

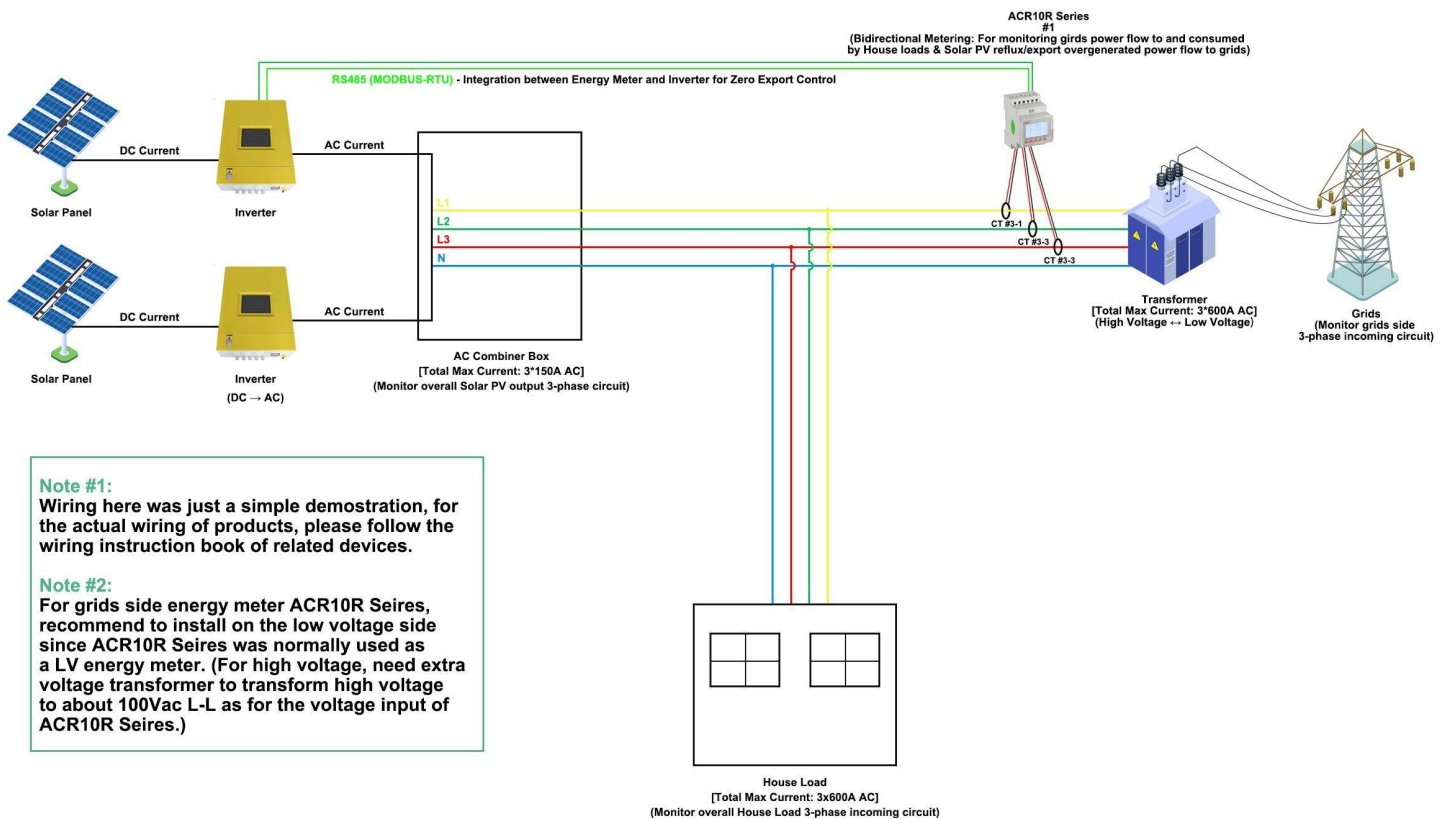
## 4. Scenario Preset

- The scenario is based on a small on-grid Solar PV system without DC energy storage.
- In order to realize zero export, we need energy meter with bidirectional metering function installed on Grids Side [Need to monitor the grids' overall 3-phase incoming circuit so that we can monitor the total power consumption supplied from grids to house loads and also monitor the over-generated reflux/export energy from Solar PV to grids or power transformer.]
- Selected model here was just for example, all energy meter with RS485 (MODBUS-RTU) refer in section 4 has the ability to integrate inverter based on RS485 (MODBUS-RTU) to realize Zero Export control
- Suppose grids sides incoming circuits is with rated current of 600A AC and rated voltage of 230Vac L-N&400Vac L-N.

