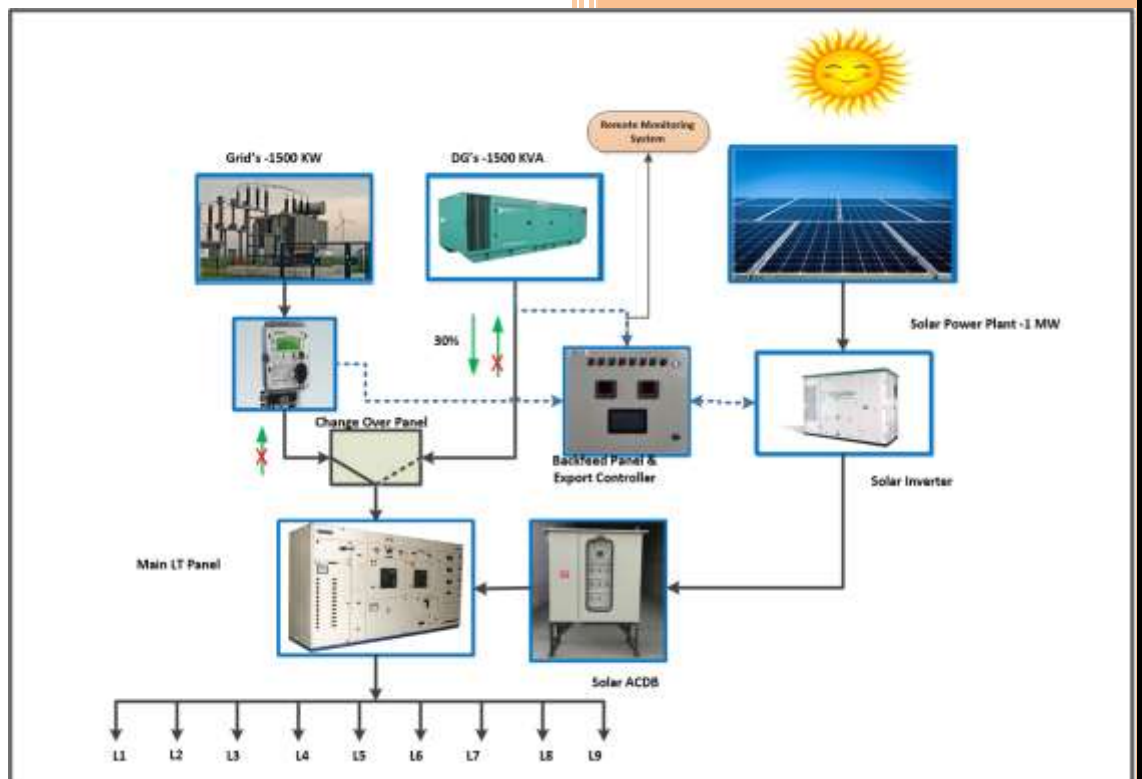




2020

Solar Back Feed Manager- Sol.SYNC



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Product Information

Most of the EPC companies face challenges when Power from Solar Power Plant flows to Diesel Generator/GRID as it harms the alternator, or sometimes results in mechanical damage.

Also where net metering is not available It can also increase the bill of the customer if the running load is less than the solar power generated and power flows towards the grid.

CECPL has a field proven, time tested, product solution **Sol.SYNC**, which

- Prevents backflow of solar power to diesel generators.
- Maintains diesel generator at 30%.**

This also works equally well on Grid Export where for example:

1. Grid where net metering is not possible or available,
2. Grid export is not needed by end client,
3. Grid export is disallowed by Discoms,
4. Grid export is allowed, but only during certain Time of Day,
5. Grid export is allowed but limited to fixed MWhr per day.

The conditions for Solar DG / Grid Sync arise *when load drops to less than Power Produced by Solar Power Plant* [e.g. on Saturday, Sundays and other holidays]. This could also happen during a normal day when load is less than power produced by a solar power plant [*like during lunch time or during shift change or immediately after a power source change over*]. Or a sudden load trip.

Sol.SYNC does the following continuously -

- a. Monitors Power demand of local load(s) on the existing Electrical Control Panel. *[Even though this is the best method, most of the time logistic of this is too complicated to collect this data, due to preexisting Electrical Power Panel design. So instead of collecting load data, DG / Grid power data is collected, bidirectionally. Though not as effective as the first method, it is well within the prescribed limits of electrical power flow and protection parameters]*
- b. Monitors Power being produced currently by Solar Power Plant.
- c. Calculates if Power Produced currently is greater than Current Power Demand of Local Loads
- d. Commands Solar Power Plant to produce power equal to the local demand
- e. Can, *optionally*, give control commands to switch on fixed, normally non-essential, loads to consume power, reducing the wastage of Solar power.

