

## Setting of 'Zero feed-in" mode for 1PH 3000-HP/1PH 6000-HP inverters

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## 1 Table of revisions

| <i>Rev.</i> | <i>Dated created</i> | <i>Author</i> | <i>Description/modifications</i> |
|-------------|----------------------|---------------|----------------------------------|
| 00          | 07/07/2023           | L.A. & L.C.   | First issue                      |
|             |                      |               |                                  |
|             |                      |               |                                  |
|             |                      |               |                                  |

## 2 Purpose

This document contains the technical connection and configuration instructions for correctly enabling the "Zero Feed-in" mode for a system comprising 1PH 3000-HP/1PH 6000-HP inverters. For systems comprised of multiple inverters from different ranges, please refer to the documentation relating to the "COMBOX" device at [www.zcsazzurro.com](http://www.zcsazzurro.com).

## 3 Required devices and minimum configurations

### 3.1 Example of a system with a single inverter

The following devices are required in order to correctly configure the "Zero Feed-In" mode where the production plant consists of only one inverter from the 1PH-3000-ZSS/ 1PH-6000-ZSS range:

- a) ZCS 1PH 3000-HP/1PH 6000-HP inverter.
- b) DDSU666 direct connect meter supplied by ZCS.
- c) (Alternatively to point b) CT sensor supplied by ZCS.
- d) DTSU666 meter with CTs supplied by ZCS (or commercial CTs with 5A secondary) in the case of a three-phase system.
- e) Connection cables for DDSU666 Meter and, if necessary, an extension for CT sensor (not supplied by ZCS).

### 3.1.1 Connections with single inverter and DDSU666 Meter

In this case, the DDSU666 meter must be positioned as shown in the logical block diagram below

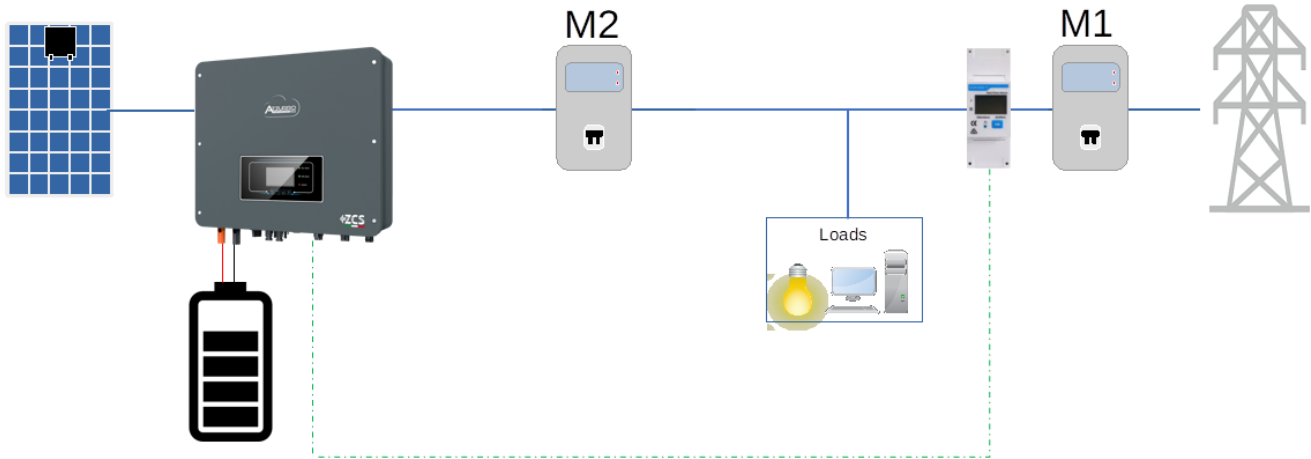



Figure 1 - logical position of the DDSU666 meter

In this case, the meter must be placed close to the import/export meter (M1) in order to measure all incoming and outgoing flows (or in a logically equivalent position).

|   |  |
|---|--|
|  | <p><b>Meter connection in a position other than the one indicated may compromise the proper functioning of the "Zero Feed-In" mode</b></p> |
| <p><b>Attention</b></p>   |  |

