

Technical Note - Retrofit Application, Sigen C&I ESS Solution Integrated with Installed Inverters

Manufacturer: Sigenenergy Technology Co., Ltd.

Scope of application: This document is only used for Sigen PV 50~125MI-HYA and Sigen PV 50~110MI-HYB.

Revision History

Version	Date	Description
1.0	2025.06	Initial release
2.0	2025.07	Increase the description of frequency setting of "Frequency control"
3.0	2025.08	Increase the description of Gateway Smart Port connection with 3rd-party PV grid-tied inverter in backup scenario
4.0	2025.09	Revise the description of Sigenenergy Sensor 2
5.0	2025.09	Add the model of Sigen PV 125MI-HYA

Background

For existing on-grid solar PV projects which are already in operation (using inverters from other brands), it is hoped that by adding a battery energy storage system (BESS) the entire installation can achieve maximum self-consumption, while keeping centralized monitoring, management, and zero-injection requirements between the newly added BESS and the existing on-grid solar system. The retrofit solution proposed via Sigenergy C&I solution provided by Sigenergy can meet the requirements in this scenario.

Introduction of the existing on-grid system

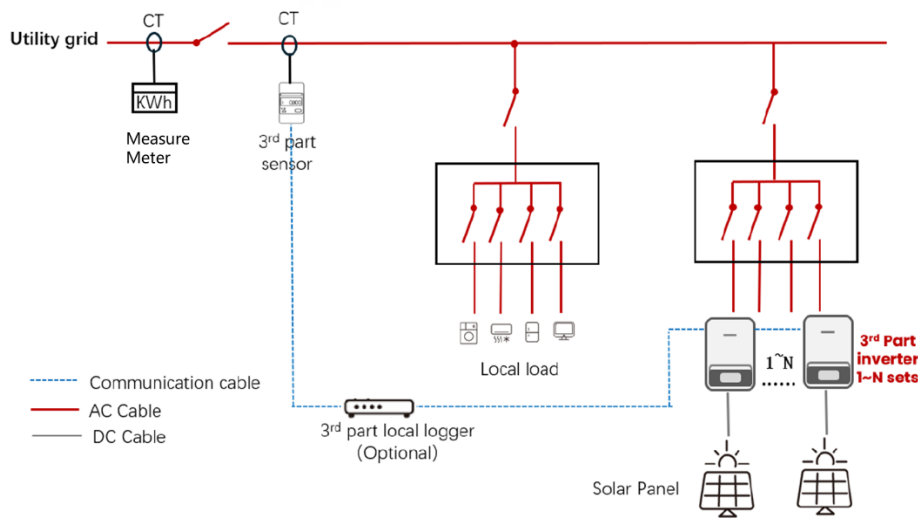


Figure 1. Single line diagram of the existing on-grid system

The existing on-grid system description:

1. Pure on-grid scenario, power outage scenario will not occur (There is no backup).
2. One or several 3rd-party PV grid-tied inverters have been installed.
3. No existing battery storage system (No BESS).
4. A CT or power sensor has been installed to meet zero-injection requirement: the inverter(s) communicates with the power sensor (or through a local logger) to detect the power at the grid connection point in real time. When the inverter detects power injection into the grid at the power sensor point, it will limit its AC output power to ensure that the solar system has no power injection into the grid.
5. The existing inverters system is unable to communicate with a potential newly solar and ESS system.

Requirements for retrofit:

1. SigenStack BESS and Sigen C&I inverter Integration: Enables centralized control, maximizes solar self-consumption, and enforces zero grid feed-in compliance.

2. Surplus PV Energy Capture: Stores excess generation from existing PV inverters into BESS, minimizing energy waste.
3. Seamless Load Support: BESS autonomously supplements power to loads during PV generation deficits.
4. Unified System Monitoring: Real-time visibility of both existing inverters and BESS operations via integrated platform.

Sigenenergy On-Grid Retrofit Solution in C&I

In response to the existing system and retrofit requirements in C&I scenario, Sigenenergy can provide the solution with Sigen C&I inverter (HYA), SigenStack system and two power sensors, which can achieve the retrofit requirements mentioned above without communication with existing 3rd-party inverters.

