

## Wireless module - RAD-2400-IFS - 2901541

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2400 MHz wireless transceiver with RS-232, RS-485 2-wire interface, expandable with I/O extension modules, with screw connection, antenna connection:RSMA (female), including DIN rail connector, without antenna

### Product Description

Radioline is the new wireless system for large systems. Special features include extremely easy assignment of inputs and outputs by simply turning the thumbwheel - without any programming. Radioline transmits I/O signals (I/O mode) or serial data (serial mode) and is therefore very versatile. Alternatively, I/O signals can now also be connected to controllers directly using the Modbus protocol (PLC/Modbus RTU mode). In addition, you can implement various network structures: from a simple point-to-point connection to complex mesh networks. Thanks to the latest Trusted Wireless technology, Radioline is the ideal choice for industrial use.

### Product Features

- License-free 2.4 GHz frequency band
- Extended temperature range, -40°C ... +70°C
- Range of several kilometers thanks to adjustable data rates for the wireless interface (16 ... 500 kbps)
- Integrated RS-232/RS-485 interface
- Quick and easy startup without programming
- High degree of reliability due to Trusted Wireless 2.0 technology (AES encryption, frequency hopping method, and coexistence management)
- Suitable for ATEX zone 2
- Mesh networks of up to 250 devices



### Key Commercial Data

Packing unit	1 pc
Weight per Piece (excluding packing)	220.0 g
Country of origin	Germany

### Technical data

Note

# Wireless module - RAD-2400-IFS - 2901541

## Technical data

### Note

Utilization restriction	EMC: class A product, see manufacturer's declaration in the download area
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### Dimensions

Width	17.5 mm
Height	99 mm
Depth	114.5 mm

### Ambient conditions

Degree of protection	IP20
Ambient temperature (operation)	-40 °C ... 70 °C (>55°C derating) -40 °F ... 158 °F (>131°F derating)
Ambient temperature (storage/transport)	-40 °C ... 85 °C -40 °F ... 185 °F
Permissible humidity (operation)	20 % ... 85 %
Permissible humidity (storage/transport)	20 % ... 85 %
Altitude	2000 m
Vibration (operation)	in accordance with IEC 60068-2-6: 5g, 10 Hz ... 150 Hz
Shock	16g, 11 ms

### General

Operating mode	I/O data (Default setting, configuration via thumbwheel) Serial data (Activation and configuration via PSI-CONF software) PLC/Modbus RTU mode (Activation and configuration via PSI-CONF software)
Overvoltage category	II
Assembly instructions	on standard DIN rail NS 35 in accordance with EN 60715
Degree of pollution	2
Housing material	PA 6.6-FR
Flammability rating according to UL 94	V0
MTTF	778 Years (Telcordia standard, 25°C temperature, 21% operating cycle (5 days a week, 8 hours a day)) 358 Years (Telcordia standard, 40°C temperature, 34.25% operating cycle (5 days a week, 12 hours a day)) 142 Years (Telcordia standard, temperature 40 °C, operating cycle 100 % (7 days a week, 24 hours a day))
Wireless licences	Australia Belgium Bulgaria Denmark Germany

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## Technical data

### General

	Estonia
	France
	Finland
	Greece
	Great Britain
	Italy
	Ireland
	Iceland
	Canada
	Croatia
	Liechtenstein
	Luxembourg
	Latvia
	Lithuania
	Malta
	Morocco
	Netherlands
	Norway (The device may not be operated within 20 km of Ny Ålesund town center.)
	Austria
	Poland
	Portugal
	Romania
	Russia
	Sweden
	Switzerland
	Slovakia
	Slovenia
	Singapore
	Spain
	South Africa
	Thailand
	Czech Republic
	Turkey (The device may only be operated with Phoenix Contact antennas in accordance with the "Short Range Radio Devices (SRD) Regulations" Gazette No. 26464 dated March 16, 2007.)
	Hungary
	USA

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## Technical data

### General

	Ukraine
	United Arab Emirates
	Cyprus (rep.)
Export note	*The range may be considerably above or below that stated. It is dependent on the environment, antenna technology, transmission power, and the product used.

