



Radioline

Easy startup
at the turn of a wheel

The Radioline system – Distribute signals easily with I/O mapping

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

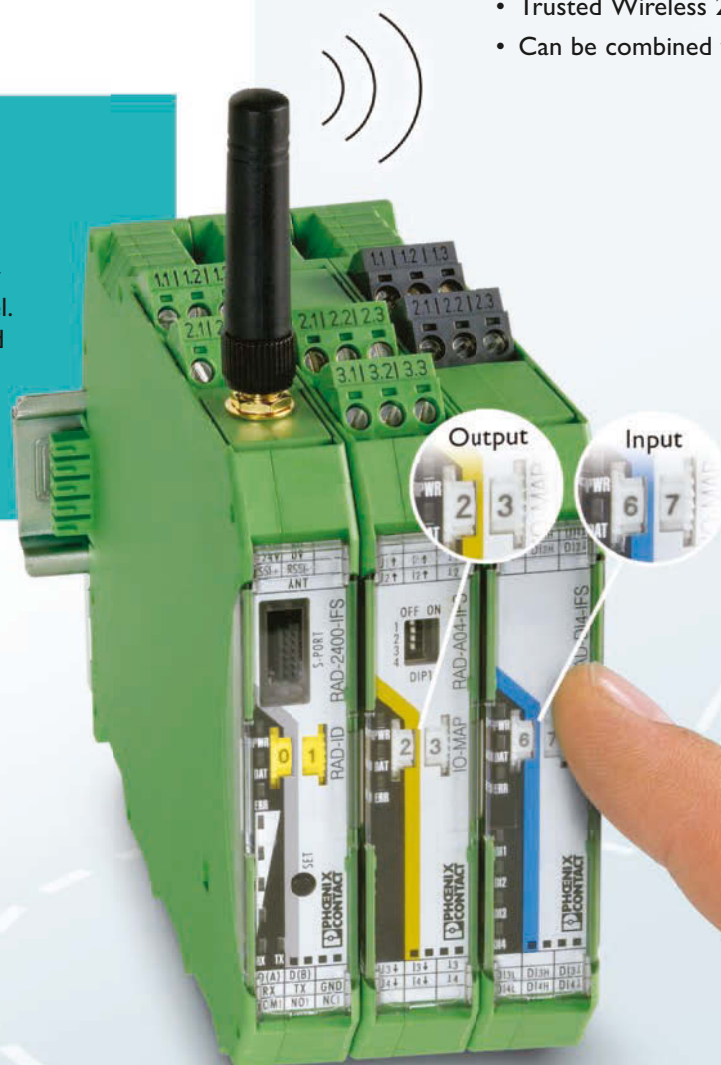
Special features include extremely easy assignment of inputs and outputs by simply turning the thumbwheel – without any programming.

