

## Application Note on Export Limiting

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### Audience

This application note is intended for use by Schneider Electric qualified personnel maintaining a system involving CL Series inverters (CL 30, CL 33, CL 50).

The qualified personnel have training, knowledge, and experience in:

- Installing electrical equipment and PV input systems (up to 1100 VDC).
- Applying all applicable installation codes.
- Analyzing and reducing the hazards involved in performing electrical work.
- Selecting and using Personal Protective Equipment (PPE).

In addition, qualified personnel have received specific training from the manufacturer on servicing CL Series inverters. The qualified personnel must refer to the product's lock-out and tag-out procedures for additional lock-out and tag-out information for a variety of servicing situations.

 **DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, ARC FLASH, AND FIRE**

This document is in addition to, and incorporates by reference, the relevant product manuals for CL Series inverter. Before reviewing this document, you must read the relevant product manuals. Unless specified, information on safety, specifications, installation and operation is as shown in the primary documentation received with the product. Ensure you are familiar with that information before proceeding.

**Failure to follow these instructions will result in death or serious injury.**

## Overview

In many parts of the world, utility companies require that grid-connected photovoltaic systems have the ability to limit the export of power to the grid while offsetting the site's loads. The Schneider Electric CL Series inverters have this capability, when using the InsightFacility and a compatible power meter to control excess PV energy to the main supply panel without expediting to the grid.

This applications note explains how the CL Series inverters' export limiting feature can be configured.

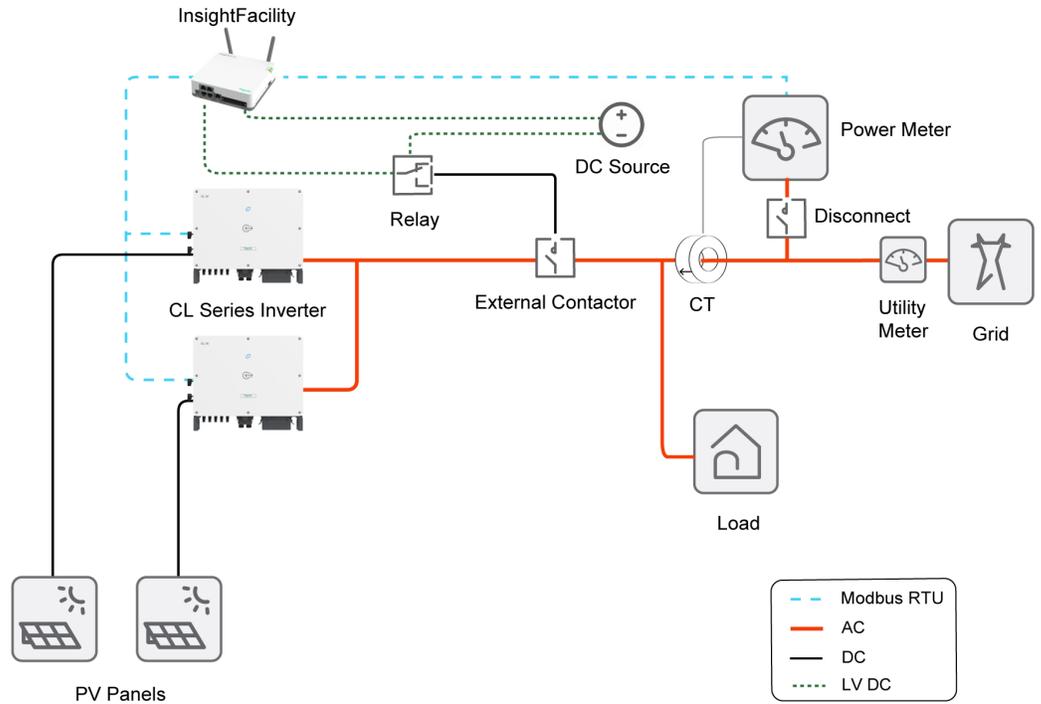
Note: The inverter will not produce power when there is no load during Zero sell Export control limit.

