

ILB BT ADIO MUX INSTALL

Typical combinations of antennas and adapter cables



Application note
107804_en_01

© PHOENIX CONTACT 2022-06-29

1 Description

This application note shows you how to install the Wireless MUX set indoors or outdoors with various accessories.

Accessories:

- Antennas
- Antenna cables
- Surge protection



WARNING

This application note does **not** replace the device-specific documents.

Observe the safety information, conditions, and limits of use specified in the respective product documentation.



Make sure you always use the latest documentation.

It can be downloaded at: phoenixcontact.net/product/2702875

2 Table of contents

1	Description	1
2	Table of contents	2
3	Ordering data	3
4	Optimum antenna installation	6
5	Installation indoors.....	8
6	Installation outdoors	13

3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
Wireless MUX set, two modules with 16 digital inputs and outputs and 2 analog inputs and outputs (0 ... 20 mA, 0 ... 10 V) each, RSMA (female) antenna connection, without antennas	ILB BT ADIO MUX	2702875	1
Wireless MUX set, two modules with 16 digital inputs and outputs and 2 analog inputs and outputs (0 ... 20 mA, 0 ... 10 V) each, RSMA (female) antenna connection, incl. omnidirectional antennas with 1.5 m cable	ILB BT ADIO MUX-OMNI	2884208	1
Accessories	Type	Item no.	Pcs./Pkt.
Inline shield connector	IB IL SCN 6-SHIELD-TWIN	2740245	5
Connector, colored, for Inline power and segment terminal blocks	IB IL SCN-PWR IN-CP	2727637	10
Connector, for digital 1, 2 or 8-channel Inline terminals	IB IL SCN-8	2726337	10
Labeling field, width: 12.2 mm	IB IL FIELD 2	2727501	10
Insert strip, Sheet, white, unlabeled, can be labeled with: Office printing systems: Laser printer, mounting type: insert, lettering field size: 62 x 10 mm, Number of individual labels: 72	ESL 62X10	0809492	1
Flat zack marker sheet, Sheet, white, unlabeled, can be labeled with: CMS-P1-PLOTTER, PLOTMARK, mounting type: snapped, for terminal block width: 6.2 mm, lettering field size: 5 x 5.5 mm, Number of individual labels: 100	ZBFM 6/WH:UNBEDRUCKT	0803618	10
Quick mounting end clamp for NS 35/7,5 DIN rail or NS 35/15 DIN rail, with marking option, with parking option for FBS...5, FBS...6, KSS 5, KSS 6, width: 5.15 mm, color: gray	CLIPFIX 35-5	3022276	50
Compact omnidirectional antenna, 2.4 GHz/5 GHz, gain: 2 dBi/2.5 dBi, polarization: linear, opening angle: h 360°, degree of protection: IP68, connection: N (male), corresponding connecting cable for control cabinet feed-through (Item No. 2701402)	ANT-OMNI-2459-04	1284780	1
Omnidirectional antenna, 2.4 GHz, gain: 2 dBi, polarization: linear, opening angle: h/v 360°/75°, degree of protection: IP65, connection: RSMA (male), incl. 1.5 m / 5 ft. connecting cable and mounting bracket for wall mounting	RAD-ISM-2400-ANT-OMNI-2-1-RSMA	2701362	1
Omnidirectional antenna with protection against vandalism, 2.4 GHz, gain: 3 dBi, polarization: linear, opening angle: h/v 360°/85°, degree of protection: IP55, connection: RSMA (male), for control cabinet mounting (optional wall mounting), incl. 1.5 m / 5 ft. connecting cable	RAD-ISM-2400-ANT-VAN-3-0-RSMA	2701358	1

