



Radioline Antenna Accessories

Content

- Concept: New antenna assembly for simple access
- Table: product overview

Examples

- Antennas & Assembly
 - RAD-2400-IFS
 - RAD-900-IFS
 - RAD-900-DAIO6

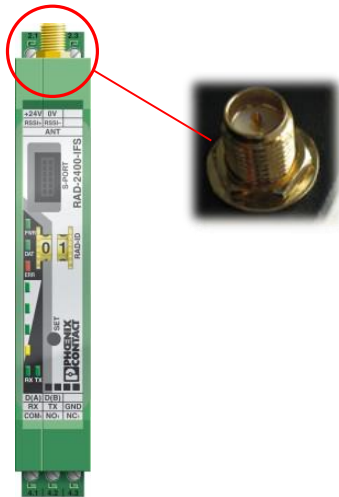
Addendum

- Designing a long distance link
- Antenna installation
- Connectors – technical details



Radioline:

All new Phoenix Contact wireless devices will have the RSMA(F) connector



Wireless Module

RSMA (female) antenna connectors
on all new wireless devices



Antenna- Cable

One cable type (RSMA male – N male) in different
length (0.5...5 m)

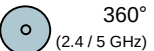
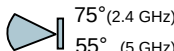
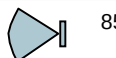


Antenna

N (female) connector on antenna

Antennas & Cables for Radioline 2.4 GHz

overview 1/2

Article	RAD-ISM-2400- ANT-OMNI-2-1- RSMA	RAD-ISM-2400- ANT-VAN-3-0-RSMA	ANT-OMNI-2459- 02	RAD-ISM-2400- ANT-OMNI-6-0	RAD-ISM-2459-ANT- FOOD-6-0-N		ANT-DIR-2459-01
Order No.	2701362	2701358	2701408	2885919	2702898		2701186
Picture							
Frequency	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz		2.4 GHz
Gain	2 dBi	3 dBi	2.5 dBi	6 dBi	>3 dBi		9 dBi
Polarization	vertical	vertical	vertical	vertical	vertical		vertical
HPBW horizontal	 360°	 360°	 360° (2.4 / 5 GHz)	 360°	 360°		 75° (2.4 GHz) 55° (5 GHz)
HPBW vertical	 75°	 85°	 30°	 30°	 30°		 55° (2.4 GHz) 55° (5 GHz)
Connector	RSMA (m)	RSMA (m)	N (m)	N (f)	N (f)		N (f)
Protection class	IP 65	IP 55	IP 68	IP 65	IP 68		IP 67
Temperature range	-20...+65°C	-40...+80 °C	-40...+70°C	-40...+75°C	-40...+80°C		-40...+80°C
dimensions	82,5x7,8 mm	86 x 43 mm	180 x 23 mm	250 x 22 mm	92 x 52 mm		80x101x35 mm
	incl. fixed cable 1,5m	fixed cable 1,5m	mount on switching cabinet, use cable No. 2701402	wall & mast mount	No cable included. Recommended cable, 2903263		wall & mast mount

HPBW = Half Power Band Width = opening angle

Antennas & Cables for Radioline 2.4 GHz

overview 2/2

Article	RAD-PIG-RSMA/N-x	CN-UB-70DC-6-BB	RAD-CAB-PFP**
Order No.	290326 3 /4 /5 /6	2803166	5606124 /5 /6
Picture			
Frequency	up to 5 GHz	up to 6 GHz	up to 6 GHz
Gain	-1.2 dB/m @ 5 GHz	-	-7.6, -3.9, -3.13 dB per 100 ft
Polarization	-	-	-
HPBW horizontal	-	-	-
HPBW vertical	-	-	-
Connector	RSMA (m)- N (m)	N (f) – N (f)	N (m) – N (m)
Protection class	-	IP 68	-
Temperature range	-40...+85°C	-40...90°C	-40...105°C
dimensions	0,5 or 1 or 2 or 3 m	24 x 24 x 47 mm	10, 20 and 25 ft
	Cable between Wireless module & Antenna or surge arrester	Antenna surge suppression	Antenna cables,

HPBW = Half Power Band Width = opening angle

Various antennas for different applications – all using the same connector

Omni 2.4 / 5 GHz
No. 2702898



N (f)

Omni 2.4 GHz
No. 2885919



N (f)

Directional 2.4 / 5 GHz
No. 2701186



N (f)

N (m)



RSMA (m)

RSMA (f)



RAD-PIG-RSMA/N-x

RAD-PIG-RSMA/N-0.5	No. 2903263	length 0.5 m
RAD-PIG-RSMA/N-1	No. 2903264	length 1 m
RAD-PIG-RSMA/N-1	No. 2903265	length 2 m
RAD-PIG-RSMA/N-3	No. 2903266	length 3 m



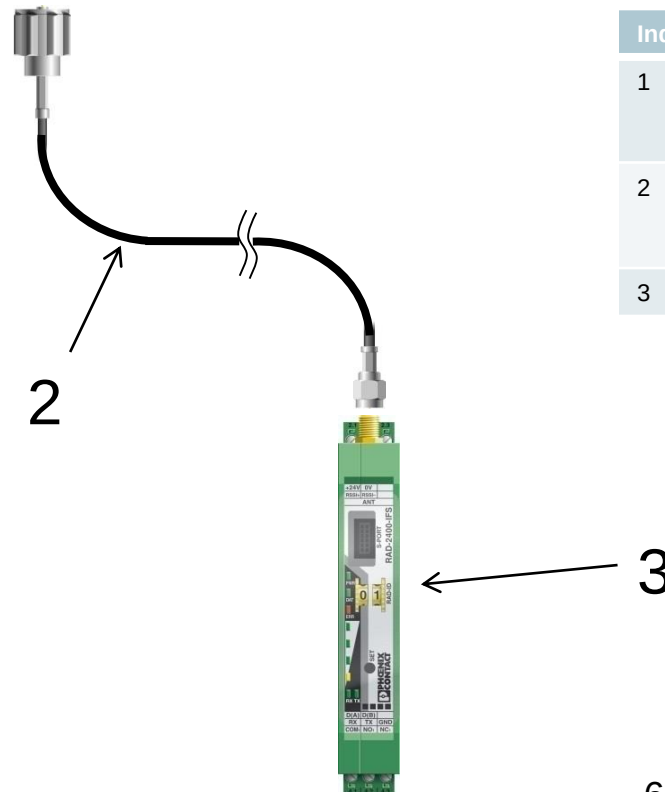
One cable type connects Radioline to all this antennas

Antenna for omnidirectional radiation with improved gain



Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2885919	RAD-ISM-2400-ANT-OMNI-6-0	Omnidirectional antenna with 6 dBi gain 2.4 GHz N(f)	1
2	2903263/4/5/6	RAD-PIG-RSMA/N-0.5/1/2/3	N(m) to RSMA(m) antenna cable 0.5/1/2/3 m	1
3	2901541	RAD-2400-IFS	Radioline 2.4 GHz	1