## Equipment List

The Export Limiting function was tested and certified with the following components:

- Up to a maximum of six CL Series inverters (CL 30, CL 33, or CL 50)
- One InsightFacility with firmware V1.12 or newer
- Power meter
  - WattNode™ WND-WR-MB (available from Schneider Electric: 865-0340)
- Current Transformers (CTs) compatible with the power meter, if required (see the power meter's installation manual for details, select the CT based on the number of CL Series inverters connected)
  - ACTL-0750 series (available from Schneider Electric: 865-0341)
  - ACTL-1250 series (available from Schneider Electric: 865-0342)
- External Contactors
  - Schneider Electric TeSys Series (TeSys D, TeSys F, etc. as required)
- Relay
  - RSB1A120BDPV, Harmony, Interface plug-in relay pre-assembled, 12 A, 1 CO, with LED, with protection circuit, 24 V DC
- 24 V DC power supply (for powering the relay and InsightFacility)
  - ABLM1A24004, Regulated Power Supply, 100-240 V AC, 24 V 0.4 A, single phase, Modular
- Fuse disconnecter
  - DF101V, TeSys fuse-disconnector 1P 32 A - fuse size 10 x 38 mm - blown fuse indicator

## System Setup



**Note:** The external power meter (with 2 A, 3-pole, 3-phase disconnect, such as a breaker or fuse), relay (with added DC source for power), and external contactor are required in order for the Export Limiting feature to work. Current Transformers (CTs) may be required. See the power meter's installation manual for more information.

## Power Meter, Current Transformer and External Contactor Setup

This section describes the InsightFacility settings and pin-out connections to the power meter and external contactor.

### Hardware Installation

For a list of required components, see *Equipment List* and *System Setup*.

For information about the power meter, Current Transformers (CTs), and external contactor, including features, installation, and operation, see the relevant product manuals for those products.

### Power Meter Settings

The recommended power meter setting for the CL Series Export Limiting application are:

- Modbus Address: 1 (DIP switch 1, set to Up)
- Termination Resistor: On (DIP switch 7, set to Up)
- Baud Rate: 19,200
- Power Reading Scale: 1 W, register 1609 set to 1.
- Power Reading Averaging: 500 ms averaging period, register 1608 set to 500.
- CT Range (if installed): 150 A to 600 A. See your CT rating.

**Note:** Rated current CT setting based on the used CT Range.

See the power meter installation manual for information about how to set the recommended settings.

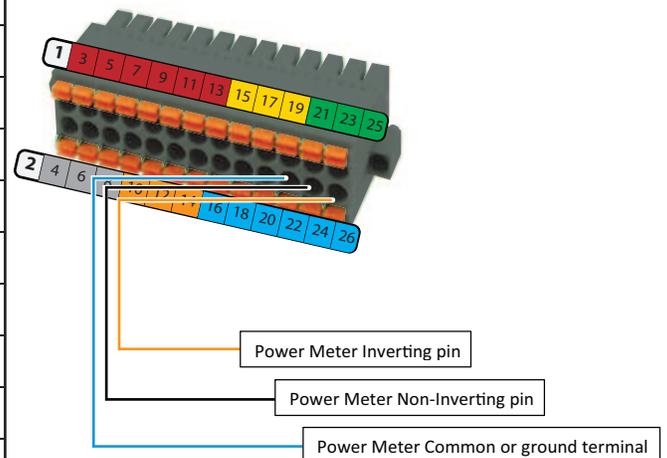
## Setup InsightFacility with Power Meter

The pin-out connections for the InsightFacility and power meter are shown below.

**Note:** For the export limiting application, **the power meter CANNOT be in the same Modbus port as any inverter**. It is recommended that all inverters are connected to Modbus port A (pin 16, 18, 20), while the power meter is connected to Modbus port B (pin 22, 24, 26).

**Note:** If the power meter is not quickly discovered during the device detection, you can verify the connections of pins 18 and 20.

	InsightFacility	Power Meter
2	9-24 VDC power Input	
4	GND	
6	12 VDC digital input 1	
8	12 VDC digital input 2	
10	ISO1 CAN GND	
12	ISO1 CAN L	
14	ISO1 CAN H	
16	ISO1 RS-485 GND	
18	ISO1 RS-485 1A	
20	ISO1 RS-485 1B	
22	ISO2 RS-485 GND	C
24	ISO2 RS-485 2A	<b>Non-inverting pin: B+</b>
26	ISO2 RS-485 2B	<b>Inverting pin: A-</b>



