

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 50~110MI-HYA and Sigen PV 50~110MI-HYB

Revision History

Version	Date	Description
1.0	2025.06	Initial release

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 Sigenenergy C&I solution provided by Sigenenergy can meet the requirements in this scenario.

Introduction of the existing on-grid system

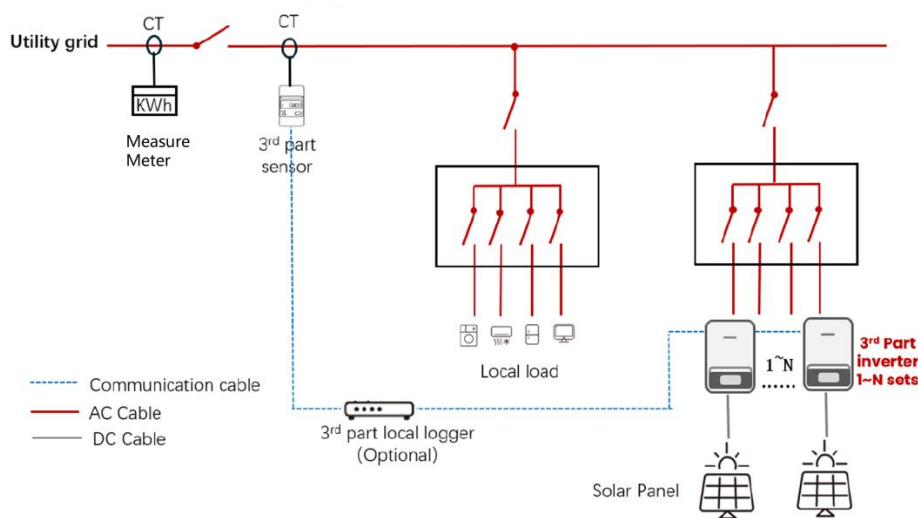


Figure 1 . Single line diagram of the existing on-grid system

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.

Sigenergy On-Grid Retrofit Solution in C&I

In response to the existing system and retrofit requirements in C&I scenario, Sigenergy 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:

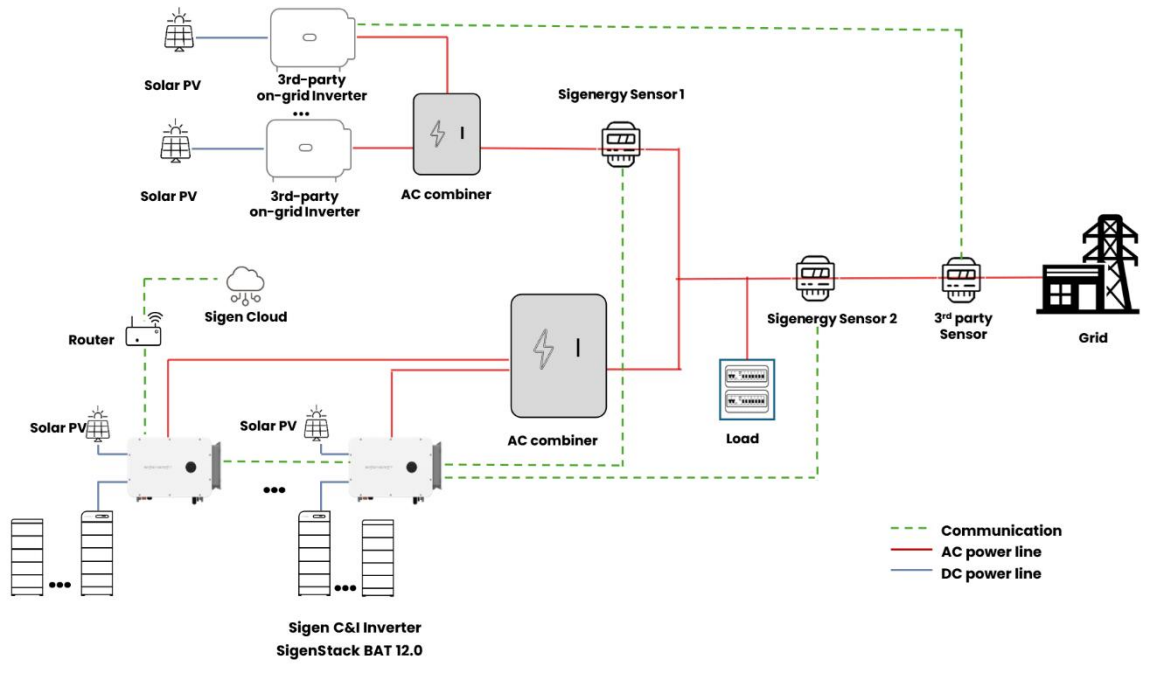


Figure 2. Single line diagram of Sigenergy on-grid retrofit solution in C&I

Sigenergy Sensor:

1. **Sigenergy 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. **Sigenergy Sensor 2** is mainly used for power control at the grid connection point, to realize the maximum consumption and zero-injection functions for the entire system. To achieve zero injection functions.

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** $\leq (-100)$ W, and the 3rd-party inverters will control the power at the point of 3rd-party sensor ≤ 0 W, ensuring that the Sigen C&I inverter prioritizes zero-injection control.

Important Note 2:

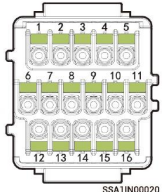
Sigenenergy Sensor 1 in Figure 2 can only be connected to the RS485-1 port of Sigen C&I inverter (**Pin 15 and Pin 16 shown as below**). **Sigenenergy Sensor 2** in Figure 2 can only be connected to the RS485-2 port of the Sigen C&I inverter (**Pin 13 and Pin 14 shown as below**). The order of the two ports cannot be exchanged.

5.10 Signal cable Connection

Tips

- The power sensor needs to be purchased from our company's official channels.
- The appearance and specific wiring of the power sensor can be found in the instruction manual delivered with the case.

5.10.1 COM terminal introduction



Function description	Pin Definition		Pin Number	Signen Sensor TP-CT300-DH (SDM630MCT 40mA/300A)	Signen Sensor TP-CT600-DH (SDM630MCT V2/600A)	Signen Sensor TPX-CH (DTSU666)
(Reserved) DO1, connected to third party intelligent electric equipment, such as switch control and heat pump	D01-COM	Dry contact 1-Common	1	-	-	-
	D01-NO	Dry contact 1-Normal Open	2	-	-	-
RS485-3, Reserved	RS485A1-2	RS485 signal 3_A+	3	-	-	-
	RS485B1-2	RS485 signal 3_B-	4	-	-	-
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	-	-	-
RS485-2, Used to access the grid side power sensor	PE	PE signal shielding ground	12	-	-	-
	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	-	-	-
	RS485A1-1	RS485 signal 1_A+	15	-	-	-
	RS485B1-1	RS485 signal 1_B-	16	-	-	-

Figure 3. Inverter RS485 Wiring Interface

How to add an existing third-party installed inverter through mySignen 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