The single line diagram of the retrofit solution is shown below:

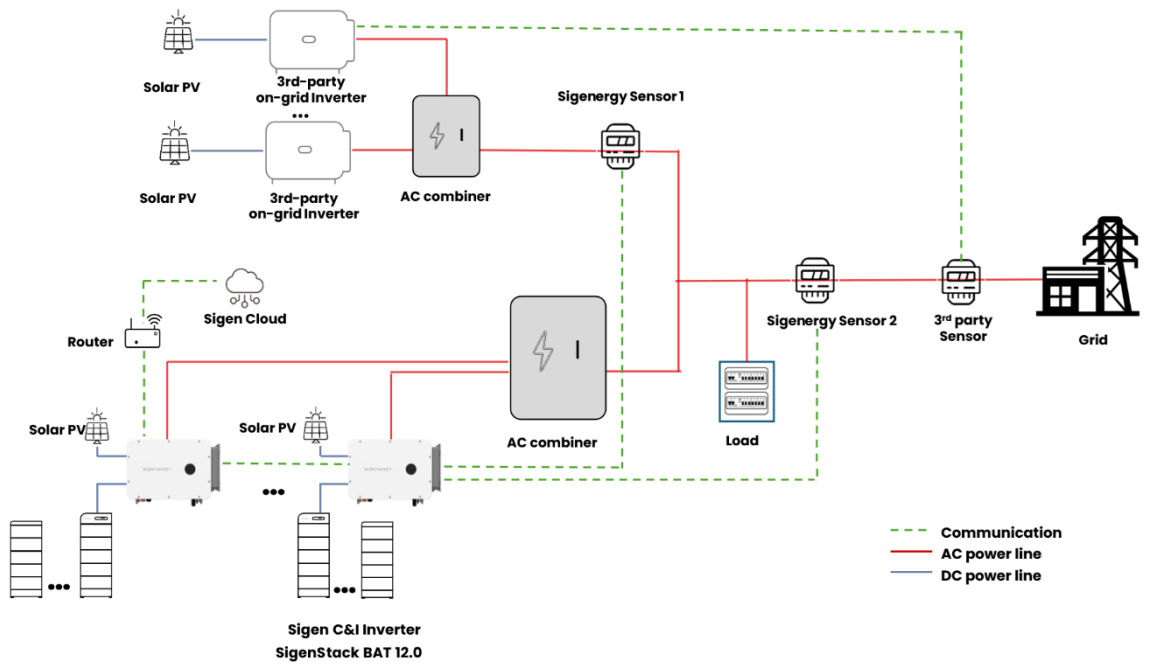


Figure 2. Single line diagram of Sigenenergy on-grid retrofit solution in C&I

Sigenenergy Sensor:

1. **Sigenenergy Sensor 1 (optional)** is used to get the power generation data (such as AC active power, AC current, voltage and yield) of the existing solar system and display it on the mySigen APP.

Clients may opt out of Sigen Sensor 1 installation at this point. The current, voltage, and power generation information of the third-party inverter will not be displayed on the mySigen APP, but this will not affect the overall functionality of the system.

2. **Sigenenergy Sensor 2** is mainly used for power control at the grid connection point, to realize the maximum consumption and zero-injection functions for the Sigenenergy

system.

Control strategy for maximum consumption and zero-injection

1. **When output power of the 3rd-party inverters < load power:** The newly added Sigen C&I inverter will supplement the power supply to the load. When both the newly added Sigen C&I inverter and the 3rd-party inverters cannot support the load, the remaining power supply demand is supplemented by importing power from the utility grid.
2. **When output power of the 3rd-party inverters > load power:** The newly added Sigen C&I inverter will detect the injection current at the point of Sigenenergy Sensor 2 and charge the battery to ensure zero injection at the grid point. In this way, the excess power of the 3rd-party inverter will charge SigenStack BESS without energy waste.
3. **When output power of the 3rd-party inverters > load power + SigenStack charge power:** Sigen C&I inverter will charge the battery at maximum chargeable power. Meanwhile, 3rd-party inverters can detect the injection current at the point of the 3rd-party sensor and limit their output power to ensure zero-injection at the point of the 3rd-party sensor.

