1. GENERAL DESCRIPTION

1.1 Introduction

Some FRER meters can be optionally equipped with an integrated IEC61850 Gateway or, as an alternative, can use an external IEC61850 / Modbus RTU Gateway.

1.2 Additional option

As an additional option, on the integrated Gateway, a Master RS485 Modbus interface can also be installed, expanding the Gateway functionality to other meters only equipped with a Slave RS485 Modbus interface.

1.3 Available Versions

Both Gateway types, integrated and external, are available in different combinations regarding the maximum number of meters that can be connected, the Set of available measured quantities, the number of Data Sets and Report Control Blocks included in the default configuration, and allowed as maximum in each IED.

Max Meters	Set of measured quantities (1)	Default Data Sets for the Gateway L.D. (1)	Default Data Sets for each Meter L.D. (1)	Default Data Sets for each IED	Default RCB's for each Data Set (1)	Default RCB's for each IED	Max allowed Data Sets for each IED	Max allowed RCB's for each IED
1	Full	1	4	5	4	20	6	24
4	Full	0	3	12	2	24	12	24
6	Reduced	0	3	18	1	18	18	24

Note (1): See chapter 5 "IEC61850 SERVER" for further details

1.4 Special considerations regarding the measurements updating time

The IEC61850 Gateway performs 3 basic operations in sequence:

- Fetching of the measurements data from the meter.
- Evaluating if the measurements data have changed more than the preset deadbands and, in case, updating the relevant Data Sets.
- Sending the Reports to the subscribed clients, according to the triggering options they have chosen.

This sequence is repeated, in a cyclical way, for each meter connected to the Gateway.

The time needed to complete the sequence for a single meter, depends on many factors, but the most relevant are:

- the variability of the measured quantities
- the number of subscribed RCB's by the IEC61850 clients.

When the measured variables are in a steady state (they don't vary more than the deadbands), and no RCB's have been subscribed, the time required to complete the full sequence for each meter is around 450ms.

When all the measured variables change, from cycle to cycle, more than the deadbands, then each subscribed RCB's adds about 100ms to the sequence time for each meter.

In application where update time is a concern, the "Single Meter" version of the Gateway should be preferred to both "4 and 6 Meters" versions, the Data Sets should be kept as few and small as possible, the deadbands should be set as wide as possible, and the number of subscribed Report Control Blocks should be as low as possible.

2. BASIC COMMISSIONING

2.1 Introduction

Before fully configure the devices, after that the proper hardware and electrical installation have been completed (see the installation manual and/or the terminals label for each specific product), and the devices have been powered-on, some operations must be carried out in the following order.

2.2 What you needed

Check to have got the following items from FRER (they are in a small CD included in the package, or you can obtain them from the FRER support):

a) "Gateway Tracker" utility installation file.

"Gateway Tracker" is an utility to identify the devices on a network, to set their IP addresses, to update them to the latest firmware release, and to upload and download special files to and from the devices, if requested by the FRER support.

Install it on your laptop or desktop PC.

b) Latest available firmware release.

It is recommended that the firmware of the devices is upgraded to the latest release before commissioning them.

Note: In case of devices with firmware release lower than 3.0.0.3, this is mandatory, due to both important performance and features improvements, and bug fixes.

Contact FRER support to be sure to have obtained the latest available firmware release: you will be asked to specify the Gateway version (Single, 4, or 6 Meters) and the last five digits of the MAC address (you can read them on the label of the Gateway, or by the "Gateway Tracker" Utility

You will receive from FRER support a file containing the latest firmware release, which may have a name similar to GW1_3_0_0_3.hex (for the "Single Meter" version), to GW4_3_0_0_3.hex (for the "4 Meters" version) or to GW6_3_0_0_3.hex (for the "6 Meters" version).

Note: In case you have different Gateway versions, be careful to use the right firmware file for the right Gateway version, otherwise at the end of the process the Gateway will be unusable.

2.3 Settings by the front display and front panel panel push-buttons

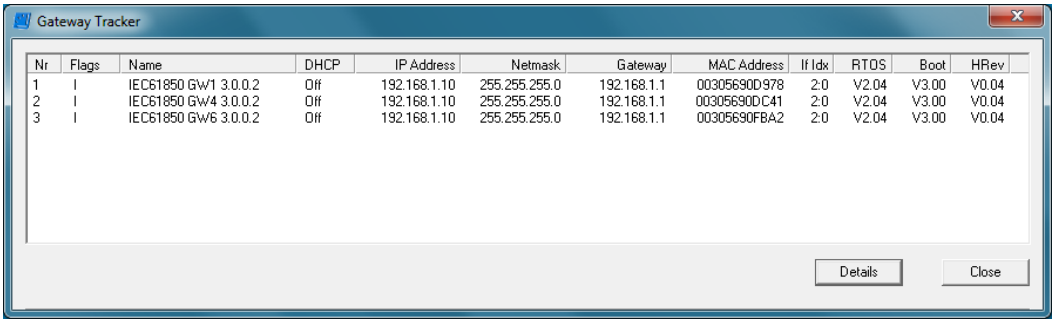
For each meter connected to the IEC61850 Gateway (including the single one which integrates the gateway itself):

a) Enter the configuration menu (as described in the specific user manual).
b) Set the correct VT's and CT's ratios (they can also be further modified later, but this requires the repetition of the meter configuration in the configuration Web-Server -see later on paragraph 2.5 "Operations with the Configuration Web-Server"-).
c) Set the following communication parameters:
Device logic address: between 1 and 247.
Baud rate: 19200.
Parity: Even.
Stop bits: 1.
d) Exit the configuration menu confirming changes, if requested by the meters.

Note: All meters connected to the same Gateway must be set with the same communication parameters, except the device logic address, which must be different for each one of them.

2.4 Operations with the "Gateway Tracker" utility

a) Start the "Gateway Tracker utility", a windows opens showing a list of Gateways connected to the local network.

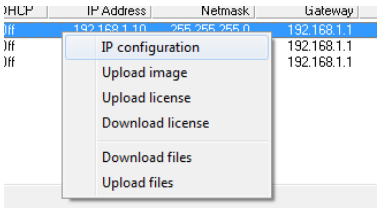


Note: The factory IP settings of the Gateways are the following:
- IP address: 192.168.1.10
- Subnet mask: 255.255.255.0
- Default gateway: 192.168.1.1

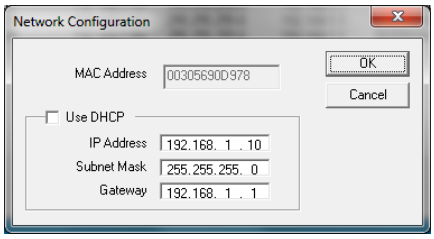
Note: The Gateways must belong to the same network broadcast domain of the PC, in order to be revealed.

Note: Always avoid wireless connections, use only connections with Ethernet cable.

b) Right click on the first Gateway of the list, and then select the menu item "IP configuration":



c) Set the addresses of your choice and press OK:



d) Repeat the same process for all the Gateways in the list.

Note: All devices must be assigned with a unique IP address, and no conflicting IP addresses can exist with other devices on the network.

Note: The assigned IP addresses must belong to the same sub-network of the PC, otherwise the following step "Upload image" will not work.

Note: If an IP conflict exists on the network, the following step "Upload image" may leave the Gateway unusable, to be returned to the factory for repairing.

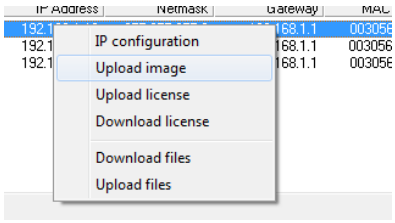
Note: In the following step "Upload image", after the upload of an image has been completed, the relevant Gateway will revert to its factory default IP settings: check that these settings do not conflict with those of any other Gateway on the network.

Note: The simplest way to avoid conflicting IP settings during these operations, is to physically connect one by one the Gateways directly to the PC.

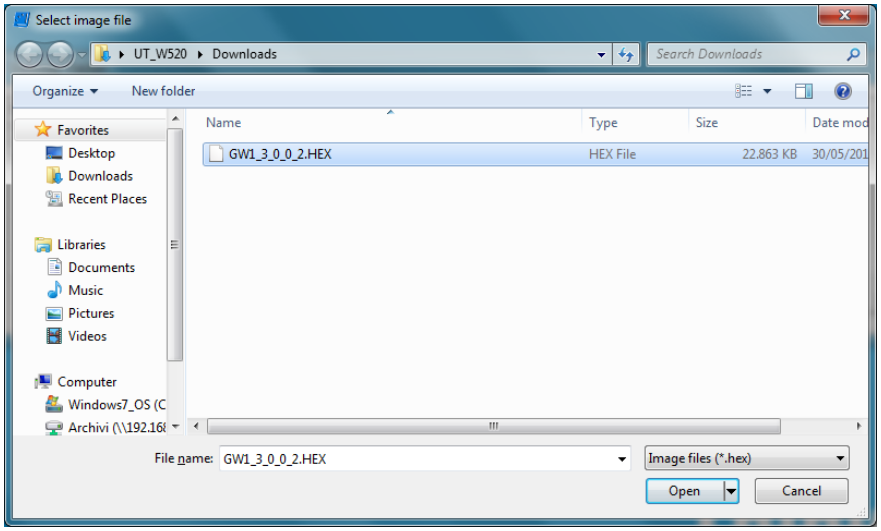
Note: The Ethernet port of the Gateways has no auto MDI/MDIX switching function, so you may need a crossed Ethernet cable or you may need to connect the devices to an Ethernet port supporting the auto MDI/MDIX switching.

e) Once you have properly set the IP addresses, right click on the first Gateway of the list, and then select the

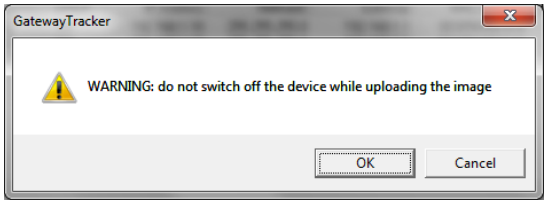
menu item "Upload image ":



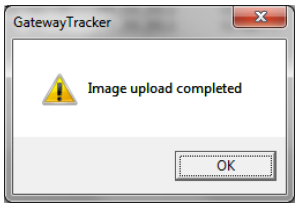
f) Select the upgrade file, containing the latest firmware release, that you have received from Frer support, and press "Open":



g) You will receive the following warning message, and press "OK":



h) Wait that the progress bar indicating the progress status will reach the end, until you will get the following confirmation message:



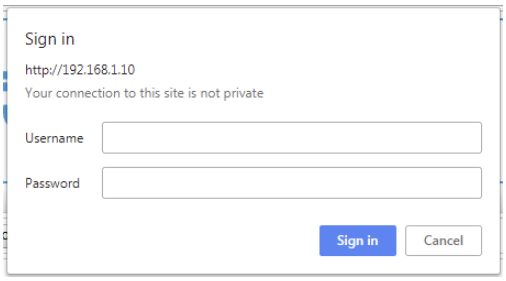
Note: After the upload of an image has been completed, the relevant Gateway will revert to its default IP settings: check that these settings do not conflict with those of any other Gateway on the network.

i) Repeat the same process for all the Gateways in the list.
j) Re-set the correct IP addresses again, according to your needs, as shown in points b) to d).
k) Close the "Gateway Tracker" utility when done.