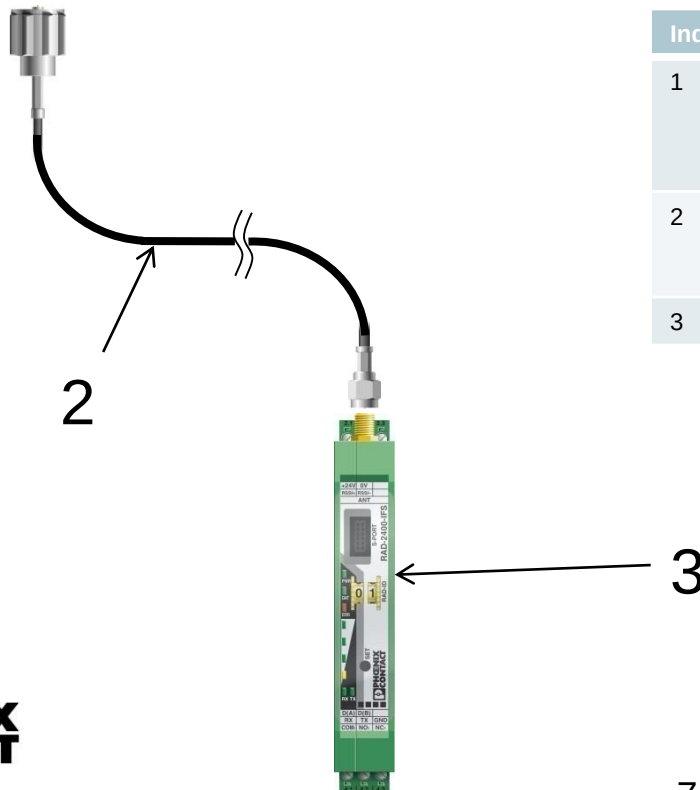


Antenna for directional radiation with improved gain

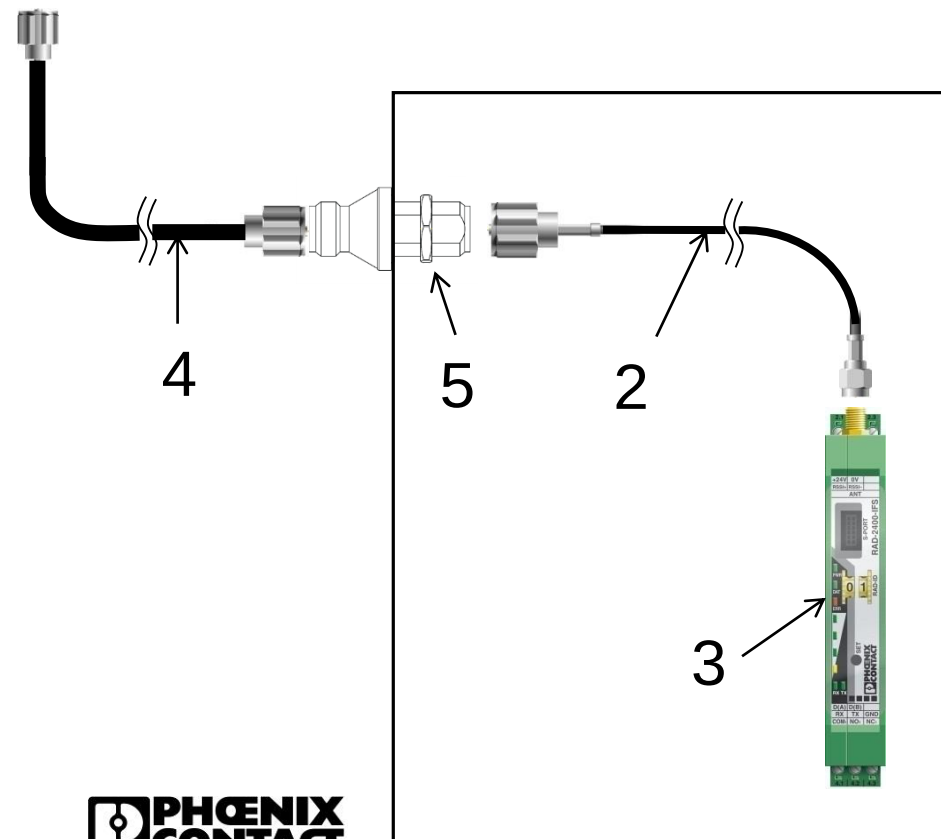


Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2701186	ANT-DIR-2459-01	Panel directional antenna with 9 dBi gain 2.4 GHz IP67 N(f)	1
2	2903263/4/5/6	RAD-PIG-RSMA/N-0.5/1/2/3	N(m) to RSMA(m) antenna cable 0.5/1/2/3 m	1
3	2901541	RAD-2400-IFS	Radioline 2.4 GHz	1



Antenna for directional radiation prolonged cable with surge protection

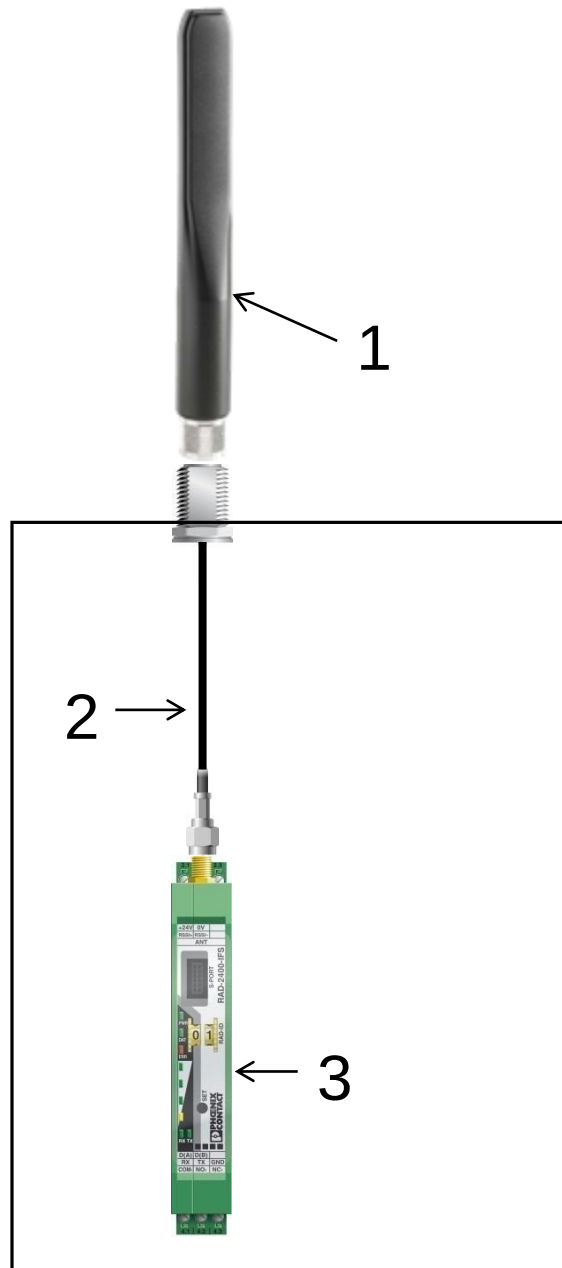


mounting inside switching cabinet

Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2701186	ANT-DIR-2459-01	Panel Directional antenna with 9 dBi gain 2.4 GHz IP67 N(f)	1
2	2903263/4/5/6	RAD-PIG-RSMA/N-0.5/1/2/3	N(m) to RSMA(m) antenna cable 0.5/1/2/3 m	1
3	2901541	RAD-2400-IFS	Radioline 2.4 GHz	1
4	5606124 5606125 5606126	RAD-CAB-PFP**	N(m) to N(m) antenna cable 10, 20, 25 ft	1
5	2803166	CN-UB-70DC-6-BB	Coaxial surge protection	1

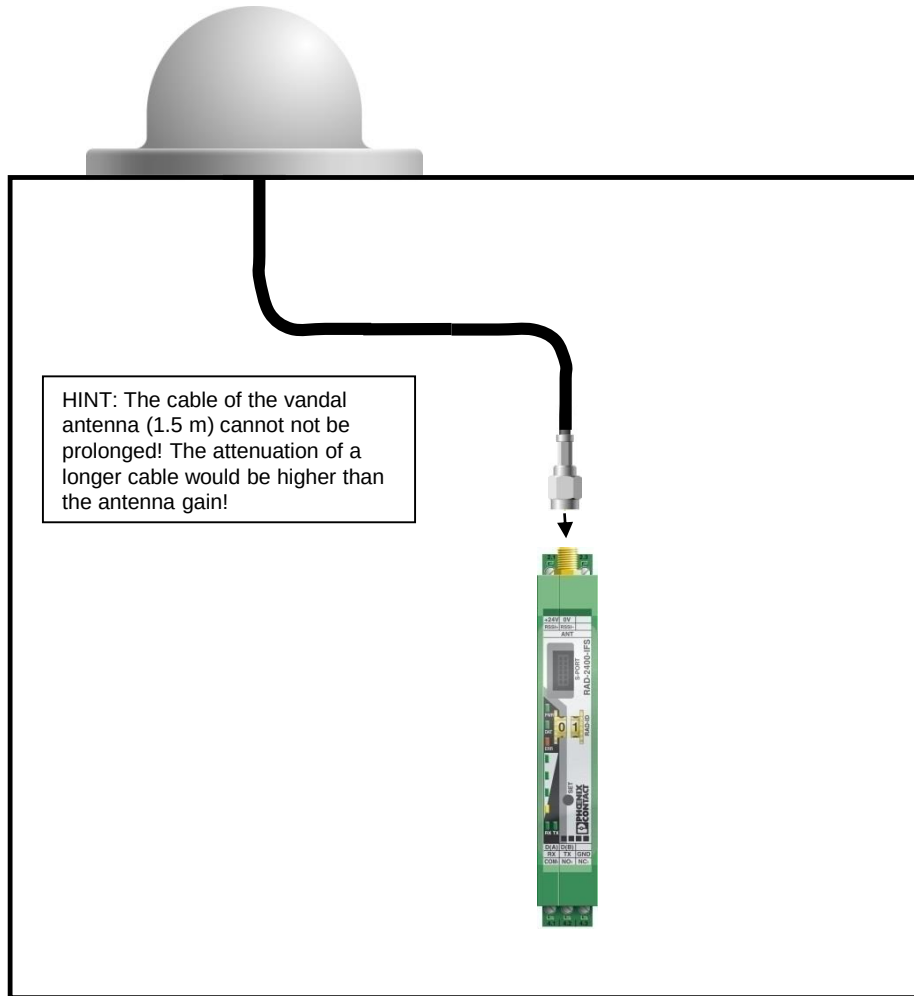
Mounting the RAD-2400-IFS inside a standard switching cabinet



Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2701408	ANT-OMNI-2459-02	Omnidirectional antenna with 2.5 dBi gain, 2.4 GHz, IP68, N(m)	1
2	2701402	RAD-PIG-EF316-N-RSMA	N(f) to RSMA(m) antenna cable (bulkhead)	1
3	2901541	RAD-2400-IFS	Radioline 2.4 GHz	1

