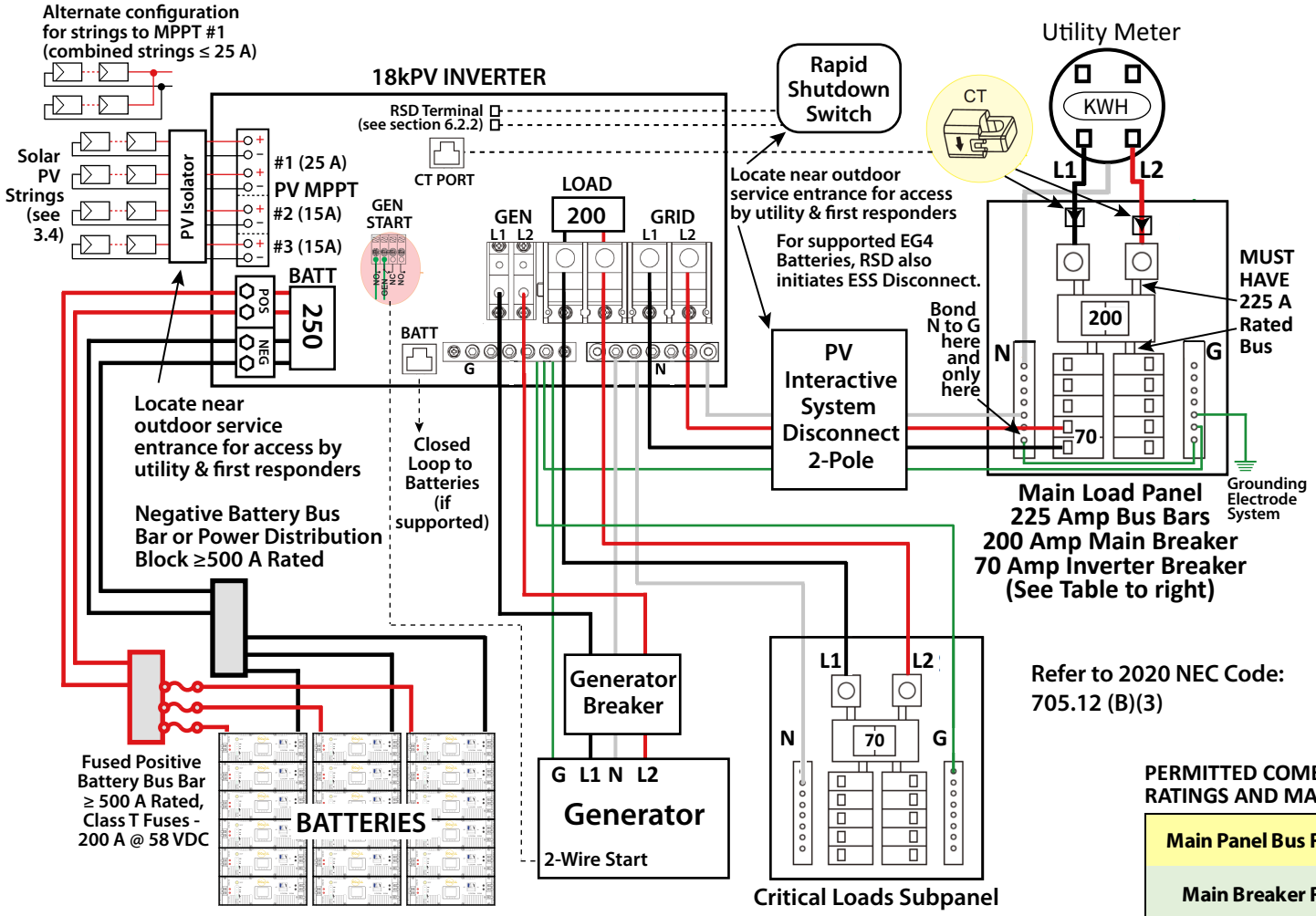
Partial Home Backup with Backfed Breaker



Refer to 2020 NEC Code: 705.12 (B)(3)

If using the Wallmount battery then no external bus bars or fusing is needed up to 3 batteries. If using 1 or 2 server rack battery racks and short battery cables that are fully contained in conduit or gutters, then the distribution bus bars and fusing shown can be omitted. Overcurrent Protection for the battery cables is then dependent on the battery breaker in the inverter. More than 2 racks require distribution fusing as shown.

Note: For 200 A rated bus bars with 200 A Main Breakers, a workable option is to have EG4 derate the inverter's grid sell-back to 32 Amps which we can do remotely and then we can provide a letter to your utility or AHJ certifying that your inverter's continous sell-back out has been derated.

BACKFED BREAKERS are the most cost effective and simple way to connect your inverter to the Utility grid. They are simply a breaker installed on your main breaker panel that is backfed for net metering.

HOWEVER TO USE A BACKFED BREAKER: Your 200 Amp panel MUST HAVE a 225 Amp rated breaker bus bar OR you need to downsize your Main Breaker to 175 Amps - see table below.

The other main disadvantage of a backfed breaker is you cannot take advantage of the 18K's ability to pass-through a full 200 Amp Service to your breaker panel thus making whole home backup impossible. The maximum Critical Loads Subpanel breaker with this configuration is 70 Amps.

The NEC Code formula for working with backfed breakers is as follows:

THE SUM OF THE MAIN SERVICE BREAKER PLUS 125% OF THE INVERTER OUTPUT RATING CANNOT EXCEED 120% OF THE BUS BAR RATING ON THE BREAKER PANEL.