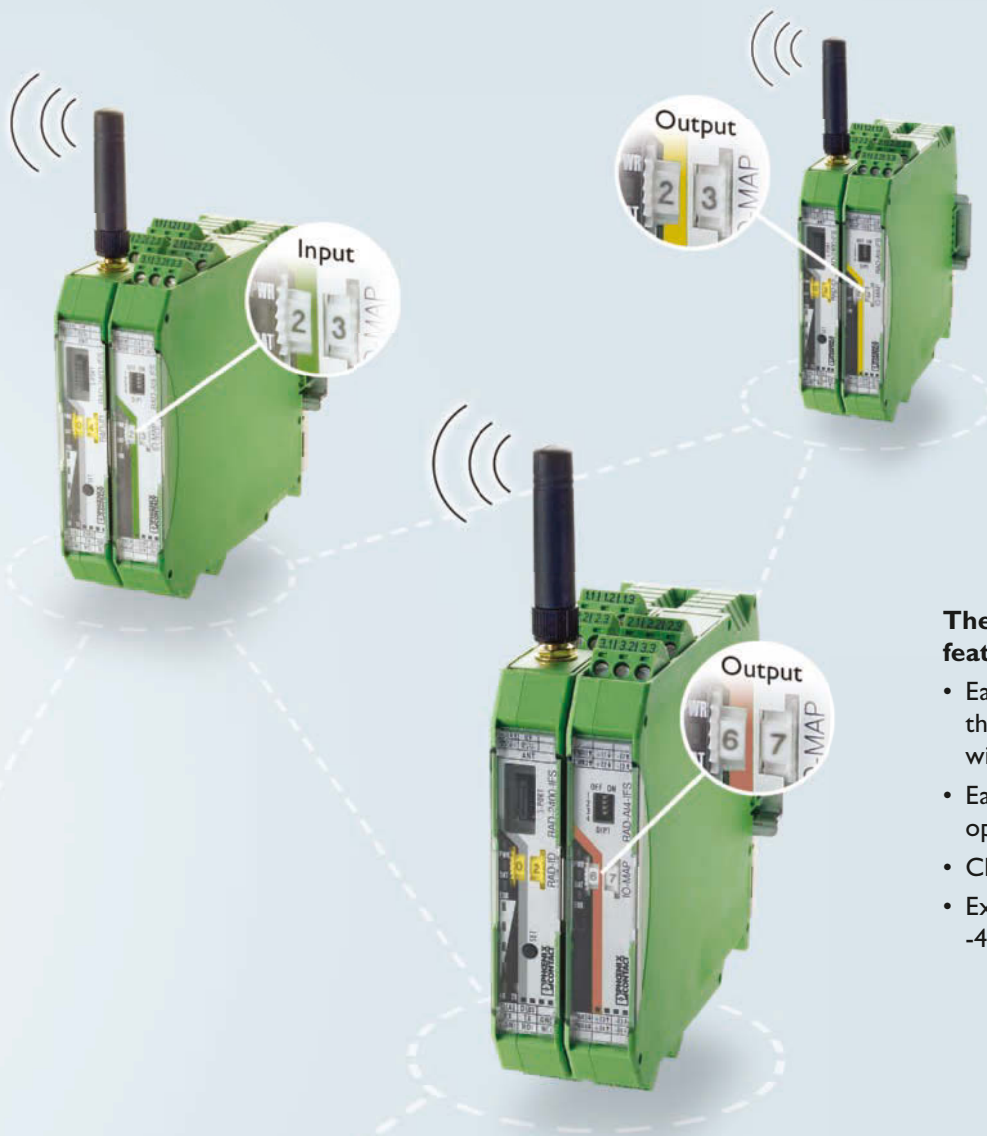
Radioline features:

- Quick and easy startup without programming
- Straightforward point-to-point or network connections (line, star, mesh)
- Modular station structure with up to 32 I/O modules per station via DIN rail connector
- Transmission of I/O signals and serial data
- Trusted Wireless 2.0 technology
- Can be combined with RS-485 stations

What advantages does I/O mapping offer?

I/O mapping simplifies signal distribution in your system. Assign inputs and outputs quickly by simply turning the thumbwheel. In this way you can distribute and multiply I/O signals freely in your network – without the need for any complex programming.





The I/O extension modules feature:

- Easy I/O mapping via the thumbwheel on the front with no need for programming
- Easy module replacement even during operation (hot swap-capable)
- Channel-to-channel electrical isolation
- Extended temperature range: -40°C to +70°C

It's easy with Radioline:



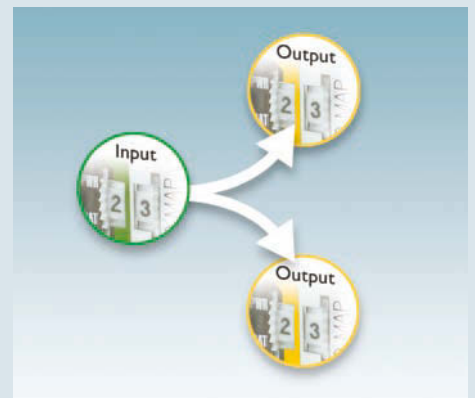
Easy installation

Create a modular wireless station in the control cabinet and extend or replace it easily during operation.



Unique addresses for front modules

Set a unique address on the front module by simply turning the thumbwheel.



Distribute inputs and outputs

On the I/O module, the thumbwheel is used to assign the inputs and outputs by creating pairs, thereby easily distributing the I/O signals in the system.

Radioline – Used in industry worldwide

The Radioline system makes it possible to transmit data and signals over several kilometers. Devices with a range of frequencies are available for worldwide operation. There is also the option of a license-free radio frequency of 868 MHz, 900 MHz, or 2.4 GHz, depending on the required range and region where the equipment is to be used.