2.5 Operations with the Configuration Web-Server

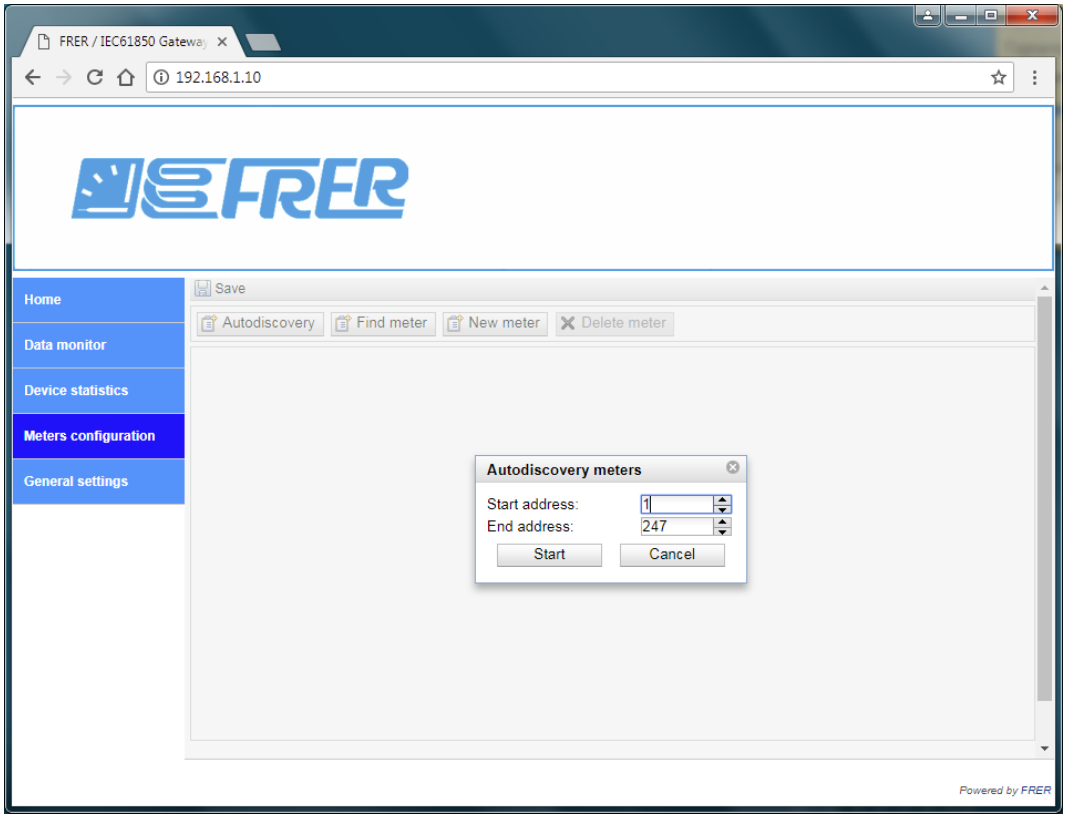
a) Using a web browser of your choice, type in the address bar the IP address of the gateway you want configure, the following home page will appear:

b) Press the "Meters configuration" menu item, and enter the credentials in the following login panel:

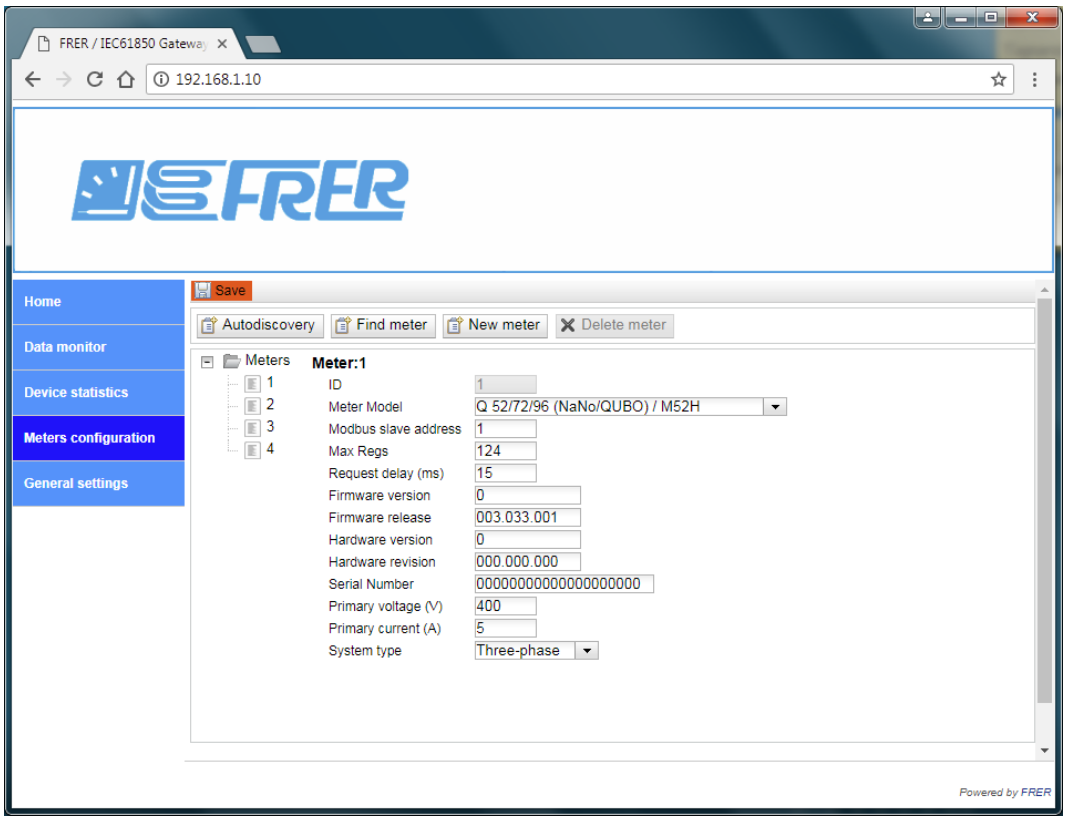


Note: The factory default credentials are:
- Username: admin
- Password: password

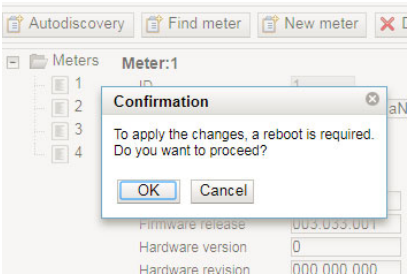
c) Press the "Autodiscovery" button, then "Start", and then "OK" to the successive confirmation message:



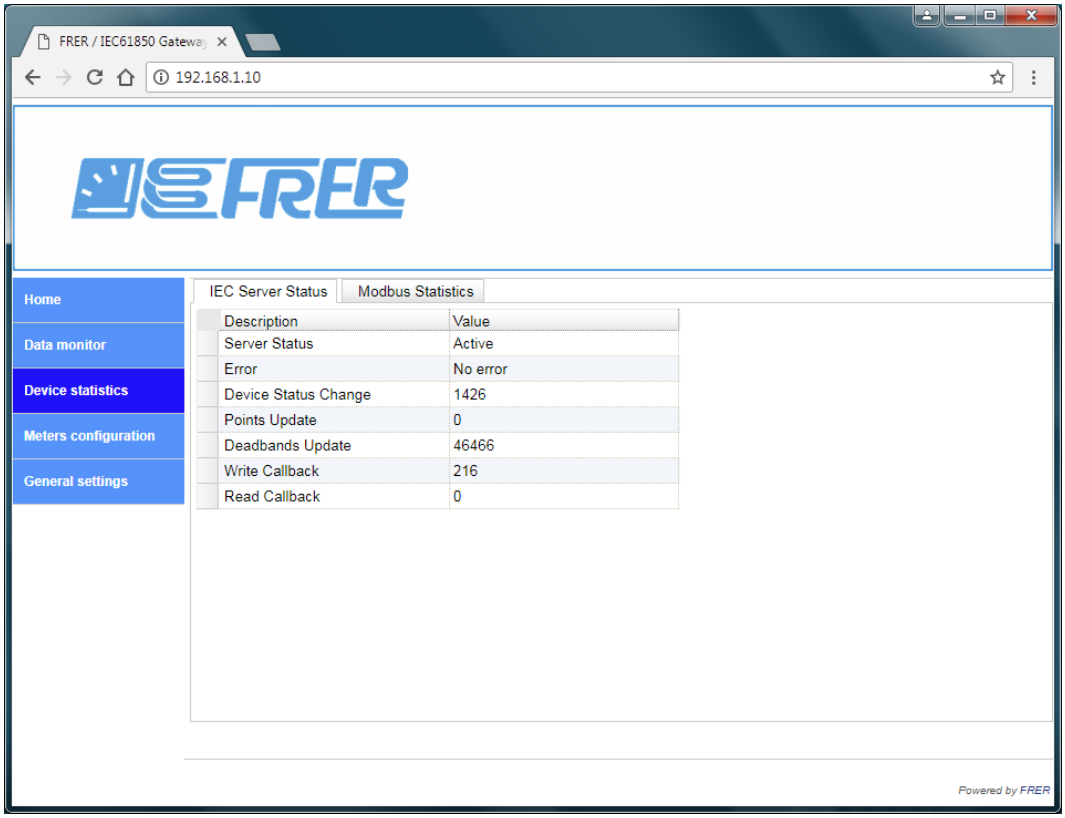
d) Press the "Save" button when the autodiscovery function will have discovered all meters connected to the Gateway (their quantity changes depending on the Gateway version ("Single, 4 or 6 Meters")



e) And then confirm reboot, which is needed to create the proper IID file.



f) Wait a couple of minutes to allow the server completing the reboot process, then press "Device statistics" on the home page to get confirmation that the IEC61850 server is properly running:



g) Repeat the same process for all the other Gateways.
h) Close the Configuration Web-Server when done.

3. CONFIGURATION WEB-SERVER

3.1 Introduction

Each IEC61850 Gateway is equipped with an integrated Configuration Web-Server (accessible by typing its IP address on the address bar of any web browser of your choice), used to configure some functional details of the Gateway itself, and some behaviors of the IEC61850 protocol stack, and to monitor, in the commissioning process, the correct operation of the system.

The following is a detailed description of all the settings, grouped by the main menu items found on the left side of the main page.

Every settings change made by the operator, needs to be saved (by pressing the "Save" button on the page) and will became operative after a reboot of the system (a reboot will be automatically proposed after having pressed the "Save" button).

However, all modifications introduced in a single settings page can be "cumulated" in a single saving, and all modifications in all pages can be "cumulated" in a single reboot, unless a change in one setting affects the operation of another setting (this is the case, for example, when one changes the communication parameters of the serial link, which will be used in the "Meters configuration" page to identify the meters connected to the Gateway).

Note: Some settings need to be transferred to the IID file; they are:
- IP settings
- IED name
- Deadbands
- Any change in "Meters configuration"

In this case, a new IID file must be created, which will overwrite the IID or CID file currently in use.
When a CID file is loaded in the IEC61850 Server, these settings will reflect those contained in the CID file, and could not be modified anymore unless the server is allowed to replace the current CID file with a newly generated IID file (see paragraph 3.2.3 "IEC61850" for further details).