### Supply

Supply voltage range	19.2 V DC ... 30.5 V DC
Max. current consumption	≤ 65 mA (@ 24 V DC, @ 25°C, stand-alone)
Transient surge protection	Yes

### Wireless interface

Antenna connection	RSMA (female)
Direction	Bi-directional
Frequency	2400 MHz
Frequency range	2.4002 GHz ... 2.4785 GHz
Number of channel groups	8
Number of channels per group	55
Channel distance	1.3 MHz
Data rate	16 kbps (adjustable)
	125 kbps (Default setting, adjustable)
	250 kbps (adjustable)
Receiver sensitivity	-106 dBm (16 kbps)
	-96 dBm (125 kbps)
	-93 dBm (250 kbps)
Transmit capacity, minimum	0 dBm
Transmit capacity, maximum	≤ 20 dBm (Outside of Europe, adjustable via software)
	≤ 19 dBm (Europe, can be set via software, depends on the data rate)
	18 dBm (Default setting, adjustable)
Range	± 5 km (The range may be considerably above or below that stated, and depends on the environment, antenna technology, and the product used)
Security	128-bit data encryption

### Serial interface

Interface 1	RS-232
Connection method	COMBICON plug-in screw terminal block
	3-conductor
Transmission length	≤ 15 m
Transmission speed	0,3 ... 115,2 kbit/s

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## Technical data

### Serial interface

Interface 2	RS-485
Connection method	COMBICON plug-in screw terminal block
	2-wire
Transmission length	≤ 1200 m
Termination resistor	390 Ω (switchable via DIP switches)
	150 Ω (switchable via DIP switches)
	390 Ω (switchable via DIP switches)
Transmission speed	0,3 ... 187,5 kbit/s
Interface 3	Configuration interface
Connection method	S-PORT (socket)

### System limits

Designation	Wireless module
Number of supported devices	≤ 250 (Addressing via PSI-CONF software)
	≤ 99 (Addressing via thumbwheel)
Number of possible extension modules	≤ 32 (per wireless module)
Designation	Wireless network
I/O data mode	≤ 99 (I/O extension modules per wireless network, serial interfaces deactivated)
Serial data mode	0 (no I/O extension modules can be used)
PLC/Modbus RTU mode	≤ 99 (I/O extension modules per wireless network, access to extension modules via Modbus RTU protocol)

### RSSI output

Number of outputs	1
Voltage output signal	0 V ... 3 V

### RF link relay output

Number of outputs	1
Contact type	PDT
Contact material	PdRu, gold-plated
Maximum switching voltage	30 V AC/DC
	60 V DC
Max. switching current	500 mA (30 V AC/DC)
Electrical service life	5 x 10 <sup>5</sup> cycles with 0.5 A @ 30 V DC

### Connection data

Connection method	Screw connection
Conductor cross section solid min.	0.2 mm <sup>2</sup>
Conductor cross section solid max.	2.5 mm <sup>2</sup>

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## Technical data

### Connection data

Conductor cross section flexible min.	0.2 mm <sup>2</sup>
Conductor cross section flexible max.	2.5 mm <sup>2</sup>
Conductor cross section AWG min.	24
Conductor cross section AWG max.	14
Stripping length	7 mm
Tightening torque	0.6 Nm
Screw thread	M3

### Status indicator

Status display	Green LED (supply voltage, PWR)
	Green LED (bus communication, DAT)
	Red LED (periphery error, ERR)
	3 x green, 1 x yellow LED (LED bar graph receive quality, RSSI)
	Green LED (receive data, RX)
	Green LED (transmit data, TX)

### Approvals and conformance

Conformance	CE compliance (R&TTE directive 1999/5/EC)
IECEX	Ex nA nC IIC T4 Gc
UL, USA / Canada	UL 508 Listed
Standard designation	Ex Directive (ATEX)
Standards/regulations	EN 60079-0
Standard designation	Ex Directive (ATEX)
Standards/regulations	EN-60079-15
Standard designation	R&TTE Directive 1999/5/EC
Standards/regulations	EN 300328
	EN 61000-6-4
	EN 61000-6-2
	EN 50371
	EN 60950-1

### Standards and Regulations

Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
Standard designation	Ex Directive (ATEX)
Standards/regulations	EN 60079-0
Standard designation	Ex Directive (ATEX)
Standards/regulations	EN-60079-15
Standard designation	R&TTE Directive 1999/5/EC
Standards/regulations	EN 300328

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## Technical data

### Standards and Regulations

	EN 61000-6-4
	EN 61000-6-2
	EN 50371
	EN 60950-1
Shock	16g, 11 ms
Flammability rating according to UL 94	V0
Interface description	Trusted Wireless
Channel distance	1.3 MHz
Security	128-bit data encryption
Vibration (operation)	in accordance with IEC 60068-2-6: 5g, 10 Hz ... 150 Hz
Conformance	CE compliance (R&TTE directive 1999/5/EC)
	FCC Directive, Part 15.247
	ISC Directive RSS 210
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

## Classifications

### eCl@ss

eCl@ss 4.0	27230207
eCl@ss 4.1	27230207
eCl@ss 5.0	27230207
eCl@ss 5.1	27242208
eCl@ss 6.0	27242208
eCl@ss 7.0	27242208
eCl@ss 8.0	19179290
eCl@ss 9.0	19179290

