

BlitzFunk AW22R, CW22R

MANUAL, Release 2025/4



fünfeinhalb Funksysteme GmbH · 01187 Dresden · Germany · www.fuenfeinhalb.de

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1 General Information

1.1 Product Names

This manual contains information on the products:

- BlitzFunk[®] Access Point AW22R
- BlitzFunk[®] Client CW22R

1.2 Highlighting of Tips and Warnings

Throughout the text the following symbols are used:



Tip: This symbol provides helpful guidance or additional details to assist with product use.



WARNING: This symbol indicates critical safety information. Ignoring these warnings may result in damage or injury.

1.3 Legal Information

This wireless system is classified as a Category 2 receiver in accordance with ETSI EN 300 440.

The BlitzFunk AW22R and CW22R devices comply with electromagnetic compatibility (EMC) standards for industrial environments (Class A devices) and residential environments (Class B devices).

Compliance with EMC regulations was verified using shielded Ethernet cables. To ensure continued compliance, always use shielded Ethernet cables when operating this equipment.

These products include software licensed under the GPL. A list of the GPL components, along with their source code and license texts, is available upon request at *contact@fuenfeinhalb.de*

1.4 CE

The manufacturer hereby declares that the BlitzFunk AW22R and CW22R devices comply with the applicable EU Directives and European Norms, including their amendments. The full EU Declaration of Conformity is available at: https://fuenfeinhalb.de/pdf/CE_Declaration_of_Conformity.pdf

1.5 WEEE Disposal and Recycling Information



CE

All products bearing this symbol are waste electrical and electronic equipment (WEEE as in directive 2012/19/EU) which should not be mixed with unsorted household waste. Instead, you should protect human health and the environment by handing over your waste equipment to a designated collection point for the recycling of waste electrical and electronic equipment, appointed by the government or local authorities. Correct disposal and recycling will help prevent potential negative consequences to the environment and human health. Please contact the installer or local authorities for more information about the location as well as terms and conditions of such collection points.

2 About the Product

2.1 Intended Use

The BlitzFunk product line is a wireless networking solution designed to deliver highly reliable real-time wireless connectivity for industrial environments. It may serve as a replacement for wired Ethernet in industrial applications and enables wireless connections for mobile systems.

A BlitzFunk network requires at least one access point and one or more client devices. The system is fully transparent to common industrial Ethernet protocols (e.g., PROFINET, PROFIsafe, EtherNet/IP, OPC UA) and functions as a Layer 2 switch. Unlike traditional wireless Ethernet bridges, it is not restricted to point-to-point links.

BlitzFunk is ideal for small to medium-sized networks with 1 to 20 clients, and can scale to support up to 100 clients.





WARNING: While measures have been taken to ensure high reliability at low latency of the wireless connection, wireless links remain subject to challenging propagation conditions and potential interference. This may result in data loss. Appropriate fail-safe mechanisms must be implemented to prevent injury and mitigate economic risks in the event of a communication failure.



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WARNING: This equipment is not suitable for use in locations where children are likely to be present.

2.2 Physical Interfaces: Client



Figure 2 Front panel of a BlitzFunk client

Client devices are powered via the device's DC port using an external power supply. The data connection is established via the device's ETH port, which supports a 100 Mbit/s Ethernet connection.



Pin	Function
1	+ 12 to 48 V DC
2	not connected
3	GND
4	not connected
5	not connected





Pin	Function	
1	RX+	
2	TX+	
3	RX-	
4	TX-	

Figure 3 Pin mapping of client connectors (view towards device)

Tip: A reverse polarity protection is in place in case the external power supply is connected to the wrong pins at the DC port.

The device features four SubMiniature version A (SMA) ports for mounting antennas. The function of each port changes depending on the current operating state of the device, such as during setup, data transmission, or reception:

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Port	Receive (RX)	Transmit (TX)	
ANT1	1 st channel of channel group & device setup		
ANT2	1 st channel of channel group & device setup	1 st channel of channel group & device setup	
ANT3	2 nd channel of channel group	2 nd channel of channel group	
ANT4	2 nd channel of channel group		

2.3 Physical Interfaces: Access Point



Figure 4 Front panel of a BlitzFunk access point

Access point devices can be powered either via the DC port using an external power supply or via Power over Ethernet (PoE) according to the IEEE 802.3af standard. Both PoE mode A and mode B are supported.

The data connection is established via the ETH port, which supports a 1000 Mbit/s Ethernet connection.