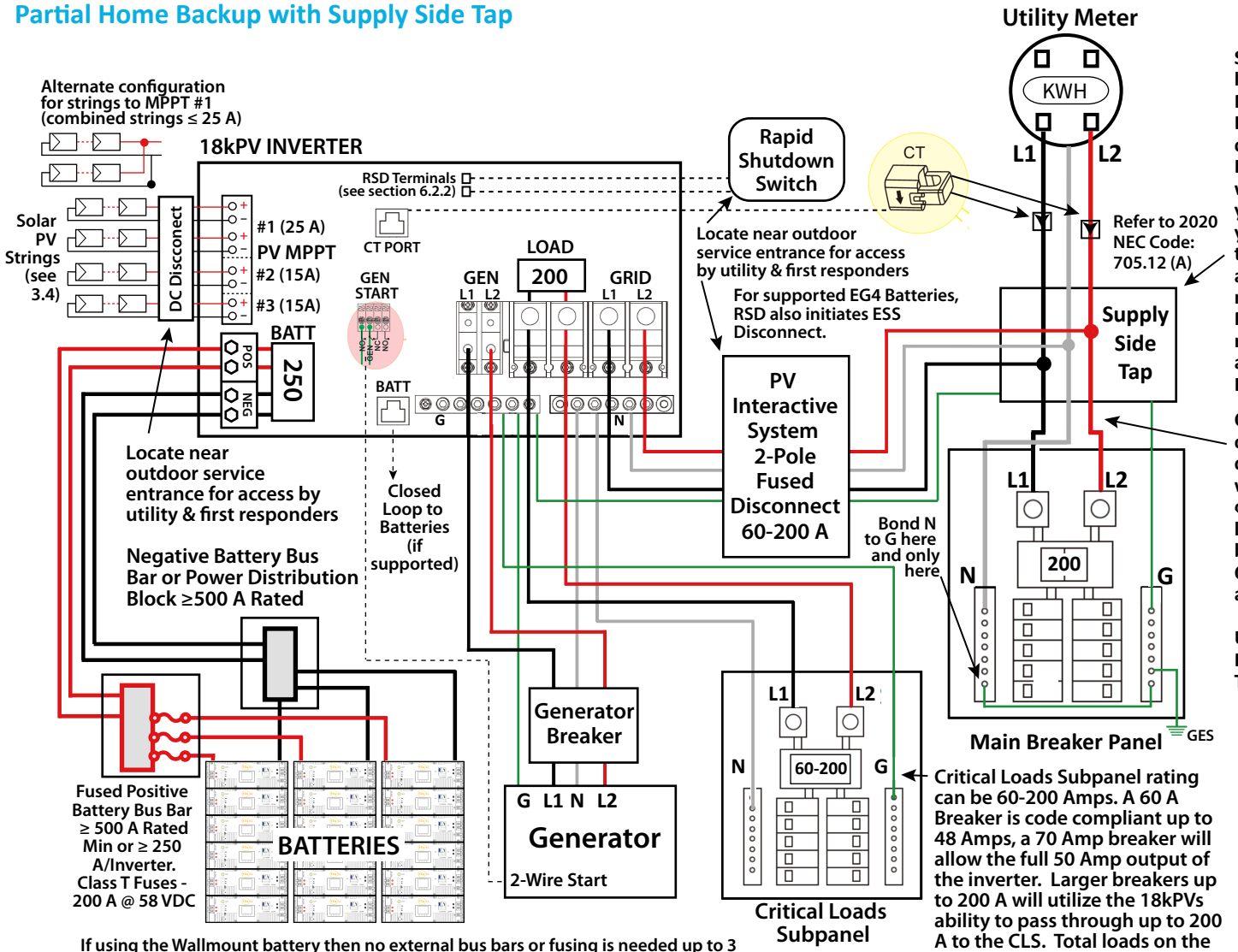
VIOLATING THIS RULE CAN LEAD TO BUS OVERLOAD AND FIRE.

PERMITTED COMBINATIONS OF MAIN BREAKER RATINGS AND MAIN BUS RATINGS (Amps):

Main Panel Bus Rating	225	200	200	150
Main Breaker Rating	200	200	175	100
Inverter Rating (x 1.25)	62.5	62.5	62.5	62.5
Meets NEC Code Safety	√	X	√	√

NOTE: The Inverter Breaker must be located at the opposite end of the bus from the Main Breaker. Use 70 Amp Breaker for Inverter.

Partial Home Backup with Supply Side Tap



If using the Wallmount battery then no external bus bars or fusing is needed up to 3 batteries. If using 1 or 2 server rack battery racks and short battery cables that are fully contained in conduit or gutters, then the distribution bus bars and fusing shown can be omitted. Overcurrent Protection for the battery cables is then dependent on the battery breaker in the inverter. More than 2 racks require distribution fusing as shown.

SUPPLY SIDE TAPS - If your home has - like most homes do - a 200 Amp Rated Main Panel and a 200 Amp Main Breaker and therefore cannot use a 60 or 70 A Backfed Breaker (see Backfed Breaker diagram) then a supply side tap with a Critical Loads Subpanel may be your solution. This only works when you can find a place in your meter main that will allow your electrician to make a tap between the utility meter and the main 200 Amp breaker. Some Meter-Mains have an actual cable that runs between the meter socket outputs and the Main Breaker allowing for a KUP-L type tap or equivalent.