## 5. Devices Deployment Plan

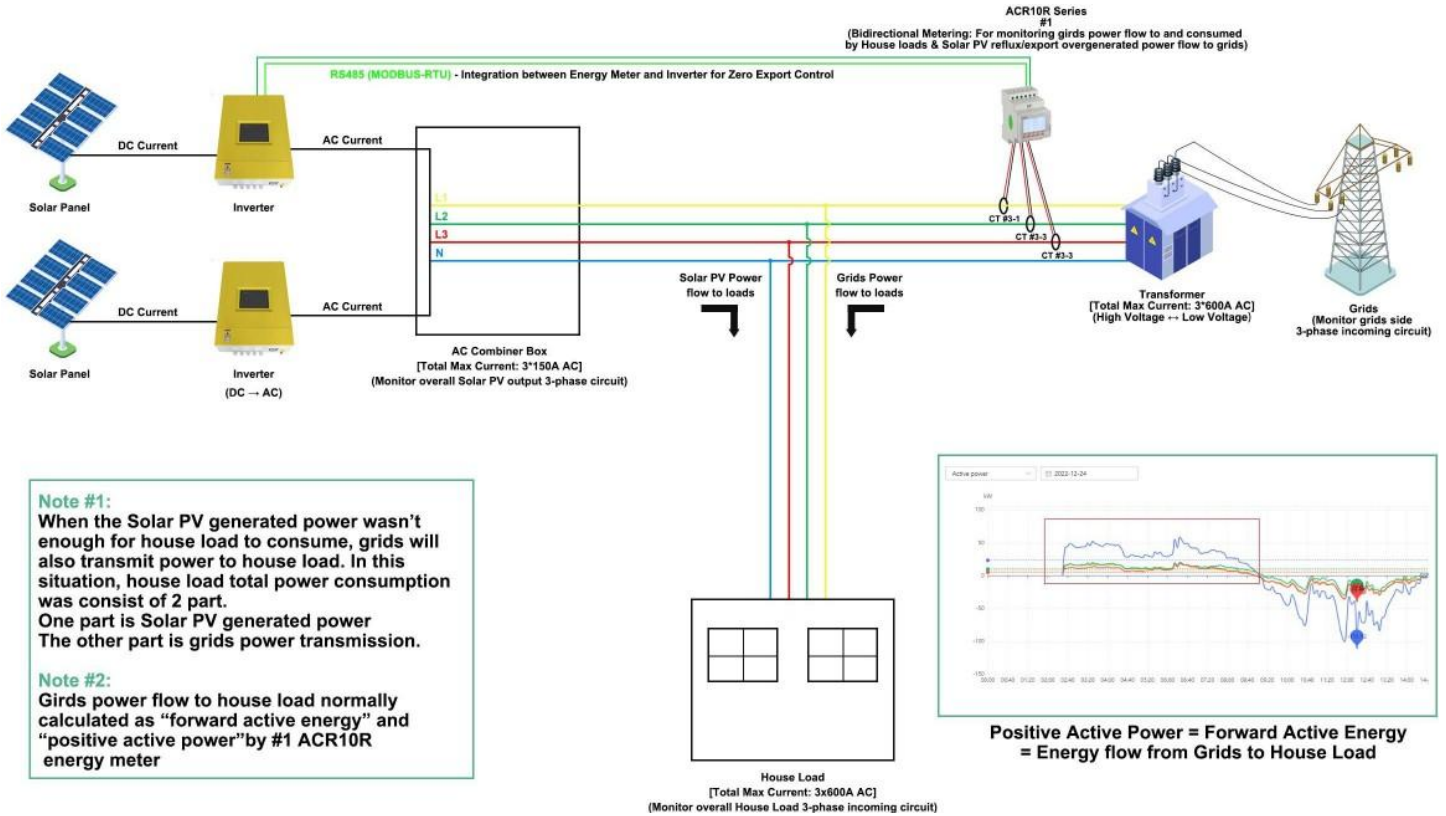
### Grids Side - Grids' Overall 3-phase Incoming Circuit:

- 1\* ACR10RH-D110RE4 3-phase Rogowski Coil Energy Meter



## 6. Calculation Logic - When the Solar PV Generated Power < House Load Consumed Power

- When the solar PV generated power wasn't enough for house loads to consume. Grids will also distribute power to house load for consuming. So, in this situation, the house load total power consumption was consisted of 2 parts, solar PV generated power and grids distribution power.
- Grids power flow to house load for consuming was normally calculated as "forward active energy, EPI" and "positive active power, +kw" by #1 ACR10R energy meter.



