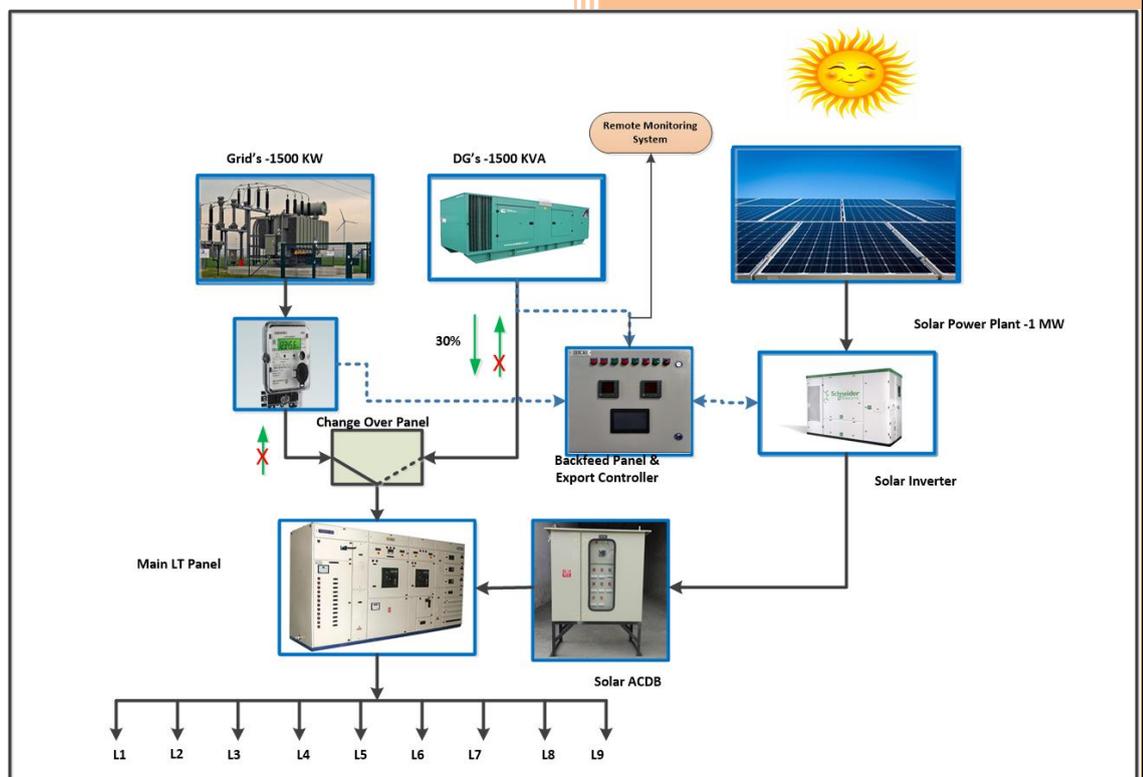




2020

Solar Back Feed Preventer- Sol.CON



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Product Information

Most of the EPC companies face challenges of reverse power flowing from the Solar Power Plant to the Diesel Generator Set. Or to the Grid of Discoms, where Net Metering is not allowed.

When Power from the Solar Power Plant flows to the Diesel Generator, it can **seriously harm the alternator / generator**. It can also increase the electricity bill of the customer (*where net metering is not available*) or cause **penalties** where **Grid export is not allowed** or during certain specified TOD.

CECPL has a solution where we have a field proven, time tested product **Sol.CON**, which prevents back injection of solar power to diesel generator. This also works equally well on Grid (where net metering is not possible or is not needed). The product is working successfully in multiple locations across India with many of leading solar EPC using it.

The condition for use of **Sol.CON** is created, when load drops to less than Power Produced by Solar Power Plant like weekends and holiday. This could even happen any time of the day when load is less than power produced by solar power plant, during lunch hours or shift changeover.

