Industrial Wireless

Wireless from the sensor to the network

PHOENIX CONTACT
INSPIRING INNOVATIONS

Our Industrial Wireless products for your automation infrastructure

Phoenix Contact is a leading international supplier for automation infrastructure. Industrial Wireless products from Phoenix Contact provide reliability and security for the transmission of data and signals.

Wireless systems enable you to easily and efficiently negotiate the many challenges faced in an industrial communication infrastructure.

The advantages of industrial wireless systems at a glance:

- Flexibility, easy installation, and cost savings compared to cable-based installations
- Bypassing of obstacles
- Alternative to slip rings that are prone to wear and cable lines on mobile devices
- Reduced maintenance costs
- Monitoring and control of remote stations with no cable access

Wi

Wireless systems for all interfaces

Our comprehensive product range offers flexible options for implementing wireless industrial communication solutions. Suitable wireless systems are available for a wide range of interfaces.

Wireless I/O

Digital signals
0 ... 250 V AC/DC

Analog signals
0 ... 20 mA, 4 ... 20 mA
0 ... 10 V, HART

Wireless Serial

Modbus

RS-232

PROFIBUS

RS-422

RS-485

Wireless Ethernet

Ethernet

EtherNet/IP

Modbus

PROFINET

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Industrial Wireless in …

… Process technology

Process technology systems often feature widely distributed outdoor system structures. Therefore it is often only possible to acquire I/O data such as temperatures and fill levels at great effort, since the distance to be covered is so great or the terrain is inaccessible. For the implementation of such systems, it is therefore systems with integrated repeater functions, which are particularly suitable for creating linear or tree structures, that are primarily used. The devices that are used feature extended ambient temperature ranges and approvals for use in potentially explosive areas. Since the values of sensors only ever change slowly, low transmission speeds are used, thereby enabling long distances to be covered. With modern wireless technology, fieldbus systems can also be transmitted in addition to I/O signals, e.g., to replace slip rings in wastewater technology.

System expansion and post installation

Acquisition of data from distributed or difficult to access sensors

... production automation

In contrast to process technology systems, systems used in production automation are often physically restricted in terms of space.
The distances to be covered are usually several hundred meters. The applications are highly dynamic and fast roaming methods must be supported so that it is possible to switch between various system parts.

The controllers and floor conveyor vehicles that are connected wirelessly require large volumes of data in a short amount of time, which is why WLAN technology is used for these applications. Another field of application is the replacement of hose packs that are susceptible to interference on robots or drag chains. The necessary I/O information, for example from proximity switches, is transmitted by means of wireless technology. At the fixed part of the system, the wireless signals are either converted back into discrete I/O signals or converted into data packets for an established fieldbus system. As a result, fast and wear-free transmission of I/O information in the space of a few milliseconds is ensured in IP20 and IP65 environments.

Dynamic applications
Fast transmission of large amounts of data and replacement of components that are susceptible to interference

Wireless technologies

The key requirement for the use of wireless technologies in industrial applications is that the technology must be as robust and reliable as a cable connection, even under harsh conditions. With wireless communication, the data is transmitted by means of electromagnetic waves through free space that is not available exclusively. The wireless connection is therefore subjected to interference, such as electromagnetic interference fields, which can adversely affect transmission. In addition, reflections, fading, interference, and shadowing can occur.

Despite the influences described, Bluetooth, Trusted Wireless, WirelessHART, and WLAN 802.11 are interference-free thanks to their particular method of operation.

868 MHz
900 MHz
2.4 GHz

Trusted Wireless 2.0 technology is specifically designed for the reliable transmission of data and signals over long distances.

2.4 GHz

Bluetooth wireless technology is standardized according to IEEE 802.15.1.

2.4 GHz

WirelessHART technology is standardized according to IEEE 802.15.4 and is used for the wireless networking of HART field devices in the process industry.

Properties

- High degree of reliability thanks to AES encryption, frequency hopping method, and coexistence management
- Range of several kilometers thanks to adjustable data rates
- Mesh networks with up to 250 nodes

- Extremely reliable transmission thanks to redundant transmission channels
- High coexistence capability in unfamiliar wireless environments, parallel operation of several Bluetooth systems at one location thanks to efficient frequency usage
- Range of up to 200 m
- Short delay times

- Extremely secure transmission protected against manipulation
- High degree of reliability, thanks to full-mesh routing
- Very low energy consumption thanks to time-synchronized communication

Applications

- **Wireless I/O:**
  Analog, digital I/O signals (support modular expansion)
- **Wireless Serial:**
  Serial RS-232, RS-485 data

- **Wireless I/O:**
  Analog, digital I/O signals
- **Wireless Serial:**
  Serial RS-232, RS-422/485 data
- **Wireless Ethernet:**
  Ethernet data

- **Wireless I/O:**
  Analog HART signals

WLAN IEEE 802.11

2.4 GHz **5 GHz**

WLAN is a wireless standard according to IEEE 802.11 a/b/g/n for creating wireless local area networks.

- High data rates of up to 54 Mbps or 300 Mbps
- Fast roaming
- Device mobility in wide area networks
- High degree of reliability, thanks to MiMo technology

- **Wireless Ethernet:**
  High-speed Ethernet transmission

Mobile phone

3G GSM

Communication takes place via the mobile phone networks of the telecommunications provider.

- Available in over 200 countries
- Use of international mobile phone standards (GPRS, EDGE, UMTS, HSPA, etc.)
- Range: national and global

- **Wireless I/O:**
  Analog, digital I/O signals
- **Wireless Serial:**
  Serial RS-232 data
- **Wireless Ethernet:**
  Ethernet data
- **Alarm generation:**
  SMS, e-mail

- 2.4 GHz and 5 GHz worldwide
- 900 MHz America
- 868 MHz Europe

Wireless I/O

Radioline – easy startup with I/O mapping

Radioline is the wireless system for large systems and networks. Special features include extremely easy assignment of inputs and outputs by simply turning the thumbwheel - without any programming.

Radioline transmits I/O signals as well as serial data and is therefore very versatile. In addition, you can implement various network structures: from a simple point-to-point connection to complex networks.

I/O mapping

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.

International Ex approval

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

TRUSTED WIRELESS™

868 MHz wireless module

RAD-868-IFS
Order No. 2904909

- Supply voltage: 19.2 … 30.5 V DC
- Adjustable transmission power of up to 500 mW
- Can be extended with I/O modules via T-BUS
- Extended temperature range: -40°C … +70°C
- Antenna connection: RSMA (female)
- Certified according to ATEX directive
- For use throughout Europe

900 MHz wireless module

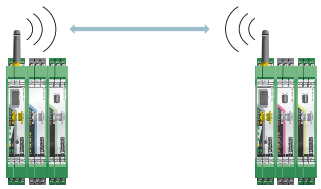
RAD-900-IFS
Order No. 2901540

- Supply voltage: 10.8 … 30.5 V DC
- Adjustable transmission power of up to 1000 mW
- Can be extended with I/O modules via T-BUS
- Extended temperature range: -40°C … +70°C
- Antenna connection: RSMA (female)
- Approvals: UL 508, HazLoc
- For use in North and South America and Canada

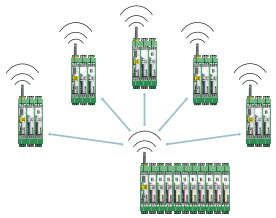
2.4 GHz wireless module

RAD-2400-IFS
Order No. 2901541

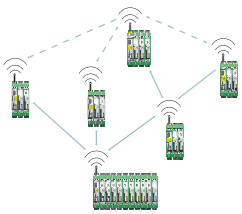
- Supply voltage: 19.2 … 30.5 V DC
- Adjustable transmission power of up to 100 mW
- Can be extended with I/O modules via T-BUS
- Extended temperature range: -40°C … +70°C
- Antenna connection: RSMA (female)
- Approvals: ATEX, UL 508, HazLoc, IECEx, FCC
- Universal use



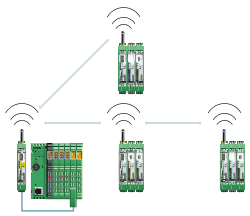
Point-to-point connection



Star network



Mesh network



I/O integration in the control level

Flexible network construction

You can implement various network structures with up to 250 devices quickly and easily with Radioline. I/O modules can be connected to the controller via the integrated RS-232 and RS-485 interface by means of wireless communication using the Modbus protocol.

The Radioline wireless system features:

- Quick and easy startup without programming
- Can be extended with up to 32 I/O modules per station via T-BUS (hot-swappable)
- Applications: I/O to I/O, I/O to serial, serial to serial
- Integrated RS-232 and RS-485 interface
- Trusted Wireless 2.0 technology
- Adjustable data rates for the wireless interface (16 … 500 kbps)
- 128-bit data encryption (AES)

Wireless I/O
Radioline extension modules

Various extension modules are available for expanding the Radioline wireless system quickly and easily. They enable the transmission of digital and analog signals as well as temperature signals.