Once the correct positioning of the meter has been established, it can be configured by following these steps

#### Meter connections:

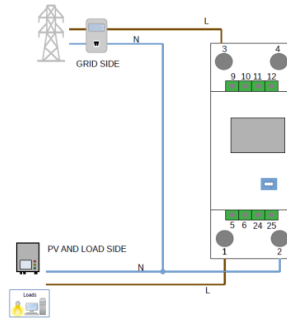
| Pin Meter | COM Port |
|-----------|----------|
| 24        | 16       |
| 25        | 15       |

1. Connect the Meter and inverter via the COM port. On the Meter side, connect to PINs 24 and

25 (as shown in the table). The “COM” connector is used on the inverter side. Use a twisted and shielded CAT5 or CAT6 cable for the connection

2. Connect the Meter in “direct connect” mode, specifically:

- ✓ Connect PIN 2 of the Meter to the neutral cable (N);
- ✓ Connect PIN 3 respectively to the exchange meter direction phase;
- ✓ Connect PIN 1 to the photovoltaic system and loads direction phase.



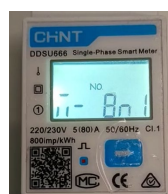
NOTE: For distances between the Meter and inverter greater than 100 meters, it is recommended to connect two 120 Ohm resistors along the 485 daisy chain: the first to the inverter (between PINs 16+ and 15- of the inverter) and the second directly to the Meter (PINs 24 and 25).



### Meter setting:

Press the button to check that the Meter address is set to **001** and that the protocol is set to **8n1**. In addition to what is described above, the display shows the following values:

- ✓ Current;
- ✓ Voltage;
- ✓ Power factor;
- ✓ Power.



