FreeCon Active
PROFINET-IRT Repeater

2581810000 / IE-CDR-V14MRJ/VAPM-C

Weidmüller

Preface

The FreeCon Active PROFINET-IRT Repeater from Weidmüller is a repeater for industrial PROFINET-IRT applications. It offers repeat and refresh functionality. With its robust IP65 metal housing, the FreeCon Active is perfect for ambitious applications in robot engineering.

Change log

Version	Date	Changes
1.0	30.10.2018	First edition

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Copyright notice

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1. Safety information

1.1 Intended use

	**NOTE** The device is only intended for the applications described in the operating instructions. Any other usage is unauthorised and can lead to accidents or damage to the device. The unauthorised use of the product shall result in an immediate invalidation of any warranty and guarantee claims from the operator against the manufacturer.

	**WARNING: Hazard** Use of the selected product beyond the specifications or failure to comply with the operating instructions and warnings can lead to serious malfunctions, which could result in personal injury or damage to equipment.

1.2 Qualified personnel

These operating instructions have been written for trained and qualified personnel who are familiar with the valid regulations and standards applicable to the field of application.

1.3 Correctness of technical documentation

These operating instructions have been prepared with due care. Unless stipulated otherwise by law, no liability shall be accepted for the correctness and completeness of the data, figures and drawings. The General Terms and Conditions of Weidmüller shall apply in their current version.

We reserve the right to make changes.

1.4 CE marking

The product complies with the European Union (EU) directives and is therefore CE compliant. Weidmüller will provided the CE Declaration of Conformity on request.

1.5 Declaration of Conformity

The product complies with EMC Directive 2014/30/EU.

1.6 Recycling according to WEEE

B2B disposal

Dear Weidmüller Customer,

By purchasing our product, you have the option of returning the equipment to Weidmüller at the end of its life

cycle.

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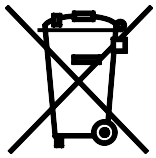


The WEEE Directive (EU Directive 2002/96 EC) governs the collection and recycling of used electrical devices. In the B2B sector (Business to Business) from 13.8.2005 onwards manufacturers of electrical appliances are required to take back and recycle electrical appliances sold after this date. Electrical devices must no longer be disposed of through the "normal" waste disposal channels. Electrical devices must be separately recycled and disposed of.

All devices covered by this directive are marked with this logo.

What can we do for you?

Weidmüller offers you a way of returning your old device to us at no cost. Weidmüller will professionally recycle and dispose of your device in accordance with the current legislation.

What do you need to do?

Once your device has reached the end of its service life, simply send it by parcel service (in a box) to the Weidmüller subsidiary that supports you. We will then take care of all of the recycling and disposal activities.

You will not incur any costs or suffer any inconvenience.

2. Overview of the FreeCon Active PROFINET-IRT Repeater

The FreeCon Active PROFINET-IRT Repeater is used to provide additional cable lengths beyond the 100 m limitation of Profinet copper cabling. The signal is not only amplified, it is also processed to ensure optimum signal quality.

It fulfils important functions:

Provision of important PROFINET diagnostic functions.

- Extension of the permissible cable segment length by 100 m.

The device is connected via PushPull plug-in connectors in series with the power and Ethernet cables. The figure below shows the integration of the FreeCon Active PROFINET-IRT Repeater in a typical robotics application.

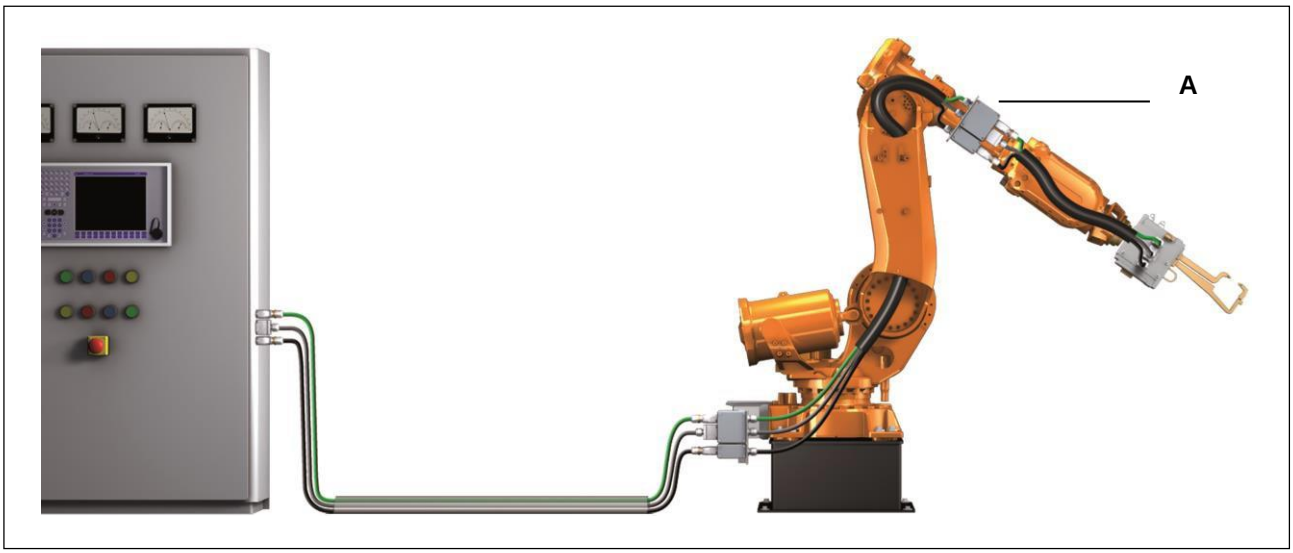


Fig. 1 The FreeCon Active PROFINET-IRT Repeater in a typical robotics application.

A - Example: Weidmüller FreeCon Active PROFINET-IRT Repeater mounted on the robot arm.

