



DIGIRAIL OEE




USER GUIDE V1.0x D



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1 SAFETY ALERTS

The symbols below are used in the device and throughout this manual to draw the user's attention to important information related to device safety and use.

		
CAUTION Read the manual fully before installing, and operating the device.	CAUTION OR HAZARD Risk of electric shock.	ATTENTION Material sensitive to static charge. Check precautions before handling.

All safety recommendations appearing in this manual must be followed to ensure personal safety and prevent damage to the instrument or system. If the instrument is used in a manner other than that specified in this manual, the device's safety protections may not be effective.

2 PRESENTATION

The **DigiRail OEE** is the ideal tool to read the sensors that monitor the operation of machines, devices or processes. Among its many applications, this multi input module allows you to count operation time and downtime and the amount of approved and rejected parts, signal the need for preventive or corrective maintenance or monitor operating conditions in general.

The device has 6 digital inputs, 2 analog inputs and 2 digital outputs, RS485 interface, USB interface, Wi-Fi or Ethernet communication interface and is compatible with the main clouds on the market. In addition, it can be integrated with MES, SCADA and ERP systems.

The figure below shows an example of topology for **DigiRail OEE**:

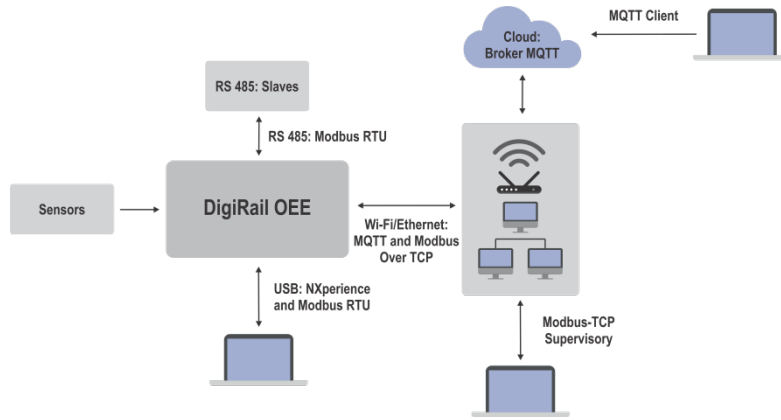


Figure 1 – Topology

3 IDENTIFICATION

3.1 DEVICE OVERVIEW

Built in ABS+PC and with IP20 protection rating, the **DigiRail OEE** has high quality housing, three LEDs on its front and a protection cover with detachable faces to pass the sensors, as shown in the figure below:

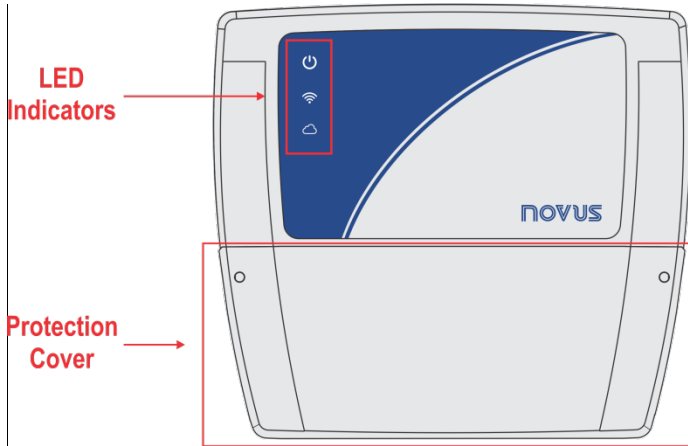


Figure 2 – Device overview

3.2 DEVICE IDENTIFICATION

The identification of the device model is described on the label attached to the back of the housing. This label also provides information on the power supply, MAC address and serial number, as shown in the figure below:

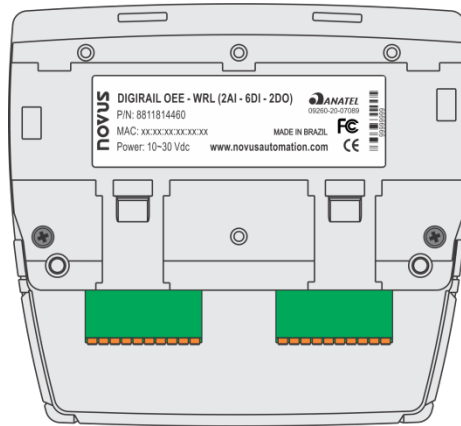


Figure 3 – DigiRail OEE

3.3 DEVICE MODEL

The DigiRail OEE has two models: DigiRail OEE - WRL and DigiRail OEE - ETH, whose features are described in Table 01:

	Digital Input	Analog Input	Digital Output	USB Interface	RS485 Communication Interface	Ethernet Communication Interface	Wireless Communication Interface
WRL	6	2	2	1	1	x	1
ETH	6	2	2	1	1	1	x

Table 01 – DigiRail OEE Models

4 INSTALLATION

4.1 MECHANICAL INSTALLATION

As shown in the figure below, the **DigiRail OEE** can be installed on DIN 35 mm rail. You must fix it with its back clips:



Figure 4 – DIN rail installation

In addition, the device also has two holes to fix it with screws, as shown in the figure below:

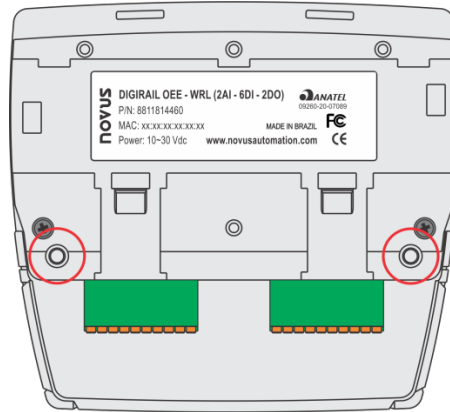


Figure 5 – Installation with screws

The **DigiRail OEE** has a removable protection cover to protect its connection terminals. The protection cover has three detachable areas, one at the bottom and one at each side, so you can easily handle the sensors:

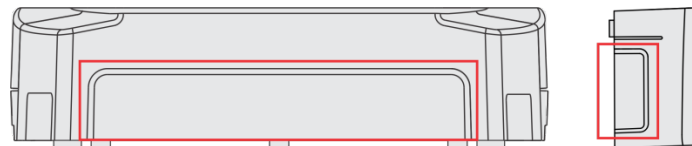


Figure 6 – Detachable areas of the protection cover

The protection cover has two pins, located on the sides of the housing, which help you fit it into the device. Once the cover has been installed, you will need a screwdriver to remove it.

4.1.1 DIMENSION

The DigiRail OEE has the following dimensions:

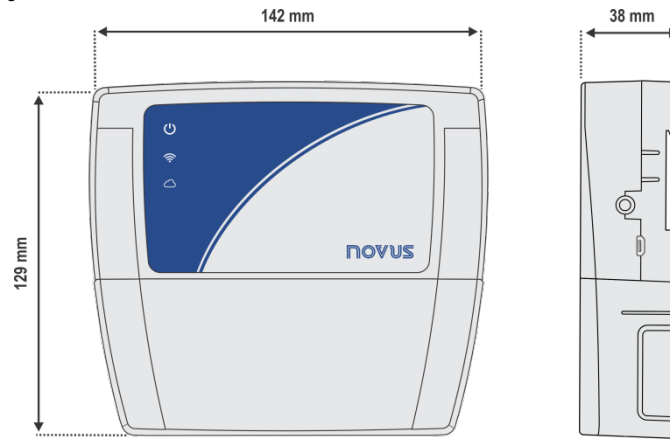


Figure 7 – Device dimensions with the protection cover

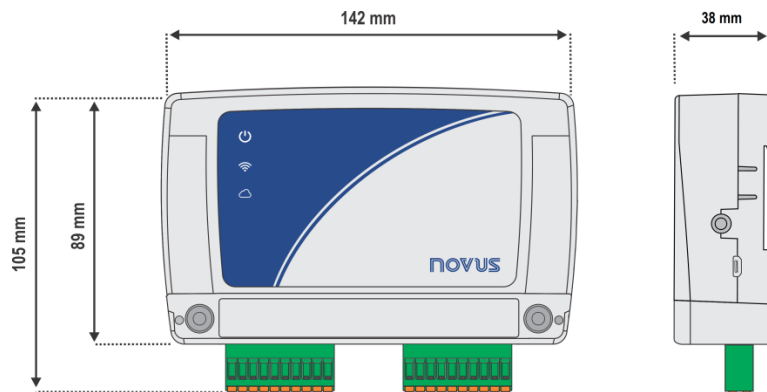


Figure 8 – Device dimensions without the protection cover

The DigiRail OEE protection cover has the following dimensions:

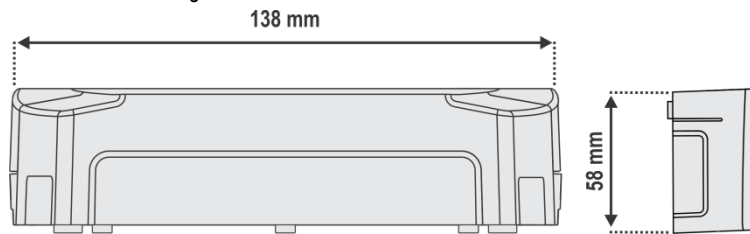


Figure 9 – Dimensions of the protection cover

4.2 ELECTRICAL INSTALLATION

The DigiRail OEE has three detachable connection terminals for the connection of the external power supply, RS485, digital inputs and outputs and analog inputs, as shown in the figure below:

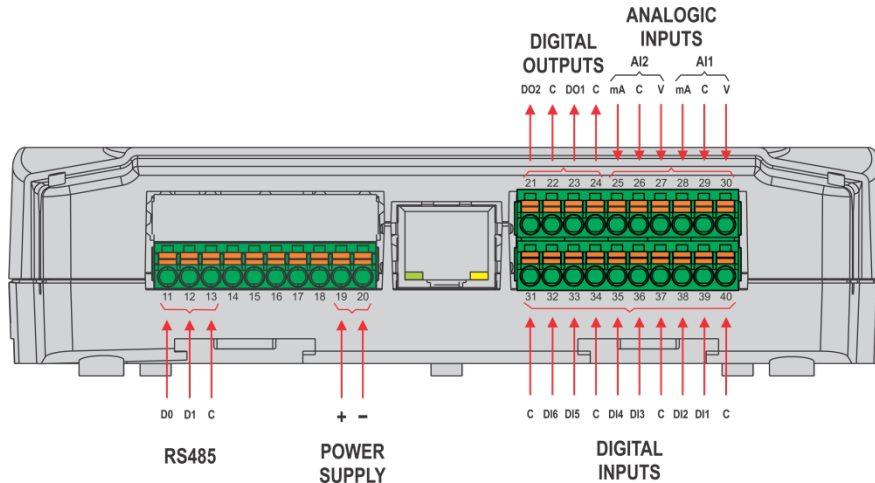


Figure 10 – Electrical connections

To connect the sensors, you must previously remove the connection terminals from the device and observe the enumeration recorded in the housing, as shown in the figure of electrical connections above.



