USA		Class I, Zone 2, Group IIC; AEx nA IIC T4
CSA, Canada		Class I, Div. 2 Groups A,B,C,D Ex nA IIC T4

Ordering data

Description	Type	Order No.	Pcs./Pkt.
WirelessHART gateway			
	RAD-WHG/WLAN-XD	2900178	1



WirelessHART adapter

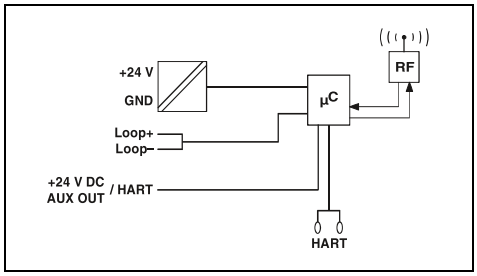
The **RAD-WHA-1/2NPT** is an adapter that allows up to 4 HART devices to be connected to a WirelessHART network.

Features:

– Allows wired HART devices to transfer data on a WirelessHART network
– Connect up to 4 HART device to one adapter
– Allows connection of one standard 4... 20 mA signal for easy integration of non-HART devices into a WirelessHART network
– 1/2-inch NPT fitting for distributed or direct device connection
– Removable antenna for connection of coaxial cable and high gain antenna

WirelessHART adapter, for worldwide use

Ex:



Technical data

Wireless path		
Interface description		WirelessHART
Direction		Bi-directional
Frequency range		2.4 GHz ... 2.4835 GHz
Number of channels		15
Connection method		N (female)
Analog input		
Number of inputs		1
Signal range		4 mA ... 20 mA
General data		
Supply voltage		11 V DC ... 30 V DC
Current consumption	max.	95 mA
Degree of protection		IP65
Ambient temperature range		-40°C ... 70°C
Housing material		Aluminum, die-cast, corrosion resistant, powder-coated
Dimensions	W / H / D	87.2 / 161 / 65.3 mm
Connection method		Flying leads, 20 AWG

Ordering data

Description	Type	Order No.	Pcs./Pkt.
WirelessHART adapter			
	RAD-WHA-1/2NPT	2900100	1

Wireless multiplexer

Wireless MUX – The wireless signal cable

The Wireless MUX transmits 16 digital and 2 analog signals bidirectionally. The Wireless MUX is supplied ready to use: Unpack – connect – switch on – and you have a working wireless path.

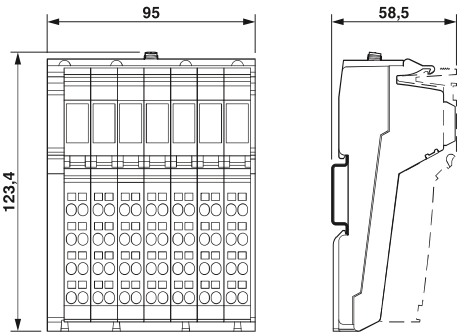
– Range*:
With omnidirectional antenna, 50 m to 100 m in halls, up to 200 m outdoors.

Features:

– Automatic establishment of the connection and signal exchange, thanks to fixed device pairing
– No configuration or settings necessary
– Extremely robust and reliable
– Interference-free operation alongside WLAN
– Typical transmission time of 10 ms

Notes:

* The range may be significantly above or below that stated, and depends on the environment, antenna technology, and the product used.