Every 250 milliseconds Sol.CON can do the following -

- a. Monitors Power going into Alternator of DG / or to Grid. In normal course of event current flows out of alternator of DG. But in case Solar Power Produced is in excess of the load on DG-Solar Power combine, current goes back to alternator / grid power and must be cutoff.
- b. Calculates *if* current is going back to alternator / Grid, irrespective of the source of current.
- c. Cuts off solar power plant, either by cutting off the inverter (some inverters have the necessary hardware) or by cutting off solar power output thru a ICOR Panel.
- d. After a 10-minute interval the Solar Power is switched on again and the process from a. to c. is repeated.

Product Features

- Controls and / or prevents solar export from Solar Power Plants to DG / Grid.
- Accuracy of better than +/- 5%.
- Monitors excess solar power going into DG / Grid.
- Alternatively, if opted for, switching non- essential fixed loads if excess solar power is available can also help in avoiding wastage of precious Solar Power.
- Only a minor change in the way solar power plant is commissioned.

- Sol.CON essentially consists of a Reverse Power Sensor, a ICOR Reengaging Timer and ICOR (Inverter Cut-Off Relay). All of this is housed in an enclosure and wired up to terminals. All the Client must do is 1) connect his CT wires to Sol.CON terminals 2) Inverter Outgoing Cable and ACDB Incoming wire to the ICOR directly. And Sol.CON will start working smoothly.



Sol.CON Model Features

- Sol.CON helps to protect a DG against any back feed current, which could seriously damage the alternator or even the generator.
- Sol.CON does DG Solar Protection. It also helps to run DG at a minimum of 30% load, in line with recommended by the DG set manufacturer.
- Sol.CON prevents export of solar power to DG / Grid, ensuring solar power is exclusively used within premises for captive use.

We have three models to control power as per inverter quantity & features requirement.

- Sol.CON-M** Back Feed Power Preventer for both DG and Grid, Cut-off automatically, Manually Switch ON.
- Sol.CON.DG** Back Feed Power Preventer for DG only,
- Sol.CON.G** Back feed Power Preventer for Grid Only
- Sol.CON-S-S** Back Feed Power Preventer - Stepped cutting off up to 4 inverters one by one.

All of above can have an Add on feature:

- Sol.CON-30** Cuts off Solar Power Plant production, if DG is running less than 30% load.

Why Sol.CON is needed ?

The usual reasons where Self-Consumption application is required by utility or energy distributor but there are chances of lesser consumption than Solar Output:

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. In absence of Grid Power supply is made by on site, local backup power units like turbines and or diesel generators which do not allow reverse power flow.
4. One wants to contribute to the environment by utilizing Solar Power to the maximum

Sample Working Chart for Sol.Con of 200 kWp

Case	Available Solar Power (200 KW)	Load on Grid Power	Load on 200kW Diesel Generator	Customer Load	Reverse Power Protection Prevents?
9:00 AM	100	60	0	160	No
10:00 AM	120	60	0	180	No
11:00 AM	140	100	0	240	No
12:00 PM	160	120	0	280	No
1:00 PM	180	10	0	190	No
2:00 PM	200	0	60	180	Yes
3:00 PM	180	0	60	200	Yes
4:00 PM	160	0	80	240	No
5:00 PM	140	0	120	260	No
6:00 PM	120	0	60	100	Yes

Sample Working Chart

DG Off. Solar Power Plant Synced with Mains Grid				
Time = 0 Second			Time = 1 Second	
Mains	Solar Power Plant (KW)	Load (KW)	SPP	Mains
45	5	50	5	45
20	5	25	5	20
15	5	2.5	0	15
10	5	4.5	0	4.5
5	5	10	5	5
Mains Off. Solar Power Plant Synced with DG				
Time = 0 Second			Time = 1 Second	
DG (50 KVA)	Solar Power Plant (5 KW)	Load (KW)	SPP	DG (50 KVA)

45	5	50	5	45
20	5	25	5	20
15	5	1.5	0	1.5
10	5	15	5	10
5	5	10	5	5
0	5	5	5	0
0	5	2.5	0	2.5

Challenges using Sol.CON (or any other DG Synch 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.CON 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