High Frequency (HF) Switching for all PLUS units (Optional)

Revision number	Document changes	Date
V1	Creation of document	May 18

1. GENERAL

The purpose of this manual is to provide information to use the Cinergia **High Frequency Switching (HFS)** Optional: introduce at the final user how to enable and disable this functionality of the PLUS version Cinergia (CNG) units. It is important for the user to have this manual nearby and familiarize with it to operate efficiently with the converter.
When the HFS option is activated (using a code in the HMI):

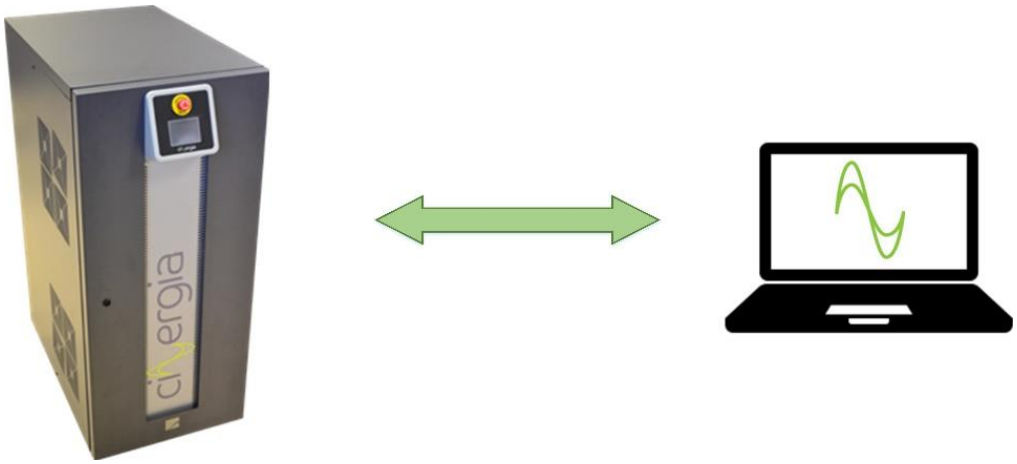
- The switching frequency is modified from 15 to 30kHz
- The ripple (current and voltage) is reduced 50% approx.
- The switching frequency is not audible
- The efficiency is reduced to 80% approximately
- The rated power is limited to:
    - 15kVA and 20kVA are limited to 7.5kW
    - 30kVA is limited to 10kW

Contact CINERGIA to get the HF Switching code for your unit. Each unit has a unique, non-transferable and exclusive password.

This document tries to be easy to understand, created with schematics and real pictures of the equipment with parts marked with letters and numbers which you can find the explanation just below the picture.

Cinergia is in constant development to deliver always the best service to you, so it is possible to find some discrepancy between this manual and the real converter itself. Don't hesitate to contact us and ask for the latest version of the documentation.

CINERGIA believes that the use of the HF Switching code must be limited to the responsible of the equipment or the technical manager and head of the Laboratory. For this reason, the password will be sent directly to the distributor. If the final customer wants to use this optional, please contact to your distributor.



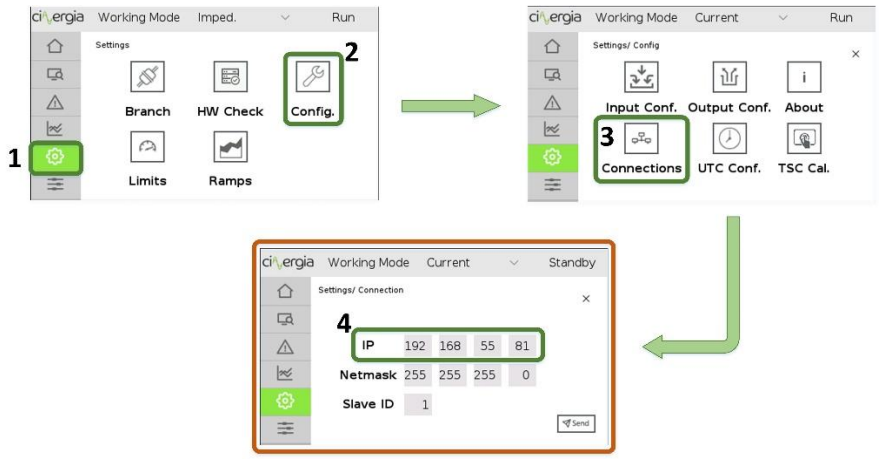
This manual is valid for the following versions:

1.511K,
1.512K,
1.0619,
1.0620

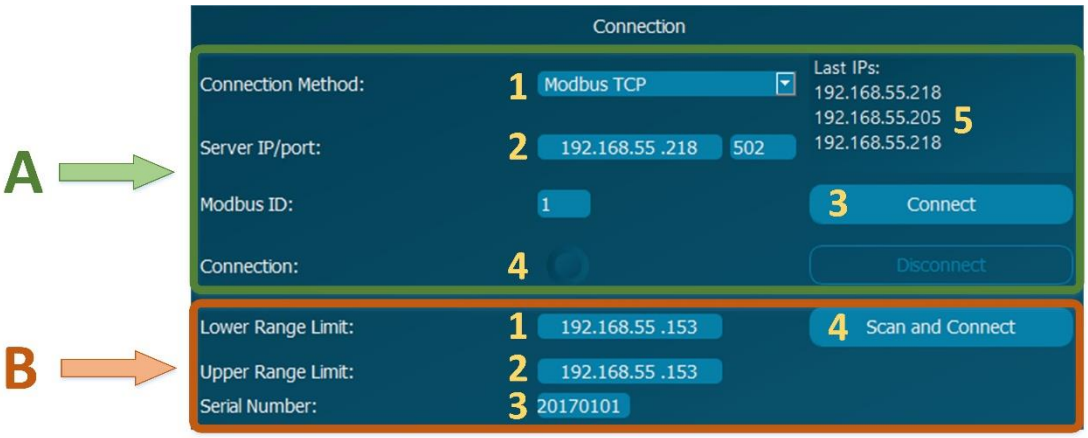
2. HUMAN MACHINE INTERFACE

CINERGIA delivers, within the scope of the supply, a Human Machine Interface software that communicates with the equipment using MODBUS protocol. This application is compatible on Windows 10/Windows 7/Windows XP. The software can be installed by executing Setup.exe file in Administrator Mode and following the instructions of the application.
To connect Cinergia units to a PC, follow these steps:

- Connect a standard RJ45 Ethernet cable to terminal X13. The unit can be connected directly either to a computer or to a router (wired or wireless). If the CINERGIA unit is connected through a router, several computers could be connected to the unit at the same time.
- Check the IP address of CINERGIA unit in the LCD Touchscreen following these steps:



- Check the computer's Ethernet configuration panel and make sure that both the computer and the CINERGIA unit are in the same subnetwork. For instance, if the CINERGIA unit IP address is 192.168.55.81 the computer Ethernet configuration shall be:
  - **a)** Computer IP address: 192.168.55.XXX (XXX can be any address different from 81 and different from any other device in the same network)
  - **b)** Subnet mask: 255.255.255.0
  - **c)** Gateway and DNS configuration are not needed for a connection with a CINERGIA unit
- Run the graphical user interface delivered by CINERGIA, write the IP address of the unit to be connected and press the Connect button.



There are two different ways to connect the unit to the PC via Modbus TCP:

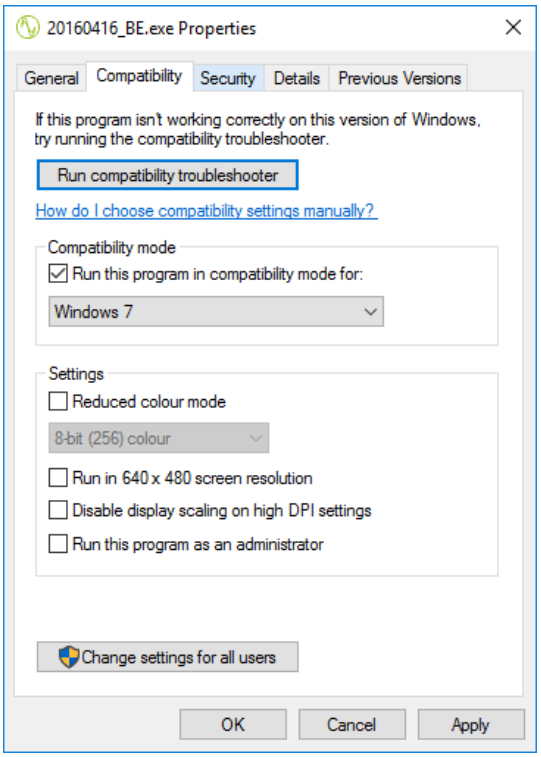
A- Known the IP address of the equipment. This IP address is displayed in the LCD touchscreen as it is explained in the LCD touchscreen schematic displayed above.
   1- Define the connection (Modbus TCP)
   2- Introduce the IP address
   3- Press Connect
   4- Once the equipment is connected, the LED will indicate it
   5- There is a register of 3 IPs which the interface has connected to the equipment