Accessories	Type	Item no.	Pcs./Pkt.
Omnidirectional antenna with protection against vandalism, 2.4 GHz/5 GHz, gain: 6 dBi/8 dBi, polarization: linear, opening angle: h 360°, degree of protection: IP68, resistant to cleaning agents, connection: N (female), for control cabinet mounting	RAD-ISM-2459-ANT-FOOD-6-0-N	2702898	1
Multiband omnidirectional antenna with protection against vandalism for control cabinet mounting, frequency band: 0.6 GHz ... 7.1 GHz, gain: 2 dBi ... 4 dBi, degree of protection: IP67, shockproof: IK10, seawater-resistant, connection: N (female)	ANT-OMNI-0671-02	1396318	1
Multiband omnidirectional antenna for wall or mast mounting, 0.6 GHz ... 7.1 GHz, gain: 1 dBi ... 3 dBi, degree of protection: IP67, seawater-resistant, connection: N (female), incl. mounting bracket and mast clamps	ANT-OMNI-0671-01	1396316	1
Omnidirectional antenna, 2.4 GHz, gain: 6 dBi, polarization: linear, opening angle: h/v 360°/30°, degree of protection: IP67, seawater-resistant, connection: N (female), incl. mounting bracket and mast clamps, ATEX and IECEx approval	RAD-ISM-2400-ANT-OMNI-6-0	2885919	1
Directional antenna, 2.4 GHz/5 GHz, gain: 9 dBi, polarization: linear, opening angle: h/v 75°/55°, degree of protection: IP67, seawater-resistant, connection: N (female), incl. mounting bracket and mast clips, ATEX and IECEx approval	ANT-DIR-2459-01	2701186	1
Antenna cable for control cabinet feed-through, outside diameter: 3.2 mm (0.126 in.), inner conductor: stranded, attenuation: 0.6 / 0.9 / 1.4 dB at 0.9 / 2.4 / 5.8 GHz, connection: N (female) -> RSMA (male), cable length: 0.5 m (1.6 ft.)	RAD-PIG-EF316-N-RSMA	2701402	1
Antenna cable, outside diameter: 5 mm (0.2 in.), inner conductor: solid, attenuation: 0.4 / 0.5 / 0.6 dB at 0.9 / 2.4 / 5.8 GHz, connection: N (male) -> RSMA (male), cable length: 0.5 m (1.6 ft.)	RAD-PIG-RSMA/N-0.5	2903263	1
Antenna cable, outside diameter: 5 mm (0.2 in.), inner conductor: solid, attenuation: 0.5 / 0.8 / 1.1 dB at 0.9 / 2.4 / 5.8 GHz, connection: N (male) -> RSMA (male), cable length: 1 m (3.3 ft.)	RAD-PIG-RSMA/N-1	2903264	1
Antenna cable, outside diameter: 5 mm (0.2 in.), inner conductor: solid, attenuation: 0.9 / 1.3 / 2.0 dB at 0.9 / 2.4 / 5.8 GHz, connection: N (male) -> RSMA (male), cable length: 2 m (6.5 ft.)	RAD-PIG-RSMA/N-2	2903265	1
Antenna cable, outside diameter: 5 mm (0.2 in.), inner conductor: solid, attenuation: 1.2 / 2.0 / 3.0 dB at 0.9 / 2.4 / 5.8 GHz, connection: N (male) -> RSMA (male), cable length: 3 m (10 ft.)	RAD-PIG-RSMA/N-3	2903266	1
Antenna cable, outside diameter: 5 mm (0.2 in.), inner conductor: solid, attenuation: 2.0 / 3.3 / 4.8 dB at 0.9 / 2.4 / 5.8 GHz, connection: N (male) -> RSMA (male), cable length: 5 m (16 ft.)	RAD-PIG-RSMA/N-5	2702140	1

Accessories	Type	Item no.	Pcs./Pkt.
Antenna cable, outside diameter: 10 mm (0.4 in.), inner conductor: stranded, attenuation: 1.0 / 1.8 / 3.1 dB at 0.9 / 2.4 / 5.8 GHz, connection: 2 x N (male), cable length: 3 m (10 ft.)	RAD-CAB-EF393- 3M	2867649	1
Antenna cable, outside diameter: 10 mm (0.4 in.), inner conductor: stranded, attenuation: 1.6 / 2.9 / 5.0 dB at 0.9 / 2.4 / 5.8 GHz, connection: 2 x N (male), cable length: 5 m (16 ft.)	RAD-CAB-EF393- 5M	2867652	1
Antenna cable, outside diameter: 10 mm (0.4 in.), inner conductor: stranded, attenuation: 2.9 / 5.6 / 9.9 dB at 0.9 / 2.4 / 5.8 GHz, connection: 2 x N (male), cable length: 10 m (32 ft.)	RAD-CAB-EF393-10M	2867665	1
Antenna cable, outside diameter: 10 mm (0.4 in.), inner conductor: stranded, attenuation: 4.3 / 8.3 / 14.8 dB at 0.9 / 2.4 / 5.8 GHz, connection: 2 x N (male), cable length: 15 m (50 ft.)	RAD-CAB-EF393-15M	2885634	1
Attachment plug with Lambda/4 technology as surge protection for coaxial signal interfaces. Connection: N connectors socket-socket	CN-LAMBDA/4-5.9-BB	2838490	1
Antenna adapter for control cabinet feed-through, frequency range: 0.3 GHz ... 6 GHz, degree of protection: IP65, connection: 2 x N (female)	RAD-ADP-N/F-N/F	2867843	1
Antenna adapter, frequency range: 0.3 GHz ... 6 GHz, connection: RSMA (male) -> RSMA (female), 90° angled	RAD-ADP-RSMA/M-RSMA/F-90	2904790	1
Vulcanizing sealing tape for external protection of adapters, cable connections, etc. against the effects of weather, roll length: 3 m	RAD-TAPE-SV-19-3	2903182	1

4 Optimum antenna installation



WARNING: Danger to life by electric shock!