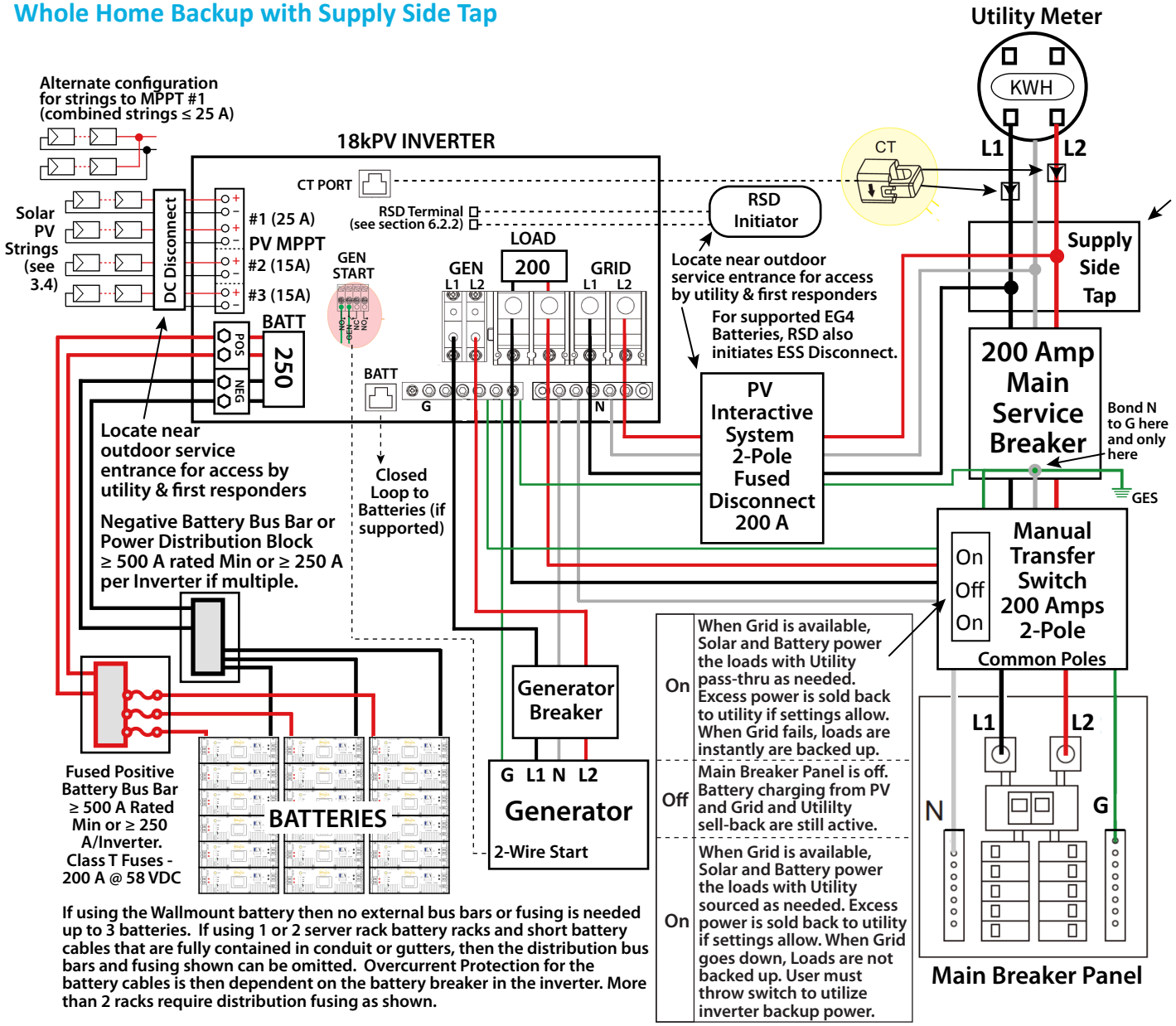
CAUTION: There is a possible danger of overloading your service entrance conductors with this configuration. You will be essentially adding a 50 A battery charger to your perhaps already fully loaded Service Entrance without any breaker capacity to protect it. Check with your electrician or AHJ to approve this installation.

Upgrading your Service Entrance to the Feeder Tap configuration. (See Feeder Tap Diagram).

Refer to NEC Code:
2020: 705.12 (A) & (B)
2023: 705.11 and 705.12

Note: The amperage rating of the PV Interactive System Disconnect should be at least 70 Amps and should match the amperage of the Critical Loads Subpanel's Main Breaker. Consult your electrician for sizing of the Supply Side Tap conductors, the PV Interactive System Disconnect, and the Critical Loads subpanel.

Whole Home Backup with Supply Side Tap



If using the Wallmount battery then no external bus bars or fusing is needed up to 3 batteries. If using 1 or 2 server rack battery racks and short battery cables that are fully contained in conduit or gutters, then the distribution bus bars and fusing shown can be omitted. Overcurrent Protection for the battery cables is then dependent on the battery breaker in the inverter. More than 2 racks require distribution fusing as shown.

