1. PARALLEL MODE OPERATION OF 4 UNITS ON ePLUS UNITS

This document is a Quick procedure document to operate the unit In Parallel mode operation using the FO and the Modular Hub provided by Cinergia.

Please read the *PR386A00 Parallel and serial operation User Manual Modular Hub ePLUS* document before operating the unit in Serial option mode.

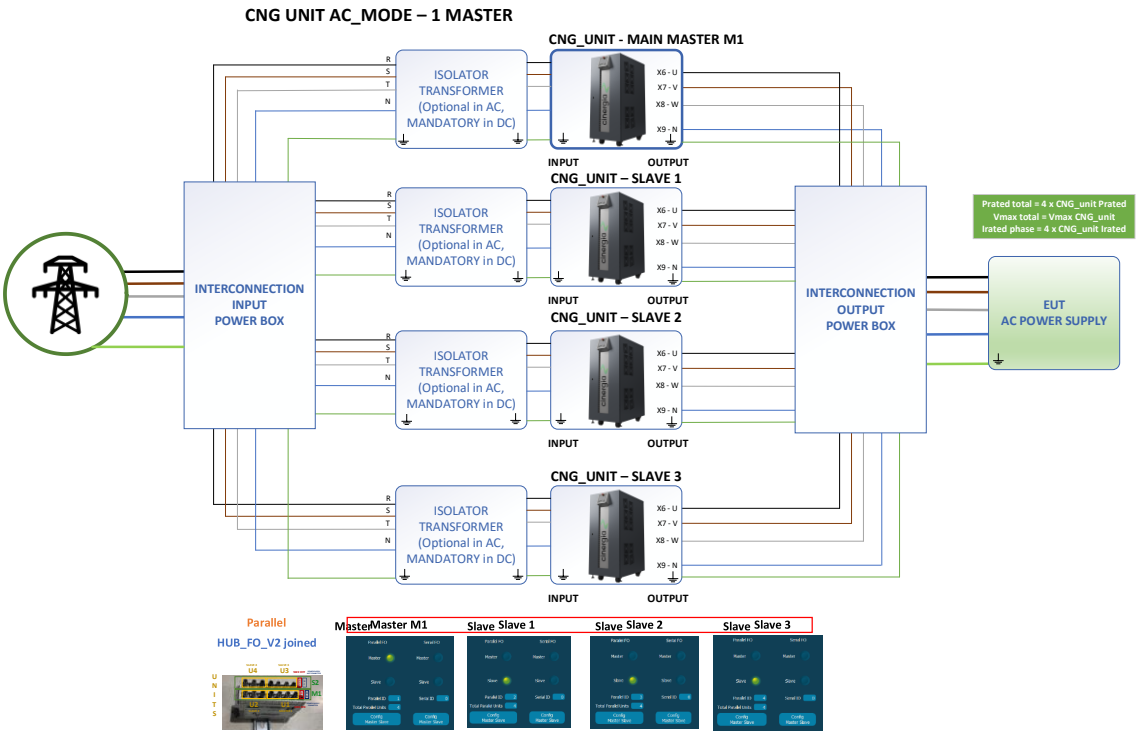
1.1. Power wiring connection

Please, check the connection diagram[1] shown below for the final four units in parallel system:

Any change on wiring must be done with no power in the system (input/grid and output/EUT) and following the premises of the *Cinergia Unit Installation and Operation manual* provided with the units.

The wiring connection of each unit must be done according the power and current of each unit. The interconnection must be done using cables according of the final power and current of all the units working in parallel.

If the units are working in PARALLEL, be sure that all the output wires of each unit are connected phase by phase (these means that each U channel, V channel, W channel of each unit are connected). The section of each power cable has to be installed according to the power (current) of the unit.



[1] *Check more diagram options in "PR386A00 Parallel and serial operation User Manual Modular Hub ePLUS" document*

Noted that the SWITCH A from the **HUB_FO_V2** Module A must be in **ON** position and the SWITCH B from the **HUB_FO_V2** Module B must be in **OFF** position.

Noted that the module A must be powered, while the module B should NOT be powered connected.

Noted that both HUB_FO_V2 must be joined as shown on page 4.

Once, all the connections and configuration are correctly done, the user must connect via Modbus by Cinergia Interface with the MAIN MASTER M1, Unit 1, introducing the Master's IP.

In this case, the interface is showing the value of the complete system: the limits and alarm values shown on the LIMITS and ALARM CONFIG TAB are from the complete system. The values shown on the SUPERVISION TAB are from the whole system.

More than two RESET sequence must be done. It is possible that the user must press the RESET button three or four times before all Alarm clears at all.