Pin	Function
1	+ 12 to 48 V DC
2	
3	GND
4	
5	

Pin	Function		
1	BI_DA+		
2	BI_DA-		
3	BI_DB+		
4	BI_DB-		
5	BI_DC+		
6	BI_DC-		
7	BI_DD+		
8	BI_DD-		

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Figure 5 Pin mapping access point connectors (view towards device)

Access points have five SMA ports. In addition to the client devices, access points include a dedicated interface for device management, separate from the interfaces used for data transmission.

Port	Receive (RX)	Transmit (TX)	
ANT1 1 st channel of channel set			
ANT2	Device setup	Device setup	
ANT3	1 st channel of channel set	1 st channel of channel set	
ANT4	2 nd channel of channel set	2 nd channel of channel set	
ANT5	2 nd channel of channel set		

2.4 LED Indicators

LED	Color	Status
	Off	No power to device
DWD	Yellow	Device is waiting for configuration
PVVK	White	<i>Pulsing</i> : device is starting <i>Permanently on</i> : device is ready for data
	Red	Error
TV	Off	No data is being transmitted wirelessly
IX	White	Data is being transmitted wirelessly
DV	Off	No data is being received wirelessly
r.v.	White	Data is being received wirelessly

3 Device Installation

3.1 Hardware Installation

Before using the device, connect all included antennas to their designated antenna ports. Antennas should be fastened by hand tight or tightened using a wrench with a maximum torque of 0.9 Nm.



WARNING: Powering the device without connecting all antennas to the SMA ports may cause damage. Using only some antennas can result in the device not functioning as intended.



Tip: For installations in tight spaces, such as interior-mounted equipment, clients can operate with reduced reliability by routing only ANT2 and ANT3 to the exterior. Since ANT1 and ANT4 are receive-only, they do not need to be RF-terminated if unused.

3.2 Antenna Orientation and Device Positioning

The angle of the antennas can impact both coverage and connection stability. In general, the wireless connection is most stable when all antennas involved in the communication are oriented parallel to each other.



Figure 6 Recommended antenna positioning

Avoid placing antennas inside or behind metallic enclosures, such as control cabinets or within automated guided vehicles, as this will degrade signal quality significantly. If the device must be installed inside a metal enclosure, use SMA extension cables to route the antennas to the outside.



Figure 7 Antenna mounting outside of metallic enclosures

The achievable range of the system depends on environmental conditions. Optimal range is typically achieved when there is a clear line of sight between the access point and the client.

3.3 Wall or Ceiling Mounting

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At the desired location, the device should be securely mounted to a wall or ceiling using its integrated mounting holes.

WARNING: To prevent injury from falling equipment, use four screws with a minimum shank diameter of 3 mm and a minimum head diameter of 6 mm. The screws should be at least 20 mm long to ensure proper anchoring in the wall. Use wall anchors for added support and always verify that the mounting surface is stable and capable of bearing the weight of the device.

3.4 Power and Data Connection

Connect both the client and access point devices to power. They must be supplied with an external DC power source in the range of 12 to 48 VDC via the DC port. The AW22R device can alternatively be powered through its ETH/PoE port using Power over Ethernet (PoE).



Figure 8 Options for powering clients and access point

Tip: If both DC and PoE are connected, the device will draw power from the DC supply. In this configuration, PoE will act as a backup in case the DC supply fails.

Connect the data ports of the devices to the end devices they are intended to communicate with. In systems with multiple access points, the ETH ports of all access points must be interconnected, for example via a network switch. To ensure proper synchronization between access points, the network infrastructure must support 1 Gbit/s Ethernet speeds and maintain a maximum latency of 50 microseconds. Typical Gigabit Ethernet switches forward packets in less than 15 microseconds, allowing up to three switches in series.





WARNING: To maintain protection against dust and water ingress, both M12 ports must be connected. It is recommended to tighten the connectors to a torque of 0.6 Nm. If a port is not in use, it must be sealed with a suitable protective cap to preserve the device's protection rating.

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4 Device Configuration

When powering devices for the first time, or when replacing existing ones, the system must be configured before data transmission can begin. Configuration is performed using the web-based interface of the access point, which can be accessed from any standard web browser. The following sections explain the available functions of the configuration interface using example setups.

Tip: Issues that may occur when using the system for the first time are summarized in chapter 8 (ref. *Troubleshooting*).

4.1 Accessing the Configuration Interface

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To access the configuration interface, a computer is required with:

- a web-browser
- one free Ethernet port

Connect the computer via Ethernet to the access point that is awaiting configuration. Power must be supplied to the access points.

Client devices that require configuration must be powered on and within wireless range of at least one access point. Client configuration is done wirelessly, so client devices should not be connected to the computer via cable.