The inputs, outputs and communication interfaces of this device are not isolated from the power supply or from each other.

INSTALLATION RECOMMENDATIONS:

- Electronic and analog signal drivers must run the plant separately from the output and power leads. If possible, in grounded conduits.
- The power supply for the electronic instruments must come from a proper power grid for instrumentation.
- It is recommended to use RC FILTERS (noise suppressors) in contactor coils, solenoids, etc.
- In control applications, it is essential to consider what can happen when any part of the system fails. The device's internal security features do not guarantee full protection.
- The electrical connections must be made with the connection terminals marked on the device. Before connecting them, make sure that the connections have been made correctly.

4.2.1 POWER SUPPLY

The connection for power supply is made at the terminals, according to the figure below. You must use a direct current power supply, with voltage between 10 and 30 V. You can also use 12 and 24 Vdc power supplies.

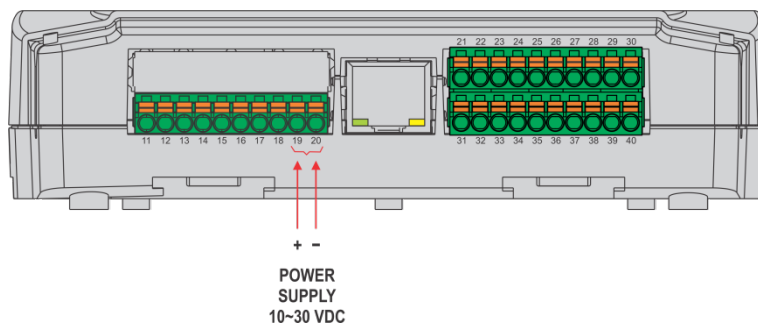


Figure 11 – Power supply

4.2.2 DIGITAL INPUT

The DigiRail OEE has digital input channels that can be configured in “Counting” or “Event” modes. Regardless of the selected function, you must configure the type of sensor connected to the input: PNP, NPN or Dry Contact. After that, select the edge of the digital signal to generate the count or event: Rising edge, falling edge or both edges.

Correlation between Sensor Type, Sensor Status and Logical Level		
Sensor Type	Sensor Status	Logical Level
PNP	Open	0
	Closed	1
NPN	Open	1
	Closed	0
Dry Contact	Open	1
	Closed	0

Table 02 – Digital input

The connection to the digital inputs is made at the corresponding terminals, as shown in the figure below:

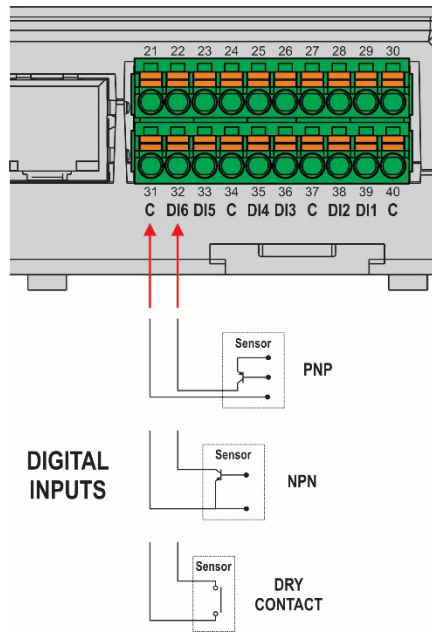


Figure 12 – Digital inputs

4.2.3 ANALOG INPUT

The connection to the analog inputs is made at the corresponding terminals, as shown in the figure below:

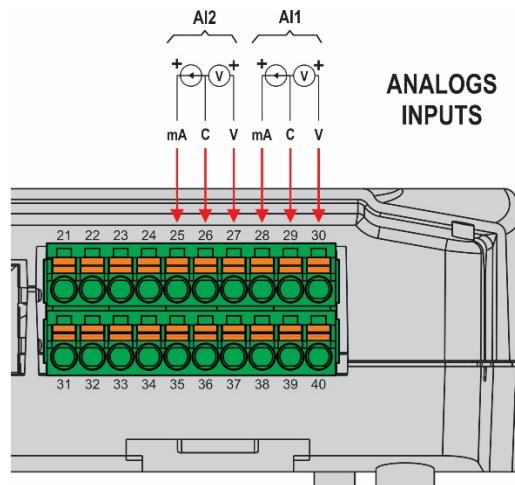


Figure 13 – Analog inputs

4.2.4 DIGITAL OUTPUT

The connection to the digital outputs is made at the corresponding terminals, as shown in the figure below:

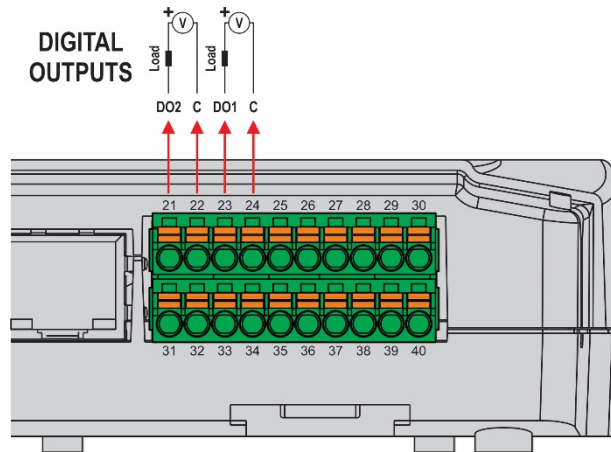


Figure 14 – Digital outputs

4.3 LED INDICATORS

The DigiRail OEE has three LEDs, located on the front of the device, as shown in the figure below:

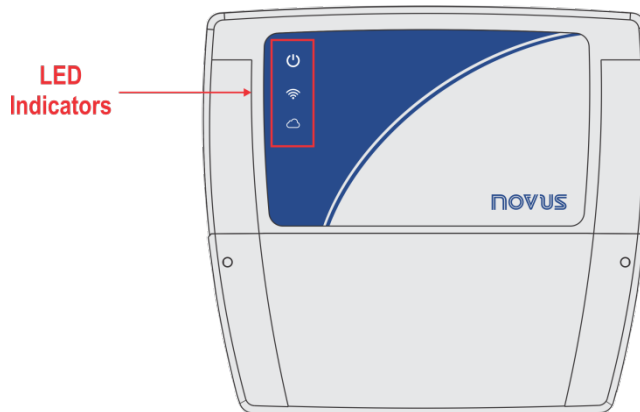


Figure 15 – LED indicators

The operation and description of each LED are as follows:




NAME	SYMBOL	STATUS	DESCRIPTION
STATUS		Off	Device off.
		On	Device on.
		Flashing	Device in firmware update mode.
WI-FI / ETHERNET CONNECTION INDICATOR		On	The connection has been established.
		Flashing	The data is being transmitted.
		Off	The connection has not been established.
MQTT BROKER CONNECTION INDICATOR		On	The connection has been established.
		Flashing	The data is being transmitted.
		Off	The connection is disabled or failed when initializing.

Table 03 – LED indicators

5 COMMUNICATION INTERFACES

5.1 USB INTERFACE

The **DigiRail OEE** has a USB port, located on the side of the housing, to configure and perform the device diagnostic. You must use a USB cable in the standard micro-USB (not supplied) to connect the device with a desktop or notebook.

During the installation of the **NXperience** configuration software, the USB port drivers will be automatically installed (see chapter [CONFIGURATION SOFTWARE](#)).

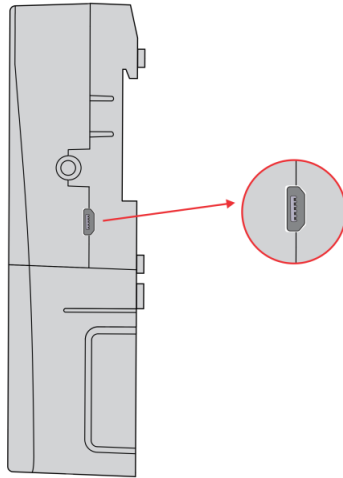


Figure 16 – USB cable connection



The USB interface is NOT ISOLATED.
It should be used temporarily to **CONFIGURATE** the device or to **PERFORM THE DIAGNOSTIC** of it.

5.2 RS485 INTERFACE

Operating only in Modbus-TCP Gateway mode for Modbus RTU, the RS485 connection interface is located on one of the **DigiRail OEE** detachable terminals, as shown in the figure below:

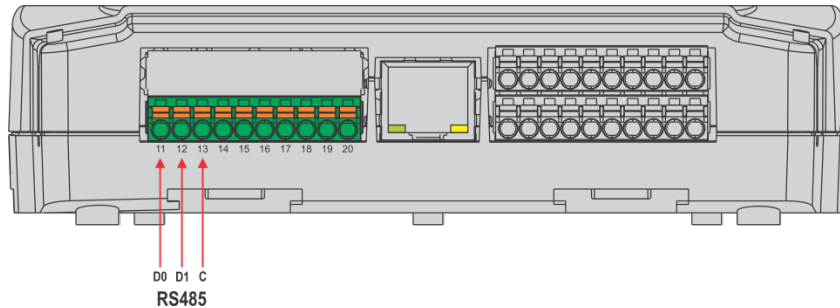


Figure 17 – RS485

The RS485 interface can be configured to operate at the following speeds (Baud Rates): 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200. Besides, it can be configured to operate with 1 or 2 Stop Bits and in even, odd and none parities. You can configure all these parameters through the **NXperience** software (see chapter [CONFIGURATION SOFTWARE](#)).