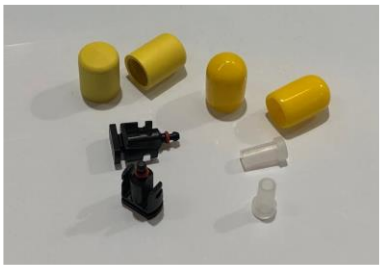
Cinergia recommends using an INTERCONNECTION BOX for the all the connection between units on GRID side. The interconnection box is not provided by Cinergia, neither designed nor manufactured.

The GROUND WIRE or EARTH CABLE must be connected at the input and also at the output of the unit.

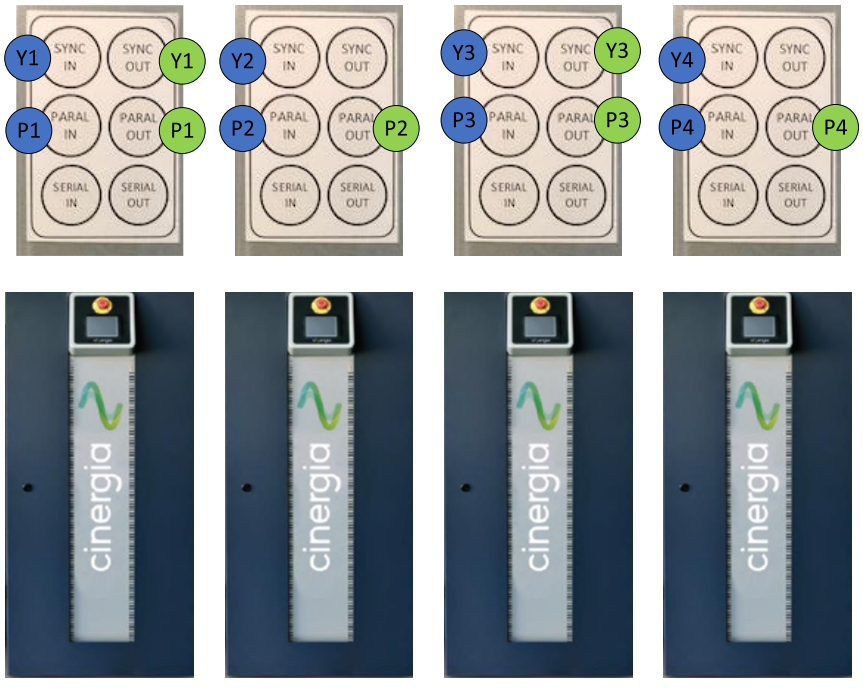
1.2. FO connection

In case that any FO connectors will not be used, please leave the FO safety protector elements installed just to avoid any internal damaged on the FO system. It could cause some permanent damage on the unit if this safety protector element is not installed properly.

DO NOT THROW IT AWAY. Keep with you all the safety protector elements from FO circuitry from the unit, from the HUB_FO_V2 and even from the FO cables. Please, see pictures below:



In case of 4 units working in parallel, using a HUB_FO_V2 modules, the final power diagram and the interface parallel and serial configuration must be according to the pictures below:



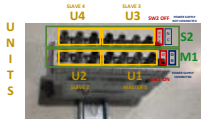
Unit 1
Master
(Main Master M1)

Unit 2
Slave 1
(Slave M1)

Unit 3
Slave 2
(Slave M1)