Parts of the antenna are electrically conductive. Contact with live cables can lead to death or serious injuries.

- The antenna and the mast must **not** be in the vicinity of live cables during installation or removal.
- If there is risk of lightning strikes: Make sure that the antenna is mounted and grounded by qualified specialist personnel in accordance with generally recognized technical regulations.

Mounting height

- Mount the antenna as high as possible. This allows you to improve the range.
- Make sure there is a line of sight between the antennas. Keep the Fresnel zone clear.



WARNING: Fall hazard

Make sure that the mounting location can be reached safely with the available equipment.

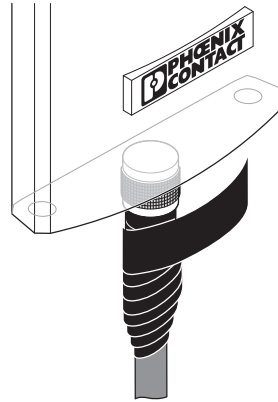
Antenna cables

- Keep the connection between the wireless module and the antenna as short as possible. Every adapter cable will cause higher attenuation.
- Do **not** install cables parallel to power lines or other electrical fields.
- Do **not** bend the cable.
- Provide strain relief for the cable.

Protection of antenna connections

- In outdoor installations, always protect connections on the cables, junctions, and antennas with sealing tape.
 - RAD-TAPE-SV-19-3, 2903182

Figure 1 Sealing tape



Surge protection

- In outdoor installations, use surge protection for coaxial signal interfaces.
 - CN-LAMBDA/4-5.9-BB, 2838490

Mounting

- In the case of insufficient stability, the quality of the antenna alignment can be reduced. When mounting the antenna, also take wind and other outside influences into consideration.

Distance



CAUTION: High frequency

Mount the antenna in such a way that persons will not be within a radius of 30 centimeters during operation.

- Always install omnidirectional antennas a sufficient distance away from obstacles such as masts, buildings, or metal walls.
- Note that there must be a gap of at least 30 centimeters between the antenna and metal parts or surfaces.
- If using several antennas, allow as much distance as possible between the antennas.
 - At least 0.6 meters vertically
 - At least one meter horizontally

Antenna connection

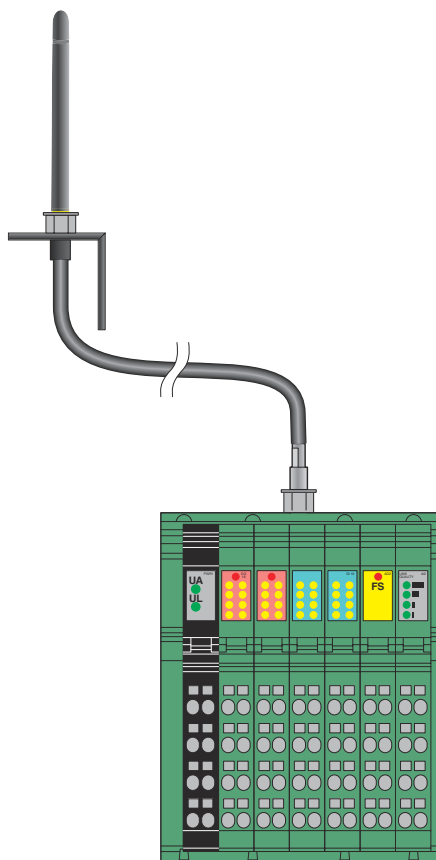
- Connect the antenna cable to the antenna from below.
- If necessary, use a drip loop.

Weather influences

- Snow, rain, or hail only have a small effect on the wireless signal. However, in the case of ice and snow, you must make sure that the antennas are not covered with ice.