Supplementing the Radioline system is a new RS-485 bus module, which can be operated in combination with the wireless modules or as a stand-alone solution.



Trusted Wireless 2.0 wireless technology was specially developed for industrial use. It features:

- Reliable communication via the frequency hopping spread spectrum (FHSS)
- Excellent coexistence features
- Self-healing network structures
- Secure data encryption according to AES and authentication
- Long ranges thanks to high receiver sensitivity and variable data transmission speeds
- Extensive diagnostic properties



Radioline wireless module 868 MHz

- Can be used in the 868 MHz European license-free frequency band
- Wireless module with 16... 27 dBm output power and particularly high receiver sensitivity
- Long distances of up to 20 km (12 miles)
- Adjustable wireless data transmission speed, 1.2... 120 kBit/s

Radioline RS-485 bus module

Thanks to the new RAD-RS485-IFS communication module, the popular, straightforward method of assigning IO information via thumbwheels is now available for wired RS-485 systems too.

The module can also be used with other Radioline wireless stations or, alternatively, as a Modbus slave on a Modbus RTU master.



Radioline wireless module 900 MHz

- Can be used in the 900 MHz license-free frequency band (North and South America and Canada)
- Wireless module with 10 ... 30 dBm output power and particularly high receiver sensitivity
- Superhet receiver with additional level of filtering and frequency conversion for particularly high noise immunity and improved coexistence
- Long distances of up to 32 km (20 miles)
- Adjustable wireless data transmission speed, 16 ... 500 kBit/s



Radioline 2.4 GHz wireless module

- Can be used worldwide in the license-free 2.4 GHz frequency band
- Wireless module with 0 ... 20 dBm output power and particularly high receiver sensitivity
- Long distances of up to 5 km (3 miles)
- Adjustable wireless data transmission speed, 16 ... 250 kBit/s

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 new 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. To achieve this, the device supports three functions:

1. Supplementing a wireless system
2. Operation in a purely RS-485 network
3. Stand-alone operation as a Modbus slave

3. 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.





1. Connection to Radioline wireless system

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

2. Multipoint multiplexer

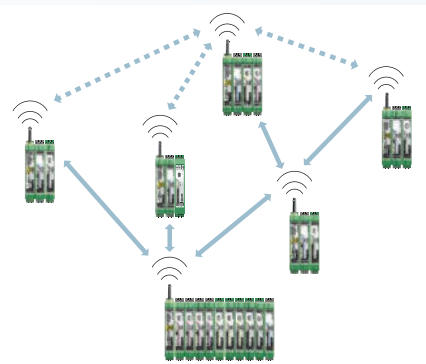
In an RS-485 network with up to 99 Radioline stations, you can now distribute I/O signals between stations entirely without the need for software configuration – all it takes is a turn of the wheel.



Radioline – Overview of application options

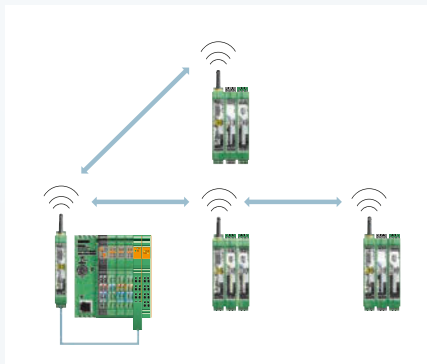
Radioline transmits I/O signals as well as serial data and is therefore very versatile. A network may consist either entirely of wireless stations or entirely of RS-485 stations. Alternatively, it is also possible to combine a wireless network with RS-485 stations.

Signal transmission with the Radioline wireless system



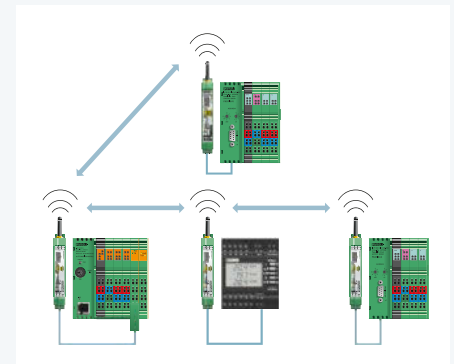
I/O to I/O

Radioline enables easy I/O signal distribution throughout the network and the creation of various network structures – from a simple point-to-point connection to complex networks.