B- Known the serial number of the equipment and the range of IPs that the equipment is located. The serial number is written in the front of the equipment with the specification data. If the equipment has a serial number such as 20170101-1, the number to introduce must be without the hyphen: 201701011. This method is useful when the user, for example, does not know the exact IP of the equipment but knows that the range of IPs is, for example, from 192.168.55.150 to 192.168.55.250
   1- Introduce the lower IP range
   2- Introduce the upper IP range
   3- Introduce the serial number (without hyphen)
   4- Press *Scan and Connect*. It may last a few seconds to scan all the IPs

If there is an error when trying to run Cinergia application, please check the compatibility mode of your computer. For instance, in a Windows 7 computer, right click CINERGIA application → Properties; go to Compatibility panel and check the box Run this program in compatibility mode; and select the operating system of your computer.

The document *Connecting CNG+ units to a PC v3* details how to connect the equipment. Please read this document to make sure that the parameters are introduced properly.

For instance, for a Windows 7 computer:



The interface delivered by Cinergia has a correct visualization with screens configured with a minimal resolution of 1366x768 (16:9)

3. HIGH FREQUENCY SWITCHING (HFS)

Once the user is connected to the equipment through the interface, it is necessary to go to the ABOUT tab to operate the HFS optional.

When the HFS option is activated:

- The switching frequency is modified from 15 to 30kHz
- The ripple (current and voltage) is reduced 50% approx.
- The switching frequency is not audible
- The efficiency is reduced to 80% approximately
- The rated power is limited to:
    - 15kVA and 20kVA are limited to 7.5kW
    - 30kVA is limited to 10kW

To activate this optional, contact Cinergia to get the upgrade code.

Only the units from 15 to 30kVA have the High Frequency Switching Option available.

CINERGIA believes that the use of the HFS code must be limited to the responsible of the equipment or the technical manager and head of the Laboratory. For this reason, the password will be sent directly to the distributor. If the final customer wants to use this optional, please contact to your distributor.

The unit must be on ALARM with the Emergency Stop Push Button pressed to make any activation or disable action. In any other case the unit can be damaged.

Once the HFS code ON or OFF has been introduced must necessary to switch OFF the unit. Please follow the instructions on section 3.1 and 3.2 to activate and disable this functionality.

If there is any discrepancy between this document and the manual, the information of the present document will prevail.

3.1. Enable the HF Switching option

If to work with the High Frequency Switching optional is required, please follow the instructions below to switch the High Frequency Option in ON.

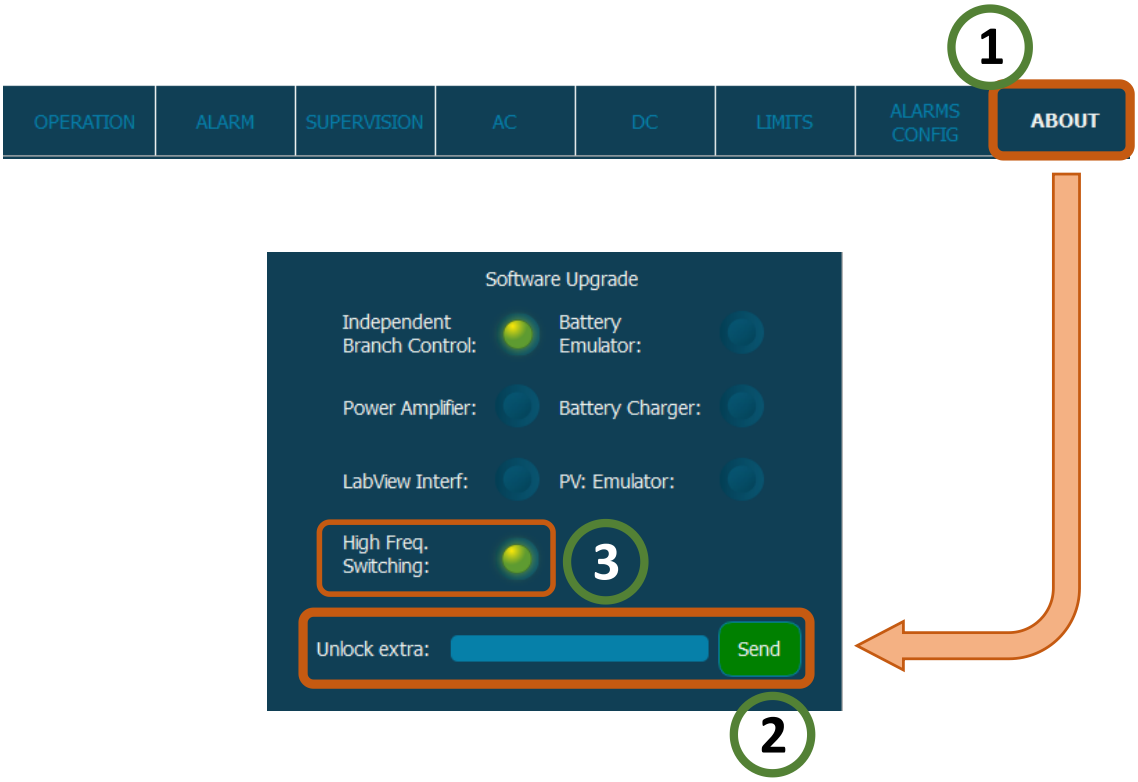
With HFS in ON mode, the unit is on 30kHz switching and lower power available.