Protocol



Indirizzo

Corrente

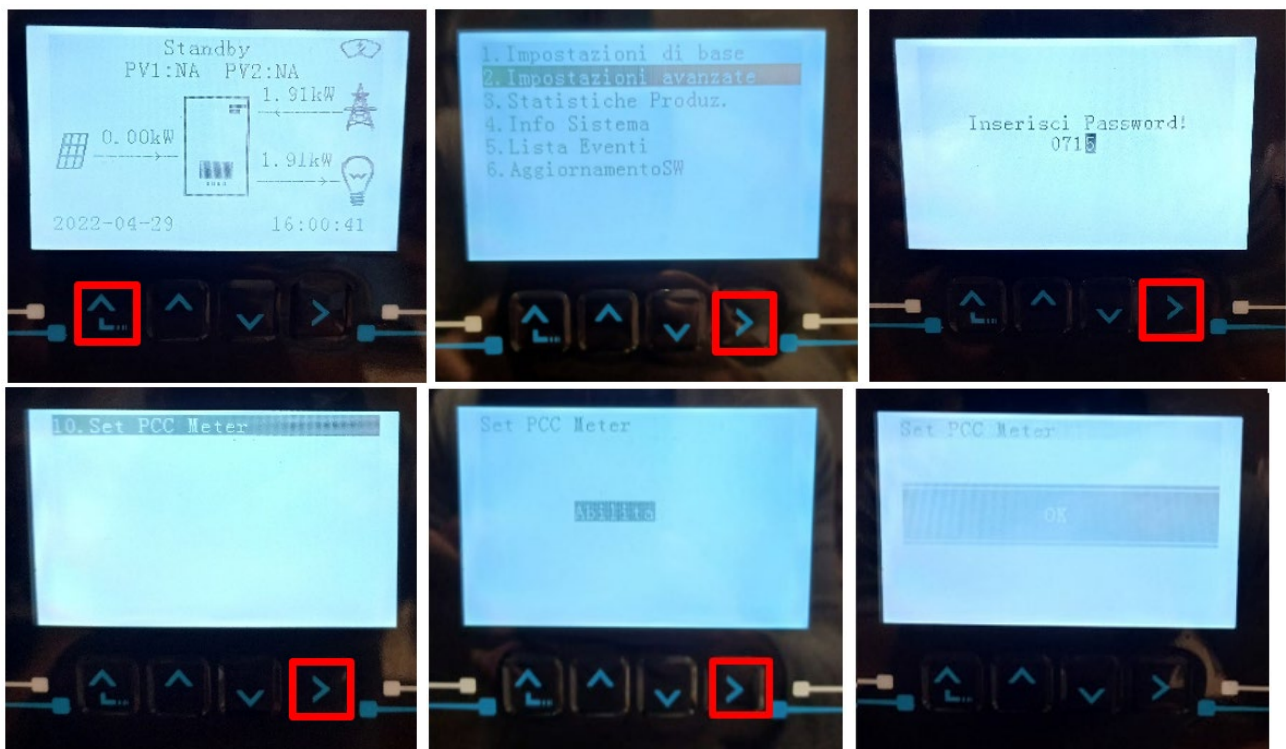
Potenza

Tensione

Power factor

## Inverter setting

- To configure the Meter reading on the inverter, access the inverter display (as shown in the figure):
  - ✓ First button on the left of the inverter;
  - ✓ Advanced settings;
  - ✓ Enter password "0715";
  - ✓ 10. Set PCC Meter;
  - ✓ Enable;
  - ✓ Ok.




### 3.1.2 Inverter checks and configuration with a single inverter and DDSU meter

Once the connections have been made and the meter and inverter have been switched on, it is necessary to configure the presence of the meter from the inverter display.

|   |  |
|---|--|
|  | <p><b>Always update the inverter to the latest FW version found at</b><br/> <a href="http://www.zcsazzurro.com">www.zcsazzurro.com</a></p> |
| Attention   |  |

Follow the steps below:


- Press and hold the first key on the left of the inverter until you enter the menu.
- Press the last key on the right to enter "advanced settings"
- Enter the password 0715 to enter the menu;
- Use the arrows to scroll to the item "Set PCC Meter"
- Enter the password 0715 to enter the menu. To change the number, press the second and third key. Press the fourth key (enter) to confirm the number.
- Select the item "Enable." Press and hold the fourth key (enter) to confirm
- Under "advanced settings" use the arrows to scroll to the "Anti-Reflux" item
- Enter the password 0715 to enter the menu. To change the number, press the second and third key. Press the fourth key (enter) to confirm the number.
- Scroll down to the item "Set 0 Feed-In"
- Enter the password 0715 to enter the menu again
- Select the item "Enable." Press and hold the fourth key (enter) to confirm
- Set the power to 0.0kW for zero feed-in

|   |  |
|---|--|
|  | <p><b>The set power value can also differ from 0kW, in which case the inverter will adjust itself so that the power fed into the grid never exceeds the set value.</b></p> |
| Note  |  |

Switch off the inverter and meter

### 3.1.3 Functional checks with a single inverter and DDSU666 meter



After restarting the meter and inverter, the functionality check can be carried out. The following procedure allows an accurate check of the functioning of the set mode.

To check the correct reading of the meter on exchange, ensure the inverter is switched off. Switch on loads greater than 1 kW. Stand in front of the meter and, using the  button to scroll through the items, check that P is:

1. Greater than 1 kW;
2. In line with home consumption;
3. The sign in front of each negative value (-).



The inverter can now be switched on.

|  |   |
|--|---|
| <br><b>Note</b>  | <p>If the phase has no active load connected and the "Zero Feed-in" mode is set to 0kW, the inverter will not produce any power. This is to avoid feeding current into the grid on that phase</p>   |
| <br><b>Note</b> | <p>If the "Zero Feed-In" mode is set to a feed-in value of 0kW, the output of the inverter might be slightly lower than the total load. This would always result in a slight withdrawal from the grid. This condition is perfectly normal and technically correct</p> |

### 3.1.4 Connections with single inverter and DTSU666 Meter

In this case, the DTSU666 meter must be positioned as shown in the logical block diagram below