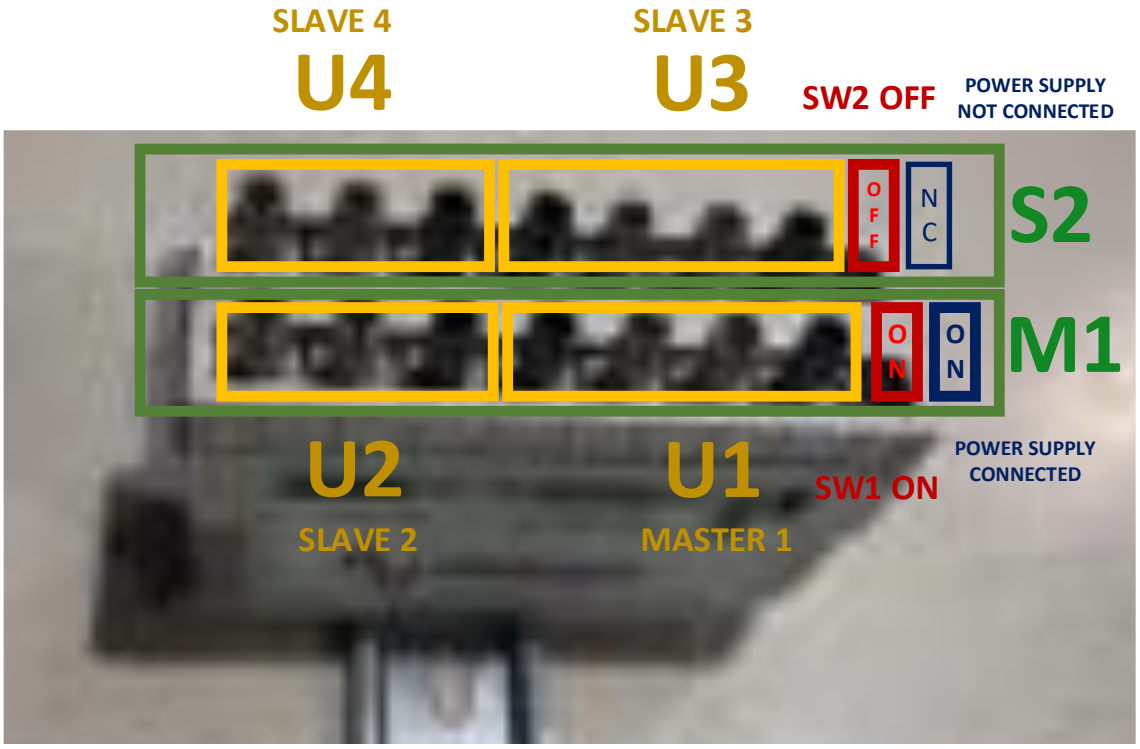
Unit 4
Slave 3
(Slave M1)

Parallel
HUB_FO_V2 joined



HUB_FO_V2 MODULE A

HUB_FO_V2 MODULE B



1.3. Interface operation

At this point, all the power wiring and the FO cables are properly connected and verified by the supervisor.

Before turning ON the unit, be sure that all the units that must work in parallel operation must be configured with the same control mode (as hardware). If all the units are not properly configured, the master will remain on Alarm status.

All the CNG units must be connected through ethernet for the configuration by the Modbus interface provided by Cinergia. Once the units are connected by the interface, the user can introduce all the codes to activate the functionality required.

The user must choose one MASTER from all the units connected in that configuration, so for the final setup, ONLY this unit is existing. This unit is the only ONE to operate and control by interface. For the final user, only one unit is working. All other units MUST be configured as a SLAVE.

1.3.1. MASTER & SLAVE configuration in parallel operation

To configure the unit as a **Master or Slave configuration:** the user must connect to the unit with the Cinergia interface: Press the button *Config Master Slave* from the Parallel FO (number **1** in the figure below).

Take into account that the unit must be in Alarm or Stand by Status to proceed with these instructions.

Once the button is pressed, a dialog box called ***Master Parallel Configuration dialog*** will appear. Press the *Refresh* button (number **2** in the figure below), just to check that all aright.