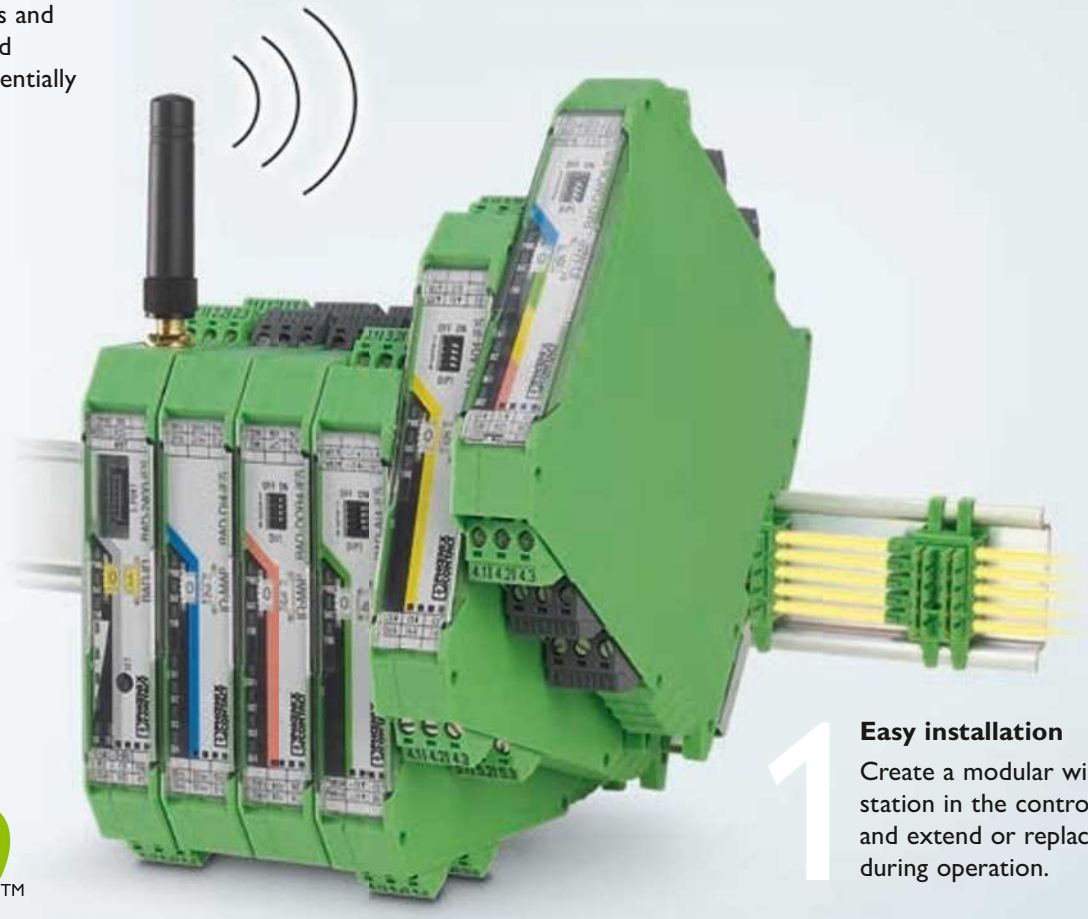
Temperature extension module

RAD-PT100-4-IFS
Order No. 2904035

- Four Pt 100 inputs
- Temperature measuring range: -50°C … +250°C
- 2/3-wire connection

International Ex approval

All extension modules are certified according to 94/9/EC (ATEX) directives and can therefore be used internationally in potentially explosive areas.



TRUSTED WIRELESS™

1 Easy installation

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

Analog/digital extension module

RAD-DAIO6-IFS
Order No. 2901533

- One analog input: alternatively 0/4 … 20 mA
- One analog output: alternatively 0/4 … 20 mA, 0 … 10 V DC
- Two digital wide range inputs/outputs: 0 … 250 V AC/DC
- Channel-to-channel electrical isolation

Analog extension modules

RAD-AI4-IFS
Order No. 2901537

RAD-AO4-IFS
Order No. 2901538

- Four analog inputs: alternatively 0/4 … 20 mA
- Four analog outputs: alternatively 0/4 … 20 mA, 0 … 10 V DC
- Channel-to-channel electrical isolation

Digital extension modules

RAD-DI4-IFS, Order No. 2901535
RAD-DOR4-IFS, Order No. 2901536

- Four digital wide range inputs: 0 … 250 V AC/DC
- Four digital relay outputs: 24 V DC/250 V AC/6 A
- Channel-to-channel electrical isolation

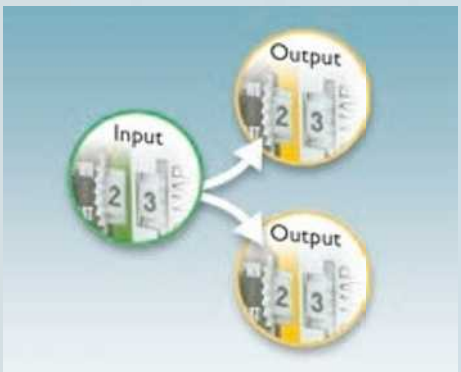
RAD-DI8-IFS, Order No. 2901539
RAD-DO8-IFS, Order No. 2902811

- Eight digital inputs: 0 … 30.5 V DC
- Two pulse inputs: 100 Hz, 32 bit
- Eight digital transistor outputs: 30.5 V DC/200 mA

2

Easy addressing

Set the address on the wireless module by simply turning the thumbwheel - without the need for tools.



3

Easy distribution

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

Properties:

- Extended temperature range: -40°C … +70°C
- Easy module replacement even during operation (hot-swappable)

Wireless I/O

Fieldline Modular for wireless fieldbus extension

The Bluetooth I/O system integrates I/O signals into a fieldbus or an Ethernet network via Bluetooth. Up to three Wireless I/O modules can be connected wirelessly to the base station.

Device configuration is easy: the base station writes the connection data to an ID plug that is then attached to the wireless modules. The base station can be integrated into all common fieldbus systems using various bus couplers.

Possible areas of application

The Fieldline Modular Wireless I/O system is particularly suitable for use in moving, temporarily installed or difficult to access machine units in all industrial applications where time-critical process signals are to be transmitted:

- Fast data transmission in typically 10 ms per module
- Short range* of 20 to 50 m in industrial halls as well as over 100 m outdoors

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

Bluetooth

Fieldline Modular Wireless I/O base station

FLM BT BS 3
Order No. 2736770

- Base station for up to three Fieldline Modular Wireless I/O modules
- Degree of protection: IP65
- Antenna connection: SMA (female)

Fieldline Modular Wireless I/O module

FLM BT DIO 8/8 M12
Order No. 2736767

- Eight digital inputs and outputs
- Degree of protection: IP65
- Antenna connection: SMA (female)

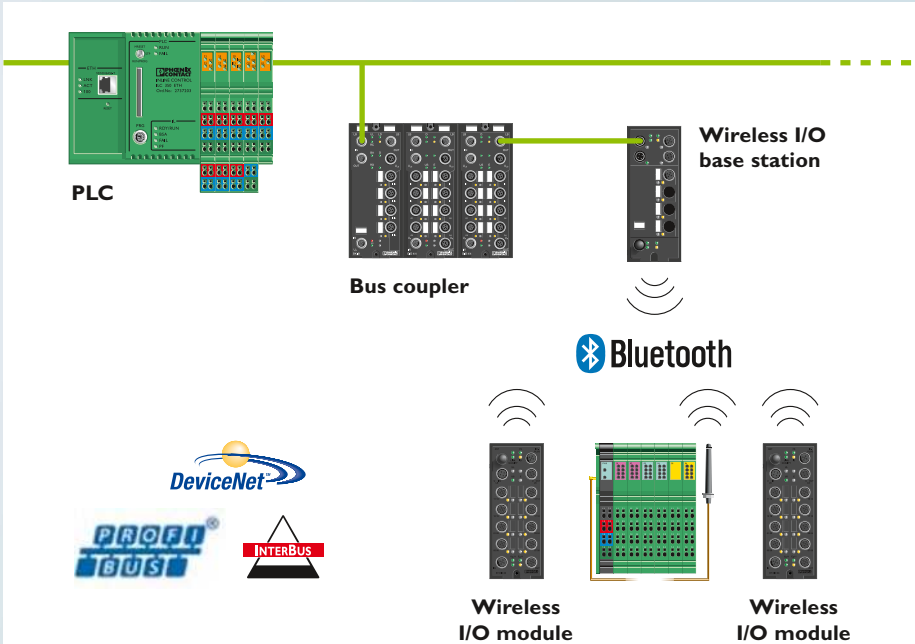
FLM BT DI 16 M12
Order No. 2693208

- 16 digital inputs
- Degree of protection: IP65
- Antenna connection: SMA (female)

Inline Block Wireless I/O module

ILB BT ADIO 2/2/16/16
Order No. 2884282

- 16 digital inputs and outputs, two analog inputs and outputs
- Degree of protection: IP20
- Antenna connection: SMA (female)



Installation close to the machine

The Wireless I/O modules can be mounted directly in the machine or system. The "last meter" to the sensors and actuators is conventionally wired in a star formation, e.g., using pre-assembled M12 connectors.

Properties of Fieldline Modular:

- Communication is established automatically
- Communication interruptions are detected and indicated
- Extremely robust and reliable
- Quick and easy startup
- Can be operated alongside WLAN without any interference, thanks to Black Channel Listing, Low Emission Mode (LEM), and Adaptive Frequency Hopping (AFH)
- Parallel operation of numerous Bluetooth systems
- Protected against manipulation and tapping

Wireless I/O
Wireless MUX – the wireless signal cable

The Wireless MUX transmits 16 digital and two analog signals bidirectionally, i.e., in both directions, which means that it can replace a 40-wire signal cable. The connection is continuously monitored. If there is gross interference in the link or it is interrupted, the outputs are reset to the defined LOW state. This is indicated on the module by a diagnostic LED.

The link quality display provides the user with constant information on the quality of the link.

Possible areas of application

The Wireless MUX is used wherever a small number of digital or analog input and output signals need to be exchanged wirelessly with a remote or movable station.