### ETIM

ETIM 3.0	EC001423
ETIM 4.0	EC000310
ETIM 5.0	EC000310

### UNSPSC

UNSPSC 6.01	30211506
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## Classifications

### UNSPSC

UNSPSC 7.0901	43223108
UNSPSC 11	39121008
UNSPSC 12.01	43223108
UNSPSC 13.2	43223108

## Approvals

### Approvals

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#### Approvals

UL Listed / cUL Listed / EAC / EAC / cULus Listed

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#### Ex Approvals

ATEX / IECEX / UL Listed / cUL Listed / cULus Listed

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#### Approvals submitted

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### Approval details

UL Listed

cUL Listed

EAC

EAC

cULus Listed



## Wireless module - RAD-2400-IFS - 2901541

### Accessories

#### Accessories

#### Antenna

##### Antenna - RAD-ISM-2400-ANT-OMNI-2-1-RSMA - 2701362



Omnidirectional antenna, 2.4 GHz, 2 dBi, linear vertical, 1.5 m cable, RSMA (male), IP65, 50  $\Omega$  impedance

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##### Antenna - RAD-ISM-2400-ANT-VAN-3-0-RSMA - 2701358



Omnidirectional antenna with protection against vandalism, 2.4 GHz, 3 dBi gain, IP55 degree of protection, 1.5 m cable length, RSMA connection (male), h/v 360°/85° apex angle.  
Appropriate mounting material is available for wall mounting.

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##### Antenna - RAD-ISM-2400-ANT-OMNI-6-0 - 2885919



Omnidirectional antenna, 2.4 GHz, 6 dBi, linear vertical, opening angle h/v 360°/30°, N (female), IP55, incl. mounting bracket and mast clips for 45 mm - 100 mm diameter, stainless steel, ATEX & IECEx approval

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##### Antenna - RAD-2400-ANT-OMNI-6-0-SW - 2903219



Omnidirectional antenna, 2.4 GHz, 6 dBi, linear vertical, opening angle h/v 360°/20°, N (female), IP65, salt water resistant

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##### Antenna - RAD-ISM-2400-ANT-OMNI-9-0 - 2867623



Omnidirectional antenna, 2.4 GHz, 9 dBi, linear vertical, N (female), IP65, 50  $\Omega$  impedance

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### Accessories

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#### Antenna - ANT-DIR-2459-01 - 2701186



Panel antenna, 2.4/5 GHz, 9 dBi, linear vertical, N (female), IP67, incl. mounting bracket and mast clips for 25 mm - 85 mm diameter, stainless steel, ATEX & IECEx approval

#### Antenna - RAD-ISM-2400-ANT-PAR-19-0 - 2867885



Parabolic antenna, IP65 degree of protection, 19 dBi gain, linear vertical, N (female) connection, impedance 50  $\Omega$ , apex angle h/v 17°/11°

#### Coaxial adapter

##### Adapter - RAD-ADP-N/F-N/F - 2867843



Adapter, N (female) -> N (female); insertion attenuation < 0.3 dB at 2.4 GHz

##### Adapter - RAD-ADP-RSMA/M-RSMA/F-90 - 2904790



Adapter, RSMA (male) -> RSMA (female) 90°; Insertion loss < 0.3 dB at 2.4 GHz

##### Antenna barrier - BAR-ANT-N-N-EX - 2702198



Antenna barrier for installation in Ex zone 2, separates and transmits RF signals with intrinsic safety (Ex i) to an antenna in zone 0, 1 or 2, 0.7 GHz ... 6 GHz frequency range, N (female) -> N (female), ATEX/IECEx approval

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### Accessories

Antenna splitter - RAD-SPL-2-N/N - 2702293



2-way distributor for antenna signals (antenna splitter), type N connector (female) on the two upper ends and type N (female) on the lower end

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### Coaxial cable

Antenna cable - RAD-PIG-EF316-N-RSMA - 2701402



Adapter cable as control cabinet feed-through, N (female) -> RSMA (male), impedance: 50  $\Omega$ , length: 0.5 m

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Antenna cable - RAD-PIG-RSMA/N-0.5 - 2903263



Antenna cable, 0.5 m in length; N (male) -> RSMA (male), impedance 50 ohms

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Antenna cable - RAD-PIG-RSMA/N-1 - 2903264



Antenna cable, 1 m in length; N (male) -> RSMA (male), impedance 50 ohms

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Antenna cable - RAD-PIG-RSMA/N-2 - 2903265



Antenna cable, 2 m in length; N (male) -> RSMA (male), impedance 50 ohms

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## Wireless module - RAD-2400-IFS - 2901541

