O.T.R. s.r.l.

WD400 WIRELESS DATALOGGER USER MANUAL

Index

1. Connect to WD400 Wireless Datalogger

WD400 Software will let you establish a direct connection with any WD400 Wireless Datalogger via USB Cable.

In order to connect to datalogger please follow these steps:

1. Insert batteries in WD400 Wireless Datalogger

   An onboard LED will turn on for some seconds. Wait for LED to turn off.

2. Insert USB Cable in WD400 Wireless Datalogger and in your PC USB port.

   A driver installation is required the first time you connect datalogger to PC. Further details about driver installation can be found in chapter 13.

3. Click **Connection** on the Left Panel

4. Choose the **COM Port** used by your driver

5. Click on **Connect.**

   *As soon as connection in established, a list of parameters will be retrieved from datalogger. **Reading** panel will open*

2. Date and Time

WD400 Wireless Datalogger has an internal clock and calendar that is used for acquisitions scheduling.
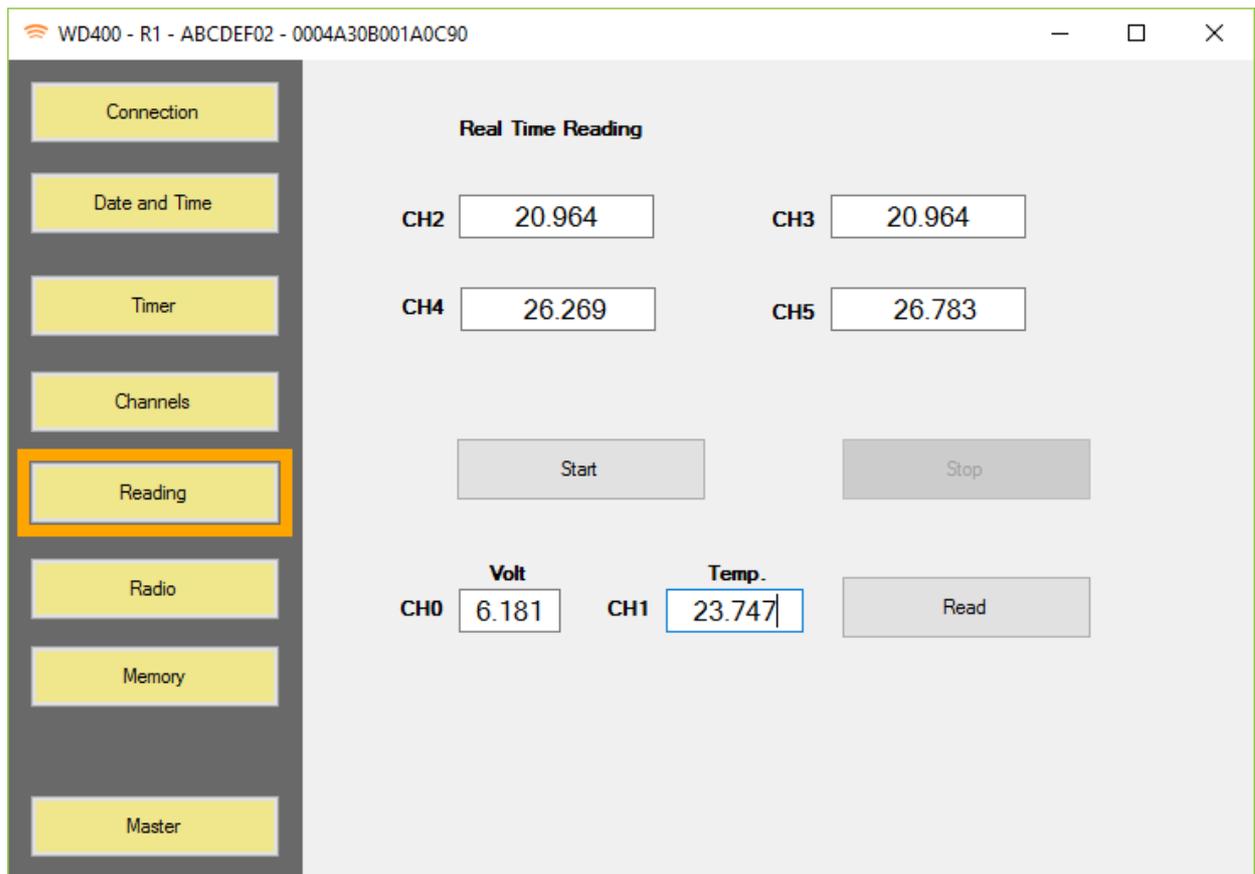
Clock shows current date and time, as saved on datalogger.

Click **Read** to retrieve current date and time from datalogger.

Click **Write** to overwrite current date and time on datalogger

Next Acquisition indicates when datalogger will acquire data next time.

Click **Read** to retrieve date and time for next acquisition from datalogger.

Click **Write** to overwrite date and time for next acquisition on datalogger

Notes:

Next Acquisition is automatically updated at each acquisition and depends on Timer value.

Clock gets automatically synchronized with Master Radio clock when successful connection is established between WD400 Wireless Datalogger and Master Radio in a LORA network.

3. Timer

Timer Panel shows the time interval between two data acquisitions, sensors pre-heating time and transmission delay to Master Radio.

Timer

Click **Read** to read timer hours, minutes and seconds from datalogger.

Click **Write** to write timer hours, minutes and seconds on datalogger.

Pre-heating Time

Pre-heating time is the time interval (in milliseconds) for datalogger to wait before reading sensors output. It is used to get a proper sensor stabilization.

Pre-heating time applies to all sensors.

Click **Read** to read pre-heating time from datalogger.

Click **Write** to write pre-heating time on datalogger.

Transmission Delay

Transmission Delay is the time interval (in minutes) between data acquisition on WD400 Wireless Datalogger and data transfer to Master Radio.

It is important to set each WD400 Wireless Datalogger with a different Transmission Delay.

If more dataloggers try to send data to the same Master Radio at the same time, transmitted data packets can collide resulting in a possibile trasmission failure.

Click **Read** to read transmission delay.

Click **Write** to write transmission delay.

Notes:

Transmission delay needs to be shorter (in minutes) than Timer. Typical configurations for Transmission Delay are

