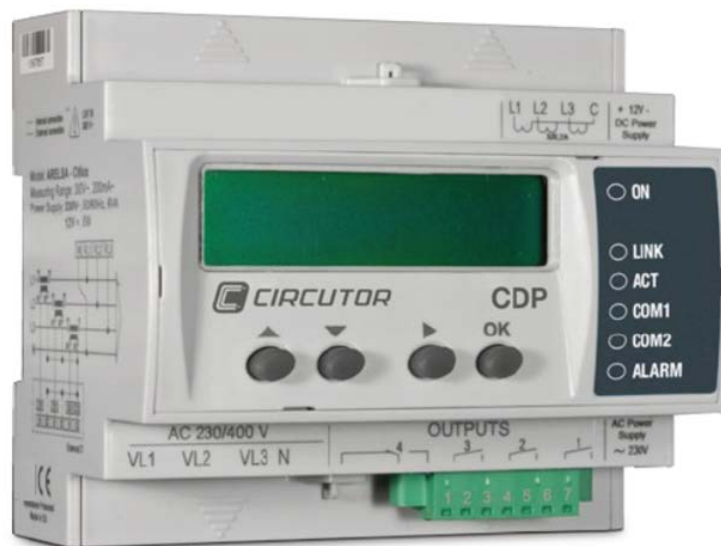




Connection and configuration of a CDP with INGETEAM inverters





APPLICATION NOTES (M028E0301-03-15A)




SAFETY PRECAUTIONS


Follow the warnings described in this manual with the symbols shown below.

	<p>DANGER Warns of a risk, which could result in personal injury or material damage.</p>
-----------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------

	<p>ATTENTION Indicates that special attention should be paid to a specific point.</p>
-----------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------

If you must handle the unit for its installation, start-up or maintenance, the following should be taken into consideration:

	<p>Incorrect handling or installation of the unit may result in injury to personnel as well as damage to the unit. In particular, handling with voltage applied may result in electric shock, which may cause death or serious injury to personnel. Defective installation or maintenance may also lead to the risk of fire. Carefully read the manual prior to connecting the unit. Follow all installation and maintenance instructions throughout the unit's working life. Pay special attention to the installation standards of the National Electrical Code.</p>
-----------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

	<p>Consult the instruction manual before using the unit In this manual, if the instructions marked with this symbol are not respected or followed correctly, it can result in injury or damage to the unit and /or installations.</p>
-------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

CIRCUTOR, SA reserves the right to modify features or the product manual without prior notification.

DISCLAIMER

CIRCUTOR, SA reserves the right to make modifications to the device or the unit specifications set out in this instruction manual without prior notice.

CIRCUTOR, SA, on its web site, supplies its customers with the latest versions of the device specifications and the most updated manuals.

www.circutor.com



CONTENTS

SAFETY PRECAUTIONS	3
DISCLAIMER	3
CONTENTS	4
LOG OF REVISIONS	5
1.- INTRODUCTION	6
2.- INGETEAM INGECON SUN LITE INVERTER	6
2.1.- COMMUNICATION CABLE	6
2.1.1. <i>INVERTER CONNECTION</i>	7
2.1.2. <i>CONNECTION OF SEVERAL INVERTERS</i>	7
2.2.- INVERTER COMMUNICATION CONFIGURATION	8
2.2.1. <i>PERIPHERAL NUMBER CONFIGURATION</i>	9
2.2.2. <i>COMMUNICATION SPEED CONFIGURATION</i>	9
2.2.3. <i>SELF-CONSUMPTION MODE CONFIGURATION</i>	9
3.- CDP CONFIGURATION	10
4.- COMMUNICATIONS TEST AND REGULATION	12
4.1.- COMMUNICATIONS TEST	12
4.2.- REGULATION TEST	13
5.- MAINTENANCE AND TECHNICAL SERVICE	14
6.- GUARANTEE	14

LOG OF REVISIONS**Table 1: Log of revisions.**

Date	Revision	Description
10/14	M028E0301-03-14A	Original version
09/15	M028E0301-03-15A	Changes in the following sections: 2.2.1.

NB: The images of the units are solely for the purpose of illustration and may differ from the original unit.

1.- INTRODUCTION

INGETEAM offers several inverter models that can be managed via the **CDP** *Dynamic power controller*.

For the **CDP** controller to be able to correctly manage the inverter, communication between the two devices must be correct and both products must be correctly programmed.



These application notes are not meant as a substitute for the **CDP** or inverter manuals, but rather as additional support for individuals who need to interconnect the two devices.

However, the guides and manuals of each product are the documents to be consulted and each company will provide the respective technical assistance.

An inverter of the **INGECON SUN LITE** family of inverters will be used in these application notes.