In addition to this, **Sol.SYNC** can, *optionally*, perform the grid reverse-power protection by controlling the power output to temporarily isolate the Solar Power Plant, if it has such a feature available, else of course, there are other resources like tripping the Solar Power inverter, simultaneously or one by one *[depending on model of Sol.SYNC chosen]*.

** With $\pm 5\%$ margin of error.

** Controlling response depends on the number of device connected in common communication bus

* Approx. communication response time of one read from 1 device is 1sec(400-1000ms)

Product Features

- Proportionally Controls and prevents solar export from PV inverters, when needed,
- Accuracy of +/- 5%,
- Works with for most of the reputed Solar Inverters Manufacturers like,



- Can be used for multiple Inverters simultaneously.
- Detects and controls excess solar power available.
- Electrically Isolated Communication connection to PV Inverters.
- RAMP up / down the Solar Power production depending on running load.
- Data Logging, with Cloud, is available as an optional feature.
- Surge Protection is given for Communication Bus.

Add On Options Available with Sol.SYNC :

- *Optional:* Tripping of DG/Grid breaker in case of Communication failure.
- *Optional:* Switching On non-essential fixed loads if excess solar power is available.

Sol.SYNC Model Features

- **Sol.SYNC** does DG Solar Synchronizing. It helps to run DG at a minimum of 30% load, in line with recommended by the DG set manufacturer.
- **Sol.SYNC** prevents export of solar power to DG and / or Grid, ensuring solar power is used within premises.
- **Sol.SYNC** can also do a T.O.D. export prevention / enablement to Grid, if so required.
- **Sol.SYNC** helps to protect a DG against any back feed current, which could seriously damage the alternator or even the generator.
- **Sol.SYNC** is not restricted by the number of inverters or DG or distance between them. In case the number of DG / Inverter is high, a suitable number of plug-in cards can be added to the system.

Sol.SYNC Models & Feature Comparison

S. No	Model No.	Solo	Lite	Lite +	Std	Std+	Premium	Ultra	Custom	
1	Prevention of Export of Surplus Power to DG and / or Grid	Yes								
2	DG run 30% as per recommended by DG manufacturer	Yes								
3	Number of Inverters Supported per device	1	2	3	≤ 8	≤ 12	≤ 16	≤ 24	>24	
4	Max No. of Grid Supported	2							>2	
5	No. of DGs (Or Grid) Supported	1	2	3	4	6	8	10	>10	
6	No. of MFMs Included	0			2	2	2	TBD		
7	Adding of load step by step	Available*					≤ 4 Loads	≤ 8 Loads	TBD	
8	Display - HMI, 4.3" / 5.7" / 7" / 10"	Available*					4.3"	5.7"	TBD	
9	PC Based Software	Available*								
10	Accuracy	≤ 5%					≤ 2.5%		TBD	
11	Level of Reverse Power Protection	1 Level					2 Levels		3 Levels	
12	Hardware / Software Failure Light	Yes								
13	Inverter Communication Failure Light	Yes								
14	CT / CT Connection Failure Light	Yes								
15	Syncronising Active Light	Yes								
16	DC Supply Healthy Light	Yes								
17	Remote Monitoring (Upto 30 parameter / Inverter + 10 for WMS if protocol is same)	Included++			Available*					
18	Product Warranty (Subject to warranty terms)	3 Year								
19	Service Warranty (Subject to warranty terms)	1 Year								
20	Post Warranty Support	Available*								
21	Extended Product Warranty	Available*								

Note: ++ Subject to parameters list given in Technical Literature.

Note: * Extra charges Apply. Please get in touch for details.

