



## Hirschmann™ Antenna Guide

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## Introduction

Since 2005 Hirschmann Automation and Control GmbH has offered a steadily increasing product portfolio of wireless LAN devices. This is comprised not only of industrial-grade active devices such as Access Points and Clients. Cables, antennas, lightning protection and so on also form an integral part of the range. Together these components offer the customer the possibility to deploy simple and secure wireless installations.

This product portfolio is of course subject to a continuous improvement process. Particularly because WLAN technology is still an innovative field. As a result, the portfolio can experience short term changes. In some cases not all of our previous accessories have been able to meet our customers' requirements. For example, resistance to vibration, grounding properties, sealing, and not least radio coverage.

For this reason we have now decided to bring our antenna portfolio up to the best and latest technological state.

- The radio coverage of the new antennas is considerable more homogeneous, and in live operation leads to a manifestly better result.
- The scope of delivery now consists of a complete solution, including antenna, 1 meter cable, and pigtail. This enables problem-free connection to the BAT-F and BAT-Rail.
- Vibration-resistant, waterproof, and stable mounting kit is also included.
- In addition there is no longer any difference between indoor and outdoor antennas. For example, all new antennas are now DC grounded, which protects the hardware against damage caused by electrical surges.
- All antennas comply with the IP65 protection class.
- Also, the connection of cables to lightning protection devices has been simplified, because all antennas are now equipped with N connectors.



## Einführung

Hirschmann Automation and Control GmbH bietet seit 2005 ein stetig wachsendes Produktportfolio rund um das Thema Wireless LAN. Hierzu gehören nicht nur industrietaugliche aktive Geräte wie Access Points oder Clients. Auch Kabel, Antennen, Überspannungsschutze etc. sind integraler Bestandteil des Angebotes, das den Kunden die Möglichkeit gibt, einfach und sicher komplette Installationen zu realisieren.

Dieses Produktportfolio unterliegt selbstverständlich einem ständigen Verbesserungsprozess. Insbesondere da die WLAN-Technologie ein weiterhin sehr innovatives Feld ist, kann es vorkommen, dass aus Erfahrungen, die man gemacht hat, kurzfristig Änderungen des Portfolios resultieren. Leider haben nicht alle unserer bisherigen Produkte allen Anforderungen bei Kunden standgehalten. Als Beispiele seien Rüttelfestigkeit, Erdungsverhalten, Dichtigkeit und nicht zuletzt das Abstrahlverhalten genannt.

Deswegen haben wir uns jetzt entschlossen, unser Antennenportfolio auf den besten und neuesten Stand der Technik zu bringen.

- Das Abstrahlverhalten der neuen Antennen ist wesentlich homogener und führt im Realbetrieb zu deutlich besseren Ergebnissen.
- Der Lieferumfang besteht nun durchgängig aus Antenne, 1m Kabel und Pigtail, um problemlosen Anschluss an BAT-F und BAT-Rail zu ermöglichen.
- Rüttelfestes, wetterfestes und stabiles Montagematerial ist ebenfalls inbegriffen.
- Zudem soll kein Unterschied mehr gemacht werden zwischen Indoor- und Outdoor-Antennen. Z.B. sind alle neuen Antennen jetzt DC-grounded, was Beschädigungen der Hardware durch Überspannungen vorbeugt.
- Alle Antennen entsprechen nun der Schutzklasse IP65.
- Ebenfalls soll die Verbindung zu Kabeln und Überspannungsschutzen vereinfacht werden, indem alle Antennen nun mit N-Buchsen ausgestattet sind.

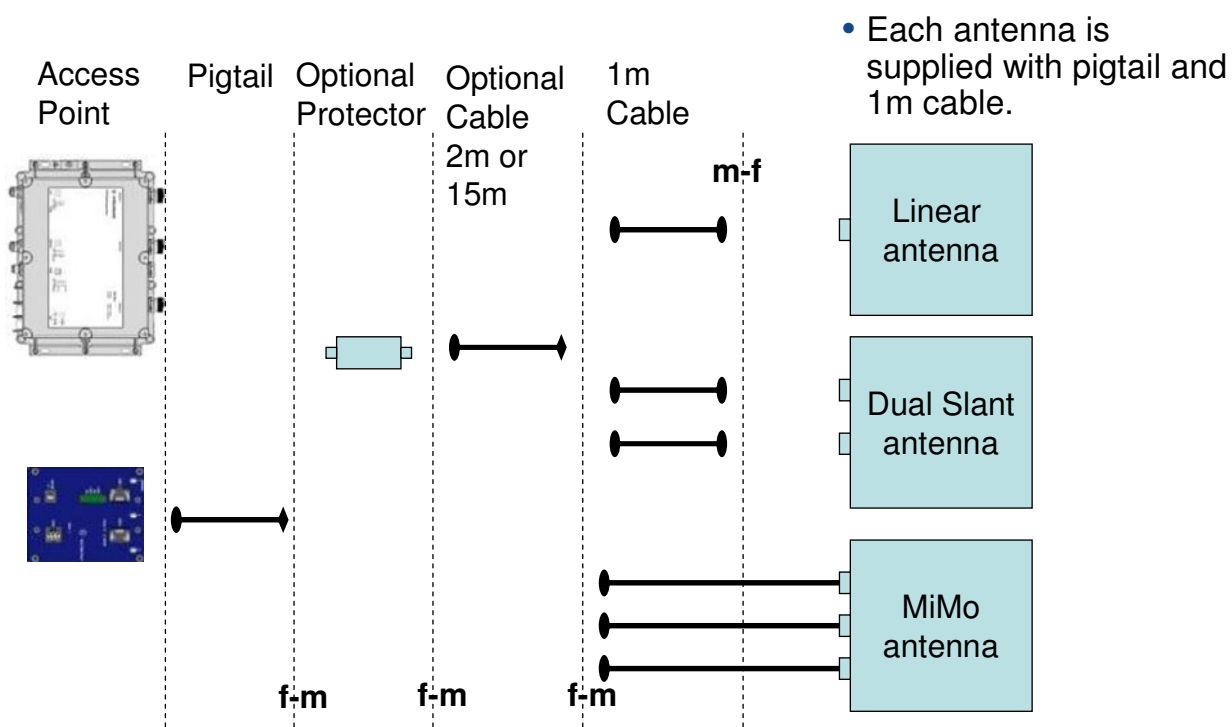


## Current BAT portfolio

| BAT family data and facts                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product description                                                                                                                                   | BAT-Rail<br>The devices are supplied in a metal enclosure for mounting on DIN rails in automation or vehicle applications.                                                                                                                                                                                                                                                                                                                                                                               | BAT-F<br>The devices are supplied in IP65/67 metal housings. They are designed for field-level applications or harsh industrial environments.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>BAT54</b><br>These products support WLAN standards IEEE 802.11a/b/g/h, and operate at up to 108 Mbps (raw data rate)                               |                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                                                                       | <b>BAT54-Rail</b> <ul style="list-style-type: none"> <li>Industrial WLAN access point for installation on DIN rails</li> <li>Two IEEE 802.11a/b/g/h/i compliant WLAN interfaces</li> <li>2 x LAN/PoE, 2 x 24 V, 1 x 12 V power supply</li> </ul> <b>BAT54-Rail Client</b> <ul style="list-style-type: none"> <li>Industrial WLAN access client for installation on DIN rails</li> <li>One IEEE 802.11a/b/g/h/i compliant WLAN interface</li> <li>1 x LAN/PoE, 2 x 24 V, 1 x 12 V power supply</li> </ul> | <b>BAT54-F</b> <ul style="list-style-type: none"> <li>Industrial WLAN access point with IP65/67 enclosure</li> <li>Two IEEE 802.11a/b/g/h/i compliant WLAN interfaces</li> <li>1 x LAN/PoE, 2 x 24 V power supply</li> </ul> <b>BAT54-F Single</b> <ul style="list-style-type: none"> <li>Industrial WLAN access point with IP65/67 enclosure</li> <li>One IEEE 802.11a/b/g/h/i compliant WLAN interface, two PoE LAN interfaces</li> <li>2 x LAN/PoE power supply</li> </ul> <b>BAT54-F Client</b> <ul style="list-style-type: none"> <li>Industrial WLAN access client with IP65/67 enclosure</li> <li>One IEEE 802.11a/b/g/h/i compliant WLAN interface</li> <li>1 x LAN/PoE, 2 x 24 V power supply</li> </ul> |
| <b>BAT300</b><br>These devices support WLAN standards IEEE 802.11a/b/g/h/n and 802.11n (Draft 2.), and they operate at up to 300 Mbps (raw data rate) |                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                       | <b>BAT300-Rail</b> <ul style="list-style-type: none"> <li>Industrial WLAN access point for installation on DIN rails</li> <li>One IEEE 802.11a/b/g/h/n/i compliant WLAN interface (up to 300 Mbps)</li> <li>2 x LAN/PoE, 2 x 24 V, 1 x 12 V power supply</li> </ul>                                                                                                                                                                                                                                      | <b>BAT300-F</b> <ul style="list-style-type: none"> <li>Industrial WLAN access point with IP65/67 enclosure</li> <li>One IEEE 802.11a/b/g/h/n/i compliant WLAN interface (up to 300 Mbps)</li> <li>1 x LAN/PoE, 2 x 24 V power supply</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