The RS485 interface works only when the DigiRail OEE is powered by an external source. It will not work when the device is powered by the USB interface only.
The device has an internal 120 ohms terminating resistor for the RS485 interface.

Table 04 shows how to connect the connectors to the RS485 communication interface:

D0	\bar{D}	D-	A	Inverted bidirectional data line.	Terminal 11
D1	D	D+	B	Bidirectional data line.	Terminal 12
C			Optional connection which improves the communication performance.	Terminal 13	
GND					

Table 04 – RS485 Connections

More details about implementing a network of devices via RS485 can be found in the document “Basic Concepts of RS485 and RS422”, available at www.novus.com.br.

5.3 ETHERNET INTERFACE

The DigiRail OEE - ETH has an Ethernet interface, located next to the device terminals, as shown in the figure below:

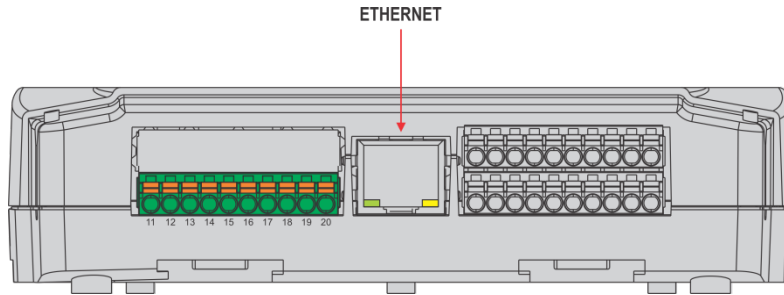




Figure 18 – Ethernet interface

If the Ethernet interface is enabled and the device is connected to an Ethernet network, the LED , located on the front of the device, will remain lit. While data is being sent through this interface, this LED will remain on and flashing.

5.4 WI-FI INTERFACE

The DigiRail OEE - WRL has an 802.11 Wi-Fi interface in b/g/n 2.4 GHz standards, operating through an internal antenna.

If the Wi-Fi interface is enabled and the device is connected to a Wi-Fi network, the LED , located on the front of the device, will remain lit. While data is being sent through this interface, this LED will remain on and flashing.

6 MQTT PROTOCOL

The **DigiRail OEE** is compatible with Message Queue Telemetry Transport (MQTT) protocol, which allows publishing data in the cloud, and supports the following MQTT Brokers: Google Cloud, Microsoft Azure, AWS, NOVUS Cloud and generic MQTT Brokers.

This chapter describes the structure of the data published in the cloud and introduces the structure to send settings to the device.

6.1 PUBLICATION AND SUBSCRIPTION TOPICS

As described below, **DigiRail OEE** uses five topics for operation:

- **Topic to publish periodic data and events:** Used to publish data generated on the device, i.e. the logs. There are two types: **channel1** and **events**.
- **Topic to receive the configuration:** Used to receive configuration data. The device subscribes to this topic to receive configuration data. For each configuration received, a confirmation reply is published in the configuration confirmation topic.
- **Topic to confirm the configuration:** The device publishes the current configuration in this topic. Every time a configuration is received, the device publishes a confirmation in this topic. After a configuration is applied to the device, the current configuration is also published in this topic.
- **Topic to receive commands:** Used to receive commands. The device subscribes to this topic to receive commands and signals the execution of a command by publishing in the command confirmation topic.
- **Topic to confirm the command:** The device publishes the result of commands executed in this topic.

Examples of topics for a generic Broker:

TOPIC	USE
Topic to publish periodic data and events	NOVUS/device1/events
Topic to receive the configuration	NOVUS/device1/config
Topic to confirm the configuration	NOVUS/device1/ack/config
Topic to receive commands	NOVUS/device1/command
Topic to confirm commands	NOVUS/device1/ack/command

Table 05 – Topics for a generic Broker

6.2 TRANSMISSION MODEL FOR DATA AND EVENTS

The publication of events and data generated by the device follows the standard MQTT model and uses a topic defined during configuration.

6.2.1 DATA AND EVENTS

The data will be published in the topic defined for the publication of periodic data and events. The type of data is indicated in the JSON message. For all data, the timestamps used are in Unix timestamp UTC format (GMT 0).

6.2.2 CHANNEL DATA

The channel data is published periodically, according to the device configuration. The data is in JSON format and has the following key/value sets:

```
{
  "device_id": "device0",
  "channels" : {
    "timestamp":1585819219,
    "chd1_value":0,
    "chd2_value":0,
    "chd3_value":0,
    "chd4_value":0,
    "chd5_value":0,
    "chd6_value":0,
    "ch1_user_range":2,
    "ch2_user_range":-19991
  }
}
```

Notes:

- **device0** is configurable in the Device ID parameter of the MQTT configuration tab of the **NXperience** configurator software.
- The **timestamp** value is the timestamp in Unix UTC format at the time the device reads the channel.
- **chdX_value** corresponds to the information of the digital channels at the time of timestamp. If the channel is not enabled, it will not appear in the JSON. If the channel is in "Register" mode, the value will correspond to the logical level of the digital channel at that moment. If the channel is in "Counting" mode, the value will correspond to the counter value at that time.
- **chX_user_range** informs the value of the analog input in the range configured by the user and at the time of the timestamp. If the analog channel is not enabled, it will not appear in the JSON.

6.2.3 EVENTS

When the digital channel is configured in “Event” mode and an event occurs, an event type message will be generated, indicating the channel, the timestamp and the edge where it occurred. The data are in JSON format and have the following key/value sets:

```
{
  "device_id": "device0",
  "events": {
    "chd1": {
      "timestamp": 1585819219.685,
      "edge": 1,
    }
  }
}
```

Notes:

- The **timestamp** value is also in Unix timestamp format in UTC (GMT 0), but the milliseconds of the event have been added as fractional part.
- Regarding the **edge** value: “1” means that the event occurred on a rising edge. “0” means that the event occurred on a falling edge.

6.3 CONFIGURATION

Some sets of device configuration can be changed or consulted via MQTT when publishing in the topic to receive device configuration. A confirmation of this publication is received in the configuration confirmation topic.

The available configuration items for this device type are:

CONFIGURATION ITEM	DESCRIPTION
rtc	RTC (Real Time Clock - device internal clock) configuration.
device	General device configuration.
chdX	Digital channel 'X' configuration (Available: chd1 , chd2 , chd3 , chd4 , chd5 and chd6).
Periodic counter reset	Configuration of the digital counters reset periodicity.
chX	Configuration of the analog channel 'X' (Available: ch1 and ch2).
eth	Configuration of the Ethernet interface (When available).
wifi	Configuration of the Wi-Fi interface (When available).
modbus tcp	Configuration of the Modbus-TCP protocol.
rs485	Configuration of the RS485 interface.

Table 06 – Configuration item

6.3.1 TRANSMISSION MODEL FOR CONFIGURATIONS AND COMMANDS

The basic operating model of the commands and configurations was developed to allow synchronization of the device settings and conditions with the cloud.

In this model there are two basic concepts:

- **Desired properties:** These are the conditions and configurations that the backend application can change or query on the device with which it interacts.
- **Reported properties:** These are the properties used as a response to receiving **Desired properties**, where the device reports its current state or the result of a command.

This message exchange model needs two different topics to work. The first is the topic in which the device is subscribed to receive the **Desired properties**. This step, initiated by the application, is called “**request**”. The device uses the second topic to publish the **Reported properties** after the command or configuration is executed. This step is called “**response**”.

For details on sending configurations via MQTT to **DigiRail OEE**, you should refer to the MQTT Protocol document available on the product page on the **NOVUS** website.

6.4 COMMANDS

Following the same model of sending settings, the commands must be published in the **Topic to receive commands**. The type of data is indicated in the JSON message. The return of the command execution is done through the **Topic to confirm the command**.

The available commands for **DigiRail OEE** are:

- **Output:** Used to obtain or modify the state of the digital outputs.
- **Reset counters:** Used to apply a reset to the digital counters.
- **Get diagnostic:** Used to obtain diagnostic data from the device.

6.4.1 OUTPUT

This command modifies the status of the device outputs.

FORMAT OF THE OUTPUT COMMAND TO MODIFY THE OUTPUTS STATUS:

```
{
  "timestamp":1585819219,
  "desired": {
    "output": {
      "out1":1,
      "out2":1
    }
  }
}
```

It is not necessary to publish the statuses that will not be modified.

FORMAT OF THE COMMAND OUTPUT RESPONSE:

```
{
  "device_id": "device0",
  "timestamp":1585819219,
  "reported": {
    "output": {
      "error": 0,
      "out1":1,
      "out2":1
    }
  }
}
```

Notes:

- The **timestamp** is the same as the command received (**desired**).
- The status described in the **desired** step will only be applied if the execution is done without errors.
- The value shown in the **error** field is an integer and reports the first error found in the execution of the command, as shown in the error codes table below:

CODE	DESCRIPTION
Error 0	Success.
Error 1	The structure is correct, but the device has received an out of range parameter.
Error 2	The structure is correct, but the device has received an unknown parameter.

Table 07 – Error codes

There are, however, unanswered error cases from the device, as shown below:

- The JSON structure was mounted wrong.
- The structure was mounted right, but some element is missing (**timestamp**, **desired**, **item**).

In case of error, none of the parameters will be accepted and the device will not go into configuration mode

- If the command has failed, the statuses indicated in **reported** will be the current ones.

This command can also be used to consult the current status of the device outputs when sent with the format provided below.

FORMAT OF THE OUTPUT COMMAND TO OBTAIN THE CURRENT STATUS OF THE OUTPUTS:

```
{
  "timestamp":1585819219,
  "desired": {
    "output": {}
  }
}
```

THE FORMAT OF THE RESPONSE TO OBTAIN THE STATE OF THE OUTPUTS IS THE SAME FORMAT AS THE RESPONSE TO THE COMMAND TO MODIFY THEM:

```
{
  "device_id": "device0",
  "timestamp":1585819219,
  "reported": {
    "output": {
      "error": 0,
      "out1":1,
      "out2":1
    }
  }
}
```

```

    }
  }
}

```

6.4.2 RESET COUNTERS

The **reset counters** command is used so that the application can reset the digital channels counters. A digital channel needs to have MQTT enabled for it to be restarted through this interface.