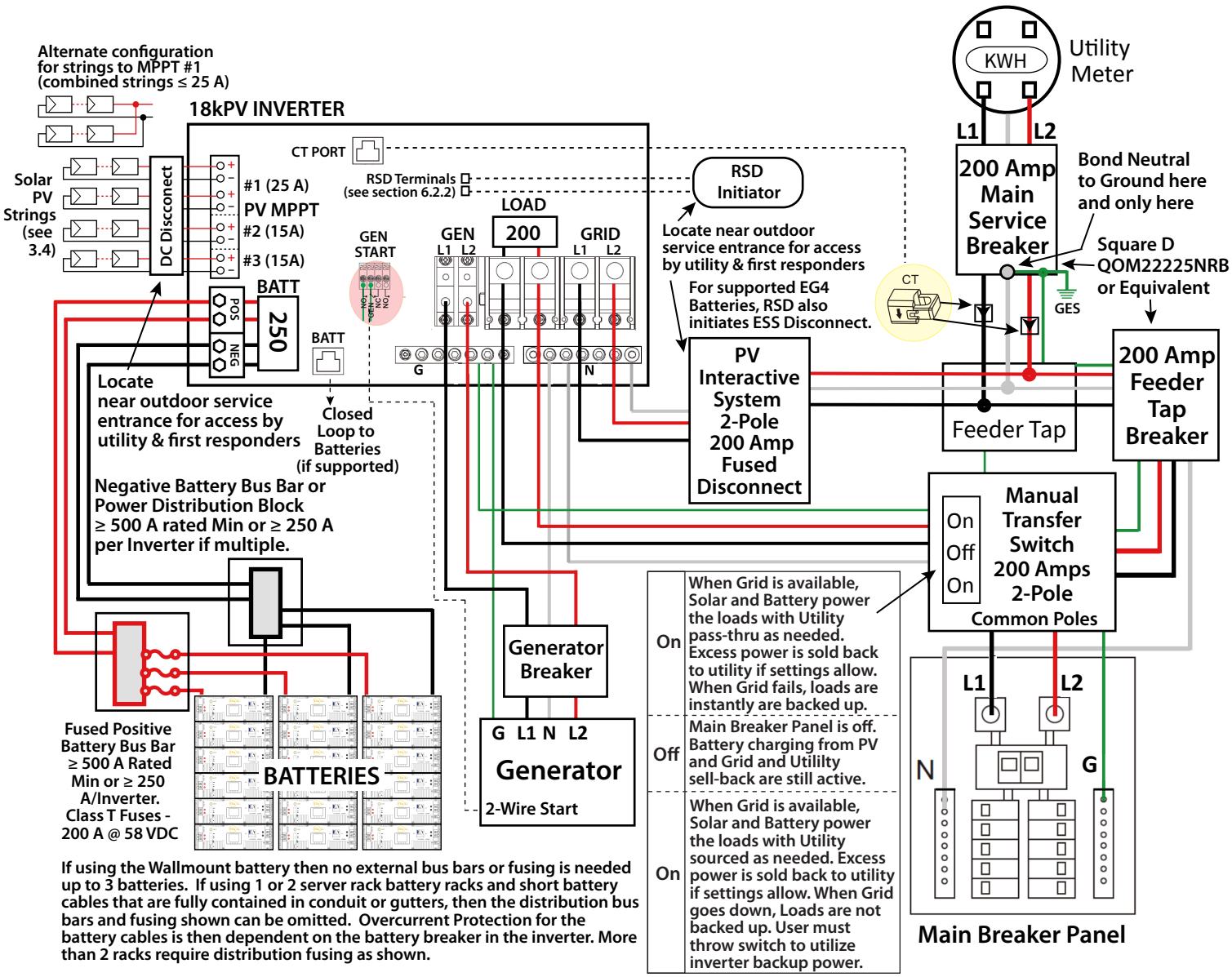
SUPPLY SIDE TAPS - If your home has - like most homes do - a 200 Amp Rated Main Panel and a 200 Amp Main Breaker and therefore cannot use a 60 or 70 A Backfed Breaker (see Backfed Breaker diagram) then a Supply-Side Tap with a Critical Loads Subpanel may be your solution. This only works when you can find a place in your meter main that will allow your electrician to make a tap between the utility meter and the main 200 Amp breaker. Some Meter-Mains have an actual cable that runs between the meter socket outputs and the Main Breaker allowing for a KUP-L type tap or equivalent. Alternatively you can reconfigure your service entrance by installing a stand-alone Main Breaker as shown. However even better is to install a Feeder Tap as per the Feeder Tap diagram.

CAUTION: There is a possible danger of overloading your service entrance conductors with this configuration. You will be essentially adding a 50 A battery charger to your perhaps already fully loaded Service Entrance without any breaker capacity to protect it.
Check with your electrician or AHJ to approve this installation.

Upgrading your Service Entrance to the Feeder Tap configuration eliminates

Refer to NEC Code:
2020: 705.12 (A) & (B)
2023: 705.11

Whole Home Backup using a Feeder Tap



If using the Wallmount battery then no external bus bars or fusing is needed up to 3 batteries. If using 1 or 2 server rack battery racks and short battery cables that are fully contained in conduit or gutters, then the distribution bus bars and fusing shown can be omitted. Overcurrent Protection for the battery cables is then dependent on the battery breaker in the inverter. More than 2 racks require distribution fusing as shown.

FEEDER TAPS ARE THE IDEAL AND SAFEST WAY TO TIE YOUR INVERTER TO THE UTILITY GRID while achieving whole home backup, full solar backfeed, and full battery charging capability while fully protecting your home's wiring.