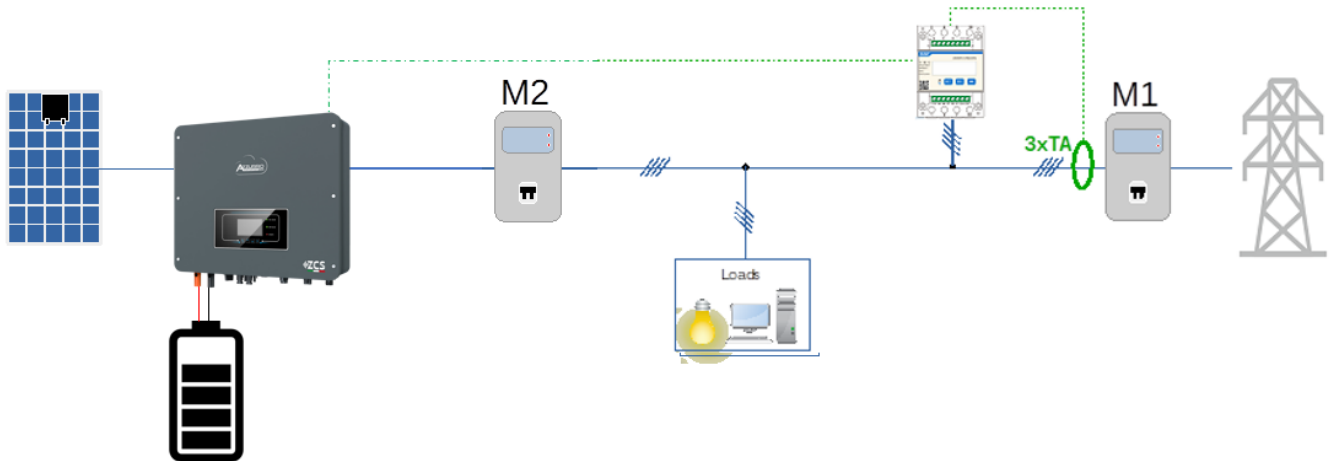



Figure 2 - logical position of the DDSU666 meter

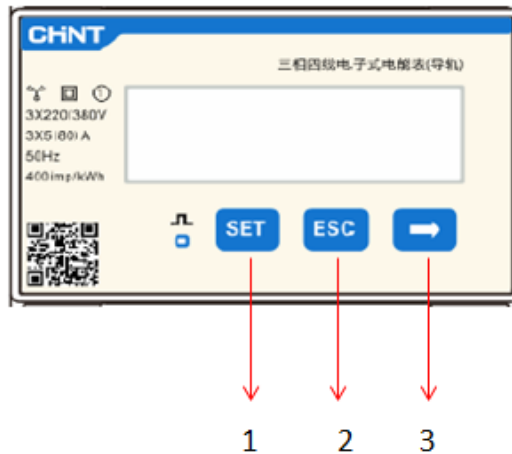
In this case, the meter must be placed close to the import/export meter (M1) in order to measure all incoming and outgoing flows (or in a logically equivalent position).

|   |  |
|---|--|
|  | <p><b>CT or meter connections in positions other than those indicated may compromise the proper functioning of the "Zero Feed-In" mode</b></p> |
| <p><b>Attention</b></p>   |  |

Once the correct positioning of the meter has been established and the voltmeters and CTs have been connected, the meter can be configured by following these steps



## Meter connections and settings:



1. Press to:
  - “Confirm”
  - “Move cursor”  
(to enter digit)
2. Press to “go back”
3. Press to “add”

Figure 3 - Meter Legend

1. Press SET, the word CODE will appear



2. Press SET again, the number “600” will appear:



3. Enter the number “701”:

  - a. From the first screen where the number “600” appears, press the “→” key once to write the number “601”.
  - b. Press “SET” twice to move the cursor left, highlighting “601”;



- c. Press the "→" key again until the number "701" is written (701 is the code for accessing the settings).