The unit must be in Alarm state with the Emergency Stop Push Button pressed before introducing any CODE.

To activate the HFS:

- Press the Emergency Stop Push Button (EPO) of the unit
- The unit must be in Alarm state
- Introduce the HF Switching ON CODE provided on the About tab of the CINERGIA's Interface, press send button and wait until the green led on HF Switching appears on the screen.

The delivered code must be introduced in the *Unlock extra* reserved space and, afterwards, press the button *Send* (number **2** in the figure below) in the *About* tab. When the High Freq. Switching is activated, the LED beside the option (**3** in the figure below) is shining:



- Switch OFF the unit
- Wait for a while (just to be sure that the unit is stopped completely)

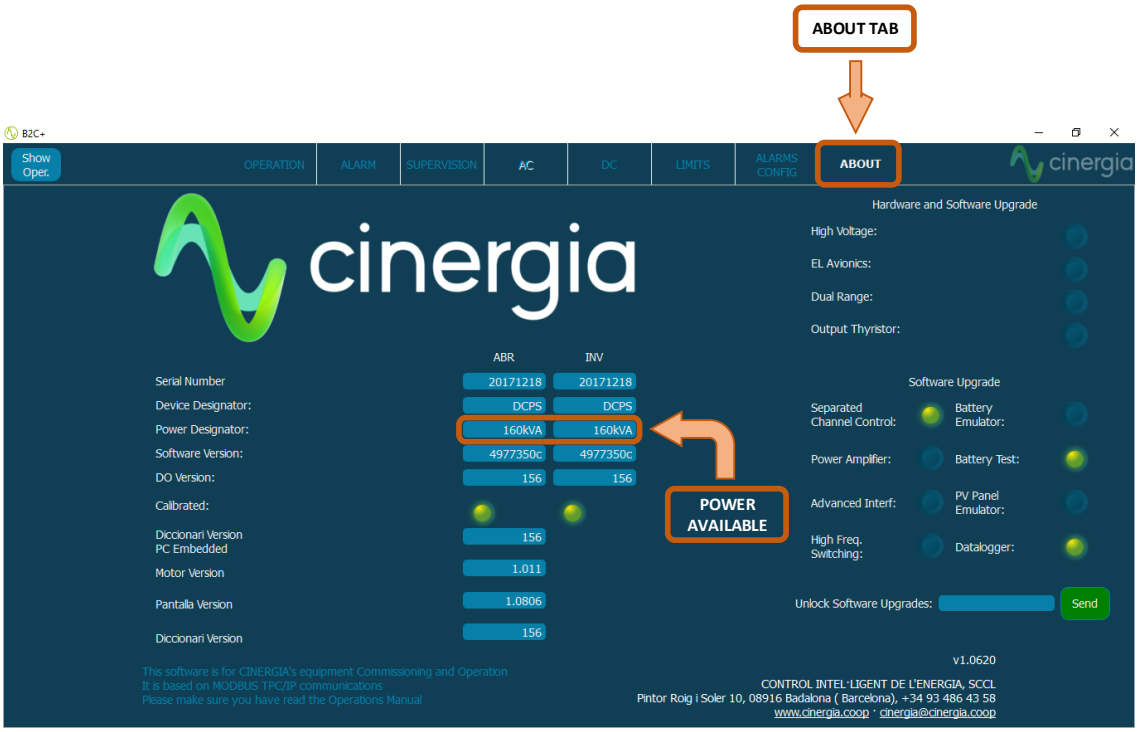
Be sure that the unit stops completely before switching on again. The control board must start with the new configuration, resetting the previous configuration.