Omnidirectional wireless set

ILB BT ADIO MUX-OMNI
Order No. 2884208

- Standard package consisting of two permanently paired modules, two omnidirectional antennas with 1.5 m cable, and a DIN rail adapter
- Ranges* between 50 and 100 m in halls and over 200 m outdoors
- Antenna connection: MCX (female)

Panel wireless set

ILB BT ADIO MUX-PANEL
Order No. 2884509

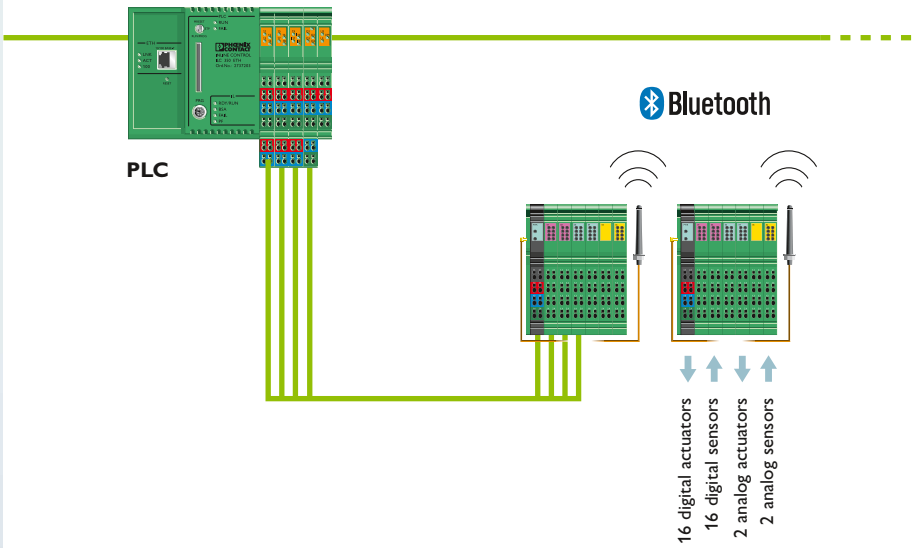
- Package consisting of two permanently paired modules, two panel directional wireless antennas each with 1 m cable, and a DIN rail adapter
- Distances* of over 400 m outdoors with a free line of sight
- Antenna connection: MCX (female)

Marine omnidirectional wireless set

ILB BT ADIO MUX-OMNI 8/M
Order No. 2693185

- Wireless MUX set with marine approvals, consisting of two permanently paired modules, two omnidirectional antennas with 1.5 m cable, and a DIN rail adapter
- Antenna connection: MCX (female)
- Ranges* between 50 and 100 m in halls and over 200 m outdoors

Technical data: supply voltage: 19.2 V DC … 30 V DC, 16 digital/two analog inputs, 16 digital outputs up to 500 mA, two analog outputs 0 mA … 20 mA or 0 V … 10 V



Wireless MUX, the wireless signal cable
Connection to the controller is quick and easy using existing input and output channels.

Properties of the Wireless MUX system:

- Connections established and signals transmitted automatically based on fixed pairing
- No configuration or settings required
- Typical transmission time of less than 10 ms
- Extremely robust and reliable
- Interference-free operation alongside WLAN
- Parallel operation of numerous Bluetooth systems
- Protected against manipulation and tapping

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

Wireless I/O
Expanding HART systems and establishing new applications

By using a WirelessHART adapter and the gateway, it is possible to adapt existing systems to new regulations, optimize maintenance schedules or acquire standard data.

The gateway can communicate with the control system via Modbus/TCP, HART-IP, and FDT/DTM. Thanks to the use of HART-IP or FDT/DTM framework structures, remote devices can be fully configured via the wireless network.

Possible areas of application

Conventional analog field devices in the process industry which are connected to non-HART-compatible control systems can be expanded easily in terms of their function without needing to replace the existing controller hardware by using WirelessHART networks. A wide range of parameterization and diagnostic functions are integrated into the existing system without having to stop the process.

WirelessHART

WirelessHART gateway

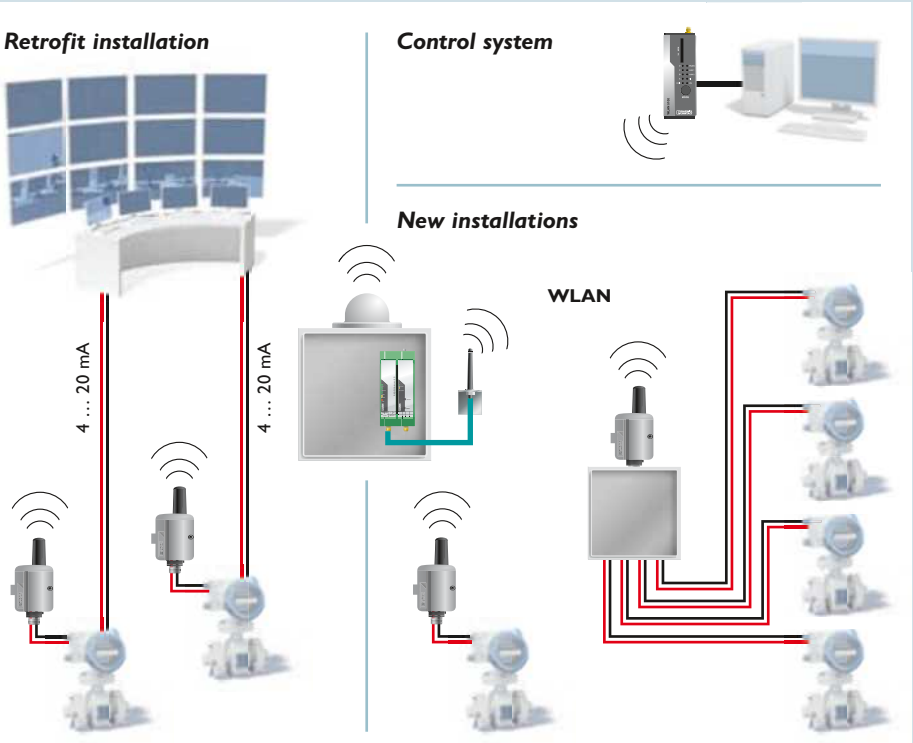
RAD-WHG/WLAN-XD
Order No. 2900178

- Enables HART data from field devices to be accessed via Modbus/TCP or HART-IP
- Supports up to 250 WirelessHART field devices
- Easy programming and diagnostics by means of integrated web server

WirelessHART adapter

RAD-WHA-1/2NPT
Order No. 2900100

- Up to four HART devices or one 4 … 20 mA non-HART device can be connected to one adapter
- Loop-powered or 24 V DC power supply
- Removable antenna for connecting a coaxial cable and a high-gain antenna



***WirelessHART** – the solution for retrofit and new installations*

Your advantages:

- Use of the same maintenance and diagnostic tools as wired HART devices
- Integrated WLAN client enables the gateways to be installed directly in the field, thereby establishing a reliable network
- Lower material and installation costs compared to wired solutions
- Labor costs saved

Wireless I/O

TC Mobile for monitoring sensors via the mobile phone network

Monitor analog and digital values easily and securely via the mobile phone network and switch relays remotely. TC Mobile I/O transmits data securely via SMS, e-mail, and GPRS. Thanks to the large voltage range and the various inputs, the signaling system can be used in a wide range of applications.

Possible areas of application

- Machine, building, and system monitoring
- Pumps, wastewater treatment plants, and water supply
- Lighting control systems and remote switchgear
- Street lighting
- Elevators and gates
- Alarm technology and building services
- HVAC technology
- Battery monitoring up to 60 V
- Railway applications according to EN 50121-4

Mobile radio module, DC

TC MOBILE I/O X200
Order No. 2903805
Remote signaling system, SMS/e-mail (client)

TC MOBILE I/O X300
Order No. 2903807
Remote control system, GPRS (ODP client)

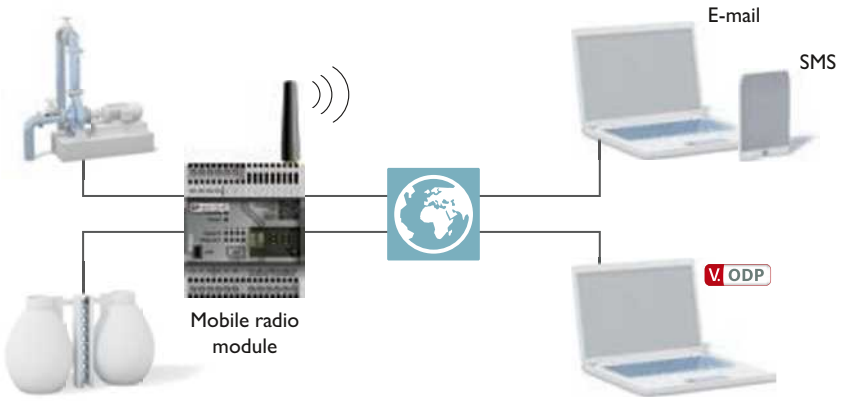
- Four digital inputs
- Two relay outputs
- Two analog inputs for voltage or current
- Voltage range: 10 V DC … 60 V DC

Mobile radio module, AC

TC MOBILE I/O X200 AC
Order No. 2903806
Remote signaling system, SMS/e-mail (client)

TC MOBILE I/O X300 AC
Order No. 2903808
Remote control system, GPRS (ODP client)

- Four digital inputs
- Two relay outputs
- Voltage range: 93 V AC … 250 V DC



Monitoring sensors via the mobile phone network

The TC Mobile I/O product range allows you to monitor analog current levels (20 mA) and analog voltage values (up to 60 V) and switch relays remotely. Communication takes place via SMS, e-mail or with an ODP server.

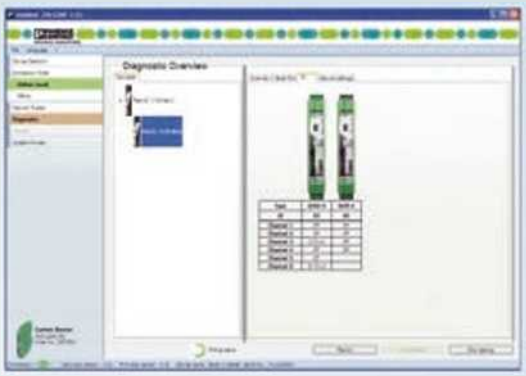
Unbeatably versatile use:

- Suitable for buildings and harsh industrial environments
- Monitoring of connected sensors (0 … 20 mA)
- Monitoring of voltages up to 60 V
- Relay switching via the mobile phone network
- SMS, e-mail, and OPD communication
- Large supply voltage range (AC or DC)

Wireless Serial

Radioline for wireless networking of serial interfaces

The wireless module can be used to wirelessly network multiple controllers or serial I/O devices quickly and easily via RS-232 and RS-485 serial interfaces. Data transmission is transparent, which means that any protocols, such as Modbus, can be forwarded. In addition, various network structures can be implemented: from a simple point-to-point connection to complex mesh networks.