Wireless set

EAC MIC

Technical data

Wireless interface		
Wireless standard		Based on Bluetooth 4.0
Frequency range		2.402 GHz ... 2.48 GHz (ISM bandwidth)
Antenna connection method		RSMA (female)
Power supply for module electronics		
Supply voltage		24 V DC
Supply voltage range		19.2 V DC ... 30.5 V DC (via power connector)
Digital inputs		
Connection technology		1-conductor
Number of inputs		16
Digital outputs		
Connection technology		1-conductor
Number of outputs		16
Analog inputs		
Number of inputs		2
Voltage input signal		0 V ... 10 V
Current input signal		0 mA ... 20 mA
Measured value resolution		12 bits
Analog outputs		
Number of outputs		2
Voltage output signal		0 V ... 10 V
Current output signal		0 mA ... 20 mA
DAC resolution		12 Bit
General data		
Dimensions	W / H / D	95 mm / 123.4 mm / 57 mm
Degree of protection		IP20
Ambient temperature (operation)		-25°C ... 60°C
EMC note		Class A product, see page 527
Conformance/approvals		
Conformance		CE-compliant (RED Directive 2014/53/EU) FCC Directive, Part 15.247 ISC Directive RSS 210
UL, USA/Canada		UL 508 Listed

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Wireless MUX set, consisting of two modules including antennas, each with 16 digital and 2 analog inputs and outputs			
- With OMNI antennas	**ILB BT ADIO MUX-OMNI**	2884208	1
- Without antennas	**ILB BT ADIO MUX**	2702875	1

RAD-Line Ethernet with Trusted Wireless

The **RAD-ISM-900-EN-BD...** wireless transceiver enables the wireless connection of several distributed controllers to a central location (controller) via an Ethernet or serial connection.

Features:

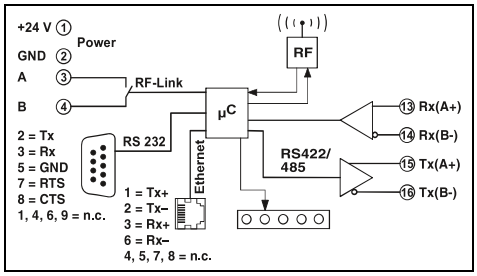
- Operates in the license-free 902 - 928 MHz ISM band
- Frequency-hopping spread spectrum technology
- Provides an interface for data transfer between a 900 MHz wireless transmission system and Ethernet, RS-232, RS-422 or RS-485 interfaces
- Contains an adjustable 10 mW ... 1 W transmitter
- Supports TCP/IP, UDP and IP v4 protocols
- Programmable for point-to-point, point-to-multipoint and multipoint-to-point configurations
- Incorporates security using selectable 128/192/256-bit AES encryption
- **RAD-ISM-900-EN-BD-BUS** features an integrated bus foot to connect I/O modules (addressable via Modbus)
- Individual modules can be configured as master, slave or repeater using integrated web browser interface
- **RAD-ISM-900-EN-BD/B** is a dedicated slave wireless transceiver with no Ethernet ports

Notes:

The products are offered exclusively for export outside the European Economic Area (EEA).

Wireless transceiver for Ethernet and serial interfaces (RS-232, RS-422/RS-485)

Ex:



Technical data

Wireless path			
Direction		Bi-directional	
Frequency range		902 MHz ... 928 MHz	
Transmission power		10 ... 30 dBm	
Serial port		RS-232	RS-485
Connection method		D-SUB-9 female connector	COMBICON plug-in screw terminal block
Serial transmission speed		300 ... 57.6 kbps	
Data format/encoding		Asynchronous	
Data flow control/protocols		RTS/CTS	
General data			
Supply voltage		11 V DC ... 30 V DC	
Current consumption		250 mA (at 24 V DC)	
Degree of protection		IP20	
Ambient temperature range		-40°C ... 65°C	
Dimensions	W / H / D	52 / 99 / 115 mm	
Screw connection rigid / flexible / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Conformance/approvals			
Conformance		FCC Directive, Part 15.247 ISC Directive RSS 210	
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D	

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Wireless module with optional Ethernet and serial interfaces			
Bus foot for I/O extension modules	**RAD-ISM-900-EN-BD-BUS**	2900017	1
Cannot be extended	**RAD-ISM-900-EN-BD**	2900016	1
Without serial interfaces	**RAD-ISM-900-EN-BD/B**	2901205	1

2.4 GHz/5 GHz accessories

Omnidirectional antennas

Omnidirectional antennas to increase gain.