2.1 Electrical properties

The FreeCon Active PROFINET-IRT Repeater typically consumes 80 mA current at 24 V DC. It works on an input voltage of between 18 and 30 V DC in a temperature range of -20 to 55°C. The maximum current on US1 or US2 must not exceed 16 A (see also Chapter 3.2 Power connection).

2.2 Internal CPU

The FreeCon Active PROFINET-IRT Repeater is fitted with an NP40 processor and uses the HMS PROFINET protocol stack.

2.3 Mechanical characteristics

The device has dimensions of 112 mm x 53 mm x 130 mm. As shown in the figure below, it is fitted with two PushPull power ports and two PushPull copper data ports.

The FreeCon Active PROFINET-IRT Repeater is not suitable for outdoor use.

Fig. 2 FreeCon Active PROFINET-IRT Repeater

3. Installation and connections

3.1 Installation

The exact installation dimensions can be found in the figure below. The FreeCon Active PROFINET-IRT Repeater is mounted to a wall using four screws. Use the device as a template to draw the correct position of the four screws. We recommend using M4x10 mm or longer screws.

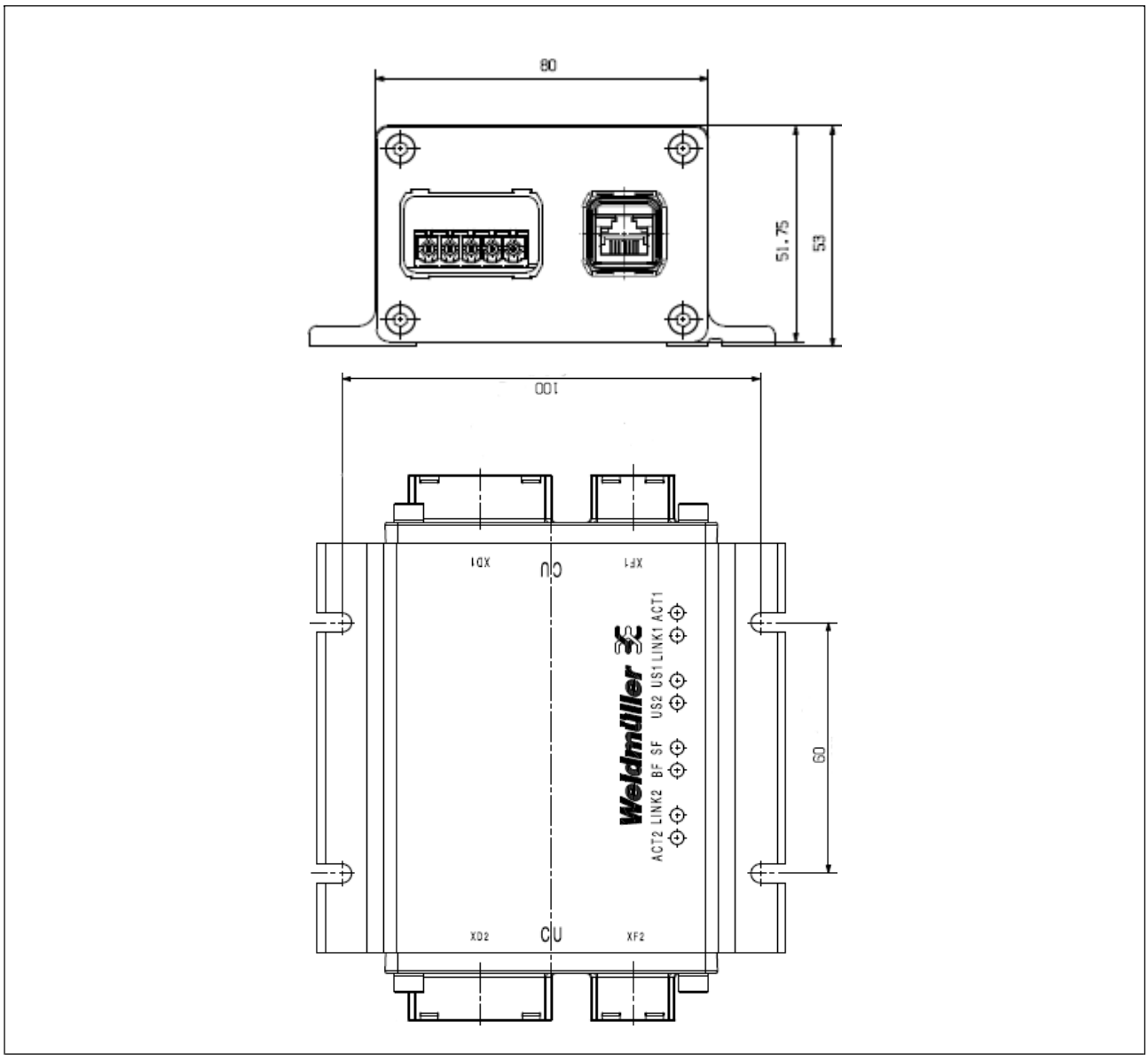
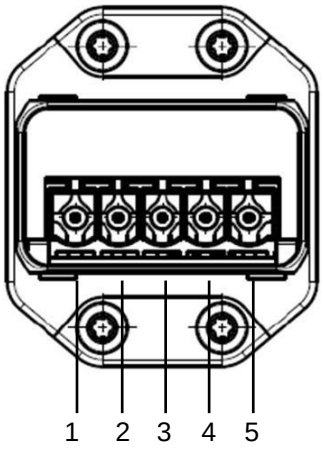


Fig. 3 Installation dimensions

3.2 Power connection

	WARNING
	Safety takes priority! Calculate the maximum current generated in the individual wires. Note all relevant regulations governing the maximum permissible current for each wire cross-section. If the power exceeds the maximum permissible value, this may cause the wiring to overheat, which will cause serious damage to your devices and equipment.

