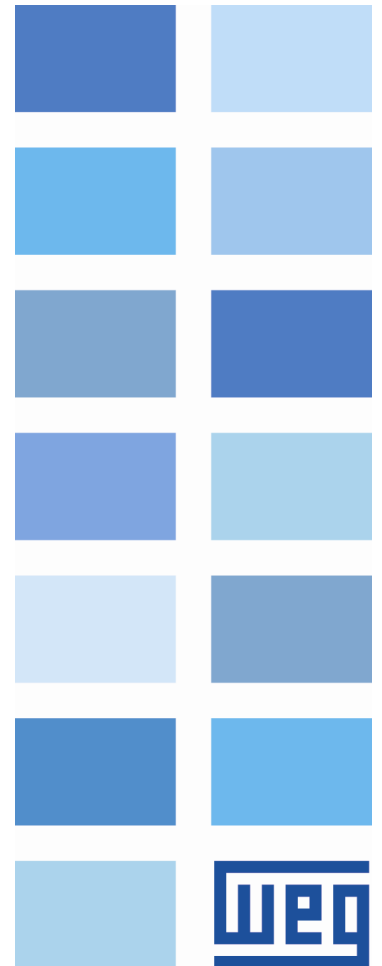


WEGScan

CFW900

Manual





WEGScan Manual

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The information below describes the reviews made in this manual.

Version	Revision	Description
-	R00	First edition.
-	R01	Bug fixes and naming update.
-	R02	General review.

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1 INTRODUCTION

This document covers the general concepts and configurations for low voltage inverter CFW900 communication and monitoring with WEG Motion Fleet Management platform.

To complement the information contained in this document, please also refer to the contents related to the following documents:

- CFW900 User's Manual;
- CFW900 Programming Manual;
- WEGScan 1000 User's Manual;
- WEG Motion Fleet Management platform's Manual.

All those manuals are available for download at the WEG website download center (www.weg.net).

Some procedures described are subject to changes that will not affect the user's understanding.

1.1 ABBREVIATIONS AND DEFINITIONS

- MFM WEG Motion Fleet Management. Cloud service platform used in WEG IoT applications.
- Drive Frequency inverter.
- Asset Device with aggregated value. For example, a frequency inverter.
- Attribute An attribute usually consists of only one variable monitored by the WEGScan published in the MFM, but there are situations where a variable is subdivided into more than one attribute, such as: last value, average value, minimum value and maximum value.
- DHCP Dynamic Host Configuration Protocol. Protocol that allows devices newly connected to a network to obtain an IP address automatically.
- DNS System responsible for translating IP addresses into domain names and vice versa.
- Ethernet Interconnection architecture for local area networks (IEEE 802.3).
- Firmware Set of operating instructions that are programmed directly into electronic equipment hardware.
- Gateway Electronic device that allows data flow between different communication networks.
- Hardware Equipment or device.
- IoT Internet of Things. Technology that allows machine-to-machine communication using an internet connection.
- IP Internet Protocol. Internet protocol for forwarding datagrams between networked devices.
- Login Action for the user to access the system. It is usually necessary to enter a username and password.
- Logout Action that terminates the user's connection to the system.
- MQTT Message Queuing Telemetry Transport. Transport protocol that uses the publish/subscribe architecture to transfer lightweight messages between devices.
- Pop-up Window smaller than a screen, which is over the main window.
- Plant Factory installation.
- RS-485 Interface standard for asynchronous serial communication.
- Site Set of plants.
- Software A program or set of instructions executed by a microcontroller or a microprocessor.

- TLS Security Protocol (Transport Layer Security).
- URL Uniform Resource Locator. Web address of a resource available on a network.
- Web World Wide Web. Hypertextual system that operates over the internet.
- WLAN Wireless Local Area Network.

1.2 OVERVIEW - WEGSCAN AND CFW900

WEGScan 1000 is the device used to gather and exchange data from low voltage frequency inverters to the WEG Motion Fleet Management (MFM) platform. Enabling access to data from different assets and assisting in their maintenance. The CFW900 inverter has an embedded WEGScan functionality, but it can also be connected to the platform through WEGScan 1000. There are two ways to connect to the MFM platform:

- **Standalone mode:** Inverter connected directly to the internet, through the integrated Ethernet port, publishing data directly to the platform;
- **Bridge mode:** Inverter connected through the WEGScan 1000 gateway responsible for bridging the local network, where the inverter is installed, and the WEG MFM platform.

Some of the possible functionalities related to the data exchange between CFW900 and the MFM platform are:

1. Remote Monitoring:

- Track parameters values and the inverter general status remotely;
- Data Access and real time critical analysis;
- Assistance in decision-making regarding predictive maintenance helping to reduce machine downtime.

2. Data Analysis:

- Assists in equipment optimization and performance;
- Enables advanced data analysis to identify trends, recurring failures and opportunities for improvement.
- Data sampling at every 5 minutes;
- Data storage for up to 30 days in case of disconnection with the MFM platform*.

3. Fault Diagnosis:

- Detecting potential failures before they occur;
- Historical data analysis and operating patterns to identify anomalies that could indicate problems.

* Only when the drive is equipped with a SD memory card. Without a memory card, up to 24 hours of data samples are stored in the drive volatile memory.

2 WAYS TO CONNECT TO THE MFM PLATFORM

This manual contains the necessary information for the correct configuration and use of the CFW900 WEGScan functionality. The document was developed for professionals with suitable training or technical qualifications to operate this type of product. Failure to comply with the product instructions may cause operating accidents and damages to the device, in addition to voiding the warranty. The user is responsible for the correct definition of the environment and application characteristics.

2.1 PHYSICAL INSTALLATION

The CFW900 frequency inverter installation should follow the steps described in the corresponding User's Manual.

2.2 INTERNET CONNECTION REQUIREMENTS

Once installed, it's necessary to provide an internet connection in order to publish data to the MFM platform, the customer's network must meet some requirements and have some releases.



NOTE!

To configure the access to addresses, ports and the internet, ask the IT team in charge of the network.

- The user's network must not have VPN or PROXY;
- The ports of Table 2.1 and the IP addresses of Table 2.2 must be accessible;

Table 2.1: Addresses required for the WEGScan communication with the MFM

Domain
broker.app.wnology.io

Table 2.2: Ports required for the WEGScan communication with the MFM

Protocol	Port
TCP	1883
TCP	8883

2.3 STANDALONE MODE - DIRECT CONNECTION WITH THE PLATFORM

If an internet access point is available to the CFW900 frequency inverter, it's possible to configure the drive to publish the data directly to the MFM platform. In order to guarantee the connection's security and data integrity the drive uses TLS protocol (v1.2) to encrypt the transmitted data. The steps to this configuration are described as follows:

- Configure the Ethernet network parameters in the drive:
 - C9.4.1: Ethernet - IP Address Settings: DHCP
- Confirm that the inverter's date and hour parameter are properly configured:
 - C11.1.1: Configuration - Time Zone
 - C11.1.2: Configuration - Date/Hour
- With the WPS software, configure the WEGScan functionality in Standalone mode and download the configuration to the device (See chapter 3);
- Connect the CFW900's Ethernet port to the available internet access point.

Once configured, the product will be able to publish data to the MFM platform automatically.