I/O to serial (Modbus RTU)

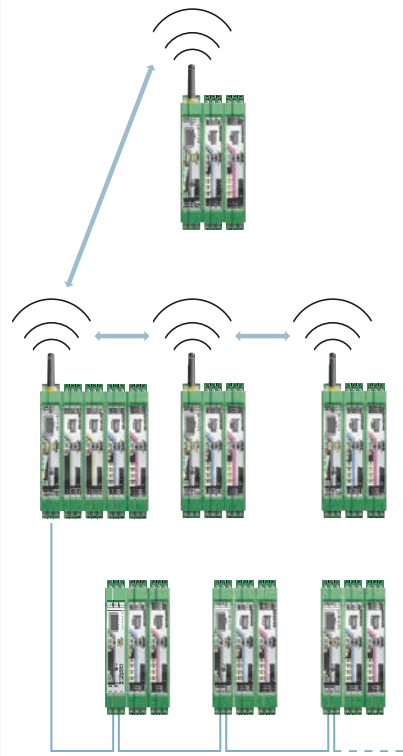
With Radioline, I/O modules can be connected to the controller directly via the integrated RS-232 and RS-485 interface by means of wireless communication using the Modbus protocol.



Serial to serial (transparent)

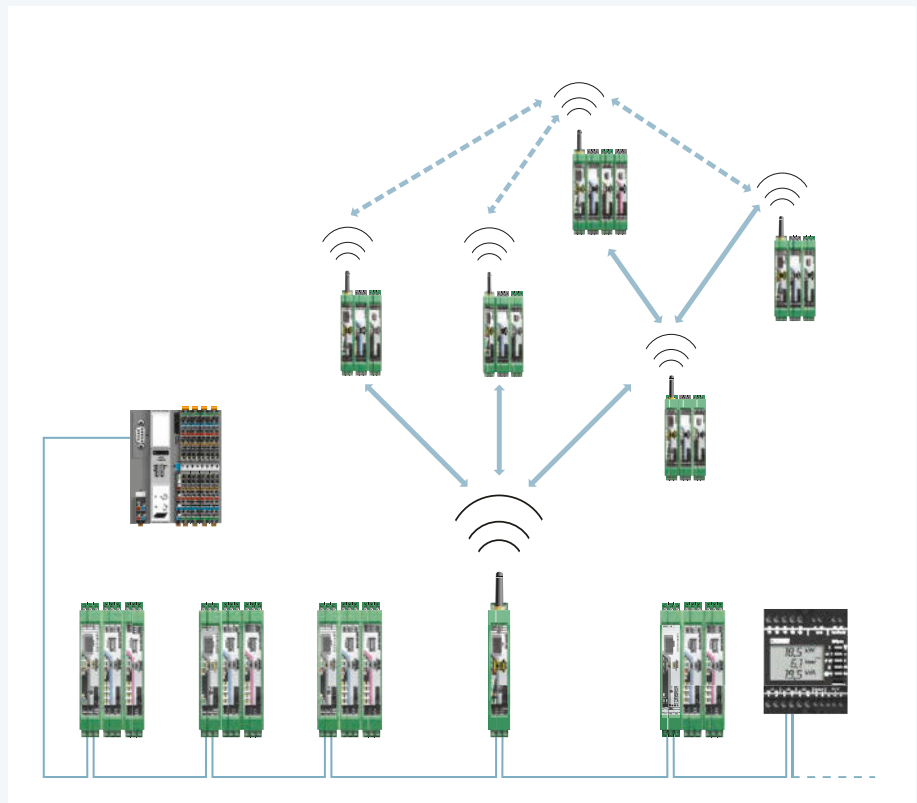
Radioline can be used to network multiple controllers or serial I/O devices quickly and easily using wireless technology. In this way, serial RS-232/RS-485 cables can be replaced.

Signal transmission with the Radioline RS-485 bus module



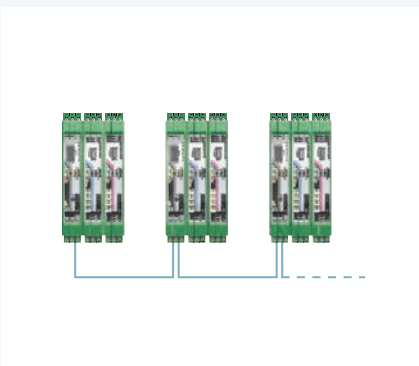
I/O to I/O in a combined system

An existing wireless system on the master can be expanded to include RS-485 stations. This allows I/O signals to be exchanged easily between all the stations in the network using I/O mapping.