Power port pin assignment (U_{S1} / U_{S2})



Pin assignment				
1	**2**	**3**	**4**	**5**
L1	N1	L2	N2	FE
U_{S1+}	U_{S1-}	U_{S2+}	U_{S2-}	FE

The cabling must be carried out in accordance with the PROFINET installation guidelines (can be viewed at www.profibus.com).

We recommend labelling the cables to all connected devices.

To connect the FreeCon Active PROFINET-IRT Repeater, use the Weidmüller PushPull ***STEADY****TEC*® Power plug-in connectors IE-PS-VAPM-5P-2.5 (order number 2465440000).

Fig. 4 The IE-PS-VAPM-5P-2.5 Power plug-in connector

Pin assignment for the Power plug-in connector:

1: L1 24 V DC (U_{S1+})

2: N1 0 V DC (U_{S1-})

3: L2 24 V DC (U_{S2+})

4: N2 0 V DC (U_{S2-})

5: Functional earth (FE)

The FreeCon Active PROFINET-IRT Repeater is only powered via US1. U_{S2} is fed through the device and only used as the power supply for other connected devices.

3.3 Data connection

The FreeCon Active PROFINET-IRT Repeater has two 100Base-T RJ45 Ethernet ports and acts as a 2-port Profinet switch.

Use the Weidmüller PushPull ***STEADY****TEC*® data connector IE-PS-V14M-2SC-POF (order number 1012170000).

Fig. 6 The IE-PS-V14M-2SC-POF data connector

3.4 Earthing

Proper earthing and cable laying is critical in order to minimise the effect of electromagnetic interference (EMI). The FreeCon Active PROFINET-IRT Repeater is earthed via the functional earth on the power connector.

4. Setup and network configuration

The FreeCon Active PROFINET-IRT Repeater can be configured and integrated into your system using one of the following two access methods:

- PROFINET IO controller setup with GSDML file
- FreeCon CFG tool from Weidmüller

Once a valid IP address has been assigned, you can also access and configure the device via a web browser. Please note that the factory setting for the IP address is 0.0.0.0 in accordance with the PROFINET specification and therefore must be changed before you can access the FreeCon Active PROFINET-IRT Repeater via a web browser.

The FreeCon Active PROFINET-IRT Repeater must have a valid TCP/IP configuration in order to guarantee proper functioning in the network.

4.1 Setup using GSDML file

The FreeCon Active PROFINET-IRT Repeater is generally installed in a system by integrating its GSDML file into the PLC configuration. The GSDML file and a BMP icon for the Repeater are archived on the Repeater itself (in the Fca-pir-cop.zip compressed file). As described in Section 4.3 below, these files can be downloaded via the Repeater's web interface.

Make sure that the version saved on the FreeCon Active PROFINET-IRT Repeater is up-to-date. The current version of the GSDML file can be downloaded from the Weidmüller website www.weidmueller.com.

The GSDML file defines the parameters and configurable settings for the Repeater. It is used by the PLC configuration software for the configuration and integration of the Repeater into the whole system.

Before you access the extended diagnostic settings, you need to import the GSDML file and integrate it into your system topology. The necessary procedure depends on the PLC configuration software used.

4.2 Setup using Weidmüller FreeCon CFG

The FreeCon Active PROFINET-IRT Repeater can also be configured using the "FreeCon CFG" software. This software, which you can download for free from the Weidmüller website, searches the Ethernet and displays all the FreeCon Active PROFINET-IRT Repeaters found. The program can access the settings for all devices on the network via UDP on port 3250.

Carry out the following steps to run the service program:

1 Connect the PushPull Power plug-in connector to the power port on the FreeCon Active PROFINET-IRT Repeater.

2 Connect the PushPull data push-in connector to the data port of the FreeCon Active PROFINET-IRT Repeater.

3 Start "FreeCON CFG.exe" on your PC (the PC must be connected to the same network).

4 Click on the "Scan" button to search for Weidmüller devices.

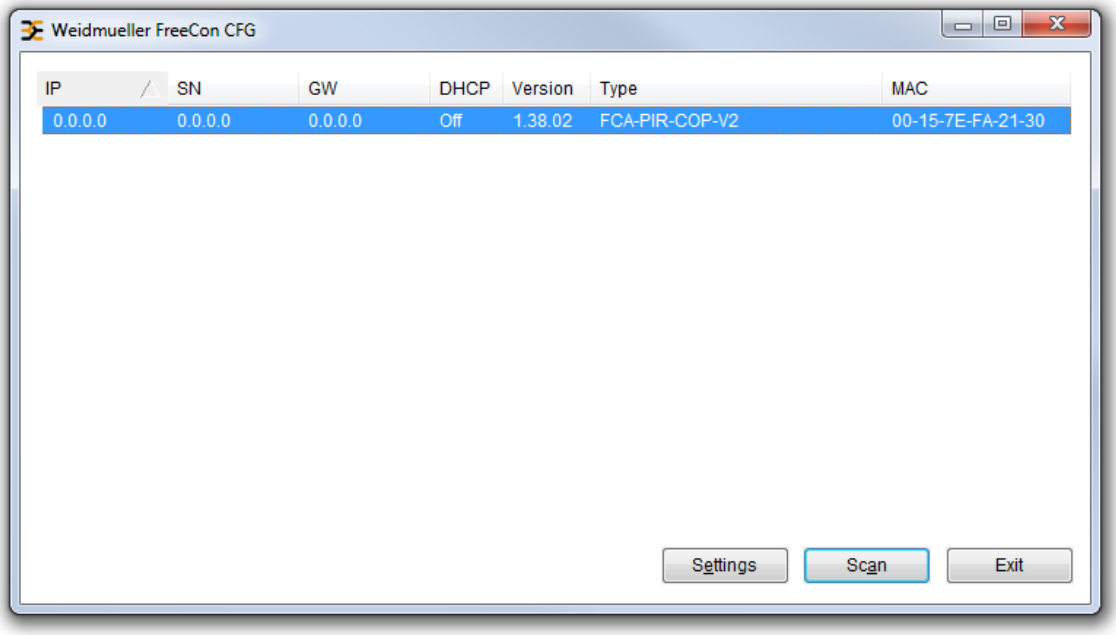


Fig. 7 Search for Weidmüller devices in FreeCon CFG.