Important Note 1:

From the above control strategy, Sigen C&I inverter will prioritize controlling zero-injection at the point of **Sigenenergy Sensor 2**, and then the 3rd-party inverters will control zero-injection at the point of 3rd-party sensor.

To keep a stable control, the zero-injection parameter at the point of **Sigenenergy Sensor 2** is generally set to be slightly **smaller** than that at the point of 3rd-party sensor to prioritize the implementation of the zero-injection strategy.

If it exceeds the control range of Sigen C&I inverter, the 3rd-party inverters will do the zero-injection function and limit its output power.

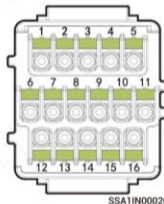
Example:

Setting the zero-injection parameter of the 3rd-party sensor to 0W, and setting that of the **Sigenenergy Sensor 2** to (-0.5% of nominal capacity of Sigenenergy system) W. In this way, the Sigenenergy system will constantly control power at the point of **Sigenenergy Sensor 2** \leq (-0.5% of nominal capacity of Sigenenergy system) W, and the 3rd-party inverters will control the power at the point of 3rd-party sensor \leq 0W, ensuring that the Sigen C&I inverter prioritizes zero-injection control.

Important Note 2:

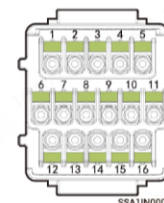
Sigenenergy Sensor 1 in Figure 2 can only be connected to the RS485-1 port of Sigen C&I

inverter (Pin 15 and Pin 16 shown as below). Sigenenergy Sensor 2 in Figure 2 can only be connected to the RS485-2 port of the Sigen C&I inverter (Pin 13 and Pin 14 shown as below). The order of the two ports cannot be exchanged.



Function description	Pin Definition	Pin Number	Sigen Sensor TP-CT300-DH (SDM630MCT 40mA/300A)	Sigen Sensor TP-CT600-DH (SDM630MCT V2/600A)	Sigen Sensor TPX-CH (DTSU666)
(Reserved) DO1, connected to third party intelligent electric equipment, such as switch control and heat pump.	DO1-COM Dry contact 1-Common	1	-	-	-
	DO1-NO Dry contact 1-Normal Open	2	-	-	-
RS485-1-2, Reserved.	RS485A1-2 RS485 signal 1-2_A+	3	-	-	-
	RS485B1-2 RS485 signal 1-2_B-	4	-	-	-
Used for grid power scheduling, such as DRM, Ripple Control Receiver, etc.	DI1 Digital input 1	5	-	-	-
	DI2 Digital input 2	6	-	-	-
	DI3 Digital input 3	7	-	-	-
	DI4 Digital input 4	8	-	-	-
	GND Signal GND	10	-	-	-
Used to connect the rapid shutdown DI interface as the signal cable port for the NS protection device.	DI5 Digital input 5	9	-	-	-
	PE PE signal shielding ground	12	-	-	-
RS485-2, Used to access the grid side power sensor.	RS485B2 RS485 signal 2_B-	13	13	13	25
	RS485A2 RS485 signal 2_A+	14	14	14	24
RS485-1-1, Custom port. Used to connect Meteorological Station, a third-party EMS controller and so on.	PE PE signal shielding ground	11	-	-	-
	RS485A1-1 RS485 signal 1-1_A+	15	-	-	-
	RS485B1-1 RS485 signal 1-1_B-	16	-	-	-