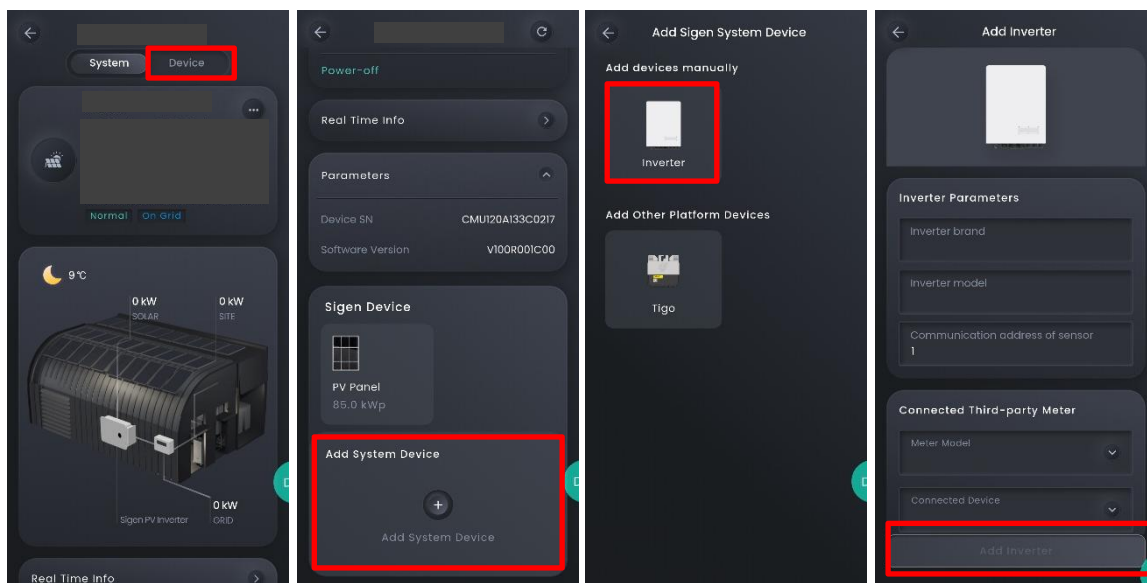


Figure 4. Interface of adding 3rd-party inverter system

Query the 3rd-party inverters system information on the 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

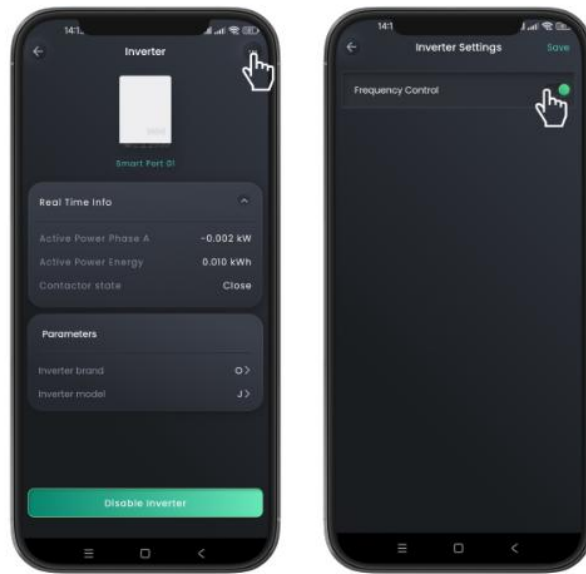


Figure 5. Interface of 3rd-party inverter system

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 needs to be done on site.
2. 3rd-party inverters can be connected to the Sigen Gateway **Grid Port (with grid)** or **Smart Port**.
 - a) 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.
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. 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.**
6. The Sigen Gateway does not support the 3rd-party inverters being connected to the **Backup Port**.