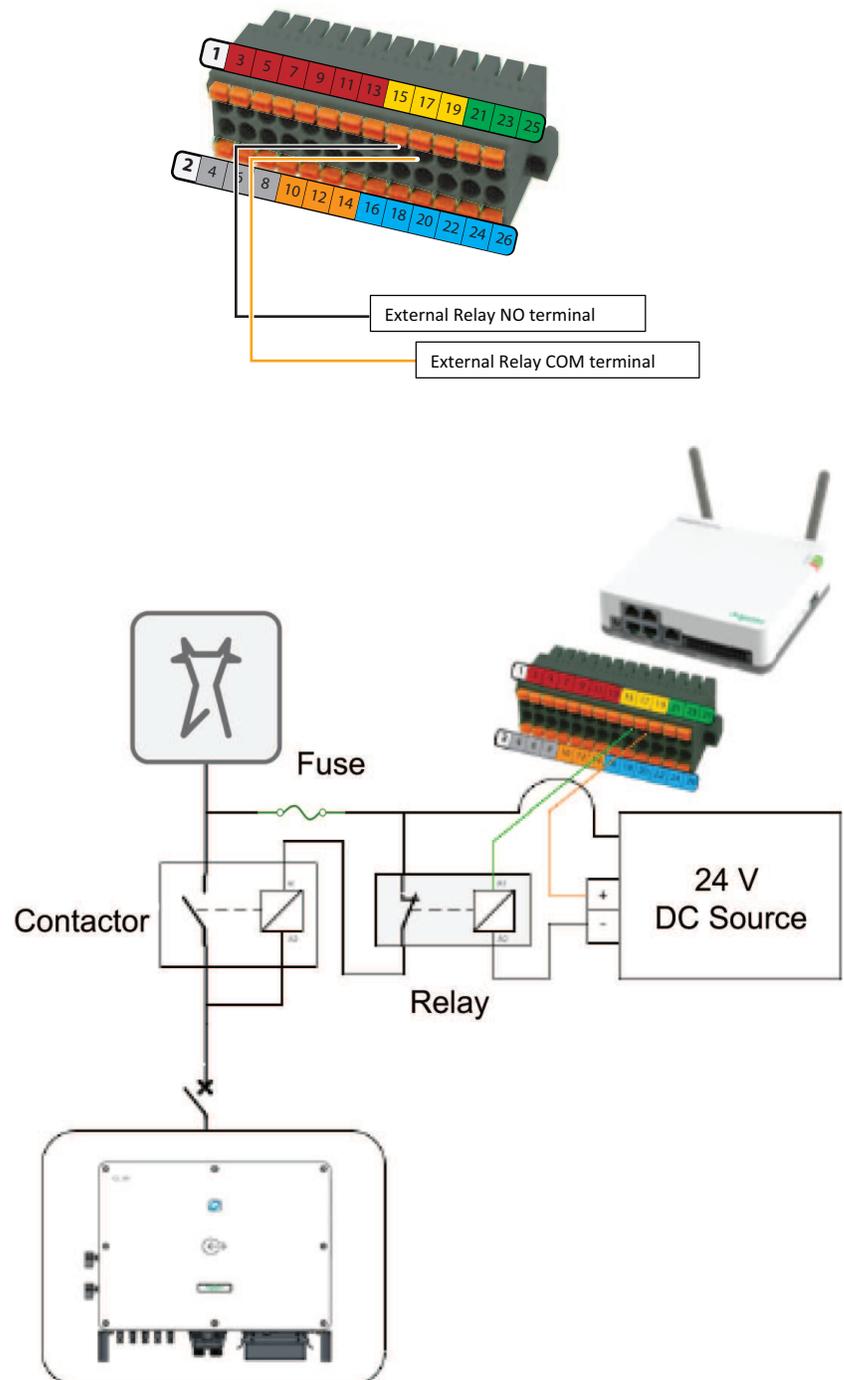
**NOTE:** The power meter design and settings are subject to change without notice. See the specific power meter product manual(s) for the most up-to-date information.

## Setup InsightFacility with External Contactor

Connect the external contactor to the relay output of the InsightFacility using pins 15 and 17, as shown below.

NOTE: The Programmable dry contact relay on InsightFacility is only rated for maximum 24 V DC. Please refer to the *InsightFacility Owners Guide* (document number: 990-91411) for more info.