Technical Descriptors

IP Protection Class - IP54	Enclosure Material - CRCA (Powder Coated)
Environmental conditions- 0°C to 45& 5% to 95% R.H	Mounting Location -Indoors
Installations Options - Wall mounting	Power Interface - Phases: 1 / 3
Control Voltage Range - 200-270V AC; 50/60Hz	Power Range – 1 kW to 12 MW.
Measurement Accuracy - ≤ 5%	Power Consumption - Max 100 W
Power Supply - Phase A	Communication - RS485 / Ethernet (Depending on Inverter Make and Model)
Maximum Inverters at one Sol.SYNC	up to 150 nos.
Ramp up/ramp down - Through modbus Com port	Aux Load Control Output - 240 VAC 1A / 24 VDC 1A
HMI, 4.3" / 7.0" Inch in Premium / Ultra models	RMS thru GPRS included in Lite and Standard Models

For Best Results from Sol.SYNC we strongly recommend: -

- Use Solar Inverters enabled with Communication thru Ethernet Port,
- Use RS-485 cable where communication lengths are up to 800 meters
- Use Repeaters (2 maximum) in case RS-485 cabling distances are greater than 400 meters
- Use Fiber Optic Cable, with FO to RS-485 converters, where communication lengths are higher than 800 meters,
- Use only good quality modbus / FO cable manufacturers for communication cable, like Belden / Lapp / HeluKabel etc., for consistent and reliable results,
- Make sure separate earth is given to electronic equipment like Inverters and Sol.SYNC and this is not mixed up with Structure / Building / LA earth pit.
- Earth Pit resistance should be less than or equal to 3 Ohms.

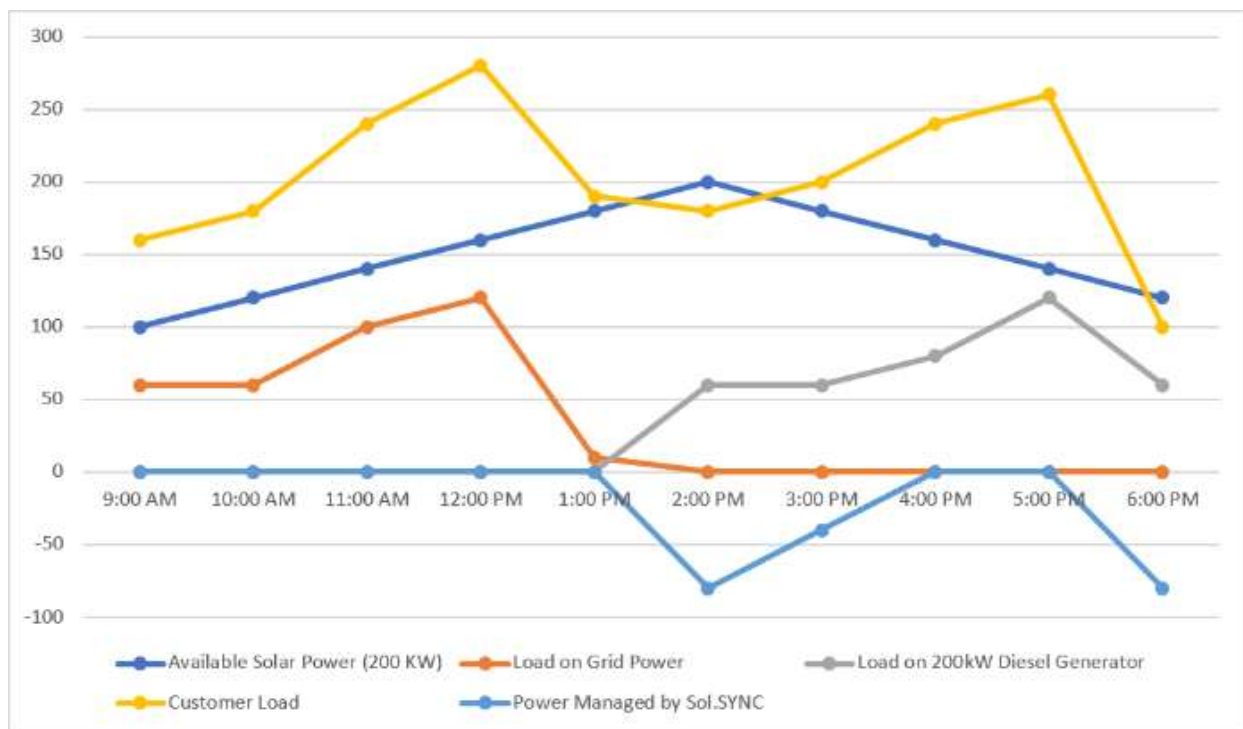
Why Sol.SYNC is needed ?