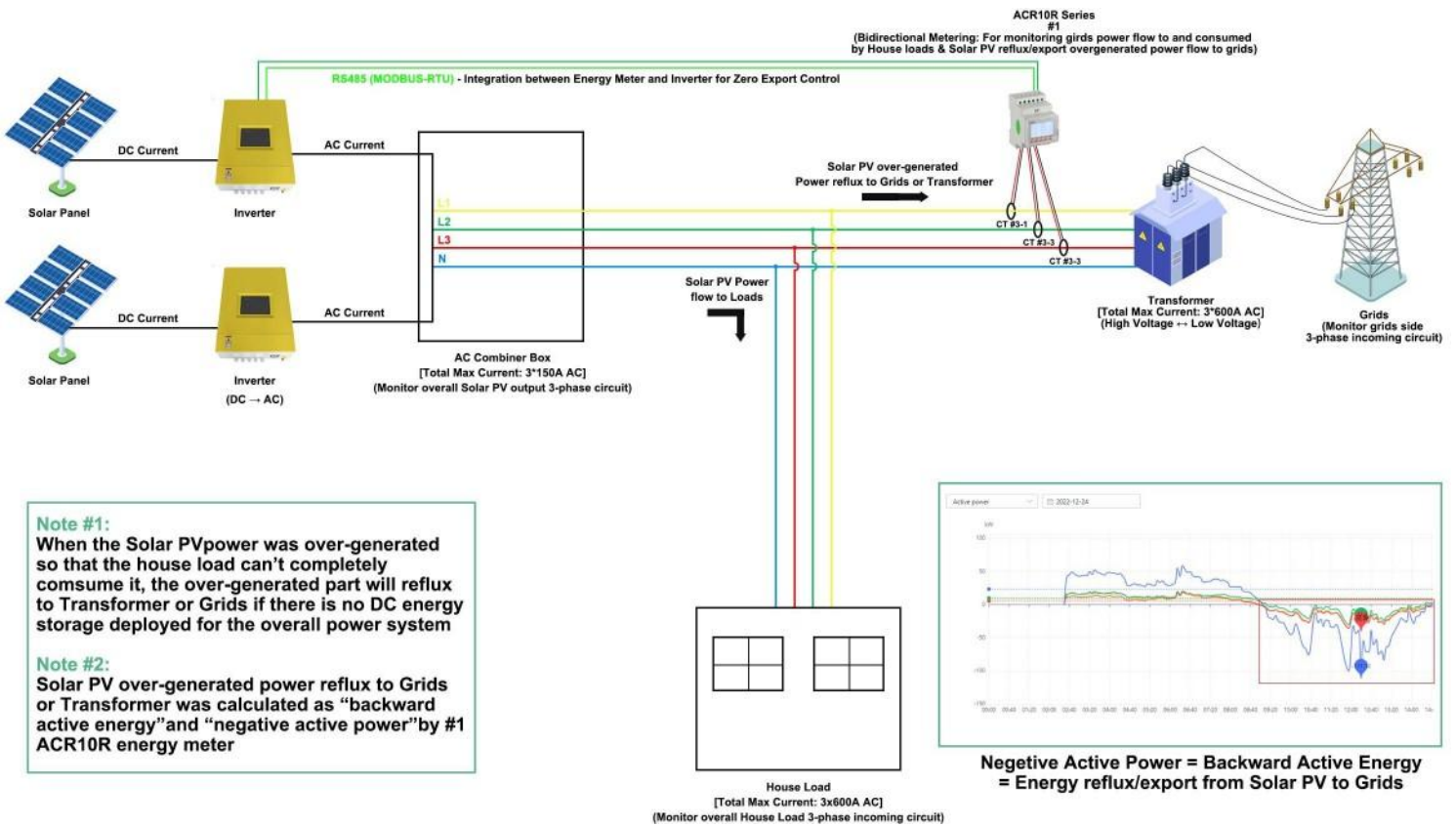
Calculation logic (When Solar PV not Enough)