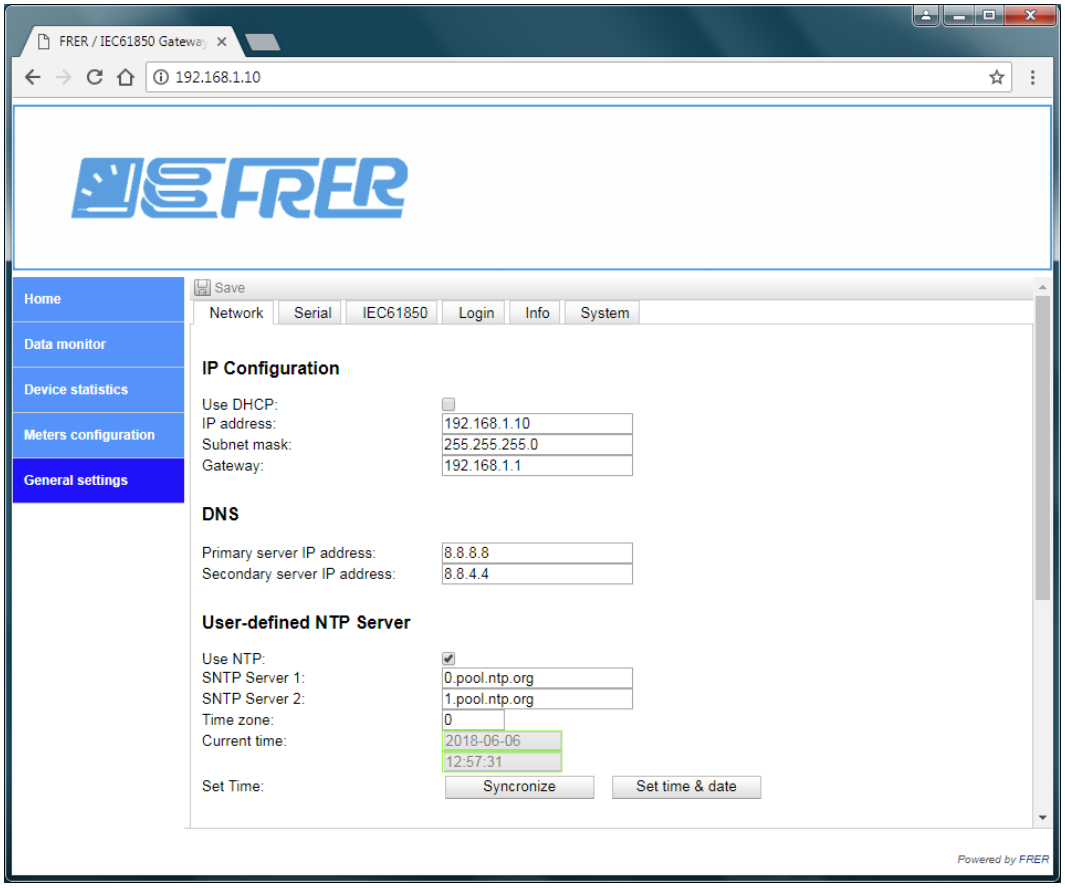
Note: The Configuration Web-Server heavily interferes with the operation of the IEC61850 Server, specially with those pages which continuously update their content (Data monitor and Device statistics): its use must be limited to the minimum required during commissioning, and should be avoided during normal operation of the IEC61850 Server

Note: Only one session of the Configuration Web-Server is allowed at a time.

3.2 General settings

This page contains some sub-pages, they are described one by one.

3.2.1 Network



IP Configuration:

In this section the **IP address**, **Subnet mask** and **Default gateway** of the server can be set or, as an alternative, the **DHCP** client can be enabled, which retrieves automatically these settings from a DHCP client on the network.

The factory IP settings of the Gateways are the following:

- IP address: 192.168.1.10
- Subnet mask: 255.255.255.0
- Default gateway: 192.168.1.1

Note: Since the gateway will be used as IEC61850 server, it is advisable not to use DHCP, but manually assign fixed IP settings.

Note: IP settings affect both the IEC61850 Server operation (they will be also included in the IID file) and the Configuration Web-server operation; therefore it is not possible to have different IP settings for the IEC61850 Server and for the Configuration Web-server.

Note: When a CID file is loaded in the IEC61850 Server, these settings will reflect those contained in the CID file, and could not be modified anymore unless the server is allowed to replace the current CID file with a new generated IID file (see paragraph 3.2.3 "IEC61850" for further details).

DNS:

In this section the **Primary and Secondary DNS servers** can be set.

Note: DNS servers are used only if the NTP is enabled, and the NTP servers are specified with their URL instead of their IP addresses. (see next section for further details).

User-defined NTP Server

If "**Use NTP**" check-box is checked, at boot time and then every one hour, the date and time will be automatically retrieved from the specified NTP servers, and the internal RTC will be adjusted accordingly.

If "Use NTP" check-box is NOT checked, the user must set the date and time manually, and then the internal RTC will keep them with its typical accuracy of +/- 2 minutes/month.

In both cases, RTC is backed by a super-cap which is able to keep the RTC running for about 2 weeks without auxiliary power supply: there are not batteries to be replaced.

SNTP servers 1 and 2 are the NTP servers which will be connected to get the current date and time: the first attempt is made on the server 1, and if it times out a further attempt is made on server 2; if both fail, no further attempts will be made until the next synchronization one hour later (however in the meantime the internal RTC will keep running).

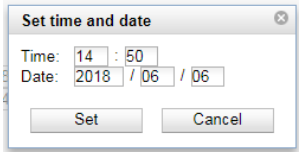
SNTP servers can be specified with their URL or their IP address, even one in one way and the other in the other way.

Time zone is used to specify to the server which localized time you need instead of the UTC time, which you will get if time zone = 0)

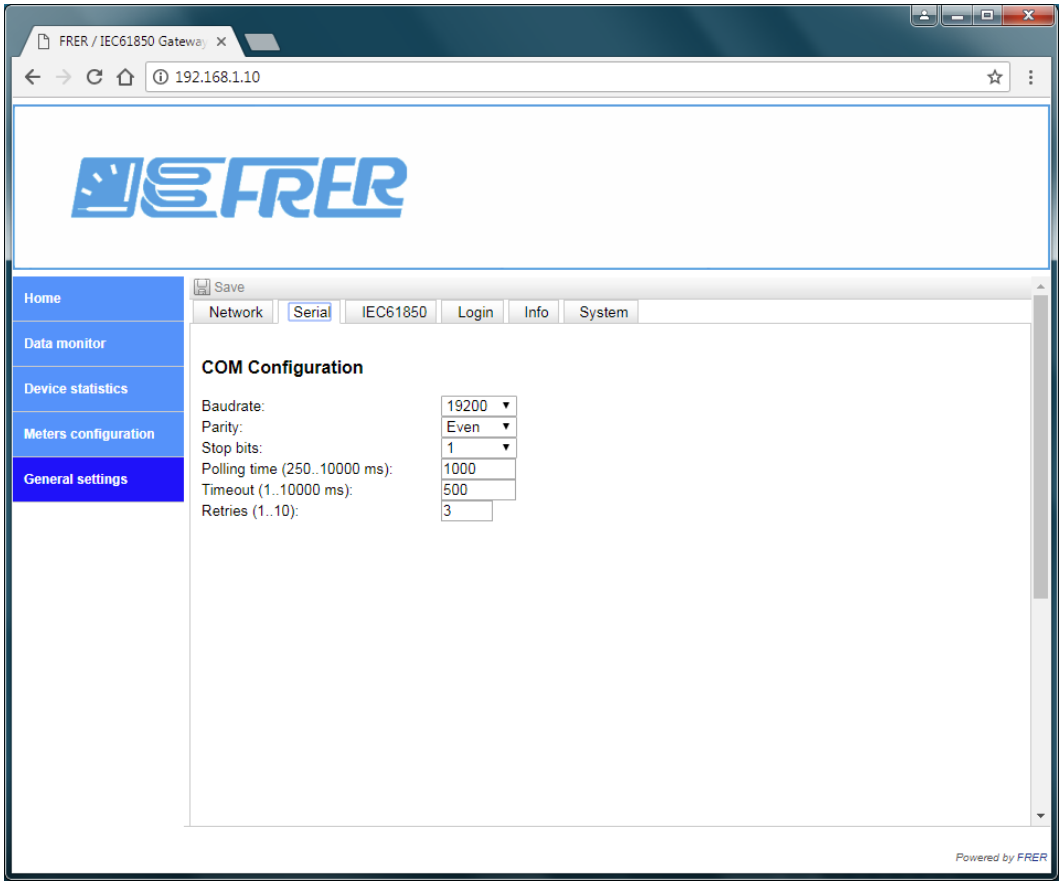
The two small windows containing the current date and current time have both a thin frame which change color as follows: Green = Sync ok, Orange = Sync in progress, Red = Last Sync failed.

It is possible to force a manual sync by pressing the button "**Synchronize**".

Pressing the button "**Set time & date**" opens a small window where you can manually set date and time.



3.2.2 Serial



In this page the communication parameters of the serial link, used by the Gateway to fetch the measurements data from the meters, are set.

Note: these settings are valid also for the "integrated" version of the Gateway, which uses an internal serial link to connect to its hosting meter, instead of the RS485 line of the external version.

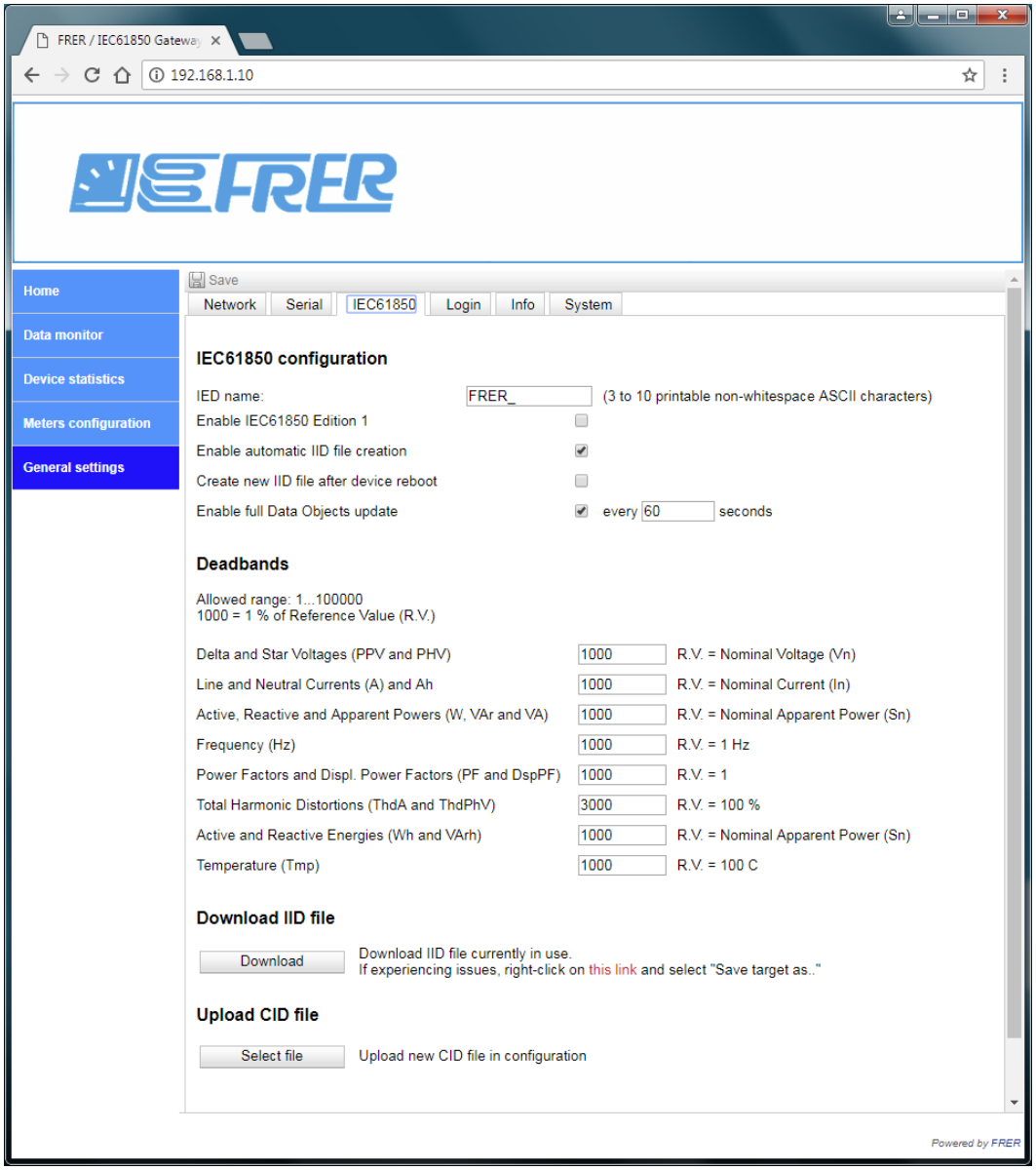
Baudrate, **Parity** and **Stop-bits** must be set in the same way as they were set on the meters, by the front panel display and the front panel push-buttons (see paragraph 2.3 "Settings by the front display and front panel push-buttons" under the chapter 2. "BASIC COMMISSIONING").

Polling time sets the period of the measurements polling cycle to the connected meters; if a polling time lower than the time needed to complete the full polling cycle is set, then the polling will be performed at the maximum possible speed (see paragraph 1.4 "Special considerations regarding the measurements updating time", under the chapter 1 "GENERAL DESCRIPTION").