NB the test has been conducted using an INGETEAM INGECON SUN 2.5 TL inverter with s/n: 100110103128, Ver.FW: AAY1000A, Ver.FWD: AAY1001T, Boot D: AAS1092_F

2.- INGETEAM INGECON SUN LITE INVERTER

The **CDP** and the inverter communicate via an RS-485 bus. This RS-485 bus can connect up to 32 inverters, although the number of inverters in the vast majority of domestic installations ranges from 1 to 3.

2.1.- COMMUNICATION CABLE

This type of inverter requires a special connector available from INGETEAM when purchasing a communications card for its inverters.

The connector is of the Harting type, see **Figure 1**.



Figure 1: Harting connector.

List of communication cable terminals between the **CDP** and the inverter:

Table 2: List of communication cable terminals.

CDP R2 channel communications connector		INVERTER Harting-type connector	
Terminal	Description	Terminal	Description
1	A+	1	RS-485 B +
3	B-	2	RS-485 A -
5	GND	5	GND

A 120Ω resistor (supplied by INGETEAM) must be connected between pins 1 and 2 of the Harting connector.

2.1.1. INVERTER CONNECTION

Figure 2 shows the connection between the **CDP** and a single inverter.

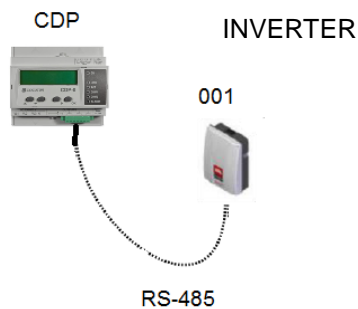


Figure 2: Connection between a CDP and a single inverter.

2.1.2. CONNECTION OF SEVERAL INVERTERS

Figure 3 shows the connection between the **CDP** and several inverters.

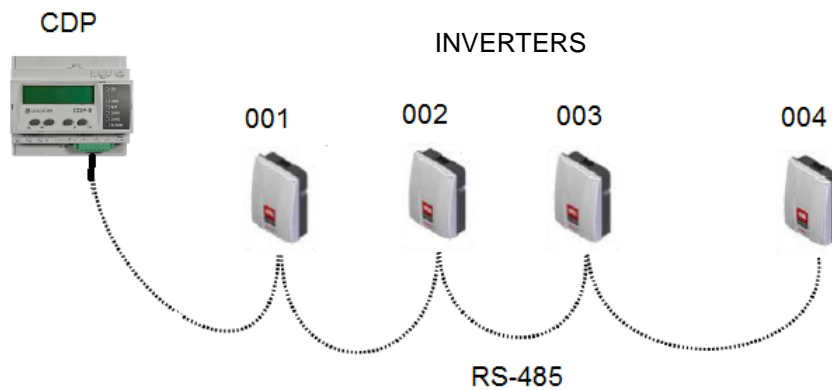


Figure 3: Connection between a CDP and several inverters.

The communication cable between the inverters is a pin-to-pin cable with Harting

connectors on both ends.

The bus end terminal resistor is recommended in installations that have several inverters or inverters that are far apart from each other.


In these situations the manufacturer recommends installing a 120 Ω line termination resistor on both ends of the RS-485 bus.

According to the manufacturer, these resistors have their own encoding, which should be checked in the technical documentation provided.

This resistor is installed between pins 1 and 2 of the Harting communications connector.

2.2.- INVERTER COMMUNICATION CONFIGURATION

The following describes how to use the display to configure the inverter for ensuring correct communication with the **CDP**.

	<p>The AC and DC sides of the inverter must be connected to the mains before it can turn on. Consult the inverter manual if you have any doubts.</p>
-----------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------

The INGETEAM inverter parameters are configured with the 4 buttons on the front panel of the unit. (Figure 4)



Figure 4: INGETEAM inverter keypad.

The parameters to be configured are:

- ✓ Peripheral number
- ✓ Self-consumption

2.2.1. PERIPHERAL NUMBER CONFIGURATION

1. To change the inverter peripheral number, go to the “**Change inv. number**” option on the main menu:

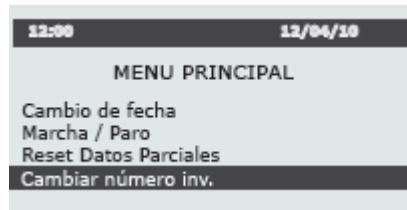


Figure 5: Main configuration menu.