**Note:** In case of an error, press "ESC" and then "SET" again to reset the required code.



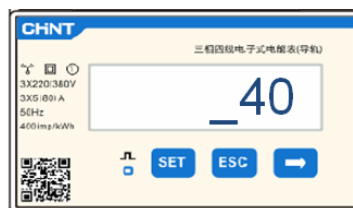
4. Confirm by pressing SET until you enter the settings menu.

5. Enter into the following menus and set the parameters indicated:

a. **CT:**

- i. Press SET to enter the menu
- ii. Enter "40" (in the case of sensors supplied by ZCS 200/5, or the correct transformation ratio of the CTs used):
  1. From the first screen where the number "1" appears, press the "→" key several times until the number "10" is written.
  2. Press SET once to move the cursor left, highlighting "10"
  3. Press the "→" key several times until the number "40" is written

**Note:** In case of error, press "SET" until the digit for thousands is highlighted and then press "→" until only the number "1" appears; at this point, repeat the procedure described above.



- iii. Press "ESC" to confirm and "→" to scroll to the next setting.

b. **ADDR:**

- i. Leave address 01 (default setting) so that the inverter assigns the data sent by the meter as the power relating to the exchange.

After the meter has been configured, the communication of the meter can be connected to the inverter according to the attached diagram:

| Pin Meter | COM Port |
|-----------|----------|
| 24        | 16       |
| 25        | 15       |

Figure 4 – meter - Inverter communication connections

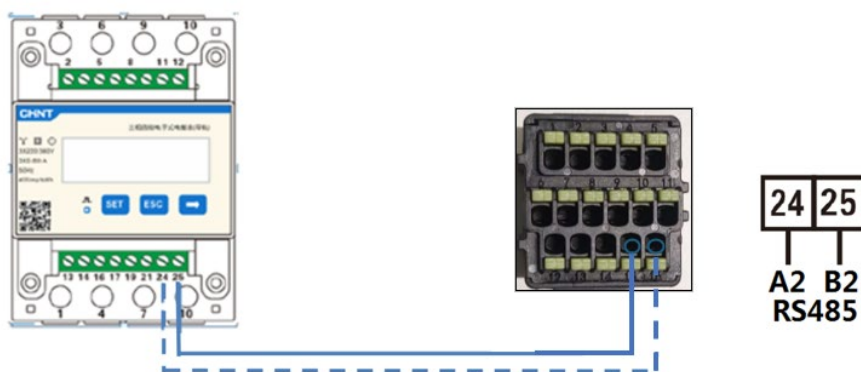
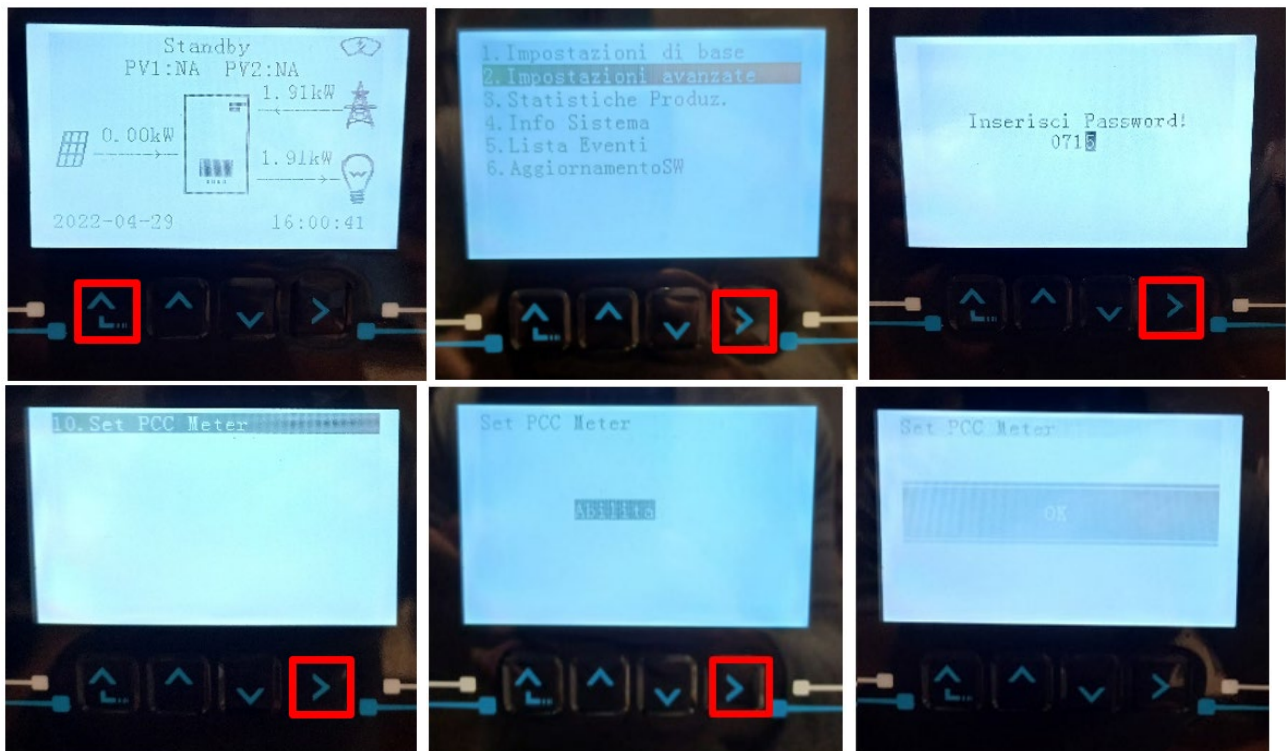