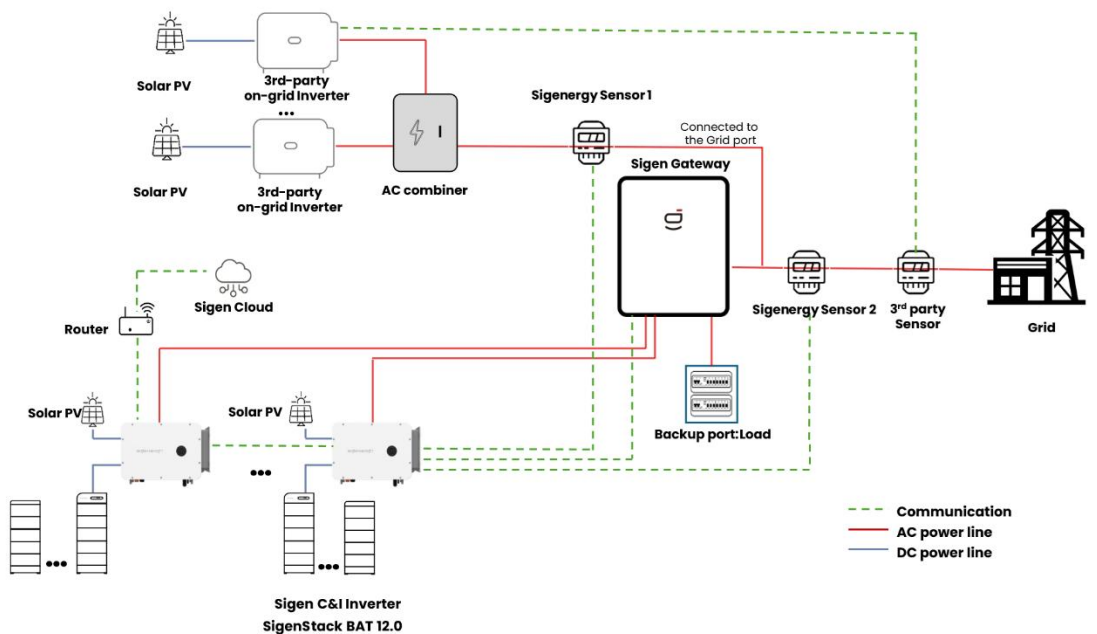


Figure 6. Single line diagram of the retrofit solution (Backup scenario): 3rd-party inverters are connected to Grid Port

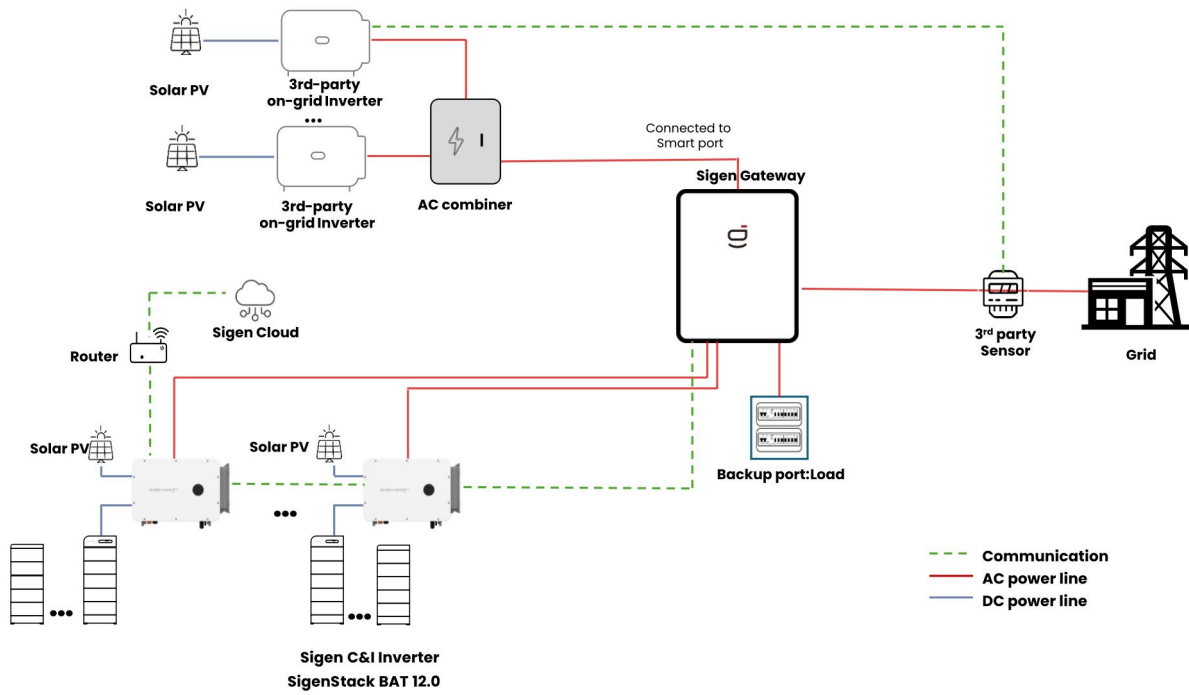


Figure 7. Single line diagram of the retrofit solution (backup scenario): 3rd-party inverters are connected to Smart Port

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