### Accessories

Antenna cable - RAD-PIG-RSMA/N-3 - 2903266



Antenna cable, 3 m in length; N (male) -> RSMA (male), impedance 50 ohms

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Antenna cable - RAD-PIG-RSMA/N-5 - 2702140



Antenna cable, 5 m in length; N (male) -> RSMA (male), impedance 50 ohms

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Antenna cable - FL LCX PIG-EF142-N-N - 2700677



Antenna cable, N (male) - N (male), impedance: 50 ohm, length: 0.5 m

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Antenna cable - RAD-CAB-EF393- 3M - 2867649



Antenna cable, 3 m in length, N (male) -> N (male), 50 Ω impedance

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Antenna cable - RAD-CAB-EF393- 5M - 2867652



Antenna cable, 5 m in length, N (male) -> N (male), 50 Ω impedance

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## Wireless module - RAD-2400-IFS - 2901541

### Accessories

Antenna cable - RAD-CAB-EF393-10M - 2867665



Antenna cable, 10 m in length, N (male) -> N (male), 50  $\Omega$  impedance

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Antenna cable - RAD-CAB-EF393-15M - 2885634



Antenna extension cable, 15 m in length, N (male) -> N (male), 50  $\Omega$  impedance

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### Communication module

Communication module - RAD-RS485-IFS - 2702184



Multipoint multiplexer for RS-485 bus system, can be extended with I/O extension modules. Can be used as Modbus RTU bus coupler or combined with Radioline wireless system, screw connection. Up to 99 stations, including DIN rail connector

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### Configuration memory

Configuration memory - RAD-CONF-RF3 - 2902814



CONFSTICK for easy and secure network addressing for the 2.4 GHz Radioline wireless module (RAD-2400-IFS), unique network ID, RF band 3

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Configuration memory - RAD-CONF-RF5 - 2902815



CONFSTICK for easy and secure network addressing for the 2.4 GHz Radioline wireless module (RAD-2400-IFS), unique network ID, RF band 5

## Wireless module - RAD-2400-IFS - 2901541

### Accessories

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#### Configuration memory - RAD-CONF-RF7 - 2902816



CONFSTICK for easy and secure network addressing for the 2.4 GHz Radioline wireless module (RAD-2400-IFS), unique network ID, RF band 7

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#### Configuration memory - RAD-MEMORY - 2902828



Memory stick for saving individual configuration data for the Radioline wireless module

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### Control box

#### Control box - FL RUGGED BOX - 2701204



Control box for robust construction of wireless systems for industrial applications, IP66, 25 x 18 x 13 cm, polycarbonate material, gray, drilled, incl. DIN rail, plugs, and screw connections, without devices

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### DIN rail connector

#### Electronic housing - ME 17,5 TBUS 1,5/ 5-ST-3,81 GN - 2709561



DIN rail connector for DIN rail mounting. Universal for TBUS housing. Gold-plated contacts, 5-pos.

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### Extension module

## Wireless module - RAD-2400-IFS - 2901541

### Accessories

#### I/O extension module - RAD-DAIO6-IFS - 2901533



Analog/digital I/O extension module with 2 digital inputs/outputs (0...250 V AC/DC) and 1 analog input (0/4...20 mA) and output (0/4 ... 20 mA, 0...10 V), with screw connection, incl. DIN rail connector

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#### I/O extension module - RAD-DI4-IFS - 2901535



Digital I/O extension module with 4 digital inputs (0...250 V AC/DC), with screw connection, incl. DIN rail connector

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#### I/O extension module - RAD-DOR4-IFS - 2901536



Digital I/O extension module with 4 digital relay outputs (5 A, 250 V AC/ 24 V DC), with screw connection, incl. DIN rail connector

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#### I/O extension module - RAD-DI8-IFS - 2901539



Digital I/O extension module with 8 digital inputs (0 ... 30.5 V DC) or 2 pulse inputs (0 ... 100 Hz), with screw connection, including DIN rail connector

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#### I/O extension module - RAD-DO8-IFS - 2902811



Digital I/O extension module with 8 digital transistor outputs (30.5 V DC/200 mA), with screw connection, including DIN rail connector

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## Wireless module - RAD-2400-IFS - 2901541

### Accessories

#### I/O extension module - RAD-AI4-IFS - 2901537



Analog extension module with 4 analog current inputs (0/4 mA ... 20 mA), with screw connection, incl. DIN rail connector

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#### I/O extension module - RAD-AO4-IFS - 2901538



Analog I/O extension module with 4 analog current/voltage outputs (0/4 mA ... 20 mA, 0...10 V), with screw connection, incl. DIN rail connector

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#### I/O extension module - RAD-PT100-4-IFS - 2904035



Temperature I/O extension module with 4 PT 100 inputs (-50...+250 °C), with screw connection, including DIN rail connector