Timeout and **Retries** set the way in which the Server manages missing or bad responses from a meter: if, after a measurements data request, a valid response does not arrive within the time set in "Timeout", then the request is repeated for a maximum number of times set in "Retries".

If all attempts to get the measurements from the meter fail, then the meter is considered off-line and its measurement data are marked as Bad (on the IEC61850 protocol, this meter will have the DO "Healt" of the LLN0, and the DO PhyHealt of the LPHD = "Alarm", and all the DO's of the measurement LN's will have the DA "q" = "questionable" and the Quality details = "OldData".

3.2.3 IEC61850



This page contains many of the settings that will affect the IEC61850 Server operation, and the way IID and CID files are generated and used.

IEC61850 configuration

The **IED name** can be set (from 3 to 10 printable non-whitespace ASCII characters) to recognize the server from other servers connected on the same network.

Note: When a CID file is loaded in the IEC61850 Server, this settings will reflect that contained in the CID file, and could not be modified anymore unless the server is allowed to replace the current CID file with a new generated IID file (see "Enable automatic IID file creation").

The "**Enable IEC61850 Edition 1**" check-box allows forcing the IEC61850 Server to operate according the edition 1 of the rule: this is largely discouraged and used only to solve compatibility issues.

The "**Enable automatic IID file creation**" check-box, when checked, allows the creation of a new IID file, which will replace any existing IID or CID file currently used, after any parameter relevant to the IEC61850 Server operation has been modified.

Note: Since the creation of a new IID file will overwrite the currently used IID or CID file, a warning message asking a confirmation will appear when checking this check-box.

The "**Create new IID file after device reboot**" check-box, when checked, forces the creation of a new IID file, which will replace any existing IID or CID file currently used, after the first reboot, even if none of the parameters relevant to the IEC61850 Server operation have been modified; this is useful to replace a corrupted or wrong CID file loaded by the user, or to revert the IEC61850 Server to a known standard configuration.

The "**Enable full Data Objects update**" forces a complete update of all DO's of the IEC61850 Server, regardless of the deadbands, with a time cycle defined by the user (this possibly triggers a reports generation).

This function is similar to the standard "Integrity" triggering option which, when activated, will trigger a report at fixed (but configurable) time intervals, but they are different in the following aspects:

- The "Integrity" will trigger a report of all members of a Data-set, regardless of the other triggering options selected, while the "Full data objects update" will trigger a report generation depending on the triggering options supported by the members of the Data-set, and activated by the RCB subscriber.
  As an example, if the "Full data objects update" updates a DA with an unchanged value, and this DA does not support the "dupd" trigger option (as for example most DA's of the "BCR" CDC, contained in the MMTR or MMTN LN's), it will not trigger any report for that DA even if the RCB subscriber has activated the "dupd" trigger option.
- If the "Full data objects update" is not enabled, the data contained in a report triggered by the "Integrity" can be as old as the last time that those measuring data have changed more than the deadbands (in some circumstances those data can be even days or weeks old), while the data contained in a report generated by the "Full data objects update" are always fresh measuring data.

A careful evaluation of the desired final result, is then necessary before activating one or the other of the two options (or both), to avoid useless network traffic due to duplicated reports.

The relevant factory setting are:

- The "Full data objects update" function is activated with a cycle time of 60 seconds.
- In the RCB's, the triggering option data-update is set to false, while the integrity is set to true with an integrity time of 60 seconds (see paragraph 5.4 "Unbuffered Report Control Blocks default settings" for further information).

Deadbands

Deadbands are used by the IEC61850 Server to update the deadbanded DA's (Mag and cVal), when the change of the relevant instantaneous values (instMag and instCVal) exceed the deadband values set by the user.

In the FRER IEC61850 Server, the deadbands are referenced to the nominal values, instead of the less meaningful current (actual) values: this has the advantage that the deadbands have a fixed width over the entire measuring range, instead of having narrower width at the beginning of the measuring range, and wider width at its end.

Note: Since the deadbans used by the IEC61850 Server refer to the nominal values of the meters (Nominal Voltages, Nominal Currents, Nominal Powers and so on), which in turn depend on the Primary Voltages and Primary Currents configured in the meters by the front panel display and front panel push-button, a modification in those settings, made on the meters, must necessarily be followed by a new "Meters configuration" (see later on paragraph 3.3 "Meters configuration") and then by the generation of a new IID file, which will overwrite any currently used IID or CID file.

Note: When a CID file is loaded in the IEC61850 Server, these settings will reflect that contained in the CID file, and could not be modified anymore unless the server is allowed to replace the current CID file with a new generated IID file (see "Enable automatic IID file creation").

Download IID file

Pressing this button, the SCL file currently used by the IEC61850 Server (the internally generated IID file or the user uploaded CID file) can be downloaded to be integrated in the rest of the system, or modified and reloaded as CID file using the "Upload CID file" button.

Upload CID file

Pressing this button, a CID file can be uploaded to the IEC61850 Server.

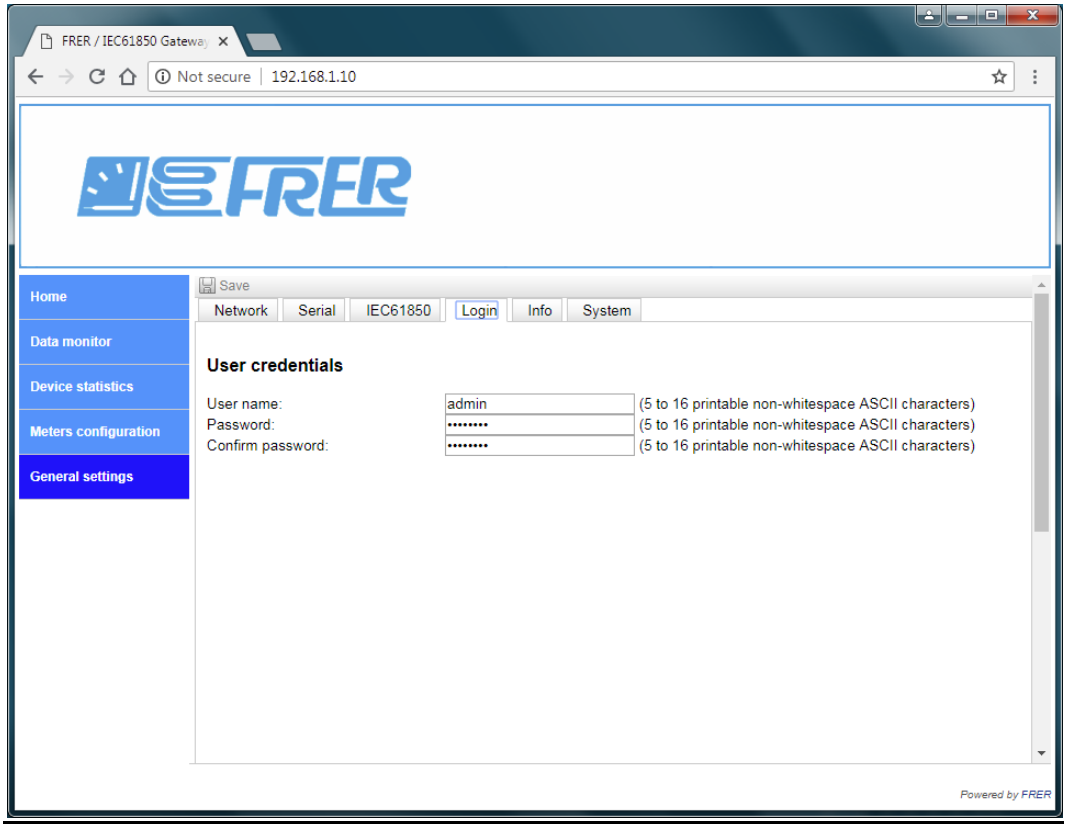
Uploading a Cid files automatically disables (un-checks) the "Enable automatic IID file creation" check-box, and the following settings:

- IP settings
- IED name
- Deadbands
- Any change in "Meters configuration"

will reflect those contained in the CID file, and could not be modified anymore unless the server is allowed to replace the current CID file with a newly generated IID file by checking again the Enable automatic IID file creation" check-box.

Note: The Data Model of the uploaded CID file can't have been modified respect to that in the downloaded IID file (see chapter 5 "IEC61850 SERVER" for additional information). If a CID file with a Data Model different from the current Meters configuration is loaded, the server will show an unpredictable behavior.

3.2.4 Login



In this page the user credentials are set.

The factory default credentials are:

- Username: admin
- Password: password

In case the User name or the password have been lost, the wildcard for both is "frer2730" (without double quotes).

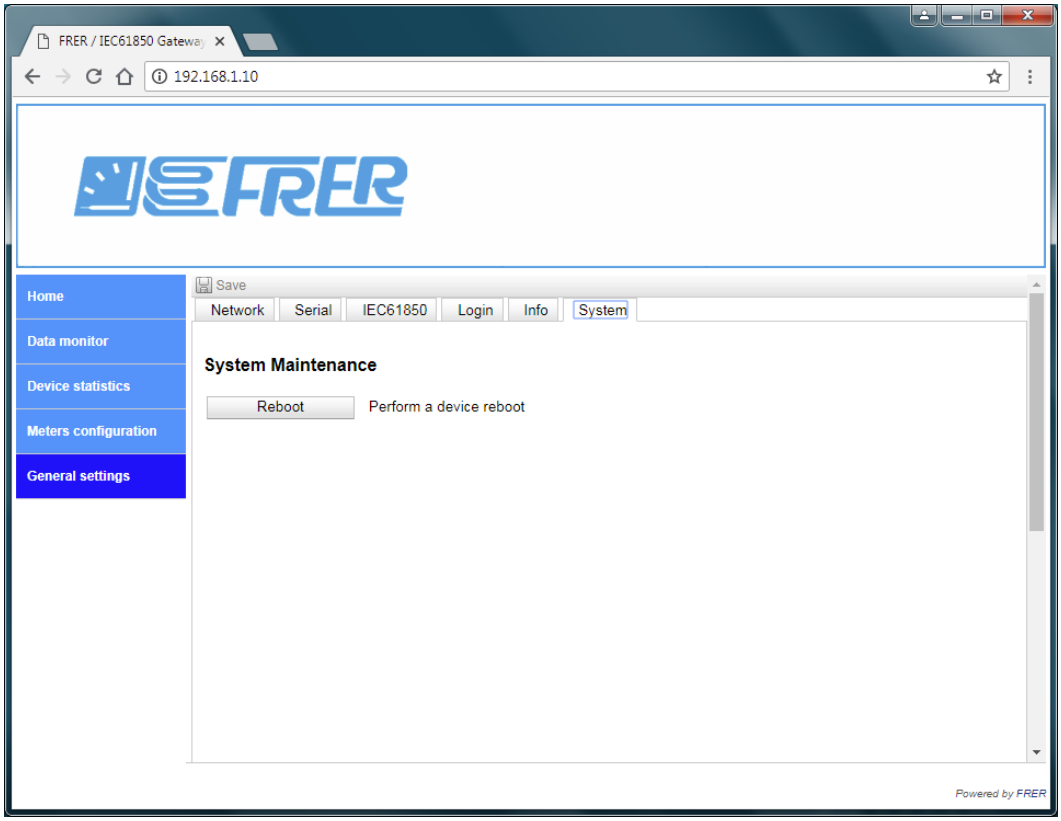
3.2.5 Info

This page shows the main info regarding the IEC61850 Server.

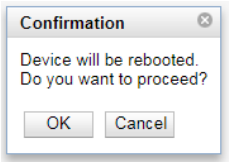
Some of them will appear in the DO "NamPlt" of the LLN0, and in the DO "PhyNam" of the LPHD, of the Gateway LD.

Send a screen copy of this page, together with a screen copy of the "Device statistics" page, to the FRER support in case that assistance is needed.