Convenient software diagnostics

All network devices can be monitored conveniently via the master:

- Online diagnostics:
  - Network structure
  - Signal quality of each network station (RSSI)
  - Recording of RSSI signal and I/O status of each network station
- Exclusion of up to two frequency bands (WLAN channels)
- Extended network settings

TRUSTED WIRELESS™

International Ex approval

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

Wireless module

RAD-868-IFS
Order No. 2904909

RAD-900-IFS
Order No. 2901540

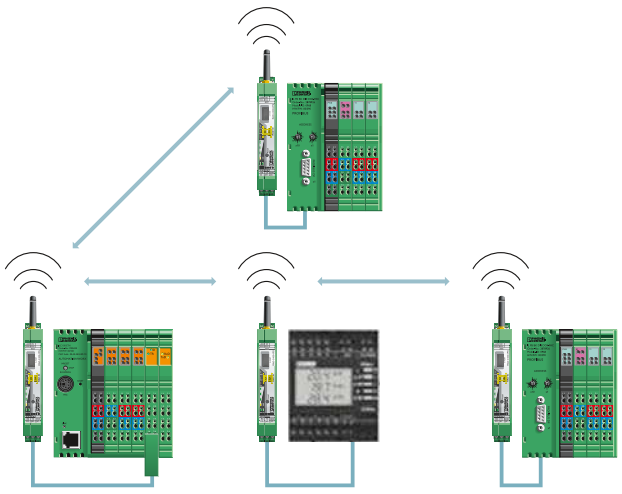
RAD-2400-IFS
Order No. 2901541

- Can be extended with I/O modules via T-BUS
- Extended temperature range: -40°C … +70°C
- Integrated RS-232 and RS-485 interface

I/O extension modules

RAD-DI4-IFS Order No. 2901535	Digital IN	**RAD-DAIO6-IFS** Order No. 2901533	Analog/Digital IN/OUT
RAD-DOR4-IFS Order No. 2901536	Digital OUT	**RAD-AI4-IFS** Order No. 2901537	Analog IN
RAD-DI8-IFS Order No. 2901539	Digital IN	**RAD-AO4-IFS** Order No. 2901538	Analog OUT
RAD-DO8-IFS Order No. 2902811	Digital OUT	**RAD-PT100-4-IFS** Order No. 2904035	Temperature module

• For configuration sticks and configuration cables see page 43.



Replacement for serial cabling

Connect your controller to serial field devices using wireless technology. The slaves are connected directly or via repeater slave intermediate stations. Up to 250 repeater slaves can be connected one after the other to extend the wireless path. Serial I/O devices and I/O extension modules can be connected to the intermediate stations.

The Radioline wireless system features:

- Quick and easy startup without programming
- Easy point-to-point or network connections (star, mesh)
- Can be extended with up to 32 I/O modules per station via T-BUS (hot-swappable)
- Applications: I/O to I/O, I/O to serial, serial to serial
- Trusted Wireless 2.0 technology
- Adjustable data rates for the wireless interface (16 … 500 kbps)
- 128-bit data encryption (AES)

Wireless Serial
Interface converters for RS-232, RS-422, and RS-485

The Bluetooth converter can be used to convert RS-232, RS-422, RS-485 2-wire serial interfaces, and USB to the license-free Bluetooth wireless standard. It serves as a flexible and easy replacement for cabling in order, for example, to perform programming and diagnostics tasks via a notebook or as an inexpensive alternative to slip rings, drag chains, and fieldbus cables, such as Modbus and PROFIBUS.

Possible areas of application

- Wireless programming access between a notebook and a controller
- Data link between a third-party device with integrated Bluetooth interface and a controller
- Networking of mobile devices
- Integration of a bus device into an existing bus system, e.g., Modbus or PROFIBUS

Integrated **USB interface** for device configuration without power supply.

The current signal quality can be read via **digital outputs** DO1/DO2.

Bluetooth

PROFIBUS Modbus

RS-232 RS-422 RS-485

Bluetooth converter

PSI-WL-RS232-RS485/BT/2DO
Order No. 2313805

- Universal Bluetooth converter for RS-232, RS-422, RS-485 2-wire

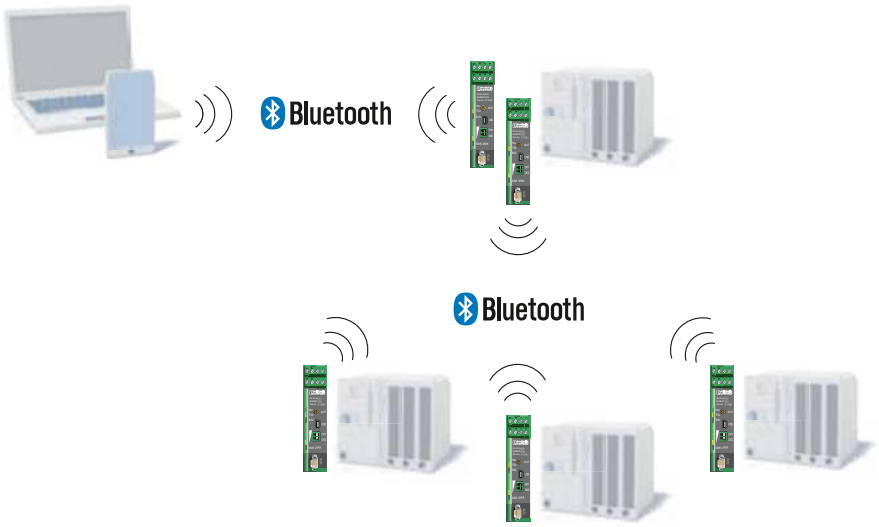
PSI-WL-RS232-RS485/BT/HL
Order No. 2313795

- Bluetooth converter with hazardous location approval
- Point-to-point and multipoint connections (up to seven slaves)
- Antenna connection: MCX (female)

Bluetooth PROFIBUS set

PSI-WL-PROFIB/BT-SET/2DO
Order No. 2313876

- Preconfigured for an invisible, password-protected point-to-point PROFIBUS connection
- Transmission speed: 187.5 kbps
- Consisting of two permanently paired Bluetooth converters and two omnidirectional antennas
- Antenna connection: MCX (female)



Transmit and request serial data securely
Use the Bluetooth converter as an access point and call control data via your noteboook.

Flexible parameterization options and possible applications:

- Suitable for worldwide use, thanks to adjustable transmission power (-28 … 20 dBm)
- Can be used for RS-232/422/485 2-wire interfaces up to 187.5 kbps
- Transceiver for distances of up to 150 m

High transmission reliability:

- Secure and tamper-proof data transmission, thanks to password protection, 128-bitencryption, and invisible,fixed device pairing
- Coexistence with other wireless systems due to the adaptive frequency hopping (AFH) method

Wireless Serial

COM server – integration of serial devices into the Ethernet network

The COM server for WLAN closes the gap between serial interfaces on automation devices and mobile industrial applications with an Ethernet interface.

By using the device server, non-network-capable components can also be accessed via local networks or the Internet. This enables you, for example, to request system states, perform software updates, carry out remote maintenance or transmit visualization data.

Redirector software

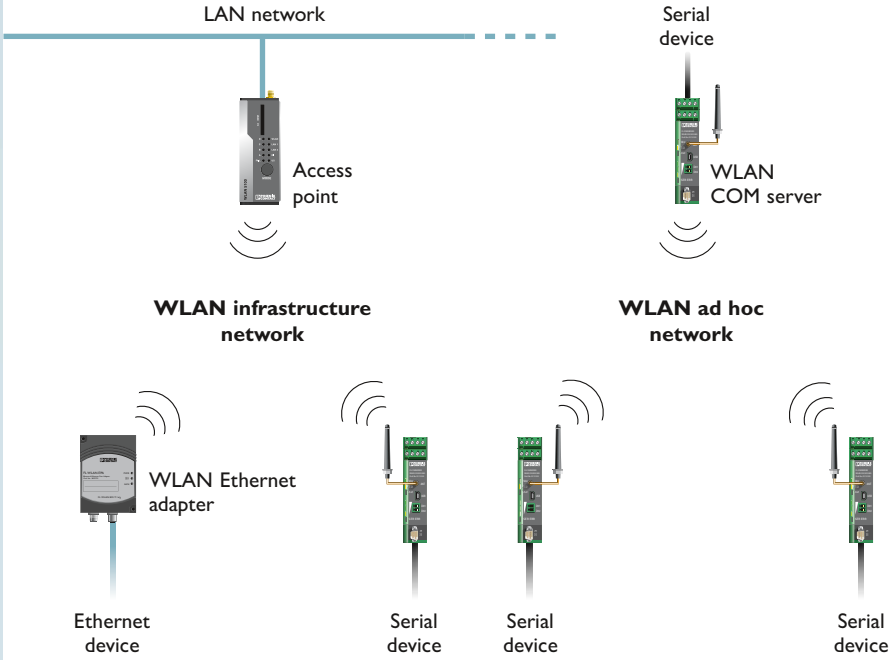
The redirector software, which is supplied as standard with the COM server, redirects the serial data of the application software to the LAN interface of the PC using a virtual COM port. This allows data to be transmitted in an existing Ethernet network without any range restrictions or additional cable costs. At the automation devices in the field, a COM server converts the Ethernet data back into serial data. It is therefore possible to access remote serial devices via the network just as easily as if these devices were connected directly to the PC.

WLAN

Serial device server for 802.11 WLAN

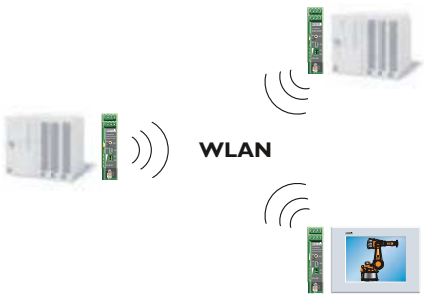
FL COMSERVER WLAN 232/422/485
Order No. 2313559

- Converts RS-232, RS-422, RS-485 serial interfaces to Wireless LAN
- Protocols: TCP, UDP
- 54 Mbps WLAN according to IEEE 802.11 b/g
- Transmission speed can be adjusted via configuration software
- LEDs for status and diagnostics indicators
- LED bar graph for WLAN link quality
- Link quality can be checked via digital outputs



Infrastructure mode
Integration of devices in an Ethernet network via WLAN access point.

Ad hoc mode
Direct connection between up to seven devices for constructing small networks.



Serial tunneling
COM servers replace serial cables by using existing Ethernet networks.