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### Interface converter

#### Interface converters - FL COMSERVER UNI 232/422/485 - 2313452



Second generation FL COMSERVER UNI..., serial device server for converting a serial 232/422/485 interface to Ethernet, supports TCP, UDP, Modbus gateway, and PPP applications, incl. COM port redirector software and user documentation

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### Mounting material

#### Weather protection tape - RAD-TAPE-SV-19-3 - 2903182



Vulcanizing sealing tape for external protection of adapters, cable connections, etc. against the effects of weather, roll length: 3 m



## Wireless module - RAD-2400-IFS - 2901541

### Accessories

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Mounting material - FL RUGGED BOX POLE SET - 2701205



Set for mast mounting of the FL RUGGED BOX housing, incl. screw clamps for masts up to 89 mm #

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### Power supply

Power supply unit - MINI-SYS-PS-100-240AC/24DC/1.5 - 2866983



Primary-switched MINI POWER supply for DIN rail mounting, input: 1-phase, output: 24 V DC/1.5 A

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### Programming cable

Cable for programming - RAD-CABLE-USB - 2903447



USB data cable for communication between the PC and RAD-... Radioline devices. Energy supply for diagnostics and configuration via the USB port of the PC, cable length: 2 m

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### Shield connection clamp

Shield connection terminal block - SKS 8-SNS35 - 3062786



Shield connection terminal block, for applying the shield to busbars

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### Solar set

## Wireless module - RAD-2400-IFS - 2901541

### Accessories

Solar system - RAD-SOL-SET-24-100 - 2885472



24 V / 100 Wp solar system for worldwide use. Consisting of a solar panel, prewired control cabinet with charge controller, solar batteries, fuses, surge protection and assembly material (including mast clips).

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Solar system - RAD-SOL-SET-24-200 - 2917722



24 V / 200 Wp solar system for worldwide use. Consisting of a solar panel, prewired control cabinet with charge controller, solar battery, fuses, surge protection and assembly material (including mast clips).

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### Surge protection for transceiver systems

Surge protection device - CN-LAMBDA/4-5.9-BB - 2838490



Attachment plug with Lambda/4 technology as surge protection for coaxial signal interfaces. Connection: N connectors socket-socket

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### Additional products

I/O extension module - RAD-DAIO6-IFS - 2901533



Analog/digital I/O extension module with 2 digital inputs/outputs (0...250 V AC/DC) and 1 analog input (0/4...20 mA) and output (0/4 ... 20 mA, 0...10 V), with screw connection, incl. DIN rail connector

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I/O extension module - RAD-DI4-IFS - 2901535



Digital I/O extension module with 4 digital inputs (0...250 V AC/DC), with screw connection, incl. DIN rail connector

## Wireless module - RAD-2400-IFS - 2901541

### Accessories

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#### I/O extension module - RAD-DOR4-IFS - 2901536



Digital I/O extension module with 4 digital relay outputs (5 A, 250 V AC/ 24 V DC), with screw connection, incl. DIN rail connector

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#### I/O extension module - RAD-DI8-IFS - 2901539



Digital I/O extension module with 8 digital inputs (0 ... 30.5 V DC) or 2 pulse inputs (0 ... 100 Hz), with screw connection, including DIN rail connector

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#### I/O extension module - RAD-DO8-IFS - 2902811



Digital I/O extension module with 8 digital transistor outputs (30.5 V DC/200 mA), with screw connection, including DIN rail connector

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#### I/O extension module - RAD-AI4-IFS - 2901537



Analog extension module with 4 analog current inputs (0/4 mA ... 20 mA), with screw connection, incl. DIN rail connector

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#### I/O extension module - RAD-AO4-IFS - 2901538



Analog I/O extension module with 4 analog current/voltage outputs (0/4 mA ... 20 mA, 0...10 V), with screw connection, incl. DIN rail connector

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# Wireless module - RAD-2400-IFS - 2901541

## Accessories

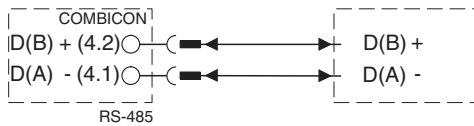
I/O extension module - RAD-PT100-4-IFS - 2904035



Temperature I/O extension module with 4 PT 100 inputs (-50...+250 °C), with screw connection, including DIN rail connector