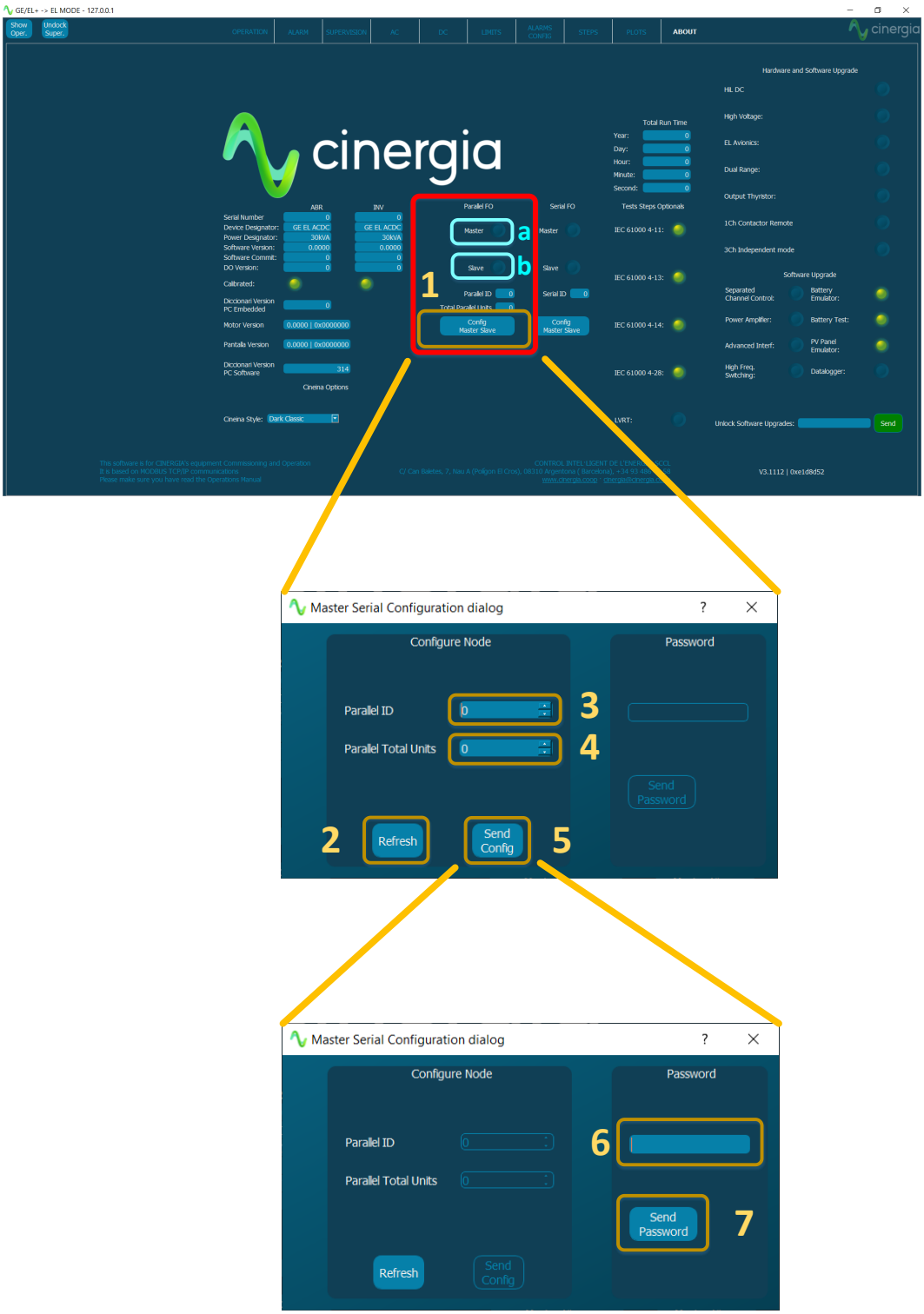
Fill the *Parallel ID* blank space (number **3** in the figure below) with the Parallel ID value of the unit to configure, as a Master always must be a 1. Fill the *Parallel Total Units* blank space (number **4** in the figure below) with the Total number of units to connect in Parallel from the final setup. Press the button ***Send Config*** (number **5** in the figure below).

Once the button is pressed, the right part of the present dialog will be unlocked. The delivered code[2] *Password_Upgrade_Paralel_ON_Master or Password_Upgrade_Paralel_ON_Slave* must be introduced in the *Password* reserved space (number **6** in the figure below) and, afterwards, press the button *Send Password* (number **7** in the figure below). You can find the code:

Password_Upgrade_Serial_ON_Master
Password_Upgrade_Serial_ON_Slave
Password_Upgrade_Serial_OFF
Password_Upgrade_Paralel_ON_Master
Password_Upgrade_Paralel_ON_Slave
Password_Upgrade_Paralel_OFF

← ENABLE as a MASTER
← ENABLE as a SLAVE
← DISABLE any configuration

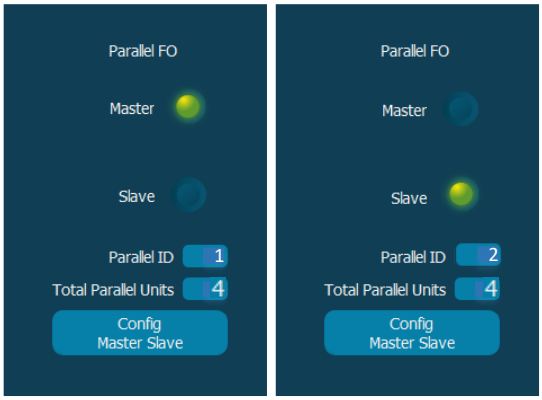
[2] *The user would find all the delivered codes for these functionalities in the USB provided with the unit*



When the configuration is activated, the LED beside the option (marked with an **a** or **b** in the figure below) will be shining and the final configuration will appear on the reserved spaces.

When the configuration is activated and the codes are correct, the specific space configuration marked as a Serial FO will show the final configuration sent.

As an example of 4 units working in parallel, and the current unit configured as a Master of the *final setup, the specific space Parallel FO configuration will show:*



If all units from the final system (Master and slave) are NOT properly configured and even the FO are not properly connected, the Master will remain to Alarm status all the time.