– Standard omnidirectional antennas

Gain 2 dBi (2.4 GHz)

Gain 2.5 dBi (2.4 GHz) / 5 dBi (5 GHz)

	Technical data	Technical data
General data		
Ambient temperature (operation)	-20°C ... 65°C	-40°C ... 70°C
Degree of protection	IP65	IP68
Gain	2 dBi -	2.5 dBi (2.4 GHz) 5 dBi (5 GHz)
Impedance	50 Ω	50 Ω
Horizontal / vertical apex angle	360 ° / 75 °	360 ° / 30 ° (at 2.4 GHz) 360 ° / 16 ° (at 5 GHz)
Dimensions W / H	7.8 mm / 82.5 mm	23 mm / 180 mm
Frequency range	2.4 GHz	2.4 GHz ... 2.5 GHz / 5.15 GHz ... 5.83 GHz
Scope of delivery	incl. mounting material	-

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Omnidirectional antenna						
With connection RSMA (male)	**RAD-ISM-2400-ANT-OMNI-2-1-RSMA**	2701362	1			
With connection N (male)				**ANT-OMNI-2459-02**	2701408	1

2.4 GHz/5 GHz accessories

Omnidirectional antennas

Omnidirectional antennas to increase gain.

– With vandalism protection, thanks to increased impact strength

Gain 3 dBi (2.4 GHz)

Dual band,
gain up to 6 dBi (2.4 GHz) / up to 8 dBi (5 GHz)

	Technical data	Technical data
General data		
Ambient temperature (operation)	-40°C ... 80°C	-40°C ... 80°C
Degree of protection	IP55	IP68
Impact strength	IK08	-
Gain	3 dBi -	6 dBi (2.4 GHz, when mounted on metal surface) 8 dBi (5.6 GHz, when mounted on metal surface)
Impedance	50 Ω	50 Ω
Horizontal / vertical apex angle	360 ° / 85 °	360 ° / -
Dimensions W / H	86 mm / 43 mm	92 mm / 51 mm
Frequency range	2.4 GHz	2.4 GHz / 5.15 GHz ... 5.83 GHz

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
OMNI omnidirectional antenna with protection against vandals						
With connection RSMA (male)	**RAD-ISM-2400-ANT-VAN-3-0-RSMA**	2701358	1			
With connection N (female)				**RAD-ISM-2459-ANT-FOOD-6-0-N**	2702898	1
Mounting material for wall mounting	**RAD-ANT-VAN-MKT**	2885870	1			

2.4 GHz/5 GHz accessories

Omnidirectional antennas

Omnidirectional antennas to increase gain.

– High-quality omnidirectional antennas for wall and mast mounting

Gain 6 dBi (2.4 GHz)

Gain 5 dBi (5 GHz)

	Technical data	Technical data
General data		
Ambient temperature (operation)	-40°C ... 75°C	-45°C ... 70°C
Degree of protection	IP67	IP64
Gain	6 dBi	5 dBi
Impedance	50 Ω	50 Ω
Horizontal / vertical apex angle	360 ° / 30 °	360 ° / 25 °
Dimensions W / H	22 mm / 250 mm	16 mm / 130 mm
Frequency range	2.4 GHz ... 2.5 GHz	5.15 GHz ... 5.875 GHz
Scope of delivery	incl. mounting material	incl. mounting material

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Omnidirectional antenna						
With connection N (female)	**RAD-ISM-2400-ANT-OMNI-6-0**	2885919	1	**ANT-OMNI-5900-01**	2701347	1

2.4 GHz/5 GHz accessories

Directional wireless antennas

Directional wireless antennas with high gain for transmission over longer distances.