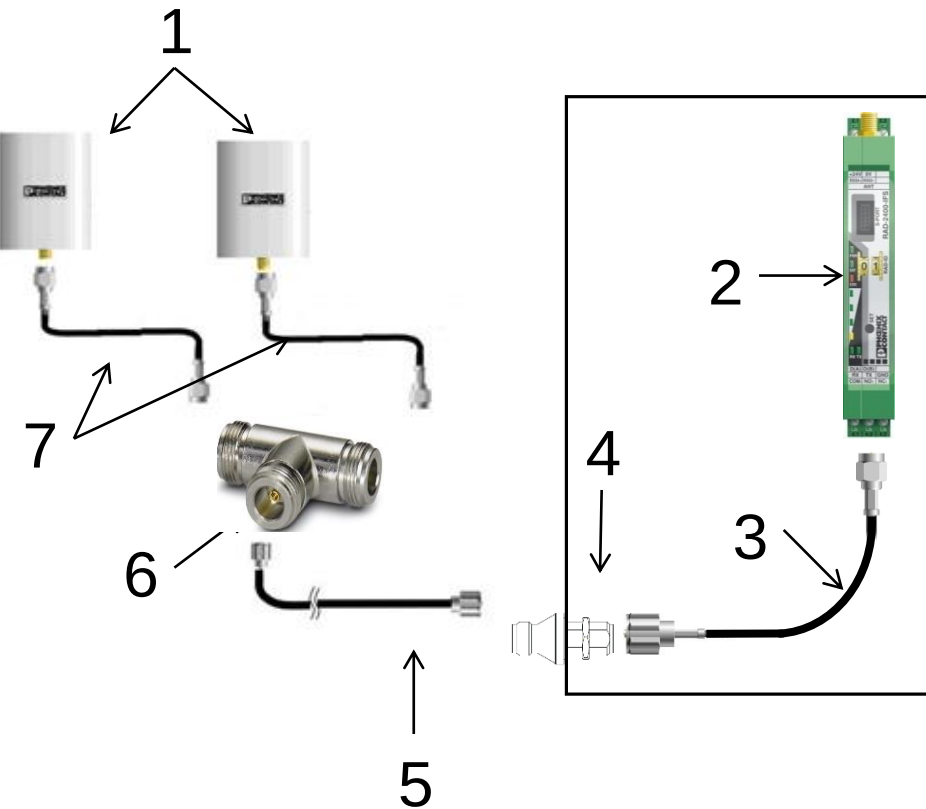
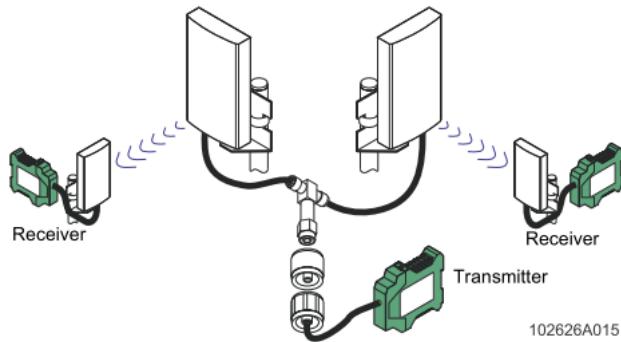
Antenna for omnidirectional radiation with standard gain and vandal proof design



Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2701358	RAD-ISM-2400-ANT-VAN-3-0-RSMA	Omnidirectional antenna with 3 dBi gain 2.4 GHz RSMA(m) IP55	1
2	2901541	RAD-2400-IFS	Radioline 2.4 GHz	1

Antenna splitter sets for repeater applications



Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2701186	ANT-DIR-2459-01	Panel directional antenna with 9 dBi gain 2.4/5GHz N(f)	2
2	2901541	RAD-2400-IFS	Radioline 2.4 GHz	1
3	2903263/4/5/6	RAD-PIG-RSMA/N-0.5/1/2/3	Antenna cable N(m) to RSMA(m) 0.5/1/2/3 m	1
4	2803166	CN-UB-70DC-6-BB	Coaxial surge protection	1
5	5606124 5606125 5606126	RAD-CAB-PFP**	N(m) to N(m) antenna cable 10, 20, 25 ft	1
6	2702293	RAD-SPL-2-N/N	Antenna splitter: 3 N(F)	1
7	5606124 5606125 5606126	RAD-CAB-PFP**	N(m) to N(m) antenna cable 10, 20, 25 ft	2

Can the classic antenna portfolio still be used ?

Yes !

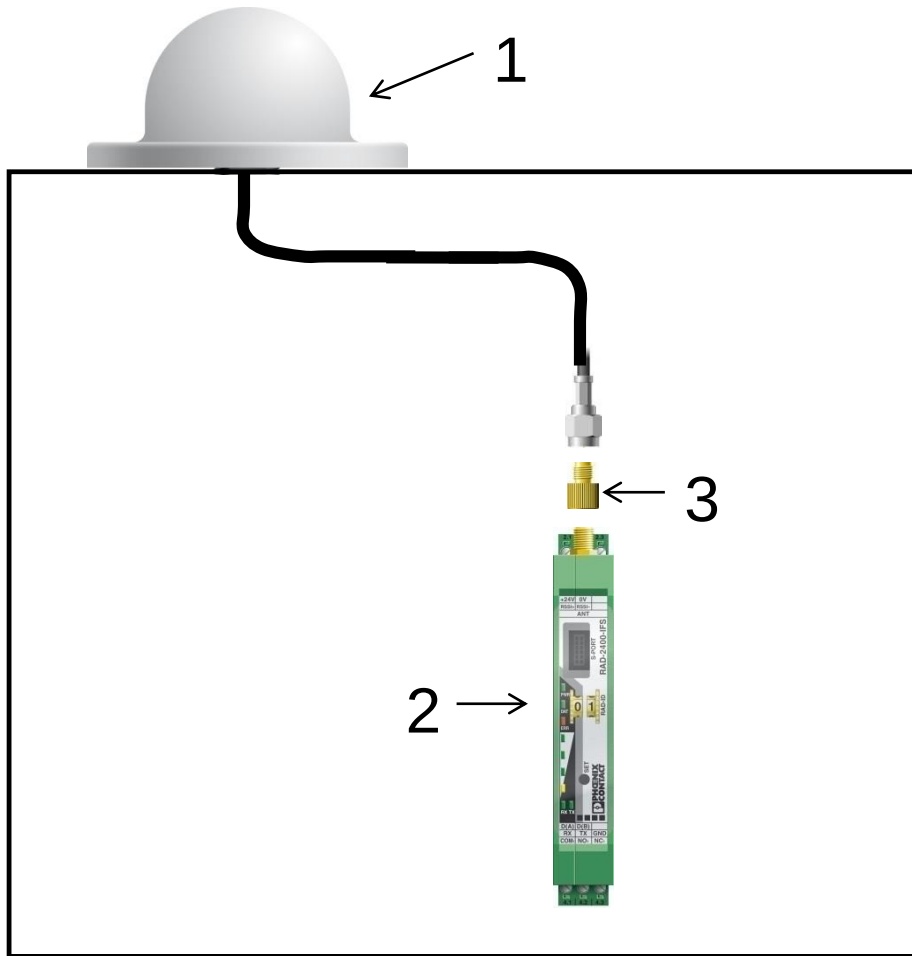
- choose the antenna for the wanted frequency band