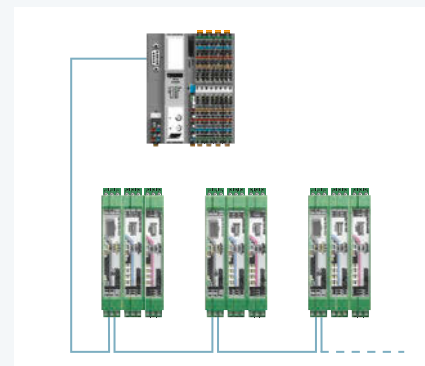
I/O to serial (Modbus RTU)

Combined operation of Radioline wireless systems and RS-485 stations is possible on any Modbus RTU master.



I/O to I/O

With the Radioline multipoint multiplexer, I/O signals can be distributed to various stations with ease via an RS-485 2-wire line.



I/O to serial (Modbus RTU)

Using the RS-485 interface, it is possible to address any Radioline station via the Modbus RTU protocol. This allows the equipment to be used in any Modbus network.

Radioline – Overview of front modules and I/O extension modules

The Radioline transmission system consists of wireless modules for the 868 MHz, 900 MHz, and 2.4 GHz frequency ranges, plus an RS-485 bus module for a range of applications.

The Radioline extension modules enable the transmission of digital and analog signals as well as temperature signals. Matching accessories are also available.



RAD-868-IFS

Order No. [2904909](#)

- Supply voltage: 19.2 ... 30.5 V DC
- Extended temperature range: -40°C to +70°C
- Antenna connection: RSMA (female)
- Can be used in Europe
- Range of up to 20 km*



International Ex approval

The entire system is certified according to 94/9/EC (ATEX) directives and can therefore be used internationally in potentially explosive areas.

Digital extension modules with 4 channels



RAD-DI4-IFS

Order No. [2901535](#)

RAD-DOR4-IFS

Order No. [2901536](#)

- 4 digital wide-range inputs: 0 ... 250 V AC/DC
- 4 digital relay outputs: 24 V DC/250 V AC/5 A
- Extended temperature range: -40°C to +70°C

Digital extension modules with 8 channels



RAD-DI8-IFS

Order No. [2901539](#)

RAD-DO8-IFS

Order No. [2902811](#)

- 8 digital inputs: 0 ... 30.5 V DC
- 2 pulse inputs: 100 Hz, 32 bit
- 8 digital transistor outputs: 30.5 V DC/200 mA
- Extended temperature range: -40°C to +70°C

900 MHz wireless module



RAD-900-IFS

Order No. [2901540](#)

Supply voltage: 10.8 ... 30.5 V DC

- Extended temperature range: -40°C to +70°C
- Antenna connection: RSMA (female)
- For use in North and South America and Canada
- Range of up to 32 km*

2.4 GHz wireless module



RAD-2400-IFS

Order No. [2901541](#)

Supply voltage: 19.2 ... 30.5 V DC

- Extended temperature range: -40°C to +70°C
- Antenna connection: RSMA (female)
- Universal use
- Range of up to 5 km*

RAD-RS485-IFS

Order No. [2702184](#)

Supply voltage: 19.2 ... 30.5 V DC

- Extended temperature range: -40°C to +70°C
- RS-485 2-wire connection (screw terminal block)
- Worldwide use
- Range: 1,200 m or more with converter or repeater

Analog/digital extension module



RAD-DAIO6-IFS

Order No. [2901533](#)

- 1 analog input: alternatively 0/4 ... 20 mA
- 1 analog output: alternatively 0/4 ... 20 mA, 0 ... 10 V DC
- 2 digital wide-range inputs/outputs: 0 ... 250 V AC/DC
- Extended temperature range: -40°C to +70°C

Analog extension modules



RAD-AI4-IFS

Order No. [2901537](#)

RAD-AO4-IFS

Order No. [2901538](#)

- 4 analog inputs: alternatively 0/4 ... 20 mA
- 4 analog outputs: alternatively 0/4 ... 20 mA, 0 ... 10 V DC
- Extended temperature range: -40°C to +70°C

Pt100 extension module



RAD-PT100-4-IFS

Order No. [2904035](#)