Tip: The system can be configured while already installed in its final location. Although a temporary connection to a computer is needed for configuration, the cabling used during configuration is the same as in the system's operational state.

By default, the configuration interface is accessible at:



Access points include an integrated DHCP server, which assigns IP addresses within the 10.5.0.0/24 subnet. If another DHCP server is already active on the wired network between your computer and the access points, use that server's interface to identify the access point's assigned IP address.

Ensure that the computer you use to access the configuration interface has an IP address in the same subnet.

Tip: In setups with multiple access points, it does not matter which access point you connect to when accessing the configuration interface.

4.2 Password Protection

By default, the configuration interface is accessible from any device within the same network. To restrict access, you can set a password in the *Password* tab of the configuration interface. This ensures that only authorized users can modify system settings.



To set a password, click the *Enable* toggle, enter the desired password, and click *Apply*. You can choose whether read access is allowed without a password or not.



After applying, you are automatically logged in. You may log out via the *Log Out* Button.

4.3 Device Association

Before data can be transmitted between devices, they need to be associated. Device association and wireless settings are configured in the *Channels & Devices* tab.



BlitzFunk devices communicate using channel groups. Each channel group uses two redundant 20 MHz channels for data transmission. Before associating devices, select two operating channels by clicking *Create Channel Group*.



To minimize the risk of interference, it is recommended to separate the channels by at least 80 MHz. Adjacent channels cannot be selected.

For device management, a third 20 MHz channel is used, located at 5745 MHz (channel 149). This channel is currently fixed but will be made configurable in a future software update.

Tip: The frequency bands between 5765 MHz and 5865 MHz, as well as between 5955 MHz and 6415 MHz, are generally less crowded than other frequency bands.

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Tip: The achievable range depends on the permitted transmission power. Higher ranges can typically be achieved in the 2.4 GHz and lower 5 GHz bands, compared to the upper 5 GHz and 6 GHz bands. Channels in the higher frequency ranges are therefore referred to as short range.

Associate devices by dragging them into a channel group or by selecting them using the *Add Access Points* and *Add Clients* buttons. Devices available for configuration are shown in the *Unconfigured Devices* section if they are in setup mode, which is indicated by a yellow PWR LED. Client devices enter setup mode if they are not assigned to a channel group. They may also enter setup mode temporarily if they lose connection to their assigned channel group.



The number of clients in a channel group affects both latency and data throughput. Each additional client increases latency by 2 milliseconds. The system's total data rate of 6 Mbit/s is shared equally among all clients in the channel group.

Clients per Channel Group	Latency [ms]	Data Rate [Mbit/s]
1	4	6
2	6	3
4	10	1.5
6	14	1
10	22	0.6
20	42	0.3

BlitzFunk
 6015
 6035
 6055
 6075
 6095
 6115
 6135
 6175
 6195
 6215
 6235
 6255
 6275
 6295
 6315
 6335

 13
 17
 21
 25
 29
 33
 37
 41
 45
 49
 53
 57
 61
 65
 69
 73
 77
 81
 9 9 89 85 CONFIGURATION 5 | 5975 MHz 77 | 6335 MHz 👕 REMOVE la Channels & Devices + CREATE CHANNEL GROUP Firmware Devices in Channel Group #1 Password Access Points this device 🗟 STATUS 📑 REMOVE A2A167394 Access Point Clients s4ms 6 Mbit/s 🗈 STATUS 👕 REMOVE C2A167424 DISCARD APPLY CHANGES 2 🚔 EN 📼

Information on the maximum latency and data rate per client is shown next to each client device during configuration.

After modifying the device configuration, two buttons appear at the bottom center of the screen. To apply the configuration, use the *Apply Changes* button. Pressing this button restarts the devices. Once a configuration with at least one access point and one client in the same channel group is applied, data can be transmitted between the devices, indicated by a white PWR LED.

Alternatively, changes can be discarded using the *Discard* button.

🗖 BlitzFunk	+ CREATE CHANNEL GROUP
EINHALE CONFIGURATION	Devices in Channel Group #1
lance and the contract of the	Access Points
Hirmware	Image:
Password	
	Clients
	:: 🗍 • C2A167424 Client s4ms 6 Mbit/s 🗈 STATUS 🗑 REMOVE
	Unconfigured devices
	Access Points
🚔 EN 👻	No Access Points DISCARD APPLY CHANGES 2





WARNING: Changing the system configuration of already configured devices will interrupt data transmission between them.