2.4 GHz

- use one antenna cable adapter to change from RSMA to SMA



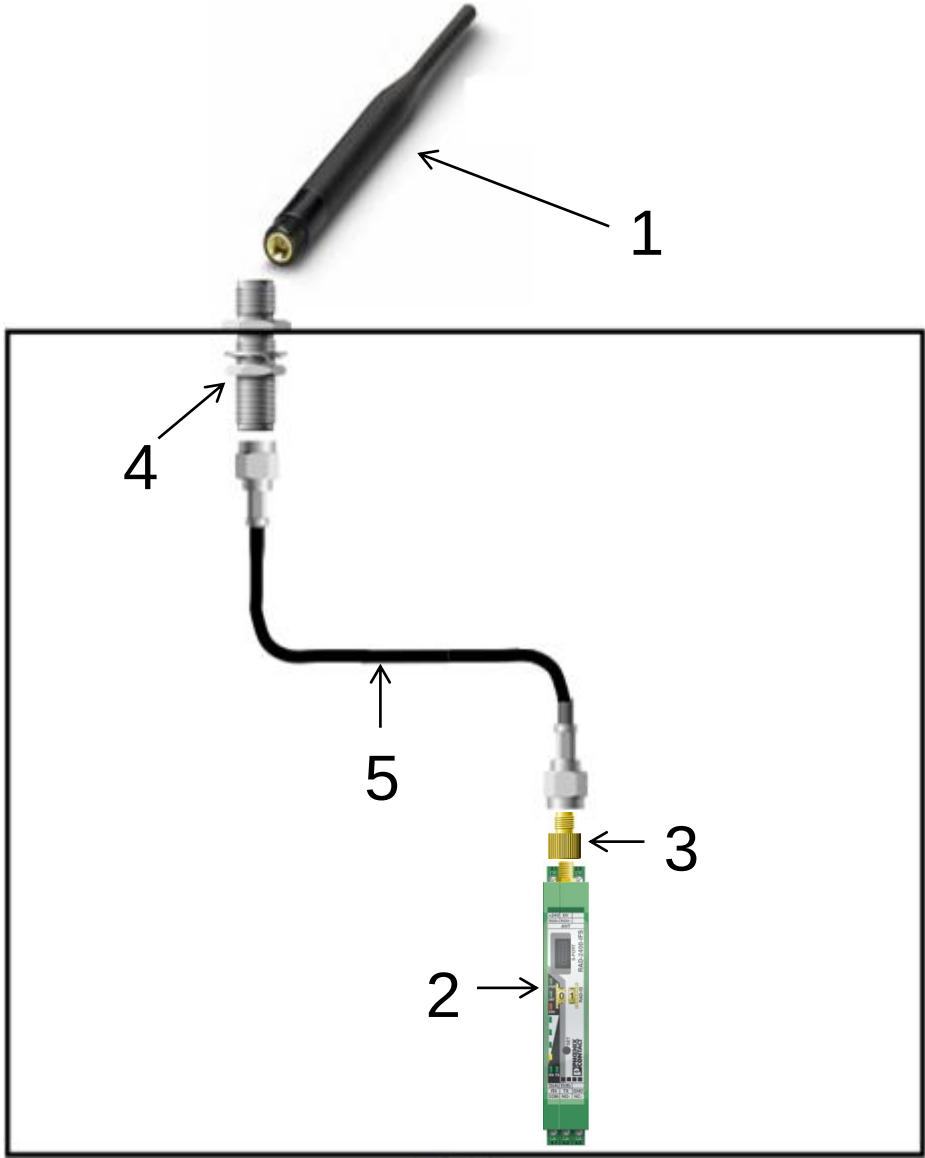
Vandal proof omnidirectional antenna mounted on switching cabinet or mobile device



Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2885867	RAD-ISM-2400-ANT-VAN-3-0-SMA	Omnidirectional antenna with 3 dBi gain 2.4 GHz SMA(m) IP55	1
2	2901541	RAD-2400-IFS	Radioline 2.4 GHz	1
3	2884538	RAD-ADP-RSMA/F-SMA/F	Adapter for RSMA(f) to SMA(f)	1

**5 dBi omnidirectional antenna
in enclosure with SMA Female to
SMA Female bulkhead adaptor**



Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2884923	RAD-ISM-2400-ANT-OMNI-5-0	Omnidirectional antenna with 5 dBi gain 2.4 GHz SMA(m) IP55	1
2	2901541	RAD-2400-IFS	Radioline 2.4 GHz	1
3	2884538	RAD-ADP-RSMA/F-SMA/F	Adapter for RSMA(f) to SMA(f)	1
4	2884541	RAD-ADP-SAM/F-SMA/F	Adapter for SMA(F) to SMA(f)	1
5	2885618	RAD-PIG-EF-316-SMA/M-SMA/M	Antenna cable SMA(m) to SMA(m) 0.5M	1

Vandal proof omnidirectional antenna to be mounted on switching cabinet or mobile device: IP68 for food and beverage

1 →



N(m)



RSMA(m)

3 ←

RSMA(f)



2 →

Antenna gain :

6 dBi @ 2.4 GHz (on metal surface)
3 dBi @ 2.4 GHz (without metal surface)

Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2702898	RAD-ISM-2459-ANT-FOOD-6-0-N	Omnidirectional antenna with 6 dBi gain 2.4 GHz N(F) IP68	1
2	2901541	RAD-2400-IFS	Radioline 2.4 GHz	1
3	2903263	RAD-ADP-RSMA/F-SMA/F	Adapter for RSMA(f) to SMA(f)	1

Antennas & Cables for Radioline 900 MHz

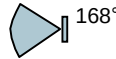
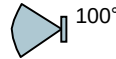
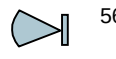
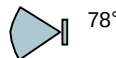
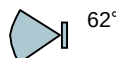
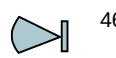
overview 1/2

Article	RAD-900-ANT-OMNI-2-2-RSMA	RAD-900-ANT-OMNI-2-N	RAD-ISM-900-ANT-OMNI-RPSMA	RAD-ISM-900-ANT-OMNI-0-N	RAD-ISM-900-ANT-OMNI-FG-3-N	RAD-ISM-900-ANT-OMNI-FG-6-N	RAD-ISM-900-ANT-OMNI-5
Order No.	2904801	2904802	2885676	5604160	2867791	2885579	2867199
Picture							
Frequency	900 MHz	900 MHz	900 MHz	900 MHz	902-928 MHz	900 MHz	900 MHz
Gain	2.15 dBi	2.15 dBi	2 dBi	2.15 dBi	5.15 dBi	8dBi	7 dBi
Polarization	vertical	vertical	vertical	vertical	vertical	vertical	vertical
HPBW horizontal	 360°	 360°	 360°	 360°	 360°	 360°	 360°
HPBW vertical	 78°	 78°	 78°	 78°	 28°	 15°	 30°
Connector	RSMA (m)	N (f)	RPSMA (m)	N (f)	N (f)	N(f)	N (f)
Protection class	IP 65	IP 66	IP 55	IP 65	IP 65	IP 65	IP 65
Temperature range	-40...+75°C	-40...+70°C	-20...+65°C	-40...+75°C	-40...+80°C	-40...+80°C	-40...+80°C
dimensions	89 x 12 mm	89 x 38 mm	203 x 13 mm	89 x 3 mm	1120 x 60 mm	1800 x 60 mm	610 x 3 mm
	Fixed cable 6m	Mounts on switching cabinet	Direct mount on radio	Fixed cable 76 mm	Fiber glass with wall mount kit	Fiber glass with wall mount kit	wall & mast mount

HPBW = Half Power Band Width =opening angle

Antennas & Cables for Radioline 900 MHz

overview 2/2

Article	RAD-ISM-900-ANT-YAGI-3-N	RAD-ISM-ANT-YAGI-6.5-N	RAD-ISM-900-ANT-YAGI-10-N		RAD-PIG-RSMA/N-x	CN-UB-70DC-6-BB	RAD-CAB-PFP**
Order No.	2867801	2867814	5606614		290326 3 / 4 / 5 / 6	2803166/2803153	5606124 / 5 / 6
Picture							
Frequency	900 MHz	900 MHz	900 MHz		up to 5 GHz	up to 6 GHz	up to 6 GHz
Gain	5 dBi	8.5 dBi	12.15 dBi		-1.2 dB/m @ 5 GHz	-	-7.6, -3.9, -3.13 dB per 100 ft
Polarization	vertical	vertical	vertical		-	-	-
HPBW horizontal	 168°	 100°	 56°		-	-	-
HPBW vertical	 78°	 62°	 46°		-	-	-
Connector	N (f)	N (f)	N(f)		RSMA (m) – N (m)	N (f) – N (f)/N (m) – N (f)	N (m) – N (m)
Protection class	IP 65	IP 65	IP 65		-	IP 68	-
Temperature range	-40...+80°C	-40...+80°C	-40...+70°C		-40...+85°C	-40...+90°C	-40...105°C
dimensions	170 x 60 mm	170 x 60 mm	172 x 60.5 mm		0,5 or 1 or 2 or 3 m	24 x 24 x 47 mm	10, 20 and 25 ft
	Yagi directional antenna	Yagi directional antenna	Yagi directional antenna		Cable between Wireless module & Antenna or surge arrester	Antenna surge suppression	Antenna cables, More lengths available

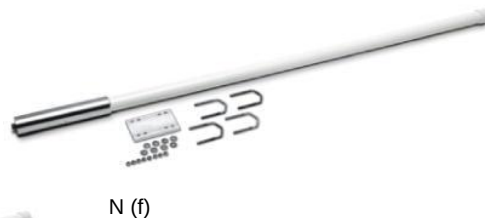
HPBW = Half Power Band Width = opening angle

Various antennas for different applications – all using the same connector (900 MHz)

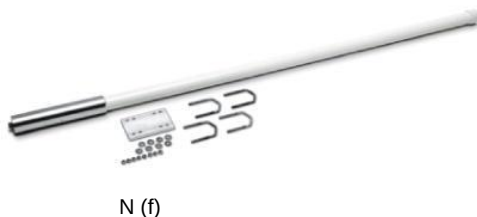
RAD-ISM-900-ANT-OMNI-5
No. 2867199



RAD-ISM-900-ANT-OMNI-FG-3-N
No. 2867791



RAD-ISM-900-ANT-OMNI-FG-6-N
No. 2885579



RAD-ISM-900-ANT-YAGI-3-N
No. 2867801



N (m)

RSMA (m)

RSMA (f)

RAD-PIG-RSMA/N-x

RAD-PIG-RSMA/N-0.5	No. 2903263	length 0.5 m
RAD-PIG-RSMA/N-1	No. 2903264	length 1 m
RAD-PIG-RSMA/N-1	No. 2903265	length 2 m
RAD-PIG-RSMA/N-3	No. 2903266	length 3 m

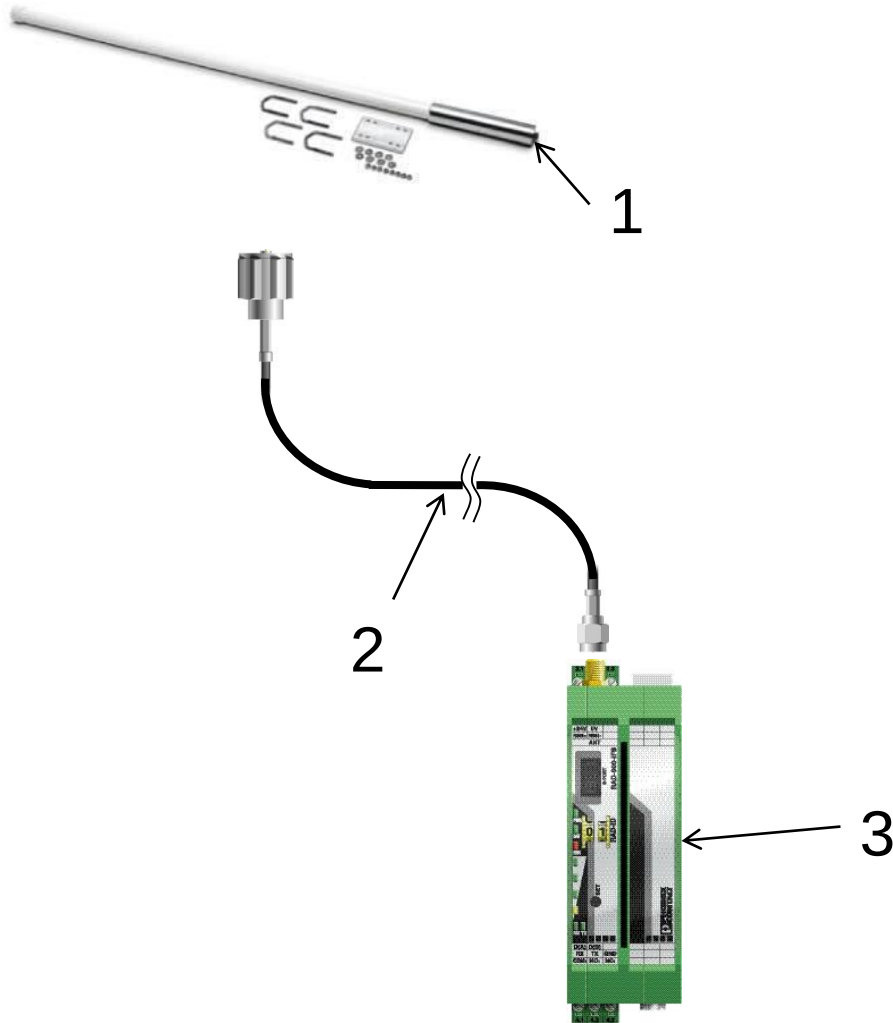


One cable type connects Radioline to all this antennas

RAD-900-IFS
Art. No. 2901540



Antenna for omnidirectional radiation with improved gain (5 dBi)



Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2867791	RAD-ISM-900-ANT-OMNI-FG-3-N	Omni Directional antenna with 5 dBi gain 900 MHz N(f)	1
2	2903263/4/5/6	RAD-PIG-RSMA/N-0.5/1/2/3	N(m) to RSMA(m) antenna cable 0.5/1/2/3 m	1
3	2901540	RAD-900-IFS	Radioline 900 MHz	1

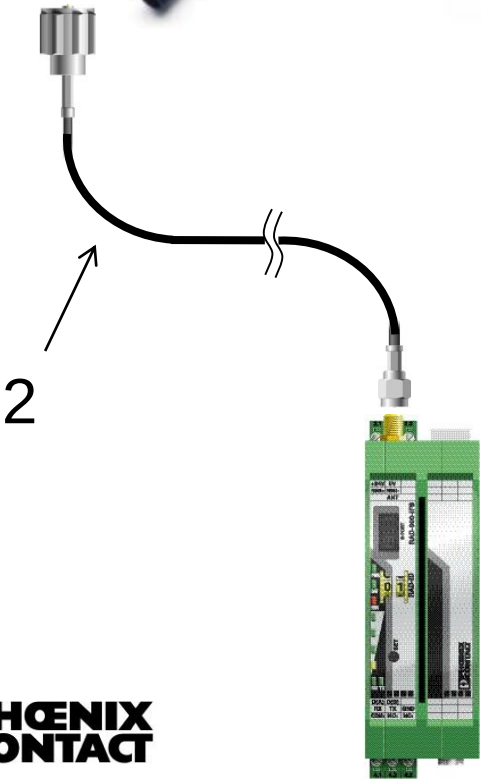
Antenna for directional radiation with improved gain (8.5 dBi)



1

Bill of Materials

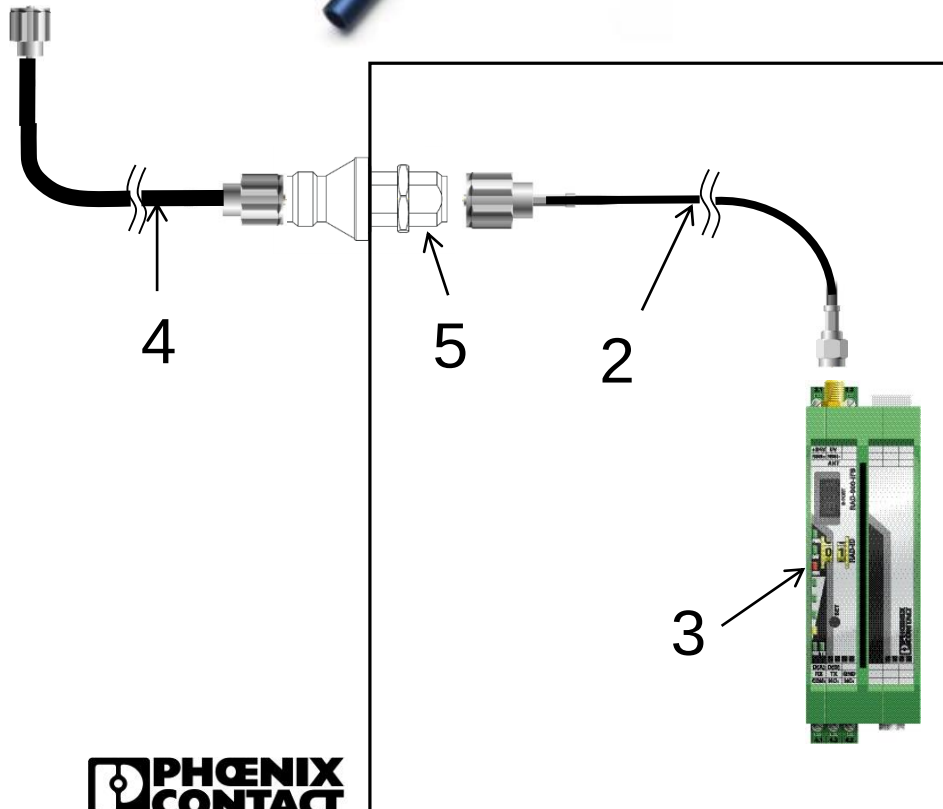
Index	Part #	Part Name	Description	Qty
1	2867814	RAD-ISM-900-ANT-YAGI-6.5-N	Yagi Directional antenna with 8.5 dBi gain 900 MHz N(f)	1
2	2903263/4/5/6	RAD-PIG-RSMA/N-0.5/1/2/3	N(m) to RSMA(m) antenna cable 0.5/1/2/3 m	1
3	2901540	RAD-900-IFS	Radioline 900 MHz	1



