

EG4 18kPV System Wiring Diagrams - v2.1

Overview of EG4 18kPV Use Cases

EG4 18kPV with GridBOSS

1. 18kPV with GridBOSS - Basic Architecture
2. 18kPV with Grid BOSS and Whole or Partial Home Backup
 - 2a. 18kPV with Grid BOSS and Whole or Partial Home Backup (with Notes)
3. 18kPV with Grid BOSS: Options for Utility Lockable Disconnect(s) and Meter Requirements

EG4 18kPV without GridBOSS

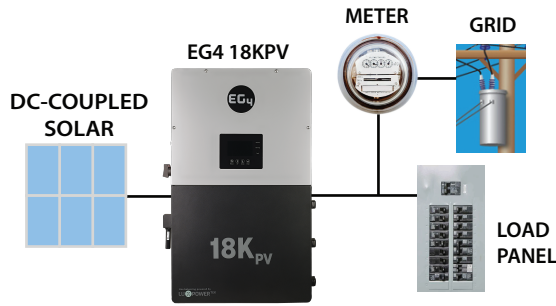
4. EG4 18kPV with Back-Fed Breaker - No Backup - Self Consumption and NEM/TOU only
5. 18kPV with Backfed Breaker, BusBar PCS and Partial Home Backup
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11. 18kPV Off-Grid

Overview of EG4 18kPV Use Cases (See Corresponding Drawing #)

WITHOUT GRIDBOSS

Grid-Tie Only (No Batteries)

Drawing #3 (without battery)

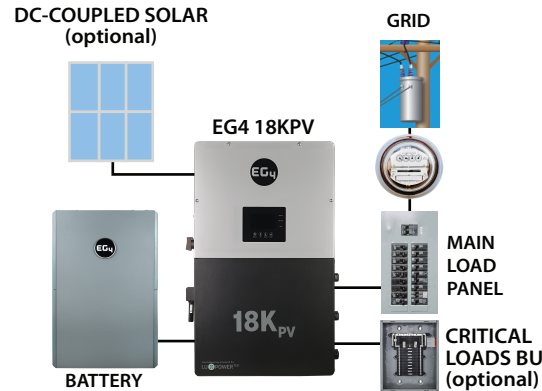


- Maximize Solar Offset
- Low Initial Cost - Simple
- No Storage or add later
- No Solar when Grid down

Optimize or Minimize NEM

No or Critical Loads Backup

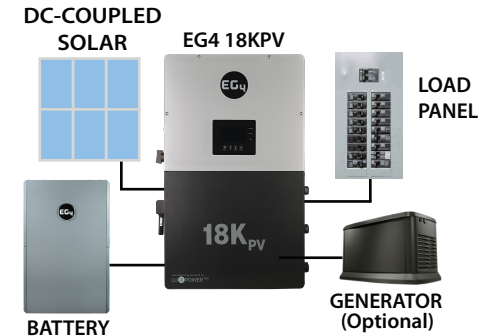
Drawings #4 & 5



- Minimize Buy & Sell with unfavorable NEM Policy
- Buy Low, Sell High with favorable NEM or TOU Policy
- TOU Capable with or without Solar or Backup Loads

Off-Grid

Drawing #9



- Remote - No Grid or Seldom Use Grid
- Grid too Expensive
- Add Grid Backup Later
- Energy Autonomy

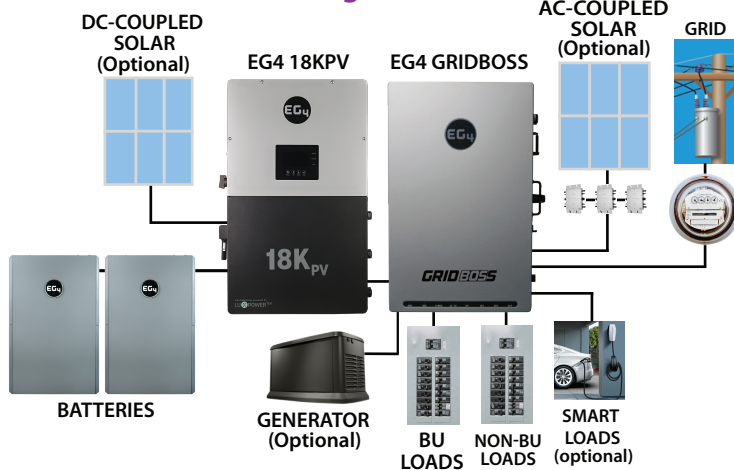
Note: If no utility grid is present or planned then the EG4 6000XP or 12000XP may better serve this purpose.