5 Installation indoors

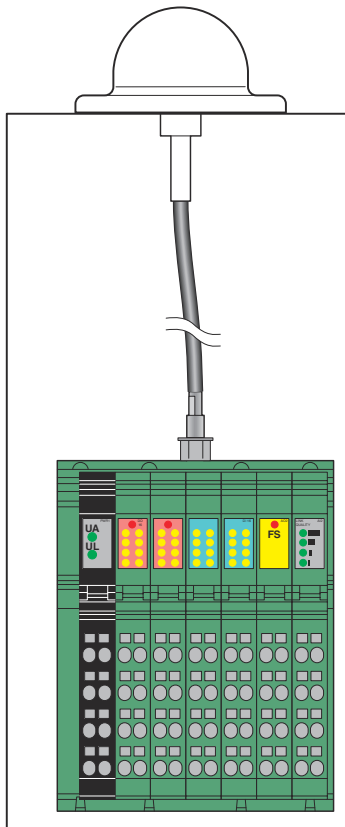
Figure 2 Omnidirectional antenna, 2 dBi



Supplied as standard with the ILB BT ADIO MUX-OMNI

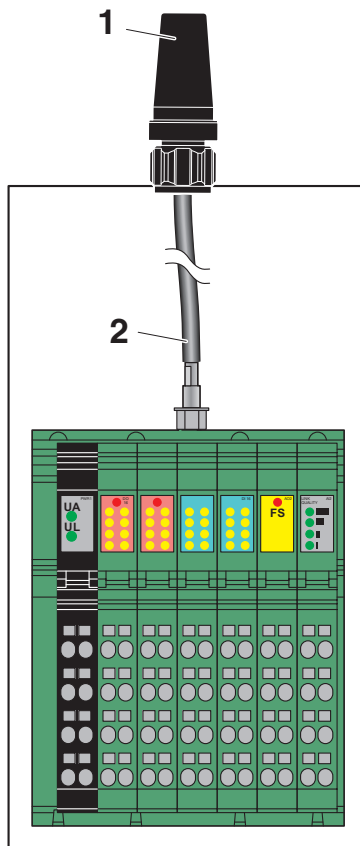
Pos.	Product	Description	Connection	Item No.
	RAD-ISM-2400-ANT-OMNI-2-1-RSMA	Omnidirectional antenna for wall mounting, frequency band: 2.4 GHz, gain: 2 dBi, degree of protection: IP65, incl. 1.5 m connecting cable, mounting bracket, and mounting material	RSMA (male)	2701362

Figure 3 Omnidirectional antenna with protection against vandalism, 3 dBi



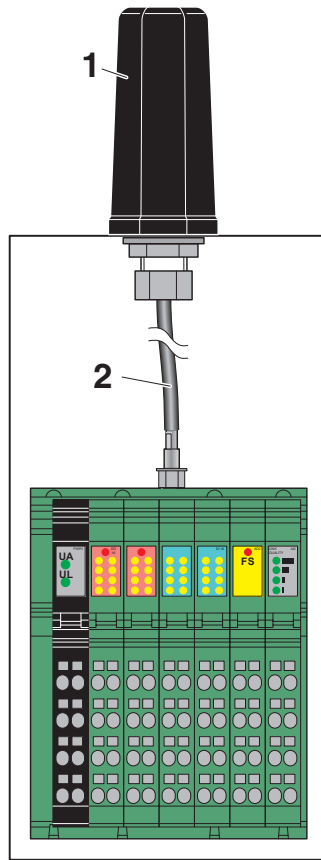
Pos.	Product	Description	Connection	Item No.
	RAD-ISM-2400-ANT-VAN-3-0-RSMA	<p>Omnidirectional antenna with protection against vandalism for control cabinet mounting, frequency band: 2.4 GHz, gain: 3 dBi, degree of protection: IP55, shockproof: IK08, incl. 1.5 m connecting cable</p> <p>Appropriate mounting material is available for wall mounting.</p>	RSMA (male)	2701358