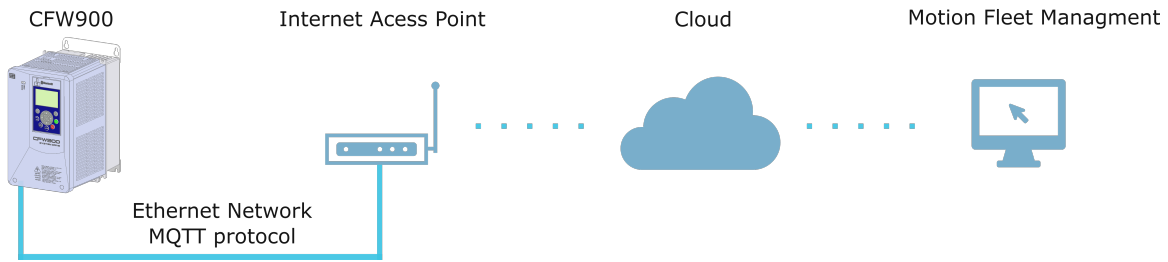


Figure 2.1: Direct connection scheme between CFW900 and the MFM platform

2.4 BRIDGE MODE - CONNECTION USING THE WEGSCAN 1000 AS BRIDGE

If no internet access point is available to the CFW900 frequency inverter, the WEGScan 1000 can be used as a bridge to publish data from the inverter to the MFM platform. In this mode, CFW900 publishes data, using the MQTT protocol, to the WEGScan 1000 in a local network and WEGScan 1000 transfer the data to the platform. The steps to this configuration are described as follows:

- Configure the Ethernet network parameters in the drive:
 - C9.4.1: **Ethernet - IP Address Settings:** Parameters;
 - C9.4.2: **Ethernet - IP Address:** This IP address depends on the WEGScan 1000 Ethernet port chosen in the configuration wizard. See further details in the chapter 3;
- Confirm that the inverter’s time parameters are properly configured:
 - C11.1.1: **Configuration - Time Zone;**
 - C11.1.2: **Configuration - Date/Hour;**
- With the WPS software, set the WEGScan functionality in Bridge mode and download the configuration to the device (See chapter 3);
- Connect the CFW900’s Ethernet port to the WEGScan 1000, or in the same local network where the WEGScan 1000 is installed.

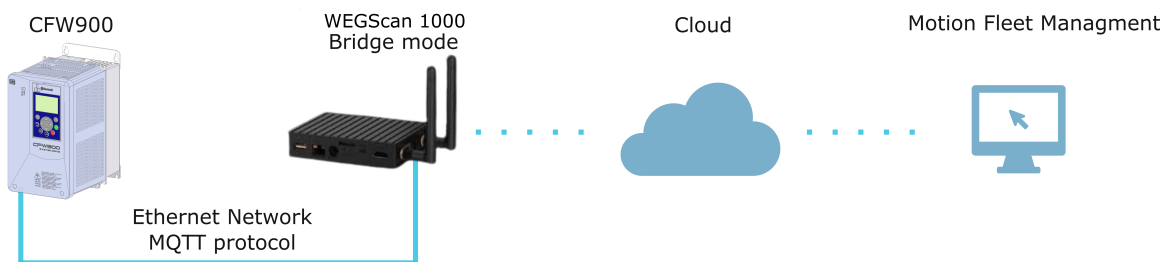


Figure 2.2: Connection scheme between CFW900 and the MFM platform using WEGScan 1000 as bridge

3 CONFIGURE THE DRIVE IN THE MFM PLATFORM

In order to configure the WEGScan functionality in the CFW900 it's necessary to register in the WEG Motion Fleet Management platform. The registration process, sites and plants are specified in the MFM platform, available in (<https://mfm.wnology.io>). There must be at least one plant available for the inverter configuration. For cases of connection in Bridge mode, it is expected that the WEGScan 1000 gateway is already configured and registered in the same plant where the inverter will be added. For more information about the WEGScan 1000, consult its configuration manual.

The WEGScan functionality is configured through the WEG Programming Suite (WPS) software. The configuration steps are as follows:

- Step 1** Connect the CFW900 frequency inverter to a computer with internet connection. The inverter can be connected via USB or Ethernet interface.

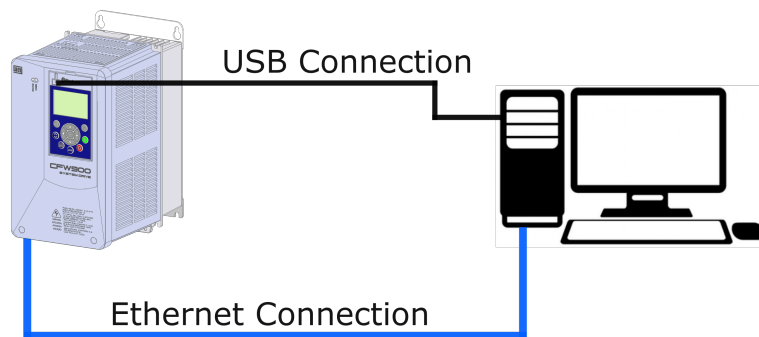


Figure 3.1: Ways to connect the CFW900

- Step 2** On the computer, open the WPS software and create a project selecting the CFW900 inverter. Consult the WPS software documentation about the creation and configuration of resources.

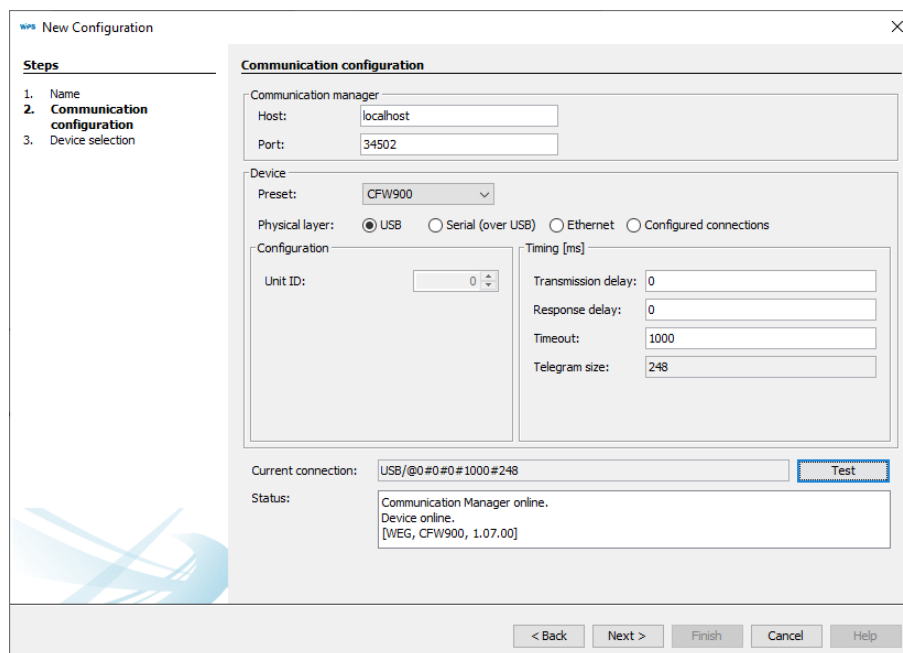


Figure 3.2: Creating project in WPS

- Step 3** With the resource created, in the configuration, open the “Cloud Services” in the project tree. Right-click with mouse in “WEG MFM WEGScan” and select the “Configure” option.