4.4 Configuring Multiple Access Points to Extend Coverage

Multiple access points can be used to extend coverage by configuring a roaming setup. Access points in a BlitzFunk network coordinate to share the channels of a channel group. This allows clients to move between access points without additional latency.

To use the roaming functionality, access points need to be connected via 1 Gbit/s Ethernet (ref. *Power and Data Connection*) and placed with overlapping coverage. Best performance is achieved when a client has a clear line of sight to at least two access points. When using short range channels, the distance to the nearest access point should be less than 20 meters.



Figure 9 Example for a setup containing multiple access points to increase coverage

In the configuration interface, add multiple access points to a channel group. Add clients to the channel group and press *Apply Changes* to confirm.

EINHALE BlitzFunk CONFIGURATION	1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 #1 5 5975 MHz 77 6335 MHz	3 77 81 85 89 93
😪 Channels & Devices	+ CREATE CHANNEL GROUP	
لطح Firmware	Devices in Channel Group #1	
Password	Access Points	
	:: H A2A167398 Access Point (this device)	🗟 STATUS 👕 REMOVE
	:: 📜 🔹 A2A167394 Access Point	🗟 STATUS 🖥 REMOVE
	Clients	
	:: 🕌 O C2A167424 Client C4ms 6 Mbit/s	🗟 STATUS 📋 REMOVE
🚔 EN 👻	+ ADD CLIENTS DISCARD APPLY CHANGES (

4.5 Configuring Multiple Access Points to Increase Capacity or Reduce Latency

To increase the data rate per client and reduce latency, multiple channel groups can be operated in parallel. Latency and data rate scale independently for each channel group. A device in one channel group can still transmit and receive data to a device in another channel group.

For a setup with multiple channel groups, a separate access point is required for each group. The access points must be connected to each other via 1 Gbit/s Ethernet (ref. *Power and Data Connection*).



Figure 10 Example for a setup with multiple access points to increase capacity

In the configuration interface, create multiple channel groups and assign one access point to each group. Add clients to the corresponding channel group and press *Apply Changes* to confirm the configuration.



5 System Diagnostics

5.1 Link Status Monitoring

For configured clients, detailed status information about the wireless connection can be viewed in the configuration interface (ref. *Accessing the Configuration Interface*). Click the client's *Status* button to open it.



Reported Metric	Meaning
Receive Power per Channel	Displays the wireless signal strength of each wireless link used during operation between the client and the currently connected access point. A low receive power indicates coverage issues due to a large distance from the access point, an improperly mounted antenna, or a setup in which the antenna is obstructed by metal.
Payloads (Transmit Direction / Receive Direction)	Displays the number of Ethernet payloads that the devices received for transmission.
Buffer Overflows (Transmit Direction / Receive Direction)	Displays the number of packets that have been dropped. When the system is overloaded with more data than can be transmitted, older packets are dropped to ensure real-time performance for newer packets. A value greater than zero indicates that more data is being generated than the wireless system can handle. Overloading is expected for short periods when using the transport control protocol (TCP).
Packet Losses (Transmit Direction / Receive Direction)	Displays the number of packets lost over the wireless link. A value greater than zero indicates coverage issues or strong interference from other wireless networks on the operating channels.

The menu gives detailed status information about:



To troubleshoot an installation, the counters can be reset by clicking the table head with a dotted underline.

6 Device Maintenance

6.1 Firmware Updates

Devices can be updated via the configuration interface (ref. *Accessing the Configuration Interface*). Devices can be updated regardless of whether they are in setup mode or already configured.



WARNING: When performing an update or a firmware synchronization on a configured system, data transmission will be interrupted. **All devices must be reconfigured after the update.**

To update the devices, switch to the firmware tab in the configuration interface.



To upload a new firmware, select a firmware file from your computer using the *Upload Firmware* button.



By clicking the *Update Devices* button, the firmware will be distributed to all devices in the list.

BlitzFunk	FIRMWARE UPDATE		
	Uploaded Firmware : fb1e9b0 May 6, 2025 ×		
😪 Channels & Devices			
طع Firmware	Devices		
A Password	A2A167394 this device 58f8295 Apr 29, 2025	ready	
	C2A167424 58f8295 Apr 29, 2025	ready	
🚔 EN 🔻	UPDATE DEVICES 2		

If there is a firmware mismatch, devices can be synchronized to the same firmware using the *Synchronize Firmwares* button. The button is only displayed in case of a firmware mismatch.