– For wall or mast mounting

Gain 9 dBi (2.4 GHz / 5 GHz)

Gain: 19 dBi (2.4 GHz)

	Technical data		Technical data
General data	ANT-DIR-2459-01	ANT-DIR-5900-01	
Ambient temperature (operation)	-40°C ... 75°C	-40°C ... 80°C	-40°C ... 70°C
Degree of protection	IP67	IP67	IP65
Gain	9 dBi	9 dBi	19 dBi
Impedance	50 Ω	50 Ω	50 Ω
Horizontal / vertical apex angle	75 ° / 55 ° (at 2.4 GHz) 55 ° / 55 ° (at 5 GHz)	70 ° / 60 ° (at 5 GHz) -	17 ° / 11 °
Dimensions W / H	80 mm / 101 mm	80 mm / 101 mm	610 mm / 419 mm
Frequency range	2.4 GHz ... 2.5 GHz / 5.15 GHz ... 5.875 GHz	5.15 GHz ... 5.875 GHz	2.4 GHz
Scope of delivery	incl. mounting material	incl. mounting material	incl. mounting material

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Panel directional wireless antenna (without cable)						
With connection N (female), dual band	**ANT-DIR-2459-01**	2701186	1			
With connection N (female), 2 emitters	**ANT-DIR-5900-01**	2701348	1			
Parabolic antenna						
With connection N (female)				**RAD-ISM-2400-ANT-PAR-19-0**	2867885	1

868 MHz/900 MHz accessories

Omnidirectional antennas
– For wall or mast mounting

Gain: 4 dBi (868 MHz)

Gain: 2.5 dBi (868 MHz)

	Technical data	Technical data
General data		
Ambient temperature (operation)	-40°C ... 75°C	-40°C ... 85°C
Degree of protection	IP67	IP67
Impact strength	-	IK08
Gain	4 dBi	2.5 dBi
Impedance	50 Ω	50 Ω
Connection method	N (female)	N (female)
Horizontal / vertical apex angle	360 ° / 30 °	360 ° / 55 °
Dimensions W / H	20 mm / 620 mm	80 mm / 40 mm
Frequency range	868 MHz ... 870 MHz	868 MHz ... 870 MHz
Scope of delivery	incl. mounting material	-

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Omnidirectional antenna						
	ANT-OMNI-868-01	2702136	1			
OMNI omnidirectional antenna with protection against vandals						
With connection N (female)				**ANT-OMNI-VAN-868-01**	1090616	1
Mounting material for wall mounting				**RAD-ANT-VAN-MKT**	2885870	1

868 MHz/900 MHz accessories

Directional wireless antennas
– For wall or mast mounting

Gain: 3.5 dBi (868 MHz)
Circular polarized

Yagi directional antenna,
up to 12 dBi gain (868/900 MHz)

	Technical data	Technical data	
General data		...-YAGI-6.5-N	...-YAGI-10-N
Ambient temperature (operation)	-40°C ... 75°C	-40°C ... 80°C	-40°C ... 80°C
Degree of protection	IP67	IP65	IP65
Gain	3.5 dBi	8.5 dBi	12.15 dBi
Impedance	50 Ω	50 Ω	50 Ω
Connection method	N (female)	N (female) with cable (0.6 m)	N (female) with cable (0.6 m)
Horizontal / vertical apex angle	135 ° / 90 °	100 ° / 62 °	56 ° / 46 °
Dimensions W / H	80 mm / 101 mm	60.5 mm / 172 mm	60.5 mm / 172 mm
Frequency range	865 MHz ... 870 MHz	868 MHz ... 960 MHz	868 MHz ... 960 MHz
Scope of delivery	incl. mounting material	incl. mounting material	incl. mounting material

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Panel directional wireless antenna (without cable)						
	ANT-DIR-868-01	2702137	1			
Directional wireless antenna						
				RAD-ISM-900-ANT-YAGI-6.5-N	2867814	1
				RAD-ISM-900-ANT-YAGI-10-N	5606614	1

Antenna cables

– Various cables for connection of different antennas
– Frequency range: 300 MHz ... 6 GHz

Antenna adapter cable, N (male) -> RSMA (male)