5 The Repeater is shown in the list of devices detected as "FCA-PIR-COP-V2". Double-click on the IP address to change it (the actual IP address may be different to that shown).

Depending on your network, you can either set a static IP address or select "DHCP on".

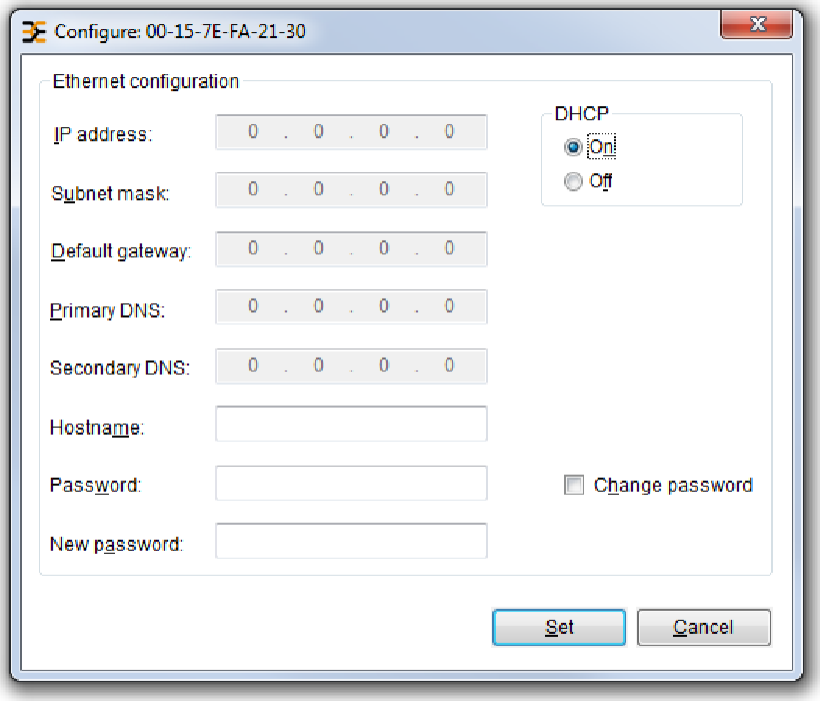


Fig. 8 Configuring a new IP address in FreeCon CFG

6 Click on the "Set" button to apply the new settings.

7 Click on the "Scan" button again to display the values you have changed.

8 Right-click on the Repeater entry. This brings up a menu from which you can access the device web page or the configuration page, or run the PROFINET "Wink" function.

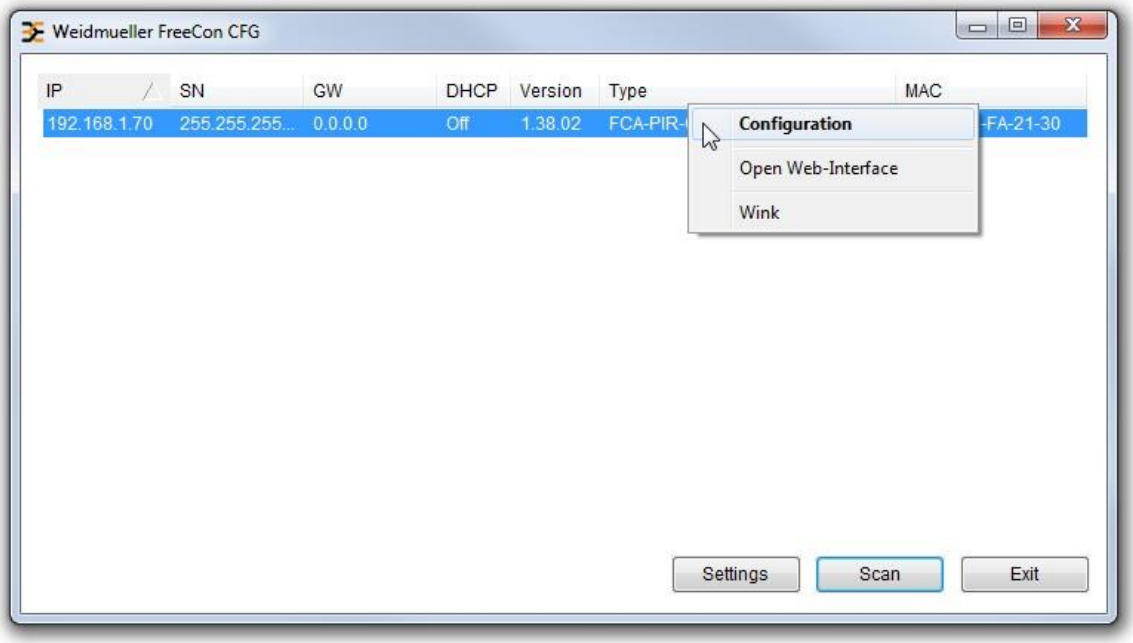


Fig. 9 Options menu in FreeCon CFG

4.3 Using a web browser to access the device

Once the FreeCon Active PROFINET-IRT Repeater has been configured using FreeCon CFG, the web server hosted on the Repeater can be accessed via the assigned IP address. To do this, use a web browser installed on a PC in the same subnet. The web interface can be used to manually access the device properties (firmware version, serial number and MAC address) or to change the settings (IP, subnet mark or gateway addresses).