Figure 5 – Position of RS485 connectors on "snap-in" inverter port

Connect PIN 24 of the meter to PIN 16 of the inverter's COM port and PIN 25 to PIN 15. Use a twisted and shielded CAT5 or CAT6 cable for the connection. If the distance between the meter and inverter is greater than 50 m, it is recommended to use a terminating resistor of 120ohm (0.25W) between PINs 24 and 25 of the meter.

## Inverter setting

1. To configure the Meter reading on the inverter, access the inverter display (as shown in the figure):
  - ✓ First button on the left of the inverter;
  - ✓ Advanced settings;
  - ✓ Enter password "0715";
  - ✓ 10. Set PCC Meter;
  - ✓ Enable;
  - ✓ Ok.




### 3.1.5 Inverter checks and configuration with a single inverter and DTSU666 meter

Once the connections have been made and the meter and inverter have been switched on, it is necessary to configure the presence of the meter from the inverter display.

|   |  |
|---|--|
|  | <p><b>Always update the inverter to the latest FW version found at</b><br/> <a href="http://www.zcsazzurro.com">www.zcsazzurro.com</a></p> |
| Attention   |  |

Follow the steps below:

- Press and hold the first key on the left of the inverter until you enter the menu.
- Press the last key on the right to enter "advanced settings"
- Enter the password 0715 to enter the menu;
- Use the arrows to scroll to the item "Set PCC Meter"
- Enter the password 0715 to enter the menu. To change the number, press the second and third key. Press the fourth key (enter) to confirm the number.
- Select the item "Enable." Press and hold the fourth key (enter) to confirm
- Under "advanced settings" use the arrows to scroll to the "Anti-Reflux" item
- Enter the password 0715 to enter the menu. To change the number, press the second and third key. Press the fourth key (enter) to confirm the number.
- Scroll down to the item "Set 0 Feed-In"
- Enter the password 0715 to enter the menu again
- Select the item "Enable." Press and hold the fourth key (enter) to confirm
- Set the power to 0.0kW for zero feed-in


|   |  |
|---|--|
|  | <p><b>The set power value can also differ from 0kW, in which case the inverter will adjust itself so that the power fed into the grid never exceeds the set value.</b></p> |
| Note  |  |


Switch off the inverter and meter

### 3.1.6 Functional checks with a single inverter and DTSU666 meter

After restarting the meter and inverter, the functionality check can be carried out. The following procedure allows an accurate check of the functioning of the set mode.