	InsightFacility	External Contactor
1	GND	
3	0-10 VDC analog input 1	
5	0-10 VDC analog input 2	
7	GND	
9	4-20 mA input 1	
11	4-20 mA input 2	
13	GND	
15	Relay 1 NO	NO
17	Relay 1 COM	COM
19	Relay 1 NC	
21	Relay 2 NO	
23	Relay 2 COM	
25	Relay 2 NC	



## CL Series Inverter Setup

This section describes the CL Series Inverter pin-out connections and setup using the InsightMobile SE app and InsightLocal web portal.

For more information about the CL Series inverter and InsightFacility, including features, installation, and operation, see the main product manuals for those products.

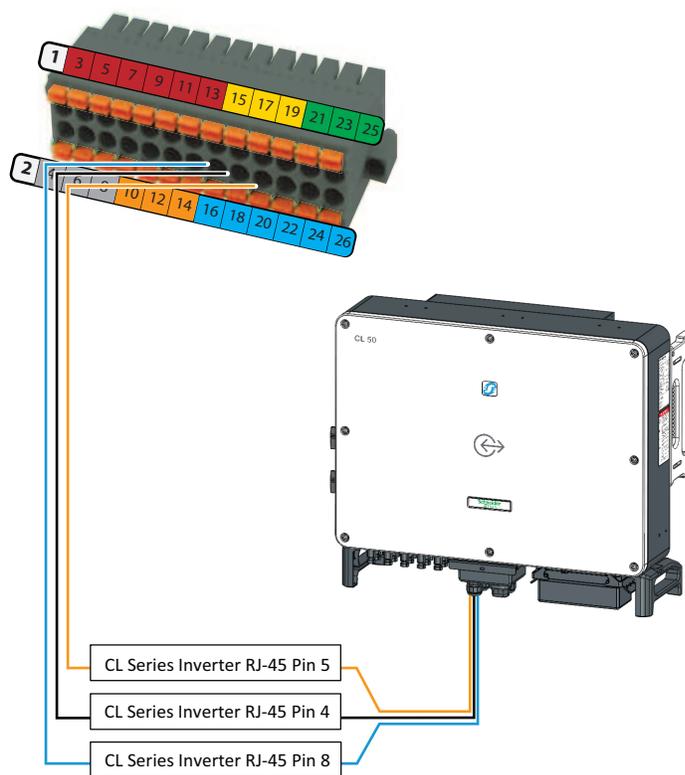
### InsightFacility to CL Series Inverter Pin-Out Connection for RS-485

The pin connections for the InsightFacility to the CL Series inverter are shown below. For more details, see the *CL 30, CL 33, and CL 50 inverter Owner's Guide (990-91392)*.

**Note:** It is recommended to use a shielded Cat5 Cable (24 AWG) to connect the InsightFacility to the CL Series inverter.

**Note:** If the CL Series inverter is not quickly discovered during the device detection you can verify the connections of pins 18 and 20.