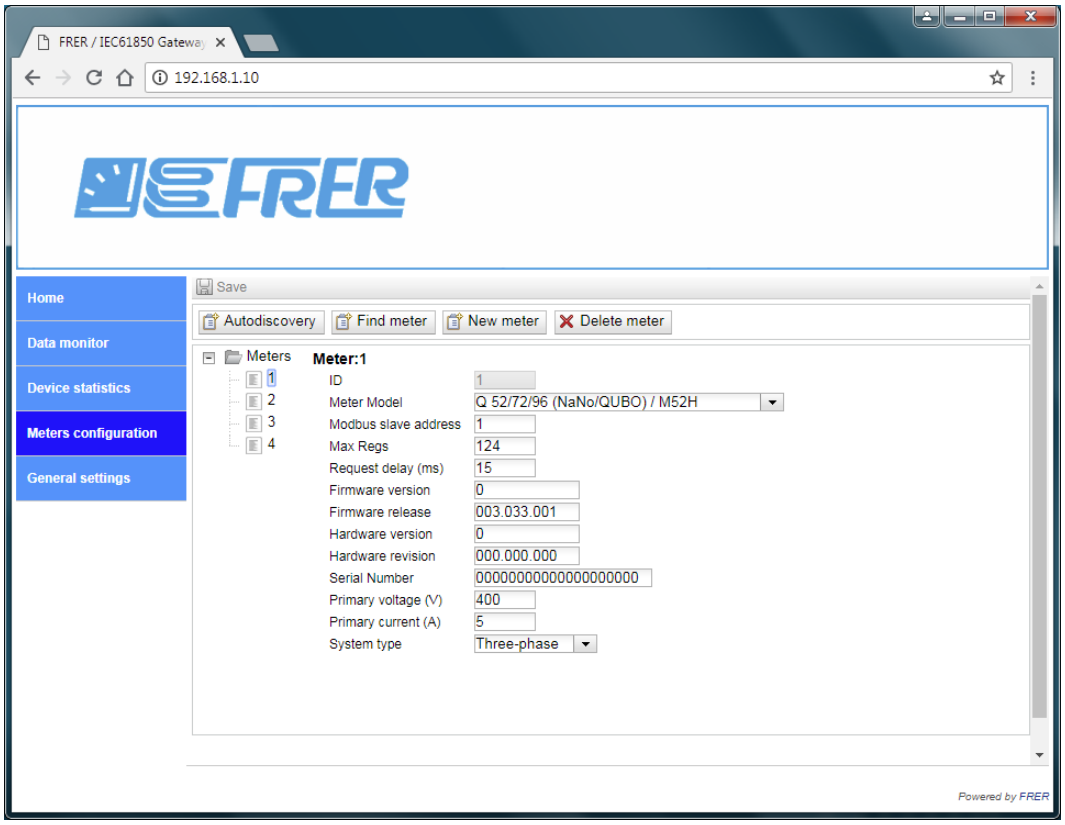
3.2.5 System



This page is used to manually reboot the Gateway.
After pressing the "Reboot" button, a warning message, requiring a confirmation, will appear:



3.3 Meters configuration



Meters Configuration page is used to configure the meters connected to the Gateway.

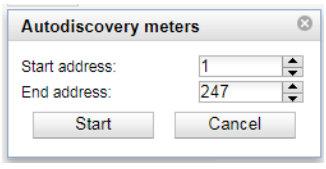
Meters are collected using different ways (Autodiscovery, Find meter, New meter), and each one of them has many editable fields, that are automatically read from the meters and filled by both the "Autodiscovery" and "Find meter" functions (but can also be modified later by the user).

The configuration of the meters is used by many processes in the gateway:

- The **ID** of meters and the **System type** are used to generate the Data Model of the IEC61850 Server (one Logical Device per each meter, and different Logical Nodes according to the System type).
- **Meter Model**, **Firmware** and **Hardware versions**, **releases** and **revisions**, together with the **Serial Number**, will appear in the DO "NamPlt" of the LLN0, and in the DO "PhyNam" of the LPHD, of the meters LD's.
- **Modbus slave address**, **Max Regs** (which is the maximum number of register that can be read with a single Modbus query) and **Request delay** (which is the minimum idle time required between two queries) are used in the retrieving of the measurement data from the meters.
- **Primary voltage** and **primary current** are used by the IEC61850 Server to properly calculate the deadbands set by the user.

Autodiscovery

Pressing this button, the Gateway will start an automatic search of the meters connected to it:



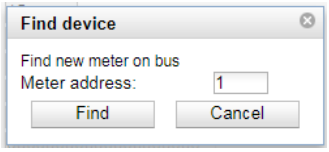
It is possible to limit the address range within which the scan will be performed, and for each meter found, a special query will automatically read all the over mentioned necessary information.

The "Autodiscovery" scan stops when the maximum number of meters that can be connected to the gateway has been found, or when the scan reaches the higher address allowed for the scanning process.

In any case (whether or not all meters have been found, and even if no meters at all have been found), the new "Autodiscovery" result will overwrite the old one (the old meters configuration will be fully replaced by the new "Autodiscovery" result).

Find meter

Pressing this button, the Gateway will start the search of a single meter, of which the user has specified the address, connected to it:



When the meter is found, a special query will automatically read all the over mentioned necessary information.

In contrast with the "Autodiscovery", the "Find meter" function will only add the new meter found to the existing configuration, without deleting anything.

New meter

By pressing this button a new meter, with a default set of information, will be added to the existing configuration, without having been searched at all.

This function is useful to perform a full Meters configuration (and then to generate a complete IID file), before having fully commissioned the system (when the meters are not yet connected to the external Gateway, for example), but requires that the user manually fills all information fields with the proper data.

Delete meter

By pressing this button, the selected meter will be removed from the configuration.

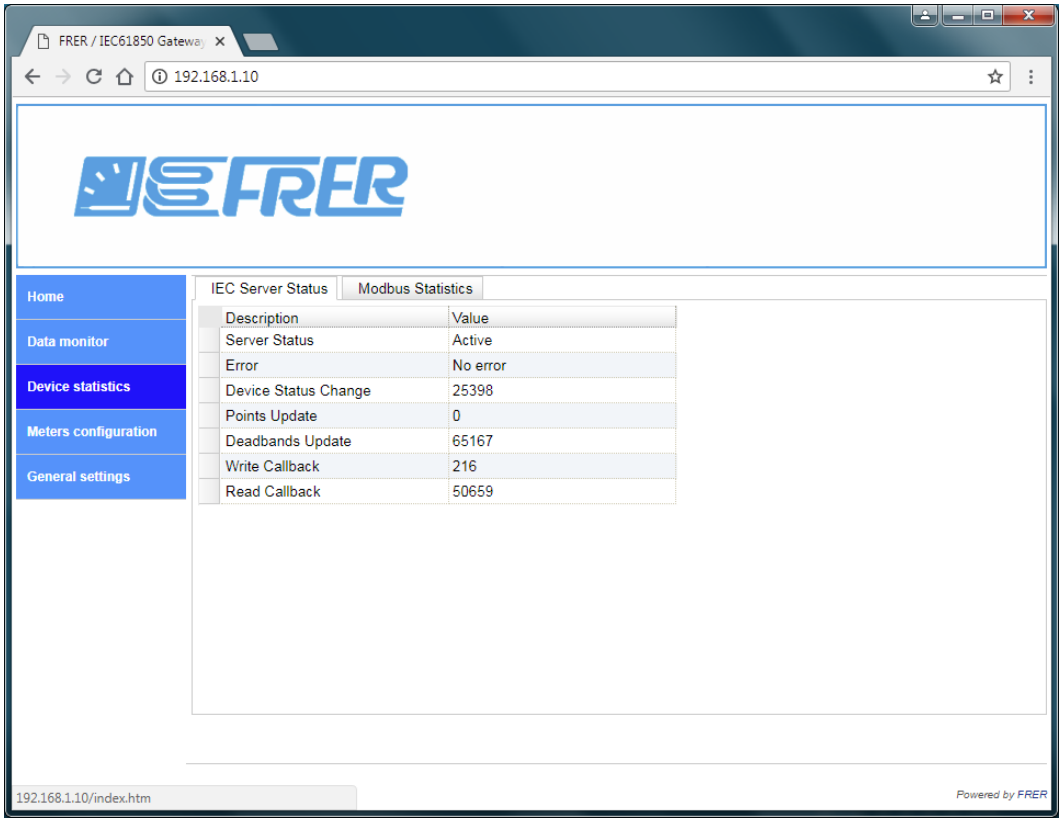
When the Meter configuration is complete, it must be saved, and the gateway must be rebooted in order to generate the proper IID file.

Note: When a CID file is loaded in the IEC61850 Server, these settings will reflect that contained in the CID file, and could not be modified anymore unless the server is allowed to replace the current CID file with a new generated IID file (see paragraph 3.2.3 "IEC61850" for further details).

3.4 Device statistics

The device statistics page is used to check the proper operation of the Gateway; it has two sub-pages:

3.4.1 IEC Server Status



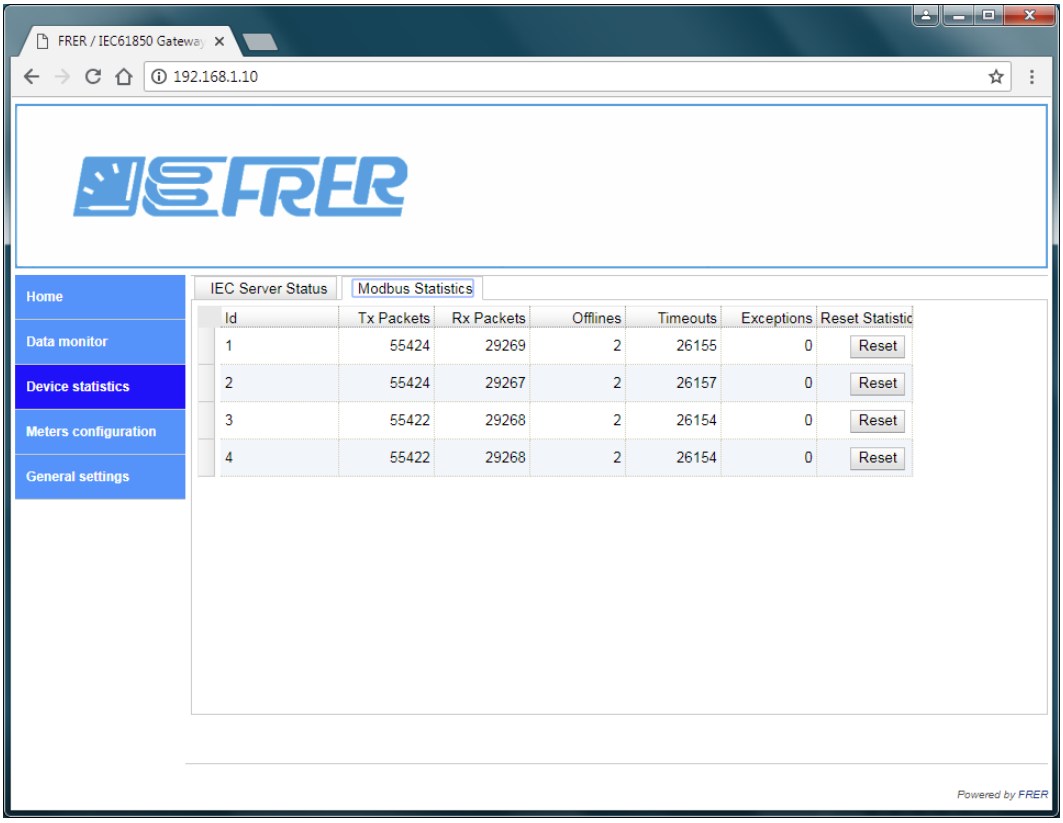
In this page some data regarding the IEC61850 Server operation are shown.

Server Status and **Error** are the main fields to check for the confirmation of a good operation.

The error field, in case of error, will show an error number with a short explanation text.

Send a screen copy of this page, together with a screen copy of the "Info" page, to the FRER support in case that assistance is needed.