Timer: 1[hour] on each Datalogger

Transmission Delay 0 [minutes] for Datalogger N.0
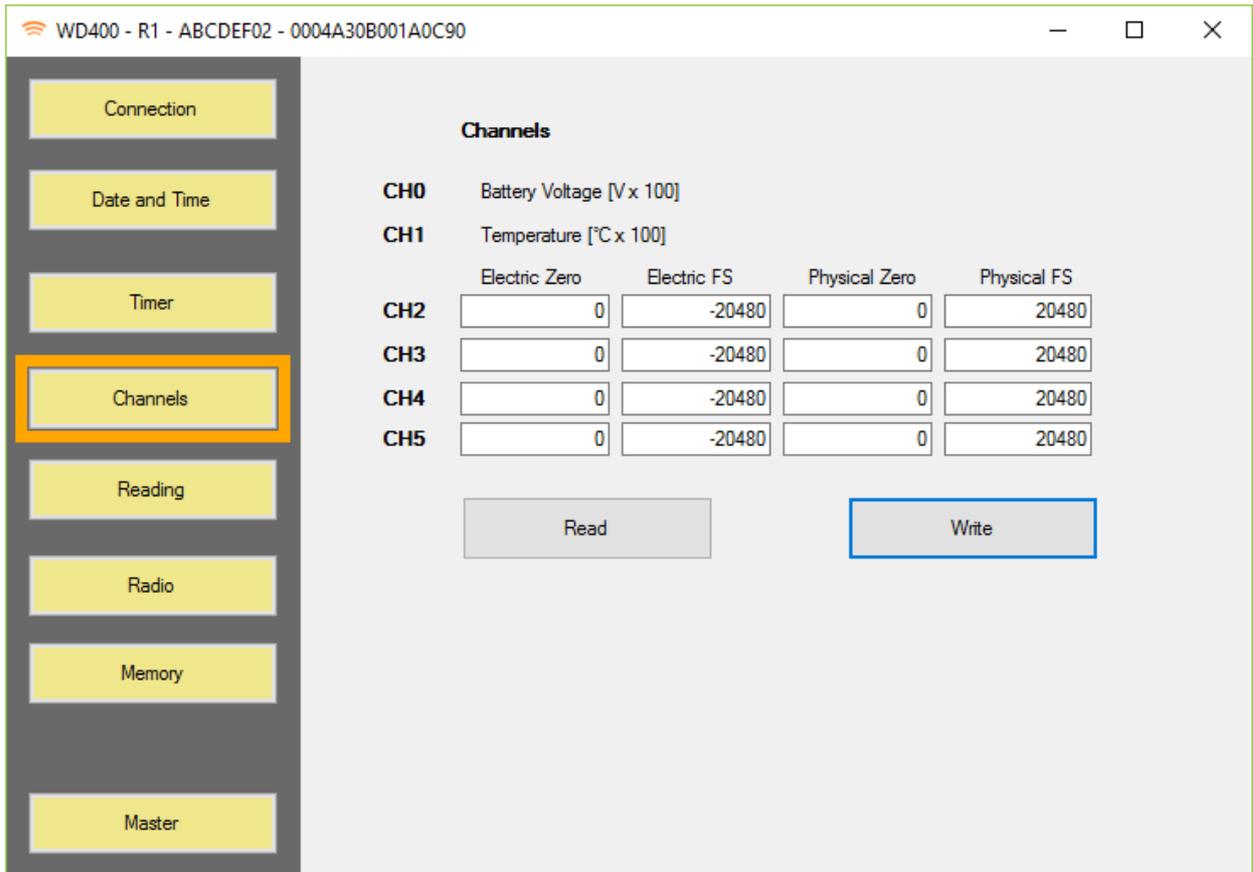
Transmission Delay 1 [minutes] for Datalogger N.1

Transmission Delay 2 [minutes] for Datalogger N.2

…

Transmission Delay X [minutes] for Datalogger N.X

6. Channels

WD400 Wireless Datalogger can be wired to up to four different sensors. Channel 0 and Channel1 send Battery Value and Temperature respectively by default. External sensors output is stored and transmitted in Channels from 2 to 5 **(CH2, CH3, CH4, CH5)**

Click **Read** to read channel parameters from datalogger

Click **Write** to write channel parameters on datalogger

Each sensor can have different output and wiring (potentiometers, 4-20mA, mV output, Load Cells can be wired to the same datalogger). Different parameters are needed for different sensor types.

In case internal MEMS inclinometers are installed onboard WD400 Wireless Datalogger, their output (axes Y and X) are routed to Channel 2 (**CH2**) and Channel 3 (**CH3**) respectively.

Datalogger will always store and transmit 6 values for each reading: **VBATT** (Battery value), **TEMP** (Temperature as read by an internal NTC3K sensor**), CH2, CH3, CH4, CH5**.

In the example above, potentiometric crackmeters are connected to each channel. The first two crackmeters have 50mm FS, while sensors on **CH2** and **CH3** have 100mm FS.

Parameters 0 * -20480 * 0 * 50 allow WD400 Wireless Datalogger to show physical values on screen when Reading function is active. The same physical values can be downloaded from datalogger via USB.

(Master Radio will receive electrical values to be transformed once again into physical units. Data transformation on Master Radio can be remotely set)

The following parameters on Master Radio will transform electrical values, as received from WD400 Wireless Datalogger, into physical unit outputs:

CH2: 0 * -20480 * 0 *50

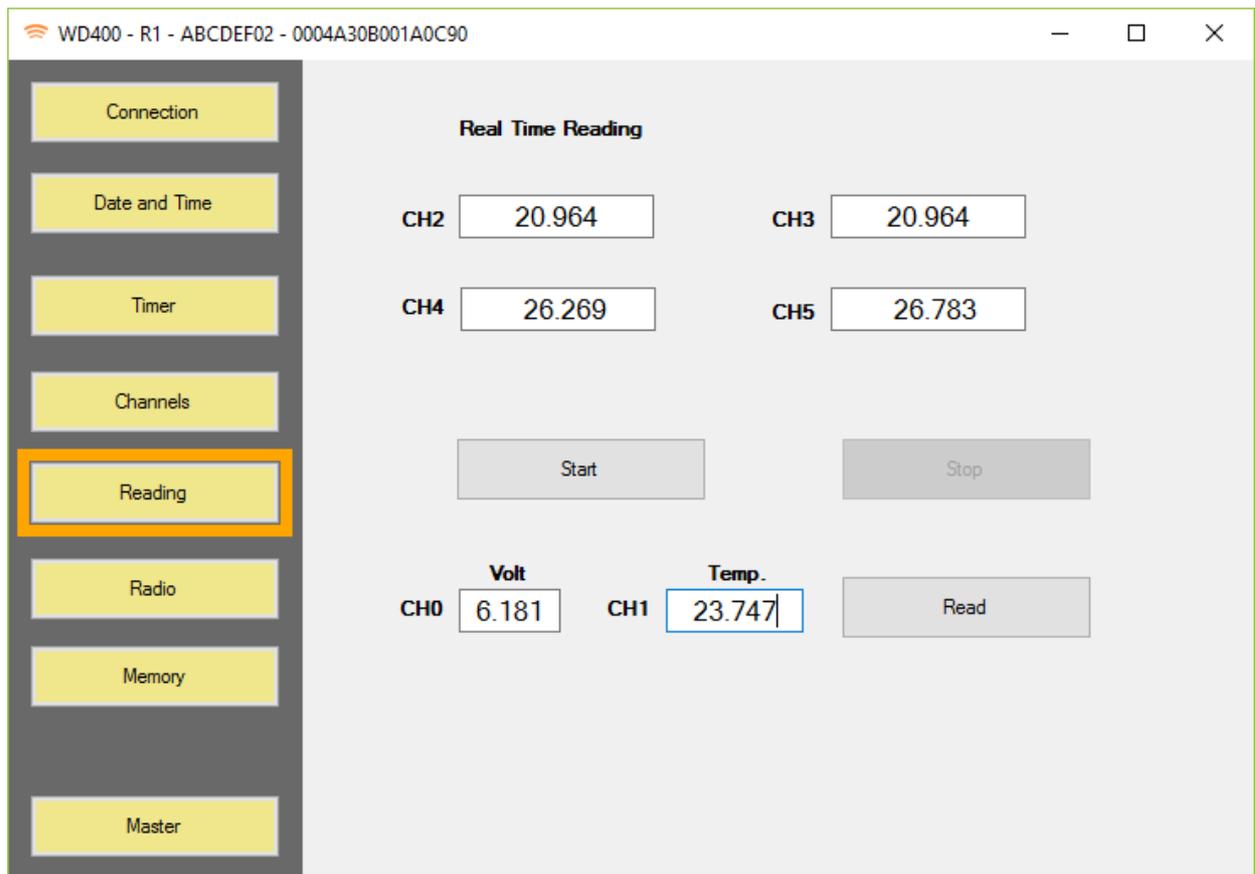**CH3**: 0 * -20480 * 0 *50

CH4: 0 * -20480 * 0 *100

CH5: 0 * -20480 * 0 *100

Additional info about setting these parameters on Master Radio can be found in chapter 10.

7. Reading

This function lets you check wiring and installation, by means of a continuous reading of current sensors output.