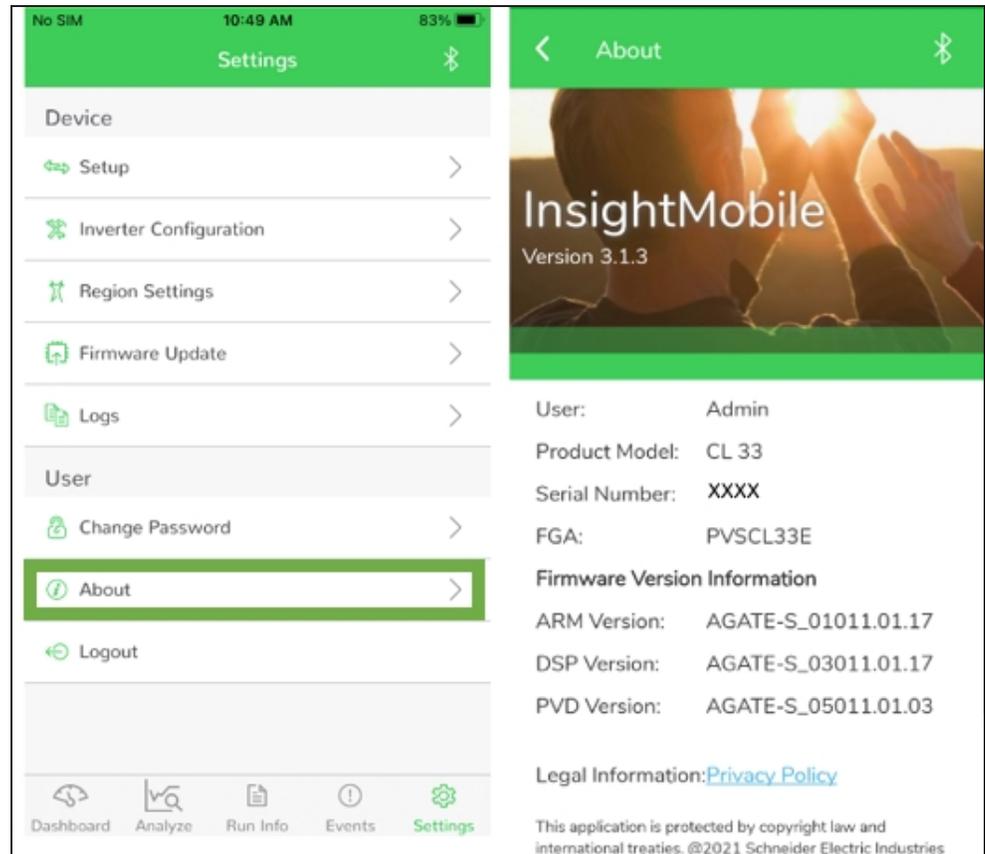
	InsightFacility	CL Series Inverter
2	9-24 VDC power Input	
4	GND	
6	12 VDC digital input 1	
8	12 VDC digital input 2	
10	ISO1 CAN GND	
12	ISO1 CAN L	
14	ISO1 CAN H	
16	ISO1 RS485 GND	8 (Modbus ground)
18	ISO1 RS485 1A	4 (DATA+)
20	ISO1 RS485 1B	5 (DATA-)
22	ISO2 RS485 GND	
24	ISO2 RS485 2A	
26	ISO2 RS485 2B	



## CL Series Inverter Setup using Insight Mobile

### To login and check InsightMobile SE app firmware version:

1. Download and install the Insight Mobile app from Apple store or Google play store.
2. Log in to the mobile app.
3. Click **Bluetooth direct to device** to connect to the inverter.
4. Select the CL Series Inverter.
5. Click **Settings** > **About** to view the firmware version.



The required firmware version is:

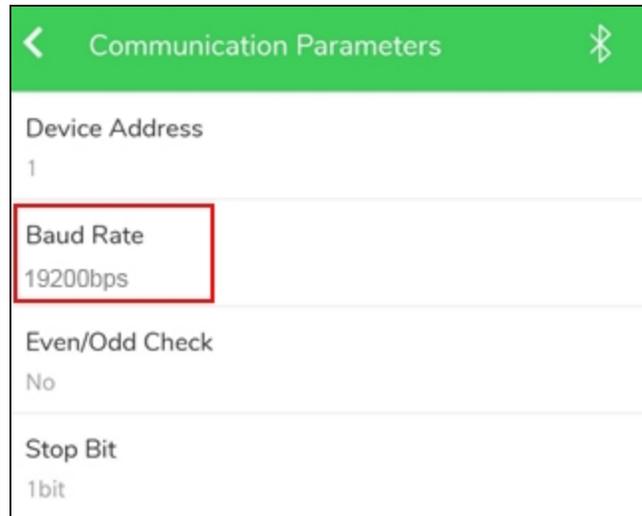
- ARM: AGATE-S\_01011.01.17
  - DSP: AGATE-S\_03011.01.17
  - PVD: AGATE-S\_05011.01.03
6. Upgrade the firmware following the instructions in CL Series Owner's Guide (990-91392).

### To set up the CL Series inverter using the InsightMobile SE app:

1. Click **Settings** > **Region Settings** > **Grid Configuration** > **Country/Region** to set or confirm the country settings.