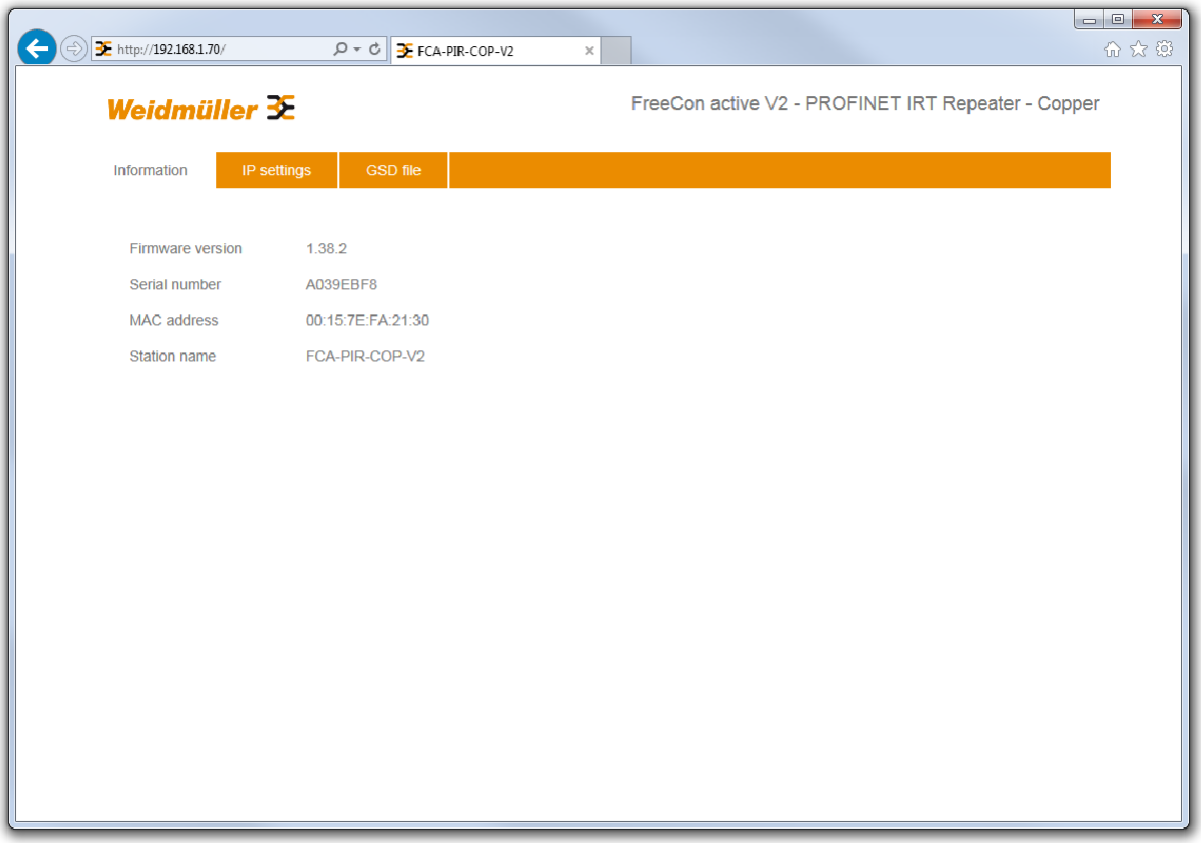


Fig. 10 Properties of the FreeCon Active PROFINET-IRT Repeater in the web browser view

The IP settings can be changed in the following screen.