BlitzFunk configuration		
🕞 Channels & Devices		
나. Firmware	Devices	
Password	A2A167394 this device fb1e9b0 May 6, 2025	same version
	C2A167424 58f8295 Apr 29, 2025	ready
🚔 EN 🔻	SYNCHRONIZE FIRMWARES 1	

After a firmware update, the configuration is deleted and the devices restart into setup mode. Then, the devices need to be reconfigured (ref. *Device Configuration*).

6.2 Factory Reset

To perform a factory reset, power off and on the device exactly three times within the first two seconds of startup. When all three LEDs light up blue, allow the device to continue booting. During startup, the device will delete its configuration and briefly flash all LEDs yellow to indicate the reset. It will then restart in setup mode.



1 power cycle

2 power cycles

3 or more power cycles

Figure 11 Visualization of how the device displays the number of power cycles performed at the beginning of its startup phase. This also applies to access points.

7 Technical Data

Mechanical Data		
Width	Client	100 mm
	AP	160 mm
Height (without antennas)	Client	130 mm
	AP	140 mm
Depth	Client	36 mm
	AP	39 mm
Mounting	Wall mounting	

Environmental Conditions	
Operating temperature	-20 °C to 60 °C
Degree of protection	IP65

Connections		
Power Supply	Client	12 – 48 V DC;
		4.1 W average; 10 W peak
	АР	12 – 48 V DC or
		PoE 802.3af mode A / mode B;
		4.8 W average; 15 W peak
DC	M12, 5-pin, A-coded	
Ethernet	Client	M12, 4-pin, D-coded; 100 Mbit/s
	AP	M12, 8-pin, X-coded; 1000 Mbit/s
Antennas	SMA female, 50 Ω	

Wireless Features		
Systematic one-way latency	2 ms per client	
Jitter	≤ 2 ms	
Reliability (for specified latency and jitter)	99.9999 %	
Data throughput	6 Mbit/s	
Maximum data unit (Ethernet-Frame)	1500 Bytes	
	2412 MHz – 2462 MHz	
Frequency	5180 MHz – 5240 MHz	
bands	5745 MHz – 5865 MHz	
	5955 MHz – 6415 MHz	
Bandwidth	2 × 20 MHz	

8 Troubleshooting and Support

8.1 Troubleshooting

Problem: Web interface not accessible

It takes about 30 seconds after powering on an access point before the web interface becomes available. The interface can only be accessed through access points, not from client devices. Make sure the URL in your browser is *http://10.5.0.1* and not *https://10.5.0.1*. If another DHCP server is active on the network, locate the access point's IP address in the DHCP lease list.

Problem: New device does not appear or disappears occasionally (grey status indication or device is completely missing in the web interface)

This is likely caused by low signal strength. Verify that all antennas are properly mounted on both access points and clients. Antennas should be tightened hand tight or using a torque of 0.9 Nm. Try moving the client closer to the nearest access point or install another access point nearby. Avoid shielding antennas with metallic objects like control cabinets or machine housings. For devices mounted in metal enclosures, use low-loss SMA cables rated up to 7 GHz to position the antennas outside.

Problem: Occasional communication errors and outages

This may be due to system overload, weak signal strength, or interference from other wireless networks operating on the same channels. In the web interface, open the client's status and check the reported values (ref. *Link Status Monitoring*). If buffer overflows are rising, the system is overloaded and must be supplied with less data. If the receive power drops below -80 dBm and packet loss increases, refer to the signal strength tips above. If receive power is good (above -60 dBm) but packet loss is still high, interference is likely. Try using different channels with at least 80 MHz spacing.

Problem: Unexpected continuous activity on TX and RX-LEDs in combination with communication errors and difficulties accessing the web interface

The system is likely overloaded. If you do not expect high traffic from the application, check your network for loops. Ensure that none of the clients are connected to the access points using a wired connection.

Problem: Otherwise inexplicable behavior

Unexpected behavior can occur during undervoltage conditions. If the device is powered through the DC connector, ensure that the supply voltage does not drop below 10 volts. When using Power over Ethernet (PoE), make sure the PoE source (e.g. a PoE switch) is compliant with at least IEEE 802.3af and is capable of supplying sufficient power. Note that not all switches can power every port simultaneously at full load.

Do not power off the device during firmware updates or configuration changes. In rare cases, unexpected behavior may also result from software bugs. You can always recover from invalid configurations by performing a factory reset (ref. *Factory Reset*).

8.2 Support

For technical assistance, troubleshooting, or product inquiries, please contact our support team at *contact@fuenfeinhalb.de* or call +49 351 8966 5590.

fünfeinhalb Funksysteme GmbH

Chemnitzer Straße 78A 01187 Dresden, Germany