2

3

Antenna for directional radiation prolonged cable with surge protection

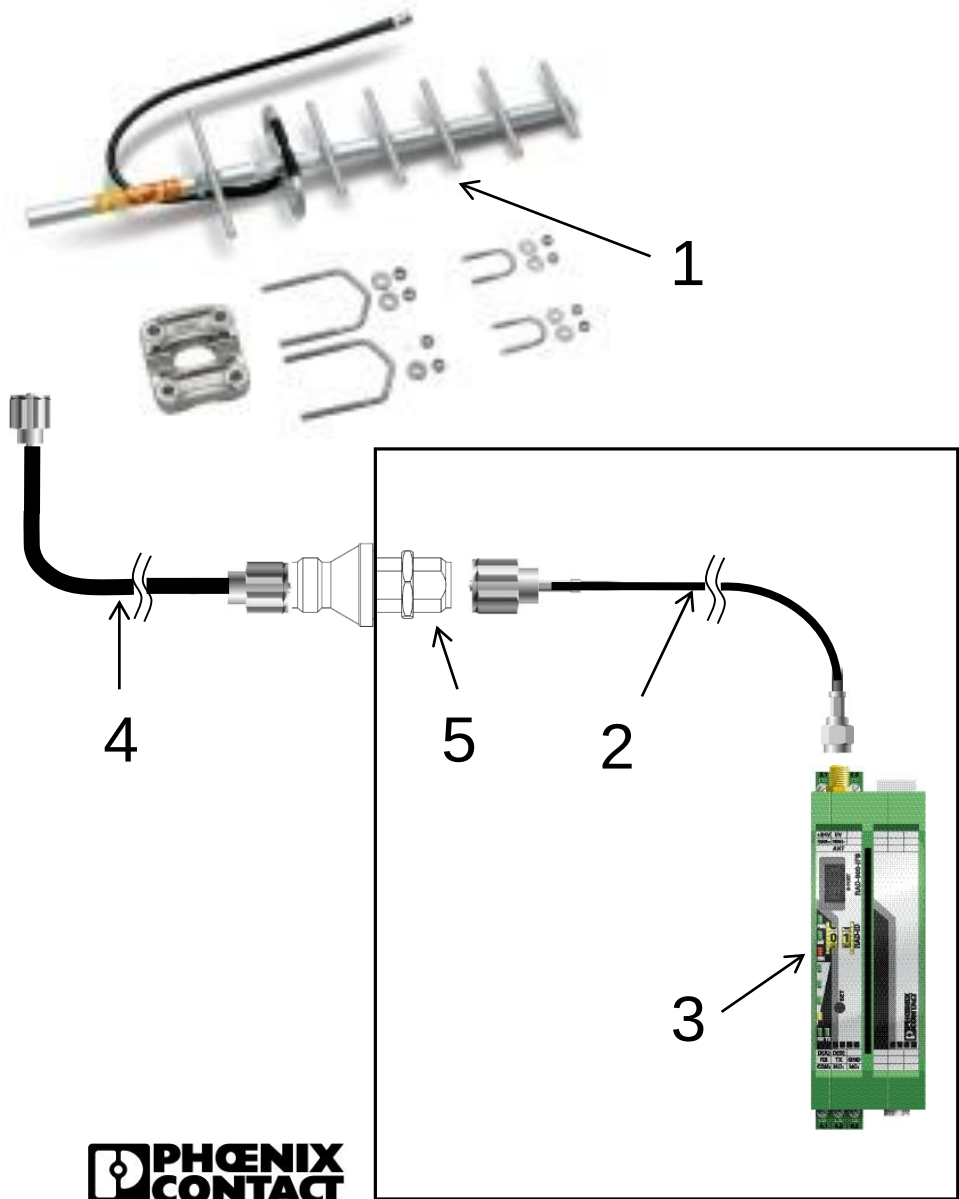


mounting inside switching cabinet

Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2867814	RAD-ISM-900-ANT-YAGI-6.5-N	Yagi Directional antenna with 8.5 dBi gain 900 MHz N(f)	1
2	2903263/4/5/6	RAD-PIG-RSMA/N-0.5/1/2/3	N(m) to RSMA(m) antenna cable 0.5/1/2/3 m	1
3	2901540	RAD-900-IFS	Radioline 900 MHz	1
4	5606124 5606125 5606126	RAD-CAB-PFP**	N(m) to N(m) antenna cable 10, 20, 25 ft	1
5	2803166	CN-UB-70DC-6-BB	Coaxial surge protection	1

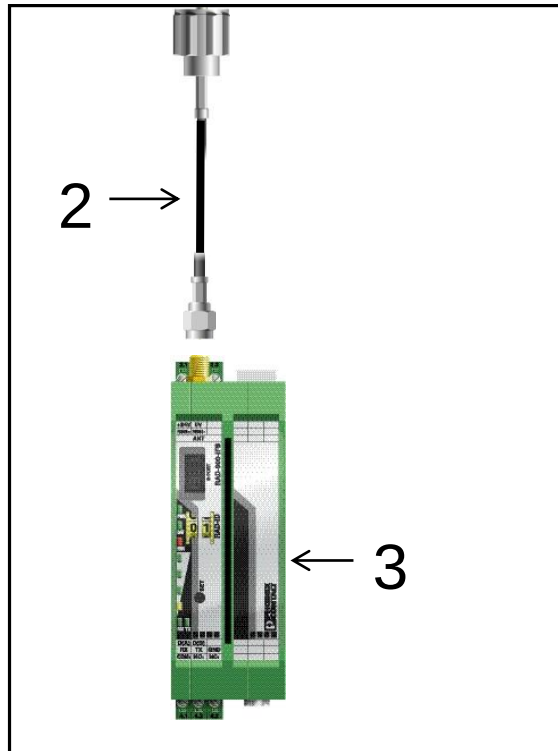
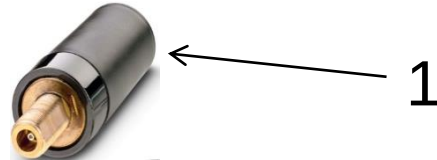
Antenna for directional long distance Communication



Bill of Materials

Index	Part #	Part Name	Description	Qty
1	5606614	RAD-ISM-900-ANT-YAGI-10-N	Yagi directional antenna with 12.15 dBi gain 900 MHz N(f)	1
2	2903263/4/5/6	RAD-PIG-RSMA/N-0.5/1/2/3	N(m) to RSMA(m) antenna cable 0.5/1/2/3 m	1
3	2901540	RAD-900-IFS	Radioline 900 MHz	1
4	5606124 5606125 5606126	RAD-CAB-PFP**	N(m) to N(m) antenna cable 10, 20, 25 ft	1
5	2803166	CN-UB-70DC-6-BB	Coaxial surge protection	1

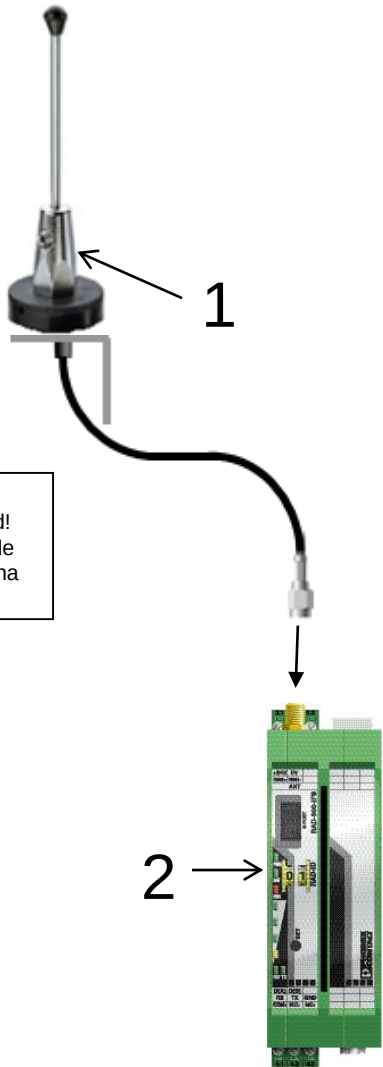
Mounting the RAD-900-IFS inside a standard switching cabinet



Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2904802	RAD-900-ANT-OMNI-2-N	Omni directional antenna with 2 dBi gain 900 MHz N(f)	1
2	2903263/4/5/6	RAD-PIG-RSMA/N-0.5/1/2/3	N(m) to RSMA(m) antenna cable	1
3	2901540	RAD-900-IFS	Radioline 900 MHz	1