- 4 Pt100 inputs
- Temperature measuring range: -50°C to +250°C
- 2/3-wire connection
- Extended temperature range: -40°C to +70°C

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


Radioline – Antennas, cables, and accessories

Antennas




868 MHz

	Type	Gain	Connection	Order No.	Features
	Omnidirect. antenna, salt water resist. 	4 dBi	N (female)	2702136	<ul style="list-style-type: none"> • Temperature: -40°C to +75°C • Degree of protection: IP65 • Including mounting bracket
	Panel antenna 	3.5 dBi	N (female)	2702137	
	Yagi panel antenna	8.5 dBi	N (female)	2867814	
	Yagi panel antenna	12 dBi	N (female)	5606614	

900 MHz


	Type	Gain	Connection	Order No.	Features
	Omnidirectional antenna	2 dBi	RSMA (male) with 1.5 m cable	2904801	<ul style="list-style-type: none"> • Temperature: -40°C to +80°C • Degree of protection: IP65 • Including mounting bracket
	Omnidirectional antenna	2 dBi	N (female)	2904802	
	Omnidirectional antenna	5 dBi	N (female)	2867791	
	Omnidirectional antenna	7 dBi	N (female)	2867199	
	Yagi directional antenna	5 dBi	N (female) with 0.6 m cable	2867801	
	Yagi directional antenna	8.5 dBi	N (female) with 0.6 m cable	2867814	
	Yagi directional antenna	12 dBi	N (female) with 0.6 m cable	5606614	

2.4 GHz


	Type	Gain	Connection	Order No.	Features
	Omnidirectional antenna	2 dBi	RSMA (male) with 1.5 m cable	2701362	<ul style="list-style-type: none"> • Temperature: -40°C to +80°C • Degree of protection: IP65 • Including mounting bracket
	Vandal-proof antenna	3 dBi	RSMA (male) with 1.5 m cable	2701358	
	Omnidirect. antenna 	6 dBi	N (female)	2885919	
	Omnidirectional antenna, salt water resistant	6 dBi	N (female)	2903219	
	Panel antenna 	9 dBi	N (female)	2701186	
	Parabolic panel antenna	19 dBi	N (female)	2867885	

Antenna cables



N (male) to N (male)

	Length	Frequency	Order No.
	3 m	868 MHz/2.4 GHz	2867649
	5 m	868 MHz/2.4 GHz	2867652
	10	868 MHz/2.4 GHz	2867665
	15 m	868 MHz/2.4 GHz	2885634
	6 m	900 MHz	5606125
	15 m	900 MHz	2867225
	30 m	900 MHz	2867238

RSMA (male) to N (male)

	Length	Frequency	Order No.
	0.5 m	868 MHz/900 MHz/2.4 GHz	2903263
	1 m	868 MHz/900 MHz/2.4 GHz	2903264
	2 m	868 MHz/900 MHz/2.4 GHz	2903265
	3 m	868 MHz/900 MHz/2.4 GHz	2903266
	5 m	868 MHz/900 MHz/2.4 GHz	2702140