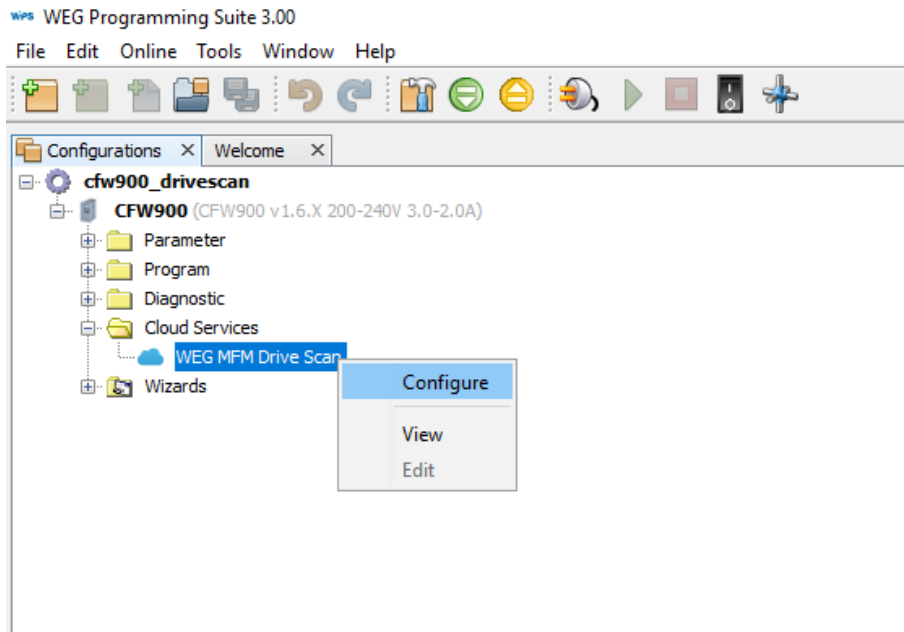


Figure 3.3: Opening the cloud services configuration tool

Step 4 Log in with the email and password, as registered in the MFM platform.

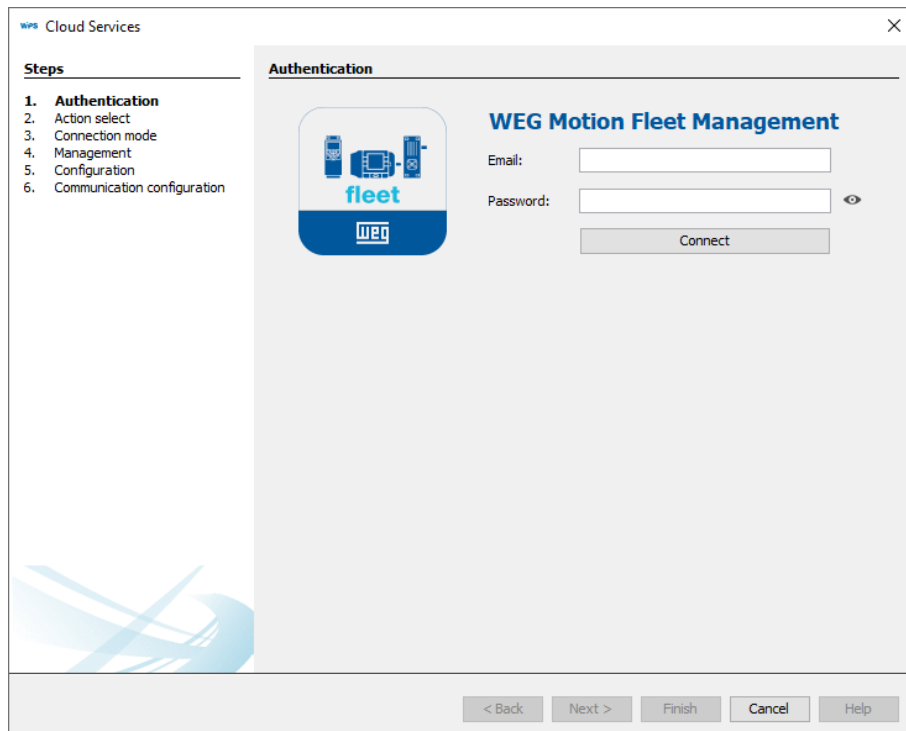


Figure 3.4: MFM platform authentication

Step 5 After authentication, select the desired action. It's possible to create or modify the configurations of each CFW900 available in the plant.

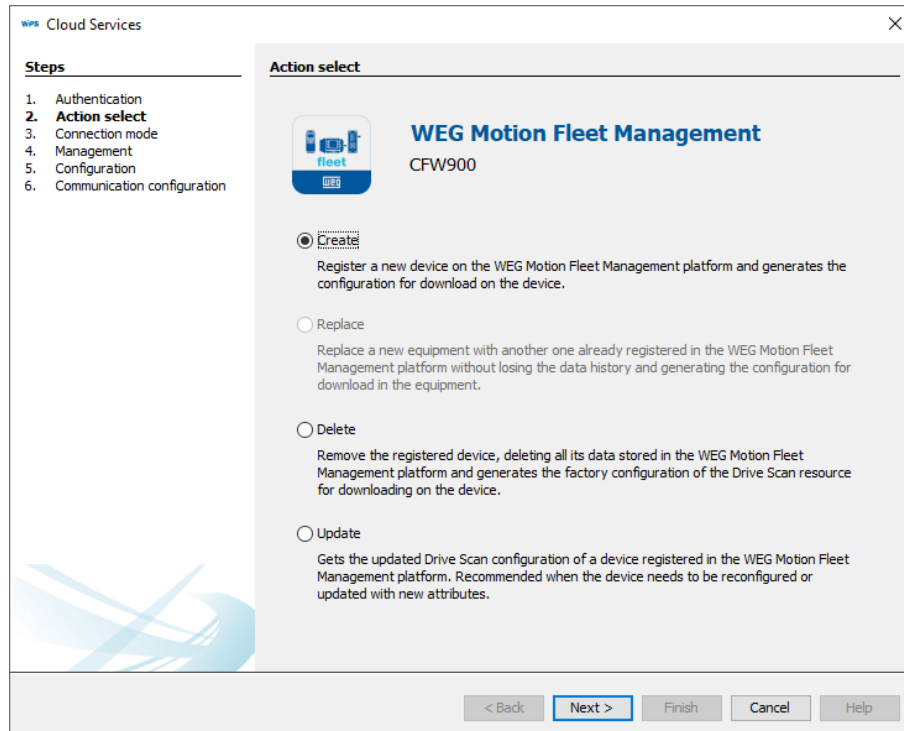


Figure 3.5: Select the action to be executed in the platform

Step 6

Choose the connection mode: Standalone mode, if the drive is connected directly to the internet or Bridge mode, if the WEGScan 1000 is used as gateway for the connection.