The structure used for this command follows the same model as for sending configurations, using the concepts of “**desired**” and “**reported**”.

The **reset_chdX** value can assume values of 0 or 1. The value of “1” indicates that a reset is to be applied to the counter of the corresponding digital channel. The value “0” indicates that the counter should not be changed. In this case, it is also possible to simply omit the JSON channel.

REQUEST *RESET COUNTERS*:

```

{
  "timestamp":1585819219,
  "desired": {
    "reset_counters" : {
      "reset_chd2":1,
      "reset_chd4":1
    }
  }
}

```

RESPONSE *RESET COUNTERS*:

```

{
  "device_id": "device0",
  "timestamp":1585819219,
  "reported" : {
    "reset_counters": {
      "error": 0,
      "reset_chd1":0,
      "reset_chd2":0,
      "reset_chd3":0,
      "reset_chd4":0,
      "reset_chd5":0,
      "reset_chd6":0
    }
  }
}

```

Notes:

- The **timestamp** is the same as the command received (**desired**).
- The status described in the **desired** step will only be applied if the execution is done without errors.
- The **error** value is an integer and reports the error found during the command execution.
- In this example, digital channels 1, 3, 5 and 6 do not appear in JSON **desired**, since you do not want to reset your counters.

6.4.3 GET DIAGNOSTIC

The **get diagnostic** command returns diagnostic data from the device.

REQUEST *GET DIAGNOSTIC*:

```

{
  "timestamp":1585819219,
  "desired" : {
    "diag" : {}
  }
}

```

RESPONSE *GET DIAGNOSTIC*:

```

{
  "device_id": "device0",
  "timestamp":1585819219,
  "reported" : {
    "diag": {
      "title": "Pci v2",
      "location":"home",
      "curr_timestamp":1589326517,

```



```

        "cfg_timestamp":1589311676,
        "fw_v":"01.23",
        "mqtt_queue":1,
        "sn":"00000001",
        "rssi":"90",
        "ipv4":[ 192, 168, 0, 23 ]
    }
}

```

Notes:

- The **title** and **location** fields are defined in the general configuration frame of the configurator software.
- The **curr_timestamp** field presents the current timestamp of the device, i.e., obtained from its internal clock and is in Unix timestamp UTC format.
- The **cfg_timestamp** field presents the timestamp of the last configuration applied to the device and is also in Unix timestamp UTC format.
- The **fw_v** field presents the firmware version of the device.
- The **mqtt_queue** field presents the number of logs pending sending via MQTT.
- The **sn** field presents the serial number of the device.
- The **rssi** field informs the Wi-Fi signal quality. It is displayed in percent. Thus, the higher the value, the better the signal.
- The **ipv4** field informs the IP of the device on the network.

6.4.4 GATEWAY MQTT RS485

Sending packets through the RS485 serial interface via MQTT allows you to read data from a local network (Modbus RTU, for example) and send commands remotely via the MQTT protocol. In this case, **DigiRail OEE** operates as a Gateway, communicating with the slave devices through the RS485 serial interface.

To send commands remotely, it is necessary to connect another MQTT client to the Broker to which the **DigiRail OEE** is connected and, in the sequence, register in the topic configured for command confirmation. The command must then be published in the topic configured in **DigiRail OEE** to receive commands.

Modbus RTU commands can be published in hexadecimal format with the following structure:

```

{
  "timestamp":XXXXXX,
  "desired": {
    "gateway_485": {"mb_buffer":"bytes in hexadecimal to transmit through serial 485"}
  }
}

```

Below is an example of a message to be published in the command sending topic:

```

{
  "timestamp":15,
  "desired": {
    "gateway_485": {"mb_buffer":"02 03 00 00 00 0A C5 FE"}
  }
}

```

In sequence, the response received through the RS485 serial interface will be published by **DigiRail OEE** in the topic assigned to the commands confirmation, following the format:

```

{
  "device_id":XX,
  "timestamp":XXXX,
  "reported": {
    "gateway_485": {"error":0; "mb_buffer":"bytes received in response to the command sent"}
  }
}

```

An example message that could be received in the command confirmation topic:

```

{
  "device_id":"DeviceName",
  "timestamp":15,
  "reported": {
    "gateway_485": {"error":0; "mb_buffer":"00 03 14 19 C7 00 00 06 4E 00 00 04 E0 00 00 03 D
0 00 00 03 D0 00 00 1B 13"}
  }
}

```

7 MODBUS-TCP PROTOCOL

The DigiRail OEE is compatible with Modbus-TCP protocol, the data communication protocol used to connect the device to supervisory control and data acquisition systems (SCADA). It supports up to 3 simultaneous connections, allowing up to 3 Modbus-TCP masters to monitor it at the same time.

7.1 COMMANDS

READ HOLDING REGISTERS – 0x03:

This command can be used to read the value of one or up to a maximum of 125 consecutive registers, according to **Table 08**.

WRITE HOLDING REGISTERS – 0x06:

This command can be used to write in a register, according to **Table 08**.

WRITE MULTIPLE HOLDING REGISTERS – 0x16:

This command can be used to write in multiple registers, according to **Table 08**.

7.2 REGISTERS TABLE

Below is the table of registers supported by the device:

ADDRESS	REGISTER	DESCRIPTION
1	HR_PRODUCT_CODE	Product code.
2	HR_SERIAL_NUMBER_H	Serial number (32bits).
3	HR_SERIAL_NUMBER_L	
4	HR_FIRMWARE_VERSION	Version firmware x 100.
		Reserved.
6	HR_MAC_ADDR_0_1	MAC Address. Hexadecimal format with 2 digits per register. 0 : 1 : 2 : 3 : 4 : 5
7	HR_MAC_ADDR_2_3	
8	HR_MAC_ADDR_4_5	
		Reserved.
10	HR_USB_STATUS	USB interface status: 0 → Disconnected; 1 → Connected.
		Reserved.
13	HR_NUMBER_OF_ACTIVE_CH	Number of enabled analog channels.
14	HR_NUMBER_OF_ACTIVE_CHD	Number of enabled digital channels.
15	HR_RESET_COUNTERS	Reset of digital channel counters. Note: Write 1 resets all the digital counters that are configured to be reset by Modbus-TCP and MQTT.
		Reserved.
17	HR_STATUS_OF_RECORDS	Number of registers pending sending via MQTT protocol.
		Reserved.
20	HR_LAST_CONFIG_YEAR,	Year of last configuration.
21	HR_LAST_CONFIG_MONTH,	Month of last configuration.
22	HR_LAST_CONFIG_DAY,	Day of last configuration.
23	HR_LAST_CONFIG_HOUR,	Hour of last configuration.
24	HR_LAST_CONFIG_MINUTE,	Minute of last configuration.
25	HR_LAST_CONFIG_SECOND	Second of last configuration.
26	HR_CURRENT_YEAR	Current year.
27	HR_CURRENT_MONTH	Current month.
28	HR_CURRENT_DAY	Current day.
29	HR_CURRENT_HOUR	Current hour.
30	HR_CURRENT_MINUTE	Current minute.
31	HR_CURRENT_SECOND	Current second.
		Reserved.

ADDRESS	REGISTER	DESCRIPTION
34	HR_RESET_COUNTER_CHD1	Resets the digital channel counter 1. Note: Write 1 resets the counter for this channel, if it is configured to allow reset via Modbus-TCP and MQTT protocols.
35	HR_RESET_COUNTER_CHD2	Resets the digital channel counter 2. Note: Write 1 resets the counter for this channel, if it is configured to allow reset via Modbus-TCP and MQTT protocols.
36	HR_RESET_COUNTER_CHD3	Resets the digital channel counter 3. Note: Write 1 resets the counter for this channel, if it is configured to allow reset via Modbus-TCP and MQTT protocols.
37	HR_RESET_COUNTER_CHD4	Resets the digital channel counter 4. Note: Write 1 resets the counter for this channel, if it is configured to allow reset via Modbus-TCP and MQTT protocols.
38	HR_RESET_COUNTER_CHD5	Resets the digital channel counter 5. Note: Write 1 resets the counter for this channel, if it is configured to allow reset via Modbus-TCP and MQTT protocols.
39	HR_RESET_COUNTER_CHD6	Resets the digital channel counter 6. Note: Write 1 resets the counter for this channel, if it is configured to allow reset via Modbus-TCP and MQTT protocols.
		Reserved.
41	HR_DIGITAL_OUT1_VALUE	Digital output status and control (on = 1/off = 0). Allows the output reading and writing.
42	HR_DIGITAL_OUT2_VALUE	Digital output status and control (on = 1/off = 0). Allows the output reading and writing.
		Reserved.
45	HR_CHD1_STATUS	Digital channel status: NOT_CONFIGURED → 0; OK → 1; CONFIG_ERROR → 2.
46	HR_CHD1_VALUE_HIGH	Counting mode: Counter value in 32-bit. Event mode: Logical input level.
47	HR_CHD1_VALUE_LOW	
48	HR_CHD1_TIME_STAMP_LAST_HIGH	Last event timestamp. 32-bit. Unix format.
49	HR_CHD1_TIME_STAMP_LAST_LOW	
		Reserved.
56	HR_CHD2_STATUS	Digital channel status: NOT_CONFIGURED → 0; OK → 1; CONFIG_ERROR → 2.
57	HR_CHD2_VALUE_HIGH	Counting mode: Counter value in 32-bit. Event mode: Logical input level.
58	HR_CHD2_VALUE_LOW	
59	HR_CHD2_TIME_STAMP_LAST_HIGH	Last event timestamp. 32-bit. Unix format.
60	HR_CHD2_TIME_STAMP_LAST_LOW	
		Reserved.
67	HR_CHD3_STATUS	Digital channel status: NOT_CONFIGURED → 0; OK → 1; CONFIG_ERROR → 2.
68	HR_CHD3_VALUE_HIGH	Counting mode: Counter value in 32-bit. Event mode: Logical input level.
69	HR_CHD3_VALUE_LOW	
70	HR_CHD3_TIME_STAMP_LAST_HIGH	Last event timestamp. 32-bit. Unix format.
71	HR_CHD3_TIME_STAMP_LAST_LOW	