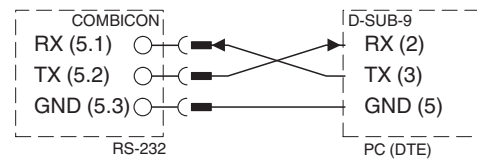
## Drawings

Connection diagram



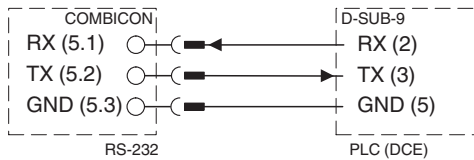
RS-485 connection

Connection diagram



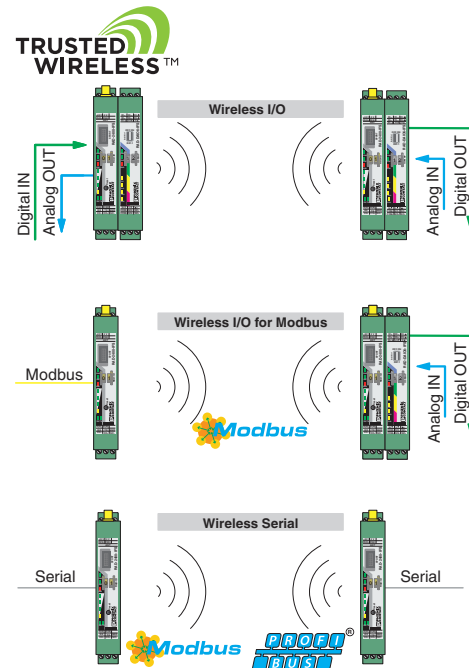
RS-232 connection

Connection diagram



RS-232 connection

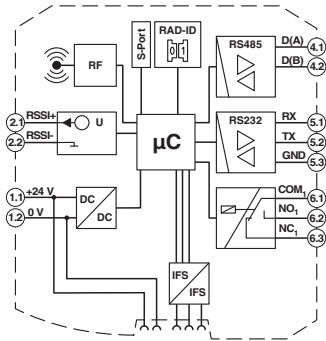
Application drawing



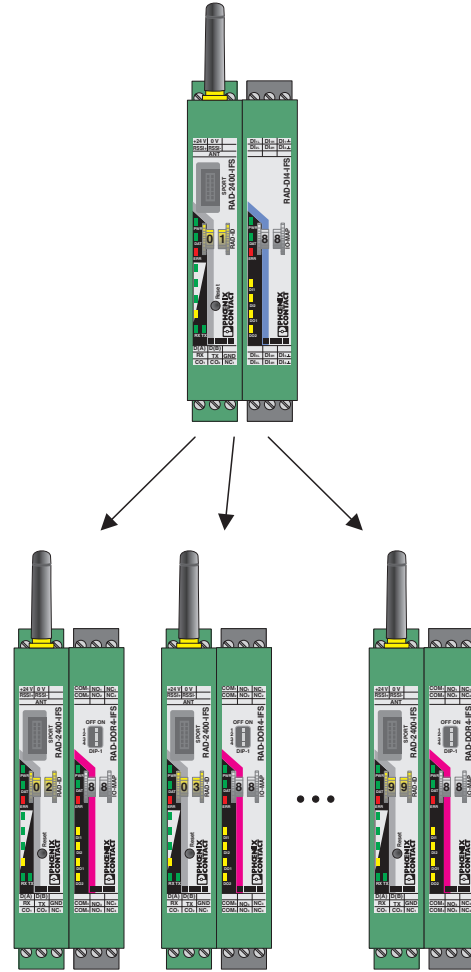
Trusted Wireless

# Wireless module - RAD-2400-IFS - 2901541

Block diagram