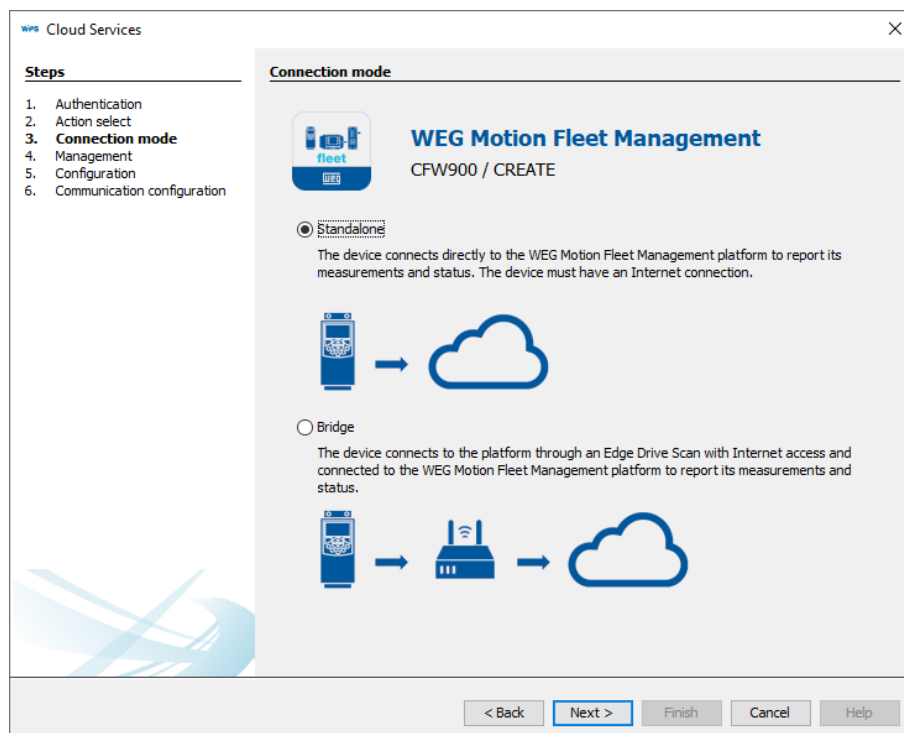


Figure 3.6: Select the action to be executed in the platform

Step 7 In Standalone mode, select which plant the inverter should be added, attribute a name that will be used to identify the drive in the platform and write the unique product serial number. It's possible to use the search tool to read the inverter internal memory and fill the serial number automatically.

- Standalone

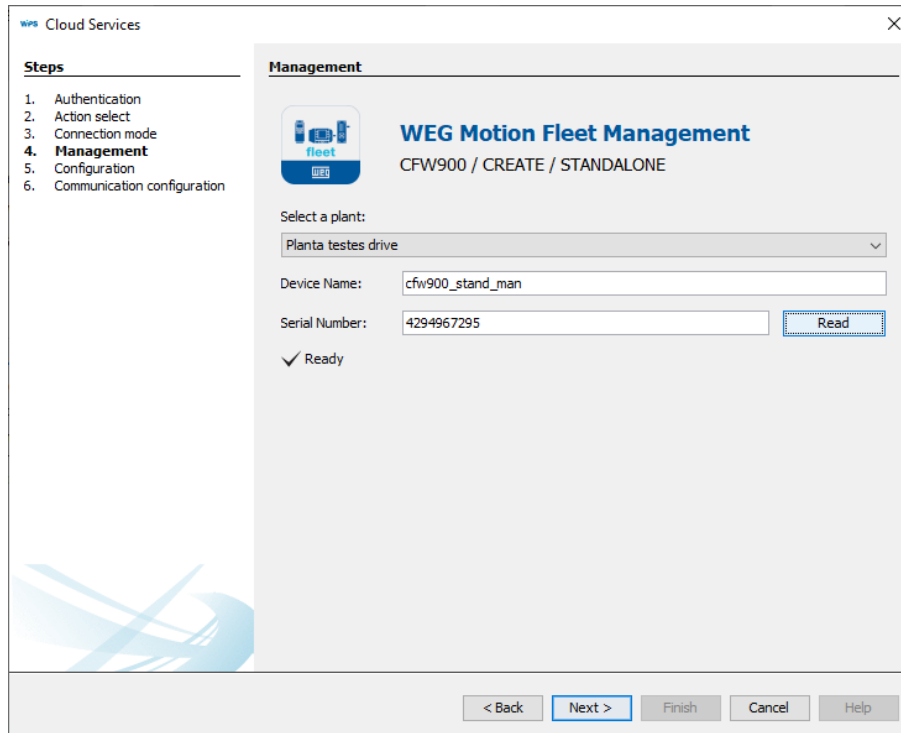


Figure 3.7: Creating the device in the platform - Standalone mode

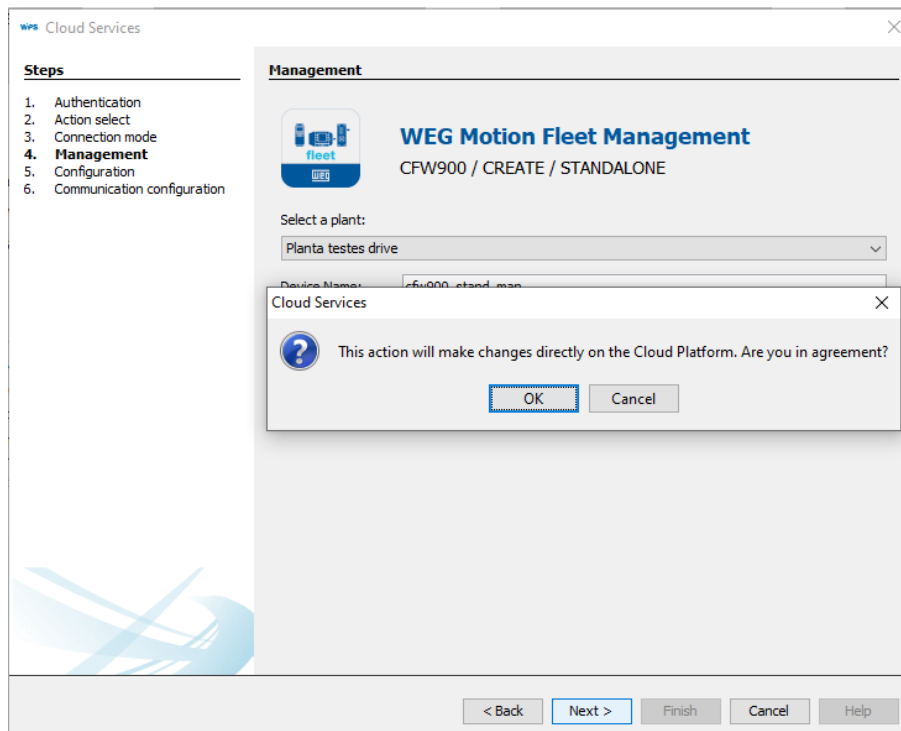


Figure 3.8: Confirm the data modification in the platform - Standalone mode

Step 7 - Bridge - In the management screen the user is able to create or replace the configuration of any CFW900 available in each plant. In Bridge mode, the user must select the desired plant to add the inverter, choose the WEGScan 1000 gateway previously registered in the platform, attribute a name that will be used to identify the drive in the platform and write the unique product serial number. It's possible to use the "read" tool to read the inverter internal memory and fill the serial number automatically.