Diagram of "Forward Active Energy, EPI"

## - Calculation Logic - When the Solar PV Generated Power > House Load Consumed Power

- When the solar PV generated power was larger than house loads power consumption. The part of over-generated solar PV power will reflux/export to power transformer or grids. In this situation, solar PV power generation will be distributed to 2 parts, to house loads and to power transformer or grids. (2) Solar PV over-generated power which reflux/export to power transformer or grids was normally calculated as "backward active energy, EPE" and "negative active power, -kw" by #1 ACR10R energy meter.



Calculation Logic (Solar PV Over-generated)

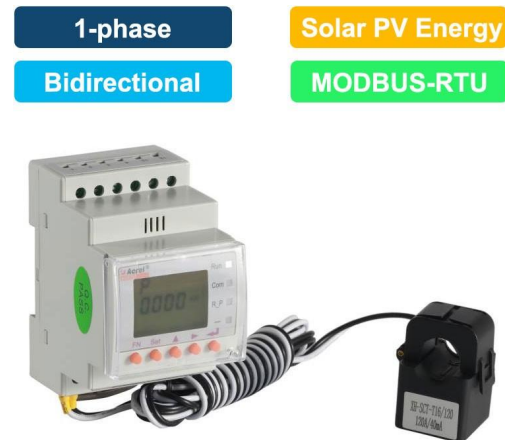


Diagram of "Backward Active Energy, EPE"

**- Energy Meter Model Selection (For Solar PV Zero Export Solution)**

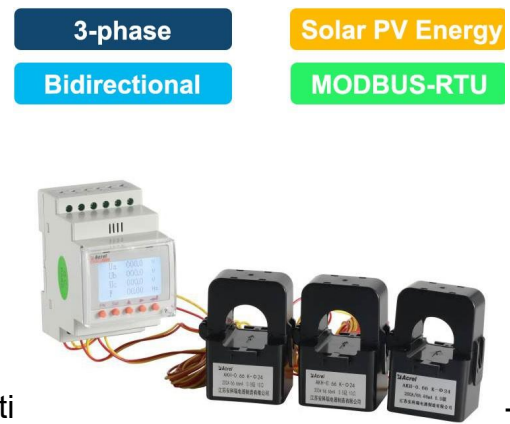
**Model 1: ACR10R-D16TE 1-phase Energy Meter**

- 3. Metering: Bidirectional AC Metering 1-phase
- 4. Rated Voltage: 220~264Vac L-N (45~65Hz)
- 5. Rated Current: **120A AC [via paired CT]**
- 6. Communicaiton: **RS485 Interface**, MODBUS-RTU Protocol
- 7. Certificate&Standard: CE
- 8. Currently Integrated with: Ginlong, Fusite, Alpha ESS, etc.
- 9. More Introduction: <https://www.acrel-electric.se/product/acrel-bidirectional-three-phase-reflux-monitoring-energy-meter-acr10r-dxxtex/>



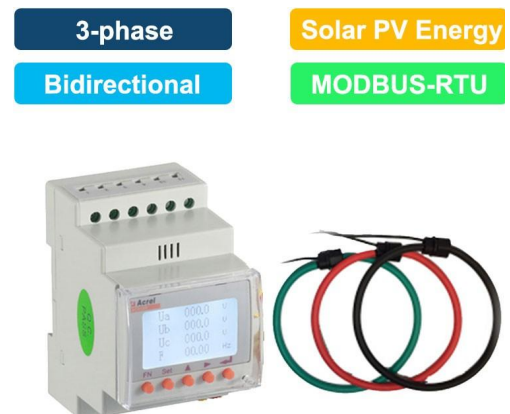
**Model 2: ACR10R-D24TE4 3-phase Energy Meter**

- 10. Metering: Bidirectional AC Metering 3-phase
  - 11. Rated Voltage: 3x220~264Vac L-N & 3x380~456Vac L-L (45~65Hz)
  - 12. Rated Current: **200A AC [via paired CTs]**
  - 13. Communicaiton: **RS485 Interface**, MODBUS-RTU Protocol
  - 14. Currently Integrated with: Ginlong, Fusite, Alpha ESS, etc.
  - 15. Certificate&Standard: CE
- More Introduction: <https://www.acrel-electric.se/product/acrel-bidirecti-energy-meter-acr10r-dxxtex/>