## AP / Cable / Antenna assembly

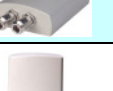
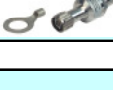


Since all antenna kits are equipped with 1m cable and pigtail, both AP types BAT-F or BAT-Rail can be seamlessly connected to the antennas.

The BAT Protector can be directly screwed on BAT-F or placed in between two cables since it is equipped with male to female connectors.



## Which for what?

| Art.-Nr     | Antennae                 |                                                                                     | Description                                | BAT-Rail | BAT-F | BAT54 | BAT300 |
|-------------|--------------------------|-------------------------------------------------------------------------------------|--------------------------------------------|----------|-------|-------|--------|
| 943 981-002 | BAT-ANT-N-6G-IP65        |    | 2,4GHz omnidirectional                     | +++      | +++   | +++   | +      |
| 943 981-003 | BAT-ANT-N-5A-IP65        |    | 5GHz omnidirectional                       | +++      | +++   | +++   | +      |
| 943 981-004 | BAT-ANT-N-6ABG-IP65      |    | Dualband hemispherical                     | +++      | +++   | +++   | +      |
| 943 981-005 | BAT-ANT-N-14G-IP23       |    | 2,4GHz directional                         | +++      | +++   | +++   | +      |
| 943 981-006 | BAT-ANT-N-18A-V-IP65     |    | 5GHz medium directional                    | +++      | +++   | +++   | +      |
| 943 981-007 | BAT-ANT-N-23A-V-IP65     |   | 5GHz very directional                      | +++      | +++   | +++   | -      |
| 943 981-008 | BAT-ANT-N-23A-VH-IP65    |  | 5GHz very directional - 11n                | +        | +     | +     | +++    |
| 943 981-009 | BAT-ANT-N-8G-DS-IP65     |  | 2,4GHz - Dual Slant                        | +++      | +++   | +++   | ++     |
| 943 981-010 | BAT-ANT-N-9A-DS-IP65     |  | 5GHz - Dual Slant                          | +++      | +++   | +++   | ++     |
| 943 981-001 | BAT-ANT-N-LC-G-50m-IP65  |  | 2,4GHz leaky cable                         | +++      | +++   | +++   | -      |
| 943 981-101 | BAT-ANT-N-LC-G-100m-IP65 |  | 2,4GHz leaky cable                         | +++      | +++   | +++   | -      |
| 943 981-012 | BAT-ANT-N-MiMoDB-5N-IP65 |  | Dualband MiMo 11n - omnidirectional        | -        | -     | -     | +++    |
| 943 981-013 | BAT-ANT-N-MiMo5-9N-IP65  |  | 5GHz MiMo 11n - directional                | -        | -     | -     | +++    |
| 943 903 373 | BAT-ANT-Protector m-f    |  | Protector against overvoltage for antennae | +++      | +++   | +++   | +++    |
| 943 903 374 | BAT-LAN-Protector IP68   |                                                                                     | Protector against overvoltage - LAN/PoE    | +++      | +++   | +++   | +++    |
| 943 903 360 | BAT-Pigtail              |                                                                                     | Adapter cable R-SMA to N-jack              | +++      | -     | nr    | nr     |
| 943 903 514 | BAT-CLB-2 N m-f          |  | Antenna cable N-plug to N-jack             | +++      | +++   | +++   | +++    |
| 943 903 515 | BAT-CLB-15 N m-f         |  | Antenna cable N-plug to N-jack             | +++      | +++   | +++   | +++    |

Very good

+++

Good

++

Possible

+

Not usable

-



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## Which replaces which?

| Current     |                        | New         |                          |                                            |
|-------------|------------------------|-------------|--------------------------|--------------------------------------------|
| Art.-Nr     | Antennae               | Art.-Nr     | Antennae                 | Description                                |
| 943 903 401 | BAT-ANT-N-8G           | 943 981-002 | BAT-ANT-N-6G-IP65        | 2,4GHz omnidirectional                     |
| 943 903 301 | BAT-ANT-N-8A           | 943 981-003 | BAT-ANT-N-5A-IP65        | 5GHz omnidirectional                       |
| 943 903 421 | BAT-ANT-N-6ABG         | 943 981-004 | BAT-ANT-N-6ABG-IP65      | Dualband hemispherical                     |
| 943 903 380 | BAT-ANT-N-14G          | 943 981-005 | BAT-ANT-N-14G-IP23       | 2,4GHz directional                         |
| 943 903 320 | BAT-ANT-N-12A          | 943 981-006 | BAT-ANT-N-18A-V-IP65     | 5GHz medium directional                    |
| 943 903 340 | BAT-ANT-N-23/9A        | 943 981-007 | BAT-ANT-N-23A-V-IP65     | 5GHz very directional                      |
|             |                        | 943 981-008 | BAT-ANT-N-23A-VH-IP65    | 5GHz very directional - 11n                |
| 943 903 411 | BAT-TNC-B-D-085-02     | 943 981-009 | BAT-ANT-N-8G-DS-IP65     | 2,4GHz Dual Slant                          |
| 943 056 111 | BAT-TNC-B-D-085-01     | 943 981-009 | BAT-ANT-N-8G-DS-IP65     | 2,4GHz Dual Slant                          |
|             |                        | 943 981-001 | BAT-ANT-N-LC-G-50m-IP65  | 2,4GHz leaky cable                         |
|             |                        | 943 981-101 | BAT-ANT-N-LC-G-100m-IP65 | 2,4GHz leaky cable                         |
| 943 903 310 | BAT-ANT-TNC-8b/g DS    | 943 981-009 | BAT-ANT-N-8G-DS-IP65     | 2,4GHz Dual Slant                          |
| 943 903 330 | BAT-ANT-TNC-10A DS     | 943 981-010 | BAT-ANT-N-9A-DS-IP65     | 5GHz Dual Slant                            |
|             |                        | 943 981-012 | BAT-ANT-N-MiMoDB-5N-IP65 | Dualband 11n - omnidirectional             |
|             |                        | 943 981-013 | BAT-ANT-N-MiMo5-9N-IP65  | 5GHz 11n - directional                     |
| 943 903 372 | BAT-Surge Arrestor m-f | 943 903 373 | BAT-ANT-Protector m-f    | Protector against overvoltage for antennae |
|             |                        | 943 903 374 | BAT-LAN-Protector IP68   | Protector against overvoltage - LAN/PoE    |
| 943 903 360 | BAT-Pigtail            | 943 903 360 | BAT-Pigtail              | Adapter cable R-SMA to N-jack              |
|             |                        | 943 903 514 | BAT-CLB-2 N m-f          | Antenna cable N-plug to N-jack             |
| 943 903 350 | BAT-CLB-7-N            | 943 903 515 | BAT-CLB-15 N m-f         | Antenna cable N-plug to N-jack             |