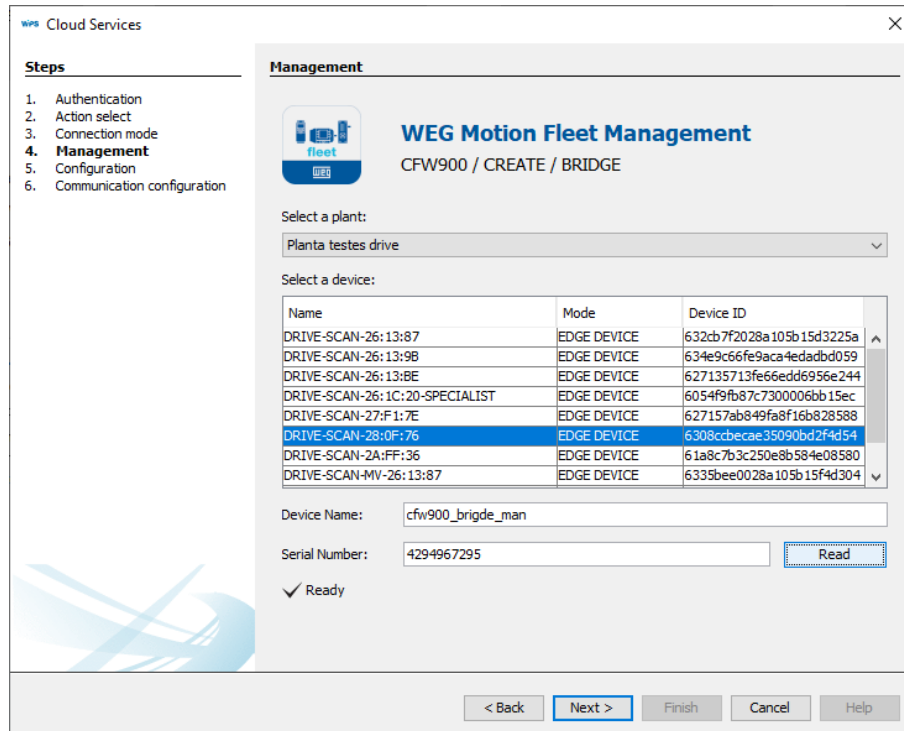


Figure 3.9: Creating the device in the platform - Bridge mode

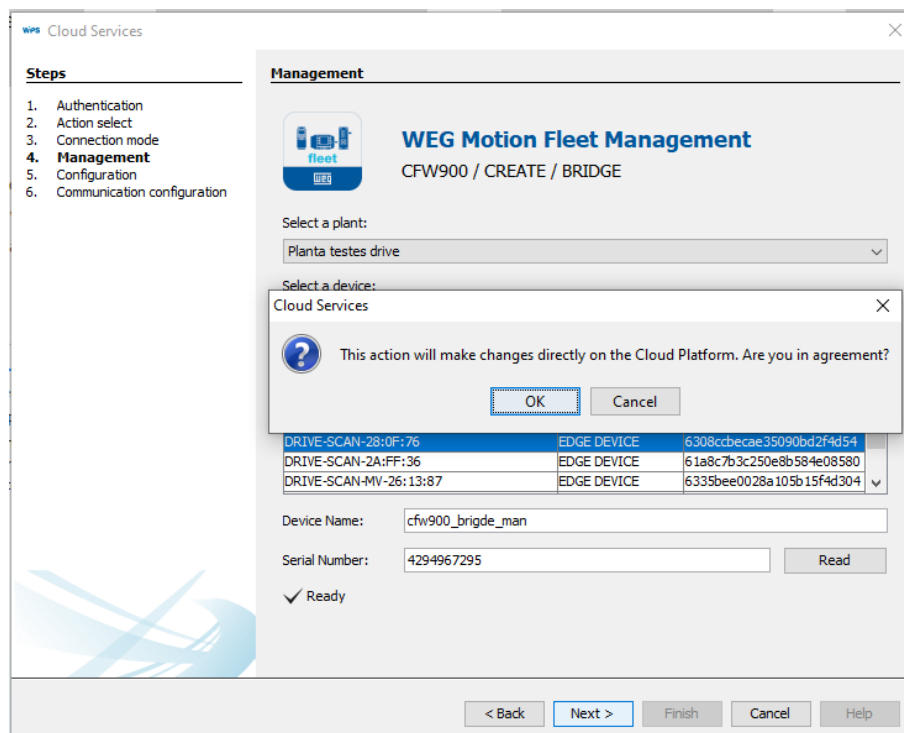


Figure 3.10: Confirm the data modification in the platform - Bridge mode

- Step 8- Standalone** - A window with a summary of the device configurations will be shown, for information purpose.

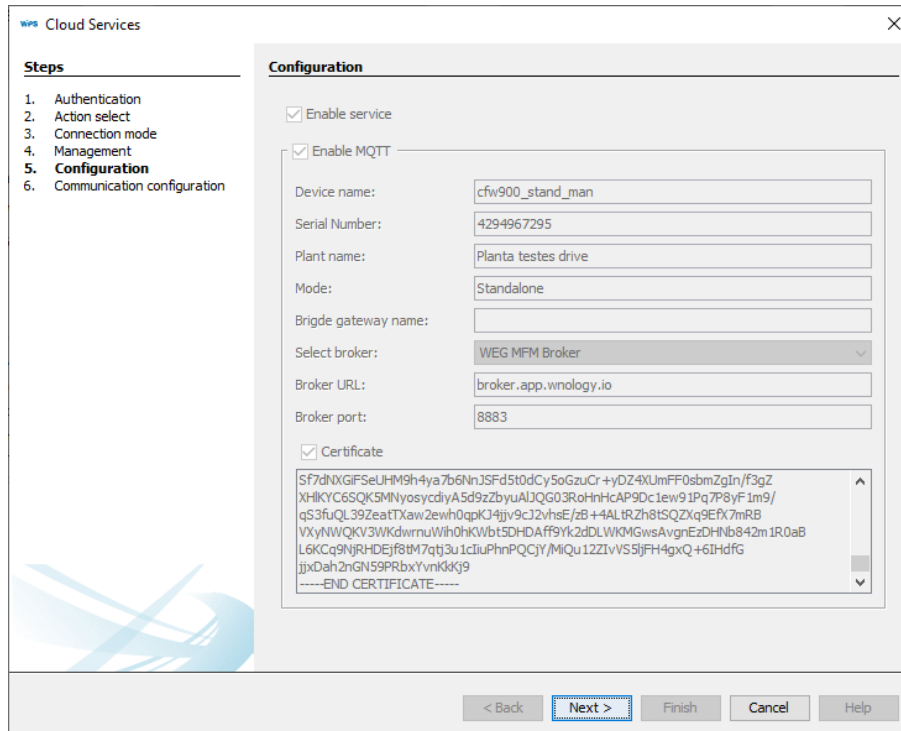


Figure 3.11: Device configuration in the platform - Standalone mode

- Step 8 - Bridge** - A window with a summary of the device configurations will be shown, for information purpose. The user must choose the IP address in which the inverter should publish the data. This IP address is defined during the WEGScan 1000 configuration process, for more information see the WEGScan 1000 manual. The IPs available match the addresses configured in the WEGScan 1000.

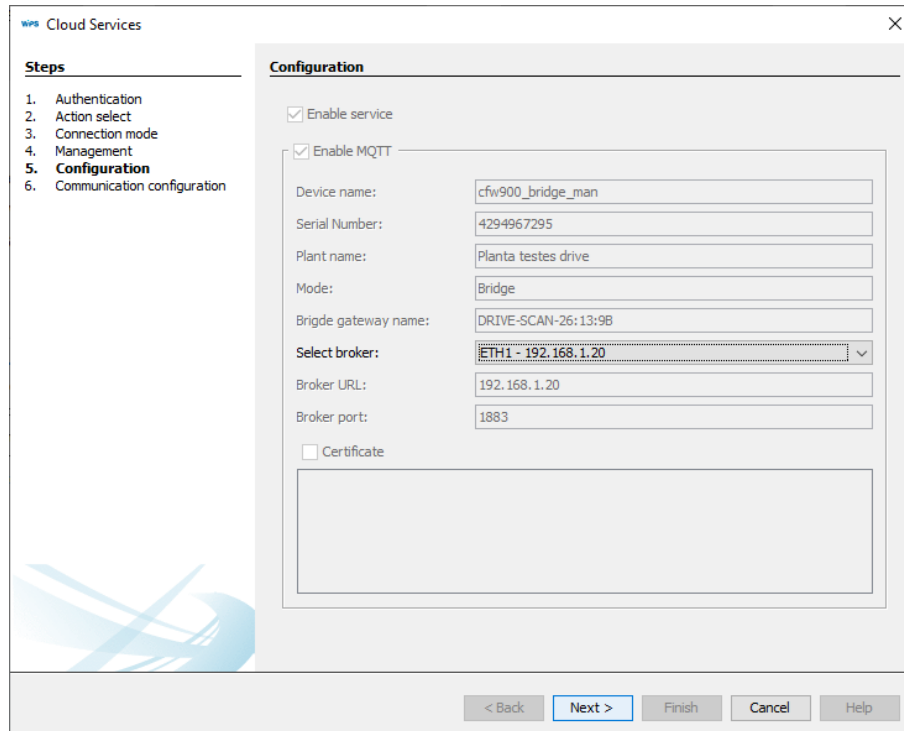


Figure 3.12: Device configuration in the platform - Bridge mode



NOTE!