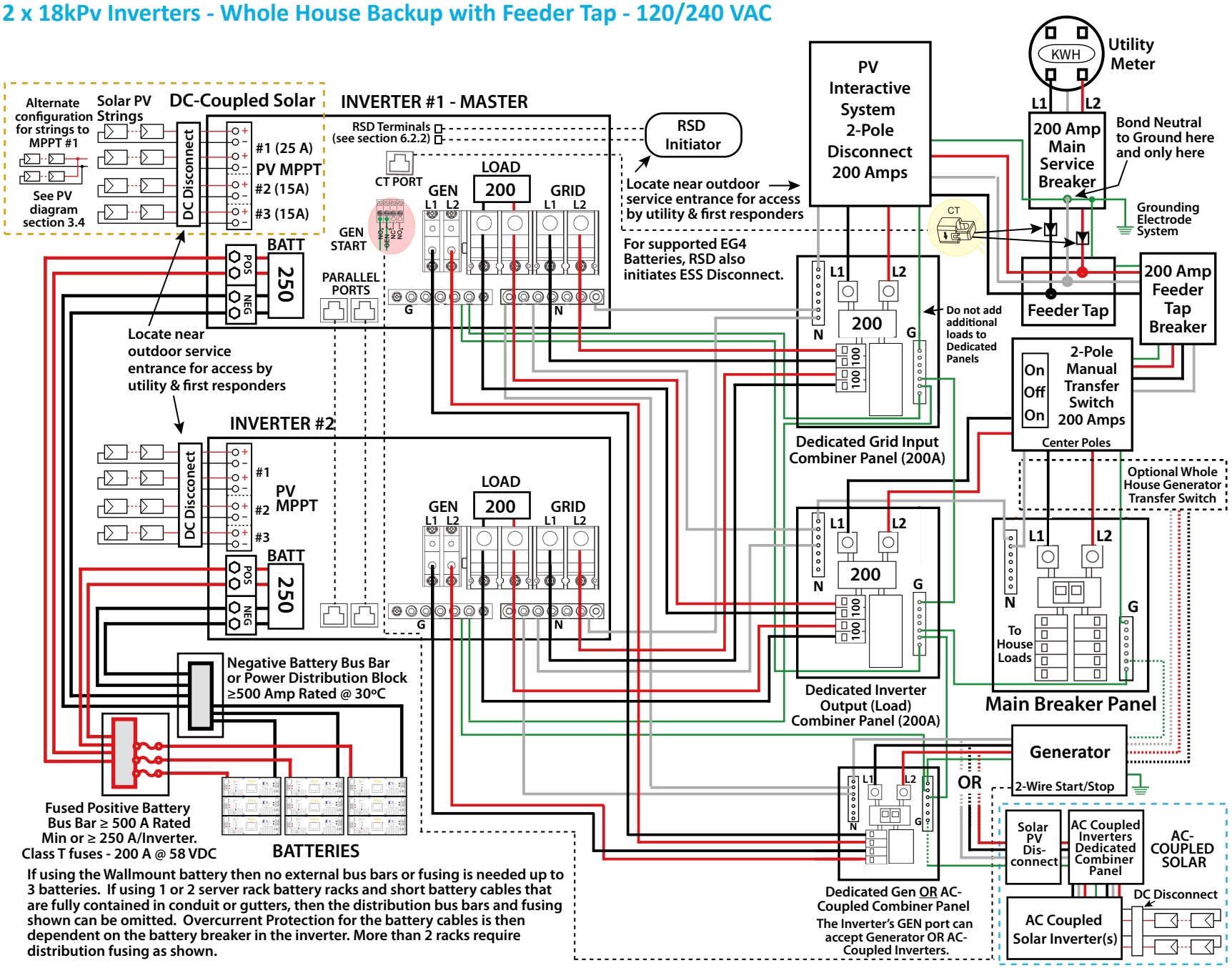
However, Feeder Taps must be installed correctly.

Refer toNEC Code:
2020: 705.12 (B)(1&2)
2023 705.12

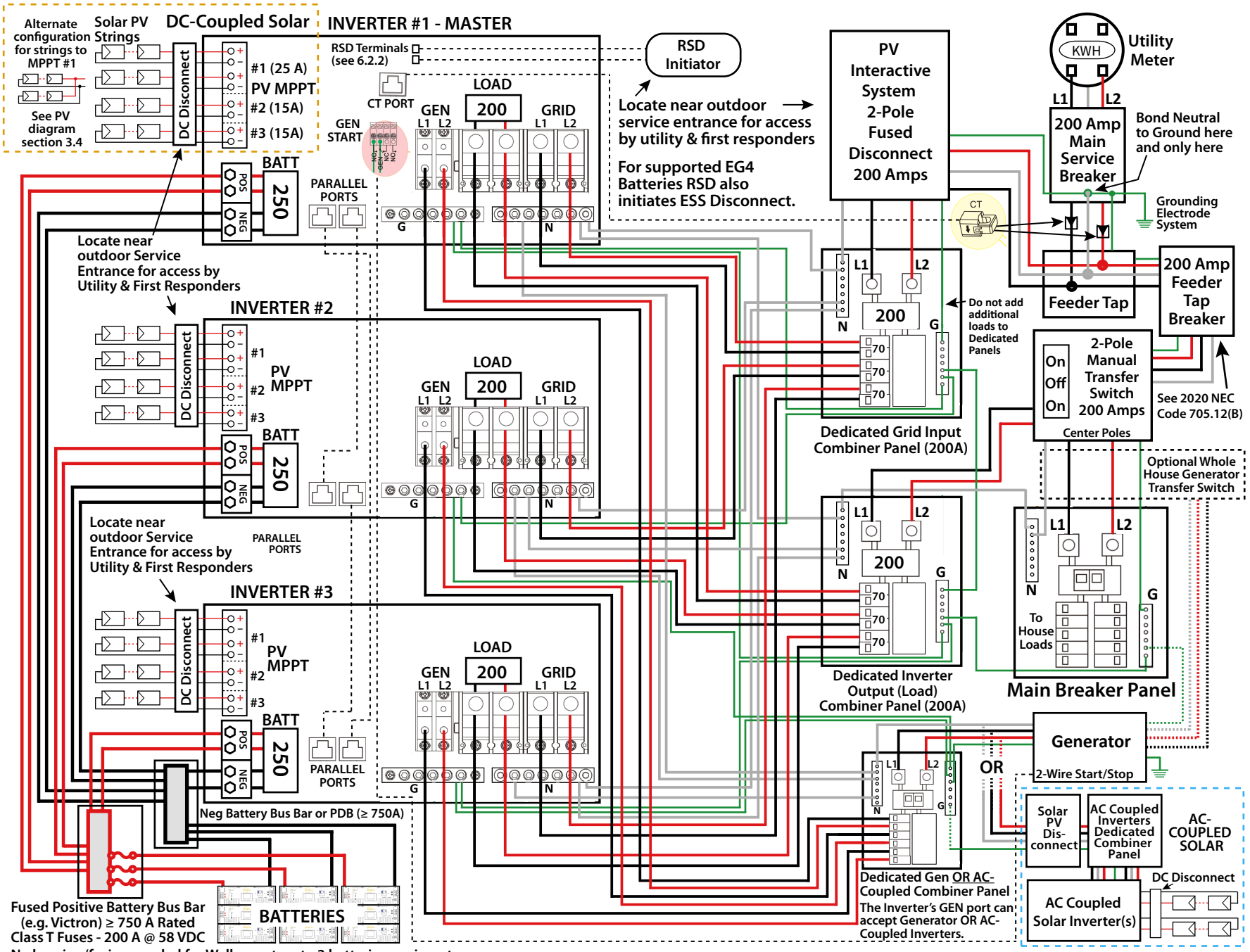
The Main Service Breaker and the Feeder Tap Breaker must be a stand-alone breaker - not a load center. There can be no loads between the Utility Meter and the Feeder Tap. If the Main Breaker Panel has a Main 200 Amp Breaker and it is within 10' of the Feeder Tap then some inspectors will allow omitting the 200 Amp Feeder Tap Breaker. However if this is done the conductors between the Feeder Tap and the Main Breaker Panel - as well as the Manual Transfer Switch are subject to the combined amperage of the Utility (200 Amps) and the backfeed capability of the inverter (50 Amps) while only being rated to 200 Amps. Best to include that breaker as shown.