Antenna extension cable

	Technical data	Technical data
General data		
Ambient temperature range	-40°C ... 85°C	-40°C ... 105°C
Impedance	50 Ω	50 Ω

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Antenna adapter cable						
0.5 m long	**RAD-PIG-RSMA/N-0.5**	2903263	1			
1 m long	**RAD-PIG-RSMA/N-1**	2903264	1			
2 m long	**RAD-PIG-RSMA/N-2**	2903265	1			
3 m long	**RAD-PIG-RSMA/N-3**	2903266	1			
5 m long	**RAD-PIG-RSMA/N-5**	2702140	1			
Antenna extension cable						
3 m long, N connection at both ends (male)				**RAD-CAB-EF393- 3M**	2867649	1
5 m long, N connection at both ends (male)				**RAD-CAB-EF393- 5M**	2867652	1
10 m long, N connection at both ends (male)				**RAD-CAB-EF393-10M**	2867665	1
15 m long, N connection at both ends (male)				**RAD-CAB-EF393-15M**	2885634	1

Accessories
Adapter/extension cables

– Extension or adaptation of wireless module for antenna
– Frequency range: 300 MHz ... 6 GHz

Panel feed-through

	Technical data	Technical data
General data		
Ambient temperature range	-40°C ... 105°C	-40°C ... 105°C
Impedance	50 Ω	50 Ω

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Antenna cable						
50 cm long, N (male) -> N (male)	**FL LCX PIG-EF142-N-N**	2700677	1			
Antenna adapter cable						
0.5 m, N (female) -> RSMA (male)				**RAD-PIG-EF316-N-RSMA**	2701402	1

Surge protection

– For installing the antenna outside buildings from a cable length of 3 m

Antenna surge protection

Surge protective device for coaxial lines

	Technical data	Technical data
General data		
Ambient temperature range	-40°C ... 90°C	-40°C ... 90°C
Degree of protection	IP68	IP68
Attenuation	typ. 0.05 dB (≤ 0.15 dB)	0.1 dB (≤ 6 GHz)
Frequency range	2.4 GHz ... 5.9 GHz	0 Hz ... 6 GHz

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
COAXTRAB, protection adapter for antenna connections with Lambda/4 technology, 2.4 to 5.9 GHz						
Socket-socket	**CN-LAMBDA/4-5.9-BB**	2838490	1			
Male/female	**CN-LAMBDA/4-5.9-SB**	2800023	1			
COAXTRAB, protection adapter for coaxial cable systems, DC to 6 GHz						
Female-female				**CN-UB-70DC-6-BB**	2803166	1
Male-female				**CN-UB-70DC-6-SB**	2803153	1

Adapter

– For installing the antenna inside buildings

Sealing tape

– Provides additional weather protection for adapters, splitters, cable connections, etc.
– Self-vulcanizing

Adapter

Sealing tape

	Technical data	Technical data
General data		
Ambient temperature range	-65°C ... 165°C	-40°C ... 90°C
Degree of protection	IP20	
Impedance	50 Ω	-
Features	-	Self-vulcanizing
Width	38 mm	19 mm
Length	-	3 m
Thickness	-	0.75 mm

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Adapter						
N (female) -> N (female)	**RAD-ADP-N/F-N/F**	2867843	1			
Weather protection tape						
1.2 m long, 90° MCX (male) -> N (male)				**RAD-TAPE-SV-19-3**	2903182	1

Accessories

Antenna barrier

– For the safe use of standard antennas in the hazardous area

The antenna barrier limits the ignition energy at the antenna connection in an intrinsically safe way according to protection type Ex i. Standard antennas can therefore be used up to Ex zone 0.