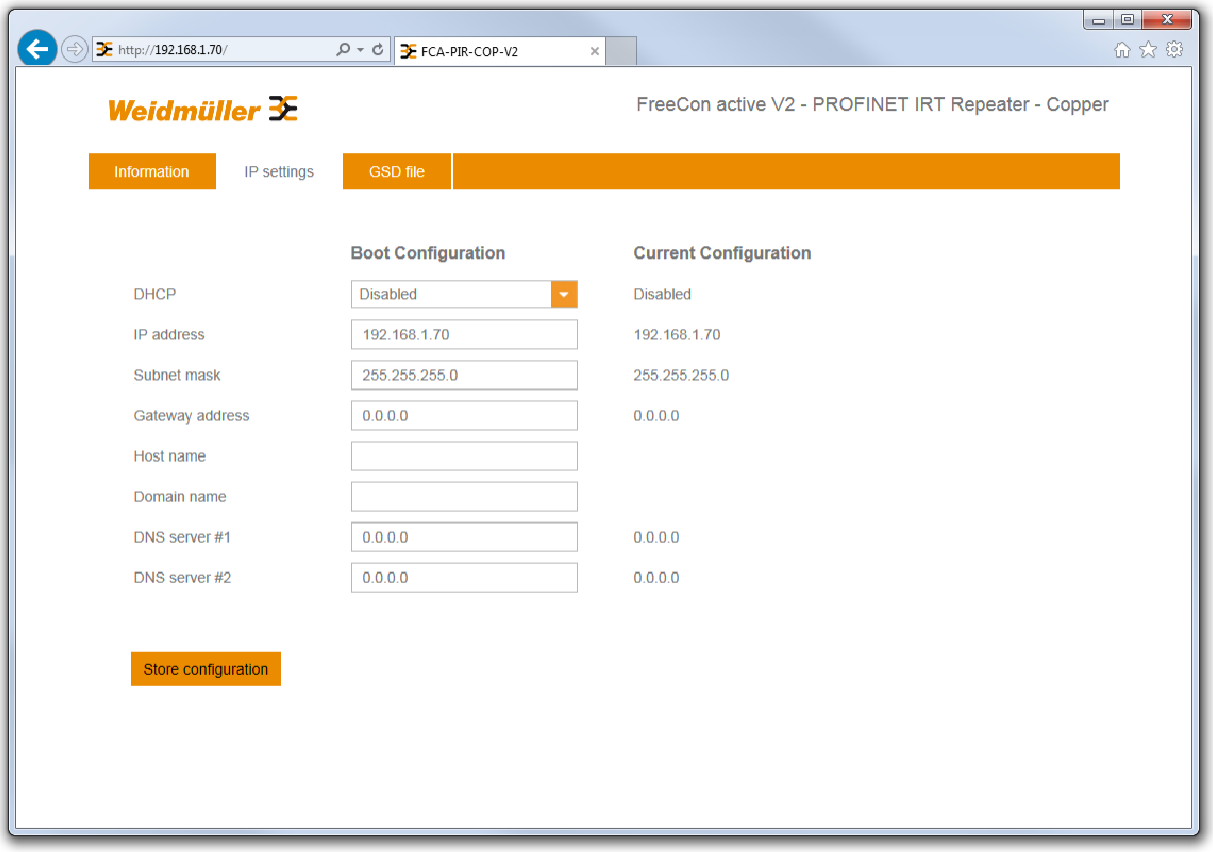


Fig. 11 Configuring the FreeCon Active PROFINET-IRT Repeater using a web browser

The FreeCon Active PROFINET-IRT Repeater must be switched off and restarted after clicking on the "STORE CONFIGURATION" button. The changes only become effective after a restart.

In order to download the GSD file, the "GSD File" page must be selected. After pressing "Download GSD file", a ZIP file containing the necessary files is downloaded. Depending on the Internet browser used, a right mouse click and the selection of the menu item "Save as..." may be necessary instead.

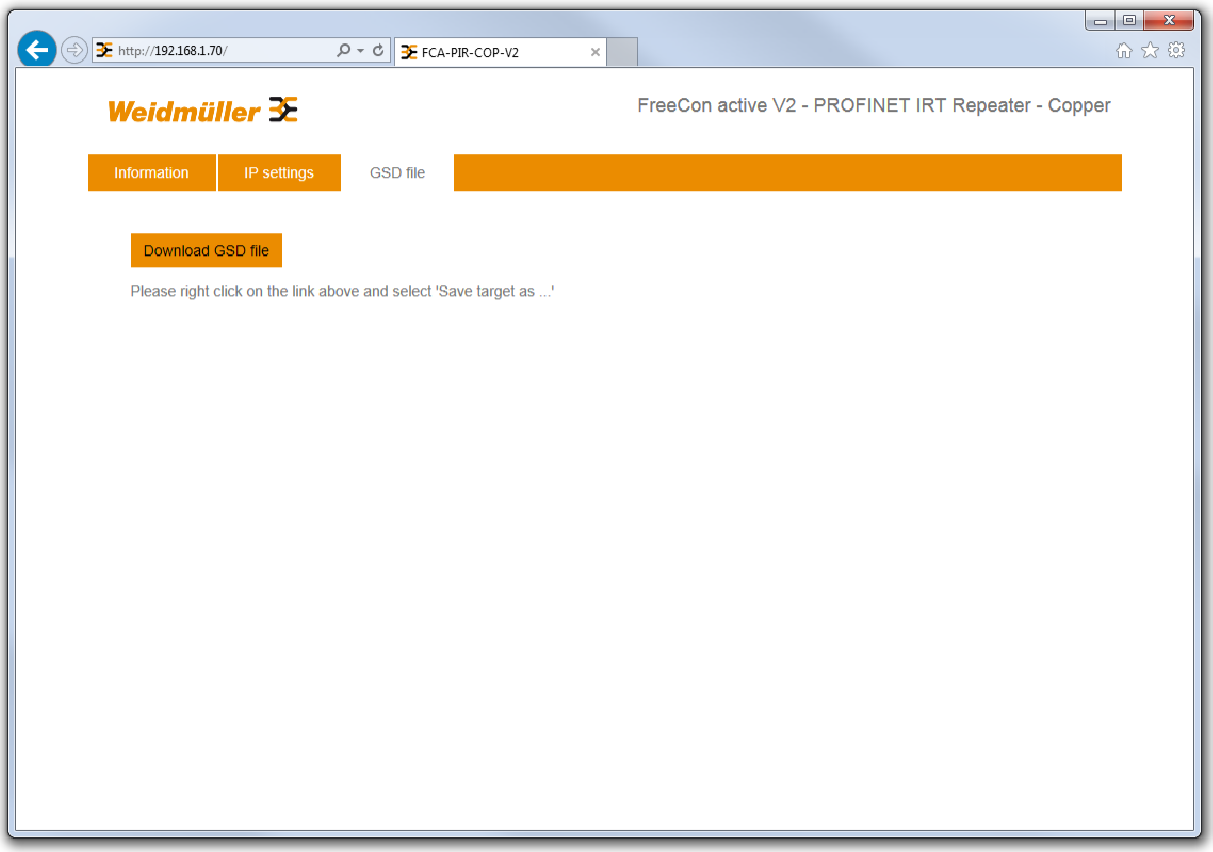


Fig. 12 Downloading the GSDML file from the FreeCon Active PROFINET-IRT Repeater

4.4 SNMP configuration

The FreeCon Active PROFINET-IRT Repeater supports the Simple Network Management Protocol (SNMP) in accordance with the PROFINET Standard and supports MIB-2. The Repeater can be configured, monitored and administered remotely from a network management station. In order to access data from the device's Management Information Base (MIB), a message-based communications schema is used.

4.5 Discovery and basic Configuration Protocol (DCP)

The Repeater offers full support for the PROFINET DCP protocol (a device detection and configuration protocol). This allows an I/O controller or supervisor to detect the FreeCon Active PROFINET-IRT Repeater and change the IP settings.

4.6 Link Layer Discovery Protocol (LLDP)

LLDP provides information on which "partners" are connected to which Ethernet port. This information is saved in the LLDP MIB and can be read with SNMP.