**Model 3: ACR10R-D110RE4 3-phase Energy Meter**

- 16. Metering: Bidirectional AC Metering 3-phase
- 17. Rated Voltage: 3x220~264Vac L-N & 3x380~456Vac L-L (45~65Hz)
- 18. Rated Current: **1000A AC (via paired 3 pcs Rogowski CTs)**
- 19. Accuracy: Class 1.0 for active energy monitoring
- 20. Communicaiton: **RS485 Interface**, MODBUS-RTU Protocol
- 21. Certificate&Standard: CE

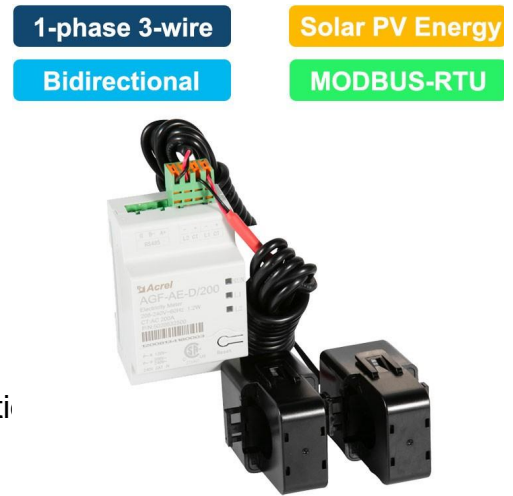


## 1. Energy Meter Model Selection (For Solar PV Zero Export Solution)

### Model 1: AGF-AE-D/200 1-phase 3-wire Energy Meter

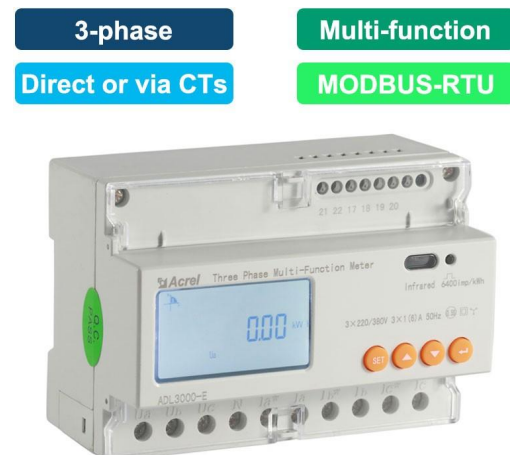
- (1) Metering: Bidirectional AC Metering 1-phase
- (2) Rated Voltage: 120Vac L-N; 208/240Vac L-N
- (3) Rated Current: 100A AC**
- (4) Communication: **RS485 Interface**, MODBUS-RTU Protocol
- (5) Currently Integrated with: Ginlong, SUNGROW, Growatt etc.

More Introduction: <https://www.acrel-electric.se/product/acrel-bidirectional-monitoring-meter-1-phase3-wire-with-ul-certificate-agf-ae-d/>



### Model 2: ADL3000-E 3-phase Energy Meter

- (6) Metering: Bidirectional AC Metering 3-phase
- (7) Rated Voltage: 3x220~264Vac L-N & 3x380~456Vac L-L (45~65Hz)
- (8) Rated Current: 3x1(6)A AC (via CTs)
- (9) Communication: **RS485 Interface**, MODBUS-RTU Protocol
- (10) Currently Integrated with: Ginlong, SUNGROW, etc.
- (11) Certificate&Standard: CE; UL
- (12) More Introduction: <https://www.acrel-electric.se/product/acrel-three-phase-multi-function-din-rail-energy-meter-adl3000-e/>



### Model 3: PZ96L-E4/KC 3-phase Energy Meter

- (13) Metering: Bidirectional AC Metering 3-phase
- (14) Rated Voltage: 3x220~264Vac L-N & 3x380~456Vac L-L (45~65Hz)
- (15) Rated Current: 3x1(6)A AC (via CTs)
- (16) Communication: **RS485 Interface**, MODBUS-RTU Protocol
- (17) Currently Integrated with: Huawei, etc.
- (18) Certificate&Standard: CE
- (19) More Introduction:

