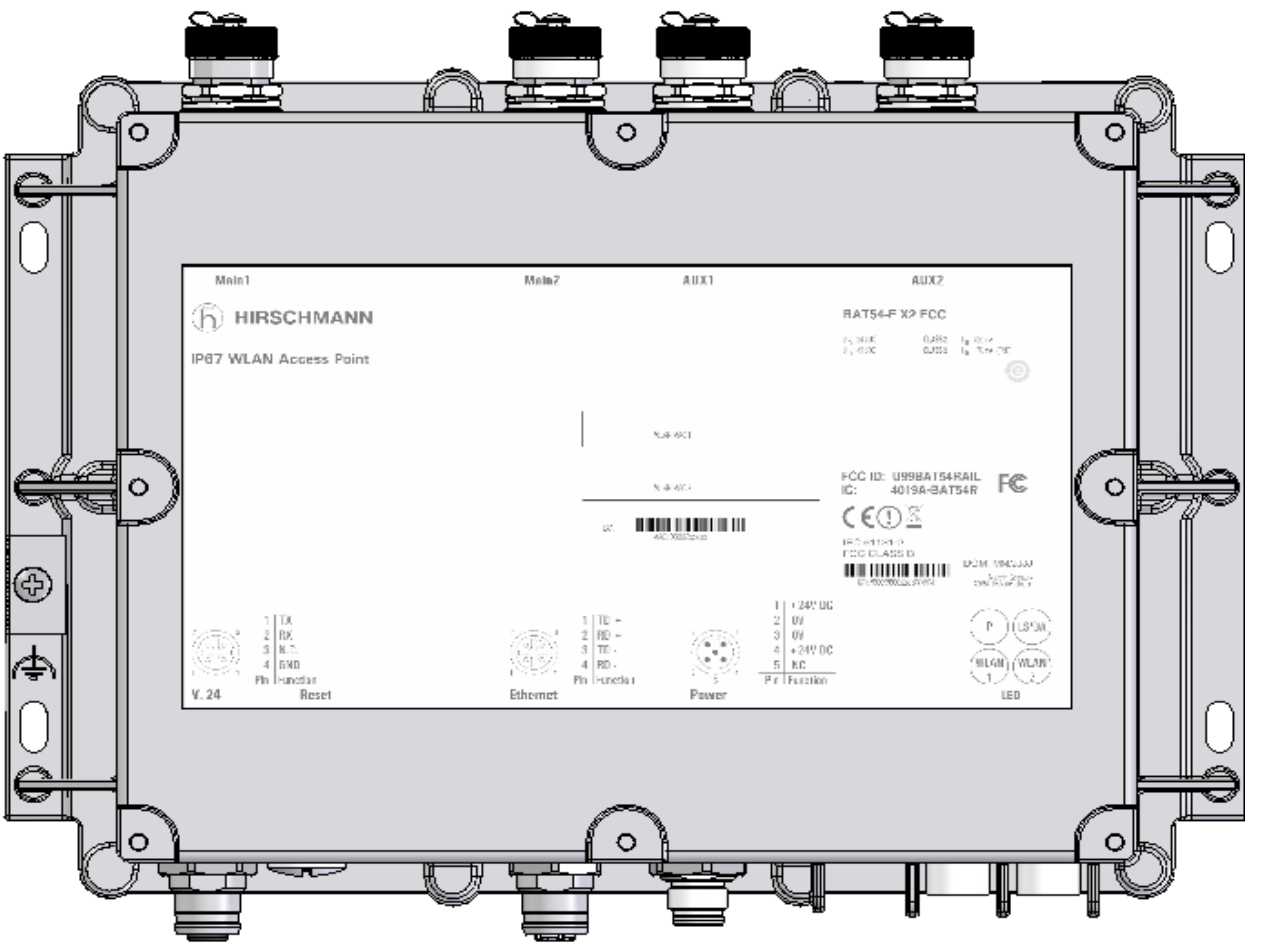
HIRSCHMANN
A Belden Company

User Manual

Installation
Dual-Band Industrial Access Point / Access Client / Access Bridge
BAT54-F Outdoor Series



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BAT54-F
Release 12/07

Technische Unterstützung
HAC-Support@hirschmann.de

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Contents

Safety instructions

This documentation contains instructions which must be observed to ensure your own personal safety and to avoid damage to devices and machinery.

Certified usage

The device may only be employed for the purposes described in the catalog and technical description, and only in conjunction with external devices and components recommended or approved by the manufacturer. The product can only be operated correctly and safely if it is transported, stored, installed and assembled properly and correctly. Furthermore, it must be operated and serviced carefully.

Supply voltage

The devices are designed for operation with a safety extra-low voltage. Accordingly, only PELV circuits or SELV circuits with voltage restrictions in line with IEC/EN 60950 may be connected to the supply voltage connections.

The supply voltage is electrically isolated from the housing.

☐ Use only undamaged parts!

☐ Relevant for North America:
The subject unit is to be supplied by a Class 2 power source complying with the requirements of the National Electrical Code, table 11(b). If power is redundant supplied (two individual power sources) the power sources together should comply with the requirements of the Na-tional Electrical Code, table 11 (b).

☐ Relevant for North America:
Use 60/75°C or 75°C copper(CU)wire only.

Shielding ground

The shielding ground of the connectable twisted pair lines is connected to the housing as a conductor.

☐ Beware of possible short circuits when connecting a cable section with conductive shielding braiding.

Housing

Only technicians authorized by Hirschmann are permitted to open the housing.

A separate screw connection on the housing is provided for the function ground. It is indicated by the function ground symbol. The function ground is electrically connected to the switching ground and the metal housing of the device.

☐ Make sure that the electrical installation meets local or nationally applicable safety regulations.

☐ Never insert pointed objects (thin screwdrivers, wires, etc.) into the inside of the subrack! Failure to observe this point may result in injuries caused by electric shocks.

Environment

The device may only be operated at the specified maximum ambient temperature and relative air humidity (non-condensing).

☐ Install the device in a location where the climatic threshold values specified in the technical data are adhered to.

☐ Only to be used in an environment with the contamination level specified in the technical data.

☐ When installing external antennas, make sure that you adhere to the regulations of the country in which you are operating the WLAN device.

☐ In ambient temperatures under -10 °C, use cabling designed for minimum temperatures.

Relevant for use in Ex zone 2 according to ATEX 95 (ATEX 100a):
Only products labeled accordingly may be operated in Ex zone 2.
When operating the device in Ex zone 2, the following applies:

II 3G
Ex nA II T4 -20°C ... +60°C
KEMA 07 ATEX 0190

Temperature code T4	Ambient –20 °C … +60 °C
List of standards	EN 60079-0: 2006
	EN 60079-15: 2005
	CLC/TR 50427: Dec. 2004

DO NOT OPEN THE DEVICE WHEN IT IS ELECTRICALLY CHARGED.
DO NOT DETACH ANY CONNECTORS WHEN THE DEVICE IS ELECTRICALLY CHARGED.
DO NOT REMOVE THE LABELED HOUSING COVER.

☐ The BAT54-F X2 (FCC) devices are installed with a housing cover - as mounted in the state on delivery.

Qualification requirements for personnel

Qualified personnel as understood in this manual and the warning signs, are persons who are familiar with the setup, assembly, startup, and operation of this product and are appropriately qualified for their job. This includes, for example, those persons who have been:

▶ trained or directed or authorized to switch on and off, to ground and to label power circuits and devices or systems in accordance with current safety engineering standards;

- trained or directed in the care and use of appropriate safety equipment in accordance with the current standards of safety engineering;
- trained in providing first aid.

General safety instructions

This device is electrically operated. Adhere strictly to the safety requirements relating to voltages applied to the device as described in the operating instructions!

Failure to observe the information given in the warnings could result in serious injury and/or major damage.

- ☐ Only personnel that have received appropriate training should operate this device or work in its immediate vicinity. The personnel must be fully familiar with all of the warnings and maintenance measures in these operating instructions.
- ☐ Correct transport, storage, and assembly as well as careful operation and maintenance are essential in ensuring safe and reliable operation of this device.
- ☐ Only use undamaged parts!
- ☐ These products are only to be used in the manner indicated in this version of the manual. Particular attention is to be paid to all warnings and items of information relating to safety.
- ☐ Any work that may have to be performed on the electrical installation should be performed by fully qualified technicians only.

National and international safety regulations

- ☐ Make sure that the electrical installation meets local or nationally applicable safety regulations.
- ☐ When installing external antennas, make sure that you adhere to the regulations of the country in which you are operating the WLAN device.

Note on the CE marking

The devices comply with the regulations contained in the following European directives:

2006/95/EG, 89/336/EWG
Directive of the council for standardizing the regulations of member states on electromagnetic compatibility (changed by RL 91/263/EEC, 92/31/EEC and 93/68/EEC).

1999/5/EG
Directive of the European Parliament and the council for radio installations and telecommunication systems and for the mutual recognition of their conformity.

2006/95/EG
Directive of the European Parliament and the council for standardizing the regulations of member states with regard to electrical equipment for use within specific voltage limits.

In accordance with the above-named EU directives, the EU conformity declaration will be at the disposal of the relevant authorities at the following address:

Hirschmann Automation and Control GmbH
Stuttgarter Strasse 45-51
72654 Neckartenzlingen
Tel.: +49 1805 141538

The product can be used in living areas (living area, place of business, small business) and in industrial areas.

Warning!
This is a class A device. This device can cause interference in living areas, and in this case the operator may be required to take appropriate measures.
The assembly guidelines provided in these instructions must be strictly adhered to in order to observe the EMC threshold values.

FCC note

Appropriate testing has established that this device fulfills the requirements of a class A digital device in line with part 15 of the FCC regulations.
These requirements are designed to provide sufficient protection against interference where the device is being used in a business environment. The device creates and uses high frequencies and can radiate same, and if it is not installed and used in accordance with this operating manual, it can cause radio transmission interference. The use of this device in a living area can also cause interference, and in this case the user is obliged to cover the costs of removing the interference.

Recycling note

After usage, this product must be disposed of properly as electronic waste in accordance with the current disposal regulations of your county / state / country.

About this manual

The following manuals are available as PDF files on the CD-ROM supplied:

- "Installation" user manual
- Reference Manual

Legend

The commendations used in this manual have the following meanings:

▶	Listing
☐	Work step
■	Subheading

1 Device description

1.1 Properties and functions

The BAT54-F enables you to set up WLANs (Wireless Local Area Networks) in order to connect individual devices (PCs and mobile computers) with a local network. In contrast to a conventional LAN, the communication here is by means of radio links, not network cables.
The BAT54-F devices can be used for both new installations and for expanding an existing LAN. Thanks to their high level of flexibility, you can combine large, small, mobile and non-mobile locations. Anywhere that high bandwidths, stable operation and network security is required, wireless LAN with the BAT54-F provides the ideal solution.
The BAT54-F is an access point/access client with a WLAN interface for dualband operation in accordance with IEEE802.11b/g and IEEE802.11a/h, and it is specially designed for outdoor use with protection class IP67. The BAT54-F can be installed quickly and easily using wizards via the Windows configuration software or the Web interface. The wide range of BAT antennas provide the correct solution for every requirement - even out-of-the-box solutions.

The devices are designed for the special requirements of industrial automation. They are suitable for outdoor use and in environments with the danger of explosions. They meet the relevant industry standards, provide very high operational reliability, even under extreme conditions, and also long-term reliability and flexibility. The devices operate without fans and have a redundant voltage supply. You can mount the devices on a wall or a pole.

It can be easily managed via a Web browser, via Telnet, with a management software product (such as HiVision) or locally on the device (V.24 interface).

The devices differ with regard to their certification and the type of integrated intenna (if included).

The devices provide you with a large range of features:

- Sturdy metal housing with protection class IP67
- Secure wall and pole mounting
- Redundant power supply with two 24V supplies and one Power over ETHERNET supply
- Temperature range –20° to +55°C
- Wireless LAN interfaces in accordance with IEEE802.11b/g and IEEE802.11a/h
- Creation of redundant WLAN connections for secure data transmission

- Transmission with up to 108 MBit/s for each radio module
- Also maximum security for point-to-point with IEEE802.11i
- RS-232 serial interface for configuration and remote access
- Both radio modules can be operated separately as an access point or access client
- High mobility combined with maximum security
- Faster roaming and prioritizing, also with 802.1x authentication
- High performance operating system with high range of functions via MultiSSID, VLAN, Rapid SpanningTree, RADIUS server, IP router, firewall, DHCP server, etc.
- Management software for Windows, Web configuration, Telnet interface and management via SNMP

Antenna technology for a high quality signal

- For operation indoors and outdoors
- Mounting with cables provided
- Secure wall and pole bracket
- Optimized distribution and performance for every application
- Long transmission distances
- Designed for 2.4 GHz and 5 GHz wave bands

Cross-platform WLAN management

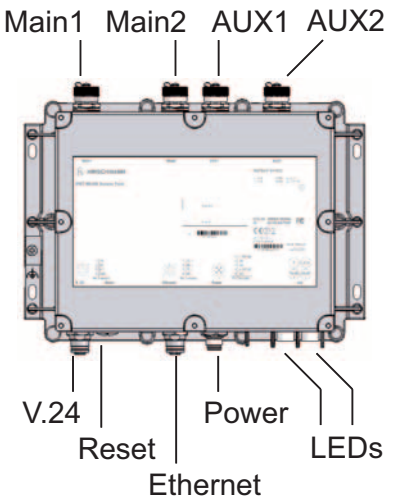
- A standardized, cross-platform management system for transparent and efficient network monitoring
- Windows management suite: LANconfig, LANmonitor, WLANmonitor
- Direct management via Web browser (HTTP, HTTPS)
- Command line level: TelNet
- Can always be reached via serial interface
- Partial configuration of multiple devices via scripting
- WLANmonitor for convenient monitoring of WLANs with Rogue AP Detection
- Monitoring of all BAT54-F devices as clients and as access points in an application

Communication via all levels

The addition, to the BAT wireless transmission system, of the RS20/RS30/RS40 open rail range of switches, the MICE range of switches, the MACH range of backbone switches, the EAGLE security system, and products for the LION control room, provides continuous communication across all levels of the company.

1.2 Connections

The devices are equipped with the following connections and operation elements:



- **Main1:** Main connection for the first WLAN module for connecting external antennas
- **Main2:** Main connection for the second WLAN module for connecting external antennas
- **AUX1:** Auxiliary connection for the first WLAN module for connecting external antennas
- **AUX2:** Auxiliary connection for the second WLAN module for connecting external antennas
- **V.24:** Serial interface, 4-pin M12 socket with A coding, data rate min. 19.2 kbit/s, max. 115 kbit/s, for connecting serial configuration cable
- **Ethernet port:** 4-pin M12 socket with D coding 10/100BASE-TX, Autosensing, Power over Ethernet (PoE), automatic MDI/MDIX recognition (no crossover cable required)
- **Power:** Power supply connection for safety extra-low voltage (SELF/PELV), 5-pin M12 plug
- **Reset button:** Restarts device or resets the configuration

1.3 Device models

Device	Area of application
BAT54-F FCC	Under extreme conditions
BAT54-F	Under extreme conditions
BAT54-F X2 FCC	Under extreme conditions, including environments with the danger of explosions
BAT54-F X2	Under extreme conditions, including environments with the danger of explosions

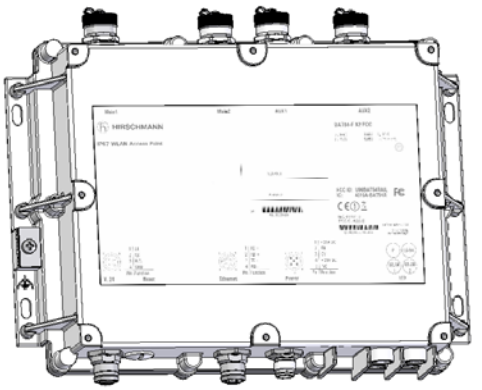


Figure 1: Device models BAT54-F, BAT54-F FCC

Figure 2: Device models with housing cover: BAT54-F X2, BAT54-F X2 FCC

1.4 External antennas

External antennas are required to operate the access point.
You will find an overview of the antennas that are supported and can be connected, along with the technical data, on the Hirschmann website under www.hirschmann-ac.com.

☐ When installing external antennas, make sure that you adhere to the regulations of the country in which you are operating the WLAN device.

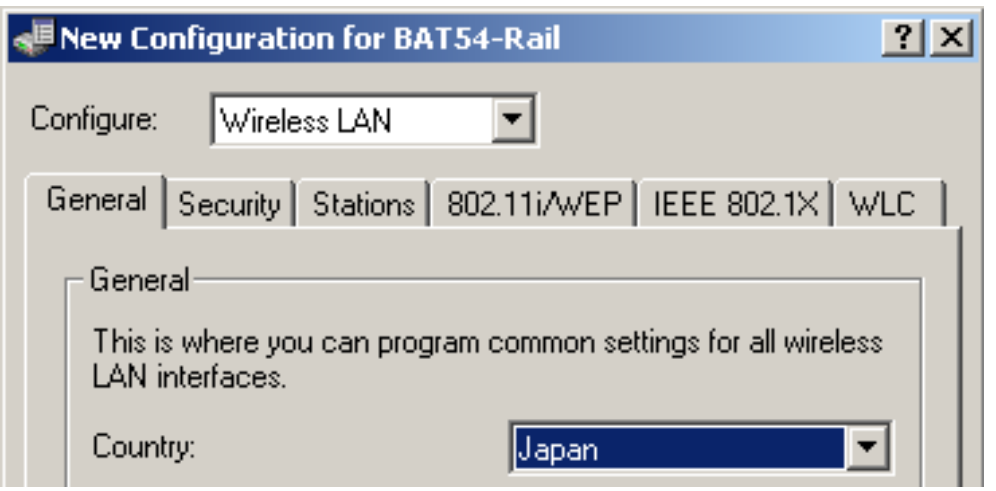
1.4.1 Transmission power

The operator of a WLAN radio installation must ensure that the transmission threshold values are adhered to.
Hirschmann provides support in adhering to the transmission power threshold values.

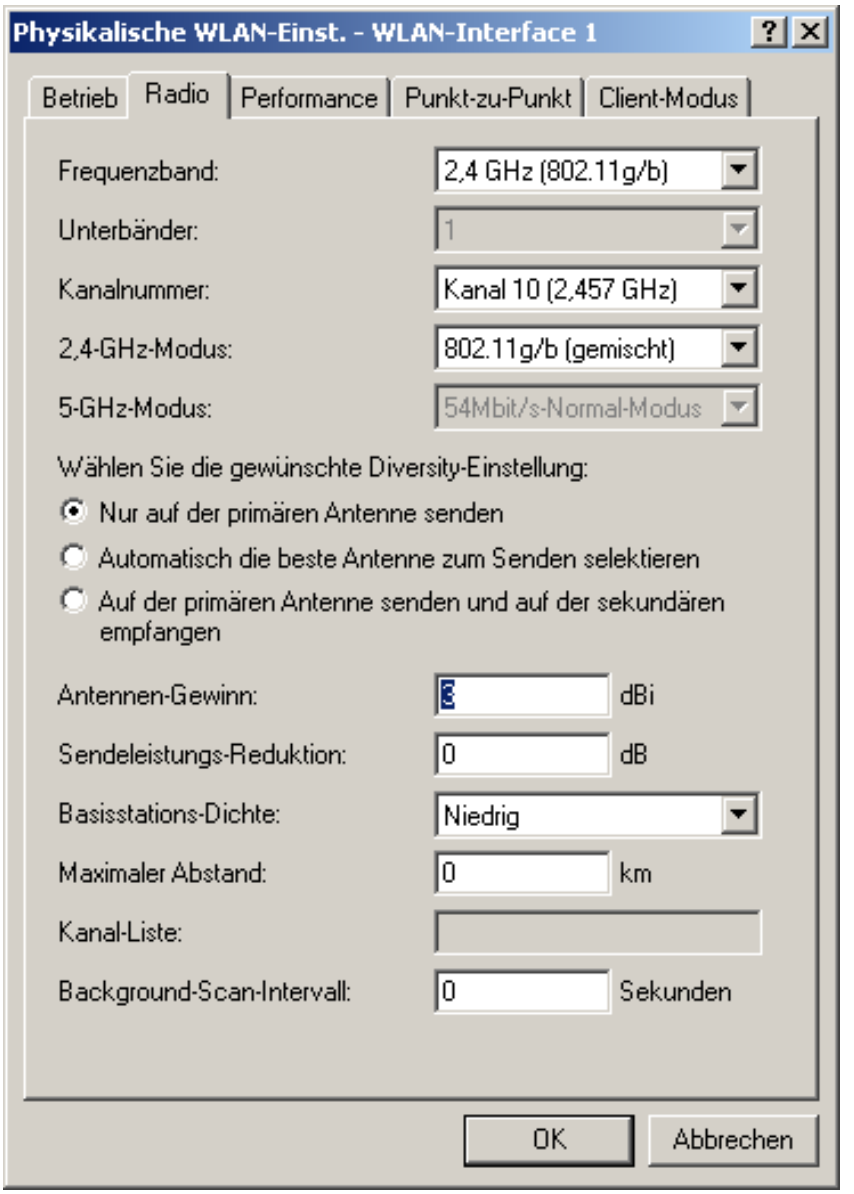
☐ Use LANconfig to start the configuration of the device. (This program is located on the CD provided.)

☐ Go to the settings for "Wireless LAN".

☐ There you enter the country in which you are installing the device (see the following figure).



☐ Then you open the configuration for the physical interface to which you are connecting the antenna. On the "Radio" tab you will find an entry field for the "antenna gain" (see the following figure).



☐ Here you enter the value listed for your antenna in the following table.

Antenna designation	Frequency range	Entry under "Antenna gain" in dBi
BAT-ANT-N-8G	2.4 GHz	8
BAT-ANT-N-8A	5 GHz	8
BAT-ANT-N-6ABG	2.4 GHz	6
	5 GHz	8
BAT-ANT-TNC-B-D-085-01	2.4 GHz	9
BAT-ANT-TNC-B-D-085-02	2.4 GHz	9
BAT- ANT- TNC- 8B/G DS	2.4 GHz	9
BAT- ANT- TNC- 10 A DS	5 GHz	10
BAT- ANT- N-14G	2.4 GHz	14
BAT-ANT-N-12A	5 GHz	12
BAT- ANT- N – 23/9 A	5 GHz	23

When the antenna gain is set correctly, the power emitted from the antenna is reduced so that the overall system adheres to the EIRP threshold values (transmission power output of the antenna).

The following frequency ranges, tranmission modes and maximum transmission powers are permitted in Japan:

Allowed channels for 2.4 GHz non-turbo operation
Channel(s) 1(2412 MHz), 2(2417 MHz), 3(2422 MHz), 4(2427 MHz), 5(2432 MHz), 6(2437 MHz), 7(2442 MHz), 8(2447 MHz), 9(2452 MHz), 10(2457 MHz), 11(2462 MHz), 12(2467 MHz), 13(2472 MHz), 14(2484 MHz):

- EIRP limit 18 dBm
- Both indoor and outdoor usage

Allowed channels for 2.4 GHz turbo operation
Channel(s) 6(2437 MHz):

- EIRP limit 20 dBm
- Both indoor and outdoor usage

Channel(s) 14(2484 MHz):

- EIRP limit 20 dBm
- Both indoor and outdoor usage

Allowed channels for 5 GHz non-turbo operation
Channel(s) 36(5180 MHz), 40(5200 MHz), 44(5220 MHz), 48(5240 MHz):

- EIRP limit 23 dBm
- Indoor only usage

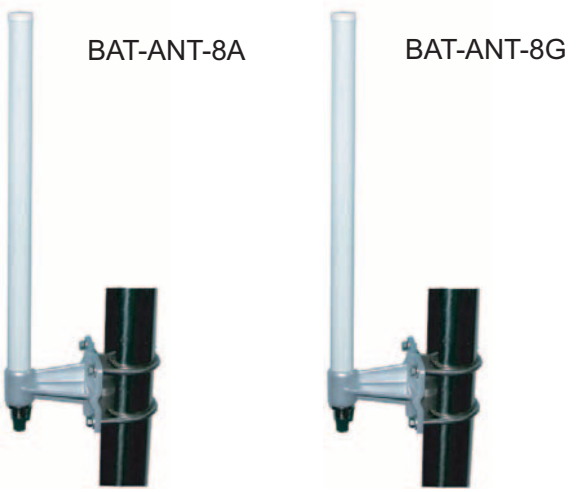
Allowed channels for 5 GHz turbo operation
(Nothing allowed)

1.4.2 Omnidirectional antennas

The following antennas are available for 2.4 and 5 GHz:

- **BAT-ANT-8G** (2.4 GHz) or **BAT-ANT-8A** (5 GHz)

Antennas with omnidirectional characteristics for use in halls or open spaces.



▶ **BAT-ANT-N-6ABG** (2.4 / 5 GHz)
Omnidirectional antenna (hemispherical antenna) for use in both frequency ranges. In industrial environments, this is the preferred choice for use on mobile devices or switch cabinets. It is water resistant and sealed in accordance with protection class IP67.

BAT-ANT-N-6ABG

1.4.3 Beam antennas

The following antennas are available for 2.4 and 5 GHz:

▶ **BAT-ANT-TNC-B-D-085-01** (circular, 2.4 GHz)
Circular polarized sector antenna. Reduces packet losses caused by faults, reflection or interference.

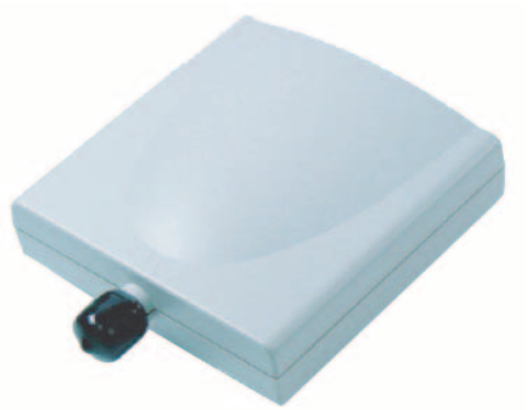
BAT-ANT-TNC-B-D-085-01

▶ **BAT-ANT-TNC-B-D-085-02** (linear, 2.4 GHz)
Sector antenna for 2.4 GHz indoors and outdoors.

BAT-ANT-TNC-B-D-085-02

▶ **BAT-ANT-N-12A** (linear, 5 GHz)
Sector antenna for 5 GHz band indoors and outdoors.

BAT-ANT-N-12A



▶ **BAT-ANT-TNC-8b/g DS** (linear, 2.4 GHz) or
BAT-ANT-TNC-10 A DS (linear, 5 GHz)
Sector antennas with polarization diversity. Reduction in packet losses through use of vertical and horizontal polarization. Supported by the diversity antenna connections of the BAT54-F. Select the "Use best antenna for transmission" setting in the WLAN interface setting.

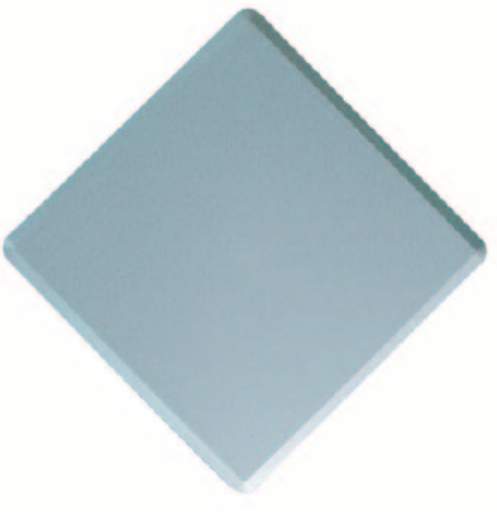
BAT-ANT-TNC-8b/g DS

BAT-ANT-TNC-10 A DS

- **BAT-ANT-N-23/9 A** (linear, 5 GHz) or
  BAT- ANT- N-14G (linear, 2.4 GHz)

Strongly directed antenna for bridging large distances in the open. Ideal for point-to-point connections.

BAT-ANT-N-23/9 A



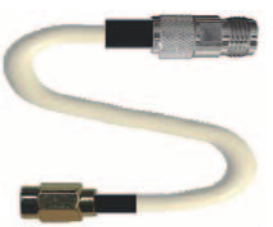
BAT-ANT-N-14G

1.5 Cables and adapters

BAT-CLB-7-TNC
Low loss cable ULA400

BAT-CLB-7-N
Low loss cable ULA400

BAT-Pigtail



BAT Surge Arrestor

Cables

- **BAT-CLB-7-N**
  Antenna cable 7 m, N plug to N plug, ULA400,
  attenuation 2 dB at 2.4 GHz, 3 dB at 5 GHz
- **BAT-CLB-7-TNC**
  Antenna cable 7 m, N plug to TNC plug, ULA400,
  attenuation 2 dB at 2.4 GHz, 3 dB at 5 GHz

Adapters

- **BAT-Pigtail**
  Adapter from RP-SMA plug to N socket,
  attenuation 0.5 dB at 2.4 GHz, 3 dB at 5 GHz
- **BAT Surge Arrestor**
  Lightening protection adapter, N socket to N socket

2 Assembly and start-up

The devices have been developed for practical application in a harsh industrial environment. The installation process is correspondingly simple.

On delivery, the device is ready for operation.
The following procedure has been proven to be successful for the assembly of the device:

- Unpacking and checking
- Setting up the device
- Wall mounting
- Pole mounting
- Mounting/connecting external antennas
- Connecting LAN and WLAN connections
- Connecting the supply voltage
- Grounding
- Installing the data lines
- Mounting the housing cover
- Startup
- Finding and configuring devices

2.1 Unpacking and checking

☐ Check whether the contents of the package are complete (see page 36 "Scope of delivery").
☐ Check the individual parts for transport damage.

2.2 Installing the device

To protect the exposed contacts of the components still to be installed from dirt, the individual system components must be connected in a dry and clean area. Seal unused ports with the cover caps supplied.

Note: Connectors are not electrical isolating devices.
Therefore, first plug the connector into the power supply plug and then switch on the power supply.

Note: Protection class IP67 is only achieved if all the connected components also fulfill protection class IP67.

☐ Cover unused connections with the cover caps supplied.
☐ Only connect plugs and other components that fulfill protection class IP 67 and that are certified for a temperate range from -20 °C to +55 °C.

2.2.1 Setting up the device

☐ Set up/mount the device in a location where the ambient conditions specified in the technical data are adhered to.

2.2.2 Wall mounting

☐ Prepare the drill holes at the installation point.
☐ Mount the device on a level surface with four M5 screws.

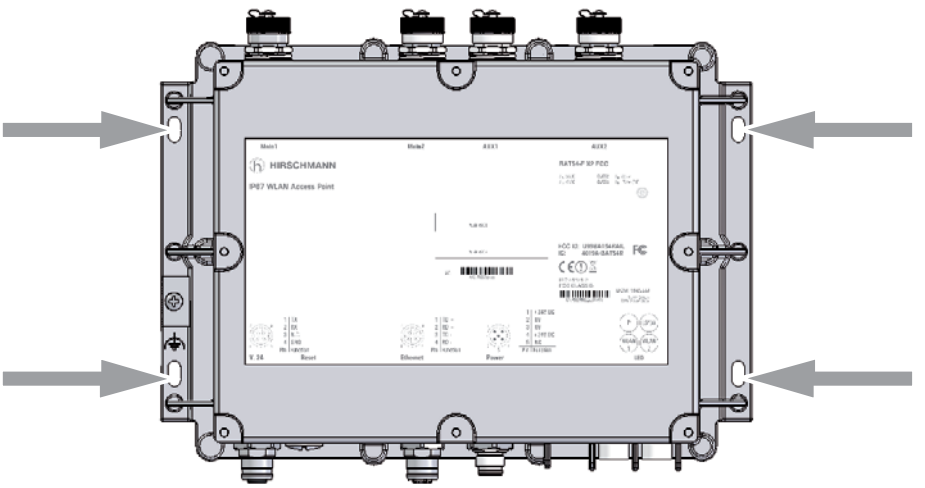


Figure 3: BAT54-F wall mounting

2.2.3 Mounting the device outdoors

Note: Set up the antenna close to the device. Use the shortest antenna cable possible.

Note: Problems with cable-free installations outdoors are usually due to reduced performance caused by corrosion processes in the antenna cable and the cable connectors.
Therefore, you should always seal the outdoor cable connectors with water-resistent tape.

Pole mounting

The BAT54-F devices are designed for pole mounting with the additional BAT54-F pole mounting set (see on page 37 "Accessories").

The BAT 54 pole mounting set is designed for:

- Pole diameter: 37 mm to 60 mm
- Maximum permitted wind load: 220 km/h.

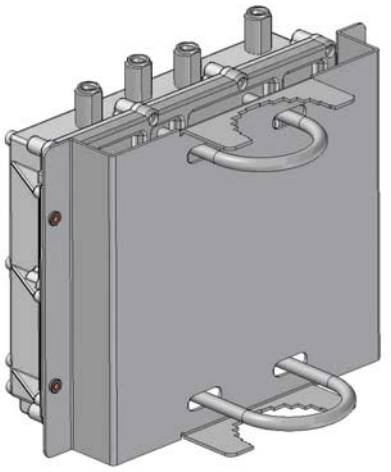


Figure 4: BAT54 pole mounting set

Lightening protection

Warning! The antenna should not be the highest point in the area. If this is the case, use a lightening conductor to divert lightening strikes.

Lightening protection is an indispensible part of your outdoor antenna installation. It protects your sensitive electronic devices from transient or electrostatic discharges to the antenna.

Warning! Antennas placed outdoors must be within the catchment area of a lightening conductor. Make sure that there is lightening protection equipotential bonding for all conductive systems leading from outdoors. When implementing your lightening protection concept, make sure you meet the requirements of standards VDE 0182 and IEC 62305.

Hirschmann recommends using the Hirschmann BAT Surge Arrestor as lightening protection (see on page 37 "Accessories").

Figure 5: BAT Surge Arrestor lightening protection

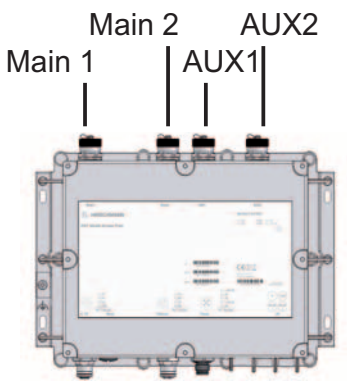
Warning! Installing this lightening protection element between an antenna and a BAT54-F does not alone provide sufficient protection against a lightening strike. The BAT Surge Arrestor lightening protection element only works as part of a comprehensive lightening protection concept. If you have any questions relating to this, contact a qualified dealer.

Note: The requirements of EN61000-4-5, surge test on power supply lines, are only met if a Blitzductor VT AD 24V, article No. 918 402, is used. Manufacturer: DEHN+SÖHNE GmbH+Co.KG, Hans Dehn Str.1, Postfach 1640, D-92306 Neumarkt.

Warning! Connect the external antenna, the access point radio interface and the lightening protection to the same ground system, e.g. to the building ground.

2.2.4 Mounting/connecting external antennas

The BAT54-F devices have four connections for connecting external antennas (AUX 1 / AUX 2, Main 1 / Main 2). These connections are N sockets. The housing of the N socket and the signal connection are electrically connected to the switching ground, the function ground and the metal housing of the device.
On delivery, the connections are sealed with cover caps.



☐ Unscrew the cover caps from the connections to which you want to connect external antennas.

☐ Connect the external antenna to the corresponding 'Antenna Main' connection.

☐ If you only want to connect one antenna with only one connection for each radio module, you use the main connection.

☐ Use the respective main connection of the two WLAN modules to connect antennas with only one antenna connection without diversity.

☐ Use the main and auxiliary connections of one WLAN module if you want to use the diversity function. The diversity function increases the connection quality by always sending or receiving via the antenna providing the best contact to the client.

Note: Please insert the terminators supplied into the sockets not being used in order to avoid radio signals from one WLAN module being received by the other WLAN module.

2.2.5 Connecting LAN and WLAN connections

☐ Connect the access point to your LAN for configuration.
☐ Assemble the network cable with the M12 plug supplied.
☐ Plug the network cable into the LAN connection of the device, and into a free network connection socket on your local network (or into a free socket on a hub/switch). Alternatively, you can also connect the device to a separate PC.

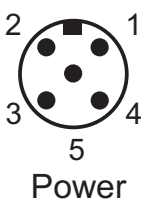
In the "Dual-Band Industrial Access Point / Access Client / Access Bridge BAT54-Rail" user manual, you will find further information for connecting the LAN and WLAN connections with the corresponding remote terminals.

2.2.6 Connecting the supply voltage

Note: For redundant and failure-resistant power supply, you can connect multiple power sources in any combination at the same time. The device automatically selects the power supply. If the power supply currently active fails and another power supply takes over the supply of power to the device, the device may reboot in order to reactivate the power supply.

5-pin M12 connector

A 5-pin M12 connector (A coding, supplied) is used to connect the power supply.
On delivery, the connection is sealed with a cover cap.
The housing of the M12 frame connector is electrically connected to the function ground and to the metal housing of the device. The supply voltage is electrically isolated from the housing.



Power

Pin	Function
1	+24V DC
2	0 V
3	0 V
4	+24V DC
5	N.C.

Power over Ethernet (PoE) - power supply via the LAN cable

Hirschmann Wireless Routers are prepared for the PoE (Power over Ethernet) procedure and conform to the 802.3af standard. PoE-capable network devices can be elegantly supplied with power via the LAN cable. This makes it unnecessary to have a separate power connection for every basis station, thus considerably reducing the work involved in the installation.

The power is input via the wire pairs transmitting the signal (IEEE 802.3af, mode A).

The power supply to the LAN is input centrally, via a PoE injector or a power hub/power switch.

Warning! In a PoE installation, only use devices that adhere to the 802.3af standard! No warranty claims can be made for damage caused by the use of impermissible devices.

2.2.7 Grounding

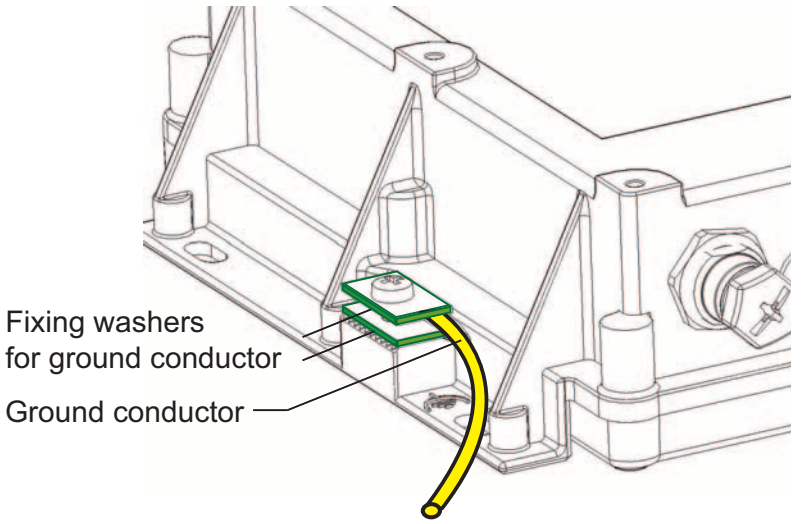
A separate anti-torsion screw connection on the housing is provided for the function ground. It is indicated by the function ground symbol. The function ground is electrically connected to the switching ground and to the metal housing of the device.

☐ For the ground wire, use a copper wire with a cross section of 4 mm^2 to 6 mm^2 (including any terminal sleeve used), and implement the grounding of the device via the screw connection.

☐ Clamp the ground wire between the two rectangular fastening plates - as shown in the figure below - and fasten the screw.

☐ Make sure that the ground wire is not in direct contact with the aluminum housing of the device.

BAT54-F ground connection



2.2.8 Installing the data lines

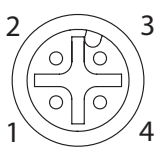
10/100 Mbit/s twisted pair connection

10/100 Mbit ports enable the connection of terminal devices or independent network segments according to the IEEE 802.3 100BASE-TX / 10BASE-T standard.
These ports support:

- Autonegotiation
- Autopolarity
- Autocrossing (if autonegotiation is activated)
- 100 Mbit/s half duplex mode, 100 Mbit/s full duplex mode
- 10 Mbit/s half duplex mode, 10 Mbit/s full duplex mode

Delivery condition: auto-negotiation activated.

The TP connection is a 4-pin M12 female connector with D coding. On delivery, the connection is sealed with a cover cap.
The housing of the M12 socket is electrically connected to the function ground and to the metal housing of the device. The connection pins are electrically separated from the function ground and the metal housing.

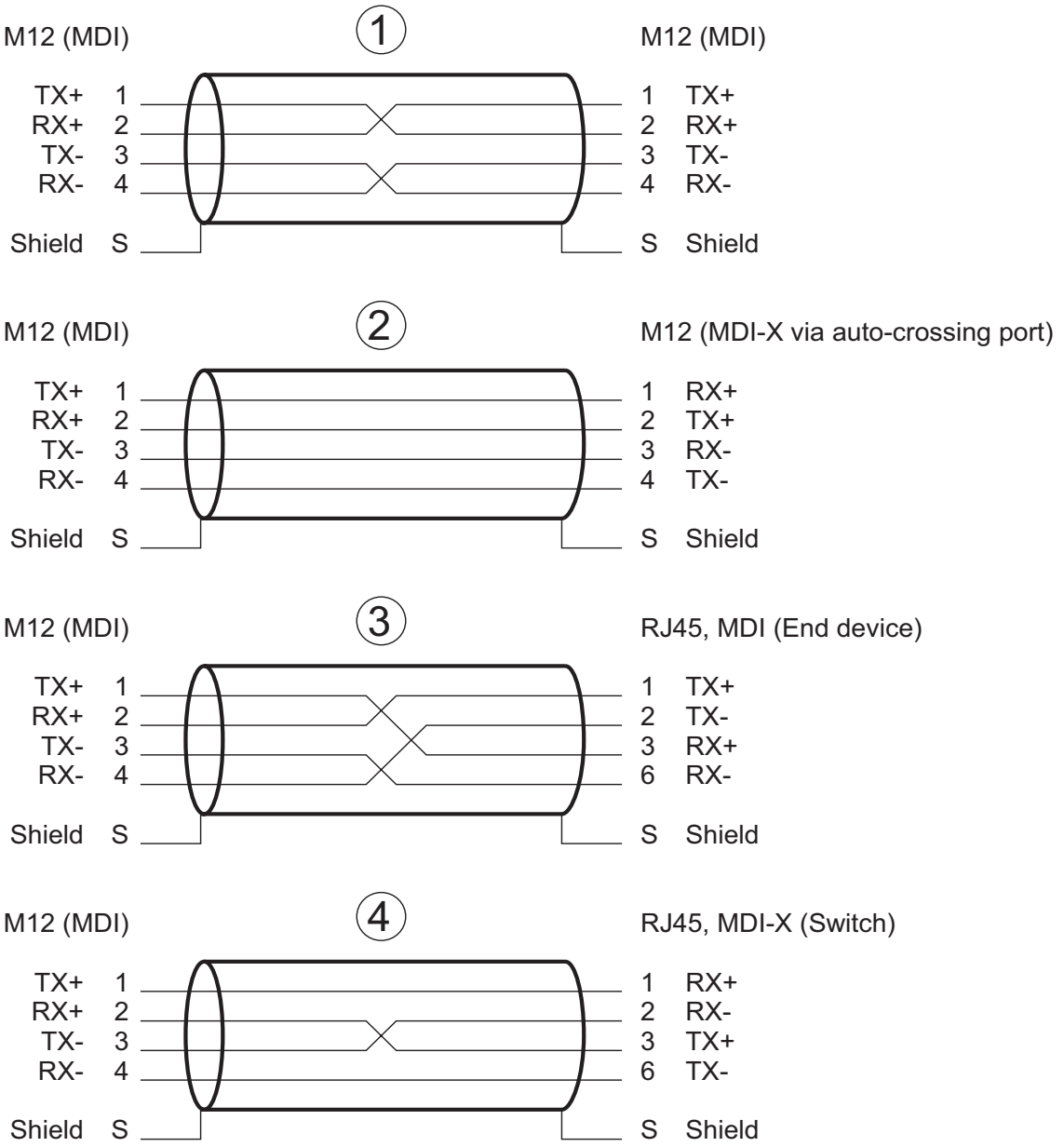


Pin	Function
1	TD+
2	RD+
3	TD-
4	RD-

Ethernet Port

Figure 6: Pin assignment of a TP/TX interface, M12 socket

- ☐ Use a shielded CAT5 cable.
- ☐ Use a shielded 4-pin M12 plug.
- ☐ Connect the cable shield to the connector housing.



1 Connection cable M12-4 to M12-4, cross-over

2 Connection cable M12-4 to M12-4, 1:1

3 Connection cable M12-4 to RJ45, cross-over

4 Connection cable M12-4 to RJ45, 1:1

2.2.9 Mounting the housing cover

For use in environments with the danger of explosions, the BAT54-F X2 and BAT54-F X2 FCC device models have an additional housing cover made of stainless sheet steel.
On delivery, the housing cover is pre-mounted.

Perform the installation in the following steps:

☐ Remove the upper part of the housing cover on the device, as shown in the following figure (point 1).
Do not try to remove the lower panel of the housing cover from the device.
☐ Screw the device, including the lower panel of the housing cover, to the mounting surface.
☐ Set up the connections to the device.
☐ Close the housing cover by replacing the upper part of the housing cover.
☐ Fasten the housing cover with four screws, as shown in the following figure (point 2).

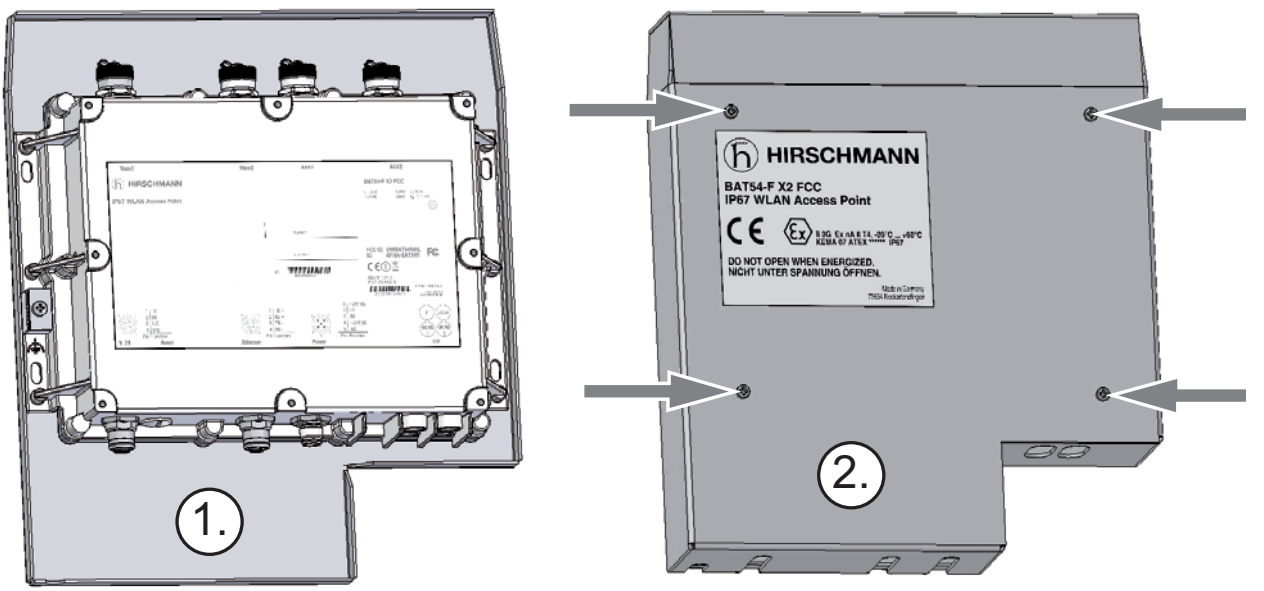


Figure 7: Mounting the housing cover for BAT54-F X2 device models with Ex certification in accordance with ATEX 95 (ATEX 100a)

2.3 Startup

By connecting the voltage supply via the 5-pin M12 connector or via the LAN cable (Power over Ethernet), you start the operation of the device.

After the device performs a short self-test, the power LED lights up green permanently or flashes alternately red and green if no configuration password has been set yet.

2.4 Finding and configuring devices

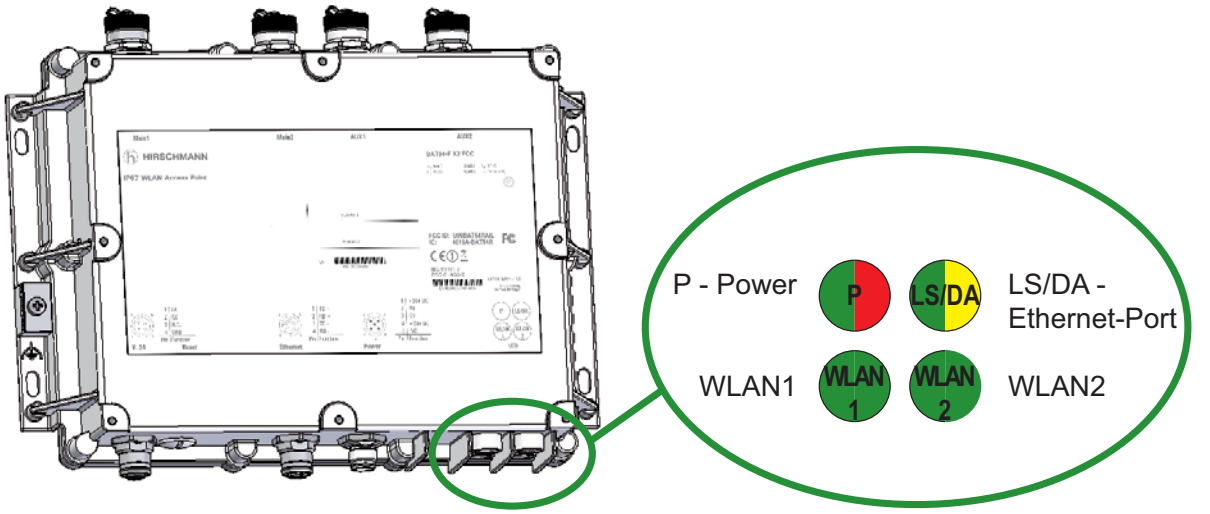
Note: Always switch on the device before starting the computer for the configuration.

A router or access point can be configured in the following ways (if the model is equipped with the corresponding interface),
see the "Dual-Band Industrial Access Point / Access Client / Access Bridge BAT54-Rail" user manual:

- Via the local network (LAN). Via the radio network (WLAN), if the WLAN encryption (e.g. WEP) in a device with a wireless interface and in the configuration computer is set or deactivated respectively. Via the serial configuration interface.

2.5 Display elements

After the operating voltage is set up, the software starts and initializes itself. Afterwards, the device performs a self-test. During this process, the LEDs light up. The process takes around 60 seconds.



Meaning of the LEDs

The behavior of the LEDs is described using the following terms:

- **Blinking** means that the LED switches on and off at regular intervals in the color specified.
- **Flashing** means that the LED lights up very briefly in the color specified, then is switched off for a much longer time (about 10x as long).
- **Flashing inversely** means the reverse. Here the LED is on for a long period in the color specified and is only briefly interrupted.
- **Flickering** means that the LED switches on and off at irregular intervals.

Device status

These LEDs provide information about conditions which affect the operation of the whole device.

P (green/ red LED)		**Power**
Green	on continuously	Device is ready for operation.
Red	blinking (slowly)	Charge lock active (see "Dual-Band Industrial Access Point / Access Client / Access Bridge BAT54-Rail" user manual)
Green/red	blinking (quickly)	Unsafe configuration (no password set)
Red	blinking (quickly)	Hardware error
WLAN 1 WLAN 2 (green LEDs)		**WLAN connection and WLAN data traffic of internal WLAN modules**
Off		No WLAN network defined or WLAN module deactivated. No beacons sent from the WLAN module.
Green		At least one WLAN network defined and WLAN module activated. Beacons sent from the WLAN module.
Green	flashing inversely	Number of flashes = number of connected WLAN stations and P2P radio lines, then there is a break.
Green	blinking	DFS scanning or another scan procedure.
Green	flickering	TX data traffic.

WLAN 1 WLAN 2 (green LEDs)		WLAN connection and WLAN data traffic of internal WLAN modules
Red	flickering	Error in radio LAN (TX error, e.g. transmission error due to bad connection).
Red	blinking	Hardware error in WLAN module.

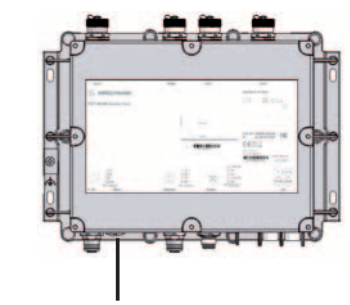
Port Status - Ethernet Port

These LEDs display port-related information.

LS/DA (green/yel- low LED)		Data, link status Status of the LAN interfaces
Off		No network device connected
Green	on continuously	Ethernet connection active
Yellow	flickering	Data traffic

2.6 Operation element (reset button)

The BAT54-F is equipped with a reset button which can be accessed from outside via a locking screw.
On delivery, the reset button is closed off with a screwable cover cap (protection class IP67/IP65).



Reset key button

The reset button has two different functions, which are triggered by pressing the button for different lengths of time:

- **Resetting the configuration** (hard reset) – the button is pressed for longer than 5 seconds. All LEDs on the device light up continuously. When the reset button is released, the device restarts with the factory settings. The hard reset can be used, for example, if you have to reconfigure the device independently of any existing settings, or if no connection to the device configuration can be made.
- **Device restart** (soft reset) – the button is pressed for less than 5 seconds. The device restarts.

Warning! After the hard reset, the device restarts in the unconfigured state, and all the settings are lost. Therefore you may want to save the current configuration of the device before the reset.

Note: Note that when the device is reset, the WLAN encryption settings defined in the device are also lost, being reset to the standard WEP key. After a reset, the wireless configuration of a device with a WLAN interface is only possible if the standard WEP key is entered in the WLAN card.

Note: You will find information on the WEP key for WLAN in the "Dual-Band Industrial Access Point / Access Client / Access Bridge BAT54-Rail" user manual.

☐ When you want to use the reset button, you screw off the cover cap.

2.7 Making basic settings

Information on the basic settings of the device can be found in the "Basic Configuration" user manual on the CD ROM.

State on delivery

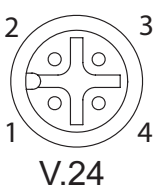
You will find information on the delivery state of the device in the "Dual-Band Industrial Access Point / Access Client / Access Bridge BAT54-Rail" user manual.

V.24 interface (external management)

At the V.24 connection, a serial interface is provided for the local connection of an external management station (VT100 terminal or PC with corresponding terminal emulation) or an AutoConfiguration Adapter ACA 11. This enables you to set up a connection to the Command Line Interface (CLI) and to the system monitor.

VT 100 terminal settings	
Data	8 bit
Stopbit	1 bit
Handshake	off
Parity	none

The connection is a 4-pin M12 female connector with A coding.
On delivery, the connection is sealed with a cover cap.
The housing of the M12 socket and the signal connections are electrically connected to the function ground and to the metal housing of the device.



V.24

Pin	Function
1	TX
2	RX
3	N.C.
4	GND

Figure 8: Pin assignment of the V.24 interface (M12 socket)

Note: You will find the order number for the terminal cable, which is ordered separately, in the Technical Data chapter (see on page 34 "Technical data").

3 Technical data

General technical data

BAT54-F description ...	Dual-band industrial wireless LAN access point/client with two independent WLAN modules with, respectively, 2400 - 2483.5 MHz (ISM) or 5150 - 5750 MHz, IEEE 802.11a/b/g/h/i
Port type and number	Two WLAN interfaces, up to 8 SSIDs per WLAN interface, One LAN port 10/100BASE-TX, Autosensing, Power over ETHERNET in accordance with IEEE802.3af

Dimensions W x H x D	BAT54-F, BAT54-F FCC	261 mm x 56 mm x 212 mm
	BAT54-FX2, BAT54-F X2 FCC	273 mm x 59 mm x 310 mm
Weight	BAT54-F, BAT54-F FCC	2000 g
	BAT54-FX2, BAT54-F X2 FCC	5200 g

Power supply	Operating voltage	2 x 24 VDC -20% to + 25% / max. 10.0 W at 5-pin "Power" plug Power over ETHERNET in acc. with IEEE802.3af, mode A Class 0: + 36 VDC to 57 VDC / max. 8.2 W at "Ethernet" socket All power supplies redundant with each other
Overload current protection at input		Non-replaceable fuse
Isolation voltage between operating voltage and housing		500 V_{eff}
Environment	Storage temperature (ambient air temperature)	-20 °C to +70 °C
	Humidity	10% to 95% (non-condensing)
	Atmospheric pressure	up to 2,000 m (795 hPa)
Operating temperature	Ambient air	-20 °C to +55 °C
Protection class	IP 67	Sturdy metal housing designed for wall and pole mounting

Radio technology

Antenna connection	Four antenna connections
Range	Up to 20 km with external antennas (depending on antenna used, frequency range and data rate)
Encryption	IEEE802.11i/WPA2 with passphrase or 802.1x and hardware-accelerated AES, user authentication with 802.1x/EAP or LEPS, IEEE 802.1x supplicant in client mode, WPA/TKIP, WEP, access control lists, WLAN port and protocol filters, RADIUS client and server, built-in firewall with QoS, port filter, protocol filter, IDS and DoS protection, PMK caching and pre-authentication for fast roaming with IEEE802.1x
Frequency range	Two independent radio modules, each 2.4 Ghz and 5 GHz: 2400–2483.5 MHz (ISM) and 5150–5750 MHz

Modulation technology	22M0F7D (DSSS/OFDM) at 2.4 GHz 20M0G7D (OFDM) at 5 GHz
Receiver sensitivity	2.4 GHz 802.11b: –87 dBm @ 11 Mbit/s, –94 dBm @ 1 Mbit/s 2.4 GHz 802.11g: –87 dBm @ 6 Mbit/s, –70 dBm @ 54 Mbit/s 5 GHz 802.11a/h: –87 dBm @ 6 Mbit/s, –67 dBm @ 54 Mbit/s
Radio topology	WLAN access point, bridge, router, client mode
Roaming	Seamless handover, IAPP support, IEEE802.11d support, background scanning for rogue AP detection and fast roaming, support of IEEE802.11e (WME)
Radio power	2.4 GHz 802.11b: +19 dBm @1 and 2 Mbit/s, +19 dBm @ 5.5 and 11 Mbit/s, 2.4 GHz 802.11g: +19 dBm @ 6 Mbit/s, +14 dBm @ 54 Mbit/s, 5 GHz 802.11a/h:+18 dBm @ 6 Mbit/s, +12 dBm @ 54 Mbit/s with TPC and DFS, transmission power reduction in 1 dB steps to minimum 0.5 dBm

EMC and immunity

EMC interference immunity		
EN 61000-4-2	Electrostatic discharge Contact discharge: test level 3 Air discharge: test level 3	 4 kV 8 kV
EN 61000-4-3	Electromagnetic field, test level 3 (80 - 2000 MHz)	10 V/m
EN 61000-4-4	Fast transients (burst), test level 3, x - Power line - Data line	 2 kV 1 kV
EN 61000-4-5	Voltage surges - Power line, line/line: test level 2 - Power line, line/earth: test level 3 - Data line: test level 3	 0.5 kV 0.5 kV 1 kV
EN 61000-4-6	Conducted interference voltages, test level 3 150 kHz - 80 MHz	 10 V
EN 61000-4-9	Impulse-type magnetic fields; test level 4	300 A/m
EMC emitted interference		
EN 55022	Class A	
FCC 47 CFR Part 15	Class A	
Stability		
Vibration	IEC 60068-2-6 Test FC test level according to IEC 61131-2	
	IEC 60068-2-64 test level in acc. with EN 50155:2001+A1:2002	
Shock	IEC 60068-2-27 Test Ea test level in acc. with IEC 61131-2, EN 50155:2001+A1:2002	
Shock resistance BAT54-F X2 and BAT54-F X2 FCC	IEC 60079-0 chap. 6.2 Shock resistance test with 1kg mass dropped from 0.7 m Housing cover only removeable with tool	

Radio standards

EN 300 328	Electromagnetic compatibility and radio spectrum matters (ERM) - bandwidth transfer systems - data transmission equipment operating in 2.4 GHz ISM band and using spread spectrum modulation technology
EN 301 893	Broadband radio access networks (BRAN) - 5 GHz high-performance RLAN
EN 301 489-1	Electromagnetic compatibility for radio equipment and services
EN 301 489-17	Electromagnetic compatibility (EMC) for radio equipment and services - specific conditions for 2.4 GHz wideband transmission systems and 5 GHz high-performance RLAN equipment

Network range

TP port	
Length of a twisted pair segment	max. 100 m (cat5e cable with 1000BASE-T)

Table 1: TP port 10BASE-T / 100BASE-TX / 1000BASE-T

Power consumption/power output and order numbers

Table 2: Performance and order numbers

Device	Power consumption	Power output	Order number
BAT54-F	10.0 W	34.1 Btu (IT)/h	943 959-111
BAT54-F FCC	10.0 W	34.1 Btu (IT)/h	943 959-011
BAT54-F X2	10.0 W	34.1 Btu (IT)/h	943 959-101
BAT54-F X2 FCC	10.0 W	34.1 Btu (IT)/h	943 959-001

Scope of delivery

Device	Scope of delivery
BAT54-F...	BAT54-F... Device Installation user manual in German and English M12 plug shielded for Ethernet interface M12 plug unshielded for power supply connection 2 x 50 Ohm N connections Adapter cable for serial interface, M12, 4-pin, plug -> SubD 9, socket CD ROM with following content: - Management software LANconfig V7.12 - Monitoring software LANmonitor V7.12 and WLANmonitor V7.12 - Installation user manual in PDF format in German/English - User manual in PDF format in German/English - Reference manual in PDF format in German/English - LCOS operating system V7.12 as upx file

Accessories

Name		Order number
ACA11-M12	AutoConfiguration Adapter for M12 connection	943 972-001
RPS 30	Rail Power Supply	943 662-003
RPS 80 EEC	Rail Power Supply	943 662-080
RPS 120 EEC	Rail Power Supply	943 662-120
RPS60/48V EEC	Rail Power Supply for Power over Ethernet	943 952-001
HiVision	Network Management software	943 471-100
HiOPC	OPC Server software	943 055-001
BAT54-F pole mounting set	Set for fastening BAT54-F device to pole, maximum permitted wind load 220 km/h, permitted pole diameter 39 mm to 60 mm	943 966-001
Antennas		
BAT-ANT-N-12A	Linear beam antenna for 5 GHz, outdoor installation with BAT Surge Arrestor. Requires cable BAT-CLB-7-N.	943 903-320
BAT-ANT-N-23/9A	Linear beam antenna for 5 GHz, outdoor installation with BAT Surge Arrestor. Requires cable BAT-CLB-7-N.	943 903-340
BAT- ANT- N-14G	Beam antenna for 2.4 GHz, outdoor installation with BAT Surge Arrestor. Requires cable BAT-CLB-7-N.	943 903 380
BAT-ANT-TNC-B-D-085-01	Circular polarized beam antenna for 2.4 GHz, outdoor installation with BAT Surge Arrestor. Requires cable BAT-CLB-7-TNC and BAT-Pigtail.	943 056-111
BAT-ANT-TNC-B-D-085-02	Beam antenna for 2.4 GHz, outdoor installation with BAT Surge Arrestor. Requires cable BAT-CLB-7-TNC and BAT-Pigtail.	943 903-411
BAT-ANT-TNC-10A DS	Polarization diversity antenna for 5 GHz, outdoor installation with BAT Surge Arrestor. Requires cable BAT-CLB-7-TNC and BAT-Pigtail.	943 903-330
BAT-ANT-TNC-8b/g DS	Polarization diversity antenna for 2.4 GHz, outdoor installation with BAT Surge Arrestor. Requires cable BAT-CLB-7-TNC and BAT-Pigtail.	943 903-310
BAT-ANT-8A	Omnidirectional antenna for 5 GHz, outdoor installation with BAT Surge Arrestor. Requires cable BAT-CLB-7-N.	943 903-301
BAT-ANT-8G	Omnidirectional antenna for 2.4 GHz, outdoor installation with BAT Surge Arrestor. Requires cable BAT-CLB-7-N.	943 903-401
BAT-ANT-N-6ABG	Hemispherical antenna for 2.4 GHz and 5 GHz. Not suitable for installations with lightening protection.	943 903-380
Cables		
BAT-CLB-7-N	Antenna cable 7 m, N plug to N plug, ULA400, attenuation 2 dB at 2.4 GHz, 3 dB at 5 GHz	943 903-350
BAT-CLB-7-TNC	Antenna cable 7 m, N plug to TNC plug, ULA400, attenuation 2 dB at 2.4 GHz, 3 dB at 5 GHz	943 903-501

Adapters		
BAT Surge Arrestor	Lightening protection adapter, N socket to N socket.	943 903-370
Octopus terminal cable	Adapter cable for serial interface, M12, 4-pin, plug -> SubD 9, socket	943 902-001

Note: Please note that products recommended as accessories may have characteristics that do not fully correspond to those of the corresponding product. This may limit their possible usage in the overall system.

Underlying norms and standards

Name	
EN 61000-6-2:2001	Generic norm – immunity in industrial environments
EN 55022:1998 + A1 2000 + A2-2003	IT equipment – radio interference characteristics
IEC/EN 60950-1:2001	Safety for the installation of IT equipment
EN 61131-2:2003	Programmable logic controllers
EN 50121-4:2000	Railway applications - EMC - emitted interference and interference immunity for signal and telecommunication systems
FCC 47 CFR Part 15:2003	Code of Federal Regulations
EN 60079-15	Electrical equipment for explosive gas atmospheres – part 15: Construction, testing and marking of protection type "n" electrical apparatus.
IEEE802.3af	Power over Ethernet

Table 3: List of norms and standards. Certified devices are marked with a certification indicator.

RFC 768	UDP	RFC 1769	SNTP
RFC 783	TFTP	RFC 1907	MIB2
RFC 791	IP	RFC 1945	HTTP/1.0
RFC 792	ICMP	RFC 2131	DHCP
RFC 793	TCP	RFC 2132	DHCP Options
RFC 826	ARP	RFC 2236	IGMPv2
RFC 951	BOOTP	RFC 2239	MAU-MIB
RFC 1112	IGMPv1	RFC 3411	SNMP Framework
RFC 1157	SNMPv1	RFC 3412	SNMP MDP
RFC 1155	SMIv1	RFC 3413	SNMP Applications
RFC 1213	MIB2	RFC 3414	SNMP USM
RFC 1493	Dot1d	RFC 3415	SNMP VACM
RFC 1542	BOOTP Extensions	RFC 2613	SMON
RFC 1757	RMON	RFC 2674	Dot1p/Q

Table 4: List of RFC's

IEEE 802.1 D	Switching, GARP, GMRP, Spanning Tree
IEEE 802.1 D-1998	Media access control (MAC) bridges (includes IEEE 802.1p Priority and Dynamic Multicast Filtering, GARP, GMRP)
IEEE 802.1 Q	Tagging
IEEE 802.1 Q-1998	Virtual Bridged Local Area Networks (VLAN Tagging, GVRP)
IEEE 802.1 w.2001	Rapid Reconfiguration
IEEE 802.3-2002	Ethernet
IEEE 802.11a/b/g/h/i	WLAN

Table 5: List of IEEE standards

Certifications

The following table shows the status of the certification of the equipment.

Standard	
EN 60079-15 (ATEX95)	pending

Table 6: Certifications - see www.hirschmann-ac.com for current status

A Further support

Technical questions and training courses

In the event of technical queries, please talk to the Hirschmann contract partner responsible for looking after your account or directly to the Hirschmann office.
You can find the addresses of our contract partners on the Internet: www.hirschmann-ac.com.

Our support line is also at your disposal:

- Tel. +49 1805 14-1538
- Fax +49 7127 14-1551

Answers to Frequently Asked Questions can be found on the Hirschmann internet site (www.hirschmann-ac.com) at the end oft the product sites in the FAQ category.
The current training courses to technology and products can be found under http://www.hicomcenter.com.

Hirschmann Competence Center

In the long term, excellent products alone do not guarantee a successful customer relationship. Only comprehensive service makes a difference worldwide. In the current global competition scenario, the Hirschmann Competence Center is ahead of its competitors on three counts with its complete range of innovative services:

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- Training offers you an introduction to the basics, product briefing and user training with certification.
- Support ranges from the first installation through the standby service to maintenance concepts.

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