WITH GRIDBOSS

Optimize or Minimize NEM

Partial Home or Limited Whole Home Backup

Drawings #1,2 & 3

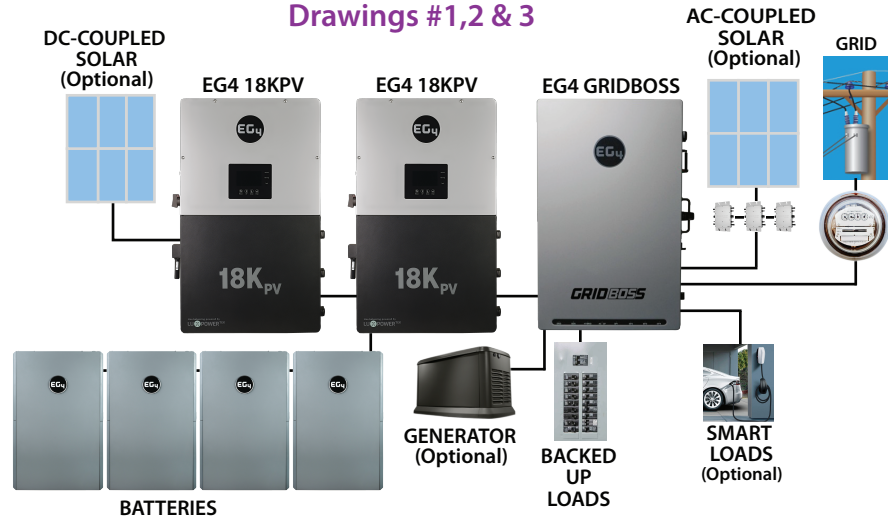


- Utilize Smart Loads to enable Whole Home BU for 1 inverter systems.
- Easily Integrate existing AC Coupled systems and/or Generators.
- Add DC Solar to existing AC Coupled Solar to achieve high Solar Offset.