The WEGScan 1000 Ethernet interface IP address selected will affect the IP address that has to be configured in the CFW900 C9.4.2 parameter. The Table 3.11 demonstrate how the IP address choice must be made based on the default values for the WEGScan 1000 interfaces.

Table 3.11: Inverter IP address designation based on the WEGScan 1000 default IP values

WEGScan 1000 default IP address	CFW900 IP address
ETH0 - 192.168.0.10	192.168.0.XX
ETH1 - 192.168.1.20	192.168.1.XX

Step 9

When the configuration process is finished, the software may ask to build and download the new configuration to the drive. In the “Download” window make sure that the “Cloud services configuration” checkbox is checked.

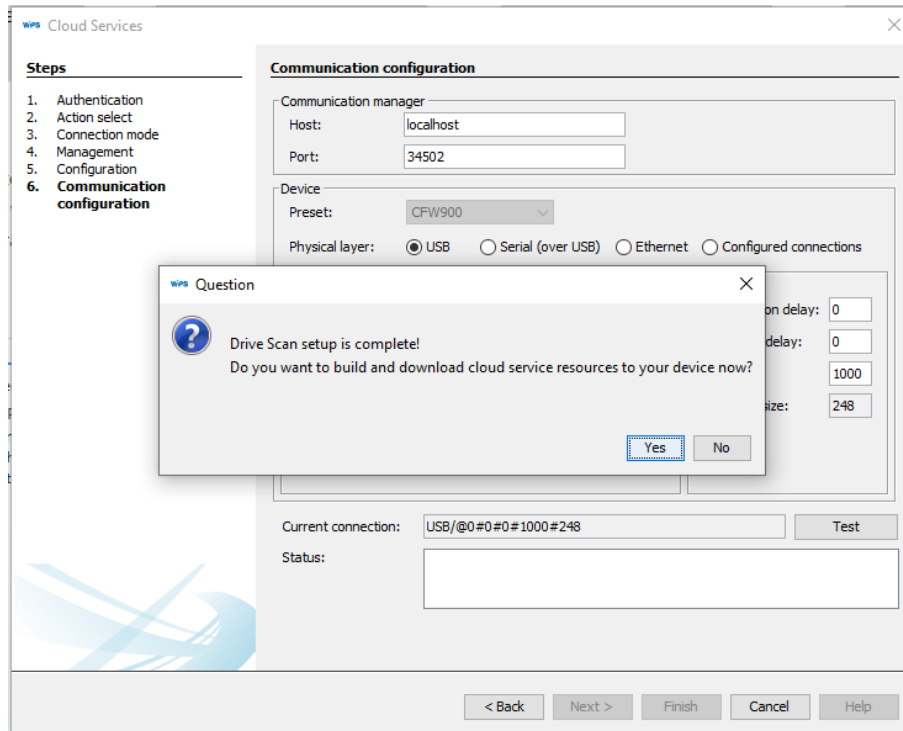


Figure 3.13: Dialog box to build and download the configuration

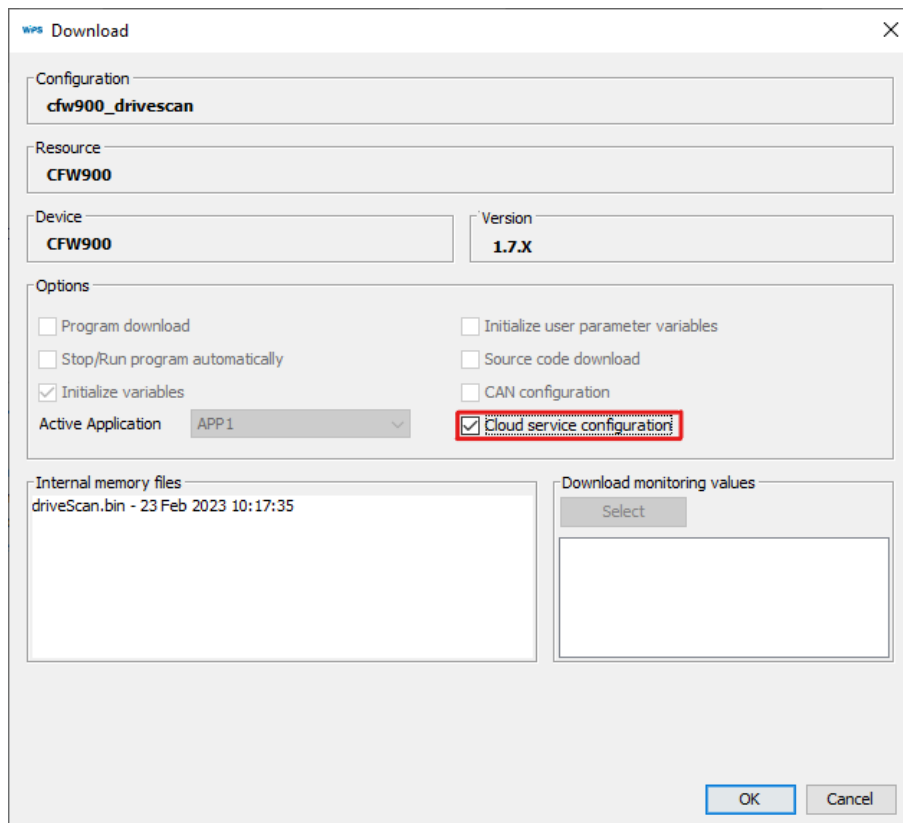


Figure 3.14: Download the configuration to the CFW900 drive

Step 10

Once the configurations are loaded to the equipment, if the drive has active connection to the platform, it should start publishing the data as intended. It's possible to check the WEGScan connection status through the S5.3.6: Ethernet - MQTT Status parameter.

4 OTHER CLOUD SERVICES ASSISTENT FUNCTIONS

Beside the creation of assets functionality, the WPS cloud services configuration assistant allows the user to delete and update inverters previously registered.

4.1 DELETE

Remove a registered device, deleting all of it's data from the WEG Motion Fleet Management. Creating a factory reset configuration file to be downloaded to the device.