Virtual COM ports
Virtual COM ports redirect serial PC applications to Ethernet. The COM servers create new COM ports in the field.

Wireless Serial

Mobile phone modem for worldwide communication via GSM

The GSM/GPRS modem can be used in all GSM networks and enables worldwide access to machines and systems. Using wireless remote maintenance it is therefore possible to avoid downtimes and minimize costs.

The configurable warning or alarm inputs are useful for remote monitoring. When they are activated, the modem automatically dials a freely definable phone number and sends stored text messages as a fax, SMS or e-mail. The integrated sleep function rounds off the range of features offered by the modem.

Possible areas of application

- Process data acquisition
- Alarm generation
- Remote maintenance of systems and machines
- Remote programming

Compact GSM/GPRS modem

The serial GSM/GPRS modem can be used to easily establish a secure point-to-point connection. Direct communication with the machine controller is via the RS-232 interface.

GSM/GPRS modem with RS-232 interface

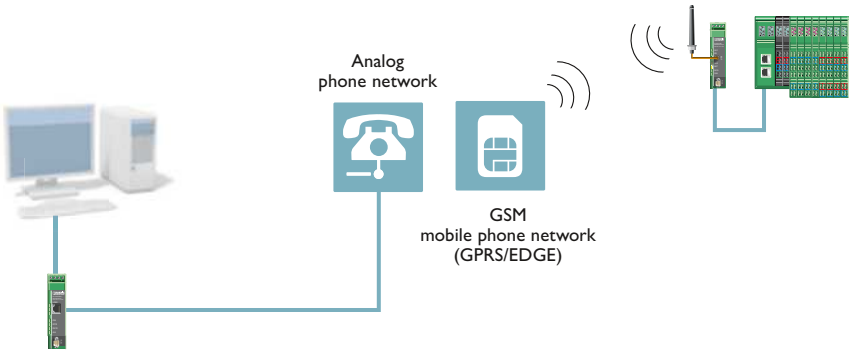
PSI-GPRS/GSM-MODEM/RS232-QB
Order No. 2313106

- Can be used in all 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz GSM networks
- Integrated TCP/IP stack
- Password protection, selective call acceptance, callback function
- PIN stored in modem is encrypted
- Supply voltage:
  10.8 V DC … 30 V DC

The industrial modems offer the following features:

- Easy startup by means of plug and play
- User-friendly configuration software
- Tried-and-tested interaction with controllers and industrial PCs from many manufacturers

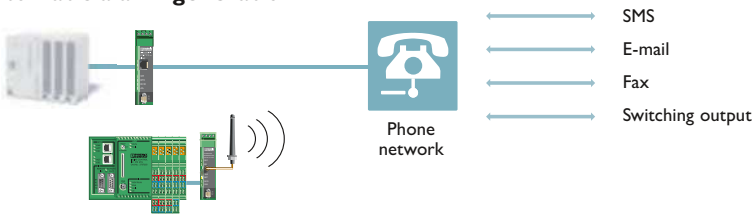
Secure dial-up connection establishment



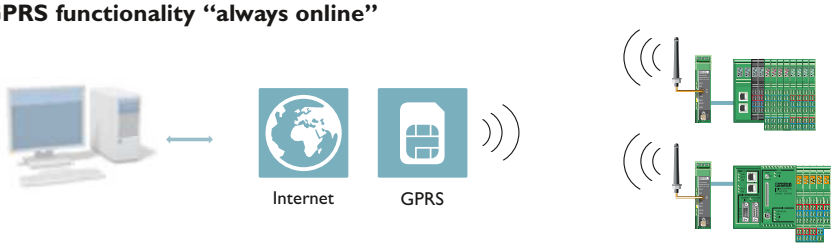
Mobile machines or remote systems often do not offer the option of connecting to a fixed-line network. GSM networks are a universal alternative here. The connection is established by directly dialing a phone number and can be made secure by means of password protection, as an option. Thanks to easy handling and the constant signal runtime, the CSD dial-up connection is a popular method used for the global remote maintenance of machines and systems.

The GPRS functionality is ideal for process data acquisition where permanent communication is required. GPRS connections are not billed according to the connection time, but based on the volume of data.

Automatic alarm generation



GPRS functionality "always online"



Remote control connection

Wireless Ethernet
Industrial Bluetooth

The industrial Bluetooth modules allow you to wirelessly transmit control data to mobile or difficult to access automation devices quickly and easily. Bluetooth communication is characterized by particularly robust transmission under difficult ambient conditions. This allows you to establish functionally safe communication via PROFIsafe or SafetyBridge technology.

Possible areas of application

Bluetooth enables mobile devices to be integrated into industrial control networks wirelessly, thereby eliminating the need for expensive cable runs.

- Robots and traveling robots
- Handling machines, packaging machines, pallet wrapping machines
- Moving machine parts
- Cranes and lifting equipment

SafetyBridge Technology
Designed by PHOENIX CONTACT

Bluetooth Ethernet adapter

FL BT EPA
Order No. 2692788

- Internal antenna
- Maximum of one wireless connection

Bluetooth Ethernet adapter set

FL BT EPA AIR SET
Order No. 2693091

- Solution set consisting of:
  2 x FL BT EPA, cable, and plug

Bluetooth access point

FL BT EPA MP
Order No. 2701416

- External, replaceable antenna (supplied)
- Connection: RSMA (male)
- Maximum of seven wireless connections

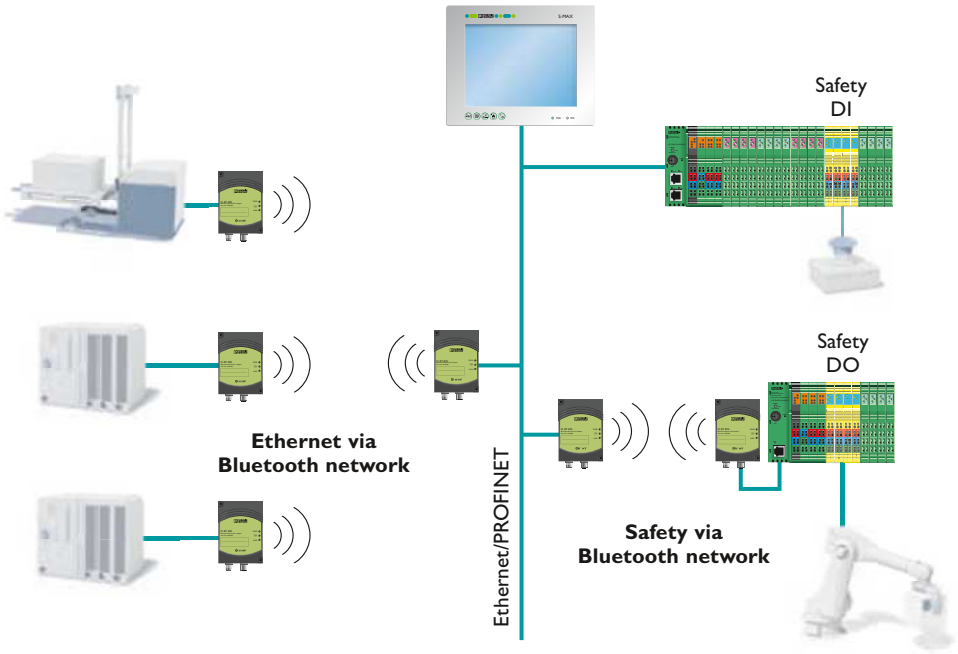
Technical features: Bluetooth V2.1+EDR, frequency band 2.4 GHz, WLAN Black Channel List, Low Emission Mode (LEM), IP65 protection, M12 connections for voltage and LAN, power supply 9 … 30 V DC, autocrossing, PROFINET prioritizing, LLDP, 128-bit data encryption, ambient temperature -40°C … +65°C, web interface, SNMP, AT commands, UL/cUL Class 1 Div 2 Hazardous location

Accessories: assembly adapter (Order No. 2701134), DIN rail adapter (Order No. 2701133)

Bluetooth applications

The Bluetooth BT EPA modules replace individual Ethernet or PROFINET cables leading to automation devices with a reliable wireless connection.

The BT EPA MP enables up to seven Bluetooth modules to be connected to the Ethernet network at the same time.



Wireless Ethernet
Industrial WLAN

The latest generation of WLAN modules is characterized by robust industrial technology combined with high performance and modern MIMO technology. The central cluster management at the WLAN 5100 access point makes the configuration and maintenance of larger WLAN networks considerably easier. Using the Ethernet adapters, you can integrate automation components such as controllers or I/O modules into the WLAN network quickly and easily.

Possible areas of application

Wireless LAN is particularly suitable for implementing a system-wide wireless infrastructure:

- Mobile maintenance
- Electric monorail systems
- Automated guided vehicle systems and forklift trucks
- Storage and retrieval machines and warehouse shuttles
- Video monitoring

WLAN 5100 access point

FL WLAN 5100
Order No. 2700718
not for the USA or Japan

FL WLAN 5101
Order No. 2701093
for the USA and Canada

FL WLAN 5102
Order No. 2701850
for Japan

SD-FLASH 2 GB
Order No. 2988162

- IEEE 802.11 a/b/g/n, WLAN access point, client, repeater, frequency band 2.4 GHz and 5 GHz, MIMO technology 3 x 3:2, up to 300 Mbps, cluster management

WLAN Ethernet adapter

FL WLAN EPA
Order No. 2692791
Integrated antenna IEEE 802.11b/g/n, 2.4 GHz

FL WLAN EPA 5N
Order No. 2700488
Integrated antenna IEEE 802.11a/n, 5 GHz

FL WLAN EPA RSMA
Order No. 2701169
IEEE 802.11a/b/g/n, 2.4 GHz and 5 GHz, external antenna, RSMA

- WLAN client, IEEE 802.11n, MIMO technology 1 x 1:1, IP65 protection, M12 connections for voltage and LAN, power supply 9 … 30 V DC, operating modes: single-client and multi-client