ADDRESS	REGISTER	DESCRIPTION
		Reserved.
78	HR_CHD4_STATUS	Digital channel status: NOT_CONFIGURED → 0; OK → 1; CONFIG_ERROR → 2.
79	HR_CHD4_VALUE_HIGH	Counting mode: Counter value in 32-bit.
80	HR_CHD4_VALUE_LOW	Event mode: Logical input level.
81	HR_CHD4_TIME_STAMP_LAST_HIGH	Last event timestamp. 32-bit. Unix format.
82	HR_CHD4_TIME_STAMP_LAST_LOW	
		Reserved.
89	HR_CHD5_STATUS	Digital channel status: NOT_CONFIGURED → 0; OK → 1; CONFIG_ERROR → 2.
90	HR_CHD5_VALUE_HIGH	Counting mode: Counter value in 32-bit.
91	HR_CHD5_VALUE_LOW	Event mode: Logical input level.
92	HR_CHD5_TIME_STAMP_LAST_HIGH	Last event timestamp. 32-bit. Unix format.
93	HR_CHD5_TIME_STAMP_LAST_LOW	
		Reserved.
100	HR_CHD6_STATUS	Digital channel status: NOT_CONFIGURED → 0; OK → 1; CONFIG_ERROR → 2.
101	HR_CHD6_VALUE_HIGH	Counting mode: Counter value in 32-bit.
102	HR_CHD6_VALUE_LOW	Event mode: Logical input level.
103	HR_CHD6_TIME_STAMP_LAST_HIGH	Last event timestamp. 32-bit. Unix format.
104	HR_CHD6_TIME_STAMP_LAST_LOW	
		Reserved.
109	HR_CH1_STATUS	Analog channel 1 status: NOT_CONFIGURED → 0; OK → 1; CONFIG_ERROR → 2.
		Reserved.
111	HR_CH1_MV_MA_VALUE_H	Value in the unit of measurement (mA or V). Float 32-bit format.
112	HR_CH1_MV_MA_VALUE_L	
113	HR_CH1_SENSE_USER_RANGE_H	Value in user range. Float 32-bit format.
114	HR_CH1_SENSE_USER_RANGE_L	Note: This is the same value as the cloud publication.
120	HR_CH2_STATUS	Analog channel 2 status: NOT_CONFIGURED → 0; OK → 1; CONFIG_ERROR → 2.
		Reserved.
122	HR_CH2_MV_MA_VALUE_H	Value in the unit of measurement (mA or V). Float 32-bit format.
123	HR_CH2_MV_MA_VALUE_L	
124	HR_CH2_SENSE_USER_RANGE_H	Value in user range. Float 32-bit format.
125	HR_CH2_SENSE_USER_RANGE_L	Note: This is the same value as the cloud publication.
		Reserved.
130	HR_MQTT_LAST_UPDATE_YEAR	Year of last sending to the MQTT Broker.
131	HR_MQTT_LAST_UPDATE_MONTH	Month of the last sending to the MQTT Broker.
132	HR_MQTT_LAST_UPDATE_DAY	Day of the last sending to the MQTT Broker.

ADDRESS	REGISTER	DESCRIPTION
133	HR_MQTT_LAST_UPDATE_HOUR	Time of the last sending to the MQTT Broker.
134	HR_MQTT_LAST_UPDATE_MINUTE	Minute of the last sending to the MQTT Broker.
135	HR_MQTT_LAST_UPDATE_SECOND	Second of the last sending to the MQTT Broker.
136	HR_MQTT_STATUS_BROKER	Communication status with the MQTT Broker. Broker_Disconnected → 0; Broker_Connected → 1; Broker_Dns_Error → 2; Broker_Broker_Error → 3; Broker_Broker_Connecting → 4.
		Reserved.
139	HR_WIFI_IRSS	Signal quality between the device and the Wi-Fi Gateway displayed in percent. The higher the value, the better the signal.
		Reserved.
141	HR_LAN_GATEWAY_COM_STATUS	ETH communication status. Gateway_Disconnected → 0; Gateway_Connected → 1; Gateway_Wifi_Provision_Error → 2; Gateway_Dhcp_Getting_Ip → 3; Gateway_Dhcp_Error → 4.
142	HR_LAN_IP_ADDR_0_1	IPv4 address. Two octets per register. Dec 0 . Dec 1 . Dec 2 . Dec 3
143	HR_LAN_IP_ADDR_2_3	
144	HR_LAN_MASK_ADDR_0_1	Mask. Two octets per register. Dec 0 . Dec 1 . Dec 2 . Dec 3
145	HR_LAN_MASK_ADDR_2_3	
146	HR_LAN_GATEWAY_ADDR_0_1	Gateway. Two octets per register. Dec 0 . Dec 1 . Dec 2 . Dec 3
147	HR_LAN_GATEWAY_ADDR_2_3	
148	HR_LAN_DNS_ADDR_0_1	DNS server IP. Two octets per register. Dec 0 . Dec 1 . Dec 2 . Dec 3
149	HR_LAN_DNS_ADDR_2_3	
		Reserved.
151	HR_LAN_IPV6_ADDR_0_1,	IPv6 address – Local. Hexadecimal format. 0_1 : 2_3 : 4_5 : 6_7 : 8_9 : 10_11 : 12_13 : 14_15
152	HR_LAN_IPV6_ADDR_2_3,	
153	HR_LAN_IPV6_ADDR_4_5,	
154	HR_LAN_IPV6_ADDR_6_7,	
155	HR_LAN_IPV6_ADDR_8_9,	
156	HR_LAN_IPV6_ADDR_10_11,	
157	HR_LAN_IPV6_ADDR_12_13,	
158	HR_LAN_IPV6_ADDR_14_15,	
159	HR_LAN_IPV6_GLOBAL_ADDR_0_1,	IPv6 address – Global. Hexadecimal format. 0_1 : 2_3 : 4_5 : 6_7 : 8_9 : 10_11 : 12_13 : 14_15
160	HR_LAN_IPV6_GLOBAL_ADDR_2_3,	
161	HR_LAN_IPV6_GLOBAL_ADDR_4_5,	
162	HR_LAN_IPV6_GLOBAL_ADDR_6_7,	
163	HR_LAN_IPV6_GLOBAL_ADDR_8_9,	
164	HR_LAN_IPV6_GLOBAL_ADDR_10_11,	
165	HR_LAN_IPV6_GLOBAL_ADDR_12_13,	
166	HR_LAN_IPV6_GLOBAL_ADDR_14_15,	
167	HR_CHD1_LEVEL,	Logical level of digital input 1.
168	HR_CHD2_LEVEL,	Logical level of digital input 2.
169	HR_CHD3_LEVEL,	Logical level of digital input 3.
170	HR_CHD4_LEVEL,	Logical level of digital input 4.
171	HR_CHD5_LEVEL,	Logical level of digital input 5.
172	HR_CHD6_LEVEL,	Logical level of digital input 6.

Table 08 – Registers table

8 CONFIGURATION SOFTWARE

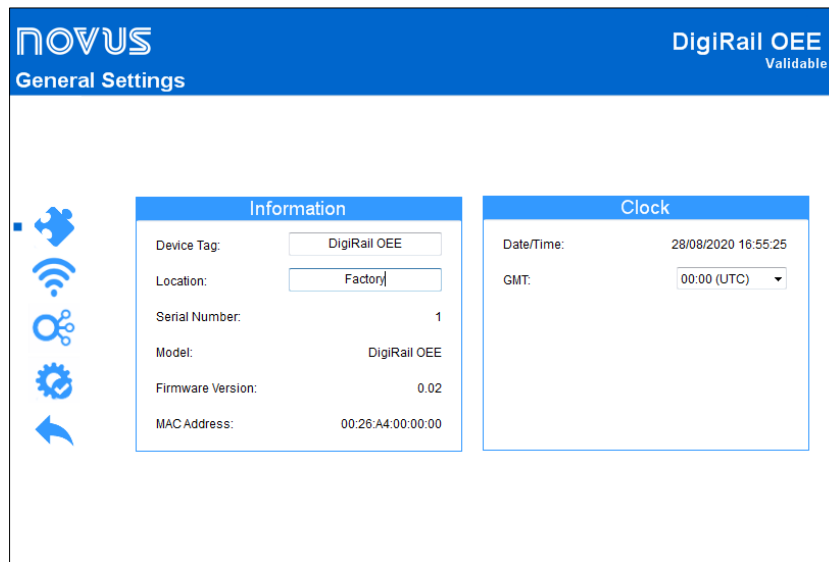
The **NXperience** software is the main tool to configure and perform the DigiRail OEE diagnosis and allows you to explore all the device's features, communicating through its USB interface or via Modbus-TCP. However, **NXperience** is not a supervisory system and has no MQTT Broker functionality. You must use appropriate systems for the application in order to enjoy all the benefits provided by the device.

This manual describes the generic functionalities of the software. For more information, check the specific operations manual. The software can be downloaded free of charge from our website www.novusautomation.com, in the Download Area.

8.1 CONFIGURING DIGIRAIL OEE WITH NXPERIENCE

You can configure **DigiRail OEE** by clicking the **Configure** button, located on the **NXperience** home screen. The following sections describe each of the parameters that can be configured and their particularities.

8.1.1 GENERAL INFORMATION



Information		Clock	
Device Tag:	DigiRail OEE	Date/Time:	28/08/2020 16:55:25
Location:	Factory	GMT:	00:00 (UTC)
Serial Number:	1		
Model:	DigiRail OEE		
Firmware Version:	0.02		
MAC Address:	00:26:A4:00:00:00		

Figure 19 – General information

INFORMATION

- **Device Tag:** Allows you to configure a tag for the device. The field allows up to 20 characters.
- **Location:** Allows you to inform the place where the device has been positioned. The field allows up to 40 characters.
- **Serial Number:** Displays the device serial number.
- **Model:** Displays the device model.
- **Firmware Version:** Displays the device firmware version.
- **MAC Address:** Displays the device MAC address.