- 1) Only switch on the meter with the PV inverter switched off, making sure that there are active loads on the system. Loads of at least 1kW per phase are recommended for accurate measurements. On the meter display, scroll through using the “->” key to see the information and check that:
  - a) The ‘P<sub>t</sub>’ values are negative and equal to the total consumption
  - b) The ‘P<sub>A</sub>’, ‘P<sub>B</sub>’ and ‘P<sub>C</sub>’ values are negative and equal to the consumption for each phase
  - c) The ‘F<sub>A</sub>’, ‘F<sub>B</sub>’ and ‘F<sub>C</sub>’ values are close to 1 or at least > 0.8
 These checks ensure the correct connection of the CT sensors and the correct cyclic direction of the phases
- 2) Switch on the inverter
- 3) Wait 300 seconds for the inverter to start
- 4) Wait for the system to enter production mode. If the potential production is higher than the active loads, the inverter production will be capped to a level that prevents any of the three phases from feeding power into the grid.
- 5) On the meter display, scroll using the “->” key to check the ‘P<sub>A</sub>’, ‘P<sub>B</sub>’ and ‘P<sub>C</sub>’ values, noticing that one or more of these three values fluctuate but remain close to 0W.
- 6) On the other hand, if the potential production is lower than the loads present, disconnect the loads, even if they are only on one phase, and then repeat the checks in point 5).

|   |  |
|---|--|
|  | <p><b>If one of the phases has no active load connected and the "Zero Feed-in" mode is set to 0kW, the inverter will not produce any power. This is to avoid feeding current into the grid on that phase</b></p> |
| <b>Note</b>   |  |

|   |   |
|---|---|
|  | <p><b>If the "Zero Feed-In" mode is set to 0kW, the output of the inverter might be slightly lower than the total load due to the unbalancing of the inverter itself. This prevents power from being fed into all three phases. This would always result in a slight withdrawal from the grid. This condition is perfectly normal and technically correct</b></p> |
|---|---|

### 3.1.7 Connections with single inverter and ZCS CT sensor

In this case, the CT must be positioned as shown in the following logical block diagrams.

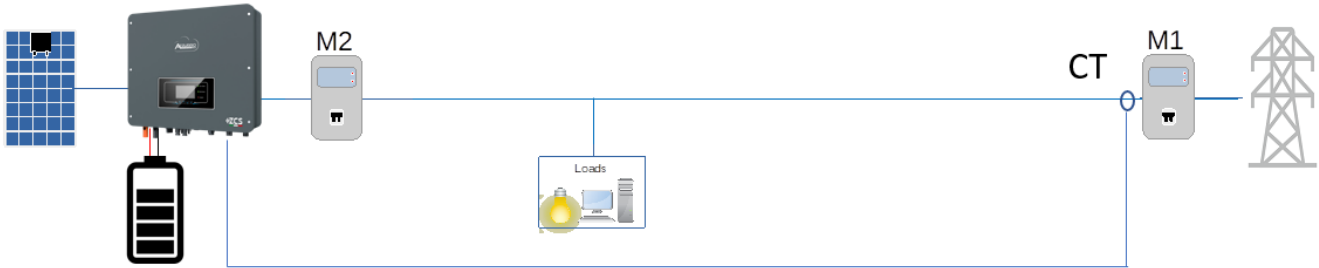


Figure 6 - logical position of the CT in the case of a single phase exiting the M1 meter