Click **Start** to continuously read sensors.
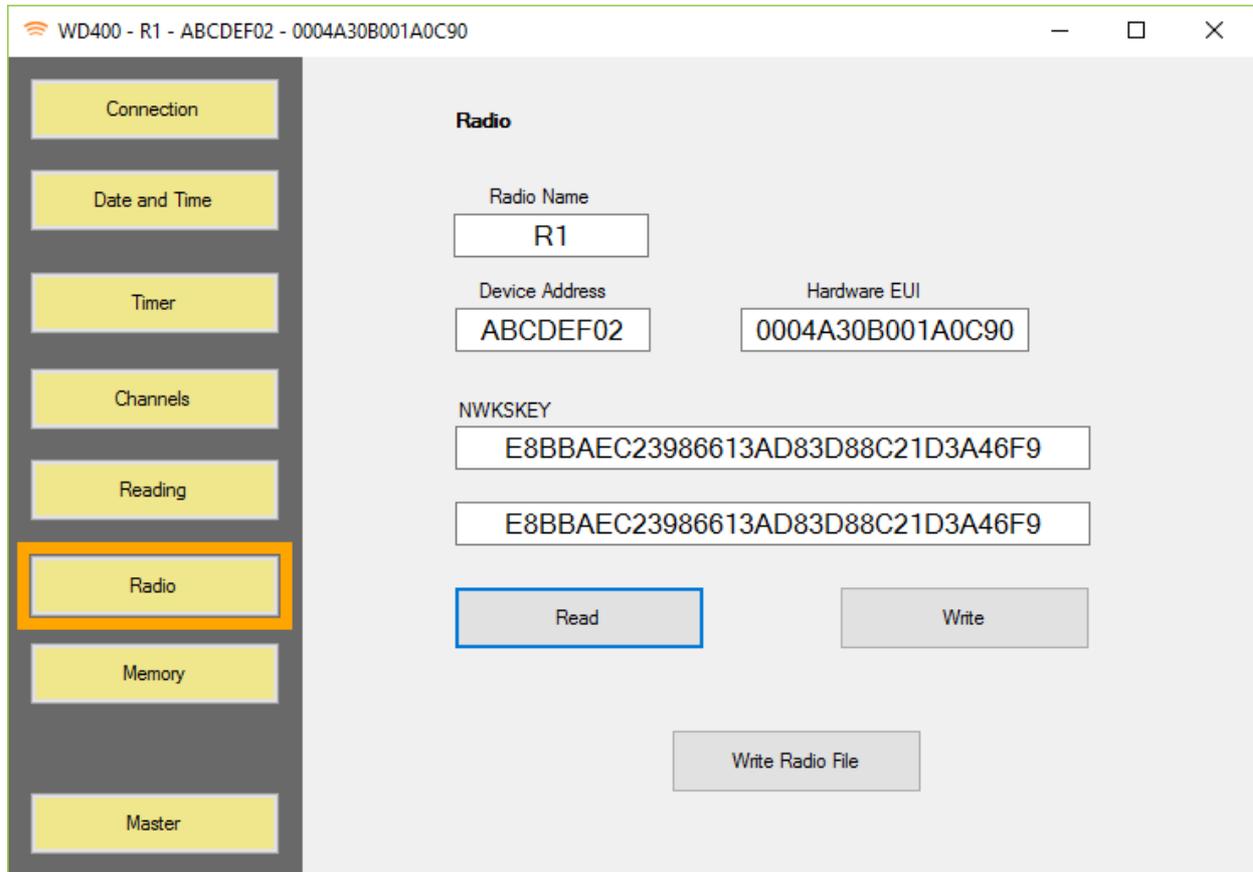
Click **Stop** to go back to normal operations.

Click **Read** to retrieve current battery level and temperature.

Do not disconnect cable from WD400 Wireless Datalogger while continuous reading is active.

8. Radio

This section lets you check and update LORA configuration parameters.

Click **Read** to read parameters from datalogger

Click **Write** to update parameters on datalogger.

Click **Write File Radio** to create a configuration file.

Hardware EUI uniquely identifies WD400 Wireless Dataloggers. This parameter can not be changed.

Device Address identifies a datalogger in its LORA network. Master Radio knows a list of Device Addresses that are granted to send data in the network. Devices with unlisted addresses will not be listened to.

NWKSKEY is your LORA network encryption key.

Master Radio and WD400 Wireless Dataloggers are configured to be able to talk to each other. Changing Device Address or NWKSKEY may result in loss of communication.
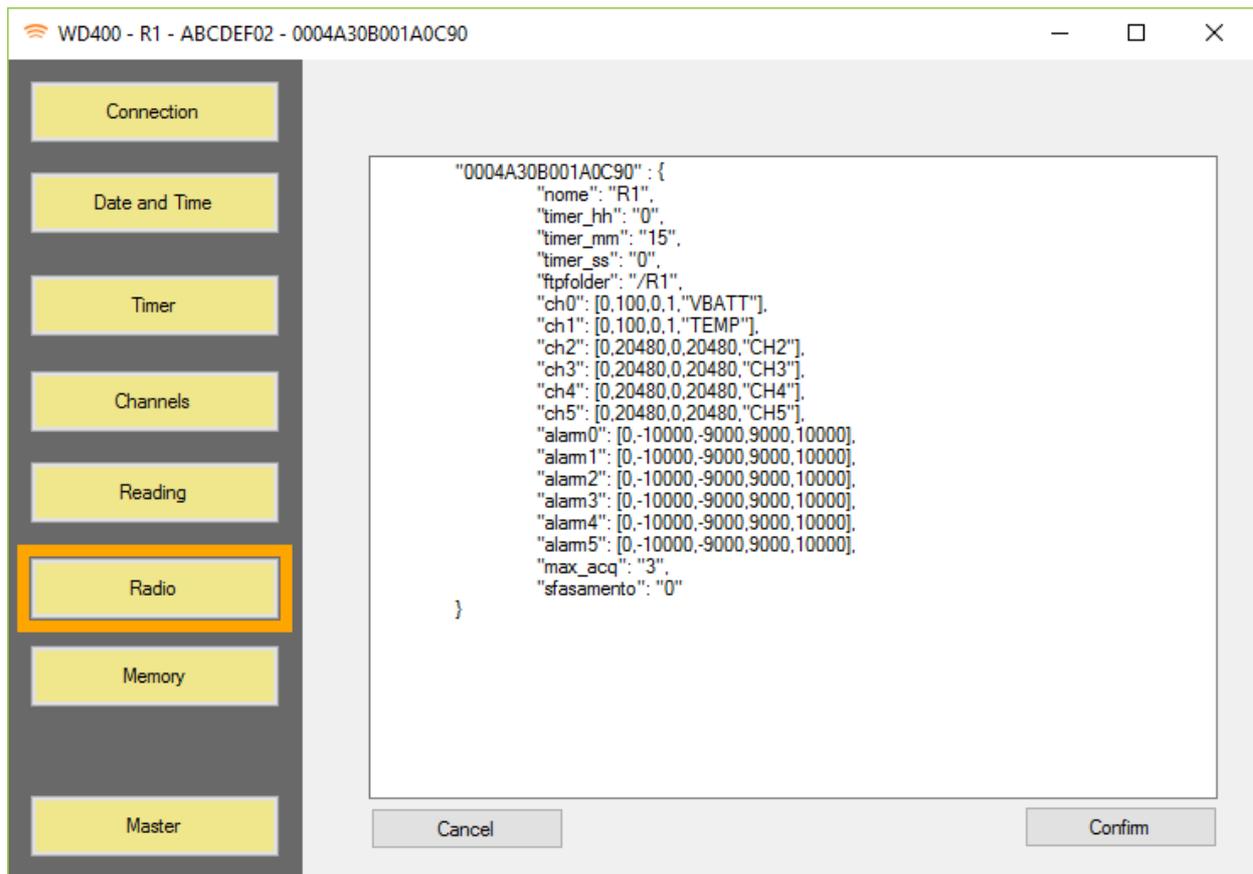
Radio Name is a user-friendly datalogger ID. Its value is copied in Radio File as destination FTP folder for data upload.