4.7 Updating firmware

The Repeater firmware can be updated by uploading a new firmware file. Updated firmware files are made available on the Weidmüller website.

The firmware file can be loaded onto the Repeater directly via the built-in FTP server.

In order to establish an FTP connection to the Repeater, first issue an IP address from your subnet, e.g. 192.168.1.101. (See Section 4.2)-

Use the "ftp *IP address*" command to establish an FTP connection to the FreeCon Active PROFINET-IRT Repeater and confirm the user login (User + Password) by pressing *Enter.* The confirmation "*User logged in"* appears.

Switch to the "Firmware" directory using the "cd firmware" command.

Enter the command "put *filename*" to transfer the new firmware to the device.

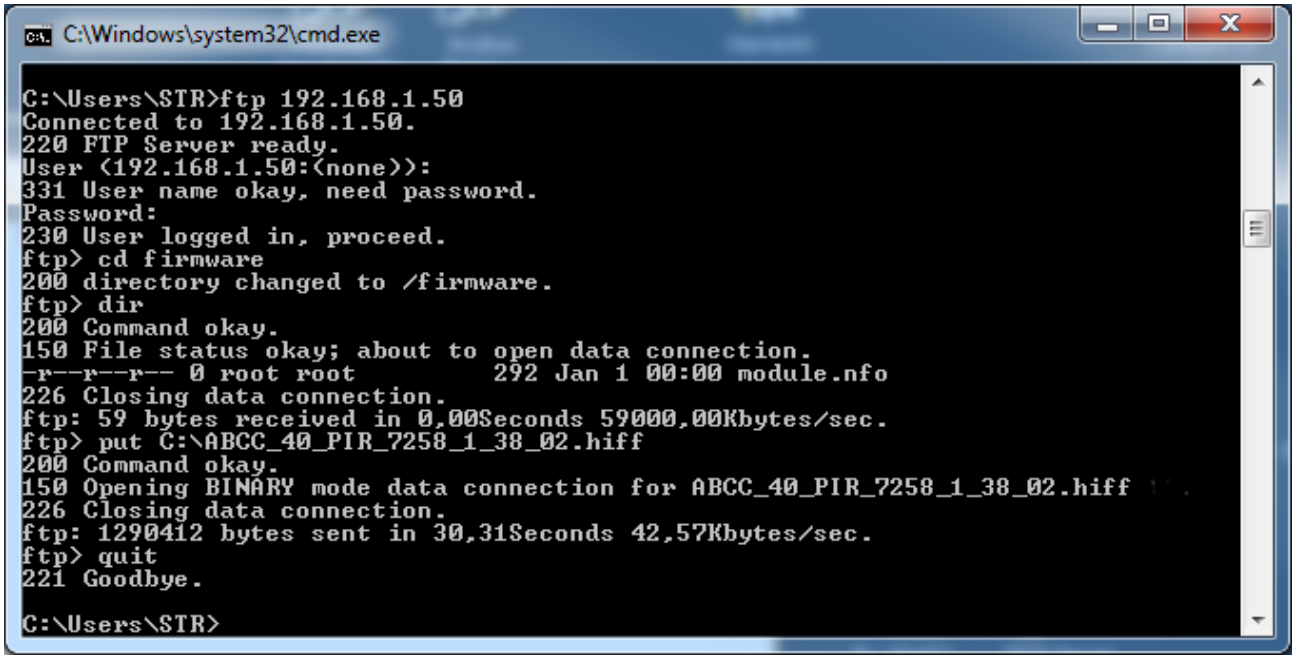


Fig. 13 Transferring the firmware file via FTP

Once the data transmission is complete, disconnect the device briefly from the power supply. The update process begins after powering up.

	NOTE
	The testing and **updating of the firmware in the FreeCon Active PROFINET-IRT Repeater can take up to 2 minutes.** During this time, the SD LED flashes alternately green and red. Never disconnect the power supply while you are installing new firmware.

After successful installation, the FreeCon Active PROFINET-IRT Repeater normally restarts automatically and is still available at its old IP address.

However, in exceptional cases, it may be necessary to disconnect the device briefly from the power supply after completing the firmware update. In this case, the SF LED remains unlit after the firmware update. In this case, the IP address settings are deleted and the device must be reconfigured as described in Section 4.2 .

A detailed description of the firmware update can be found in the download area at www.weidmueller.com..

5. Status and maintenance

5.1 LED indicators

The device has eight LEDs on the top. Their function is described in the table below.