Figure 4 Omnidirectional antenna, 2.5 dBi



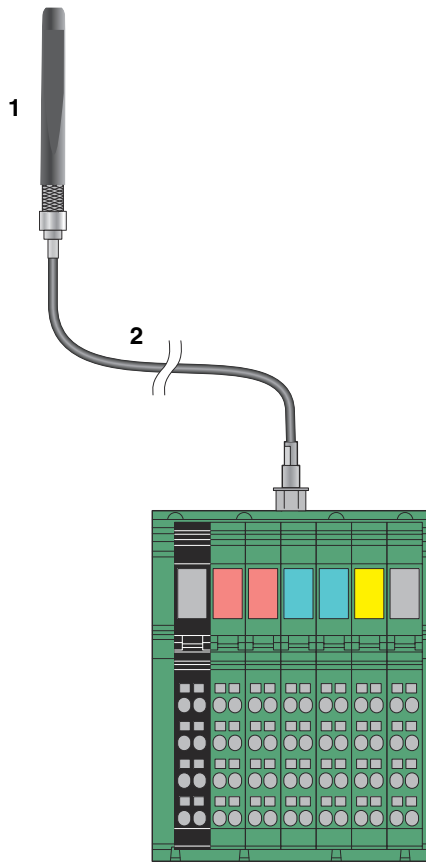
Pos.	Product	Description	Connection	Item No.
1	ANT-OMNI-2459-04	Multiband omnidirectional antenna for freely mobile applications, compact design, frequency band: 2.4 GHz / 5 GHz / 6 GHz, gain: 2.0 dBi / 2.5 dBi / 3.0 dBi, degree of protection: IP68/IP-69K, shock and vibration resistant	N (male)	1284780
2	RAD-PIG-EF316-N-RSMA	Adapter cable, 50 cm pigtail, 50 Ω impedance	N (female) → RSMA (male)	2701402

Figure 5 Multiband omnidirectional antenna with protection against vandalism, 4 dBi



Pos.	Product	Description	Connection	Item No.
1	ANT-OMNI-0671-02	Multiband omnidirectional antenna with protection against vandalism, 617 MHz ... 7125 MHz, gain: 2 dBi ... 4 dBi, polarization: linear, opening angle: h/v 360°/30° ... 55°, degree of protection: IP67, shock resistance: IK10	N (female)	1396318
	Alternatively:			
	RAD-ISM-2459-ANT-FOOD-6-0-N	Omnidirectional antenna with protection against vandalism, 2.4 GHz / 5 GHz, gain: 6 dBi / 8 dBi, polarization: linear, opening angle: h 360°, degree of protection: IP68, resistant to cleaning agents, for control cabinet mounting		2702898
2	RAD-PIG-RSMA/N-0.5	Antenna cable, 0.5 m, 50 Ω impedance	N (male) → RSMA (male)	2903263
	Alternatively:			
	RAD-PIG-RSMA/N-1	Antenna cable, 1 m		2903264
	RAD-PIG-RSMA/N-2	Antenna cable, 2 m		2903265
	RAD-PIG-RSMA/N-3	Antenna cable, 3 m		2903266
	RAD-PIG-RSMA/N-5	Antenna cable, 5 m		2702140

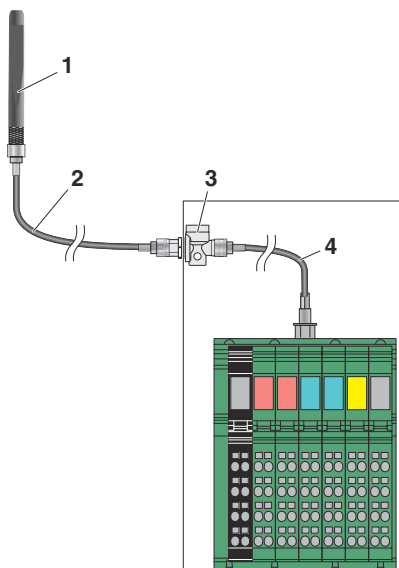
Figure 6 Omnidirectional antenna, 6 dBi



Pos.	Product	Description	Connection	Item No.
1	RAD-ISM-2400-ANT-OMNI-6-0	Omnidirectional antenna for wall or mast mounting, 2.4 GHz, gain: 6 dBi, degree of protection: IP67, salt-water resistant, shock and vibration resistant, incl. mounting bracket and mast clamps, ATEX and IECEx approval	N (female)	2885919
	Alternatively: ANT-OMNI-0671-01	Multiband omnidirectional antenna for wall or mast mounting, 0.6 GHz ... 7.1 GHz, gain: 1 dBi ... 3 dBi, degree of protection: IP67, salt-water resistant, incl. mounting bracket and mast clamps		1396316
2	RAD-PIG-RSMA/N-0.5	Antenna cable, 0.5 m, 50 Ω impedance	N (male) → RSMA (male)	2903263
	Alternatively:			
	RAD-PIG-RSMA/N-1	Antenna cable, 1 m		2903264
	RAD-PIG-RSMA/N-2	Antenna cable, 2 m		2903265
	RAD-PIG-RSMA/N-3	Antenna cable, 3 m		2903266
	RAD-PIG-RSMA/N-5	Antenna cable, 5 m		2702140