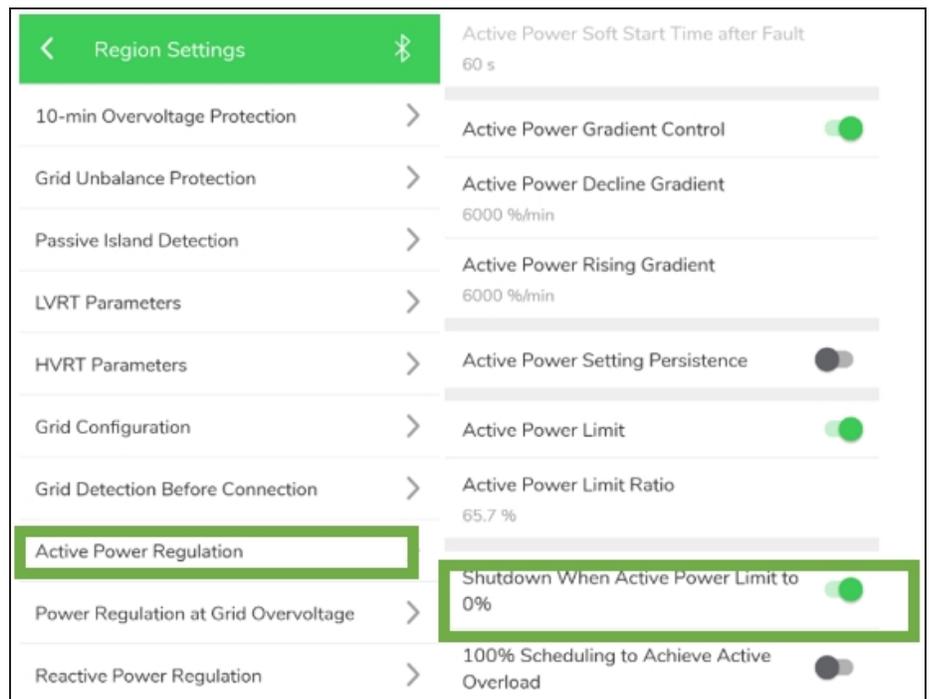
**NOTE:** For Spain, ensure the **Spain** option is selected for Export Limiting to be certified.

2. Click **Settings > Setup > Communication Parameters**.
3. Set the baud rate to 19200 bps.



4. Keep a record of the **Device Address** (shown above). This address will be required for setting up device detection in the InsightLocal web portal (see next section). Ensure that the Modbus address is unique for each inverter.
5. Click **Settings > Region Settings > Active Power Regulation**. Ensure that the following settings are **ENABLED** as shown:

- **Active Power Gradient Control**
- **Active Power Limit**
- **Shutdown When Active Power limit to 0%**



In multiple inverter installations, select each individual inverter and verify all of the settings above.

## Configure Devices Using InsightLocal

For more information about using the InsightLocal web portal, see the *InsightFacility Owner's Guide (990-91411)*.

### InsightFacility RS-485 Device Detection

To configure the Modbus settings:

1. Log in to the InsightLocal web portal.
2. Go to **Setup > Configuration > Modbus Settings**.

The screenshot shows the 'Modbus settings' configuration window. It is divided into two sections: 'Serial Port A' and 'Serial Port B'. Each section contains the following settings:

- Baud rate:** 19200 (dropdown menu)
- Parity:** none (dropdown menu)
- Stop bits:** 1 (dropdown menu)
- Error Limit:** 1 (text input field)
- Timeout (ms):** 400 (text input field) for Serial Port A and 500 (text input field) for Serial Port B.

At the bottom right of the window, there are two buttons: 'Apply' and 'Cancel'.

3. Set the device detection settings as shown below. **Note:** These recommended settings are based on the guidelines described in the Notes in *Setup InsightFacility with Power Meter on page 5*.

Setting Name	Serial Port A	Serial Port B
<b>Baud rate</b>	19200	19200
<b>Parity</b>	none	none
<b>Stop bits</b>	1	1
<b>Error Limit</b>	1	1
<b>Timeout (ms)</b>	400 (for inverter)	500 (for WattNode meter)

4. Click **Apply**.

## Setting the Detection Range

After selecting the addresses on the mobile app and power meter, select a detection range that is close to the selected addresses. This will speed up the device detection search time.

- Go to **Setup > Device Detection** and then set the detection range.

Port	Range
RS-485-1	1 to 5
RS-485-2	1 to 4

**Note:** Devices connected to InsightFacility pins 16, 18, and 20 will be detected in Port RS-485-1 and devices connected to InsightFacility pins 22, 24, and 26 will be detected in Port RS-485-2.