3.4.2 Modbus Statistics



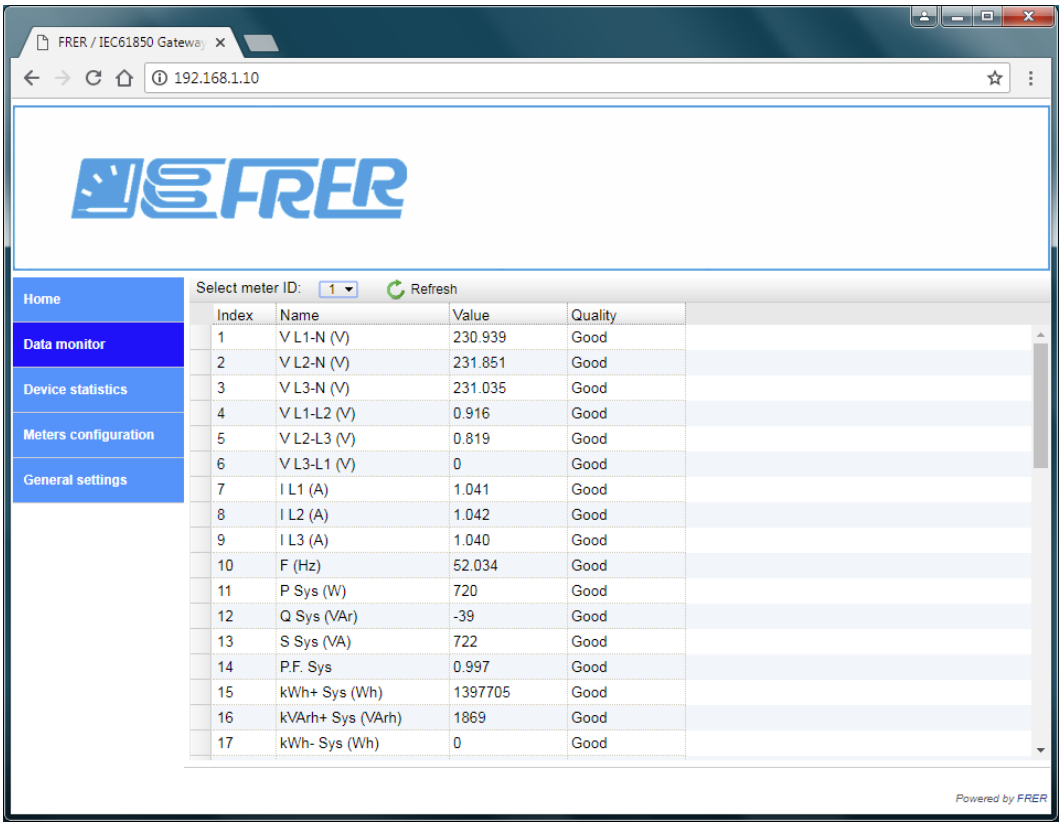
This page shows information relevant to the Modbus link to the connected meters.

While in the internal link, between the "Integrated" gateway and its "hosting" meter it is very difficult to experience communication problems, with the RS485 line, used to connect the meters with the "External" gateway, problems can more easily be originated from a bad cable choice and lay-out, missing termination at the end of the line, very noisy environment and so on.

When connecting the meters with the RS485 line, use the standard best practice normally used for RS485 lines setup (many good Application Notes, dealing with a bullet proof RS485 line implementation, can be found on the internet).

In addition, keep in mind that in both the "Integrated" and "External" gateways, the Master RS485 port is already internally equipped with both the polarization and the termination of the line: you will need to add only the termination on the far end of the line.

3.5 Data monitor



This page can be used to check if the meters connected to the Gateway are measuring and communicating properly.

Note: Since this page heavily interferes with the IEC61859 Server operation, it is not intended to be used as a visualization or a supervision application, but only as a commissioning tool.

The data on this page do not refresh automatically: to get a new set of fresh data, select the meter you are interested in, by selecting its ID in the "**Select meter ID**" selection box, and then press the "**Refresh**" button once.

The quality column will display "Bad" instead of "Good" in case of communication problems between the Gateway and the connected meters.

4. GATEWAY TRACKER UTILITY

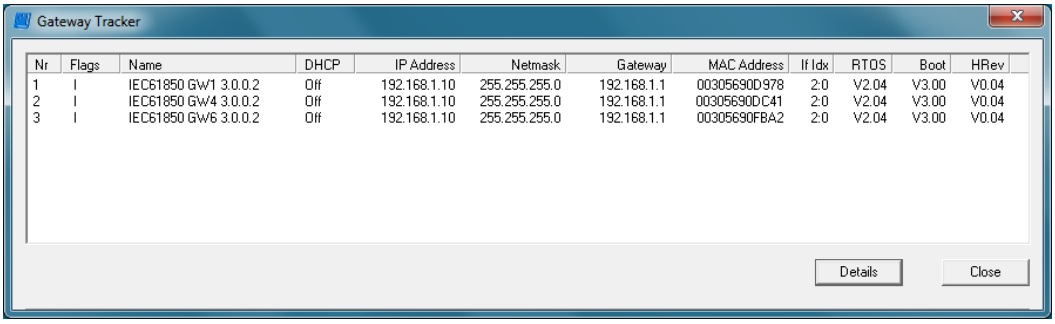
4.1 Introduction

"Gateway Tracker" is an utility to identify the devices on a network, to set their IP addresses, to update them to the latest firmware release, and to upload and download special files to and from the devices, if requested by the FRER support.

4.2 Main page of the "Gateway Tracker" utility

After having started the "Gateway Tracker utility", a window opens showing a list of Gateways connected to the local network, together with some relevant information:

- IP address, Sub-net mask, Default gateway and DHCP status: they relate to IP settings.
- MAC address: this is the unique MAC address of the device (the last 4 digits are also shown on the device label) and it is used also as Serial Number of the Gateway.
- Name: this field indicates the "Version" of the gateway ("Single or 4 or 6 Meters") and the Firmware release (as an example, in the following picture, the firmware release is 3.0.0.2).
- Some additional information relevant to the hardware revision and the RTOS installed.



Note: The factory IP settings of the Gateways are the following:
- IP address: 192.168.1.10
- Subnet mask: 255.255.255.0
- Default gateway: 192.168.1.1

Note: The Gateways must belong to the same network broadcast domain of the PC, in order to be revealed.

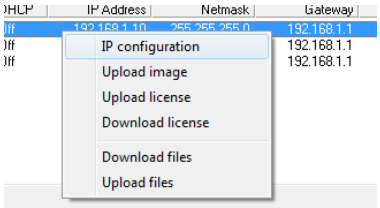
Note: Always avoid wireless connections, use only connections with Ethernet cable.

Note: The Ethernet port of the Gateways has no auto MDI/MDIX switching function, so you may need a crossed Ethernet cable or you may need to connect the devices to an Ethernet port supporting the auto MDI/MDIX switching.

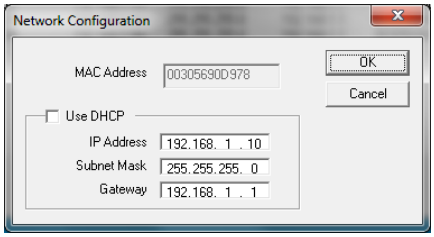
4.3 IP configuration of the Gateways

Since all gateways leave the factory with the same default IP settings, if many of them are connected to the same network, at the first start-up they will be conflicting, and will need to have their addresses changed before being able to communicate properly.

Right click on the first Gateway of the list, and then select the menu item "IP configuration":



Set the addresses of your choice and press OK:



Repeat the same process for all the Gateways in the list.

Note: All devices must be assigned with a unique IP address, and no conflicting IP addresses can exist with other devices on the network.

4.3 Firmware upgrade of the Gateways

By the "Gateway Tracker" utility, it is possible to upgrade the firmware of the Gateway, by uploading to it the image file containing the latest release.

Note: The firmware upgrade will revert all settings of the Gateway to their factory defaults; take note of the current settings to be able to restore them later, and download and save the CID file, if you have uploaded one, to be able to restore it later.

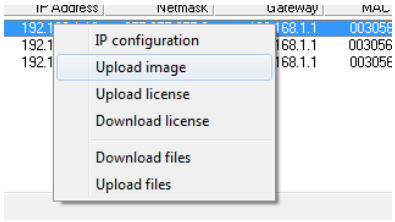
Note: The assigned IP addresses must belong to the same sub-network of the PC, otherwise the "Upload image" will not work.

Note: If an IP conflict exists on the network, the "Upload image" may leave the Gateway unusable, to be returned to the factory for repairing.

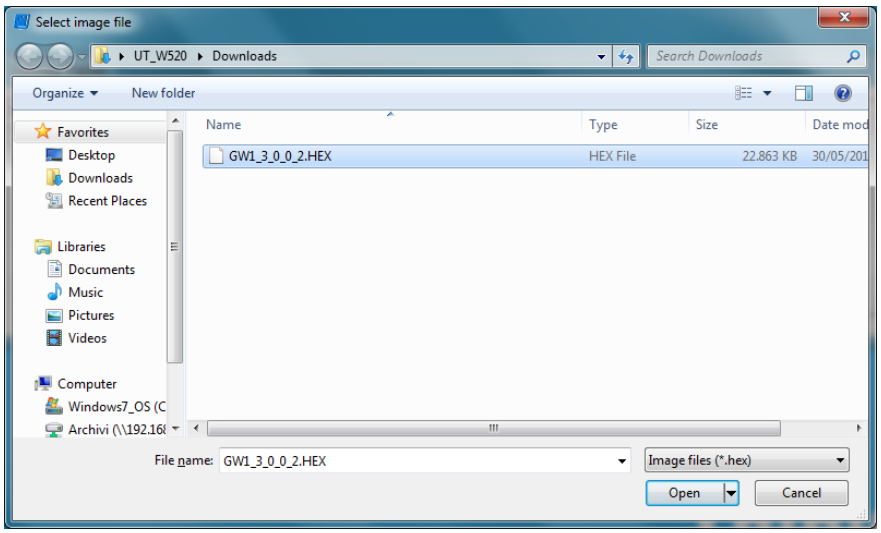
Note: After the upload of an image has been completed, the relevant Gateway will revert to its factory default IP settings: check that these settings do not conflict with those of any other Gateway on the network.

Note: The simplest way to avoid conflicting IP settings during these operations, is to physically connect one by one the Gateways directly to the PC.

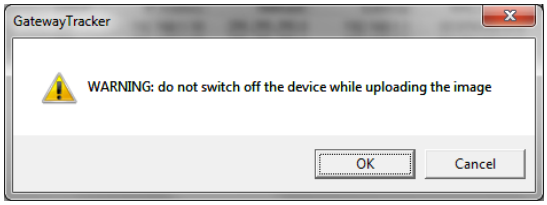
Right click on the Gateway you need to upgrade, and then select the menu item "Upload image ":



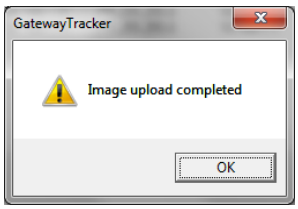
Select the upgrade file, containing the latest firmware release, that you have received from Frer support, and press "Open":



You will receive the following warning message, and press "OK":



Wait that the progress bar indicating the progress status will reach the end, until you will get the following confirmation message:



Note: After the upload of an image has been completed, the relevant Gateway will revert to its default IP settings: check that these settings do not conflict with those of any other Gateway on the network.

4.4 Other functions of the utility

The "Gateway Tracker" utility, has the following additional functions (selectable by right clicking on the desired Gateway):

- **Upload license** and **Download license**: License file was used by the very first firmware releases of the product; from release 3.0.0.2 the license is integrated in the firmware, therefore these functions are not used anymore.
- **Download files** and **Upload files**: Downloading and uploading files from and to the Gateway must be made only under the guidance of FRER support, and it is used for service purposes or to load special or customized version of the IEC61850 Server.

5. IEC61850 SERVER

5.1 Introduction

The IED FRER IEC61850 Server is modeled in the following way:

- 1 Logical Device for the Gateway itself, containing only the Logical Nodes LLN0 and LPHD.
- 1 Logical Device for each Meter, containing different Logical Nodes according to the System Type (three-phase, single-phase or DC) of the meter itself.

In the "Single" version of the Gateway, there is a "Status" Data-set in the Gateway LD, and a "Status" Data-set plus three "Measurements" Data-sets in the Meter LD.