Feeder Taps should be done by a professional electrician. Ilsco KUP-L-Taps are recommended but must be adhere strictly to installation instructions with proper torque applied measured by a torque wrench. Alternatively a Polaris or Burnby Insulated MultiTap Connector can be used but these need to be torqued twice - once upon installation and once 24 hours later.

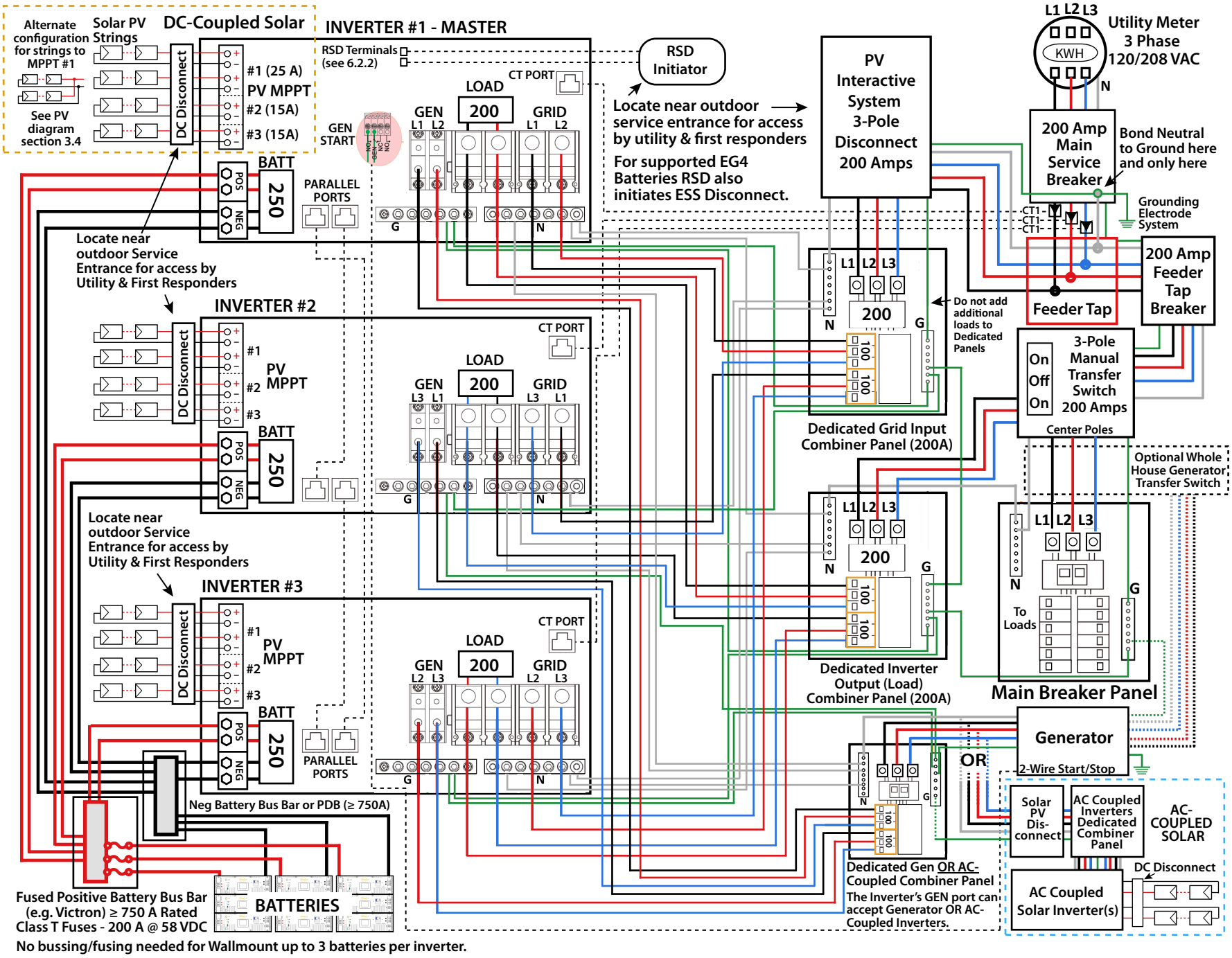
2 x 18kPv Inverters - Whole House Backup with Feeder Tap - 120/240 VAC