CLOCK

- **Date/Time:** Displays the date and time of the Windows system, which will be used by **NXperience** to set the device clock when sending the configuration.
- **GMT:** Allows you to configure the GMT of the place where the device will be used (preferably during the first use).

8.1.2 COMMUNICATION

This screen is divided into the following tabs: Ethernet or Wi-Fi, Modbus-TCP Protocol, MQTT Protocol and RS485.

ETHERNET

This tab is specific to the **DigiRail OEE – ETH** model.

The screenshot shows the 'Connections' configuration page for the 'DigiRail OEE Validable' device. The 'Ethernet' tab is selected. The configuration is as follows:

Parameter	Value
Obtaining address:	Static
IP Address:	192 . 168 . 1 . 100
Network Mask:	255 . 255 . 255 . 0
Default Gateway:	192 . 168 . 1 . 1
DNS Server:	8 . 8 . 8 . 8
IPv6 address:	2803 : 49b4 : 0d47 : 8c09 : 305e : bc4c : 614b : 3089
DNS Server:	2001 : 4860 : 4860 : 0000 : 0000 : 0000 : 0000 : 8844
Prefix:	64

Figure 20 – Ethernet model

- **Obtaining Address:** Allows you to configure the way in which **DigiRail OEE - ETH** will acquire an IP: DHCP (Dynamic Host Configuration Protocol), protocol that allows the IP address (Internet Protocol) to be assigned by the network server, or Static, which allows the user to define the IP address, the subnet mask and the default gateway for the connection. In this case, it is also necessary to define the DNS (Domain Name System) server.
- **IPv4 Configuration:**
 - **IP Address:** Allows you to configure the IP address. This parameter refers to the identification of the device in a local or public network. Each computer or device on the Internet or in an internal network has a unique IP. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
 - **Network Mask:** Allows you to configure the network mask. This parameter allows you to divide a specific network into smaller subnets, optimizing the use of a certain IP range. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
 - **Default Gateway:** Allows you to define the gateway to be used. This parameter refers to the address that connects the device to the Internet. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
 - **DNS Server:** Allows you to define the DNS server. This parameter refers to a hierarchical and distributed name management system for computers, services or any resource connected to the Internet or to a private network. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
- **IPv6 Configuration:**
 - **IP Address:** Allows you to configure the IPv6 address. This parameter refers to the identification of the device in a local or public network. Each computer or device on the Internet or in an internal network has a unique IP. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
 - **DNS Server:** Allows you to configure the DNS server. This parameter refers to a hierarchical and distributed name management system for computers, services or any resource connected to the Internet or to a private network. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
 - **Prefix:** Allows you to configure the prefix to be used.

Wi-Fi

This tab is specific to the **DigiRail OEE – WRL** model.

Figure 21 – Wi-Fi Model

- **Wi-Fi Configuration:**
 - **Access Point SSID:** Allows you to enter the name of the Wi-Fi network to which **DigiRail OEE – WRL** will try to connect to. The field allows up to 32 alphanumeric characters.
 - **Access Point Password:** Allows you to enter the Wi-Fi network password to which **DigiRail OEE – WRL** will try to connect to. The field allows up to 21 alphanumeric characters.
- **Obtaining Address:** Allows you to configure the way in which **DigiRail OEE – WRL** will acquire an IP: DHCP (Dynamic Host Configuration Protocol), protocol that allows the IP address (Internet Protocol) to be assigned by the network server, or Static, which allows the user to define the IP address, the subnet mask and the default gateway for the connection. In this case, it is also necessary to define the DNS (Domain Name System) server.
- **IPv4 Configuration:**
 - **IP Address:** Allows you to configure the IP address. This parameter refers to the identification of the device in a local or public network. Each computer or device on the Internet or in an internal network has a unique IP. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
 - **Network Mask:** Allows you to configure the network mask. This parameter allows you to divide a specific network into smaller subnets, optimizing the use of a certain IP range. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
 - **Default Gateway:** Allows you to define the gateway to be used. This parameter refers to the address that connects the device to the Internet. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
 - **DNS Server:** Allows you to define the DNS server. This parameter refers to a hierarchical and distributed name management system for computers, services or any resource connected to the Internet or to a private network. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
- **IPv6 Configuration:**
 - **IP Address:** Allows you to configure the IPv6 address. This parameter refers to the identification of the device in a local or public network. Each computer or device on the Internet or in an internal network has a unique IP. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
 - **DNS Server:** Allows you to configure the DNS server. This parameter refers to a hierarchical and distributed name management system for computers, services or any resource connected to the Internet or to a private network. It is a mandatory field when the **Obtaining Address** parameter is set to "Static".
 - **Prefix:** Allows you to configure the prefix to be used.

MODBUS-TCP PROTOCOL

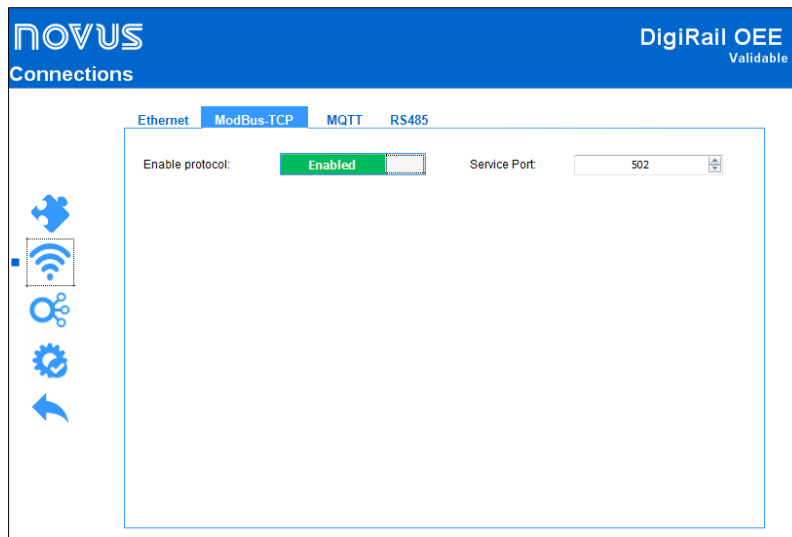


Figure 22 – Modbus-TCP protocol

- **Enable Protocol:** Allows you to enable or disable the Modbus-TCP service.
- **Service Port:** Allows you to configure the TCP port on which the service will be available.

MQTT PROTOCOL

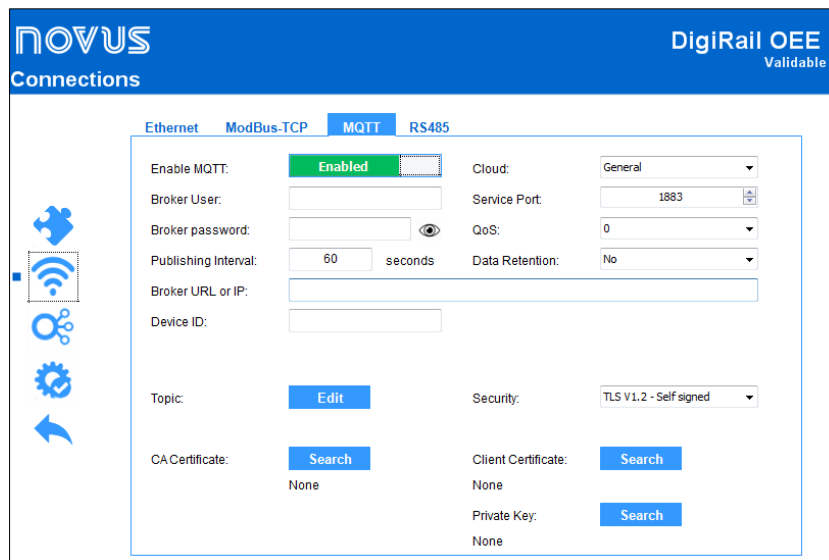


Figure 23 – MQTT Protocol

- **Enable MQTT:** Allows you to enable or disable the sending of data via the MQTT protocol.
- **Cloud:** Allows you to configure the platform to be used during the connection with the MQTT Broker: Generic platform, Google Cloud, Amazon AWS, Microsoft Azure or NOVUS Cloud. Depending on the option chosen, the parameters will adjust to meet the specific requirements of the platform. To customize all the parameters, select the "General" option.
- **Broker User:** Allows you to configure the user registered in the Broker. This field allows up to 32 characters. If the field is empty, the connection will be made in anonymous mode. Parameter not necessary for Google Cloud and Microsoft Azure.
- **Broker Password:** Allows you to configure the password of the user registered in the Broker. This field allows up to 42 characters. If the field is empty, the connection will be made in anonymous mode. Parameter not necessary for Google Cloud and Microsoft Azure.
- **Service Port:** Allows you to configure the number of the port used to make the connection with the Broker.
- **Publishing Interval:** Allows you to configure the interval in seconds with which the data will be published in the MQTT Broker.
- **QoS:** Allows you to configure the quality level of service used to send MQTT messages: 0 or 1.
- **Data Retention:** Allows you to configure whether or not data should be retained in the cloud. Not all platforms support this feature.
- **Broker URL or IP:** Allows you to configure the Broker address, which can be either a URL (Uniform Resource Locator) or an IP. The field allows up to 60 characters.
- **Device ID:** Allows you to configure a device ID.
- **Project ID:** Allows you to configure a project ID. Parameter exclusive to Google Cloud.
- **Register ID:** Allows you to configure a register ID. Parameter exclusive to Google Cloud.