## Configuring the Power Meter

Once the power meter has been detected in the steps above, configure the power meter:

- Go to **Devices > Meters** and select the power meter that will be used to measure power export to the grid.

Property	Value
Device Association	Unassociated
Total active power	0 W
Voltage phase A	0 V
Voltage phase B	0 V
Voltage phase C	0 V
Total current	nan A
frequency	nan Hz
power factor	1
Serial Number	12345678
Model Name	WND-WR-MB
Customer Device Name	Continental Control Systems

- Select the **Configuration** tab.

The screenshot displays two configuration panels. The top panel, titled "Meter Settings", features a slider for "Rated current of the attached CTs" set to 200 A, an "Averaging" dropdown menu set to "Fast", and "Apply" and "Reset" buttons. The bottom panel, titled "Advanced Device Settings", includes a "Device Association" dropdown set to "Grid", a "Device Number" input field with the value "1", a "Device Name" input field with the value "WattNode", and "Apply" and "Reset" buttons.

3. Under **Meter Settings**, configure the meter as shown:
  - **Averaging:** Fast
  - **Rated current of the attached CTs** (if installed): 150 A to 600 A. See your CT rating.  
**Note:** Rated current CT setting based on the used CT Range.
4. Click **Apply**.
5. Under **Advanced Device Settings**, set Device Association to **Grid**.
6. Click **Apply**.

## Configuring the CL Series Inverter

Once the CL Series Inverter has been detected successfully, configure the inverter:

1. Go to **Devices > Inverters**, and select the CL Series Inverter.
2. Go to **Configuration** and under **Advanced Device Settings**, set Device Association to **Grid**.

**Communication Loss Settings** ▼

Comm Loss check enable	<input type="text" value="Disable"/>	Comm lost preset Active power	<input type="text" value="100"/> Per
Comm loss time	<input type="text" value="180"/>	SecondsComm lost preset reactive pwr mode	<input type="text" value="Reactive power control..."/>
Comm loss recover enable	<input type="text" value="Disable"/>	Comm lost preset reactive pwr ratio	<input type="text" value="0"/>
Comm loss recover time	<input type="text" value="1"/>	SecondsComm lost preset reactive pf	<input type="text" value="1"/>

**Advanced Device Settings** ▼

Device Association	<input type="text" value="Grid"/>	Device Number	<input type="text" value="2"/>
Device Name	<input type="text" value="CL50"/>		

3. If there are multiple CL Series inverters in the system, select each inverter individually and set the Device Association for each.

# Smart Energy Manager

To access the export limiting configurable settings, contact your Regional Sales Application Engineer.

## To use the Smart Energy Manager feature:

1. Go to **Setup > Smart Energy Manager**.
2. Set the export limiting settings according to your grid code requirements. See the table below for the setting ranges for the CL Series.

The screenshot shows the 'Setup' page of the Smart Energy Manager. The left sidebar contains navigation options: Configuration, Network, Manage Passwords, Device Detection, and Smart Energy Manager. The main content area is titled 'Zero Sell' and contains a section for 'CL Export Power Limiting'. At the bottom right of this section, there is a 'Password' input field and an 'OK' button.

The screenshot shows the 'Setup' page with two configuration panels. The top panel is titled 'Zero Export' and contains the following settings:

- Zero Sell - Config Enable:  disabled
- Zero Sell - Trip Power:  W
- Zero Sell - Trip Set Time:  s
- Zero Sell - Trip Clear Time:  s
- Zero Sell - Config Set Point:  W

Buttons for 'CLEAR' and 'APPLY' are located at the bottom of the Zero Export panel. The bottom panel is titled 'CL Export Power Limiting' and contains the following settings:

- Region: Spain
- Export Limiting - Enable:  Enable
- Export Limit:  W
- Trip Time:  s
- Clear Time:  s

Buttons for 'CLEAR' and 'APPLY' are located at the bottom of the CL Export Power Limiting panel.