- Switch ON the unit
- Connect with the unit, and confirm on About Tab that the HF Switching is activate yet (in green marked)

This means that the unit is on 30kHz switching and lower power available.

Unit obtained	Rated power in OFF HFS	Rated power in ON HFS
30kVA	30kVA	10kVA
20kVA	20kVA	7.5kVA
15kVA	15kVA	7.5kVA

Please, check that the unit has changed its power available according to the table above on the About TAB.



Take into account that the parameters of the unit have been changed after the HFS activation according to the new rated power available. The user can find the new working current and power limits and alarms on the LIMITS and ALARMS Tab.

The unit has been changed its internal working values: the limits and alarms ha been modified according to the new rated power available.

The unit will keep this optional in ON mode, until the customer decides to disable by code. It means that if the user turns off the unit for a while and turning on again, the HF Switching will remain activated.

3.2. Disable the HF Switching option

If the user wants to disable the HF Switching optional, please follow the instructions below to switch the High Frequency Option in OFF.

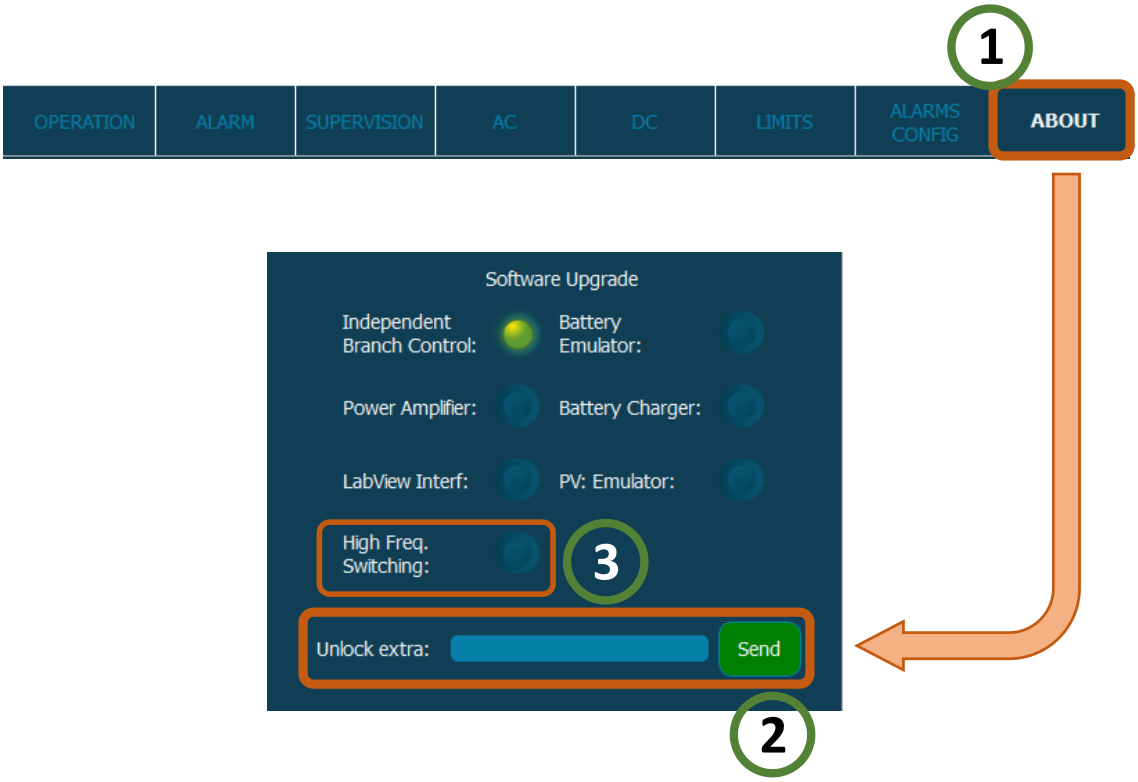
With HFS in OFF mode, the unit is on 15kHz switching and full power available.