Control box sets

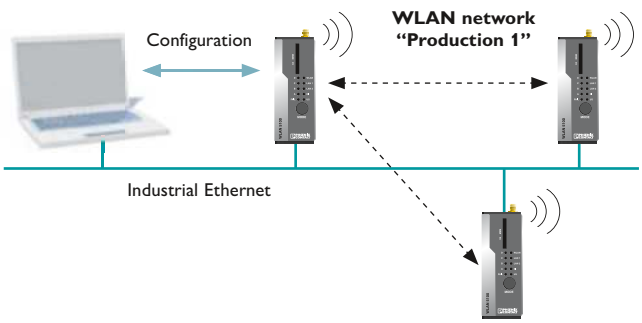
FL RUGGED BOX OMNI-1
Order No.. 2701430
with omnidirectional antennas

FL RUGGED BOX OMNI-2
Order No. 2701439
with omnidirectional antennas and power supply unit

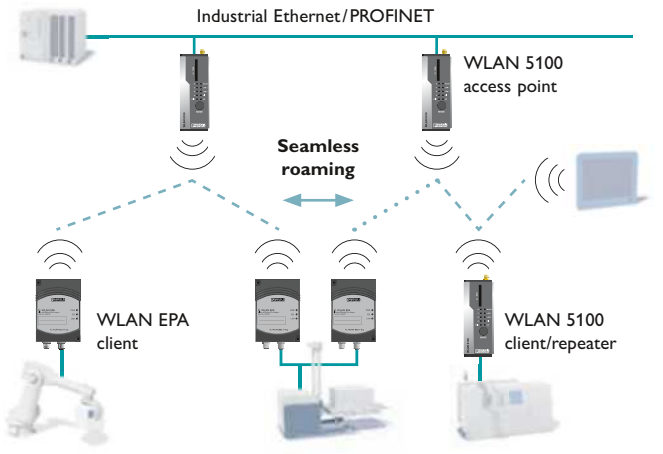
FL RUGGED BOX DIR-1
Order No. 2701440
with panel antenna

FL RUGGED BOX
Order No. 2701204
without antenna accessories

- Set for constructing wireless systems for industrial applications, IP65, with DIN rail, plugs, and screw connections, 100 … 240 V power supply unit, without devices



Cluster management makes things easier
Cluster management, a feature of WLAN 5100, enables the quick configuration and startup of all access points via a single web interface.



Typical WLAN network structure
The WLAN EPA enables interruption-free roaming in duo mode.

Wireless Ethernet

Mobile phone routers for worldwide network access

Mobile phone routers support high-performance remote connections to industrial Ethernet networks, which can be used to transmit sensitive data securely over mobile phone networks. The integrated firewall and VPN (Virtual Private Network) support protect the application against unauthorized access.

The Ethernet connection can be used for system-wide remote maintenance of all connected components in the network, such as drives, controllers, control panels, and visualization PCs.

Possible areas of application

- Efficient remote maintenance of machines and systems
- Continuous data acquisition from stations throughout the world
- Integration of remote stations into IP networks via the mobile phone network
- Alarm generation by SMS and e-mail

GSM 3G

Mobile phone router GPRS/EDGE

PSI-MODEM-GSM/ETH
Order No. 2313355

- Worldwide data links to small applications
- GSM quad band (850 MHz/900 MHz/ 1800 MHz/1900 MHz)
- Alarm generation by SMS and e-mail
- Support for IPsec and OpenVPN

Mobile phone router UMTS/HSPA

PSI-MODEM-3G-ROUTER
Order No. 2314008

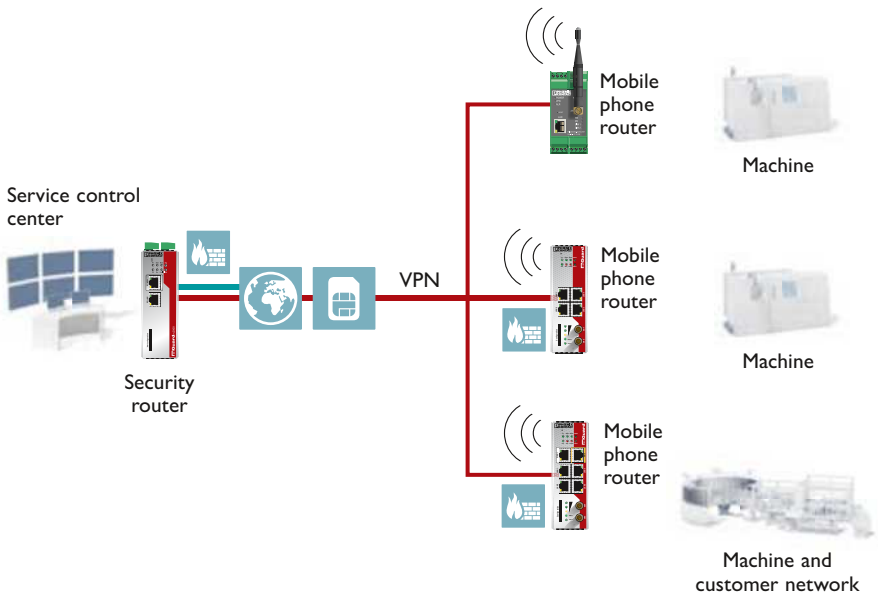
- Worldwide high-speed data links and alarm generation via 3G mobile phone networks
- UMTS/HSPA tri band (850 MHz/900 MHz/ 2100 MHz) with GPRS/EDGE fallback
- Two SIM card slots for maximum network availability
- Support for IPsec and OpenVPN

UMTS/HSPA/CDMA mobile phone router

TC MGUARD RS2000 3G VPN
Order No. 2903441

TC MGUARD RS4000 3G VPN
Order No. 2903440

- Integrated four-port switch
- American CDMA mobile phone networks are now supported in addition to UMTS/ HSPA
- Two SIM card slots
- Up to ten IPsec VPN tunnels
- SD memory cards as replaceable configuration memory



Data links

- *Worldwide Internet data link via mobile phone networks at up to 14.4 Mbps*
- *Flexible use in small machines to larger system networks*
- *Secure VPN communication*

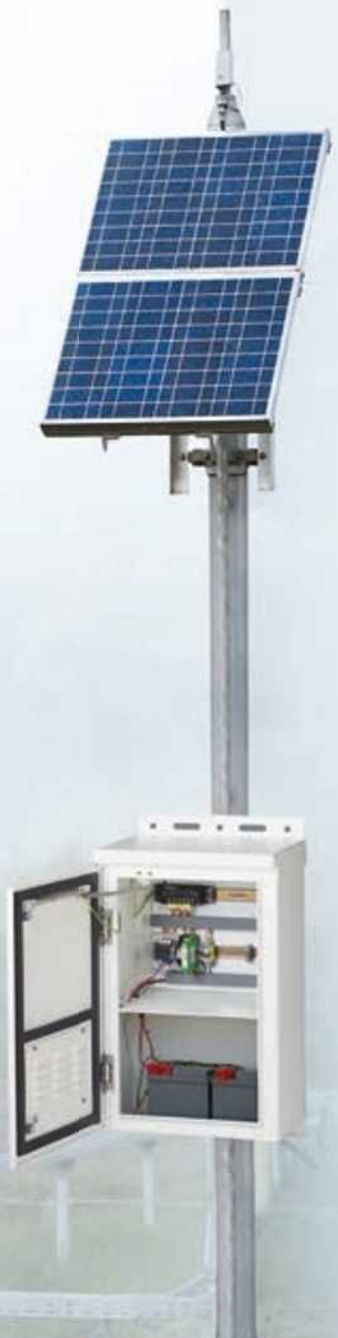
Industrial mobile phone data transmission

Modern mobile phone technology offers efficient, high-performance communication for many industrial applications. The mobile phone quick start guide answers the most frequently asked customer questions in terms that are as brief and easily comprehensible as possible and provides practical tips.

Accessories
Systems for autonomous power supply

With the solar and battery systems, it is possible to acquire data from remote sensors independently of the power supply network. A charge controller, solar battery, surge protection, and fuses are supplied prewired in a robust control cabinet. The systems are designed in such a way that sufficient solar power is provided even on short, dark winter days.

The solar modules generate sufficient power to supply wireless modules, GSM modems, distributed measuring sensors or other devices and to recharge the solar batteries. The required power depends on the connected load and the sunlight in the installation location.



Criteria for yield calculations

- **Location:**
  Unobstructed sunlight throughout the year
- **Alignment:**
  Solar modules facing south
  (locations in the Northern Hemisphere)
- **Tilt angle of the solar modules:**
  Optimum tilt angle in winter: 60°
- **Shading:**
  Consideration of shading caused by buildings or trees in future
- **Season:**
  The solar systems have been configured for the month with the poorest weather (winter). During this time, the solar panels only provide around 1/4 of the daily yield that they provide in the summer months

Your advantages:

- Ideal for all distributed applications with low energy consumption
- Easy startup: the control cabinet is prewired
- Worldwide use, thanks to the universal module mounting bracket with a tilt angle that can be adjusted in increments

The map shows the intensity of solar radiation around the world

Low High

24 V/200 Wp solar set

RAD-SOL-SET-24-200
Order No. 2917722

- Nominal voltage: 24 V
- Max. power: 200 Wp
- Battery capacity: 100 Ah
- Ambient temperature range: -20°C … +50°C
- Max. load approx. 3 … 8.5 W*

24 V/100 Wp solar set

RAD-SOL-SET-24-100
Order No. 2885472

- Nominal voltage: 24 V
- Max. power: 100 Wp
- Battery capacity: 40 Ah
- Ambient temperature range: -20°C … +55°C
- Max. load approx. 1 … 3.8 W*

Scope of supply: solar modules, prewired control cabinet with charge controller, two solar batteries, surge protection, and mounting material incl. mast mount

* Maximum connected load for year-round constant load according to power reserve and installation location.

Accessories
Antennas

The single most important item affecting radio performance is the antenna system. Careful attention must be given to this part of an installation or the performance of the entire system will be compromised.

The antennas are specially designed for industrial use at the intended frequency of operation. Select an antenna with an appropriate gain for the intended field of application.