Figure 3. HYA Inverter RS485 Wiring Interface



Function description	Pin Definition	Pin Number	Sigen Sensor TP-CT300-DH (SDM630MCT 40mA/300A)	Sigen Sensor TP-CT600-DH (SDM630MCT V2/600A)	Sigen Sensor TPX-CH (DTSU666)
(Reserved) DO1, connected to third party intelligent electric equipment, such as switch control and heat pump.	DO1-COM Dry contact 1-Common	1	-	-	-
	DO1-NO Dry contact 1-Normal Open	2	-	-	-
(Reserved) DO2, Used to connect the generator.	DO2-COM Dry contact 2-Common	3	-	-	-
	DO2-NO Dry contact 2-Normal Open	4	-	-	-
	DO1-NC Dry contact 2-Normal Close	11	-	-	-
For power scheduling, such as DRM and Ripple control Receiver.	DI1 Digital input 1	5	-	-	-
	DI2 Digital input 2	6	-	-	-
	DI3 Digital input 3	7	-	-	-
	DI4 Digital input 4	8	-	-	-
	GND Signal GND	10	-	-	-
Used to connect the rapid shutdown DI interface as the signal cable port for the NS protection device.	DI5 Digital input 5	9	-	-	-
	PE PE signal shielding ground	12	-	-	-
RS485-2, Used to access the grid side power sensor.	RS485B2 RS485 signal 2_B-	13	13	13	25
	RS485A2 RS485 signal 2_A+	14	14	14	24
RS485-1, Custom port. Used to connect Meteorological Station, a third-party EMS controller and so on.	PE PE signal shielding ground	11	-	-	-
	RS485A1 RS485 signal 1_A+	15	-	-	-
	RS485B1 RS485 signal 1_B-	16	-	-	-

Figure 4. HYB Inverter RS485 Wiring Interface

Sigenenergy Off-grid Retrofit Solution in C&I with Backup

If the newly added system also needs backup capabilities where it is required to supply power when power outage occurs, Sigenenergy can provide a solution for this scenario through Sigen Gateway in combination with the Sigen C&I Hybrid inverter (HYB) solution. In terms of Gateway for HYB such as Sigen Gateway 600-B/1200-B, the default function of smart port is used for generator connection. Before the connection of third-party inverter, the installer needs to do some simple modifications on the gateway, which can be referred to instructions of "Application Note – How to switch the generator connection to third-party inverter connection for Sigen C&I Gateway"

Important Note:

1. Need to inform **Sigenergy engineer** and **installer** before the wiring connection of retrofit solution in C&I with backup since some modifications on the gateway need to be done on site.
2. 3rd-party inverters can be connected to the Sigen Gateway **Grid Port** or **Smart Port**.
 - a) If the 3rd-party inverters are connected to **grid port**, when a power outage occurs, the Sigen C&I inverter and Gateway will switch to off grid mode, and only the Sigen C&I inverter will supply the load. **The 3rd-party inverters will shut down.**
 - b) If the 3rd-party inverters are connected to the **Smart Port**, the maximum total output of 3rd-party inverters cannot exceed the capacity of smart port breaker, If the total output of 3rd-party inverter exceeds the capacity of smart port breaker, the contactors of smart port in gateway will trip.
 - c) If the 3rd-party inverters are connected to the **Smart Port**. when a power outage occurs, the Sigenergy system and 3rd-party inverters can operate in off-grid scenario, if the power sent from 3rd-party inverters is less than the load power plus the max. charging power of Sigenergy system, the 3rd-party inverters can operate normally; Otherwise, the 3rd-party inverters will stop operating because of startup of protective measure from Sigenergy system.
3. Local load is connected to the Sigen Gateway **Backup Port**.
4. Sigen C&I inverters are connected to the Sigen Gateway **Inverters Port**.
5. The Sigen Gateway does not support the 3rd-party inverters being connected to the **Backup Port**.

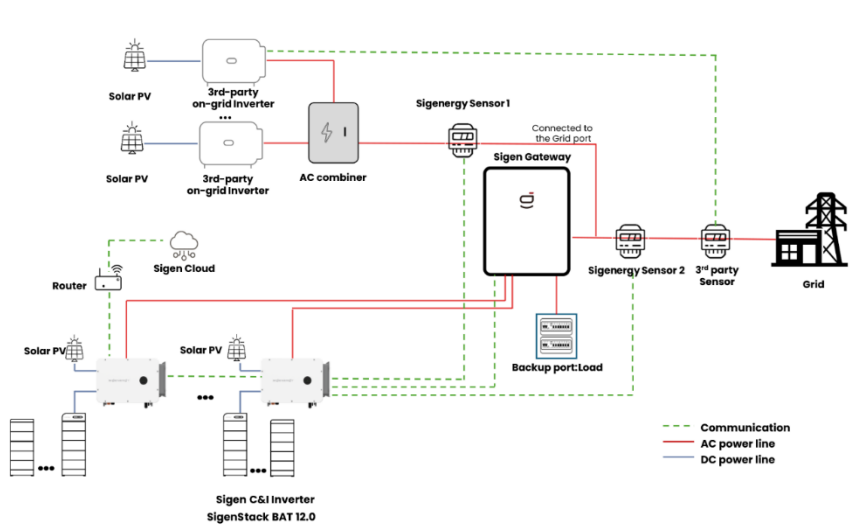


Figure 5. Single line diagram of the retrofit solution (Backup scenario): 3rd-party inverters are connected to Grid Port