The usual reasons where Self-Consumption application is required by utility or energy distributor:

1. The Solar Power Plant Owner does not have a Power Purchase Agreement (PPA) or Net Excess Feed-In Tariff (FiT is also called Net Metering) from Energy Distributor
2. The Solar Power Plant Owner is not allowed to export excess PV energy to the grid because the Energy Retailer is not obliged by law to provide revenue to the Asset Owner for the unused PV energy.
3. Grid Voltage is too high due to saturated grid tied solar systems in the area PV Inverter increases AC Output Voltage in order to export solar energy. Due to large solar penetration in the network and the fact most Grid Connected PV Inverters are transformer less, it will cause the grid voltage to increase along the distribution line resulting in large voltage fluctuations.
4. High Penetration of Solar Energy which introduces Reverse Power flow that could disrupt Distribution Network Assets This could lead to increased short circuit currents, fault level, affecting protection coordination and sensitivity, and introduction of harmonics and transients.
5. Local site's existing LV/MV Transformer has reached its capacity When PV System is connected to Shared LV Circuit or Dedicated LV Circuit that utilized Shared Transformer with other Load, the capacity of Transformer may be reached and hence Export Limiting Control may be required to avoid upgrading Local Existing Transformer
6. Energy Distributor only allows a certain amount of Energy to be fed into its distribution system to ensure grid stability or allows a discrete (or full) amount of energy feed in at certain times of day or week or month.
7. In absence of Grid Power supply is made on site, local backup power units like turbines and or diesel generators which do not allow reverse power flow.
8. One wants to reduce the expenses of Local Power Backup solutions like running expenses of Diesel Generating sets.
9. One wants to contribute to the environment by utilizing Solar Power to the maximum

Sample Working Chart for Sol.SYNC of 200 kWp

Case	Available Solar Power (200 KW)	Load on Grid Power	Load on 200kW Diesel Generator	Customer Load	Power Managed by Sol.SYNC
9:00 AM	100	60	0	160	0
10:00 AM	120	60	0	180	0
11:00 AM	140	100	0	240	0
12:00 PM	160	120	0	280	0
1:00 PM	180	10	0	190	0
2:00 PM	200	0	60	180	-80
3:00 PM	180	0	60	200	-40
4:00 PM	160	0	80	240	0
5:00 PM	140	0	120	260	0
6:00 PM	120	0	60	100	-80



Data Logging (Subject to availability in Model Selected by you)

- 30 Inverter parameters like Current, Voltage, Power, Frequency, Active Power, Reactive Power, and Cabinet Temperature can be logged every 15 Minute.
- **Weather Data Logging**
- Weather Monitoring System Data can also be logged, if is made available from client's WMS (in protocol same as ours)
- **Curtailed Power Data Logging (Irradiation Sensor with RMS Port is Required)**
- Easy to Download in excel / CSV format.

Challenges using Sol.SYNC (or any other DG Synchron Solution)

While this is a very straightforward, time tested product, we must ensure the product is properly evaluated during site survey, during product design and software programming.

Some of the main considerations that must be considered to enable a successful installation are:

A. Distances

- a. Between the Solar Inverters themselves (e.g. they may be located on different buildings within the same site),
- b. Between the Solar Inverters and Sol.SYNC Panel,
- c. Between Sol.SYNC Panel and DG Panel(s),
- d. Between DG Panels and Solar Inverters,

Distances have a major impact in hardware selection e.g.

- i. If the distances are less than 400 meters, we can use serial communication protocols,
- ii. If the distances are between 400 meters and 800 meters we can use serial communication protocols, but with repeaters,
- iii. If the distances are higher than 800 meters, we suggest to go with fiber optic cables,

B. Make and Model of Inverters

- a. While most inverters allow communication of third-party devices like Sol.SYNC with the Solar Inverters, some do not (at least not till they make your buy some communication interface)
- b. Most Solar Inverters have Serial Communication Interface, but some do have Ethernet Interface and it impacts various selection,

C. Make and Model of Remote Monitoring System being used

- a. Most solar inverters have only one communication port. While some of the better models have two communication ports. The one with two communication ports offer no problem since one can be used for RMS and other for Solar Back feed Management. But the inverters with only one communication port will either be able to allow RMS to function or the Solar Back feed Management to access the control system. However we do have a workaround solution to this which we can share once the make and model of RMS is shared with us.

Please Note Sol.SYNC does not cover the following:

- *Single phase self-consumption applications for grid connect PV Storage system with only DC coupling using MPPT Solar Charge Controller*
- *Three phase self-consumption applications for grid connected PV Storage system*
- *Off Grid Standalone PV Storage system*
- *Backup Power application*
- *Energy and Load Management application*
- *Micro grid PV systems installed and act as providing spinning reserve to Generator*