## Omni-Directional Antennas

### Omni-Directional Antenna for 2.4 GHz

#### BAT-ANT-N-6G-IP65

Order Number: 943 981-002

#### Electrical Specification

|                      |                     |
|----------------------|---------------------|
| Frequency range      | 2400 MHz - 2500 MHz |
| Gain                 | 6.0 dBi             |
| VSWR                 | < 1,8               |
| Polarization         | Linear, vertical    |
| HPBW /               | horizontal 360°     |
| Down tilt            | 0°                  |
| Max. Power           | 25 W                |
| Impedance            | 50 Ω                |
| Connector            | N female            |
| Lightning Protection | DC grounded         |

#### Environmental & Mechanical Characteristics

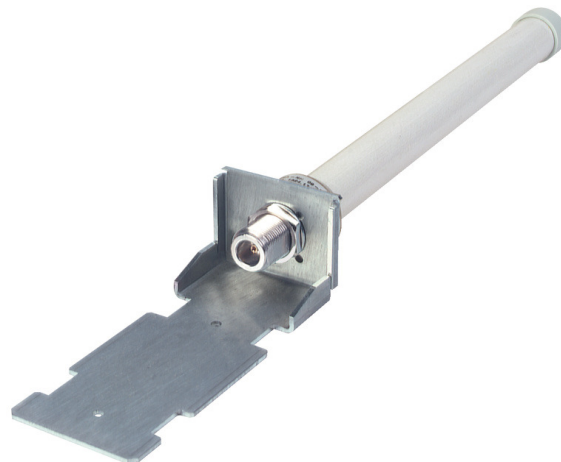
|                      |                   |
|----------------------|-------------------|
| Temperature          | – 40 °C to +80 °C |
| Lightning protection | DC ground         |
| Radome color         | Grey-white        |
| Radome material      | Fiber glass       |
| Weight               | 0.34kg            |
| Dimensions           | Ø22 x 250 mm      |
| IP                   | IP65              |

#### Cable, Accessories

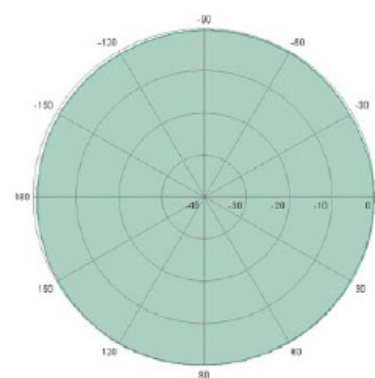
1m with N male connectors at both ends.  
Pigtail, R-SMA male to N female  
Mounting material

#### Purpose

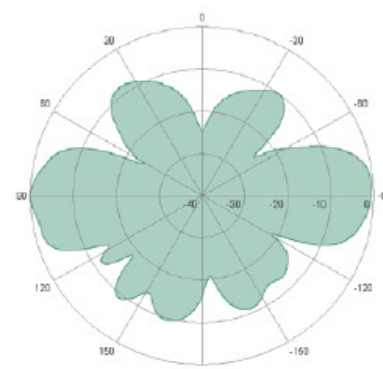
To be placed in the middle of the illuminated area. Halls or outdoor areas.



**Radiation Pattern**



horizontal



vertical



## Omni-Directional Antenna for 5 GHz

### BAT-ANT-N-5A-IP65

Order Number: 943 981-003

#### Electrical Specification

|                 |                     |
|-----------------|---------------------|
| Frequency range | 5150 MHz - 5875 MHz |
| Gain            | 5 dBi               |
| VSWR            | 1,5                 |
| Polarization    | Linear, vertical    |
| HPBW /          | horizontal 360°     |
| HPBW /          | vertical 25°        |
| Max. Power      | 6 W                 |
| Impedance       | 50 $\Omega$         |
| Connector       | N female            |

#### Environmental & Mechanical Characteristics

|                 |                 |
|-----------------|-----------------|
| Temperature     | - 45°C to +70°C |
| Radome color    | Gray-white      |
| Radome material | Polypropylene   |
| Weight          | 0,3 kg          |
| Dimension       | 16 x 160 mm     |
| IP              | IP65            |

#### Cable, Accessories

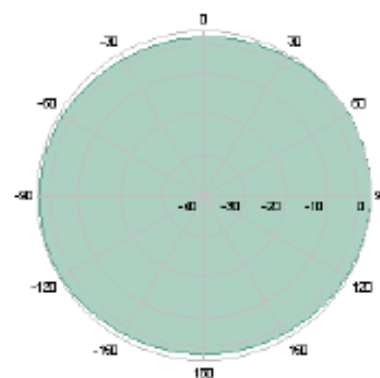
1m with N male connectors at both ends.  
Pigtail, R-SMA male to N female  
Mounting material

#### Purpose

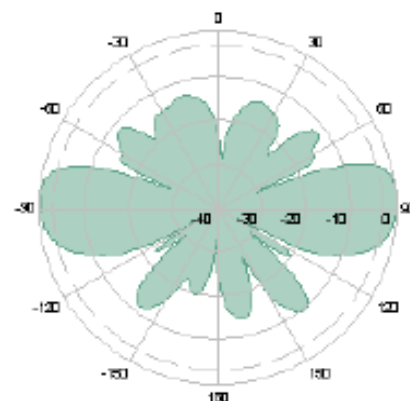
To be placed in the middle of the illuminated area. Halls or outdoor areas.



**Radiation Pattern**



**horizontal 5470 MHz**



**vertical 5470 MHz**



## Omni-Directional Dualband Antenna for MiMo

### BAT-ANT-N-MiMoDB-5N-IP65

Order Number: 943 981-012

#### Electrical Specification

|                 |                                         |
|-----------------|-----------------------------------------|
| Frequency range | 2400-2500 / 5150-5875                   |
| MHz             |                                         |
| Gain            | 3,5 dBi / 5,5 dBi                       |
| VSWR            | 1,8                                     |
| Polarization    | 3x Linear, vertical                     |
| HPBW /          | horizontal 360°                         |
| Downtilt        | 0°                                      |
| Max. Power      | 2 W                                     |
| Impedance       | 50 Ω                                    |
| Connector       | 3x N male at 1m cable directly attached |



#### Environmental & Mechanical Characteristics

|                 |                   |
|-----------------|-------------------|
| Temperature     | – 40 °C to +80 °C |
| Radome color    | 7035 (Light Gray) |
| Radome material | plastic           |
| Weight          | 0,3 kg            |
| Dimension       | 310 x 110 x 40 mm |
| IP              | IP65              |

#### Cable, Accessories

3x 1m with N male connectors at both ends.  
3x Pigtail, R-SMA male to N female  
Mounting material

#### Purpose

To be placed in the middle of the illuminated area. Halls or outdoor areas.  
To be used with BAT300 devices for optimal support of MiMo functionality.



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## Omni-Directional Antenna for 2.4/ 5 GHz

### BAT-ANT-N-6ABG-IP65

Order Number: 943 981 004

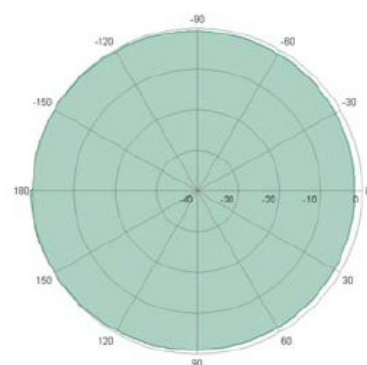


#### Electrical Specification

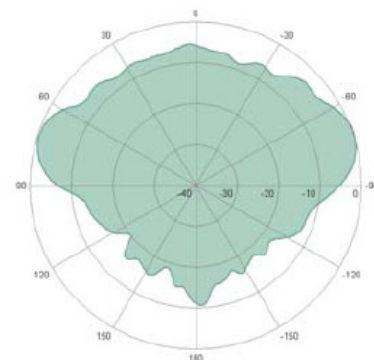
|                                     |                                 |
|-------------------------------------|---------------------------------|
| Frequency range                     | 2300 - 2500 and 4900 - 5935 MHz |
| Impedance                           | 50 $\Omega$                     |
| VSWR                                | 1.8                             |
| Polarization                        | linear, vertical                |
| Gain                                | 6dBi @2,4GHz, 8dBi @5GHz        |
| 3 dB beam width horizontal @ 2,4GHz | 360°                            |
| 3 dB beam width horizontal @ 5GHz   | 173°                            |
| Max. power                          | 75 W (CW) at 25°C               |

#### Electrical Specification

##### Radiation Pattern

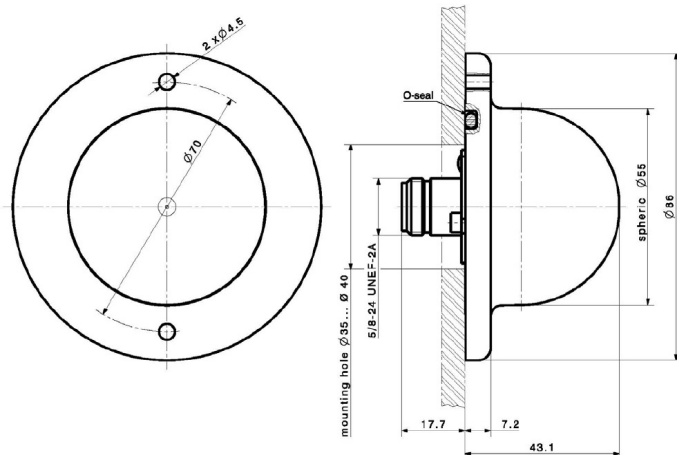


horizontal 2450 MHz



vertical 2450 MHz

Dimensions (mm)



#### Cable, Accessories

1m with N male connectors at both ends.  
Pigtail, R-SMA male to N female

#### Purpose

To be placed on moving parts, vehicles or boxes.



## Directional Antennas

### Diversity Sector Antenna for 2.4 GHz

#### BAT-ANT-N-8G-DS-IP65

Order Number: 943 981-009



#### Electrical Properties

|                           |                                   |
|---------------------------|-----------------------------------|
| Frequency range           | 2400 - 2485 MHz                   |
| Impedance                 | 50 $\Omega$                       |
| VSWR                      | 1.5                               |
| Polarization              | dual linear, $\pm 45^\circ$ slant |
| Gain                      | 8 dBi                             |
| 3 dB beamwidth horizontal | 75°                               |
| 3 dB beamwidth vertical   | 70°                               |
| Downtilt                  | 0°                                |
| Isolation between ports   | 25 dB                             |
| Front to back ratio       | 14 dB                             |
| Max. power                | 10 W (CW) at 25°C                 |
| Connectors                | 2x N female                       |

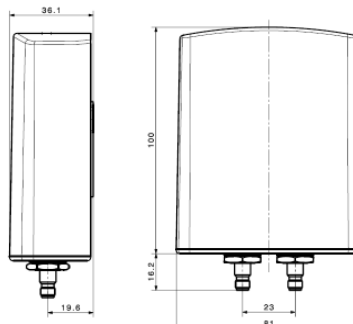
#### Mechanical Properties

|                             |                      |
|-----------------------------|----------------------|
| Dimensions                  | 101 x 80 x 35 mm     |
| Weight                      | 0.11 kg              |
| Radome material             | LEXAN EXL 9330       |
| Radome color                | RAL 7044 (silk gray) |
| Operating temperature range | - 40°C to + 80°C     |
| Storage temperature range   | - 40°C to + 80°C     |
| Windload                    | 15 N at 160km/h      |
| IP                          | 65                   |

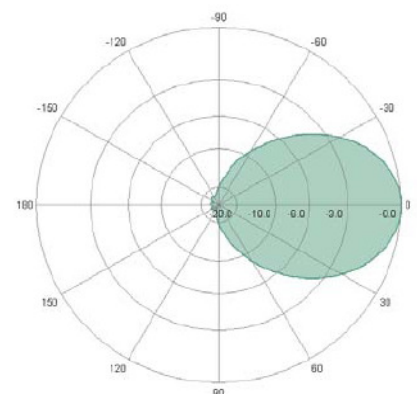
#### Cable, Accessories

2x 1m with N male connectors at both ends.  
2x Pigtail, R-SMA male to N female  
Mounting material

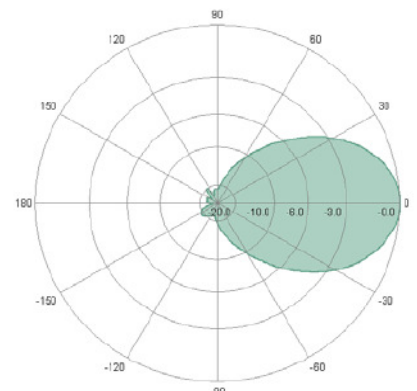
**Very well usable with BAT300**



**Radiation Pattern**



horizontal



vertical



## Directional Antenna linear for 2.4 GHz

### BAT- ANT- N-14G-IP23

Order Number: 943 981 005

#### Electrical Properties

|                           |                   |
|---------------------------|-------------------|
| Frequency range           | 2300 - 2500 MHz   |
| Impedance                 | 50 $\Omega$       |
| VSWR                      | 1.5               |
| Polarization              | vertical          |
| Gain                      | 14 dBi            |
| 3 dB beamwidth horizontal | 35°               |
| 3 dB beamwidth vertical   | 30°               |
| Downtilt                  | 0°                |
| Front to back ratio       | 20 dB             |
| Max. power                | 75 W (CW) at 25°C |
| Connector                 | N female          |

#### Mechanical Properties

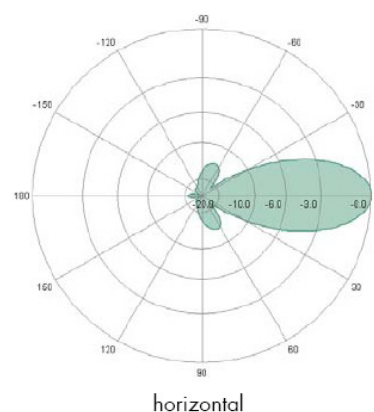
|                             |                      |
|-----------------------------|----------------------|
| Dimensions                  | 101 x 80 x 35 mm     |
| Weight                      | 0.11 kg              |
| Radome material             | LEXAN EXL 9330       |
| Radome color                | RAL 7044 (silk gray) |
| Operating temperature range | - 40°C to + 80°C     |
| Storage temperature range   | - 40°C to + 80°C     |
| Windload                    | 15 N at 160km/h      |
| IP                          | 23                   |

#### Cable, Accessories

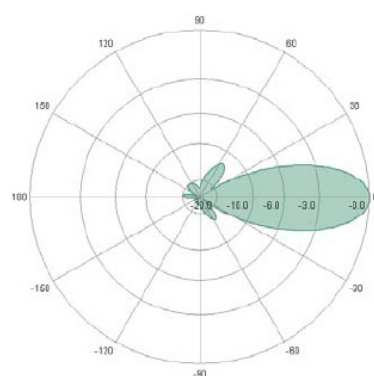
1m with N male connectors at both ends.  
Pigtail, R-SMA male to N female  
Mounting material



Radiation Pattern



horizontal



vertical



# HIRSCHMANN

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## Sectoral Diversity Antenna for 5 GHz

### BAT-ANT-N-9A-DS-IP65

Order Number: 943 981-010



#### Electrical Properties

|                           |                                   |
|---------------------------|-----------------------------------|
| Frequency range           | 5150 - 5925 MHz                   |
| Impedance                 | 50 $\Omega$                       |
| VSWR                      | 2                                 |
| Polarization              | dual linear, $\pm 45^\circ$ slant |
| Gain                      | 9 dBi                             |
| 3 dB beamwidth horizontal | 70°                               |
| 3 dB beamwidth vertical   | 60°                               |
| Downtilt                  | 0°                                |
| Isolation between ports   | 20 dB                             |
| Front to back ratio       | 20 dB                             |
| Max. power                | 10 W (CW) at 25°C                 |
| Connectors                | 2x N female                       |

#### Mechanical Properties

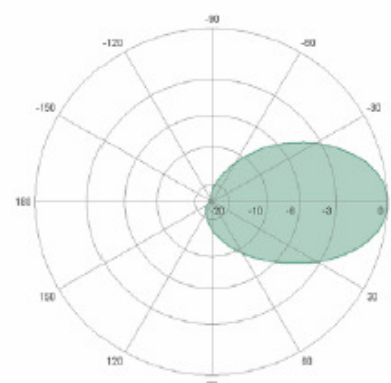
|                             |                      |
|-----------------------------|----------------------|
| Dimensions                  | 101 x 80 x 35 mm     |
| Weight                      | 0.11 kg              |
| Housing material            | ASA and aluminum     |
| Radome material             | ASA                  |
| Radome material             | LEXAN EXL 9330       |
| Radome color                | RAL 7044 (silk gray) |
| Operating temperature range | - 40°C to + 80°C     |
| Storage temperature range   | - 40°C to + 80°C     |
| Windload                    | 15 N at 160km/h      |
| IP                          | 65                   |

#### Cable, Accessories

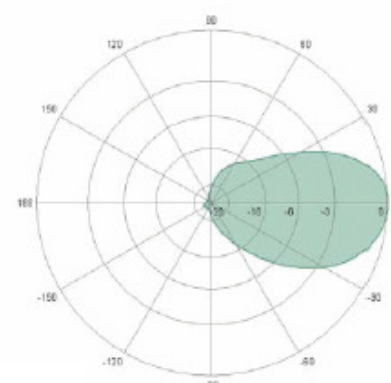
2x 1m with N male connectors at both ends.  
2x Pigtail, R-SMA male to N female  
Mounting material

**Very well usable with BAT300**

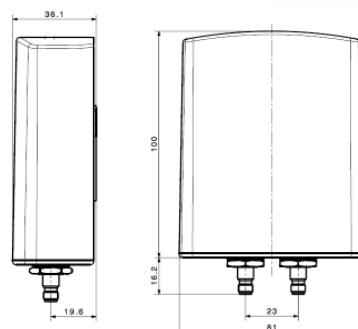
**Radiation Pattern**



horizontal



vertical





# HIRSCHMANN

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## Sectoral MiMo Antenna for 5 GHz

### BAT-ANT-N-MiMo5-9N-IP65

Order Number: 943 981-013

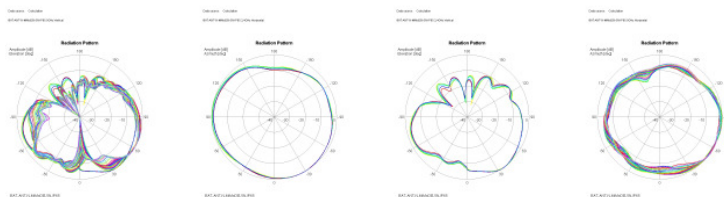
#### Electrical Properties

|                           |                                        |
|---------------------------|----------------------------------------|
| Frequency range           | 5150 - 5875 MHz                        |
| Impedance                 | 50 $\Omega$                            |
| VSWR                      | 1.5                                    |
| Polarization              | 3x linear vertical / horizontal / +45° |
| Gain                      | 9 dBi                                  |
| 3 dB beamwidth horizontal | 65°                                    |
| 3 dB beamwidth vertical   | 65°                                    |
| Downtilt                  | 0°                                     |
| Max. power                | 2 W (CW) at 25°C                       |
| Connector                 | N female                               |



#### Mechanical Properties

|                             |                      |
|-----------------------------|----------------------|
| Dimensions                  | 101 x 80 x 35 mm     |
| Weight                      | 0.11 kg              |
| Radome material             | LEXAN EXL 9330       |
| Radome color                | RAL 7044 (silk gray) |
| Operating temperature range | - 40°C to + 80°C     |
| Storage temperature range   | - 40°C to + 80°C     |



|          |                 |
|----------|-----------------|
| Windload | 15 N at 160km/h |
| IP       | 65              |

#### Cable, Accessories

3x 1m with N male connectors at both ends.  
3x Pigtail, R-SMA male to N female  
Mounting material

#### Purpose

To be placed on walls or edges of the illuminated sector. Halls or outdoor areas.  
Also usable for medium distance point-to-point connections.  
To be used with BAT300 devices for optimal support of MiMo functionality.



## Directional Antenna linear for 5 GHz

### BAT-ANT-N-18A-V-IP65

Order Number: 943 981 006

#### Electrical Specification

|                     |                                                           |
|---------------------|-----------------------------------------------------------|
| Frequency range     | 5150 – 5250 / 5250 – 5350 / 5350 – 5725 / 5725 – 5875 MHz |
| Gain                | 18 dBi / 19 dBi / 18.5 dBi / 18 dBi                       |
| VSWR                |                                                           |
| Polarization        | Linear, vertical                                          |
| HPBW / horizontal   | 18°                                                       |
| HPBW / vertical     | 18°                                                       |
| Front to back ratio | > 30 dB                                                   |
| Power handling      | 6W (CW)                                                   |
| Impedance           | 50 Ω                                                      |
| Connector           | N Jack                                                    |

#### Environmental & Mechanical Characteristics

|                       |                     |
|-----------------------|---------------------|
| Windload @ wind speed | 104N @ 216 km/hr    |
| Temperature           | - 45° C to +70° C   |
| Radome material       | plastic             |
| Radome color          | Light gray          |
| Weight                | 107 g               |
| Dimensions            | 190 x 190 x 30,5 mm |
| IP                    | IP65                |

#### Cable, Accessories

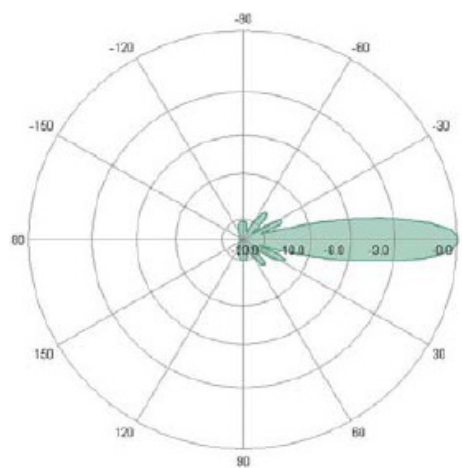
1m with N male connectors at both sides.  
Pigtail, R-SMA male to N female  
Mounting material for wall and mast mount

#### Purpose

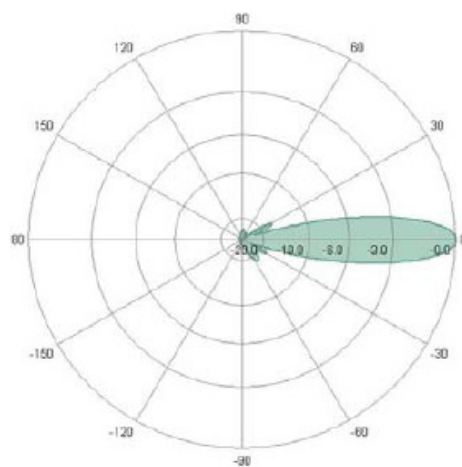
For medium distances, partly sectoral coverage in 5GHz, indoors and outdoors.



**Radiation Pattern**



horizontal



vertical



# HIRSCHMANN

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## Directional Antenna linear for 5 GHz

### BAT-ANT-N-23A-V-IP65

Order Number: 943 981 007

#### Electrical Specification

|                     |                                   |
|---------------------|-----------------------------------|
| Frequency range     | 5150 - 5350 MHz / 5470 - 5875 MHz |
| Gain                | 23 dBi                            |
| VSWR                | < 1,5                             |
| Polarization        | Linear, vertical                  |
| HPBW / horizontal   | 9°                                |
| HPBW / vertical     | 9°                                |
| Front to back ratio | > 30 dB                           |
| Max. Power          | 6W                                |
| Impedance           | 50 Ohms                           |
| Connector           | N female                          |

#### Environmental & Mechanical Characteristics

|                           |                   |
|---------------------------|-------------------|
| Windload @ survival speed | 264N @ 220 km/h   |
| Temperature               | - 45° C to +70° C |
| Lightning protection      | DC ground         |
| Radome material           | plastic           |
| Radome color              | Gray-white        |
| Weight                    | 1.5 kg            |
| Dimensions                | 305 x 305 x 25    |
| IP                        | IP65 / IP67       |

#### Cable, Accessories

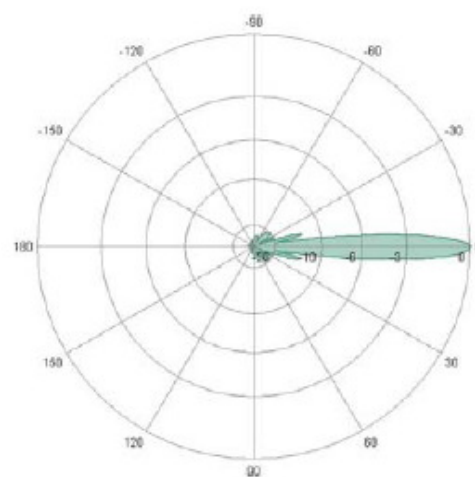
1m with N male connectors at both sides.  
Pigtail, R-SMA male to N female  
Mounting material for wall and mast mount

#### Purpose

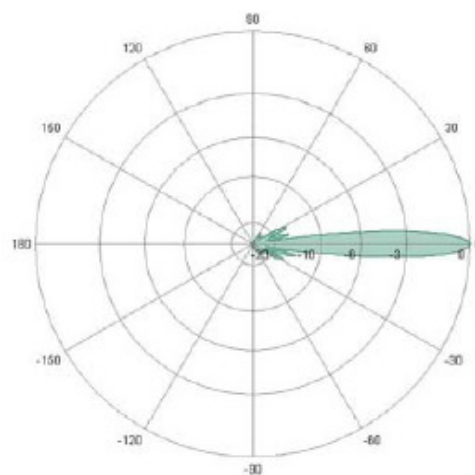
For long distances in 5GHz.  
Suggested for BAT54 devices only.



#### Radiation Pattern



horizontal



vertical



# HIRSCHMANN

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## Directional Antenna dual linear for 5 GHz

### BAT-ANT-N-23A-VH-IP65

Order Number: 943 981 008

#### Electrical Specification

|                     |                                      |
|---------------------|--------------------------------------|
| Frequency range     | 5150 - 5875 MHz                      |
| Gain                | 23 dBi                               |
| VSWR                | < 1,7                                |
| Polarization        | dual Linear, vertical and horizontal |
| HPBW / horizontal   | 9°                                   |
| HPBW / vertical     | 9°                                   |
| Front to back ratio | -30 dB                               |
| Max. Power          | 6W                                   |
| Impedance           | 50 Ohms                              |
| Connector           | 2x N female                          |



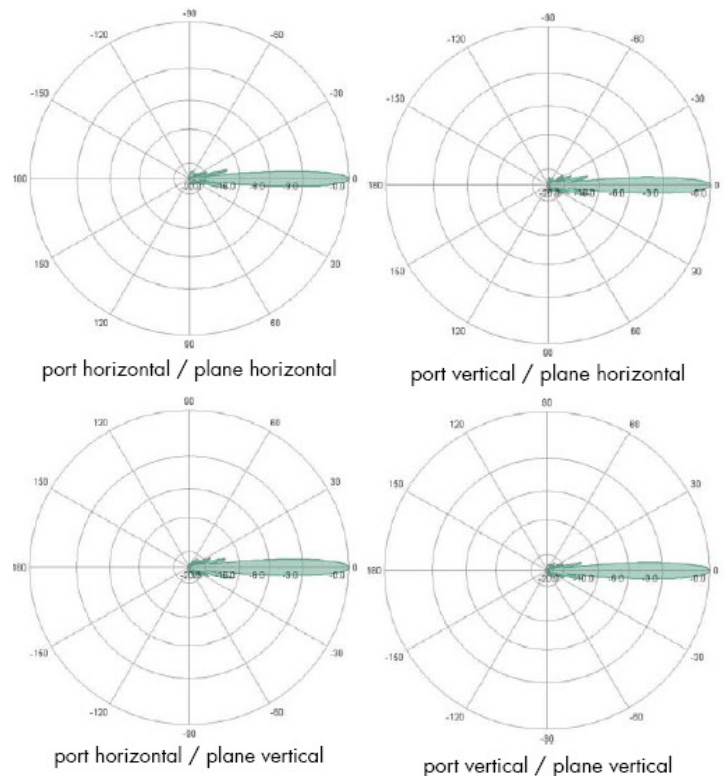
#### Environmental & Mechanical Characteristics

|                           |                   |
|---------------------------|-------------------|
| Windload @ survival speed | 264N @ 220 km/h   |
| Temperature               | - 45° C to +70° C |
| Lightning protection      | DC ground         |
| Radome material           | plastic           |
| Radome color              | Gray-white        |
| Weight                    | 2.5 kg            |
| Dimensions                | 371 x 371 x 40 mm |
| IP                        | IP65 / IP67       |

#### Cable, Accessories

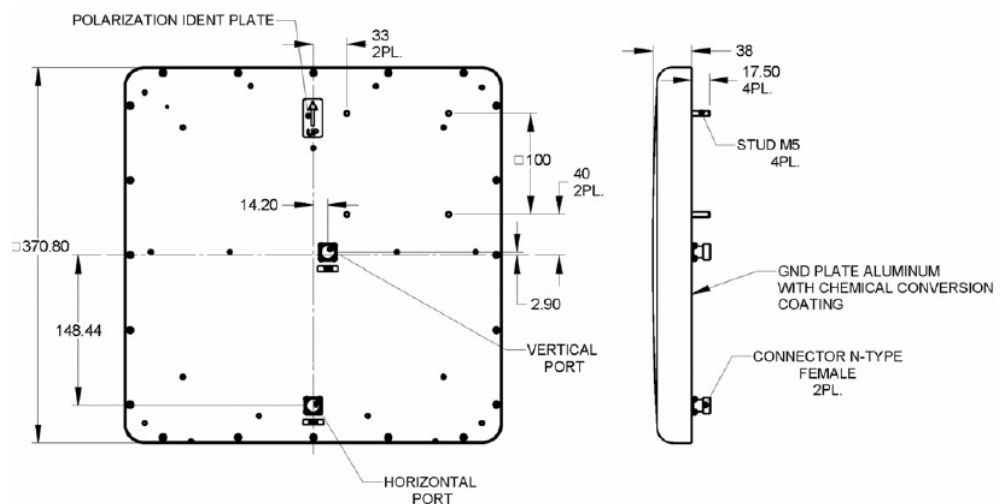
2x 1m with N male connectors at both ends.  
2x Pigtail, R-SMA male to N female  
Mounting material for wall and mast mount

Radiation Pattern



#### Purpose

For long distances in 5GHz  
Suggested for BAT300  
devices.



Antennas 2.4 and 5 GHz



## Radiating Cable Antennas (Leaky Cable)

### Antennas for 2,4 GHz

Radiating cables are in fact coaxial cables that are equipped with small slots that operate as antennas. This leads to a homogeneous field around the cable in which clients can move without roaming.



The 100m cable is designed for feeding the signal from both ends. The 50m cable is designed to be used with one AP and equipped with a terminator at the end.

### BAT-ANT-N-LC-G-50m-IP65

Order Number 943 981-001



#### Specification

|                     |                                                  |
|---------------------|--------------------------------------------------|
| Cable length        | 50 m                                             |
| Cable specification | N male connector, N-terminator; 1.5 dB at 2.4GHz |

#### Radio technology

|                   |                     |
|-------------------|---------------------|
| Frequency band    | 2000 MHz - 2900 MHz |
| Antenna connector | N-type male         |

#### Ambient conditions

|                               |                  |
|-------------------------------|------------------|
| Operating temperature         | -40 °C to +85 °C |
| Storage/transport temperature | -70 °C to +85 °C |
| Dimensions (W x H x D)        | 50m; d=15mm      |
| Mounting                      | wall             |
| Protection class              | IP 65            |
| Weight                        | 12 kg            |

#### Fire behavior

Halogen free and flame retardant outer sheath  
Low corrosive gas emission acc. to IEC 60754-2  
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C  
Low smoke emission acc. to IEC 61034

#### Scope of delivery and accessories

Leaky Cable, 2 x N-connector preassembled, 1 x terminator 50 Ohm, 50 x fastening clip



## BAT-ANT-N-LC-G-100m-IP65

Order Number 943 981-101



### Specification

Cable length 100 m  
Cable specification 2 x N male connectors; 1.5 dB at 2.4GHz

### Radio technology

Frequency band 2000 MHz - 2900 MHz  
Antenna connector N-type male

### Ambient conditions

Operating temperature -40 °C to +85 °C  
Storage/transport temperature -70 °C to +85 °C  
Dimensions (W x H x D) 100m; d=15mm  
Mounting wall  
Protection class IP 65  
Weight 24 kg

### Fire behavior

Halogen free and flame retardant outer sheath  
Low corrosive gas emission acc. to IEC 60754-2  
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C  
Low smoke emission acc. to IEC 61034

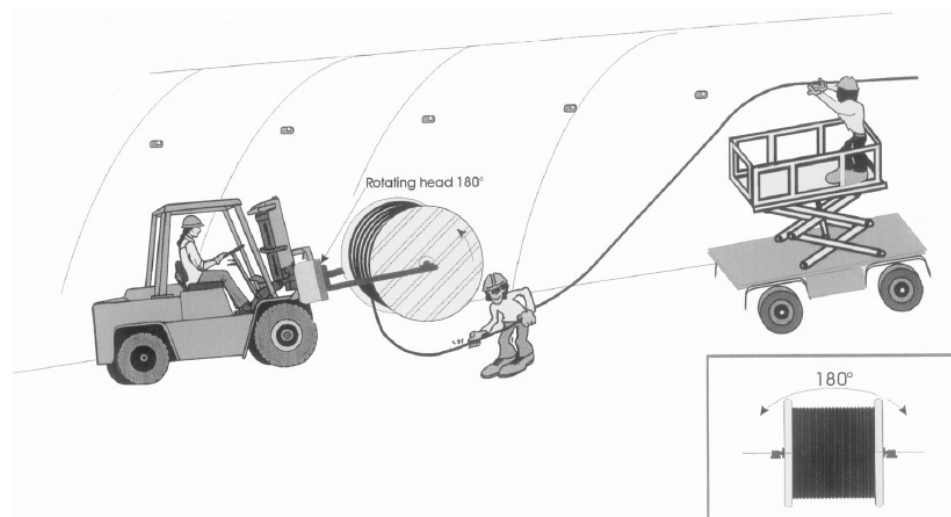
### Scope of delivery and accessories

Leaky Cable, 2 x N-connector preassembled, 1 x terminator 50 Ohm, 100 x fastening clip

### Longitudinal attenuation of both cables between 2.4 and 2.485 GHz

Configurations Longitudinal Attenuation

|                                     | dB/100 m |
|-------------------------------------|----------|
| LC at 10 cm from a concrete floor   | 15       |
| LC at 15 mm from a metal surface    | 17       |
| LC directly against a metal surface | 34       |





## Cables/Adapter

Available as accessories. Please note that all antennas are supplied with 1m cable N m-m and Pigtail!

### **BAT-CLB-2 N**

Low loss cable GX\_023272\_D-06

Order Number: **m-m**: 943 903 513; **m-f**: 943 903 514

#### **Characteristics**

|             |                                  |
|-------------|----------------------------------|
| Length      | 2 m                              |
| Attenuation | 1,4 dB / 2,4 GHz<br>3 dB / 5 GHz |
| Connector   | N male on male or male on female |
| Sealing     | IP65                             |



### **BAT- CLB- 15 N m-f**

Low loss cable

Order Number: 943 903 515

#### **Characteristics**

|             |                                |
|-------------|--------------------------------|
| Length      | 15 m                           |
| Attenuation | 4 dB / 2,4 GHz<br>7 dB / 5 GHz |
| Connector   | N male/ N female               |



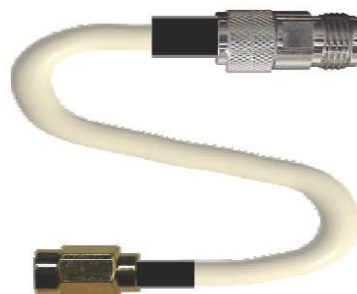
### **BAT- Pigtail**

Order Number: 943 903 360

**Note: Pigtail is already part of all antenna kits!**

#### **Characteristics**

|             |                                  |
|-------------|----------------------------------|
| Length      | 0,2 m                            |
| Attenuation | 0,5 dB / 2,4 GHz<br>1 dB / 5 GHz |
| Connector   | N female/ RPSMA-Plug             |





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## BAT-ANT Protector m-f

Order Number: 943 903 373



### Product Configuration

|                        |                                                                         |
|------------------------|-------------------------------------------------------------------------|
| Main path connectors   | Port 1: unprotected, N plug (male) - Port 2: protected, N jack (female) |
| Mounting and grounding | MH170/brk (MH=bulkhead mounting/brk=bracket)                            |
| Side of bulkhead       | protected side                                                          |
| Design specialty       | inline design                                                           |

### Technical Data

#### Electrical Data

|                                   |                                                                               |
|-----------------------------------|-------------------------------------------------------------------------------|
| Impedance                         | 50 Ohm                                                                        |
| Frequency range                   | 2000 to 6000 MHz                                                              |
| Return loss                       | $\geq 20$ dB                                                                  |
| Insertion loss                    | $\leq 0.2$ dB                                                                 |
| RF CW power                       | $\leq 300$ W                                                                  |
| PIM 3rd order                     | not specified                                                                 |
| Surge current handling capability | 50 multiple kA (test pulse 8/20 $\mu$ s)                                      |
| Residual pulse energy             | 0.0001 $\mu$ J typically (test pulse 4 kV 1.2/50 $\mu$ s / 2 kA 8/20 $\mu$ s) |
|                                   | Main path - protected side                                                    |

#### Mechanical Data

|        |      |
|--------|------|
| Weight | 85 g |
|--------|------|

#### Environmental Data

|                       |                                                                  |
|-----------------------|------------------------------------------------------------------|
| Operating temperature | -40 °C to +85 °C                                                 |
| Waterproof degree     | IP 65 (according to IEC 60529, data refers to the coupled state) |
| 2002/95/EC (RoHS)     | compliant                                                        |

**This BAT-ANT Protector is additionally equipped with a capacitor that also avoids damage of electrical static discharge.**

This device is strongly recommended to be used in- and outdoor wherever electrical discharge, overvoltage or unclear grounding occur.

Please refer to the **Outdoor Installation Guide** for how to mount and plan the installation.



# HIRSCHMANN

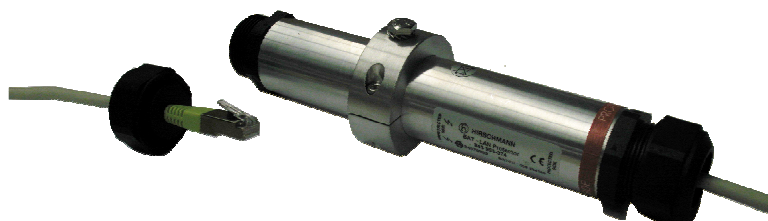
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## BAT-LAN Protector m-f

Order Number: 943 903 374

Surge and overvoltage protector for the PoE/LAN cable.

IP68 shielded. Cable not included.