In the "4 and 6 Meters" versions of the Gateway, there are only three "Measurements" Data-sets in each Meter LD.

The "Measurements" Data-sets ("Main Measurements", "Additional Measurements" and "Standard Metering") have a different number and type of members, according to the System Type of the Meter and on the version of the Gateway (the 6 Meters version has a slightly reduced set of measurements variables).

In the "Single" version of the Gateway, each Data-set has 4 instances of Unbuffered Report Control Block associated, while in the"4 and 6 Meters" versions of the Gateway, each Data-set has respectively 2 and 1 instances of Unbuffered Report Control Block associated.

While the Data Model can't be modified by the user, because it reflects the Meters configuration, Data-sets and Report Control Blocks can be modified, deleted or added by the user (within the limits of the IED capabilities) in configuration, by downloading the IID file from the Server, modifying it, and uploading it again to the Server as CID file.

5.2 Data Model

5.2.1 LN's of the Gateway LD

Logical Node	*Data Object*	*CDC*	*Data Attribute*
LLN0	**NamPlt**	LPL	vendor
			swRev
			configRev
			ldNs
	Beh	ENS	stVal
			q
			t
	Healt	ENS	stVal
			q
			t
	Mod	ENC	stVal
			q
			t
			ctlModel
LPHD	**PhyNam**	DPL	vendor
			hwRev
			swRev
			SerNum
			model
	PhyHealth	ENS	stVal
			q
			t
	Proxy	SPS	stVal
			q
			t

5.2.2 Common LN's of all Meters LD's

Logical Node	*Data Object*	*CDC*	*Data Attribute*
LLN0	**NamPlt**	LPL	vendor
			swRev
			configRev
			ldNs
	Beh	ENS	stVal
			q
			t

Logical Node	Data Object	CDC	Data Attribute
	Healt	ENS	stVal
			q
			t
	Mod	ENC	stVal
			q
			t
			ctlModel
LPHD	**PhyNam**	DPL	vendor
			hwRev
			swRev
			SerNum
			model
	PhyHealth	ENS	stVal
			q
			t
	Proxy	SPS	stVal
			q
			t
TTMP	**Beh**	ENS	stVal
			q
			t
	Tmp	MV	instMag
			mag
			q
			t
			db
			dataNS

5.2.3 Additional LN's of the System Type "Three-Phase" Meters LD's in "Single" and "4 Meters" Gateway versions

Logical Node	Data Object	CDC	Sub Data Object	CDC	Data Attribute
MHAI	**Beh**	ENS			stVal
					q
					t
	ThdA	WYE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	ThdPhv	WYE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q

Logical Node	*Data Object*	*CDC*	*Sub Data Object*	*CDC*	*Data Attribute*
					t
					db
MMTR	**Beh**	ENS			stVal
					q
					t
	SupWh	BCR			actVal
					q
					t
					pulsQty
	SupVArh	BCR			actVal
					q
					t
					pulsQty
	DmdWh	BCR			actVal
					q
					t
					pulsQty
	DmdVArh	BCR			actVal
					q
					t
					pulsQty
	DBSupWh	MV			instMag
					mag
					q
					t
					db
					dataNS
	DBSupVArh	MV			instMag
					mag
					q
					t
					db
					dataNS
	DBDmdWh	MV			instMag
					mag
					q
					t
					db
					dataNS
	DBDmdVArh	MV			instMag
					mag
					q
					t
					db
					dataNS
MMXU	**Beh**	ENS			stVal
					q
					t
	TotW	MV			instMag
					mag
					q
					t
					db
	TotVAr	MV			instMag
					mag
					q
					t
					db
	TotVA	MV			instMag
					mag
					q
					t
					db
	TotPF	MV			instMag
					mag

Logical Node	*Data Object*	*CDC*	*Sub Data Object*	*CDC*	*Data Attribute*
					q
					t
					db
	Hz	MV			instMag
					mag
					q
					t
					db
	PPV	DEL	phsAB	CMV	instCVal
					cVal
					q
					t
					db
			phsBC	CMV	instCVal
					cVal
					q
					t
					db
			phsCA	CMV	instCVal
					cVal
					q
					t
					db
	PhV	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	A	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
			neut	CMV	instCVal
					cVal
					q
					t
					db
	W	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal

Logical Node	*Data Object*	*CDC*	*Sub Data Object*	*CDC*	*Data Attribute*
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	Var	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	VA	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	PF	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	AvAPhs	MV			instMag
					mag
					q
					t
					db
	AvPPVPhs	MV			instMag
					mag
					q
					t
					db
	AvPhVPhs	MV			instMag
					mag

Logical Node	*Data Object*	*CDC*	*Sub Data Object*	*CDC*	*Data Attribute*
					q
					t
					db
	TotDspPF	MV			instMag
					mag
					q
					t
					db
					dataNS
	DspPF	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
					dataNS
			phsB	CMV	instCVal
					cVal
					q
					t
					db
					dataNS
			phsC	CMV	instCVal
					cVal
					q
					t
					db
					dataNS
					dataNS
	PhSeq	MV			instMag
					mag
					q
					t
					db
					dataNS
MSTA	**Beh**	ENS			stVal
					q
					t
	AvW	MV			instMag
					mag
					q
					t
					db
	MaxW	MV			instMag
					mag
					q
					t
					db
	AvA	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
					dataNS
			phsB	CMV	instCVal
					cVal
					q
					t
					db
					dataNS
			phsC	CMV	instCVal
					cVal
					q
					t

Logical Node	Data Object	CDC	Sub Data Object	CDC	Data Attribute
					db
					dataNS
					dataNS
	MaxA	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
					dataNS
			phsB	CMV	instCVal
					cVal
					q
					t
					db
					dataNS
			phsC	CMV	instCVal
					cVal
					q
					t
					db
					dataNS
					dataNS
	NamPlt	LPL			vendor
					swRev
					lnNs

5.2.4 Additional LN's of the System Type "Three-Phase" Meters LD's in "6 Meters" Gateway version

Logical Node	Data Object	CDC	Sub Data Object	CDC	Data Attribute
MHAI	**Beh**	ENS			stVal
					q
					t
	ThdA	WYE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	ThdPhv	WYE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db

Logical Node	*Data Object*	*CDC*	*Sub Data Object*	*CDC*	*Data Attribute*
MMTR	**Beh**	ENS			stVal
					q
					t
	SupWh	BCR			actVal
					q
					t
					pulsQty
	SupVArh	BCR			actVal
					q
					t
					pulsQty
	DmdWh	BCR			actVal
					q
					t
					pulsQty
	DmdVArh	BCR			actVal
					q
					t
					pulsQty
	DBSupWh	MV			instMag
					mag
					q
					t
					db
					dataNS
	DBSupVArh	MV			instMag
					mag
					q
					t
					db
					dataNS
	DBDmdWh	MV			instMag
					mag
					q
					t
					db
					dataNS
	DBDmdVArh	MV			instMag
					mag
					q
					t
					db
					dataNS
MMXU	**Beh**	ENS			stVal
					q
					t
	TotW	MV			instMag
					mag
					q
					t
					db
	TotVAr	MV			instMag
					mag
					q
					t
					db
	TotVA	MV			instMag
					mag
					q
					t
					db
	TotPF	MV			instMag
					mag
					q
					t

Logical Node	*Data Object*	*CDC*	*Sub Data Object*	*CDC*	*Data Attribute*
					db
	Hz	MV			instMag
					mag
					q
					t
					db
	PPV	DEL	phsAB	CMV	instCVal
					cVal
					q
					t
					db
			phsBC	CMV	instCVal
					cVal
					q
					t
					db
			phsCA	CMV	instCVal
					cVal
					q
					t
					db
	PhV	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	A	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
			neut	CMV	instCVal
					cVal
					q
					t
					db
	W	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t

Logical Node	*Data Object*	*CDC*	*Sub Data Object*	*CDC*	*Data Attribute*
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	Var	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	VA	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	PF	WIE	phsA	CMV	instCVal
					cVal
					q
					t
					db
			phsB	CMV	instCVal
					cVal
					q
					t
					db
			phsC	CMV	instCVal
					cVal
					q
					t
					db
	AvAPhs	MV			instMag
					mag
					q
					t
					db
	AvPPVPhs	MV			instMag
					mag
					q
					t
					db
	AvPhVPhs	MV			instMag
					mag
					q
					t

Logical Node	*Data Object*	*CDC*	*Sub Data Object*	*CDC*	*Data Attribute*
					db
MSTA	**Beh**	ENS			stVal
					q
					t
	AvW	MV			instMag
					mag
					q
					t
					db
	MaxW	MV			instMag
					mag
					q
					t
					db
	NamPlt	LPL			vendor
					swRev
					lnNs

5.2.5 Additional LN's of the System Type "Single-Phase" Meters LD's

Logical Node	*Data Object*	*CDC*	*Data Attribute*
MHAN	**Beh**	ENS	stVal
			q
			t
	ThdAmp	MV	instMag
			mag
			q
			t
			db
	ThdVol	MV	instMag
			mag
			q
			t
			db
MMTN	**Beh**	ENS	stVal
			q
			t
	SupWh	BCR	actVal
			q
			t
			pulsQty
	SupVArh	BCR	actVal
			q
			t
			pulsQty
	DmdWh	BCR	actVal
			q
			t
			pulsQty
	DmdVArh	BCR	actVal
			q
			t
			pulsQty
	DBSupWh	MV	instMag
			mag
			q
			t
			db
			dataNS
	DBSupVArh	MV	instMag
			mag
			q
			t

Logical Node	*Data Object*	*CDC*	*Data Attribute*
			db
			dataNS
	DBDmdWh	MV	instMag
			mag
			q
			t
			db
			dataNS
	DBDmdVArh	MV	instMag
			mag
			q
			t
			db
			dataNS
MMXN	**Beh**	ENS	stVal
			q
			t
	Amp	MV	instMag
			mag
			q
			t
			db
	Vol	MV	instMag
			mag
			q
			t
			db
	Watt	MV	instMag
			mag
			q
			t
			db
	VolAmpr	MV	instMag
			mag
			q
			t
			db
	VolAmp	MV	instMag
			mag
			q
			t
			db
	PwrFact	MV	instMag
			mag
			q
			t
			db
	Hz	MV	instMag
			mag
			q
			t
			db
	DspPF	MV	instMag
			mag
			q
			t
			db
			dataNS
MSTA	**Beh**	ENS	stVal
			q
			t
	AvAmps	MV	instMag
			mag
			q

Logical Node	Data Object	CDC	Data Attribute
			t
			db
	MaxAmps	MV	instMag
			mag
			q
			t
			db
	AvW	MV	instMag
			mag
			q
			t
			db
	MaxW	MV	instMag
			mag
			q
			t
			db
	NamPlt	LPL	vendor
			swRev
			lnNs

5.2.6 Additional LN's of the System Type "D.C." Meters LD's

Logical Node	Data Object	CDC	Data Attribute
MMTN	**Beh**	ENS	stVal
			q
			t
	SupWh	BCR	actVal
			q
			t
			pulsQty
	SupAh	BCR	actVal
			q
			t
			units
			pulsQty
			dataNS
	DmdWh	BCR	actVal
			q
			t
			pulsQty
	DmdAh	BCR	actVal
			q
			t
			units
			pulsQty
			dataNS
	DBSupWh	MV	instMag
			mag
			q
			t
			db
			dataNS
	DBSupAh	MV	instMag
			mag
			q
			t
			units
			db
			dataNS
	DBDmdWh	MV	instMag
			mag

Logical Node	*Data Object*	*CDC*	*Data Attribute*
			q
			t
			db
			dataNS
	DBDmdAh	MV	instMag
			mag
			q
			t
			units
			db
			dataNS
MMDC	**Beh**	ENS	stVal
			q
			t
	Watt	MV	instMag
			mag
			q
			t
			db
	Amp	MV	instMag
			mag
			q
			t
			db
	Vol	MV	instMag
			mag
			q
			t
			db
MSTA	**Beh**	ENS	stVal
			q
			t
	AvAmps	MV	instMag
			mag
			q
			t
			db
	MaxAmps	MV	instMag
			mag
			q
			t
			db
	AvW	MV	instMag
			mag
			q
			t
			db
	MaxW	MV	instMag
			mag
			q
			t
			db
	NamPlt	LPL	vendor
			swRev
			lnNs