Write Radio File creates a configuration file relative to the current datalogger.

Content of Radio File is shown on screen before saving and is editable.

Radio Files are saved as *.rd files.

More **Radio Files** can be combined together to create a **Radio List**.

Radio List is stored on Master Radio as a configuration file.

Radio List is used by **Master Radio** to update acquisition intervals and delay time (sfasamento) on each WD400 Wireless Datalogger, as well as compute channel outputs, and set ftp folder for remote data transmission.

Radio file example:

```
{
        "00-04-a3-0b-00-19-ed-66": {
            "nome": "LR01",
            "timer_hh": "0",
            "timer_mm": "15",
            "timer_ss": "0",
            "ftpfolder": "/LR01",
            "ch0": [0,100,0,1,"VBATT"],
            "ch1": [0,100,0,1,"TEMP"],
            "ch2": [0,-20480,0,26,"CH2"],
            "ch3": [0,-20480,0,51,"CH3"],
            "ch4": [0,-20480,0,-20480,"CH4"],
            "ch5": [0,-20480,0,-20480,"CH5"],
            "alarm0": [0,0,0,20000,20000],
            "alarm1": [0,0,0,20000,20000],
            "alarm2": [0,0,0,20000,20000],
            "alarm3": [0,0,0,20000,20000],
            "alarm4": [0,0,0,20000,20000],
            "alarm5": [0,0,0,20000,20000],
            "max_acq": "3",
            "sfasamento": "0"
        }
}
```

In the example above:

Datalogger has Hardware EUI "00-04-a3-0b-00-19-ed-66"

Its name is LR01. **(nome)**

It will be set by Master Radio to acquire data every 15 minutes **(timer_mm)**

Data from datalogger LR01 will be uploaded to server folder /LR01 via FTP **(ftpfolder)**

If LR01 has more acquisitions to send to Master Radio, the most recent 3 acquisitions will be transmitted each time. **(max_acq)**

LORA protocol imposes a limit on the amount of data that can be sent at any given time. Older, unsent acquisitions will be sent only after newer, recent acquisitions are successfully sent to Master Radio.

Its Delay Time will be set to 0 minutes **(sfasamento)**

CH0 is called VBATT and is divided by 100 before being transmitted to server. It is received by Master Radio as [Volt / 100] and retransmitted to FTP server as [Volt]
WD400 Wireless Datalogger always sends VBATT on CH0 and is always transmitted to Master Radio as [Volt x 100]

CH1 is called TEMP and is divided by 100 before being transmitted to server. It is received by Master Radio as [°C / 100] and retransmitted to FTP server as [°C]
WD400 Wireless Datalogger always sends TEMP on CH1 and is always transmitted to Master Radio as [°C x 100]

CH2 is received by Master Radio as 0 to -20480 [mVolt / 10] and transformed to 0-26 [mm] before FTP upload.
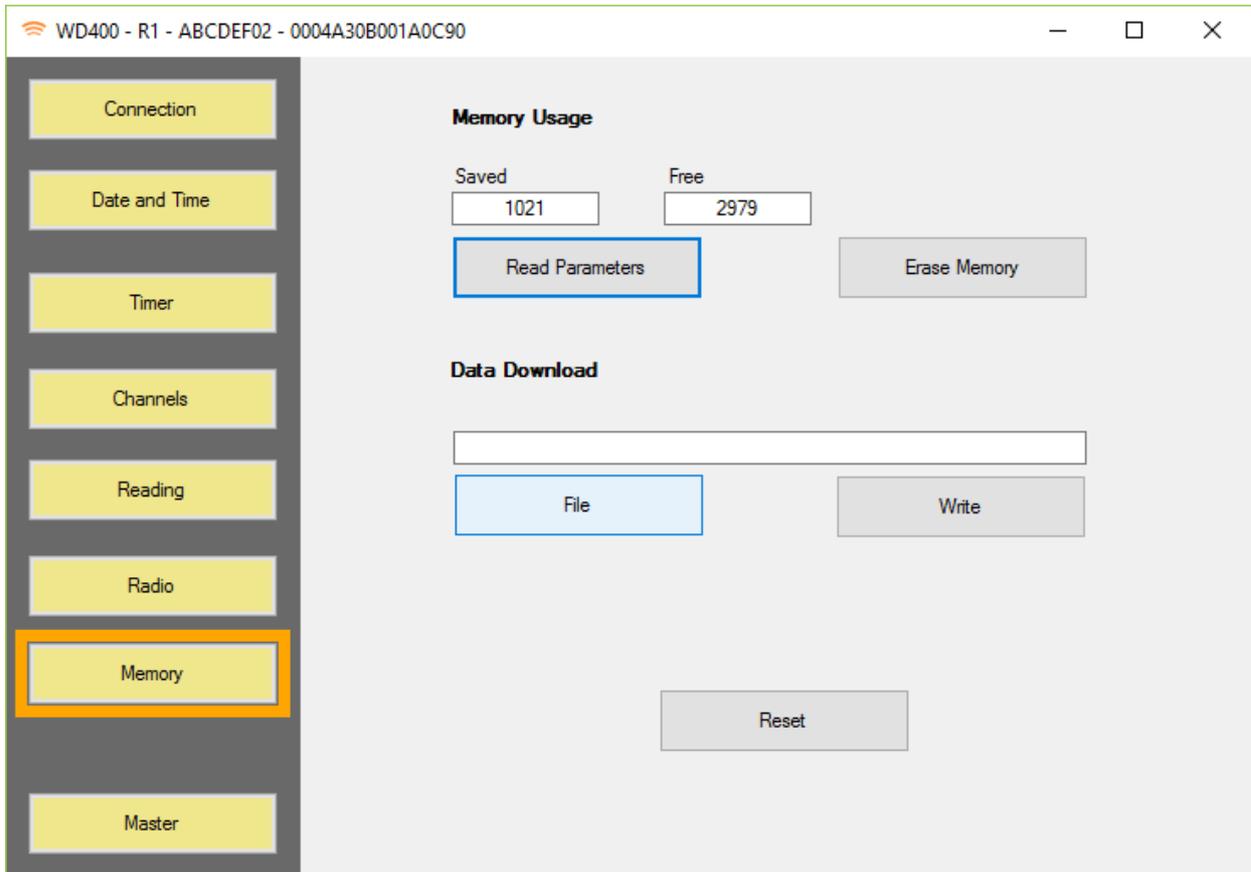
CH3 is received by Master Radio as 0 to -20480 [mVolt / 10] and transformed to 0-51 [mm] before FTP upload.

CH4-5 will not be converted in physical units. They are received by Master Radio as 0 to -20480 [mVolt / 10] and retransmitted to FTP Server as 0 to -20480 [mVolt / 10]

9. Memory

Memory Panel shows memory status and allows direct data download from datalogger.

Click **Read parametrs** to get number of saved acquisitions and free memory slots for future acquisitions.

WD400 Wireless Datalogger memory is circular. When memory is full, older acquisition will be overwritten.

Click **Erase Memory** to delete all data.