Possible areas of application

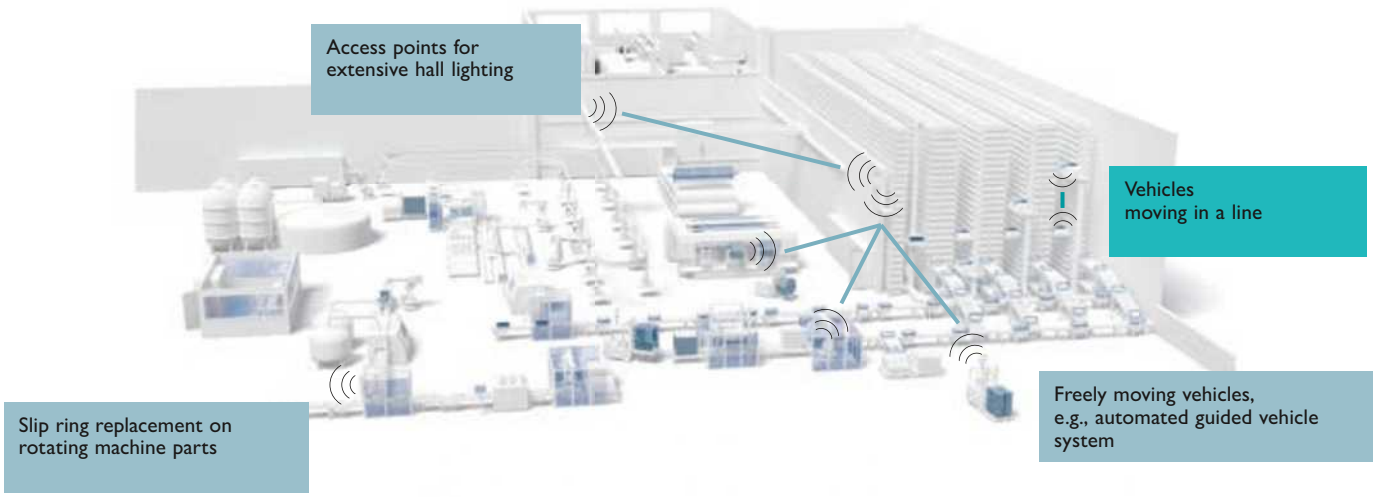
Omnidirectional antennas

- For short to medium distances
- Numerous devices in different directions
- Versatile applications

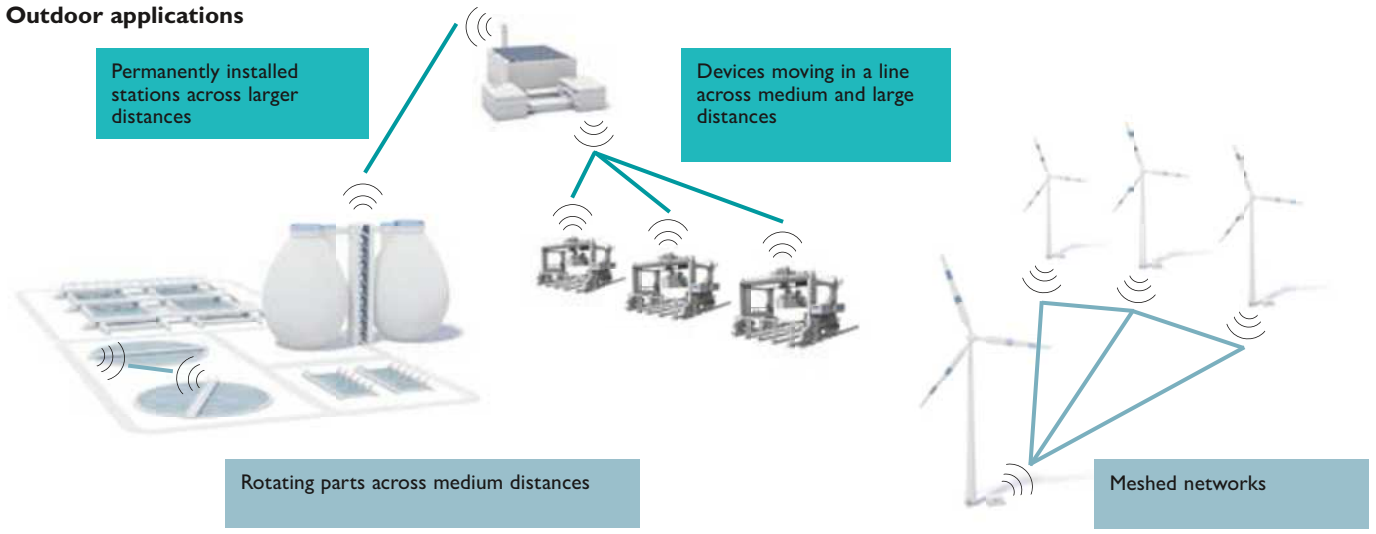
Panel antennas

- Bridging large distances
- Point-to-point connections
- Stationary or linear applications
- Decoupling due to directivity in the case of multiple point-to-point paths

Indoor applications



Outdoor applications



Omnidirectional antenna

Omnidirectional antennas are used when the wireless modules are facing different directions or are mobile. As a result of their lower gain, they are more suitable for short to medium distances.

In reflective indoor environments where there is no line of sight, the signal may be reflected from the sender to the receiver. In such cases it is important to ensure that the omnidirectional antenna is not mounted immediately in front of reflective (metallic) surfaces.

The ideal installation location is the top of a mast or on a control cabinet so that the antenna has the greatest possible free space in all directions. In the case of multiple omnidirectional antennas, these should be installed with sufficient spacing.

Panel antenna

The use of panel antennas is recommended at permanently installed, remote stations when large distances need to be covered with a line of sight.

Panel antennas emit the transmission power in a preferred direction. This increases the range and reduces the chances of interference from other users outside the pattern.

The higher the gain of a panel antenna, the smaller its pattern (opening angle). This means that the antennas need to be precisely aligned with one another.

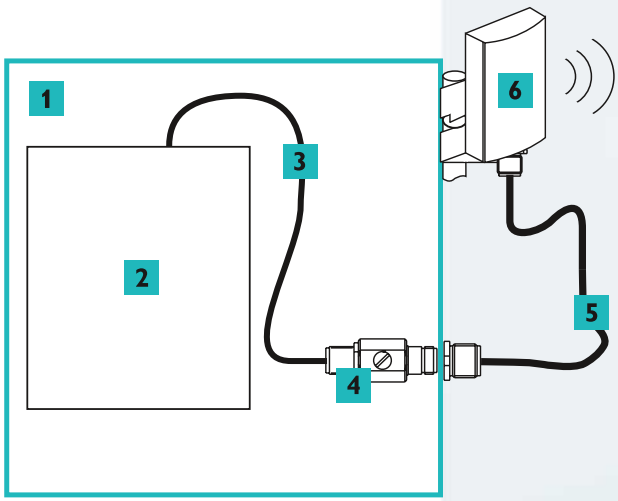
Accessories
Cables and adapters

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.

Control cabinet/ control box

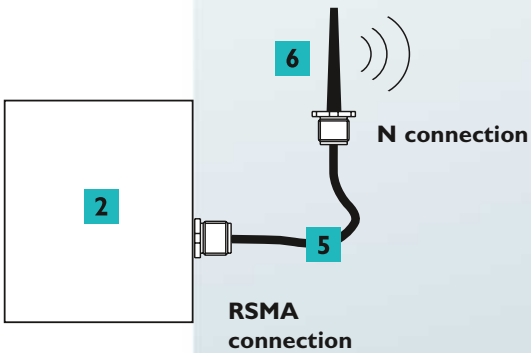
For antennas with extension cable

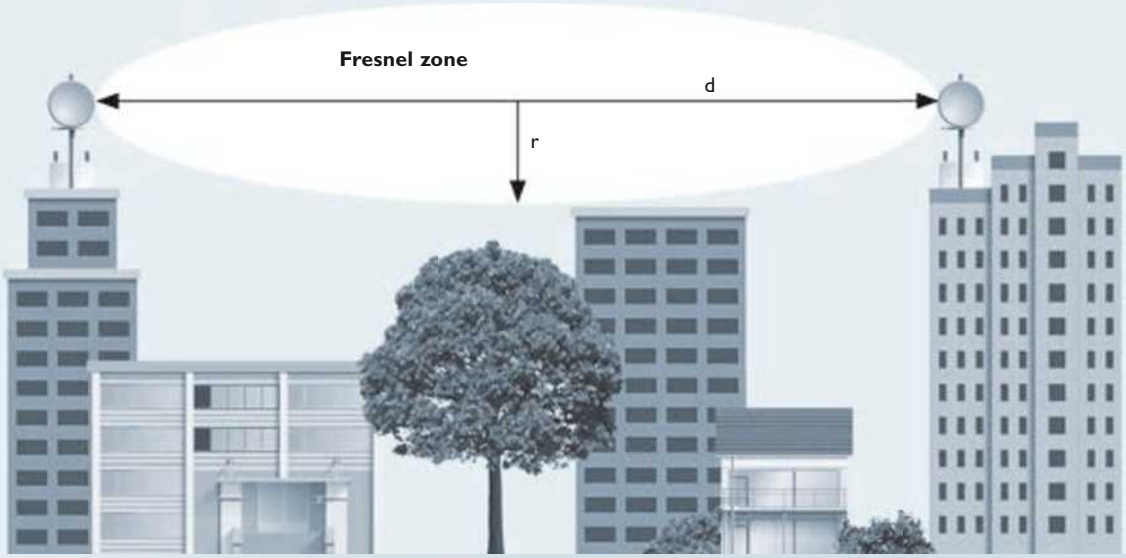


1 Control box
2 Wireless module
3 Pigtail
4 Surge protection
5 Antenna cable
6 Antenna

Simplified antenna connection

All devices with 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.





The radius of the Fresnel zone corresponds to the desired antenna height. It depends on the radio frequency and the distance between the antennas.

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 also work 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	**Antenna height (r)** 5 GHz
200 m	4 m	2.5 m	1.5 m
500 m	6.5 m	4 m	2.5 m
1000 m	9 m	5.5 m	4 m
2000 m	13 m	8 m	5.5 m
4000 m	18.5 m	11 m	8 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).