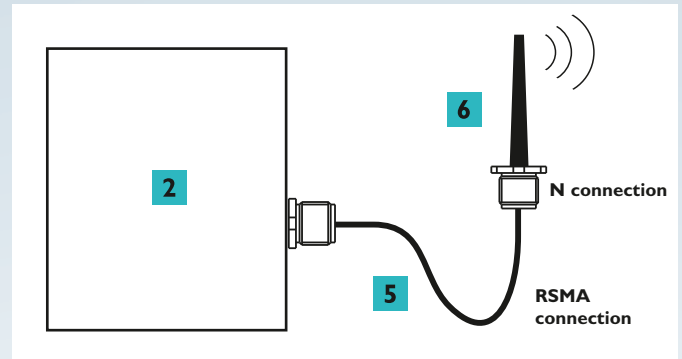
Accessories and surge protection

	Type	Connection	Frequency	Order No.	Features	
	Surge protection	N (female) > N (female)	868 MHz	2800024	Surge protection for coaxial signal interfaces with Lambda/4 technology	
	Surge protection	N (female) > N (female)	900 MHz	2803166		
	Surge protection	N (female) > N (female)	2.4 GHz	2838490		
	Antenna barrier	 N (female) > N (female)	0.7 ... 6 GHz	2702198	Installation of standard antennas in zone 0, 1, or 2	
	Configuration stick	S-PORT	2.4 GHz	2902814	RF band 3	For easy and secure network addressing with unique network ID
	Configuration stick	S-PORT	2.4 GHz	2902815	RF band 5	
	Configuration stick	S-PORT	2.4 GHz	2902816	RF band 7	
	Configuration stick	S-PORT	868 MHz	2702197	RF band 1	
	Configuration stick	S-PORT	900 MHz	2702122	RF band 1	
	Memory stick	S-PORT	For all Radioline front modules	2902828	Freely configurable	
	USB cable	USB	For all Radioline front modules	2903447	For diagnostics and configuration	
	Sealing tape			2903182	For external protection of cable connections, roll length: 3 m	

Antenna installation – Principles and technology

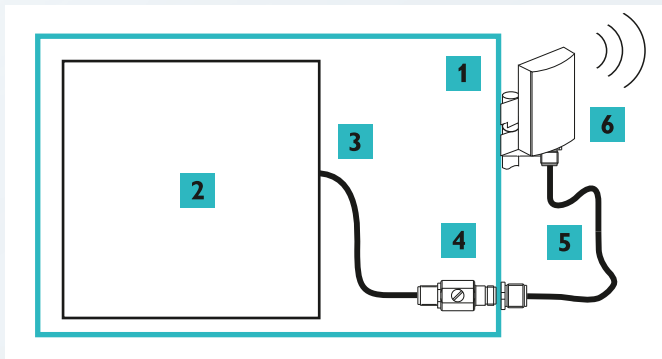
It goes without saying that we also offer the necessary accessories for using our Wireless product range indoors and outdoors.

All components are designed for industrial use and therefore operate just as safely and reliably as the wireless modules.



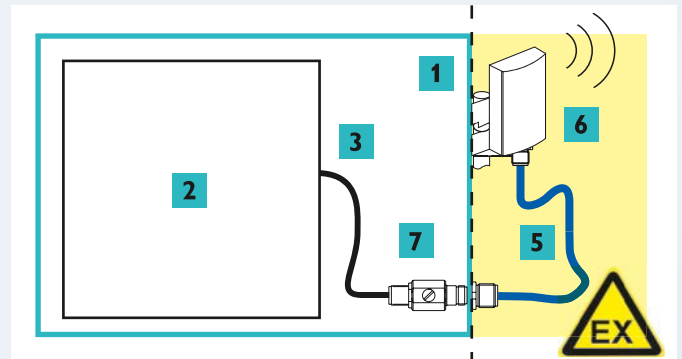
Simplified antenna connection

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.



Installation in an IP54 control box

Inside the control box, wireless modules are connected to the surge protection by means of an RSMA connection. The surge protection also functions as a panel feed-through. Additionally, extension cables with an N connection at both ends are used.