Table 1 Export limiting setting ranges

Parameter	Setting Description	Range	Setting
Region	The Country Setting that CL Series inverters are set to	Not set-able through InsightFacility	Spain
Export Limiting - Enable	Switch for enabling/disabling the CL Series Export Limiting function	Enabled/Disabled	Enabled
Export Limit	Maximum Power Limit that the system is allowed to export to the grid	-100 kW to 100 kW	0 W
Trip Time	Time to grid disconnection when inverter and/or meter communication error is detected	1s - 100s	1s
Clear Time	Time to grid reconnection after inverter and/or meter communication has been established	1s – 100s	60s

**Note:** InsightFacility V1.12 only supports the CL Series Export Limiting Feature OR the XW Pro Export Limiting Feature. The system will NOT allow you to enable both features at the same time.

## Basic Power on Test for Checking Export Controls

Once the system configuration is done, confirm all the devices are working correctly.

1. Switch the CL Series DC switch to ON to energize the inverter.
2. Once initial configuration of the CL Series and Power meter is done, confirm all devices are detected and are online.

Note: No device should be grayed out.

CL50 0		Online	CL50 0		Online	WattNode 0		Online
Device Association	Grid		Device Association	Grid		Device Association	Unassociated	
Inverter Status	Run		Inverter Status	Run		Total active power	-456 W	
Alarm Code	No Fault		Alarm Code	No Fault		Voltage phase A	230 V	
20' Total Power	26 777 kW		20' Total Power	26 744 kW		Voltage phase B	230 V	
MPPT1 Voltage	800 V		MPPT1 Voltage	800 V		Voltage phase C	232 V	
MPPT1 Current	22.3 A		MPPT1 Current	22.3 A		Total current	6 A	
MPPT2 Voltage	589.9 V		MPPT2 Voltage	589.9 V		Frequency	50 Hz	
MPPT2 Current	16.6 A		MPPT2 Current	16.6 A		power factor	1	
MPPT3 Voltage	589.9 V		MPPT3 Voltage	589.9 V		Serial Number	12345678	
MPPT3 Current	6.6 A		MPPT3 Current	6.6 A		Model Name	WMS-165-140	
MPPT4 Voltage	0 V		MPPT4 Voltage	0 V		Customer Device Name	Continental Control Systems	
MPPT4 Current	0 A		MPPT4 Current	0 A				
MPPT5 Voltage	0 V		MPPT5 Voltage	0 V				
MPPT5 Current	0 A		MPPT5 Current	0 A				
Total Real Power	12 903 kW		Total Real Power	16 679 kW				
Voltage Phase A	230 V		Voltage Phase A	230 V				
Voltage Phase B	230 V		Voltage Phase B	230 V				
Voltage Phase C	230 V		Voltage Phase C	230 V				
Phase A Current	9 A		Phase A Current	6 A				
Phase B Current	9 A		Phase B Current	9 A				
Phase C Current	9 A		Phase C Current	9 A				
Frequency	50 Hz		Frequency	50 Hz				

3. Confirm the CL Series is online and reporting correct values:
  - a. Confirm the CL Series is online and has no faults.
  - b. Confirm the Phase voltages and currents.
  - c. Check the real power of the CL Series.
  - d. Enable the CL Series export power control and confirm the power export is limited.
  - e. Confirm the inverter status is **Dispatch** or **Run** mode.
4. Confirm power meter settings (WattNode meter shown):
  - a. Confirm the power meter is measuring the active power.
  - b. Check the direction of the power flow.  
Exporting power: Positive power value  
Importing power: Negative power value
  - c. Confirm export control is enabled and load is on.

- d. Confirm the reported exported power is around -800 to -1000 watts after stabilization.

## WattNode 0 Online

Device Association	Grid
Total active power	-877 W
Voltage phase A	232 V
Voltage phase B	232 V
Voltage phase C	231 V
Total current	-6 A
frequency	50 Hz
power factor	-1
Serial Number	9102124
Model Name	WND-WR-MB
Customer Device Name	Continental Control Systems



5. Confirm communication and External contactor action:
  - a. Create a communication error by disconnecting or powering off the energy meter. This will open the external contactor connected to the CL Series.
  - b. Confirm the CL Series reports **Grid fault**.

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**Date:** June 2022

### **Contact Information**

For country-specific details, please contact your local Schneider Electric Sales Representative or visit the Schneider Electric Solar Business website at: <https://solar.se.com/>

### **Information About Your System**

As soon as you open your product, record the following information and be sure to keep your proof of purchase.

Serial Number \_\_\_\_\_

Product Number \_\_\_\_\_

Purchased From \_\_\_\_\_

Purchase Date \_\_\_\_\_