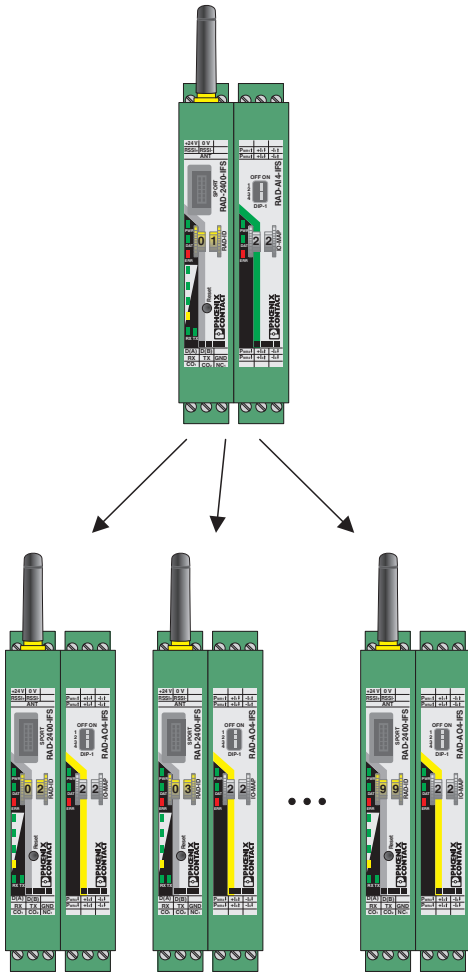
Functional drawing



Assignment of digital inputs and digital outputs

# Wireless module - RAD-2400-IFS - 2901541

Functional drawing



Assignment of analog inputs and analog outputs

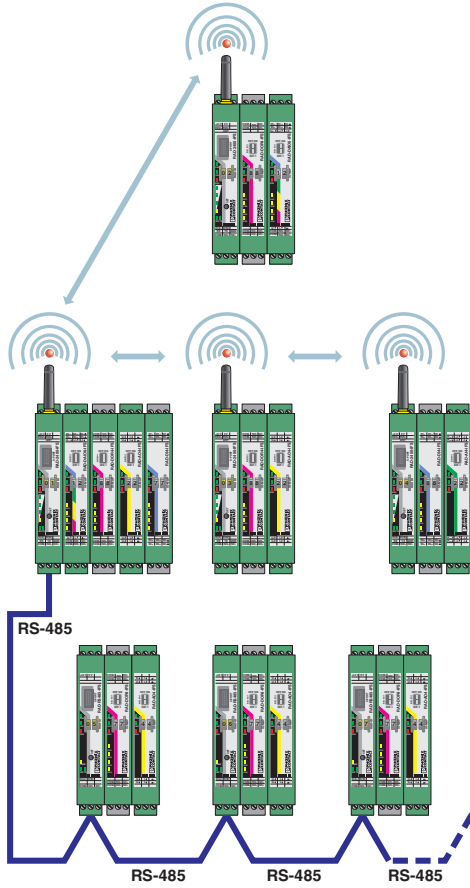
Functional drawing



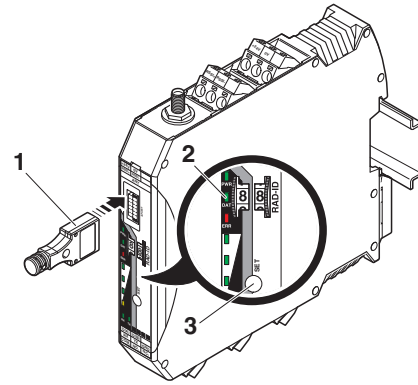
RAD-DAIO6-IFS assignment: analog/digital inputs and outputs