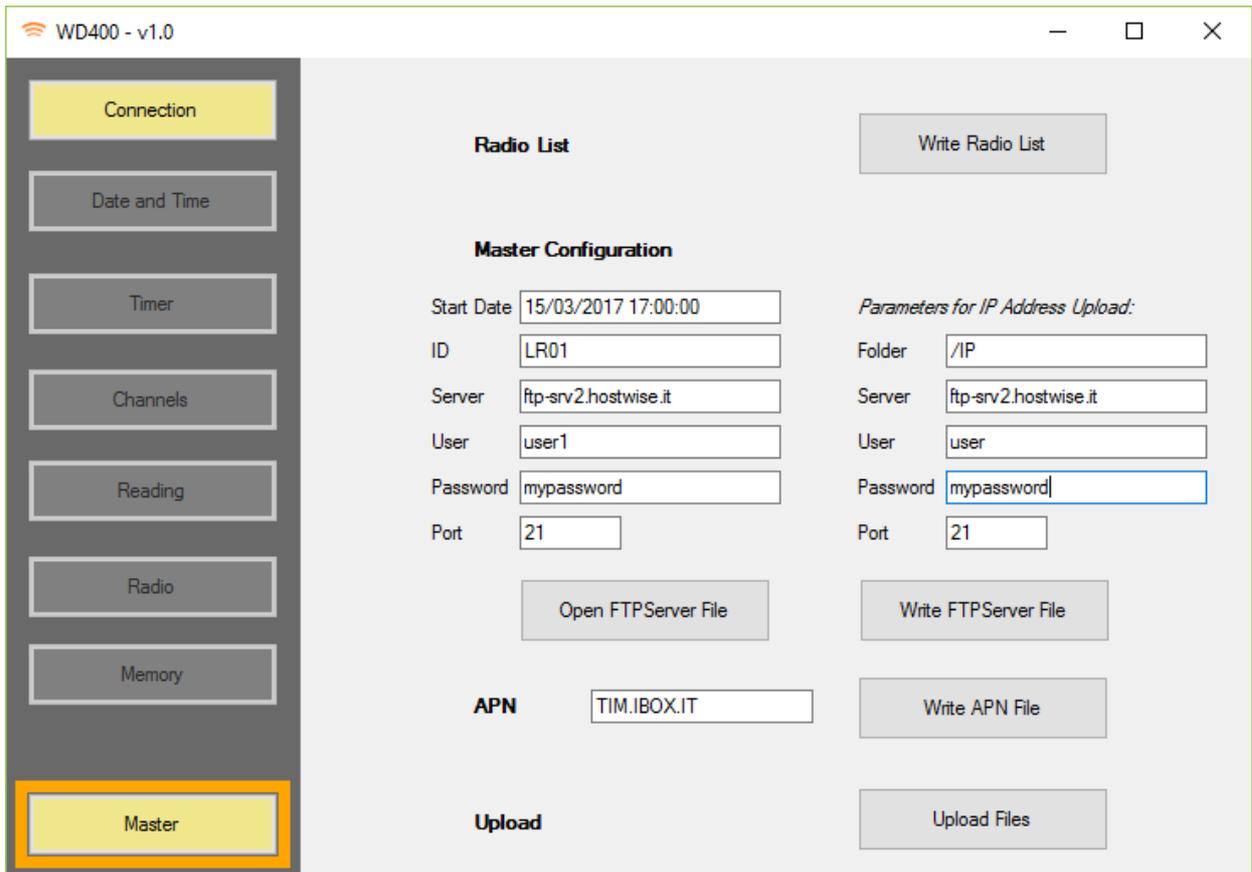Click **File** to select a destination file on your PC for data dowload.

Click **Write** to download data from datalogger to PC.

Click **Reset** to completely reset datalogger.

Radio settings will be reset too, and communication to Master Radio may be lost until correct parameters are set again.

10. Master

Master Panel is used for Master Radio configuration. USB link to WD400 Wireless Datalogger is not requested, as configuration files can be saved on Master Radio or FTP Server via FTP.

Click **Write Radio List** to select more .rd files in order to create a Radio List.

Radio List is used by Master Radio to set datalogger parameters and manage data upload.

Click **Open FTPServer File** to open an existing FTPServer File

FTPServe File is used by Master Radio to manage FTP upload and to set date and time of first acquisition for all dataloggers in its LORA network.

Click **Write FTPServer File** to write an updated FTPServer File.

FTPServer file can be manually edited before saving.

Click **Write APN File** to write an APN File.

APN file is used by Master Radio to set the proper APN (in case a SIM is installed).

APN file can be manually edited before saving.

Click **Upload FIles** to upload files to Master Radio via FTP

You will be prompted with the last saved FTP settings. You may confirm or edit them, before FTP uploading.

Standard setting are shown in the picture above, to upload file to Master Radio.

Note:

You are not requested to upload files to Master Radio directly, nor to use WD400 software to create and upload them.

You can edit configuration files with any text editor, and upload them to your FTP Server with any free FTP software such as FileZilla.

Master Radio checks for configuration files in **IP Address Upload Folder** every hour and performs an automatic download.

11. Configuration Files

Configuration files are text files saved on Master Radio. They are used to set FTP parameters,

Channels parameters, Date and time of first data acquisition, APN parameters and so on.

Configuration files can be updated remotely.

To update configuration files onboard Master Radio, you can:

- remotely access Radio Master directly

or

- upload configuration file sto FTP server. Radio Master will autonomously download and install them.

This is the complete list of configuration files:

radiolist.txt

ftpserver.txt

apn.txt

radiolist.txt and ftpserver.txt are written in standard json format.

apn.txt contains just the APN server name, without any json formatting, for ease of use.

Configuration files names are lowcase. Master Radio runs on Linux, and name files are case sensitive.

radiolist.txt and ftpserver.txt are used by Master Radio to upload internal parameters to each WD400

Wireless Datalogger.

Configuration files are saved on Master Radio in the following folder

/media/card/otr/config/

You can access Master Radio config folder with any FTP free software such as FileZilla.

Connection parameters:

IP: 192.168.1.88 (if directly connected to PC with ethernet cable)

FTP User: user

FTP Password: user

Port: 22

Folder: /media/card/otr/config/

radiolist example:

```
{
        "00-04-a3-0b-00-19-ed-66": {
            "nome": "LR01",
            "timer_hh": "0",
            "timer_mm": "15",
            "timer_ss": "0",
            "ftpfolder": "/LR01",
            "ch0": [0,100,0,1,"VBATT"],
            "ch1": [0,100,0,1,"TEMP"],
            "ch2": [0,-20480,0,51,"CH2"],
            "ch3": [0,-20480,0,51,"CH3"],
            "ch4": [0,-20480,0,51,"CH4"],
            "ch5": [0,-20480,0,51,"CH5"],
            "alarm0": [0,0,0,20000,20000],
            "alarm1": [0,0,0,20000,20000],
            "alarm2": [0,0,0,20000,20000],
            "alarm3": [0,0,0,20000,20000],
            "alarm4": [0,0,0,20000,20000],
            "alarm5": [0,0,0,20000,20000],
            "max_acq": "3",
            "sfasamento": "0"
        },
        "00-04-a3-0b-00-19-ed-aa": {
            "nome": "LR02",
            "timer_hh": "0",
            "timer_mm": "15",
            "timer_ss": "0",
            "ftpfolder": "/LR02",
            "ch0": [0,100,0,1,"VBATT"],
            "ch1": [0,100,0,1,"TEMP"],
            "ch2": [0,-20480,0,51,"CH2"],
            "ch3": [0,-20480,0,51,"CH3"],
            "ch4": [0,-20480,0,51,"CH4"],
            "ch5": [0,-20480,0,51,"CH5"],
            "alarm0": [0,0,0,20000,20000],
```

```
        "alarm1": [0,0,0,20000,20000],
        "alarm2": [0,0,0,20000,20000],
        "alarm3": [0,0,0,20000,20000],
        "alarm4": [0,0,0,20000,20000],
        "alarm5": [0,0,0,20000,20000],
        "max_acq": "3",
        "sfasamento": "0"
    }
}
```

ftpserver.txt example:

```
{
"host": "ftp-srv2.hostwise.it",
"user": "myFTPusername",
"password": "myFTPPassword",
"port":21,
"host_ip": "ftp-srv2.hostwise.it",
"user_ip": "myFTPusername",
"password_ip": "myFTPPassword",
"port_ip":21,
"folder_ip": "/LR01/IP",
"name": "myMasterRadioName",
"data_start": "13/02/2017 17:00:00"
}
```

apn.txt example:

IBOX.TIM.IT

12. Data files

Data files contain acquired data.