For installation in Ex zone 2

Technical data

General data	
Ambient temperature range	-40°C ... 75°C
Degree of protection	IP65
Frequency range	0.3 GHz ... 6 GHz
Conformance/approvals	
ATEX	Ex I (M1) [Ex ia Ma] I Ex II (1) G [Ex ia Ga] IIC Ex II (1) D [Ex ia Da] IIIC Ex II 3 (1) G Ex nA [ia Ga] IIC T6 Gc X Please follow the special installation instructions in the documentation!
IECEx	[Ex ia Ma] I [Ex ia Ga] IIC [Ex ia Da] IIIC Ex nA [ia Ga] IIC T6 Gc X

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Antenna barrier, universal frequency range			
N (female) -> N (female)	**BAR-ANT-N-N-EX**	2702198	1

Accessories

Antenna splitter

– For splitting HF signals between two antennas
– For connecting two panel antennas for repeater applications
– Use the **FL LCX PIG-EF142-N-N** antenna cable to connect two directional antennas

Antenna splitter

Technical data

General data	
Ambient temperature range	-40°C ... 100°C
Degree of protection	IP65, when installed
Frequency range	0.3 GHz ... 6 GHz

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Antenna splitter			
	RAD-SPL-2-N/N	2702293	1
Antenna cable			
50 cm long, N (male) -> N (male)	**FL LCX PIG-EF142-N-N**	2700677	1

Leaky wave conductor and accessories

The leaky wave conductor is a cable that acts as an antenna, which emits continuously along its length. It ensures a continuous wireless connection when using track-guided systems, even in angled or difficult to reach spaces.

Leaky wave conductor

Alignment tool and cable tie

Technical data

General data	
Ambient temperature (operation)	-40°C ... 85°C
Cable, attenuation	14.7 dB/100 m, longitudinal attenuation (2.4 GHz)
Connection method	open end

Technical data

	-
	-
	-

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Leaky wave conductor			
- 2.4 GHz frequency band	**FL LCX CABLE 24 E**	2702553	1
- 5 GHz frequency band	**FL LCX CABLE 5 E**	2702860	1
Connector for leaky wave conductor	**FL LCX CON-N-F E**	2702518	1
Termination resistor			
- for leaky wave conductor, N (male)	**FL LCX 50-OHM**	2884978	1
- for device, RSMA (male)	**FL LCX 50-OHM-RSMA**	2702702	1
Alignment tool for leaky wave conductor			
Cable tie for leaky wave conductor			

Ordering data

Type	Order No.	Pcs./Pkt.
FL LCX TOOL E	2702519	1
FL LCX CLAMP E	2702520	100

Control box sets

Control box set for the FL WLAN 5100 access point for use directly in industrial environments or in protected outdoor areas.

Features:

– IP66 control box
– Mounting suitable for industrial use
– Bore holes, screw connections already included
– Various sets, suitable for the most common applications

Technical data

General data		
Dimensions	W / H / D	174 mm / 254 mm / 137 mm

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Control box set, IP66, including DIN rail, plugs, and screw connections			
	FL RUGGED BOX	2701204	1
- With 3 omnidirectional antennas and antenna cables	**FL RUGGED BOX OMNI-1**	2701430	1
- With 3 omnidirectional antennas, antenna cables, and 100 ... 240 V AC power supply	**FL RUGGED BOX OMNI-2**	2701439	1
- With one panel antenna, antenna cable, and 100 ... 240 V AC power supply	**FL RUGGED BOX DIR-1**	2701440	1

Accessories

Description	Type	Order No.	Pcs./Pkt.
Set for mast mounting of the FL RUGGED BOX housing, including screw clamps for masts up to 89 mm in diameter	**FL RUGGED BOX POLE SET**	2701205	1

900 MHz accessories

Omnidirectional antennas

– Mobile or stationary applications
– Point-to-multipoint configurations
– Small antennas are suitable for applications with a shorter range
– Large antennas are suitable for applications requiring longer range