2. Press "OK" to enter the "**Change inv. number**" menu.
3. Use the arrow buttons to program number "001" and press "OK" to confirm.
4. The message appears on the display:

Save (OK)
Cancel (ESC)

5. Press the "OK" button to save.
6. The message appears on the display:

Finished OK
Exit (ESC)

7. Press the "ESC" button three times to return to the home screen.

In exceptional circumstances, if there are single-phase inverters in three-phase installations, they must be numbered as shown in **Table 3**:

Table 3: Peripheral number in three-phase installations with single-phase inverters.

Peripheral number		
Inverters L1	Inverters L2	Inverters L3
0 to 32	33 to 65	66 to 98

2.2.2. COMMUNICATION SPEED CONFIGURATION

The communication speed of this inverter cannot be changed by the user, and thus it is a standard parameter that does not affect communications between the **CDP** and the **INGETEA** **INGECON SUN** inverter.

2.2.3. SELF-CONSUMPTION MODE CONFIGURATION

It is important to check that the inverter is configured in self-consumption mode. From the main menu, choose “**Without Limitation (MPPT)**”:

1. From the main screen, press “OK” and use the arrow buttons to select “Configuration”.

2. Press the "OK" button and use the arrow buttons to select the "Self-consumption" option.
3. Press the "OK" button and use the arrow buttons to select the "Mode" option.
4. Press the "OK" button, select **"Without Limitation (MPPT)"** and press "OK".
5. Press the "ESC" button four times to return to the main screen.

3.- CDP CONFIGURATION

The **CDP** has a configuration web site where all the parameters of the connected inverter have to be entered.

To do so, enter "/setup" at the end of the navigation bar where the **CDP** is monitoring so that the following, for example, appears in the navigation bar: **"10.0.110.212/setup"**

The **CDP** configuration window will then open (**Figure 6**).

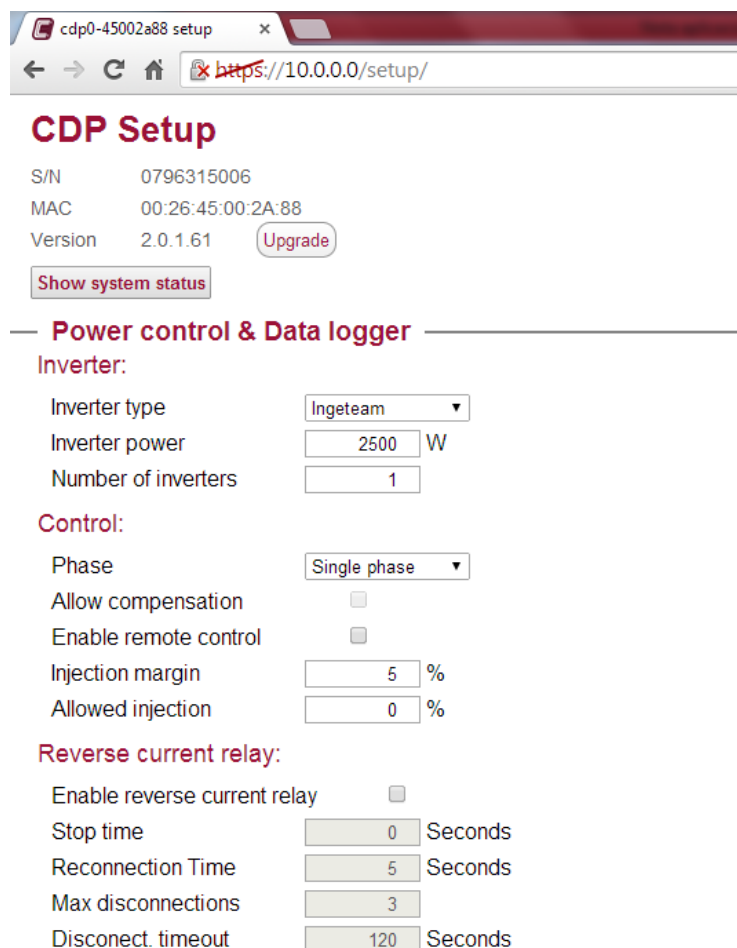


Figure 6: CDP configuration web site:

The most important inverter parameters that have to be configured in the **CDP** are (Table 4):

Table 4: Parameters to be configured in the CDP.

Parameter	Description
Inverter type	Inverter model, in this case selecting: INGETEAM
Inverter power	Total power to be controlled by the CDP.
Number of inverters	Number of inverters to control.
Phase	Inverter connection architecture



Consult the manual for more information on how to configure the CDP.

When working with several three-phase inverters in cascade, the sum of the power of all the inverters must be programmed in the "***Inverter Power***" variable in the **CDP** so that the same regulation percentage is sent to each one.

When working with single-phase inverters in three-phase installations, the total power of all the inverters must be programmed by selecting the "**three single phases**" option in the "***Phase***" variable, and then entering the number of sets of three single-phase inverters in the installation in the "***Number of inverters***" variable.