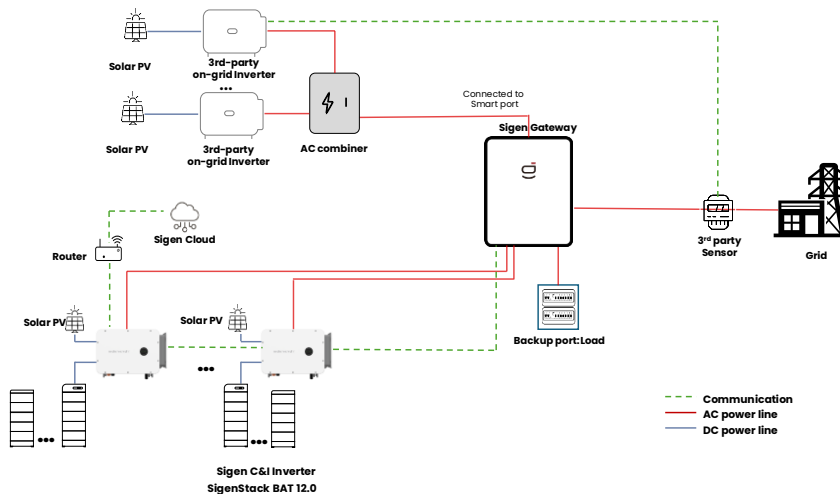


Figure 6. Single line diagram of the retrofit solution (backup scenario): 3rd-party inverters are connected to Smart Port

How to add existing 3rd-party inverter on mySigen APP

Please log in with an installer/end-user account:

1. Select "Device" and "Add System Device"
2. Select "Inverter"
3. Fill in the brand and model of the installed inverters
4. Select the power sensor model and connected inverter
5. Finish adding installed inverters

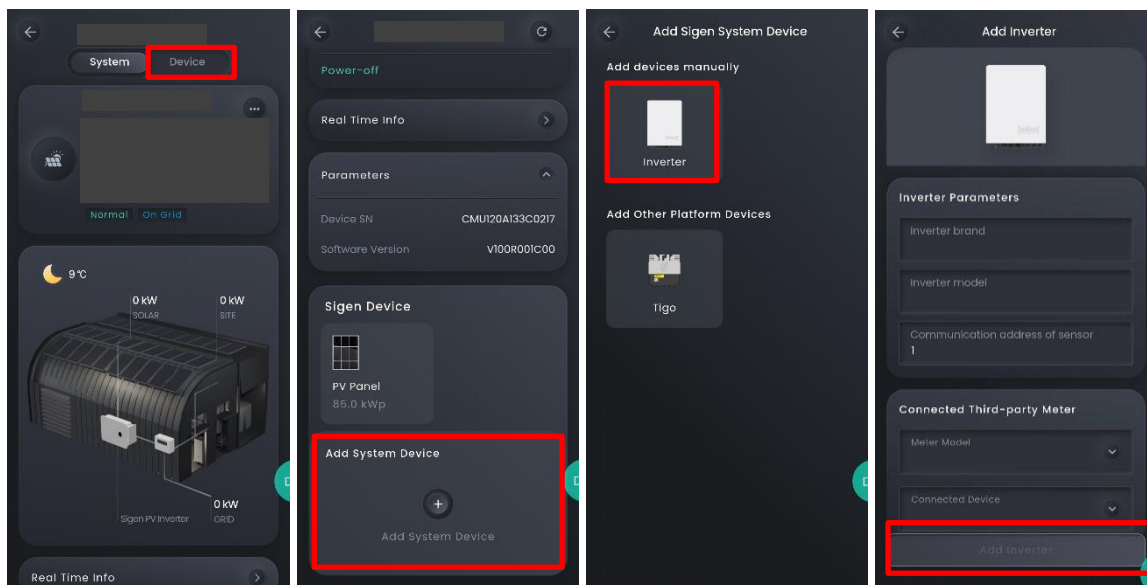


Figure 7. Interface of adding 3rd-party inverter system

Query 3rd-party inverters system information on mySigen App:

After adding the existing inverter, you can query the following 3rd-party inverters system information on the mySigen App:

1. Real time information of installed inverters, including voltage, current, active power and energy.
2. The installed inverters can be displayed on the homepage with energy and power.
3. Frequency control could be enabled at the inverter setting page. Enabling this feature allows Sigen C&I inverter to automatically adjust the system frequency when **operating off-grid**. This capability controls third-party inverters to either reduce output power or shut down when necessary, preventing potential damage from excess energy that the load cannot consume. This protection mechanism ensures safe operation in off-grid scenarios, especially when a third-party inverter is present in the system

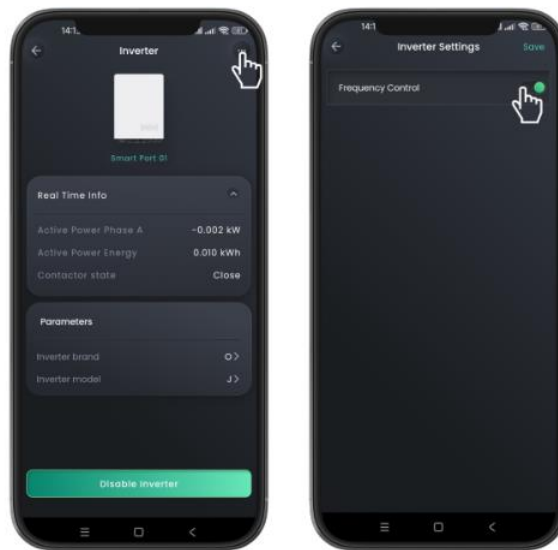


Figure 8. Interface of frequency control function for 3rd-party inverter system

4. The frequency range of "Frequency control" is based on the "Off-Grid Switching Control" in the "Off-Grid Parameters Setting". If the "custom On Off Grid Switch Enable" is enabled, the frequency will be adjusted according to "Over/Under-frequency Switching Threshold (Hz)". Otherwise, it will be adjusted according to the default setting based on the grid code.

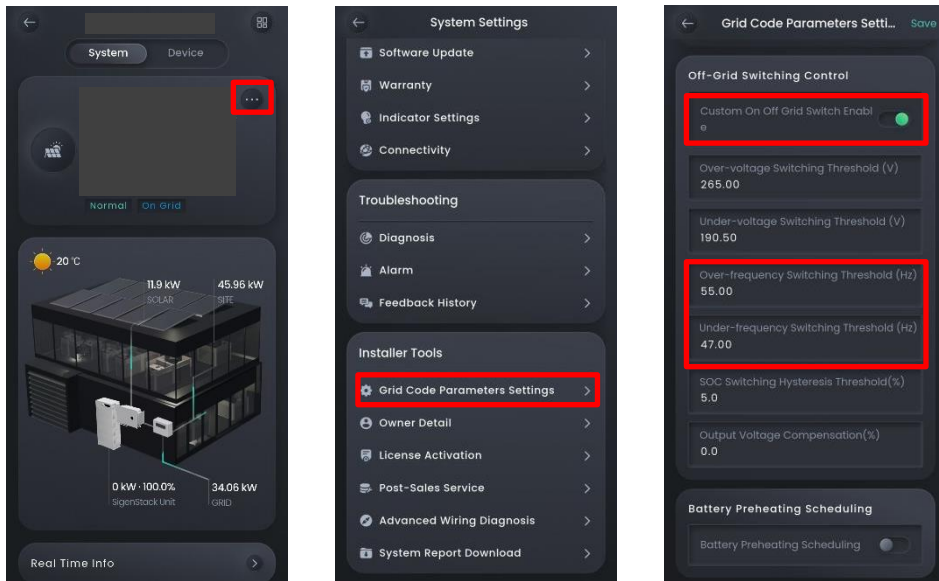


Figure 9. The frequency setting through mySigen APP

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