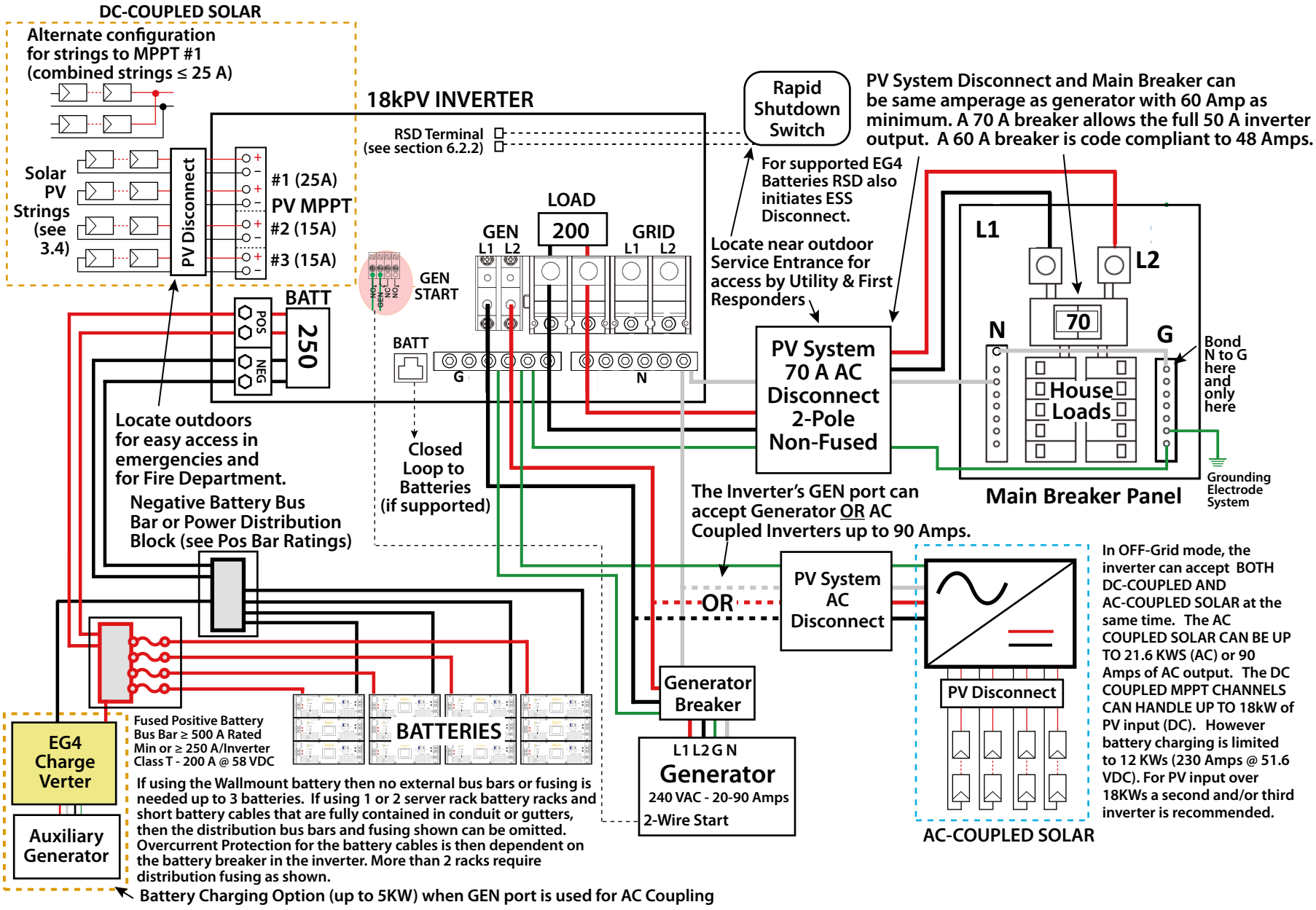
3 x 18kPv Inverters - Whole House Backup with Feeder Tap - 120/240 VAC