Acquisitions are regularly uploaded to FTP Server database, and can be easily accessed and exported by means of server functions (Graphs vizualitation, data tables listing, .csv export)

Data files are an internal copy of any acquisition received by any WD400 Wireless Dataloggger connected to Master Radio.

They are stored on Master Radio in the following folder:

/media/card/otr/data/

Data files names are derived from any WD400 Wireless Datalogger Hardware EUI.

example:

00-04-a3-0b-00-19-ed-66_archive.txt

Data files can be downloaded from Master Radio with any free FTP software, such as FileZilla.

FTP connection parameters for download:

IP: 192.168.1.88 (if directly connected to PC with ethernet cable)

FTP User: user

FTP Password: user

Port: 22

Folder: /media/card/otr/data/

Data archives that are downloaded by Master Radio contain all of the acquisition the Master Radio received, from any datalogger in the net, in the order they were received.

Data downloaded from WD400 Wireless Datalogger directly, connecting PC and datalogger through USB, are relative to that datalogger only and are listed in acquisition order.

13. Driver Installation

A manual installation of the driver (included in the CD) is needed to connect Datalogger and computer through USB. No driver is needed to connect to Master Radio with an Ethernet cable.

Follow this procedure if you want to directly connect to WD400 Wireless Datalogger via USB:

1) Connect the USB cable to both datalogger and computer

2) Turn the Datalogger on

3) Wait as your computer tries to recognize the new hardware

   A warning message should appear, informing you that the driver is missing.