- **Region:** Allows you to configure a region for the connection: “Us-central1”, “Europe-west1” or “Asia-east1”. Parameter exclusive to Google Cloud.
- **Topics:** By clicking the **Edit** button, you can enter the topics to be used for the connection:

Figure 24 – Topics

- **Publishing Topics:** Allows you to configure the device to publish data in the cloud. For more information on publication topics, check the [PUBLICATION AND SUBSCRIPTION TOPICS](#) section of the [MQTT PROTOCOL](#) chapter.
 - Topic to publish periodic data and events;
 - Topic to confirm the configuration;
 - Topic to confirm the command.
 - **Subscription Topics:** Allows you to configure the device to receive data in the cloud. For more information on subscription topics, check the [PUBLICATION AND SUBSCRIPTION TOPICS](#) section of the [MQTT PROTOCOL](#) chapter.
 - Topic to receive the configuration;
 - Topic to receive the commands.
 - **Primary Key:** Allows you to configure the primary key to be used. Parameter exclusive to Microsoft Azure.
 - **Security:** Allows you to configure the protocol and data encryption for secure communication with the MQTT Broker.
 - **None:** The connection does not use security measures.
 - **Only TLS V 1.2 - CA:** If this option is selected, communication with the Broker will use the Transport Layer Security (TLS) 1.2 protocol, which requires a TLS certificate recognized by a certification authority (CA) to ensure privacy and data integrity.
 - **TLS V 1.2 - Self Signed:** If this option is selected, communication with the Broker will use the Transport Layer Security (TLS) 1.2 protocol, which, in addition to the TLS certificate recognized by a certification authority (CA), also requires authentication of the client certificate and its private key to ensure privacy and data integrity.
- Note:** CA certificate, client certificate and private key files are accepted in .pem and .der formats only.

RS485

Figure 25 – RS485

- **Stop Bits:** Allows you to configure the number of Stop Bits to be used by the RS485 interface.
- **Baud Rate:** Allows you to configure the Baud Rate to be used by RS485: 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200.
- **Parity:** Allows you to configure the parity to be used by the RS485 interface: Even, odd or none.

- **Timeout:** Allows you to configure a period of time (in ms) to be used by the RS485 interface to define how long the device will wait for a response from a network slave. This parameter may be configured with a minimum value of 10 ms and a maximum value of 65535 ms.

8.1.3 CHANNELS

ANALOG CHANNELS

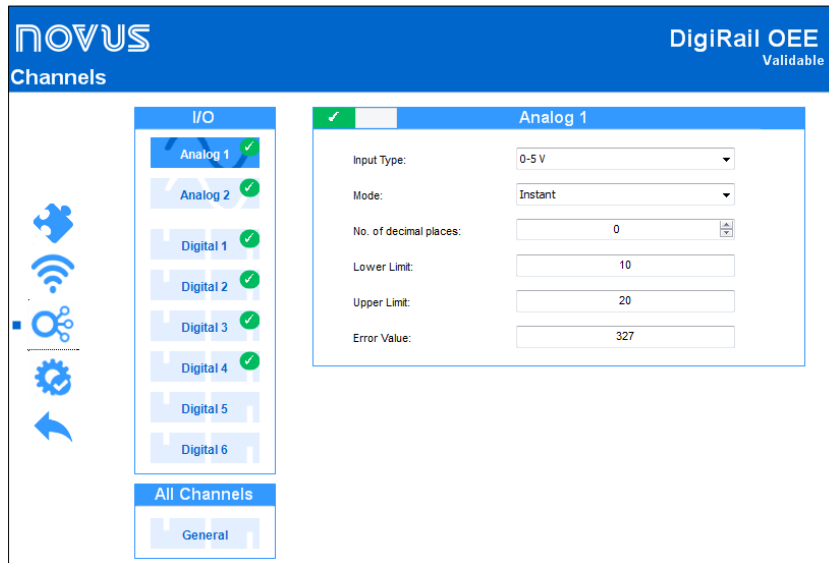


Figure 26 – Analog channels

- **Input Type:** Allows you to configure the type of sensor to be used on each analog channel.
- **Number of decimal places:** Allows you to configure the number of decimal places to be used when publishing the calculated value.
- **Lower Limit:** Allows you to configure a minimum value for the sensor.
- **Upper Limit:** Allows you to configure a maximum value for the sensor.
- **Error Value:** Allows you to configure the error value to be considered for the display when an error is detected while reading the sensor.

DIGITAL CHANNELS

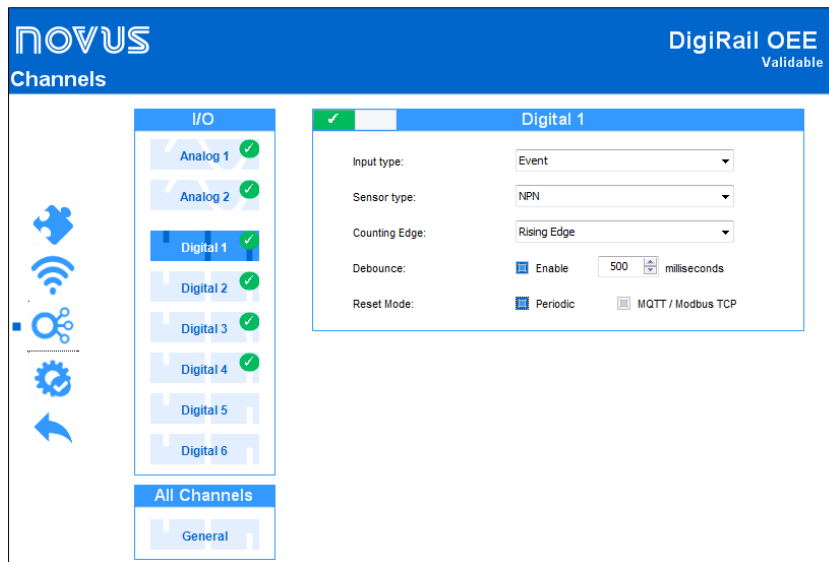


Figure 27 – Digital channels

- **Input Type:** Allows you to configure the type of digital input: Counting or Event.
- **Sensor Type:** Allows you to configure the type of sensor to be used: PNP, NPN or Dry Contact.
- **Counting Edge:** Allows you to configure the desired counting edge: Rising edge, falling edge or both edges. This way, the device will increase the counts or recognize an event whenever the configured edge is detected in the digital input.
- **Debounce:** Once enabled, allows you to configure the debounce period to be used. The debounce refers to the sensor settling time (minimum time in which the sensor must remain at the logical level of interest so that the detected edge is considered valid).
- **Reset Mode:** Allows you to configure the reset mode of the selected channel: Periodic and/or MQTT/Modbus TCO. You can set the Periodic mode on the ALL CHANNELS tab (see the [ALL CHANNELS](#) section of this chapter).

ALL CHANNELS

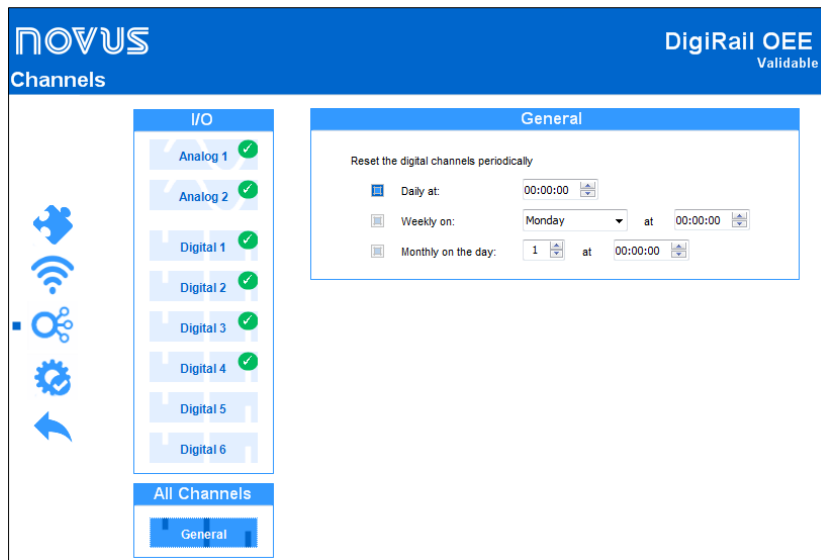


Figure 28 – All channels

RESET THE DIGITAL CHANNELS PERIODICALLY

It allows you to configure the periodic reset mode of the digital channels configured in “Periodic” mode (see the [CHANNELS](#) section of this chapter).

8.2 DIAGNOSTICS

You can view the **DigiRail OEE** diagnostics tab by clicking the **Diagnostics** button located on the **NXperience** home screen.

8.2.1 INFORMATION

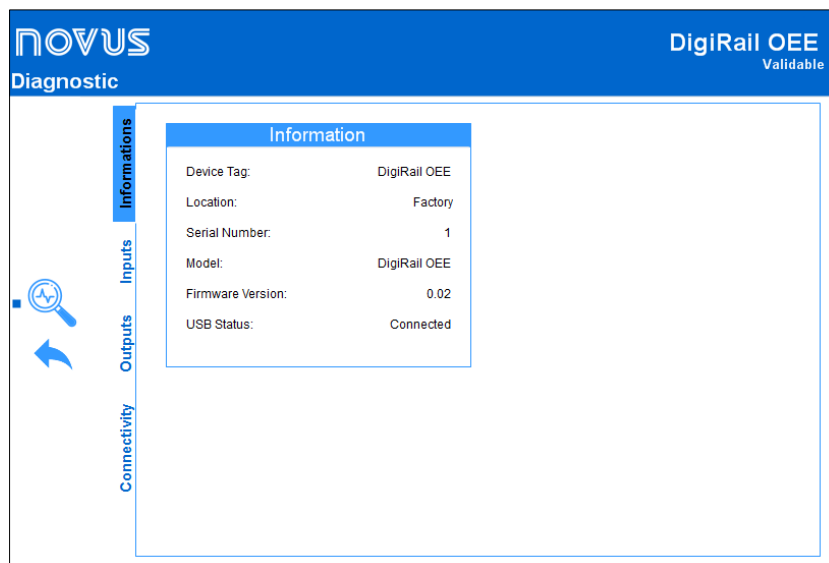


Figure 29 – General configuration

- **Device Tag:** Displays the device tag.
- **Location:** Displays the location of the device, as configured in the General Information section of the Configuration tab (see [CONFIGURING DIGIRAIL OEE WITH NXPERIENCE](#) section of this chapter).
- **Serial Number:** Displays the device serial number.
- **Model:** Displays the device model.
- **Firmware Version:** Displays the device current firmware version.
- **USB Status:** Displays the USB interface status of the device.