# Wireless module - RAD-2400-IFS - 2901541

Functional drawing



Schematic diagram

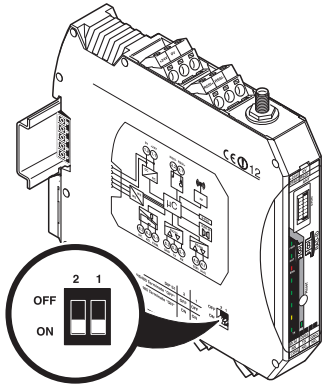


Configuration via CONFSTICK

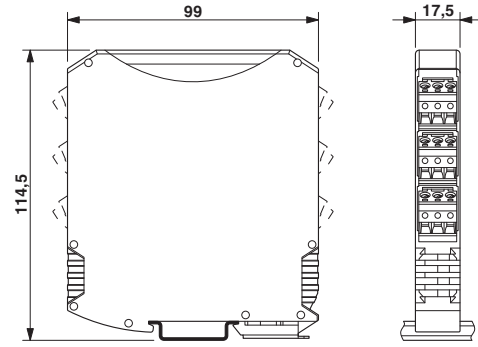
I/O-to-I/O, wireless, and RS-485

# Wireless module - RAD-2400-IFS - 2901541

Schematic diagram



Dimensional drawing

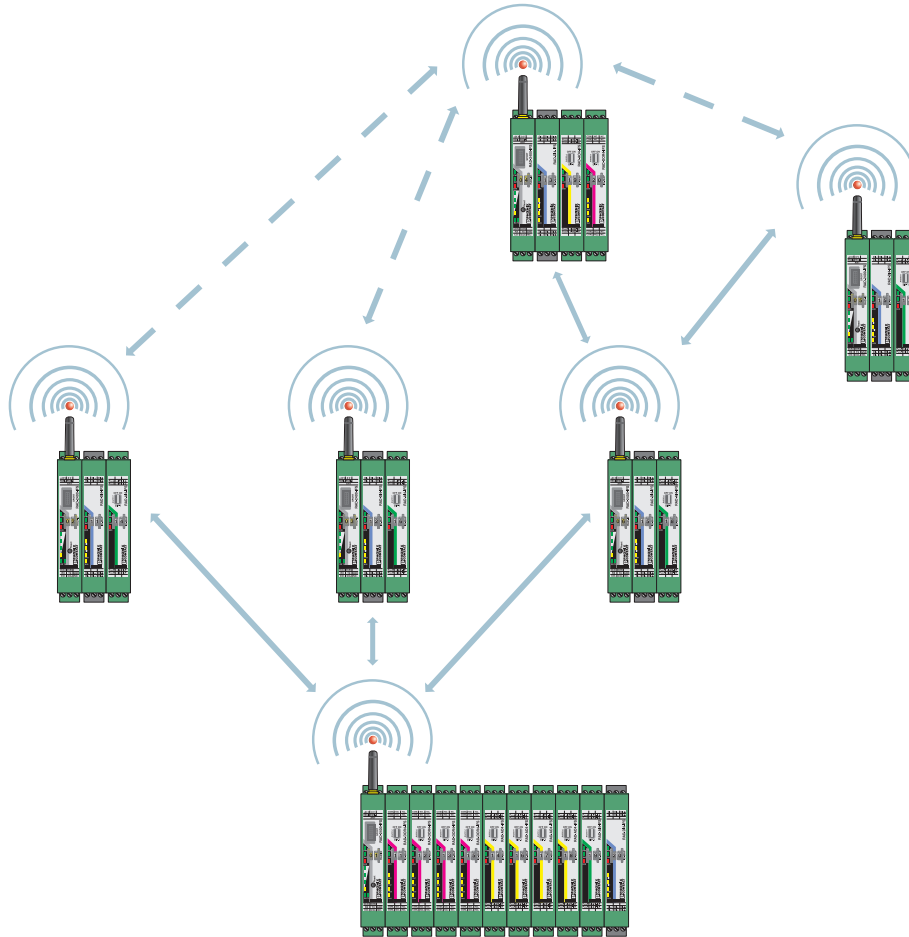


DIP switches



# Wireless module - RAD-2400-IFS - 2901541

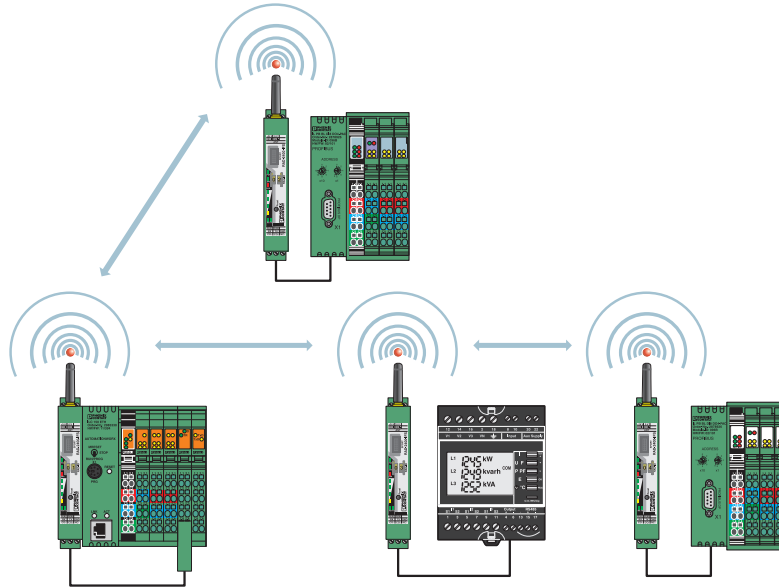
Application drawing



Wireless module in I/O data mode

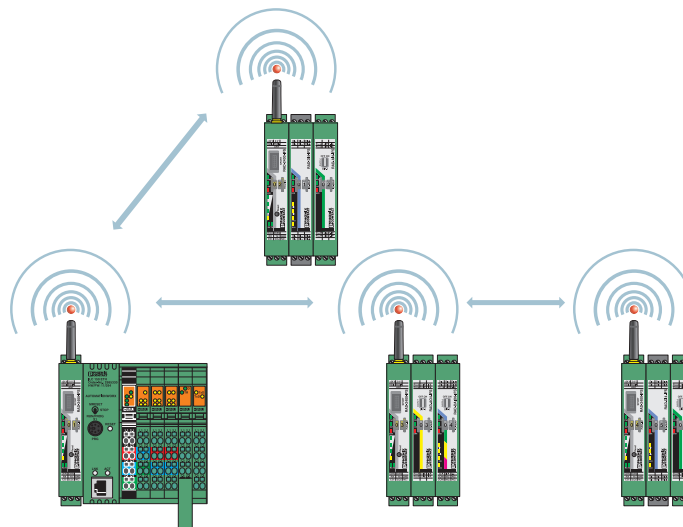
# Wireless module - RAD-2400-IFS - 2901541

Application drawing



Serial data mode

Application drawing



Wireless module in PLC/Modbus RTU mode