4) Open **Control Panel** (Start → Control Panel)
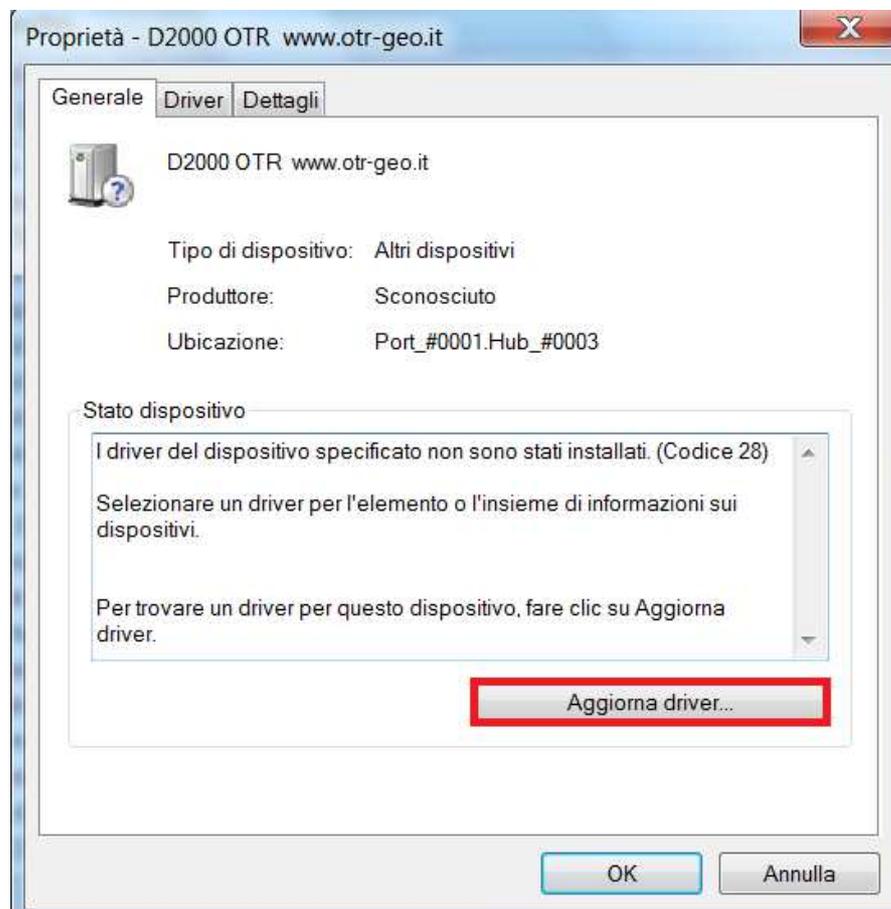
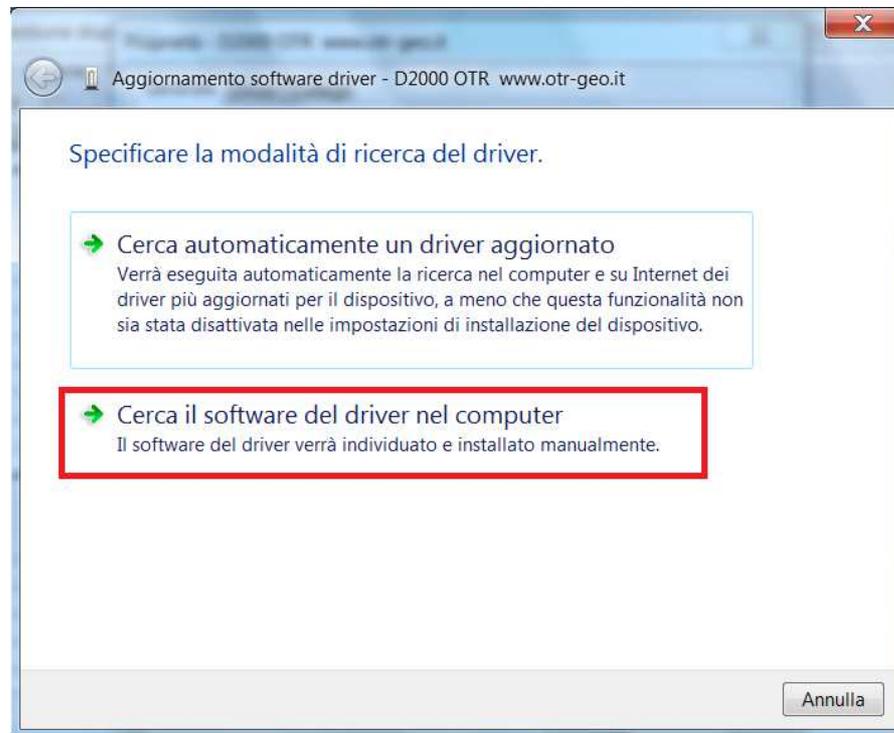5) Click on **Hardware and sounds**
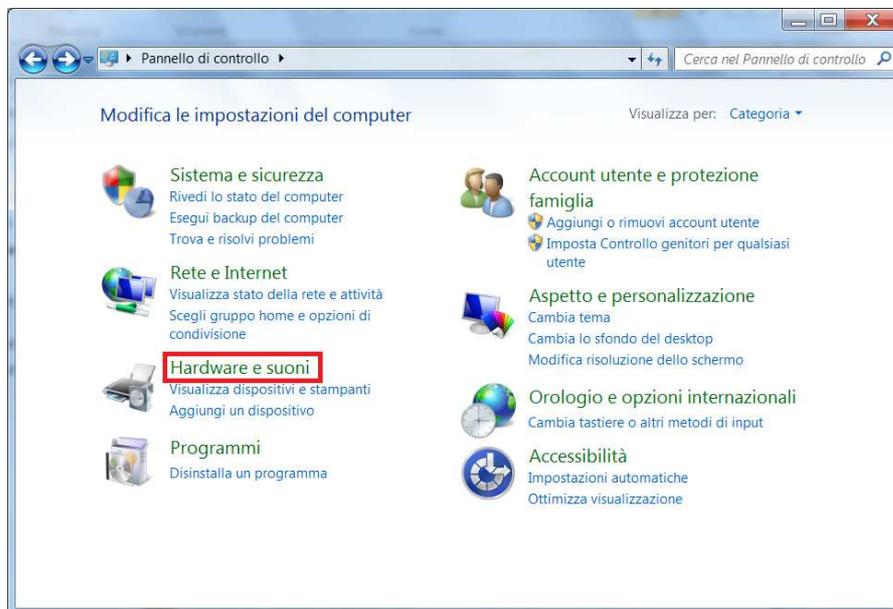
6) Click on **Device Manager**
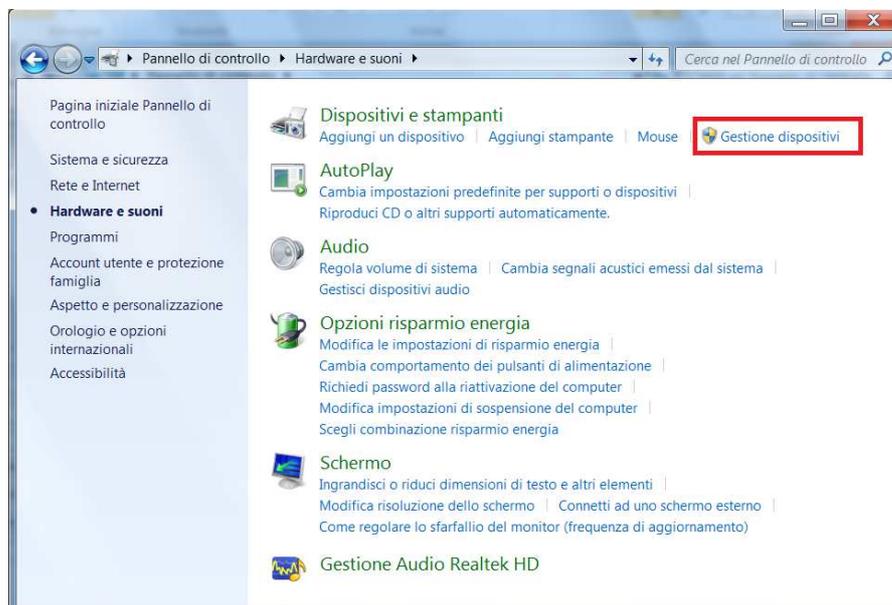
7) Expand the node **Other devices** and right-click on **D2000 OTR**. In the context menu that pops up, choose **Settings**
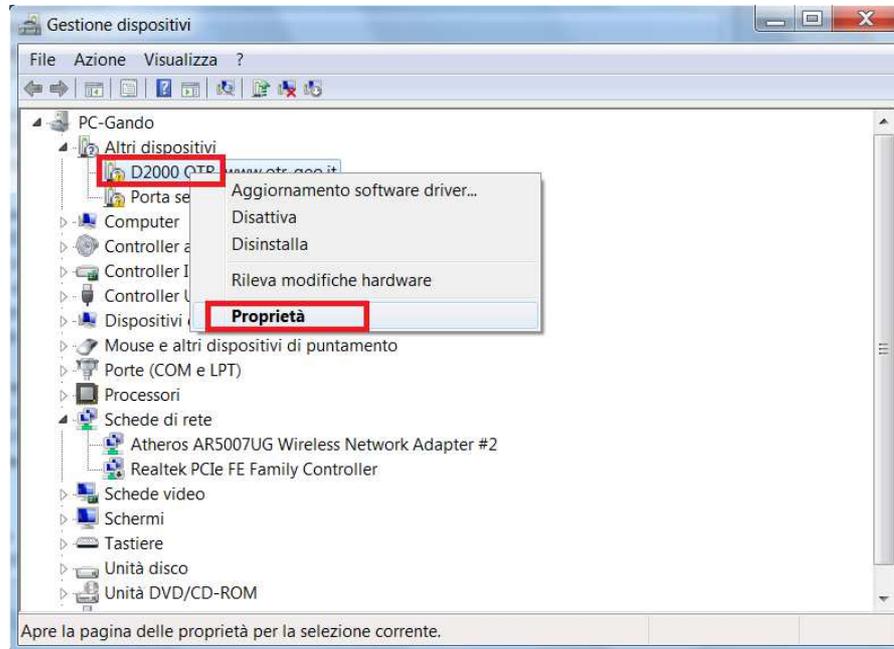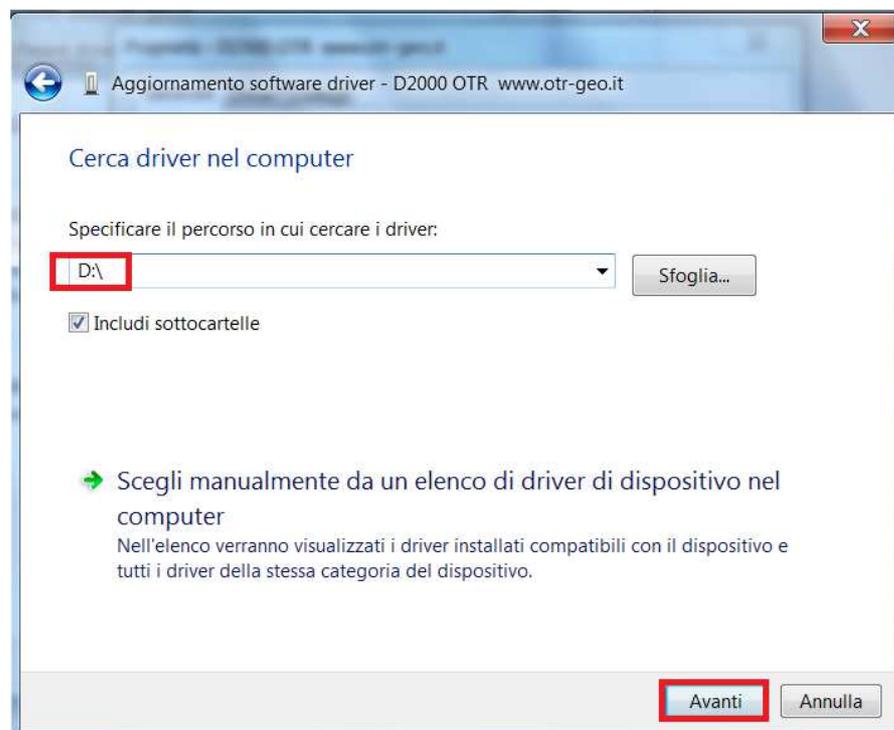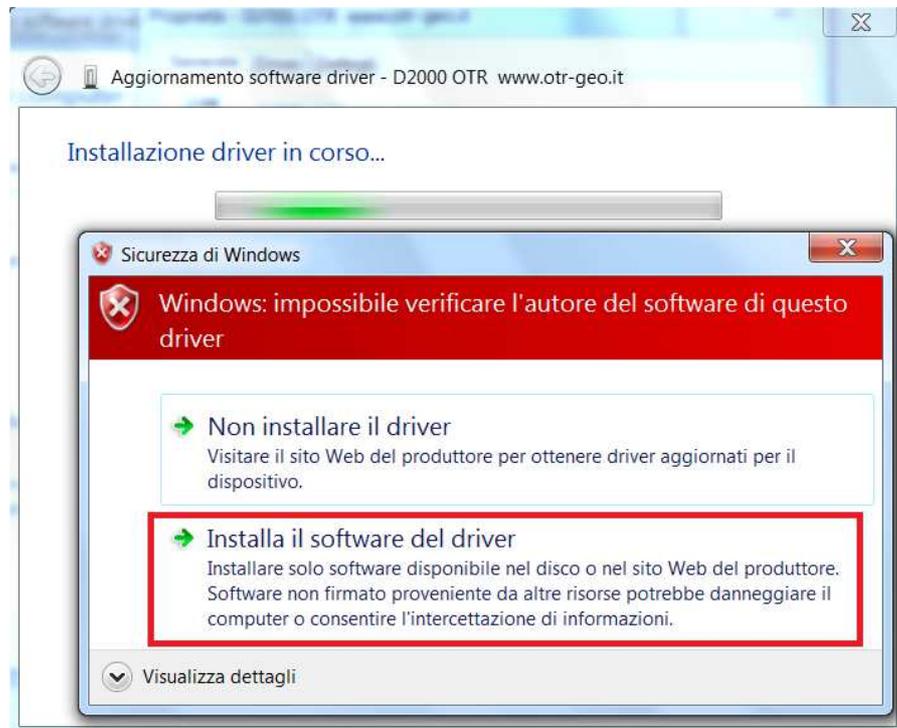