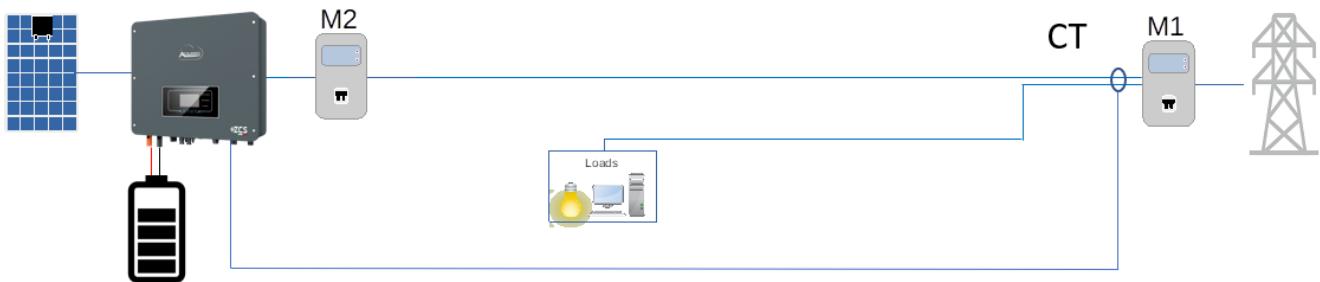



Figure 7 - logical position of the CT in the case of two phases exiting the M1 meter

The CT sensor must be placed close to the import/export meter (M1) in order to measure all incoming and outgoing flows (or in a logically equivalent position), with the sensor arrow pointing towards the M1 meter.

|   |  |
|---|--|
|  | <p><b>Connecting the CT sensor in a position other than the one indicated may compromise the proper functioning of the "Zero Feed-In" mode</b></p> |
| <p><b>Attention</b></p>   |  |

Once the correct positioning of the CT sensor has been established, it can be configured by following these steps.

### Connections of CT sensors:

| CT sensor          | COM Port |
|--------------------|----------|
| Red cable          | 14+      |
| Black/yellow cable | 13-      |

3. Connect the CT sensor and inverter via the CT port. Connect the sensor cables to the COM port of the inverter, as shown in the table. The “CT” connector is used on the inverter side. If the connection needs to be extended, use a twisted and shielded CAT5 or CAT6 cable and connect the shield to the ground only on one side.

NOTE: For distances greater than 50 meters between the CT sensor and inverter, it is necessary to use the DDSU666 meter (see previous chapter).




### 3.1.8 Inverter checks and configuration with a single inverter and CT sensor

Once the connections have been made and the inverter has been switched on, it is necessary to configure the presence of the CT sensor from the inverter display.

|   |   |
|---|---|
|  | <p><b>Always update the inverter to the latest FW version found at</b><br/><a href="http://www.zcsazzurro.com">www.zcsazzurro.com</a></p> |
| Attention   |   |

Follow the steps below:

- Press and hold the first key on the left of the inverter until you enter the menu.
- Press the last key on the right to enter "advanced settings"
- Enter the password 0715 to enter the menu;
- Use the arrows to scroll to the item "Anti-Reflux"
- Enter the password 0715 to enter the menu. To change the number, press the second and third key. Press the fourth key (enter) to confirm the number.
- Scroll down to the item "Set 0 Feed-In"
- Enter the password 0715 to enter the menu again
- Select the item "Enable." Press and hold the fourth key (enter) to confirm
- Set the power to 0.0kW for zero feed-in

|   |  |
|---|--|
|  | <p><b>The set power value can also differ from 0kW, in which case the inverter will adjust itself so that the power fed into the grid never exceeds the set value.</b></p> |
| Note  |  |

Switch off the inverter and meter

### 3.1.9 Functional checks with a single inverter and CT sensor

After restarting the inverter, the functionality check can be carried out. The following procedure allows an accurate check of the functioning of the set mode.


To check that the inverter is reading correctly, it is necessary to switch on loads greater than 1kW. Stand in front of the inverter and check that the power is:


1. Greater than 1 kW;
2. In line with home consumption.

Then switch off the loads and check that the power is:

1. At 0 kW;
2. In line with current home consumption, which should read 0.

If the above conditions are met, the inverter is functioning correctly in the 0 feed-in mode.

|   |  |
|---|--|
|  | <p><b>If the phase has no active load connected and the "Zero Feed-in" mode is set to 0kW, the inverter will not produce any power. This is to avoid feeding current into the grid on that phase</b></p> |
| <b>Note</b>   |  |

|   |  |
|---|--|
|  | <p><b>If the "Zero Feed-In" mode is set to a feed-in value of 0kW, the output of the inverter might be slightly lower than the total load. This would always result in a slight withdrawal from the grid. This condition is perfectly normal and technically correct</b></p> |
| <b>Note</b>   |  |