8.2.2 INPUTS

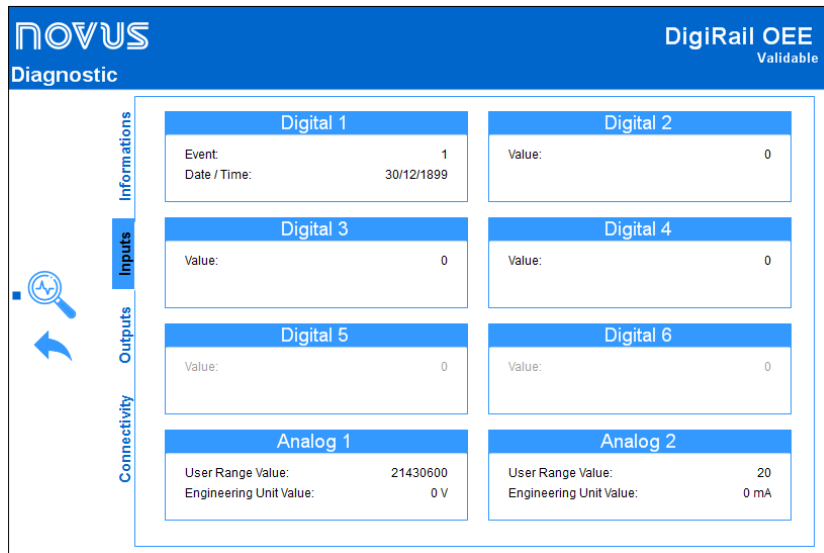


Figure 30 – Inputs diagnostics

- **Value:** Displays the current value of the configured channel. When the channel has been configured as “Event”, this field will show the value 0 or 1. When the channel has been configured as “Counting”, it will show the counter value.
- **Date/Time:** Displays the date and time of an event if the digital input has been configured in “Event” mode (see the [DIGITAL CHANNELS](#) section of this chapter).
- **Engineering Unit Value:** Displays the value measured by the channel in V or mA, depending on the type of channel configured.

8.2.3 OUTPUTS

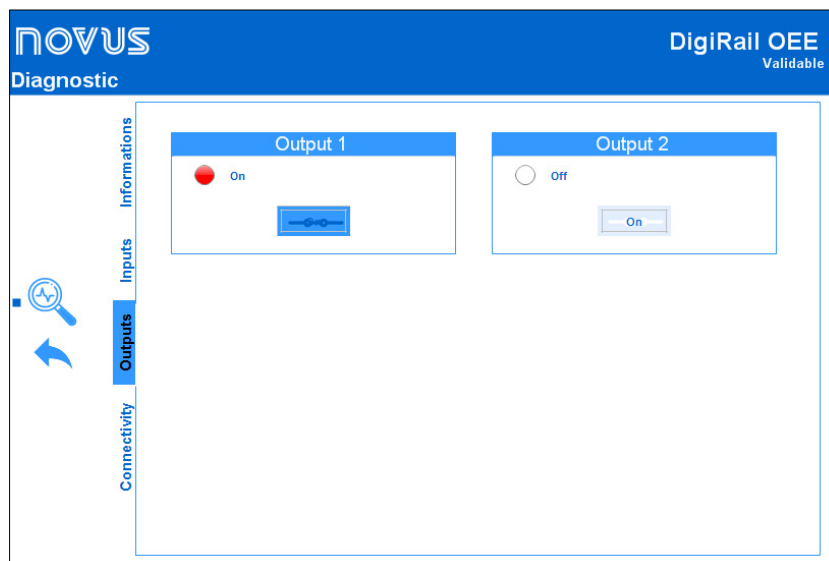


Figure 31 – Output diagnostics

This section allows you to force outputs 1 and 2 in on or off state by clicking the **On** button, in addition to displaying the current state of each output.

8.2.4 CONNECTIVITY

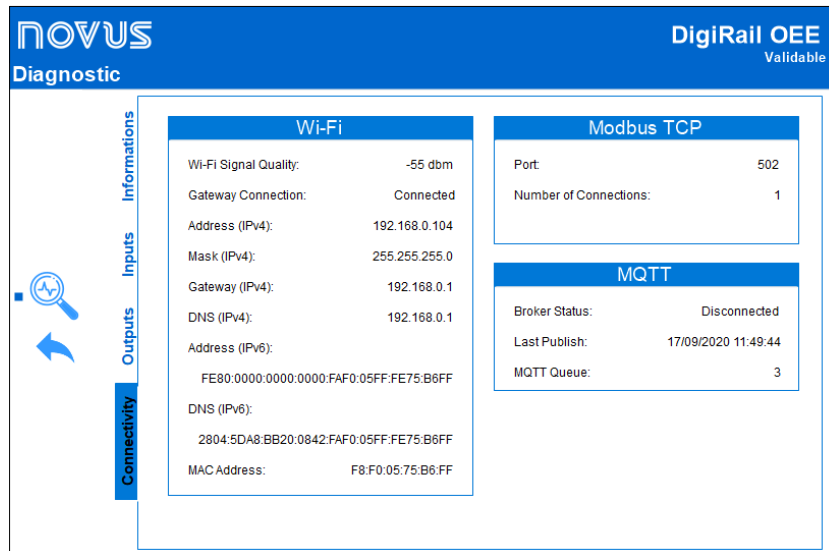


Figure 32 – Connectivity

ETHERNET

This section will present parameters related to the device model: **DigiRail OEE – ETH** or **DigiRail OEE – WRL**.

- **Wi-Fi Quality:** Displays the quality of the Wi-Fi signal in percentage value.
- **Gateway Connection:** Displays information on the current status of the Gateway connection.
- **IPv4 - Address:** Displays the device IPv4 address.
- **IPv4 - Mask:** Displays the device IPv4 mask.
- **IPv4 - Gateway:** Displays the device Gateway.
- **IPv4 - DNS:** Displays the device DNS.
- **IPv6 - Local:** Displays the device local IPv6 address.
- **IPv6 - Global:** Displays the device global IPv6 address.
- **MAC Address:** Displays the device MAC address.

MODBUS-TCP

- **Port:** Displays the number of the Modbus-TCP port configured in the device.
- **Number of Connections:** Displays the number of Modbus-TCP Clients currently connected to the device.

MQTT

- **Broker Status:** Displays the connection status to the configured MQTT Broker.
- **Last Update:** Displays the day and time of the last package successfully published in the MQTT Broker.
- **MQTT Queue:** Displays the number of logs awaiting publication.

9 TECHNICAL SPECIFICATION

FEATURES	DIGIRAIL OEE	
Input Channels	6 digital inputs and 2 analog inputs	
Compatible Analog Signals	0-5 V, 0-10 V, 0-20 mA, 4-20 mA	
Analog Input Resolution	15 bits	
Analog Channels Input Impedance	mA: 15 Ω + 1.5 V V: 1 M Ω	
Accuracy	0.15 % (F.S.)	
Digital Input	Logical Level	Logical level "0": < 0.5 V Logical level "1": > 3 V
	Maximum Voltage	30 V
	Input Impedance	270 k Ω
	Input Current @ 30 Vcc (Typical)	0.15 mA
	Maximum Frequency (Square wave)	Dry Contact: < 10 Hz PNP: 3 kHz NPN: 3 kHz
	Minimum Pulse Length	Dry Contact: 50 ms PNP: 150 us NPN: 150 us
Digital Output	2 digital NPN outputs Maximum current that can be switched at the output: 700 mA	
Buffer Capacity	<ul style="list-style-type: none"> 7000 logs with 1 analog input enabled*; 1800 logs with 2 analog inputs enabled and the 6 digital inputs in Count mode*. 	
Communication Interfaces	DigiRail OEE – ETH Model	<ul style="list-style-type: none"> USB 2.0 Interface; Ethernet Interface (10/100 Mbps) with RJ45 connector; RS485 communication interface with Modbus RTU protocol in Gateway mode.
	DigiRail OEE – WRL Model	<ul style="list-style-type: none"> USB 2.0 Interface; Wi-Fi Interface (802.11 b/g/n 2.4 GHz); RS485 communication interface with Modbus RTU protocol in Gateway mode.
LEDs	<ul style="list-style-type: none"> 1 x Status LED; 1 x Local Network Connection LED; 1 x Broker MQTT Connection LED. 	
Software	NXperience (via USB or TCP/IP network for desktops and notebooks).	
Power Supply	Power Supply	Wi-Fi Model: Consumption: 70 mA @24V Consumption: 160 mA @12V
		Ethernet Model: Consumption: 50 mA @24V Consumption: 120 mA @12V
	Batteries	CR2032 battery for internal clock retention
Dimension	129 mm x 142 mm x 38 mm.	
Mounting	DIN rail or screw mounting.	
Environment	Operating Temperature: -20 to 60 °C (-4 to 140 °F); Humidity: 5 to 95 % RH (without condensation).	
Housing	ABS+PC	
Protection Index	IP20	
Certification	ANATEL (09260-20-07089), CE, FCC; Compatible with IEC 60068-2-6 (2007); Contains FCC ID: 2ADHKATWINC1500; Contains IC: 20266-WINC1500PB.	

* None of the cases consider event log.

Table 09 – Technical Specification

9.1 CERTIFICATION

ANATEL

This device is homologated by ANATEL, according to the regulated procedures for conformity assessment of telecommunications devices, and meets the technical requirements applied.

This equipment is not subject to the protection from harmful interference and may not cause interference with duly authorized systems.

For more information, see the ANATEL website www.anatel.gov.br.

NORM CISPR 22

In a domestic environment, this product may cause interference, which may require that the user take appropriate measures to minimize the interference.

FCC

Contains FCC ID: 2ADHKATWINC1500

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

RF Exposure: To satisfy FCC RF exposure requirements, a separation distance of 6.5 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operations at closer distances than this are not recommended. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CE Mark

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

IC

Contains IC: 20266-WINC1500PB

This device complies with Industry Canada's license exempt RSS standard(s). Operation is subject to the following two conditions:

(1) This device may not cause interference, and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

The installation of the transmitter must ensure that the antenna has a separation distance of at least 6.5 cm from all persons or compliance must be demonstrated according to the ISED SAR procedure

VIBRATION TESTS

The device is in accordance with the vibration tests in the profile described in IEC 60068-2-6 (2007) - Environmental Testing - Part 2: Tests - Test Fc: Vibration (Sinusoidal).

10 WARRANTY

Warranty conditions are available on our website www.novusautomation.com/warranty.