2.15 dBi/7 dBi gain

5 dBi/8 dBi gain

Technical data				
General data	...-OMNI-0-6 / ...-OMNI-2-2-...	...-OMNI-5	...-OMNI-FG-3-N	...-OMNI-FG-6-N
Ambient temperature (operation)	-40°C ... 75°C	-40°C ... 80°C	-40°C ... 80°C	-40°C ... 80°C
Degree of protection	IP65	IP65	IP65	IP65
Gain	2.15 dBi	7 dBi	5.15 dBi	8 dBi
Impedance	50 Ω	50 Ω	50 Ω	50 Ω
Horizontal / vertical apex angle	360 ° / N/A	360 ° / 30 °	360 ° / 28 °	360 ° / 15 °
Dimensions W / H	0.3 cm / 8.9 cm	0.3 cm / 60.9 cm	2.38 in. / 44.25 in.	6.05 cm / 180.34 cm
Frequency range	900 MHz	900 MHz	902 MHz ... 928 MHz	900 MHz
Scope of delivery	incl. mounting material	incl. mounting material	incl. mounting material	incl. mounting material

Ordering data						
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Omnidirectional antenna						
With connection MCX (male)	**RAD-ISM-900-ANT-OMNI-0-6**	2867160	1			
With connection RSMA (male)	**RAD-900-ANT-OMNI-2-2-RSMA**	2904801	1			
With connection N (female)	**RAD-ISM-900-ANT-OMNI-5**	2867199	1	**RAD-ISM-900-ANT-OMNI-FG-3-N**	2867791	1
With connection N (female)				**RAD-ISM-900-ANT-OMNI-FG-6-N**	2885579	1

900 MHz accessories

Directional wireless antennas (YAGI)

– Stationary applications
– Point-to-point configurations with line of sight

5 dBi gain,
with 0.6 m connecting cable

8.5 dBi/12 dBi gain,
with 0.6 m connecting cable

Technical data				
General data			...-YAGI-6.5-N	...-YAGI-10-N
Ambient temperature (operation)	-40°C ... 80°C		-40°C ... 80°C	-40°C ... 80°C
Degree of protection	IP65		IP65	IP65
Gain	5 dBi		8.5 dBi	12.15 dBi
Impedance	50 Ω		50 Ω	50 Ω
Connection method	N (female) with cable (0.6 m)		N (female) with cable (0.6 m)	N (female) with cable (0.6 m)
Horizontal / vertical apex angle	168 ° / 78 °		100 ° / 62 °	56 ° / 46 °
Dimensions W / H	6 cm / 17 cm		60.5 mm / 172 mm	60.5 mm / 172 mm
Frequency range	900 MHz		868 MHz ... 960 MHz	868 MHz ... 960 MHz
Scope of delivery	incl. mounting material		incl. mounting material	incl. mounting material

Ordering data						
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Directional wireless antenna						
	RAD-ISM-900-ANT-YAGI-3-N	2867801	1	**RAD-ISM-900-ANT-YAGI-6.5-N**	2867814	1
				RAD-ISM-900-ANT-YAGI-10-N	5606614	1

Antenna cable

– Various cables for connection of different antennas
– Frequency range: 300 MHz ... 6 GHz

Antenna adapter cable, N (male) -> RSMA (male)

Technical data

General data	
Ambient temperature range	-40°C ... 85°C
Impedance	50 Ω

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Antenna adapter cable			
0.5 m long	**RAD-PIG-RSMA/N-0.5**	2903263	1
1 m long	**RAD-PIG-RSMA/N-1**	2903264	1
2 m long	**RAD-PIG-RSMA/N-2**	2903265	1
3 m long	**RAD-PIG-RSMA/N-3**	2903266	1
5 m long	**RAD-PIG-RSMA/N-5**	2702140	1

Antenna cable

– Various cables for connection of different antennas
– Frequency range: 300 MHz ... 6 GHz

Technical data

General data	
Ambient temperature range	-40°C ... 75°C
Impedance	50 Ω

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Antenna adapter cable			
1.2 m long, MCX (male) -> N (female)	**RAD-CON-MCX-N-SB**	2867717	1
1.2 m long, 90° MCX (male) -> N (male)	**RAD-CON-MCX90-N-SS**	2885207	1
1.2 m long, SMA (male) -> N (female)	**RAD-CON-SMA-N-SS**	2867403	1