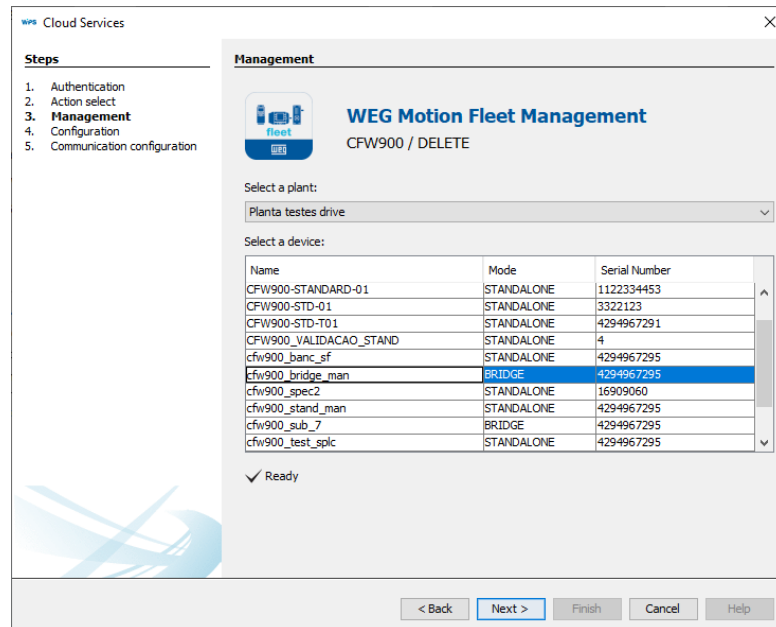


Figure 4.1: CFW900 delete process in the platform

4.2 UPDATE

Get WEGScan configuration of device registered in the platform. Recommended when the device needs to be reconfigured or updated with new attributes.

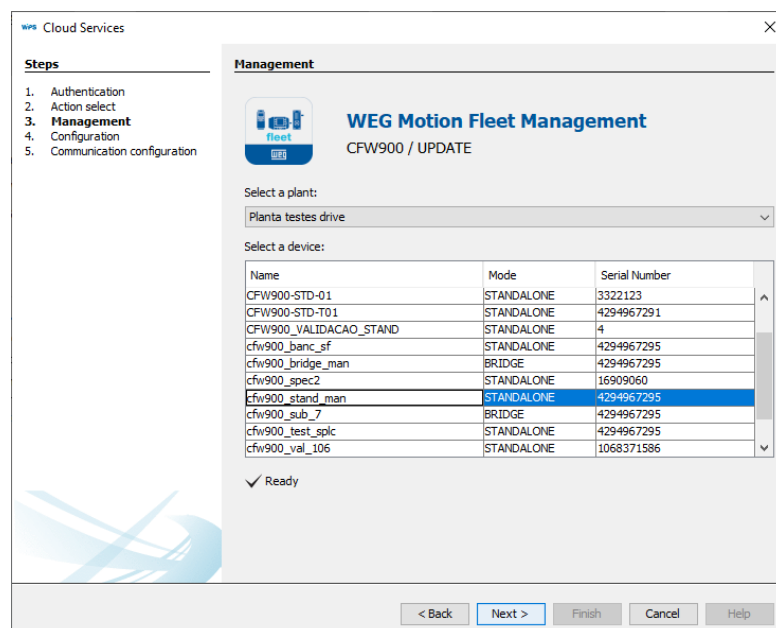


Figure 4.2: CFW900 update process in the platform

5 MONITORING DASHBOARD

5.1 ACCESS

1. Access the website of the WEG Motion Fleet Management platform at <http://mfm.wnology.io>,
2. Enter your email and login, and press the <Enter> key,
3. Click on the "Systems" side tab, and keep clicking on each sublevel until you find your asset,
4. In the plant, select the asset to be monitored.

5.2 FEATURES

Remote asset monitoring provides the customer with enormous potential for cost reductions, especially when aspects related to maintainability and productivity are assessed.

The dashboards of assets monitored by the WEG Motion Fleet Management platform are constantly evolving, increasing the user experience in data reception.

In all dashboards, we will bring direct information about:

- Identification of each asset;
- Asset status;
- Asset health;
- Charts of the various monitored attributes;

The user can also create minimum and maximum limits for several monitored variables for each asset, allowing actions to be taken when values are exceeded. In addition, alerts are automatically generated when asset failures occur.

The tool also allows registering and scheduling maintenance events for each of your assets being monitored. Parameters sent cyclically are listed in table 5.1.

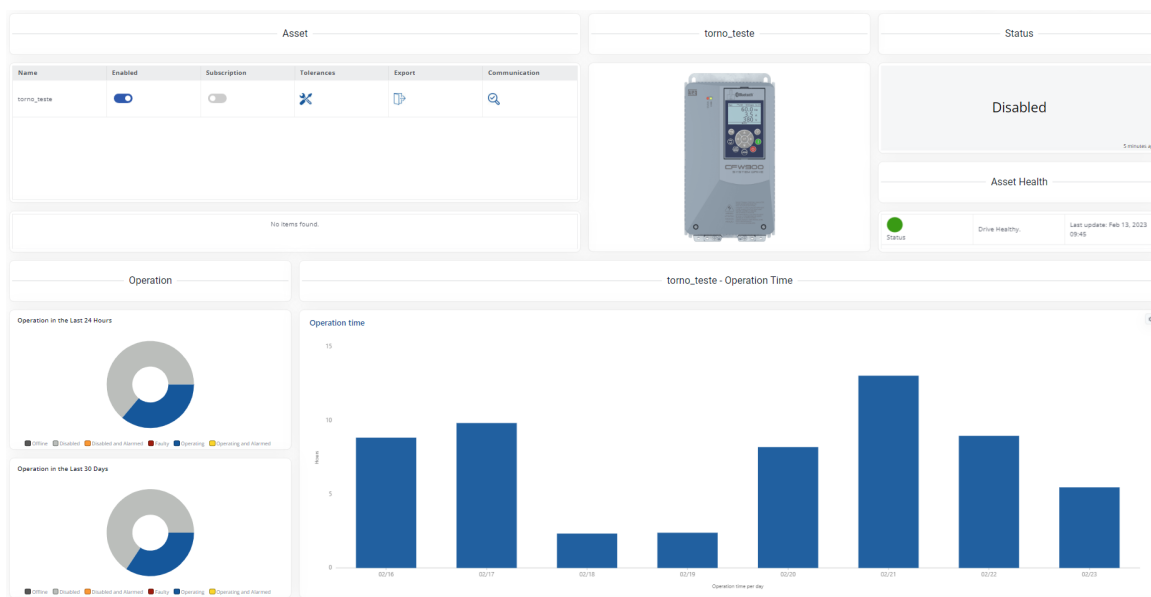


Figure 5.1: CFW900 monitoring dashboard in MFM platform

5.3 PARAMETERS BACKUP

Beside the monitoring dashboards, the CFW900 drive publishes daily a parameter backup with all the configuration parameters that were modified from the factory default value. This functionality is accessible via the asset

menu as seen in the Figure 5.2.

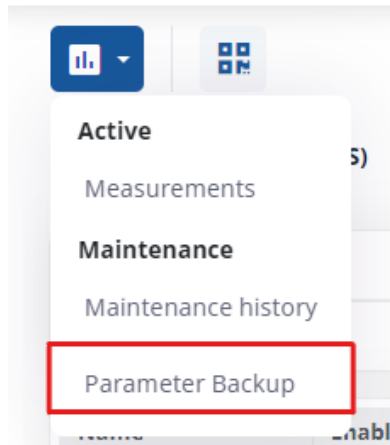


Figure 5.2: Access to the parameters backup menu

The parameters backup page has a panel with a calendar that shows in which days the parameters list was published, as seen in the Figure 5.3. The backup is published daily at 8 am. The drive also publishes the backup in the first connection after a new configuration file is loaded in the device.