Mounting the omni-directional antenna everywhere with a mounting bracket

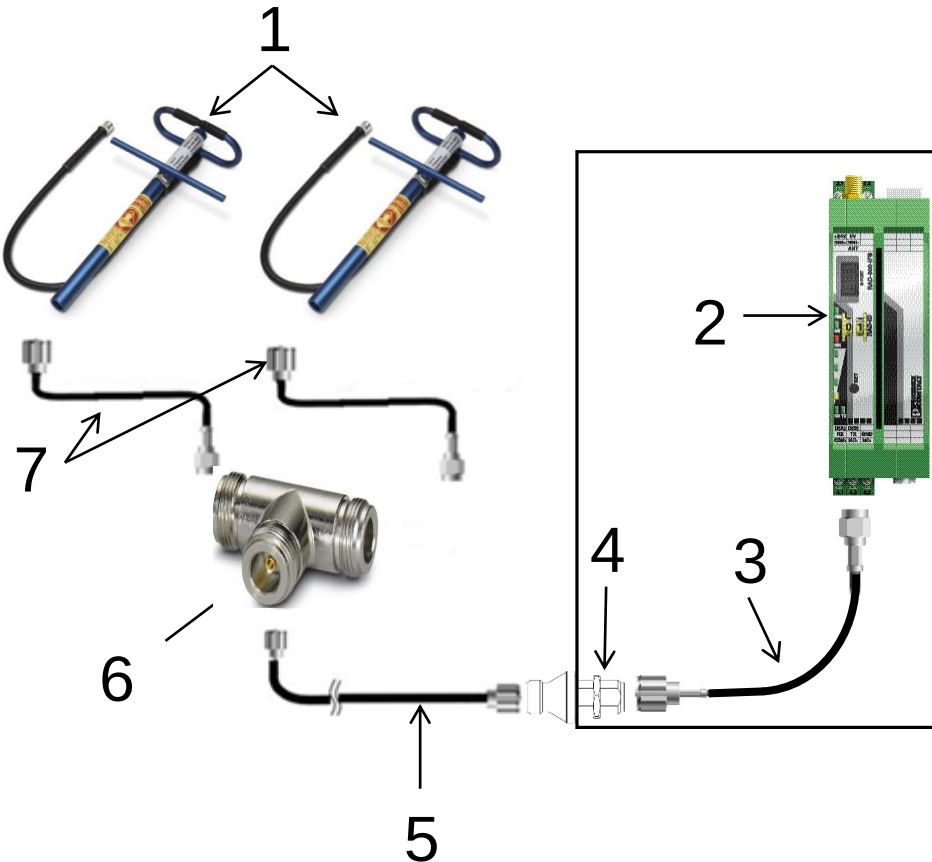
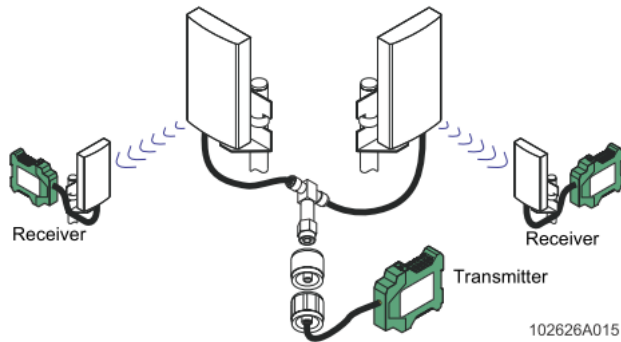


HINT: The cable of the antenna (1.5 m) cannot not be prolonged! The attenuation of a longer cable would be higher than the antenna gain!

Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2904801	RAD-900-ANT-OMNI-2-2-RSMA	Omni directional antenna with 2 dBi gain 900 MHz RSMA(m) IP65	1
2	2901540	RAD-900-IFS	Radioline 900 MHz	1

Antenna splitter sets for repeater applications



Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2867814	RAD-ISM-900-ANT-YAGI-3-N	Yagi directional antenna with 5 dBi gain 900 MHz N(f) IP65	2
2	2901540	RAD-900-IFS	Radioline 900 MHz	1
3	2903263/4/5/6	RAD-PIG-RSMA/N-0.5/1/2/3	Antenna cable N(m) to RSMA(m) 0.5/1/2/3 m	1
4	2803166	CN-UB-70DC-6-BB	Coaxial surge protection	1
5	5606124 5606125 5606126	RAD-CAB-PFP**	N(m) to N(m) antenna cable 10, 20, 25 ft	1
6	2702293	RAD-SPL-2-N/N	Antenna splitter: 3 N(F)	1
7	5606124 5606125 5606126	RAD-CAB-PFP**	N(m) to N(m) antenna cable 10, 20, 25 ft	2

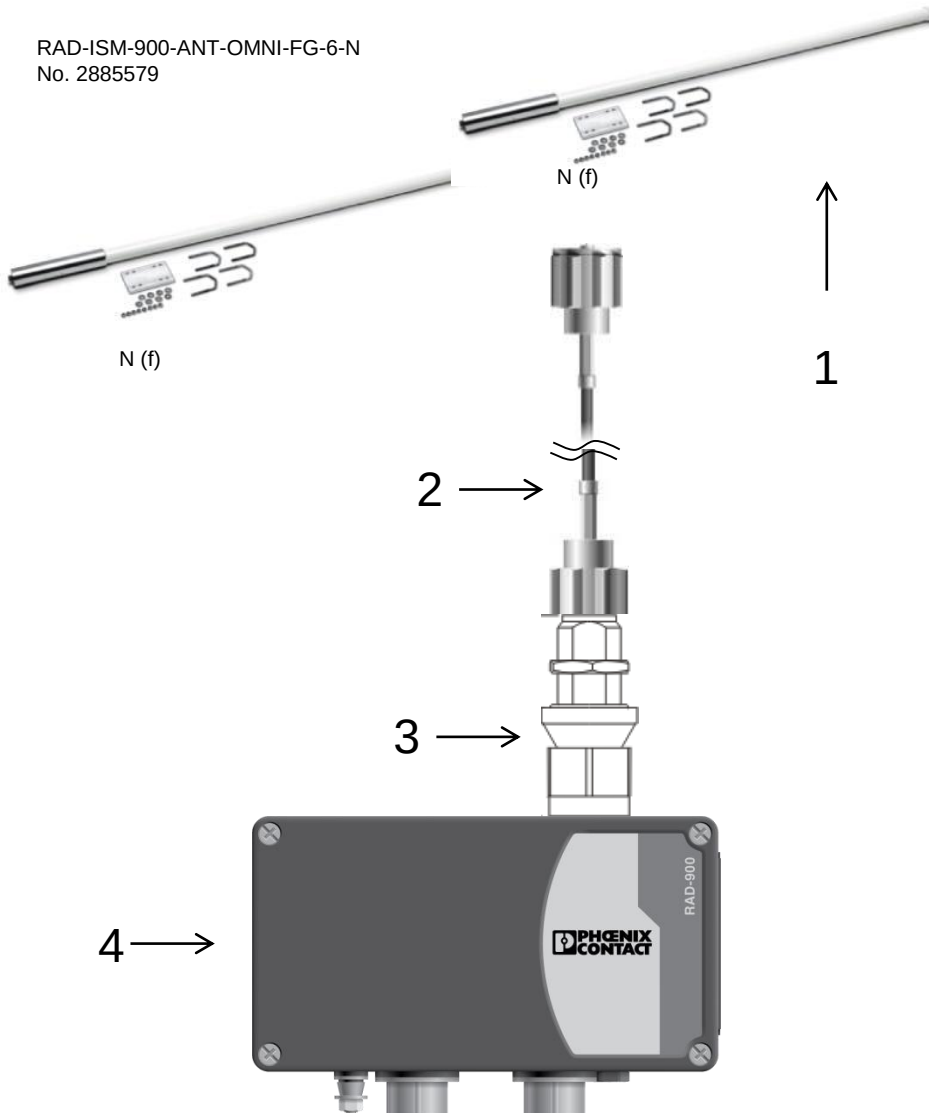
RAD-ISM-900-ANT-OMNI-FG-3-N
No. 2867791

RAD-ISM-900-ANT-OMNI-FG-6-N
No. 2885579

RAD-ISM-900-ANT-OMNI-5
No. 2867199

Various antennas for different applications – all using the same connector (900 MHz)

RAD-ISM-900-ANT-YAGI-3-N
No. 2867801



RAD-900-DAIO6
Art. No. 2702877

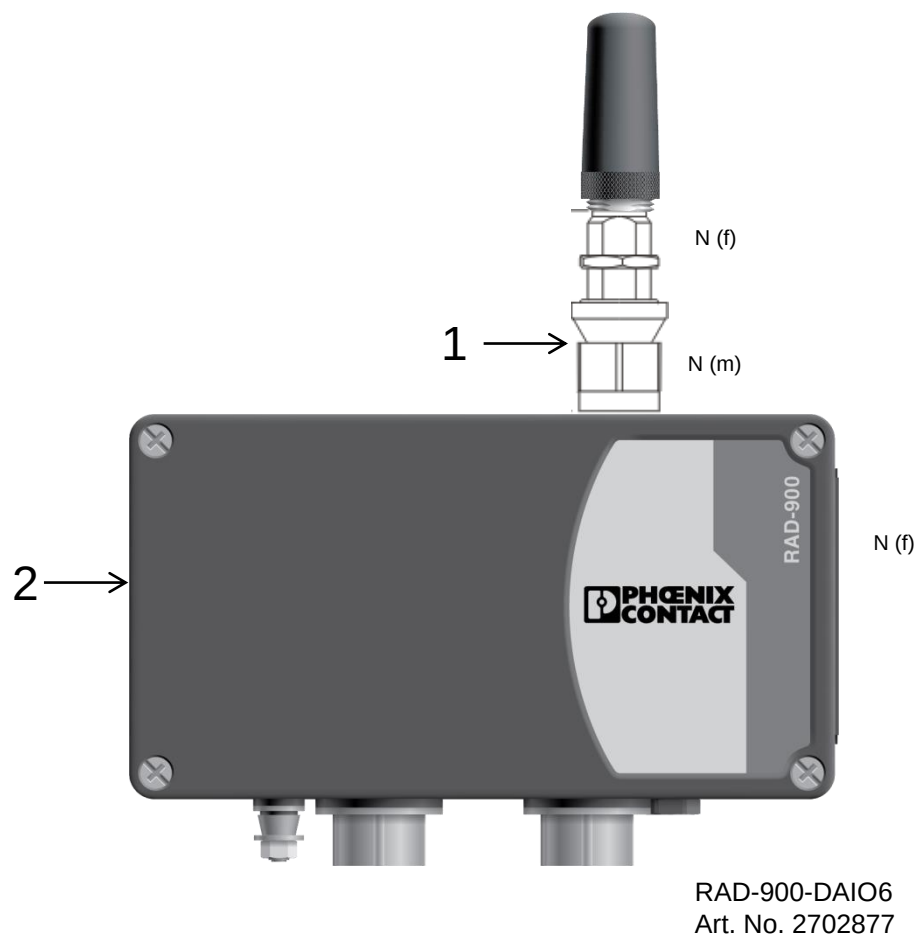


Bill of Materials

Index	Part #	Part Name	Description	Qty
1	Antenna	See options above or table on page 19		
2	5606124 5606125 5606126	RAD-CAB-PFP**	N(m) to N(m) antenna cable 10, 20, 25 ft	1
3	2803153	CN-UB-70DC-6-SB	N(m) to N(f) antenna surge protection	1
4	2702877	RAD-900-DAIO6	Radioline 900 MHz	1