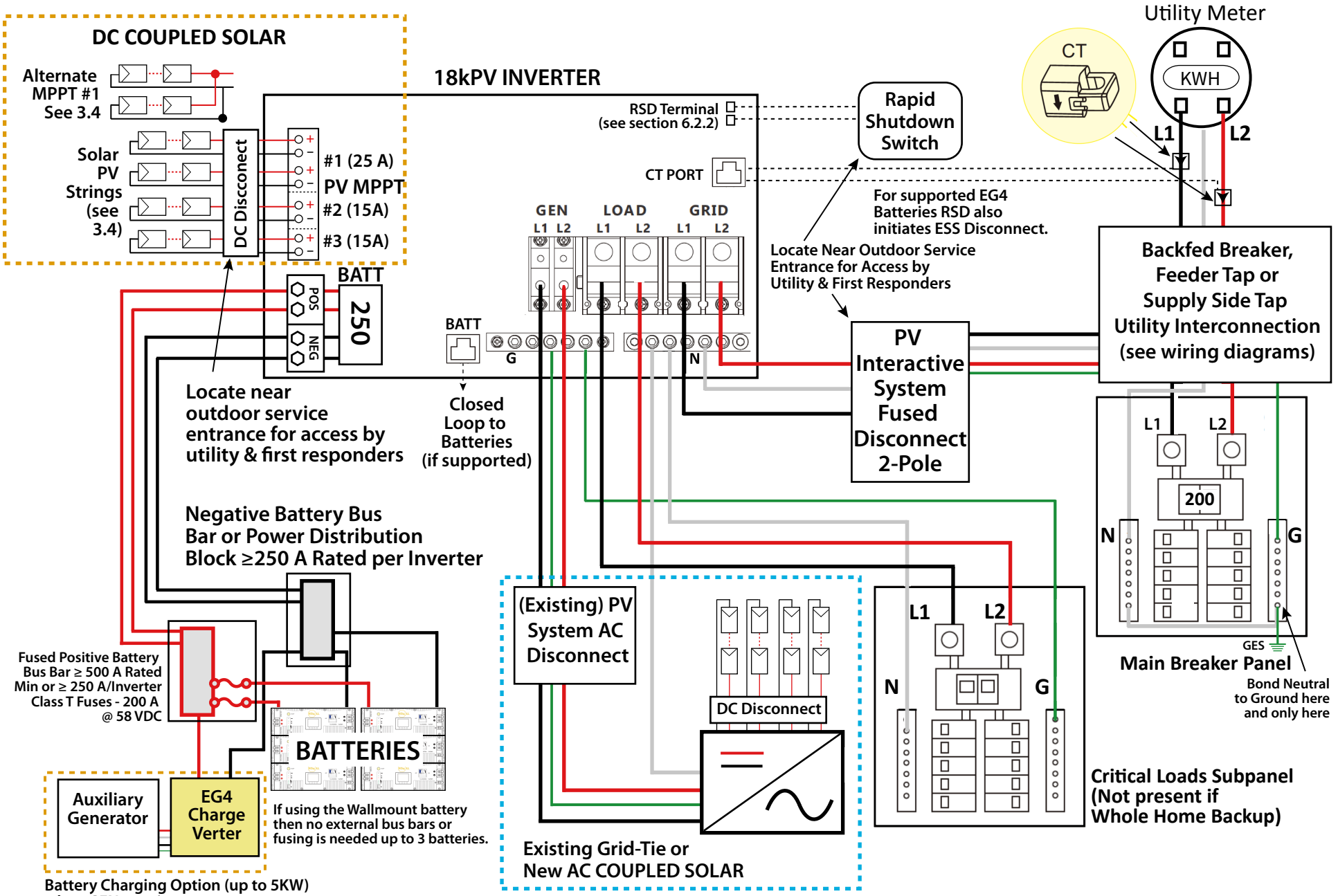
3 x 18kPv Inverters - Whole Service Backup with Feeder Tap - 3 phase -120/208 VAC



OFF-GRID


DC-COUPLED SOLAR
Alternate configuration for strings to MPPT #1 (combined strings ≤ 25 A)
Solar PV Strings (see 3.4)
PV Disconnect
#1 (25A)
PV MPPT
#2 (15A)
#3 (15A)
18kPV INVERTER
RSD Terminal (see section 6.2.2)
Rapid Shutdown Switch
PV System Disconnect and Main Breaker can be same amperage as generator with 60 Amp as minimum. A 70 A breaker allows the full 50 A inverter output. A 60 A breaker is code compliant to 48 Amps.
For supported EG4 Batteries RSD also initiates ESS Disconnect.
LOAD
200
GEN
GRID
L1 L2
GEN START
BATT
POS
NEG
250
Locate near outdoor Service Entrance for access by Utility & First Responders
PV System 70 A AC Disconnect 2-Pole Non-Fused
L1
L2
70
N
G
House Loads
Bond N to G here and only here
Grounding Electrode System
Main Breaker Panel
Locate outdoors for easy access in emergencies and for Fire Department.
Negative Battery Bus Bar or Power Distribution Block (see Pos Bar Ratings)
Closed Loop to Batteries (if supported)
The Inverter's GEN port can accept Generator OR AC Coupled Inverters up to 90 Amps.
OR
PV System AC Disconnect
PV Disconnect
AC-COUPLED SOLAR
In OFF-Grid mode, the inverter can accept BOTH DC-COUPLED AND AC-COUPLED SOLAR at the same time. The AC COUPLED SOLAR CAN BE UP TO 21.6 KWS (AC) or 90 Amps of AC output. The DC COUPLED MPPT CHANNELS CAN HANDLE UP TO 18kW of PV input (DC). However battery charging is limited to 12 KWs (230 Amps @ 51.6 VDC). For PV input over 18KWs a second and/or third inverter is recommended.
Generator Breaker
L1 L2 G N
Generator
240 VAC - 20-90 Amps
2-Wire Start
EG4 Charge Verter
Auxiliary Generator
Fused Positive Battery Bus Bar ≥ 500 A Rated Min or ≥ 250 A/Inverter Class T - 200 A @ 58 VDC
BATTERIES
If using the Wallmount battery then no external bus bars or fusing is needed up to 3 batteries. If using 1 or 2 server rack battery racks and short battery cables that are fully contained in conduit or gutters, then the distribution bus bars and fusing shown can be omitted. Overcurrent Protection for the battery cables is then dependent on the battery breaker in the inverter. More than 2 racks require distribution fusing as shown.
Battery Charging Option (up to 5KW) when GEN port is used for AC Coupling

AC COUPLING



The inverter can accept BOTH DC COUPLED AND AC COUPLED SOLAR at the same time. The AC COUPLED SOLAR CAN BE UP TO 21.6 KWS (AC) or 90 Amps of AC output. The DC COUPLED MPPT CHANNELS CAN HANDLE UP TO 18kW of PV input(DC), with 12kW (50 A AC) of that 18kW available for back feeding the utility grid. Therefore, up to 33.6kW of AC power could be sent back to the grid. For this amount of back feed, users will need either a feeder tap or supply side tap as the point of utility interconnection. 2 Inverters and >30 KWhrs of batteries are recommended for systems needing more than 18KWs (DC) of solar.