Example: if, for example, there are six 2 kW single-phase inverters (two on the L1 phase, two on the L2 phase and two on the L3 phase) the following configuration should be entered:

- ***Inverter power:*** 12000 W
- ***Number of inverters:*** 2
- ***Phase:*** three single phases

However, if there are three 2 kW single-phase inverters (one inverter per phase) the following configuration should be entered:

- ***Inverter power:*** 6000 W
- ***Number of inverters:*** 1
- ***Phase:*** three single phases

4.- COMMUNICATIONS TEST AND REGULATION

4.1.- COMMUNICATIONS TEST

Check the communication between the inverter and the **CDP**, with LED COM1 of the **CDP**:

- ✓ A flashing (or steady) LED means communication has been correctly established.
The flashing rate is one flash per second (if there is one inverter) and 1/n if there are several inverters (where "n" is the number of inverters connected).
- ✓ If the COM1 LED is off, it means the **CDP** is not communicating with the inverter. In this case check the communication cables and the inverter communication configuration.

With the configuration web site, we can make sure the **CDP** communicates correctly with the inverters connected to it. Press the **“Show system status”** button.

When this button is pressed, the **CDP** will scan the connected inverters and indicate how many of the total number of inverters that the CDP has been assigned to control have been detected.

If the communication is correct, the following image will appear, **Figure 7** :

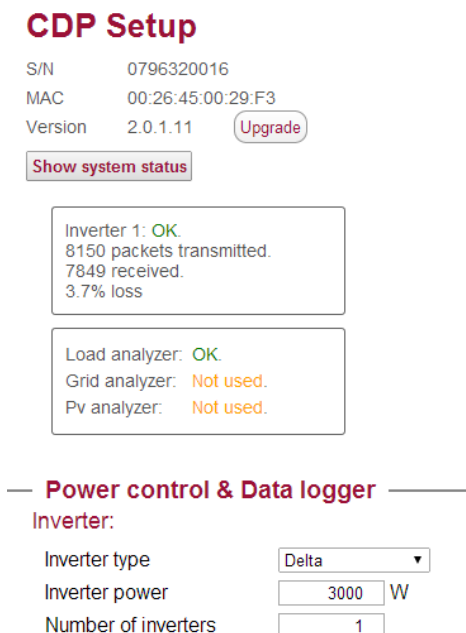


Figure 7: Verification of communications between the CDP and inverter.

4.2.- REGULATION TEST

To ensure that the **CDP** is regulating correctly, the following test can be performed:

Let us suppose a 3000W inverter generating 1400W.
This value can be displayed on the inverter.

If we now program the **CDP** indicating that the inverter power is 6000W, the **CDP** will send the inverter a new setpoint to change its MPPT and the inverter will reduce the photovoltaic generation by 50% and generate 700W.



Do not forget to reprogram the **CDP** with the initial inverter power value after the test.

5.- MAINTENANCE AND TECHNICAL SERVICE

In the case of any query in relation to unit operation or malfunction, please contact the **CIRCUTOR, SA** Technical Assistance Service.

Technical Assistance Service

Vial Sant Jordi, s/n 08232 - Viladecavalls (Barcelona)


Tel.: 902 449 459 (Spain) / +34 937 452 900 (outside of Spain)

email: sat@circutor.es

6.- GUARANTEE

CIRCUTOR guarantees its products against any manufacturing defect for two years after the delivery of the unit.

CIRCUTOR will repair or replace any defective factory product returned during the guarantee period.

	<ul style="list-style-type: none">• No returns will be accepted and no unit will be repaired or replaced if it is not accompanied by a report indicating the defect detected or the reason for the return.• The guarantee will be void if the unit has been improperly used or the storage, installation and maintenance instructions listed in this manual have not been followed. "Improper usage" is defined as any operating or storage condition contrary to the National Electrical Code or that surpassing the limits indicated in the technical and environmental features of this manual.• CIRCUTOR accepts no liability due to the possible damage to the unit or other parts of the installation, nor will it cover any possible sanctions derived from a possible failure, improper installation or "improper usage" of the unit. Consequently, this guarantee does not apply to failures occurring in the following cases:<ul style="list-style-type: none">- Overvoltages and/or electrical disturbances in the supply;- Water, if the product does not have the appropriate IP classification;- Poor ventilation and/or excessive temperatures;- Improper installation and/or lack of maintenance;- Buyer repairs or modifications without the manufacturer's authorisation.
-------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

CIRCUTOR, SA

Vial Sant Jordi, s/n

08232 -Viladecavalls (Barcelona)

Tel.: (+34) 93 745 29 00 - Fax: (+34) 93 745 29 14

www.circutor.es central@circutor.es