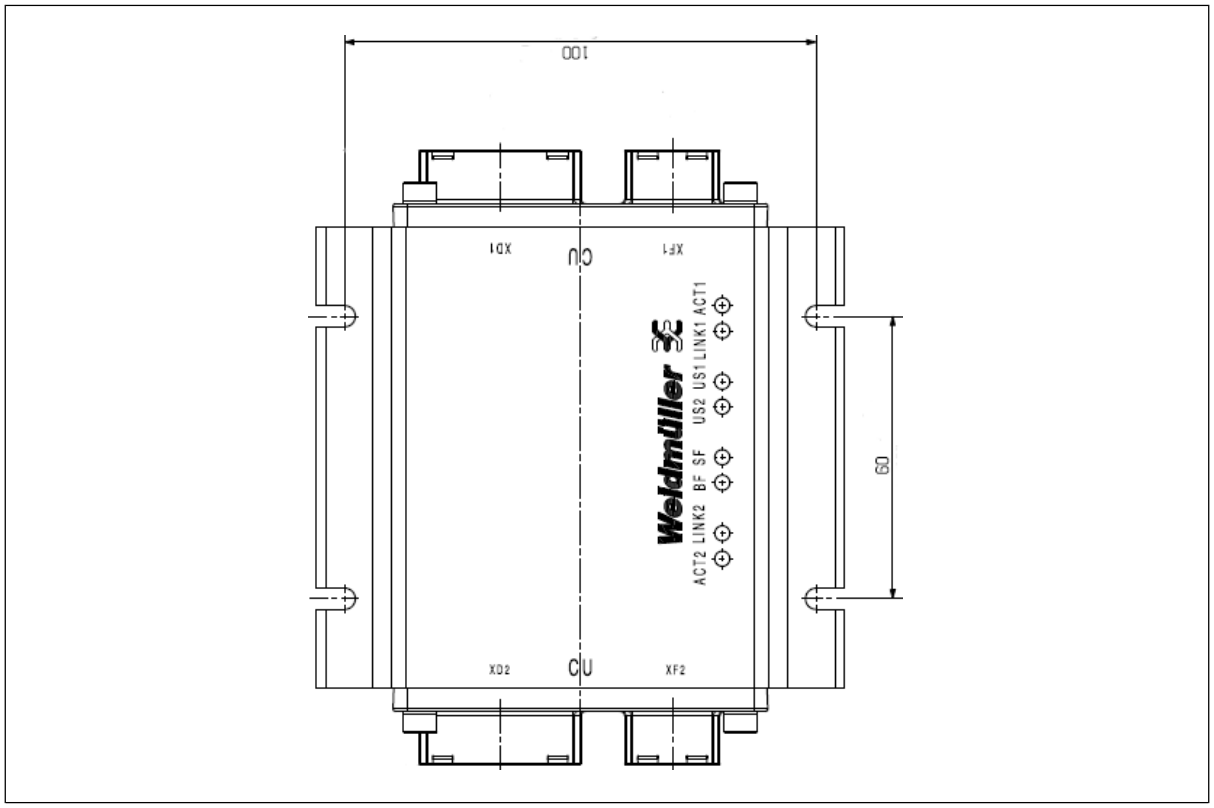


Fig. 21 The eight LEDs on the FreeCon Active PROFINET-IRT Repeater

5.1.1 LEDs LNK1 and LNK2

These LEDs show the connection status of the Ethernet transfer conductors to ports 1 (XF1) and 2 (XF2).

Colour	Status	Meaning
Green	On (continuous)	100 Mbps connection is active and transmission is OK.
Green	Off	No power supply or no network connection available
Green	Flashes	DCP Identify, "Flash LED". Flashes 3x when DCP Identity command is sent to the device by the configuration tool.

If one of the XF LEDs is not lit, check whether the relevant port is connected to another subscriber and whether the Ethernet connection is properly connected (with the right polarity).

5.1.2 LEDs ACT1 and ACT2

These LEDs show activity on the transmission conductors at ports 1 (XF1) and 2 (FX2).

Colour	Status	Meaning
Yellow	Off (continuous)	No activity
Yellow	Flashes	PROFINET activity

5.1.3 LEDs U_{S1} and U_{S2}

These two LEDs are controlled by the hardware as follows.

Colour	Status	Meaning
Green	On	Current input U_{S1} (L1) or U_{S2} (L2) is supplied with current.
	Off	Current input U_{S1} (L1) or U_{S2} (L2) is not supplied with current, or the voltage is below 18 V.

5.1.4 SF LED

This LED indicates a system failure or fault.

Colour	Status	Meaning
---	Off	No system error
Red	On	- Exception error - Serious internal error (in combination with red BF-LED) - Diagnosis event present
Red/Green	Flashing alternately	Firmware update in progress

5.1.5 BF LED

This LED indicates a bus failure.

Colour	Status	Meaning
---	Off	No bus failure
Red	On	One or more of the following faults: - Serious internal fault (in combination with red SF LED) - No station name assigned - No IP address assigned - The expected configuration does not correspond to the configuration carried out via the configuration tool.

	- Connection with IO Controller established, but IO Controller in STOP status or IRT synchronization not finished

6. Technical Data

Function	PROFINET device, conformity Class C
Profinet interface	Two 100BaseTX ports (PROFINET PushPull V14 plug-in connector, RJ45)
Power supply	
Input voltage	18…30 V DC
Current consumption	0.08 A / 24 V DC at U_{S1}
Power connection	PushPull Power plug-in connector
Reverse polarity protection	Yes
Max. current U_{S1}	16 A
Max. current U_{S2}	16 A
Mechanical data	
Base material for the housing	Aluminium profile, cover: nickel-plated zinc diecast
Type of protection	IP65
Dimensions	112 mm x 53 mm x 130 mm
Weight	725 g without plug-in connector
Type of mounting	Wall mounting with four M4 screws (10 mm or longer)
Environmental conditions	
Ambient temperature (operational)	-20°C…+55°C
Storage temperature	-40°C…+70°C
Relative ambient air humidity	Operation: 100% Storage/transport: 5...95%, no condensation
Approvals	
Emissions	EN 61000-6-3
ESD	EN61000-4-2
RF	EN61000-4-3
Burst	EN61000-4-4
Surge	EN61000-4-5
CRFI	EN61000-4-6
Impact	IEC 60068-2-27

Hammer	IEC 60068-2-75
Vibration	IEC 60068-2-6

7. Warranty

For this product, Weidmüller provides a guarantee in accordance with the guarantee terms and conditions in the general terms and conditions of sale of the Weidmüller company from which you bought the product. Weidmüller guarantees that product faults which existed on delivery will be repaired free of charge, or that Weidmüller will provide a new, fully-functioning product to replace the faulty product free of charge. If there are no specific written assurances about the system and its functionality in this catalogue / this product description, Weidmüller accepts no liability for compatibility with specific systems or suitability for specific applications. If acceptable in the law, damages and compensation of expenses regardless of the legal grounds are excluded, in particular for the breach of duties arising from contractual obligations and tort. In addition, the general conditions of sale are also applicable along with the expressly granted liability commitments of the Weidmüller company that sold you the products.