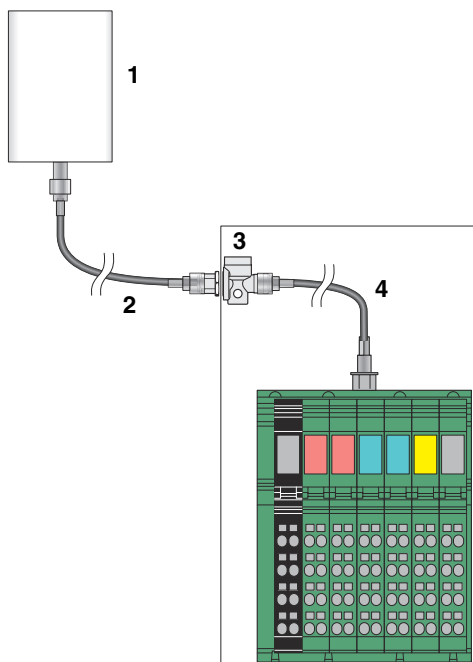
6 Installation outdoors

Figure 7 Omnidirectional antenna, 6 dBi, with surge protection



Pos.	Product	Description	Connection	Item No.
1	RAD-ISM-2400-ANT-OMNI-6-0	Omnidirectional antenna for wall or mast mounting, 2.4 GHz, gain: 6 dBi, degree of protection: IP67, salt-water resistant, shock and vibration resistant, incl. mounting bracket and mast clamps, ATEX and IECEx approval	N (female)	2885919
	Alternatively:			
	ANT-OMNI-0671-01	Multiband omnidirectional antenna for wall or mast mounting, 0.6 GHz ... 7.1 GHz, gain: 1 dBi ... 3 dBi, degree of protection: IP67, salt-water resistant, incl. mounting bracket and mast clamps		1396316
2	RAD-CAB-EF393-3M	Antenna cable, 3 m, 50 Ω impedance	N (male) → N (male)	2867649
	Alternatively:			
	RAD-CAB-EF393-5M	Antenna cable, 5 m		2867652
	RAD-CAB-EF393-10M	Antenna cable, 10 m		2867665
	RAD-CAB-EF393-15M	Antenna cable, 15 m		2885634
3	CN-LAMBDA/4-5.9-BB	Intermediate plug with LAMBDA/4 technology as surge protection for coaxial signal interfaces	N (female) → N (female)	2838490
4	RAD-PIG-RSMA/N-0.5	Antenna cable, 0.5 m, 50 Ω impedance	N (male) → RSMA (male)	2903263
	Alternatively:			
	RAD-PIG-RSMA/N-1	Antenna cable, 1 m		2903264
	RAD-PIG-RSMA/N-2	Antenna cable, 2 m		2903265
	RAD-PIG-RSMA/N-3	Antenna cable, 3 m		2903266
	RAD-PIG-RSMA/N-5	Antenna cable, 5 m		2702140

Figure 8 Directional antenna, 9 dBi, with surge protection



Pos.	Product	Description	Connection	Item No.
1	ANT-DIR-2459-01	Directional antenna for wall or mast mounting, 2.4 GHz / 5 GHz, gain: 9 dBi, degree of protection: IP67, shockproof: IK06, salt-water resistant, incl. mounting bracket and mast clamps, ATEX and IECEx approval	N (female)	2701186
2	RAD-CAB-EF393-3M	Antenna cable, 3 m, 50 Ω impedance	N (male) → N (male)	2867649
	Alternatively:			
	RAD-CAB-EF393-5M	Antenna cable, 5 m		2867652
	RAD-CAB-EF393-10M	Antenna cable, 10 m		2867665
	RAD-CAB-EF393-15M	Antenna cable, 15 m		2885634
3	CN-LAMBDA/4-5.9-BB	Intermediate plug with LAMBDA/4 technology as surge protection for coaxial signal interfaces	N (female) → N (female)	2838490
4	RAD-PIG-RSMA/N-0.5	Antenna cable, 0.5 m, 50 Ω impedance	N (male) → RSMA (male)	2903263
	Alternatively:			
	RAD-PIG-RSMA/N-1	Antenna cable, 1 m		2903264
	RAD-PIG-RSMA/N-2	Antenna cable, 2 m		2903265
	RAD-PIG-RSMA/N-3	Antenna cable, 3 m		2903266
	RAD-PIG-RSMA/N-5	Antenna cable, 5 m		2702140