*more cable length available

Adding antenna coax protection to included antenna (900 MHz)



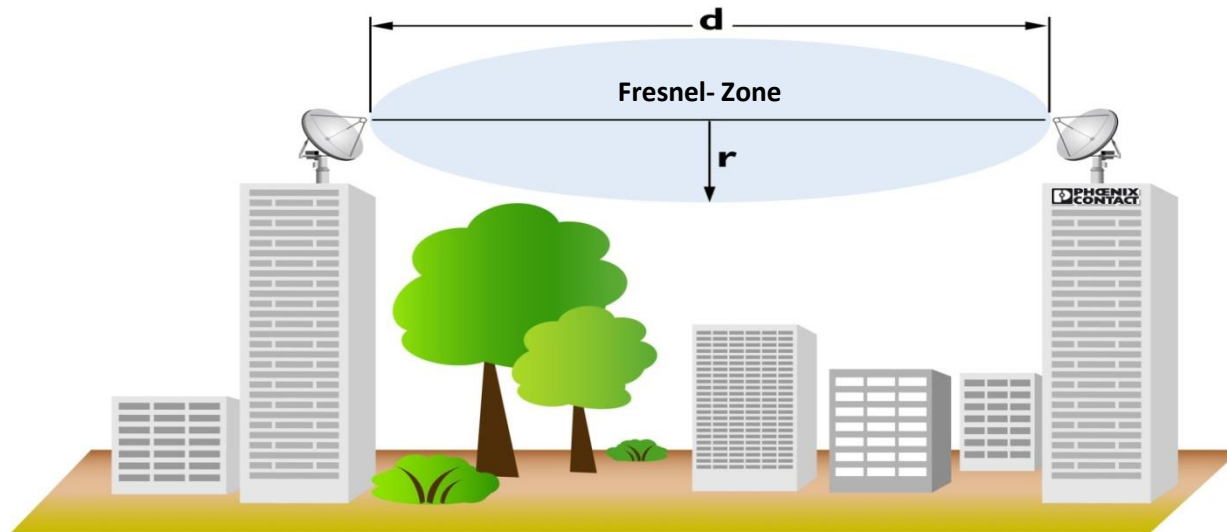
Bill of Materials

Index	Part #	Part Name	Description	Qty
1	2803153	CN-UB-70DC-6-SB	N(m) to N(f) antenna surge protection	1
2	2702877	RAD-900-DAIO6	Radioline 900 MHz	1

Dimensioning a long distance link

Boundary conditions for planning of a wireless link:

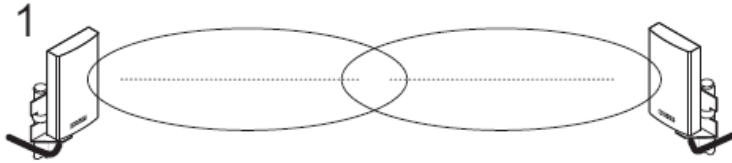
It is recommended to have a free line of sight between the communicating wireless devices. Especially on longer distances. It can be necessary to have the device (antenna) mounted a few feet above the ground – to keep the so called „Fresnel-Zone“ clear. There should be no additional obstacles inside the Fresnel- Zone. The energy of the radio transmission is transferred inside the whole Fresnel- Zone, not only in line of sight.



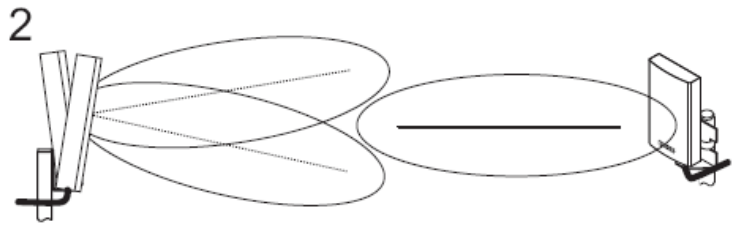
Distance wireless link (d)		Antenna height 2.4 GHz (r)	Antenna height 5 GHz (r)
200 m		2.5 m	1.5 m
500 m		4 m	2.5 m
1000 m		5 m	4 m
2000 m		8 m	6 m
4000 m		11 m	8 m

Directional/Yagi antenna installation

Adjustment of a directional panel antenna



Good: one antenna is facing the other



Bad: the beam does not reach the opposite antenna



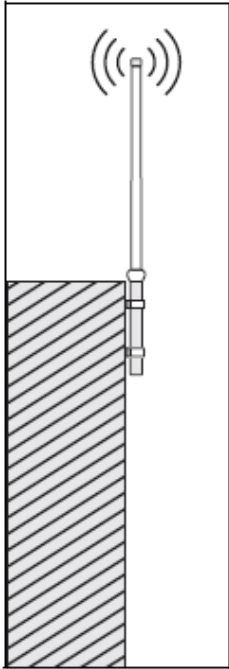
Both possibilities are ok

A metal plane behind a directional antenna is **not critical** because of its radiation purpose to the front

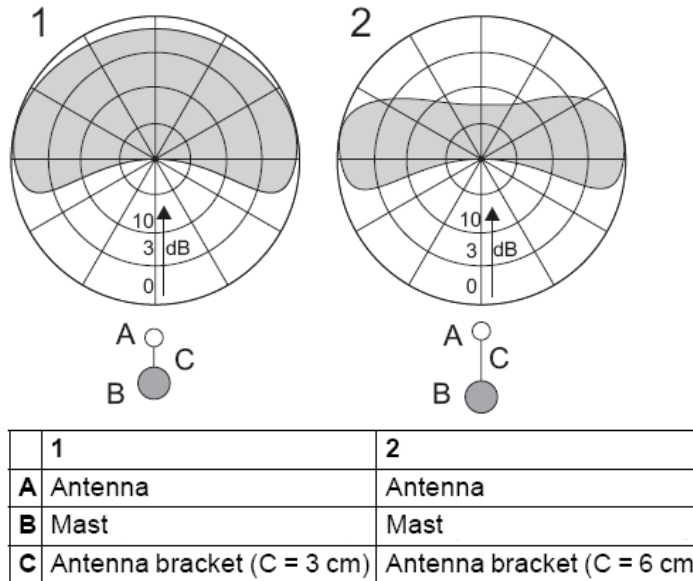


Omnidirectional antenna installation

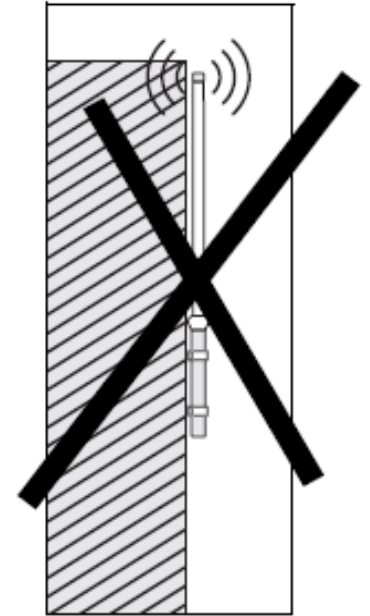
Top view on omni antenna radiation:



Correct installation
of an omni-directional antenna:
Free radiation in all directions possible



Bad influence of metal near to the radiating part of the antenna:
The radiation pattern is deformed. The antenna works no longer as an omni-directional antenna!



Wrong installation:
The radiating part is
“grounded” to a metal
plane

Adapter Comparison



SMA female

SMA male

RSMA female

RSMA male

Reverse SMA (RSMA)

...is a common antenna connector type approved worldwide.

...the polarity of this connector is “reverse”.

... that means RSMA “female” has a pin.



	Radio	Antenna	Cable
connector	RSMA* female	N female	RSMA* male - N male

*RSMA = Reverse- SMA