### Product Configuration

|                        |                                                                     |       |
|------------------------|---------------------------------------------------------------------|-------|
| Main path connectors   | RJ45 jack (female) – RJ45 jack (unprotected side – protected side)  |       |
| Mounting               | via mounting bracket                                                |       |
| Grounding              | via mounting bracket or grounding screw M6 (cable shoe eye > 6,5mm) |       |
| Data transmission rate | 1000 Mbps                                                           |       |
| Frequency range        | DC to 100 MHz                                                       |       |
| Impedance              | 100Ohm                                                              |       |
| Votage rating          | line – line (pair)                                                  | ± 6V  |
|                        | line – ground                                                       | ± 60V |
| Current rating         | per line                                                            | 1,5 A |
| Response Time          | 2 ns                                                                |       |

Surge current handling capability 50 multiple kA (test pulse 8/20 µs)

|                    |        |
|--------------------|--------|
| line – line (pair) | 0,1 kA |
| line – ground      | 2,5 kA |
| screen – ground    | 6 kA   |

|                       |                                                                    |
|-----------------------|--------------------------------------------------------------------|
| Cable category        | acc. to ISO/IEC 11801:2002 class D specified (up to CAT-5e system) |
| Operating temperature | -40° to +85 °C                                                     |
| Protection class      | IP68                                                               |
| Weight                | 330 g                                                              |

Please refer to the **Outdoor Installation Guide** for how to mount and plan the installation.



## Output power calculation

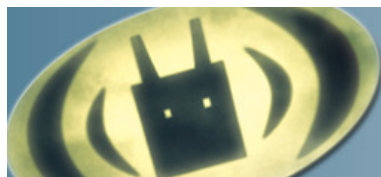
WLAN systems need to be set up in a way that the country's regulatory restrictions are not violated. Hirschmann™ has prepared BAT devices in a way that they can be configured accordingly.

→ choose the correct country setting

→ enable or disable DFS if necessary ( e.g. by choosing indoor mode)

→ insert the correct gain of the antenna/cable/protector system

Please refer to the user's manual for instructions how to configure BAT devices correctly.



## Antenna Distance Calculator

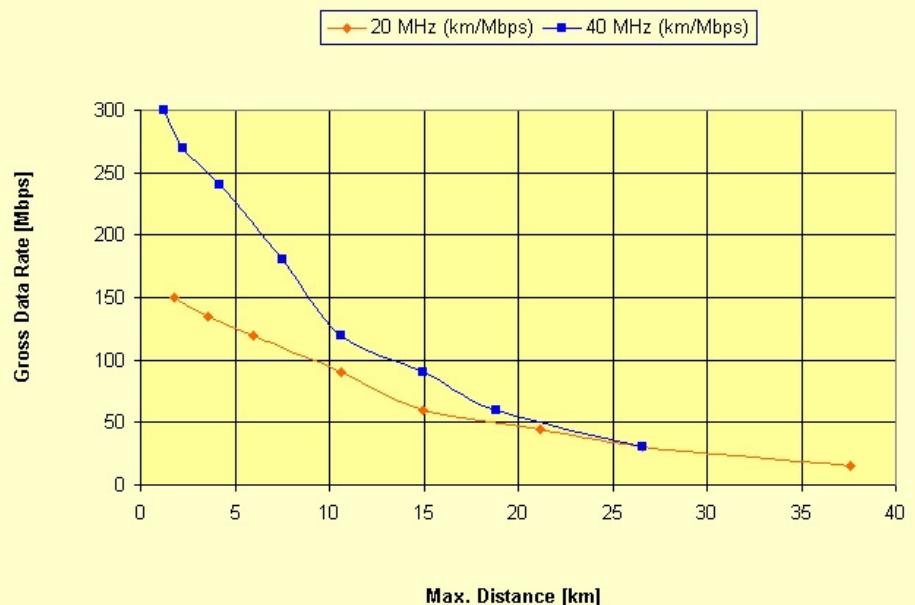
In order to easily calculate the possible range and distance of a WLAN installation, Hirschmann provides the Antenna Distance Calculator.

Please download this Excel tool from [www.hirschmann-ac.de](http://www.hirschmann-ac.de) or [www.hirschmann-ac.com](http://www.hirschmann-ac.com).

Maximum distance calculated between point A and B by using maximum output power of 20dB (2.4 GHz), 30dB (5GHz) or 36db (BFWA) respectively.

| Gross Data Rate [Mbps] | Max. Distance [km]    |
|------------------------|-----------------------|
| (for P2P radio links)  | (for P2P radio links) |
| 15,0                   | 37,584                |
| 30,0                   | 26,607                |
| 45,0                   | 21,135                |
| 60,0                   | 14,962                |
| 90,0                   | 10,593                |
| 120,0                  | 5,957                 |
| 135,0                  | 3,548                 |
| 150,0                  | 1,778                 |
| 30,0                   | 26,607                |
| 60,0                   | 18,836                |
| 90,0                   | 14,962                |
| 120,0                  | 10,593                |
| 180,0                  | 7,499                 |
| 240,0                  | 4,217                 |
| 270,0                  | 2,239                 |
| 300,0                  | 1,259                 |

Distance to Data Rate



Maximum of 100Mbps netto available.



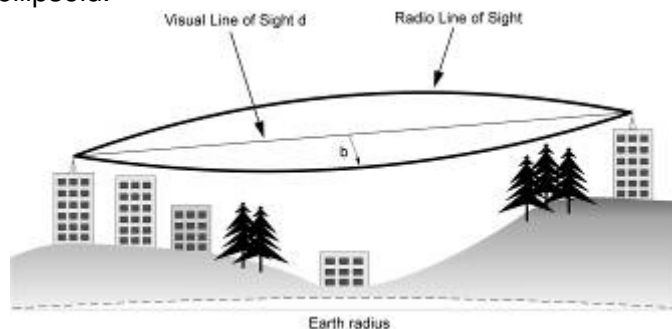
## Fresnel Zone

The Hirschmann™ Antenna Distance calculator is based on the following calculation scheme:

In order to make an undisturbed transmission possible the transmission circuit between the antennas needs a free area. This 1st Fresnel zone has the form of an ellipsoid of rotation whereby the antennas are located in the focal points of the ellipsoid.

This zone is calculated by the shaft section  $b$  of the ellipsoid

$$b = 0,5 \cdot \sqrt{(\lambda \cdot d)}$$



$d$  stands for the distance between the antennas (km)

$\lambda$  = wavelength of electromagnetic wave  $\lambda = c / f$

$c$  is the speed of the wave, nearly like vacuum approx. 300,000 km/s

$f$  = frequency of the wave in 1/s = Hz.

### Examples:

$d = 2\text{km}$

$f = 2.4\text{ GHz}$

$$b = 0.5 \cdot \sqrt{(300,000\text{km/s} / 2.4\text{GHz} \cdot 2\text{km})} = 7.9\text{m}$$

$f = 5.8\text{ GHz}$

$$b = 0.5 \cdot \sqrt{(300,000\text{km/s} / 5.8\text{GHz} \cdot 2\text{km})} = 5\text{m}$$

At distance above 2 km, it is necessary to add earth curvature to calculate the altitude at which the antenna has to be mounted. Some examples:

5km  $\Rightarrow$  0.50m

10km  $\Rightarrow$  2.00m



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## **Statement about passive antennas in hazardous environment**

All Hirschmann™ BAT-ANT antennas are passive devices which are not able to increase the power by themselves.

The BAT54-F X2 fulfils the requirements of **EN 60 079-15 (IEC60079-15)**  
(type of protection: Ex nA II T4) independent of the passive accessories used.

See KEMA test report No. 2109557, Annex A.1., last clause "Other issues"

*The radiated radio frequency energy is not more than 100 mW (less than 20dBm), which is acceptable for apparatus group IIC (maximum 2W allowed in accordance with TR EN 50427)*

Hirschmann™ therefore states that all BAT-ANT antennas can be used in Atex Zone II in operation with the certified BAT54-F X2.