5.3 Default Data-sets

5.3.1 "Status" Data-set of the Gateway LD, only present in "Single" Gateway version

LN	*DO*	*DA*	*FC*
LLN0	**Beh**	stVal	ST
LLN0	**Health**	stVal	ST
LLN0	**Mod**	stVal	ST
LPHD	**PhyHealth**	stVal	ST

5.3.2 "Status" Data-set of the Meter LD, only present in "Single" Gateway version

LN	*DO*	*DA*	*FC*
LLN0	**Beh**	stVal	ST
LLN0	**Health**	stVal	ST
LLN0	**Mod**	stVal	ST
LPHD	**PhyHealth**	stVal	ST

5.3.3 "Measurements" Data-sets of the System Type "Three-Phase" Meter LD's

5.3.3.1 "Main Measurements"

LN	*DO*	*DA*	*FC*
LLN0	**Health**	stVal	ST
MHAI	**ThdA.phsA**	cVal	MX
MHAI	**ThdA.phsB**	cVal	MX
MHAI	**ThdA.phsC**	cVal	MX
MHAI	**ThdPhV.phsA**	cVal	MX
MHAI	**ThdPhV.phsB**	cVal	MX
MHAI	**ThdPhV.phsC**	cVal	MX
MMTR	**DBSupWh**	mag	MX
MMTR	**DBSupVArh**	mag	MX
MMTR	**DBDmdWh**	mag	MX
MMTR	**DBDmdVArh**	mag	MX
MMXU	**TotW**	mag	MX
MMXU	**TotVAr**	mag	MX
MMXU	**TotVA**	mag	MX
MMXU	**TotPF**	mag	MX
MMXU	**Hz**	mag	MX
MMXU	**PPV.phsAB**	cVal	MX
MMXU	**PPV.phsBC**	cVal	MX
MMXU	**PPV.phsCA**	cVal	MX
MMXU	**PhV.phsA**	cVal	MX
MMXU	**PhV.phsB**	cVal	MX
MMXU	**PhV.phsC**	cVal	MX
MMXU	**A.phsA**	cVal	MX
MMXU	**A.phsB**	cVal	MX
MMXU	**A.phsC**	cVal	MX
MMXU	**A.neut**	cVal	MX
MMXU	**PF.phsA**	cVal	MX
MMXU	**PF.phsB**	cVal	MX
MMXU	**PF.phsC**	cVal	MX

5.3.3.2 "Additional Measurements", in "Single" and "4 Meters" Gateway version

LN	*DO*	*DA*	*FC*
MMXU	**W.phsA**	cVal	MX
MMXU	**W.phsB**	cVal	MX
MMXU	**W.phsC**	cVal	MX
MMXU	**VAr.phsA**	cVal	MX
MMXU	**VAr.phsB**	cVal	MX
MMXU	**VAr.phsC**	cVal	MX
MMXU	**VA.phsA**	cVal	MX
MMXU	**VA.phsB**	cVal	MX
MMXU	**VA.phsC**	cVal	MX
MMXU	**AvAPhs**	mag	MX

LN	*DO*	*DA*	*FC*
MMXU	**AvPPVPhs**	mag	MX
MMXU	**AvPhVPhs**	mag	MX
MMXU	**TotDspPF**	mag	MX
MMXU	**DspPF.phsA**	cVal	MX
MMXU	**DspPF.phsB**	cVal	MX
MMXU	**DspPF.phsC**	cVal	MX
MMXU	**PhSeq**	mag	MX
MSTA	**AvW**	mag	MX
MSTA	**MaxW**	mag	MX
MSTA	**AvA.phsA**	cVal	MX
MSTA	**AvA.phsB**	cVal	MX
MSTA	**AvA.phsC**	cVal	MX
MSTA	**MaxA.phsA**	cVal	MX
MSTA	**MaxA.phsB**	cVal	MX
MSTA	**MaxA.phsC**	cVal	MX
TTMP	**Tmp**	mag	MX

5.3.3.3 "Additional Measurements", in "6 Meters" Gateway version

LN	*DO*	*DA*	*FC*
MMXU	**W.phsA**	cVal	MX
MMXU	**W.phsB**	cVal	MX
MMXU	**W.phsC**	cVal	MX
MMXU	**VAr.phsA**	cVal	MX
MMXU	**VAr.phsB**	cVal	MX
MMXU	**VAr.phsC**	cVal	MX
MMXU	**VA.phsA**	cVal	MX
MMXU	**VA.phsB**	cVal	MX
MMXU	**VA.phsC**	cVal	MX
MMXU	**AvAPhs**	mag	MX
MMXU	**AvPPVPhs**	mag	MX
MMXU	**AvPhVPhs**	mag	MX
MSTA	**AvW**	mag	MX
MSTA	**MaxW**	mag	MX
TTMP	**Tmp**	mag	MX

5.3.3.4 "Standard Metering""

LN	*DO*	*DA*	*FC*
MMTR	**SupWh**	actVal	ST
MMTR	**SupWh**	pulsQty	CF
MMTR	**SupVArh**	actVal	ST
MMTR	**SupVArh**	pulsQty	CF
MMTR	**DmdWh**	actVal	ST
MMTR	**DmdWh**	pulsQty	CF
MMTR	**DmdVArh**	actVal	ST
MMTR	**DmdVArh**	pulsQty	CF

5.3.4 "Measurements" Data-sets of the System Type "Single-Phase" Meter LD's

5.3.4.1 "Main Measurements"

LN	*DO*	*DA*	*FC*
LLN0	**Health**	stVal	ST
MHAN	**ThdAmp**	mag	MX
MHAN	**ThdVol**	mag	MX
MMTN	**DBSupWh**	mag	MX
MMTN	**DBSupVArh**	mag	MX
MMTN	**DBDmdWh**	mag	MX
MMTN	**DBDmdVArh**	mag	MX
MMXN	**Amp**	mag	MX
MMXN	**Vol**	mag	MX
MMXN	**Watt**	mag	MX
MMXN	**VolAmpr**	mag	MX
MMXN	**VolAmp**	mag	MX

LN	DO	DA	FC
MMXN	**PwrFact**	mag	MX
MMXN	**Hz**	mag	MX

5.3.4.2 "Additional Measurements"

LN	DO	DA	FC
MMXN	**DspPF**	mag	MX
MSTA	**AvAmps**	mag	MX
MSTA	**MaxAmps**	mag	MX
MSTA	**AvW**	mag	MX
MSTA	**MaxW**	mag	MX
TTMP	**Tmp**	mag	MX

5.3.4.3 "Standard Metering""

LN	DO	DA	FC
MMTN	**SupWh**	actVal	ST
MMTN	**SupWh**	pulsQty	CF
MMTN	**SupVArh**	actVal	ST
MMTN	**SupVArh**	pulsQty	CF
MMTN	**DmdWh**	actVal	ST
MMTN	**DmdWh**	pulsQty	CF
MMTN	**DmdVArh**	actVal	ST
MMTN	**DmdVArh**	pulsQty	CF

5.3.5 "Measurements" Data-sets of the System Type "D.C." Meter LD's

5.3.5.1 "Main Measurements"

LN	DO	DA	FC
LLN0	**Health**	stVal	ST
MMTN	**DBSupWh**	mag	MX
MMTN	**DBSupAh**	mag	MX
MMTN	**DBDmdWh**	mag	MX
MMTN	**DBDmdAh**	mag	MX
MMDC	**Watt**	mag	MX
MMDC	**Amp**	mag	MX
MMDC	**Vol**	mag	MX

5.3.5.2 "Additional Measurements"

LN	DO	DA	FC
MSTA	**AvAmps**	mag	MX
MSTA	**MaxAmps**	mag	MX
MSTA	**AvW**	mag	MX
MSTA	**MaxW**	mag	MX
TTMP	**Tmp**	mag	MX

5.3.5.3 "Standard Metering""

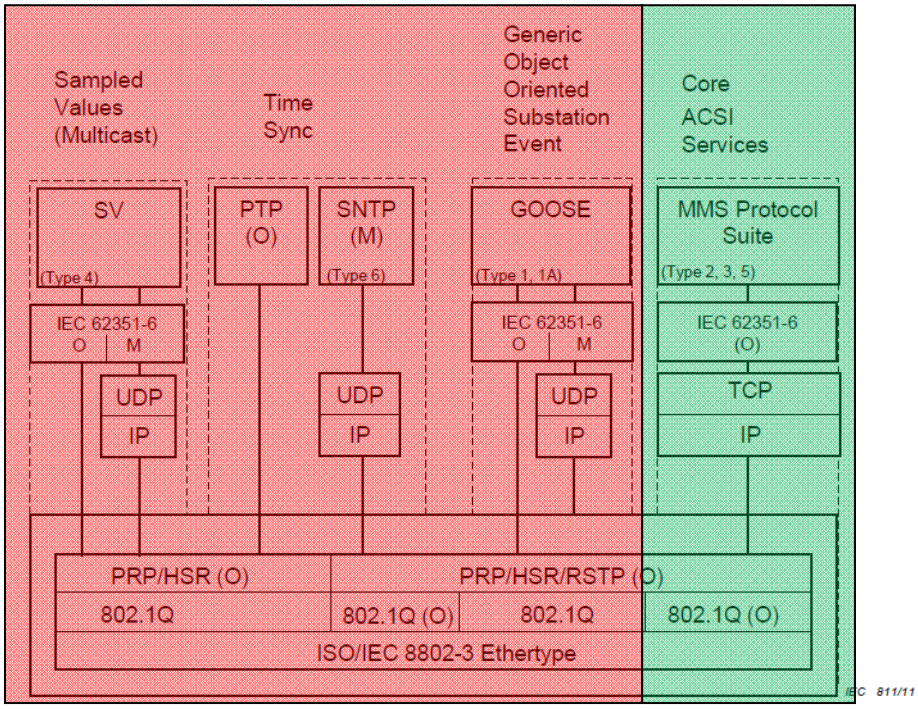
LN	DO	DA	FC
MMTN	**SupWh**	actVal	ST
MMTN	**SupWh**	pulsQty	CF
MMTN	**SupAh**	actVal	ST
MMTN	**SupAh**	pulsQty	CF
MMTN	**DmdWh**	actVal	ST
MMTN	**DmdWh**	pulsQty	CF
MMTN	**DmdAh**	actVal	ST
MMTN	**DmdAh**	pulsQty	CF

5.4 Unbuffered Report Control Blocks default settings

Name	*Description*	*Value*
OptFlds	optional fields:	
	sequence-number	true
	report-time-stamp	true
	reason-for-inclusion	true
	data-set-name	true
	data-reference	false
	conf-revision	true
BufTm	buffer time (ms)	0
TrgOps	trigger options:	
	data-change	true
	quality-change	false
	data-update	false
	integrity	true
	general-interrogation	true
IntgPd	integrity period (ms)	60000

5.5.Communication profiles

In the FRER IEC61850 Server, only the client/server communication profile is implemented; GSE and GOOSE communication profile, Time Sync communication profile and Sampled Values communication profile are currently not supported.



5.6 IED Services capabilities

Services capabilities	*Attribute*	*Value*
Services	nameLength	64
ClientServices		
DynAssociation	max	8
GetDirectory		
GetDataObjectDefinition		
DataObjectDirectory		
GetDataSetValue		
DataSetDirectory		
ConfDataSet	max	6 ("Single Meter" version) 12 ("4 Meters" version) 18 ("6 Meters" version)
	maxAttribute	45
	modify	true

Services capabilities	***Attribute***	***Value***
ReadWrite		
ConfReportControl	max	24
	maxBuf	4
GetCBValues		
ReportSettings	cbName	Conf
	datSet	Conf
	rptID	Conf
	optFields	Dyn
	bufTime	Dyn
	trgOps	Dyn
	intgPd	Dyn
	owner	true
ConfLNs	fixLnInst	true
	fixPrefix	true