Omnidirectional antenna
2.4 GHz

RAD-ISM-2400-ANT-OMNI-2-1
Order No. 2867461 (MCX, male m, 1.5)

RAD-ISM-2400-ANT-OMNI-2-1-RSMA
Order No. 2701362 (RSMA, male, 1.5 m)

- Temperature: -20°C … +65°C
- Degree of protection: IP65
- Gain: 2 dBi

RAD-ISM-2400-ANT-VAN-3-0-SMA
Order No. 2885867 (SMA, male, 1.5 m)

RAD-ISM-2400-ANT-VAN-3-1-MCX
Order No. 2885702 (MCX, male, 1.5 m)

RAD-ISM-2400-ANT-VAN-3-0-RSMA
Order No. 2701358 (RSMA, male, 1.5 m)

RAD-ANT-VAN-MKT
Order No. 2885870 (bracket for wall mounting)

- Gain: 3 dBi
- Vandal-proof

RAD-ISM-2400-ANT-OMNI-5-0
Order No. 2884923

- Temperature: -20°C … +65°C
- Degree of protection: IP55
- Gain: 5 dBi
- Connection: SMA (male)

Omnidirectional antenna
5 GHz

ANT-OMNI-5900-01
Order No. 2701347

- Temperature: -40°C … +70°C
- Degree of protection: IP55
- Gain: 5 dBi
- Connection: N (female)
- Including mounting bracket

2.4 GHz and 5 GHz

RAD-ISM-2459-ANT-FOOD-6-0
Order No. 2692526

- Temperature: -40°C … +80°C
- Degree of protection: IP67
- Gain: 6 dBi @ 2.4 GHz/8 dBi @ 5.6 GHz
- Connection: N (female)
- Including 1 m N(m) - SMA(m) cable

Panel antenna
2.4 and 5 GHz

ANT-DIR-2459-01
Order No. 2701186

- Temperature: -40°C … +80°C
- Degree of protection: IP67
- Gain: 9 dBi
- Connection: N (female)
- Including mounting bracket

Panel antenna
2.4 GHz

RAD-ISM-2400-ANT-PAN-8-0*
Order No. 2867610 (linear polarized)

RAD-ISM-2400-ANT-CIR-8-0
Order No. 2884936 (circular polarized)

- Temperature: -40°C … +80°C
- Degree of protection: IP55
- Gain: 8 dBi
- Connection: SMA (female)
- Including mounting bracket

5 GHz

RAD-ISM-5000-ANT-PAR-18-N
Order No. 5606613

- 5 GHz WLAN
- Gain: 18 dBi
- Connection: n (female)

Parabolic panel antenna
2.4 GHz

RAD-ISM-2400-ANT-PAR-19-0
Order No. 2867885

- Temperature: -40°C … +70°C
- Degree of protection: IP65
- Gain: 19 dBi
- Connection: N (female)

868 MHz

ANT-OMNI-868-01
Order No. 2702136

- Resistant to salt water
- Temperature: -40°C … +80°C
- Degree of protection: IP65
- Gain: 6 dBi
- Connection: N (female)
- Including mounting bracket

900 MHz

RAD-ISM-900-ANT-OMNI-5
Order No. 2867199 (gain: 7 dBi)

RAD-ISM-900-ANT-OMNI-FG-3-N
Order No. 2867791 (gain: 5 dBi)

RAD-ISM-900-ANT-OMNI-FG-6-N
Order No. 2885579 (gain: 8 dBi)

- Degree of protection: IP65
- Connection: N (female)

5 GHz

ANT-DIR-5900-01
Order No. 2701348 (dual-slant antenna)

- Temperature: -40°C … +80°C
- Degree of protection: IP67
- Gain: 9 dBi
- Connection: N (female)
- Including mounting bracket

Yagi panel antenna
868 MHz and 900 MHz

RAD-ISM-900-ANT-YAGI-6.5-N
Order No. 2867814 (gain: 8.5 dBi, 1.5 m cable)

RAD-ISM-900-ANT-YAGI-3-N
Order No. 2867801 (gain: 5 dBi, 0.6 m cable)

- Temperature: -40°C … +80°C
- Degree of protection: IP65
- Connection: N (female)

Adapter

1) RAD-ADP-N/F-N/F
Order No. 2867843 (N (female) > N (female))

2) RAD-ADP-N/M-SMA/F
Order No. 2917036 (N (male) > SMA (female))

3) RAD-ADP-SMA/F-SMA/F
Order No. 2884541 (SMA (female) > SMA (female))

4) RAD-ADP-RSMA/F-SMA/F
Order No. 2884538 (RSMA (male) > SMA (female))

5) RAD-ADP-RSMA/M-RSMA/F-90
Order No. 2904790 (RSMA (male) > RSMA (female) 90°)

5 GHz

RAD-ISM-5000-ANT-PAR-22-N
Order No. 5606174

- 5 GHz WLAN
- Gain: 22 dBi
- Connection: N (female)

Antenna splitter

RAD-ISM-2400-SPL-2-SMA
Order No. 2885595

- For connecting up to four receivers to an antenna
- Accessories: 2 x termination resistor, SMA (female) > N (male) adapter
- Degree of protection: IP20

RAD-ISM-2400-SPL-4-SMA
Order No. 2867856

- Vulcanizing
- For external protection of adapters, splitters or cable connections; watertight
- Length: 3 m

* For use in the Ex area with the RAD-PIG-RSMA-N-EX/ATEX 2904788 adapter cable (see page 43).

Antenna cable

RSMA-N

RAD-PIG-RSMA/N- ...
Order No. 2903263 (0.5 m length)
Order No. 2903264 (1.0 m length)
Order No. 2903265 (2.0 m length)
Order No. 2903266 (3.0 m length)
Order No. 2702140 (5.0 m length)

- Connection: N (male) > RSMA (male)

Type EF 393

RAD-CAB-EF393-..M
Order No. 2867649 (3 m length)
Order No. 2867652 (5 m length)
Order No. 2867665 (10 m length)
Order No. 2885634 (15 m length)

- Connection: N (male) at both ends

Type EF 142

RAD-CAB-EF142-.. M
Order No. 2884512 (3 m length)
Order No. 2884525 (5 m length)

- Connection: SMA (male) at both ends

Leaky cable (LCX)

2.4 GHz

FL LCX CABLE METER
Order No. 2884774

- Temperature: -40 … +85°C
- Longitudinal attenuation: 19.8 dB/100 m
- Coupling attenuation 95%: 89 dB

Assembly tool (LCX)

FL LCX TOOL
Order No. 2884981

- Planing tool

Accessories (LCX)

FL LCX CON-N-F
Order No. 2884965 (connector, N (female))

FL LCX 50-OHM
Order No. 2884978 (termination resistor, N (male))

FL LCX CLAMP
Order No. 2884994 (cable tie)

Mobile phone

Antennas

PSI-GSM/UMTS-QB-ANT
Order No. 2313371

TC ANT MOBILE/GPS
Order No. 2903590

- GSM/UMTS antenna for mounting on a control cabinet
- With omnidirectional characteristics
- 2 m antenna cable with SMA round plug

PSI-GSM/UMTS-ANT-OMNI-2-5
Order No. 2900982

- GSM/UMTS omnidirectional antenna for wall or mast mounting
- Gain: 2 dBi
- 5 m antenna cable with SMA round plug

PSI-GSM-STUB-ANT
Order No. 2313342

- Direct mounting on the device
- Angled antenna plug
- Installation in plastic control cabinets not visible from the outside
- Connection: SMA round plug

Type EF 316

RAD-PIG-EF316-...
Order No. 2867678 (1 m, MCX(m) > SMA(m))
Order No. 2867681 (50 cm, MCX(m) > N(m))
Order No. 2867694 (30 cm, N(f) > SMA(m))
Order No. 2867704 (50 cm, N (f) > N (m))
Order No. 2885618 (50 cm, SMA(m) > SMA(m))

Configuration stick

RAD-CONF-RF...
Order No. 2702122 (RF band 1, 900 MHz)
Order No. 2902814 (RF band 3, 2.4 GHz)
Order No. 2902815 (RF band 5, 2.4 GHz)
Order No. 2902816 (RF band 7, 2.4 GHz)

RAD-MEMORY
Order No. 2902828 (freely configurable)

Unique network addressing via plug-in configuration memory for secure, parallel operation of multiple networks

Configuration cable

RAD-CABLE-USB
Order No. 2903447

- USB cable for diagnostics and configuration

Antenna barrier
for the Ex area

RAD-PIG-RSMA-N-EX/ATEX
Order No. 2904788
- Thread: M25; zone 1 and 2; N (female) > RSMA (male)

RAD-PIG-RSMA-N-EX/US
Order No. 2904789
- Thread: 3/4" NPT; Class I, Div. 1, Grps. A, B, C & D; Class II, Div.1, Grps. F & G; N (female) > RSMA (male)

This adapter cable allows you to use selected antennas in zone 2.

Sealing tape

RAD-TAPE-SV-19-3
Order No. 2903182

- Vulcanizing
- For external protection of adapters, splitters or cable connections; watertight
- Length: 3 m

Surge protection
2.4 and 5 GHz

CN-UB-70DC-6-SB (868/900 MHz)
Order No. 2803153
- Connection: N (male) > N (female)

CN-UB-70DC-6-BB (868/900 MHz)
Order No. 2803166
- Connection: N (female) at both ends

CN-LAMBDA/4-5.9-BB (2.4/5.2/5.8 GHz)
Order No. 2838490
- Connection: N (female) at both ends

Antenna cable

PSI-CAB-GSM/UMTS
Order No. 2900980 (5 m)
Order No. 2900981 (10 m)

- GSM/UMTS antenna extension cable, 10 m length; SMA (male) > SMA (female), impedance: 50 Ohm

Angled adapter

RAD-ADP-SMA/F-SMA/M-90
Order No. 2917324

- 90° adapter for connecting the GSM/UMTS antenna cable where space is restricted
- SMA (female) > SMA (male)

Surge protection set

CSMA-LAMBDA/4-2.0-BS-SET
Order No. 2800491

- Consisting of attachment plug with LAMBDA/4 technology as surge protection for coaxial signal interfaces
- Connection: SMA connector plug/socket

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- Connectors
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- Fieldbus components and systems
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Printed in Germany

ION02-14.004.L3
MNR 52001683/2014-03-05/05

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