8) Click on **Driver update…**

9) Click on **Browse my computer for driver software**

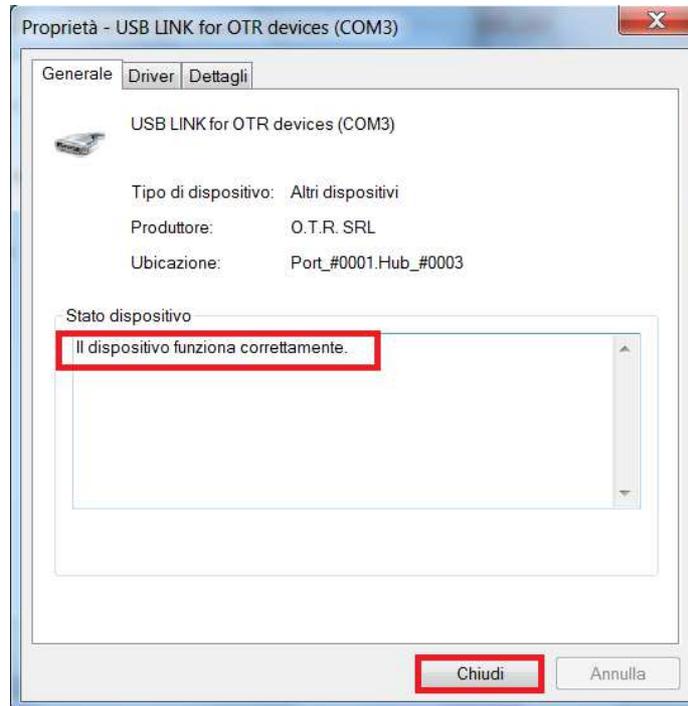10) Select CD drive (usually D:\) clicking on **Browse** and then click on **Continue**
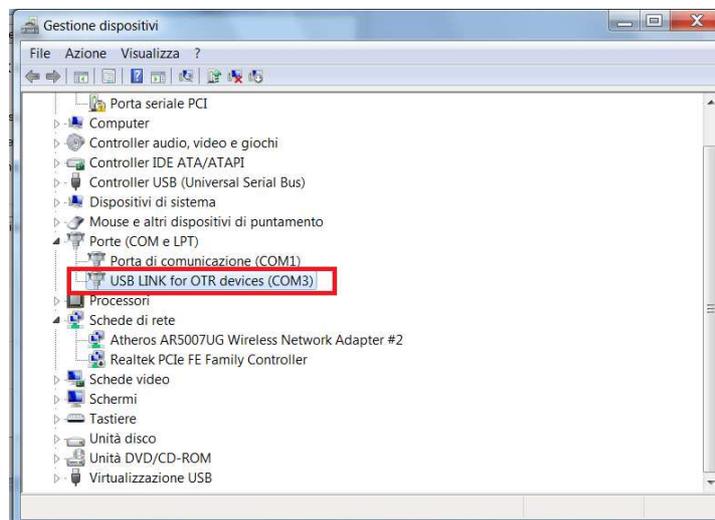
11) Click on **Install driver software**

12) Wait until the installation is completed and click on **Close**

13) Verify that your driver has been successfully installed and click on **Close**

14) Expand the node **Ports (COM & LPT)** and verify that **USB LINK for OTR devices (COMX)** is present
X is the COM port number for the driver. In our example the driver works on port COM3.

15) Open WD400 Software and choose proper COM Port before establishing connection.
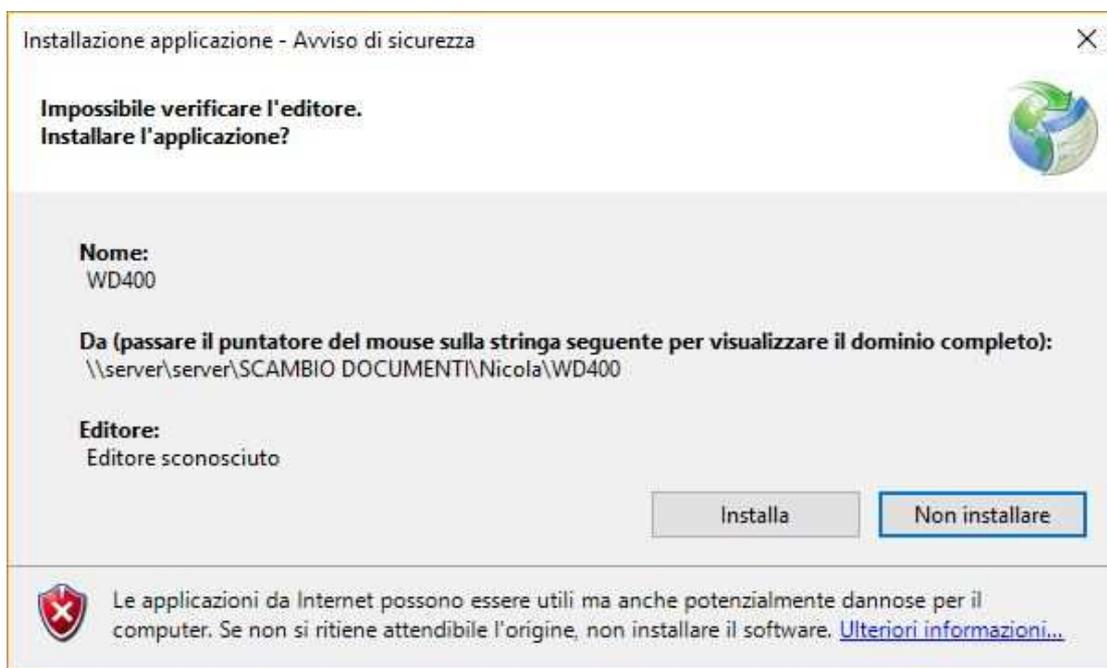In the example above, choose COM3

Notes:

No driver is needed to connect to Master Radio. Master Radio can be reached at local IP address 192.168.1.88, or remotely reached at the IP Address sent to IP Address Upload Folder on your FTP server.

14. Software Installation

Insert CD in your computer and double click on **setup.exe** file

Application Files
setup.exe
WD400.application

You will be prompted to accept installation

Installazione applicazione - Avviso di sicurezza ✕

Impossibile verificare l'editore.
Installare l'applicazione?

Nome:
WD400

Da (passare il puntatore del mouse sulla stringa seguente per visualizzare il dominio completo):
\\server\server\SCAMBIO DOCUMENTI\Nicola\WD400

Editore:
Editore sconosciuto

Installa   Non installare

Le applicazioni da Internet possono essere utili ma anche potenzialmente dannose per il computer. Se non si ritiene attendibile l'origine, non installare il software. Ulteriori informazioni...

Click on **Install**

During installation, system prerequisites are checked. You might be requested to download Microsoft additional software, such as .NET FrameWork.

Please install these prerequisites first.

When installation is completed, software will automatically launch.