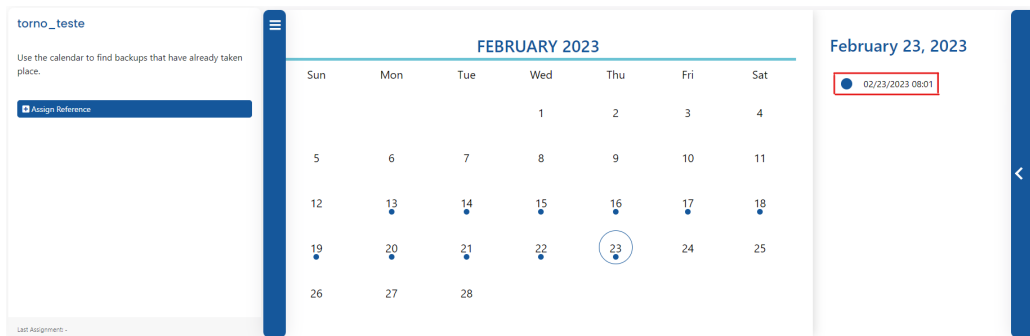


Figure 5.3: Parameters backup page

In the table, it is possible to check the parameters, their descriptions, values corresponding to a reference date and to the current date (or date of the last reading). In the dashboard, the user is still able to assign, through the button “Assign reference”, a reference date to compare the parameter values of the chosen date with the current values.

Parameter	Description	Reference: 02/13/23 09:45:3	Current: 02/23/2023 08:01	Status: 0/830(0%)
S1.2.1	Software Version - Package	10700	10700	No change
C8.1	Functional Safety - SS1-t Ramp Deceleration Time	50.0 s	50.0 s	No change
C6.1.1	Speed Control Ramps - Acceleration Time	200.0 s	200.0 s	No change
C6.1.2	Speed Control Ramps - Deceleration Time	30.0 s	30.0 s	No change
C6.1.4	Speed Control Ramps - 2nd. Ramp. Accel. Time	100.0 s	100.0 s	No change
C6.1.5	Speed Control Ramps - 2nd. Ramp Decel. Time	100.0 s	100.0 s	No change
C6.1.3	Speed Control Ramps - 1st/2nd Ramp	1st Ramp	1st Ramp	No change
C6.1.6	Speed Control Ramps - Quick Stop Time	50.0 s	50.0 s	No change
C4.3.2.1	JOG Speed - JOG Reference	75 rpm	75 rpm	No change
C4.3.3.1	Torque - Torque Reference via HMI	0.0 %	0.0 %	No change
C4.3.1.3.1	Ref. HMI, Als and Fis - HMI	400 rpm	400 rpm	No change

Figure 5.4: Table with the backup parameters

The result of comparing parameter values between the reference date and the current date is listed in the “Status” column. The “Status” can be “No changes”, when there is no divergence between the values read on the two dates, or it can be “Changed”, when there is divergence in the values read.

Table 5.1: Cyclically monitored parameters

Parameter	Atribute	Type of acquisition
S2.1.1: Motor Speed - Reference	motorSpeedReference	Average value
S2.1.3: Motor Speed - Actual Value	motorSpeed	Average value Maximum value Minimum value
S2.3.1: Inverter Output - Current	motorCurrent	Average value Maximum value Minimum value
S2.7.1: DC Link - Voltage	dcLinkVoltage	Average value Maximum value Minimum value
S2.3.3: Inverter Output - Frequency	motorFrequency	Average value Maximum value Minimum value
S1.1.1: Status - Inverter	extsts	Last value
S2.3.2: Inverter Output - Voltage	motorVoltage	Average value Maximum value Minimum value
S2.2.3: Motor Torque - Estimated Value	motorTorque	Average value Maximum value Minimum value
S2.3.5: Inverter Output - Power	outputPower	Average value Maximum value Minimum value
S2.3.4: Inverter Output - cos phi	outputPowerFactor	Last value
S1.2.1: Software Version - Package	softwareVersion	Last value
S2.5.2.1: Rectifier Temperature - Rectifier Module	rectifierTemperature	Last value
D4.1.5.1: Motor Overl. Fault - Ixt Motor Level	motorOverload	Average value Maximum value Minimum value
D3.1: Hour Control - Time Powered	tPowered	Difference
D3.2: Hour Control - Hours Enabled	tEna	Difference
D3.3: Hour Control - Fan Running Hours	tFanEna	Difference
S2.3.8: Inverter Output - Energy kWh	energyOut	Difference
D2.1.1: Actual - Alarm 1	alarmSts1	Last value
D2.1.2: Actual - Alarm 2	alarmSts2	Last value
D2.1.3: Actual - Alarm 3	alarmSts3	Last value
D2.1.4: Actual - Alarm 4	alarmSts4	Last value
D2.1.5: Actual - Alarm 5	alarmSts5	Last value
D1.1.1: Actual - Fault 1	faultSts1	Last value
D1.1.2: Actual - Fault 2	faultSts2	Last value
D1.1.3: Actual - Fault 3	faultSts3	Last value
D1.1.4: Actual - Fault 4	faultSts4	Last value
D1.1.5: Actual - Fault 5	faultSts5	Last value
C3.1.1: Configuration - Control Type	controlType	Last value
C2.1.1: Motor Data - Motor Type	motorType	Last value
C2.1.5: Motor Data - Rated Current	mRtdCurrent	Last value
C2.1.8: Motor Data - Rated Speed	mRtdSpeed	Last value
C2.1.6: Motor Data - Rated Frequency	mRtdFrequency	Last value
C2.1.3: Motor Data - Rated Power	mRtdPower	Last value
D4.1.3.1: DC Link - 100 Hz Harmonic	vHarm100Hz	Average value Maximum value Minimum value
D4.1.3.2: DC Link - 120 Hz Harmonic	vHarm120Hz	Average value Maximum value Minimum value
S2.5.1.1: IGBT Temperature - Phase U/T1 IGBT1	phaseUTemperature	Average value Maximum value Minimum value
S2.5.1.2: IGBT Temperature - Phase V/T2 IGBT1	phaseVTemperature	Average value Maximum value Minimum value

Parameter	Attribute	Type of acquisition
S2.5.1.3: IGBT Temperature - Phase W/T3 IGBT1	phaseWTemperature	Average value Maximum value Minimum value
S2.5.3.1: Internal Air Temperature - Power	airTempPowerIn	Average value
S1.3.2: Inverter Data - Inverter Serial No.	serialNumber	Last value
S5.2.1: Serial RS485 - Interface Status	serialSts	Last value
C9.10.1: Bluetooth - Mode	btSts	Last value
S5.3.1: Ethernet - Interface Status	ethSts	Last value
S5.5.1: Modbus TCP - Communication Status	mbTcpSts	Last value
S2.5.3.2: Internal Air Temperature - Control	ctrlTemp	Last value
D4.1.6.1: Thermal Management - IGBT Overload Status	igbtOvldSts	Last value
S1.3.5: Inverter Data - Rated Current	rtdCurr	Last value
C1.1.2: Power Supply - Rated Voltage	rtdVol	Last value
S2.3.9: Inverter Output - Current Switc. Freq.	swFreq	Last value
D4.1.1.1: Fan Speed - Power Fan 1 Speed	fanSpdPw1	Last value
D4.1.1.2: Fan Speed - Power Fan 2 Speed	fanSpdPw2	Last value
D4.1.1.3: Fan Speed - Power Fan 3 Speed	fanSpdPw3	Last value
D4.1.1.4: Fan Speed - Power Fan 4 Speed	fanSpdPw4	Last value
D4.1.1.5: Fan Speed - Int. Fan 1 Speed	fanSpdInt1	Last value
D4.1.1.6: Fan Speed - Int. Fan 2 Speed	fanSpdInt2	Last value
D4.1.6.3: Thermal Management - Heat Sink Temp.	hsTemp	Last value
C11.1.1: Configuration - Time Zone	rtcUTC	Last value
S1.5.1: Date/Hour - Actual	rtcClock	Last value



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