The unit must be in Alarm state with the Emergency Stop Push Button pressed before introducing any CODE.

To activate the HFS:

- Press the Emergency Stop Push Button (EPO) of the unit
- The unit must be in Alarm state
- Introduce the HF Switching OFF CODE provided on the About tab of the CINERGIA's Interface, press send button and wait until the green led on HF Switching disappears on this tab.

The delivered code must be introduced in the *Unlock extra* reserved space and, afterwards, press the button *Send* (number **2** in the figure below) in the *About* tab. When the High Freq. Switching is activated, the LED beside the option (**3** in the figure below) is not shiny:



- Switch OFF the unit
- Wait for a while (just to be sure that the unit is stopped completely)

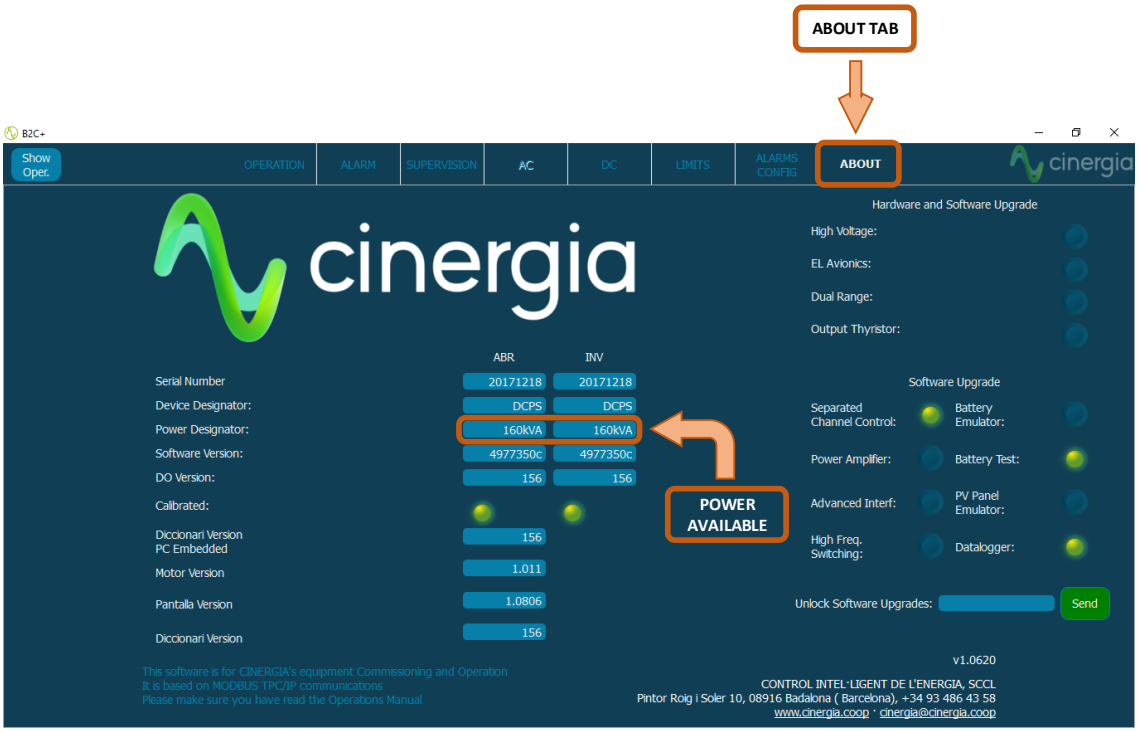
Be sure that the unit stops completely before switching on again. The control board must start with the new configuration, resetting the previous configuration.

- Switch ON the unit
- Connect with the unit, and confirm on About Tab that the HF Switching is disable (not marked)

This means that the unit is on 15kHz switching and full power available.

Unit obtained	Rated power in OFF HFS	Rated power in ON HFS
30kVA	30kVA	10kVA
20kVA	20kVA	7.5kVA
15kVA	15kVA	7.5kVA

Please, check that the unit has changed its power available according to the table above on the About TAB.



Take into account that the parameters of the unit have been changed after the HFS activation according to the new rated power available. The user can find the new working current and power limits and alarms on the LIMITS and ALARMS Tab.

The unit has been changed its internal working values: the limits and alarms has been modified according to the new rated power available.

The unit will keep this optional in ON mode, until the customer decides to disable by code. It means that if the user turns off the unit for a while and turning on again, the HF Switching will remain activated.