Extension cable

– Various cables to extend the distance between the wireless module and antenna

Antenna extension cable, N (male)

Technical data

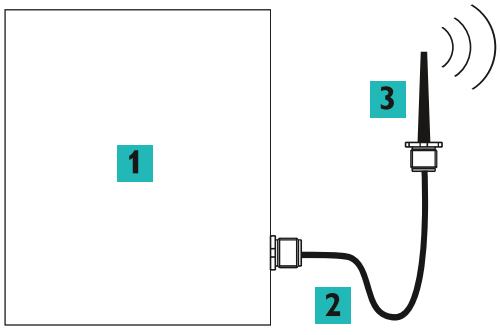
General data	
Ambient temperature range	-40°C ... 85°C
Impedance	50 Ω

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Antenna extension cable, N connection at both ends (male)			
3 m long, attenuation (at 900 MHz) 0.96 dB	**RAD-CAB-PFP240-10**	5606124	1
6 m long, attenuation (at 900 MHz) 0.98 dB	**RAD-CAB-PFP400-20**	5606125	1
7.5 m long, attenuation (at 900 MHz) 1 dB	**RAD-CAB-PFP500-25**	5606126	1
12 m long, attenuation (at 900 MHz) 0.25 dB/m	**RAD-CAB-RG213-40**	2867377	1
15 m long, attenuation (at 900 MHz) 0.25 dB/m	**RAD-CAB-RG213-50**	2867225	1
18 m long, attenuation (at 900 MHz) 0.13 dB/m	**RAD-CAB-PFP400-60**	2867380	1
24 m long, attenuation (at 900 MHz) 0.13 dB/m	**RAD-CAB-PFP400-80**	2867393	1
30 m long, attenuation (at 900 MHz) 0.13 dB/m	**RAD-CAB-PFP400-100**	2867238	1
45 m long, attenuation (at 900 MHz) 0.08 dB/m	**RAD-CAB-PFP600-150**	2885184	1

Simplified antenna connection

– All wireless modules with an RSMA connection are connected directly to the N connection of the antennas via a cable
– Various cable lengths between 50 cm and 5 m are available

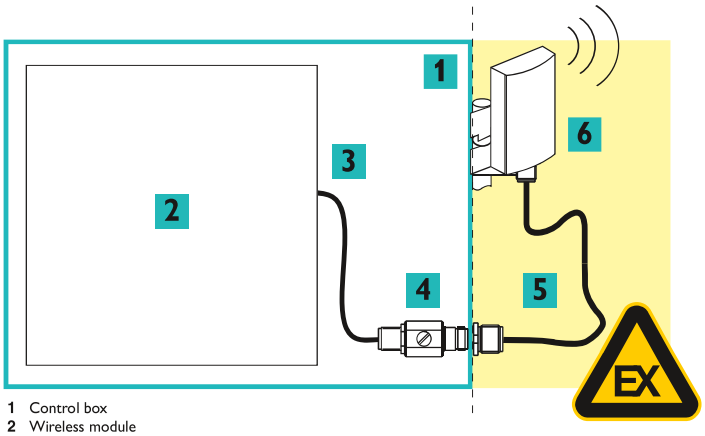


1 Wireless module
2 Adapter cable
3 Antenna

Installation in the Ex area

The antenna barrier makes the high-frequency outputs of wireless modules intrinsically safe in accordance with Ex i protection. It limits the ignition energy in the event of an error.

The antenna barrier is installed in an IP54 control box in zone 2 or in the safe area. This makes it possible to use standard antennas in potentially explosive areas up to zone 0.



1 Control box
2 Wireless module
3 Adapter cable
4 Antenna barrier
5 Antenna cable
6 Antenna