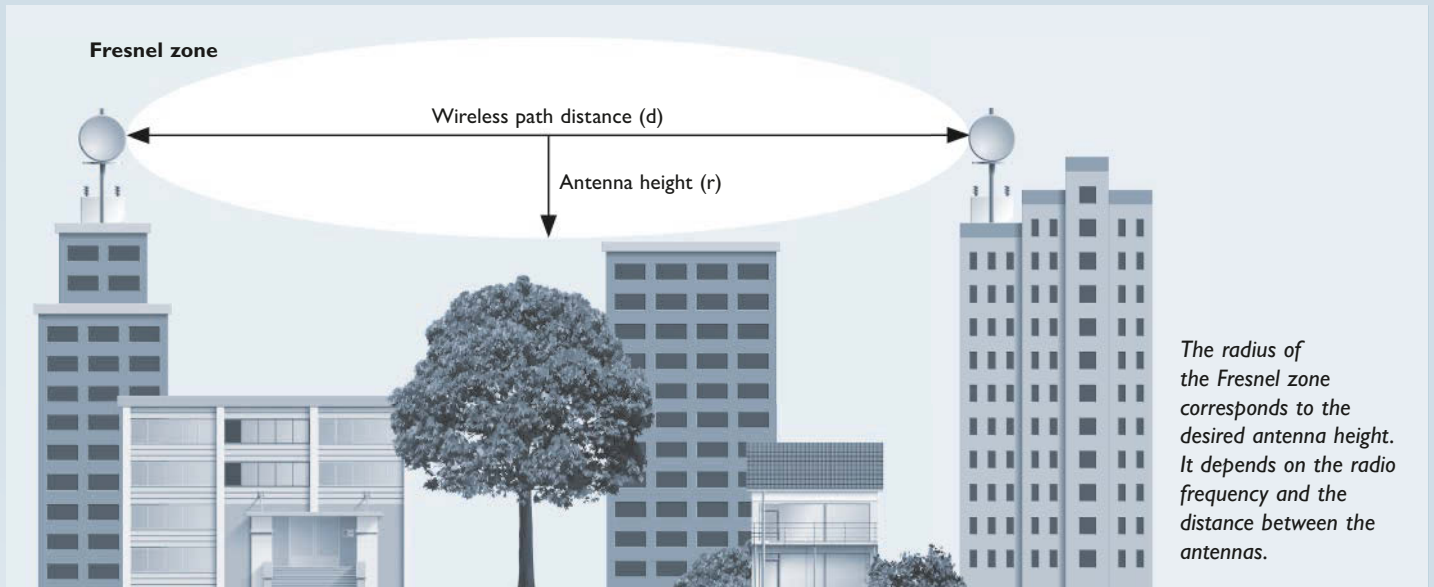


Installation in the Ex area

The antenna barrier makes the high-frequency outputs of wireless modules intrinsically safe according to the Ex i type of protection. It limits the ignition energy in the event of an error. The antenna barrier is installed in an IP54 control box 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 | 5 Antenna cable |
| 2 Wireless module | 6 Antenna |
| 3 Adapter cable | 7 Antenna barrier |
| 4 Surge protection | |

Planning a radio link



There should be a line of sight, especially in the event of longer distances, between the antennas of the wireless devices.

To keep the Fresnel zone free from any obstacles, it may be necessary to mount the antennas a few meters high. This area should also be free from any other obstacles.

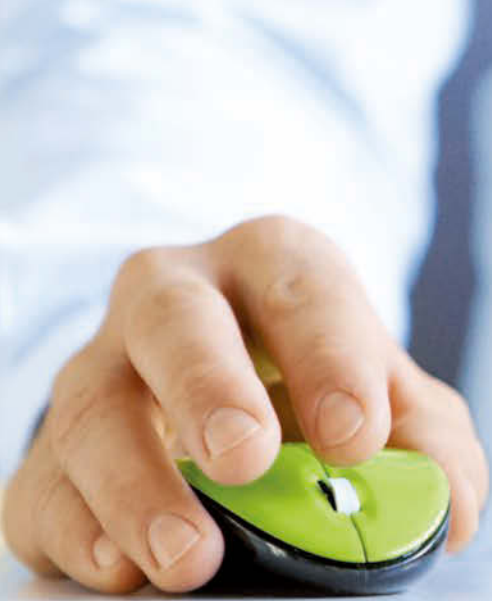
Obstacles outside or inside buildings

The wireless path may work even if obstacles are within the Fresnel zone (house, tree, etc.). The decisive factor is the number of obstacles and the area they occupy in this zone.

In this case it is recommended that you perform test measurements. Inside buildings, in conventional automation environments, there is a predominance of reflections, which do not occur outdoors. They contribute to a good wireless connection even if the Fresnel zone is not free from obstacles.

Wireless path distance (d)	Antenna height (r) 868/900 MHz	Antenna height (r) 2.4 GHz
200 m	4 m	2.5 m
500 m	6.5 m	4 m
1,000 m	9 m	5.5 m
2,000 m	13 m	8 m
4,000 m	18.5 m	11 m
10,000 m	29 m	–
20,000 m	41.5 m	–
30,000 m	50 m (900 MHz only)	–

Radius of the Fresnel zone depending on the frequency and distance. This gives the mounting height for wireless devices (antennas).



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Product range

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- Measurement and control technology
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- PCB terminal blocks and PCB connectors
- Power supply units and UPS
- Protective devices
- Relay modules
- Sensor/actuator cabling
- Software
- Surge protection and interference filters
- System cabling for controllers
- Tools
- Wireless data communication

PHOENIX CONTACT GmbH & Co. KG
Flachmarktstraße 8
32825 Blomberg, Germany
Phone: + 49 5235 3-00
Fax: + 49 5235 3-41200
E-mail: info@phoenixcontact.com
phoenixcontact.com