Optimize or Minimize NEM - Whole Home Backup

Off-Grid Capable for Extended Outages

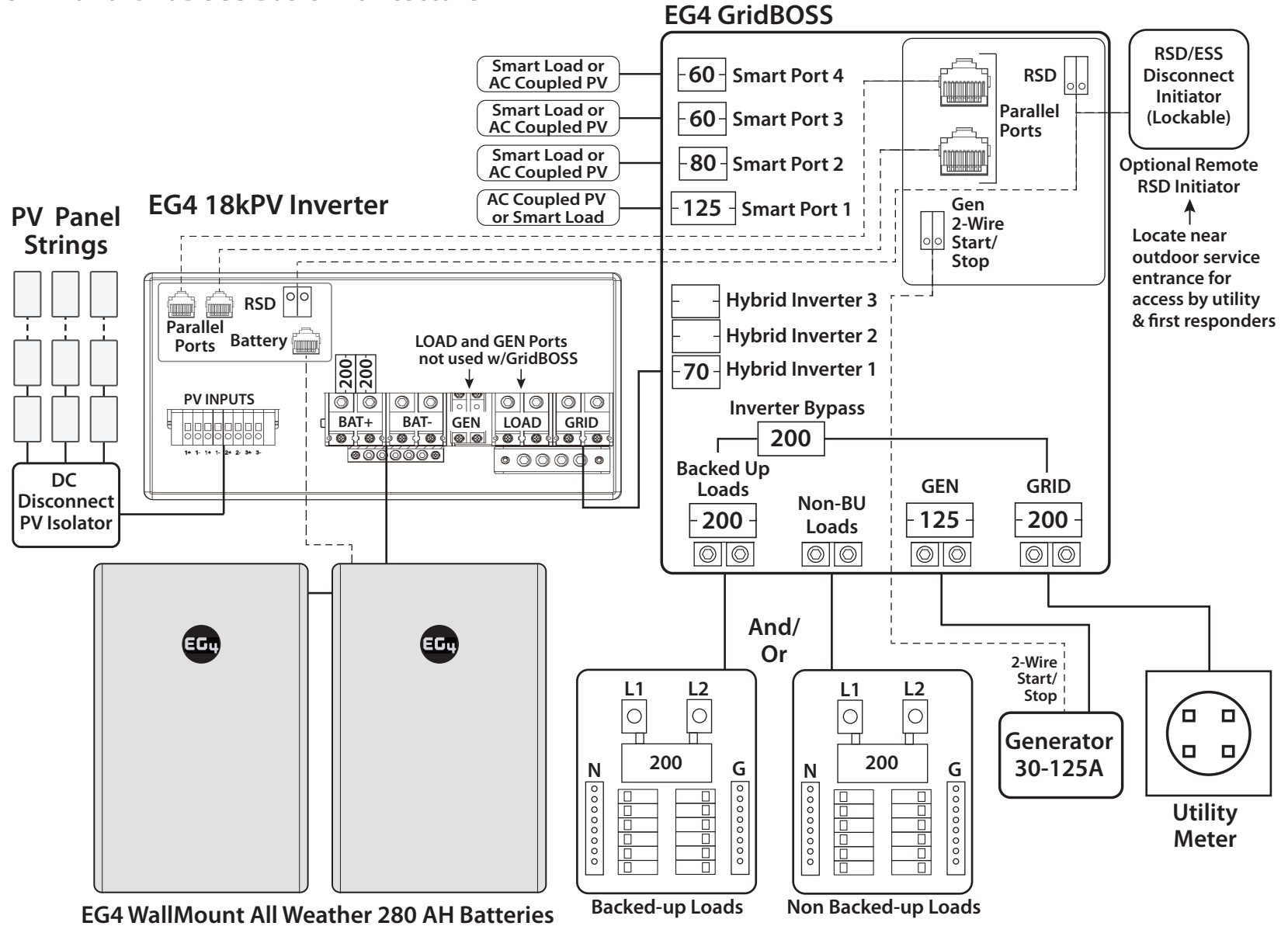
Drawings #1,2 & 3



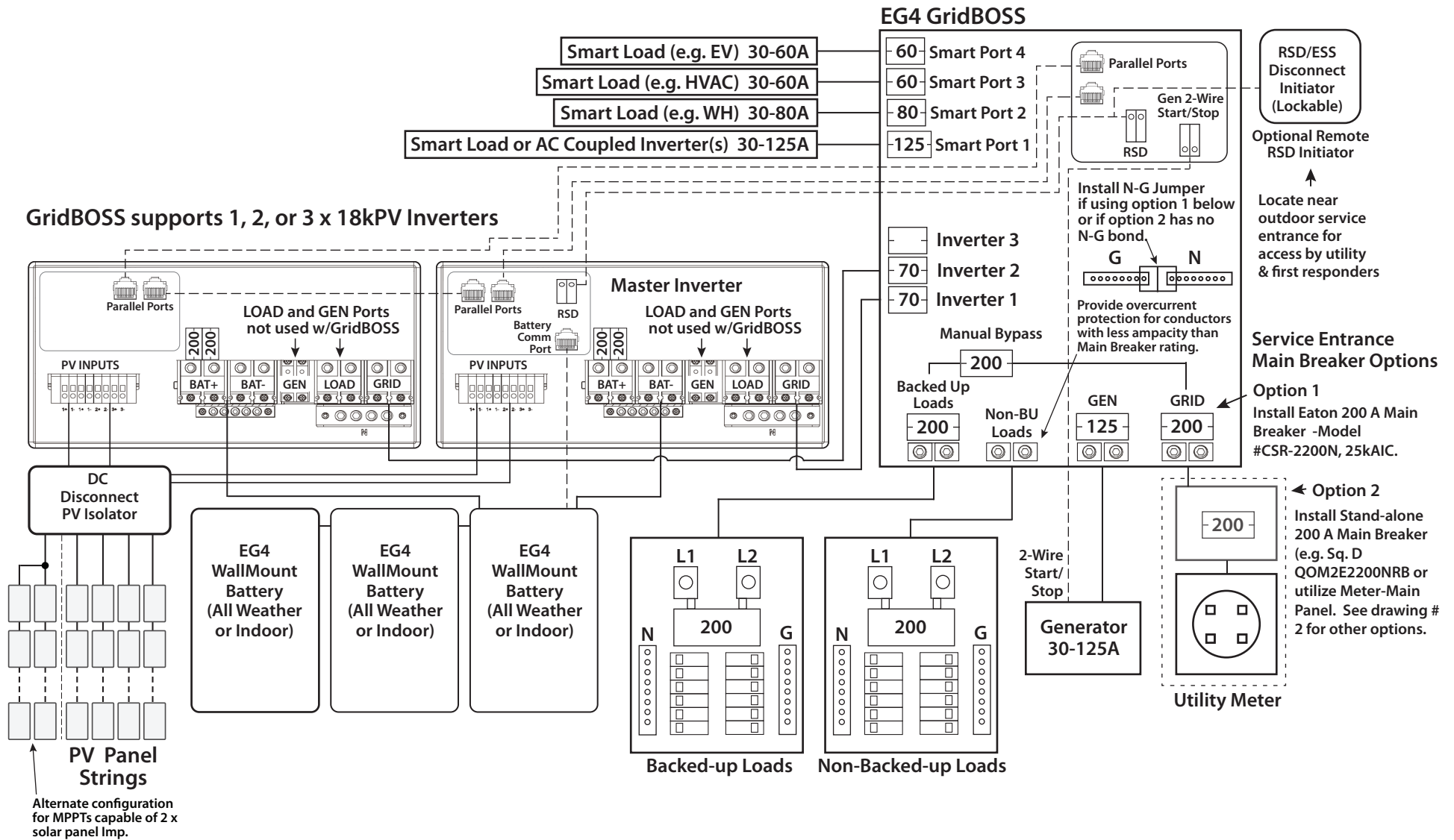
- Utilize Smart Loads to manage battery backup during long outages.
- 2 Inverter systems meets full power needs of 90% of homes, 3 = 200 A Service.
- Provide DC Solar with or without AC Solar to meet full energy needs on or off-grid.

EG4 18kPV with GridBOSS

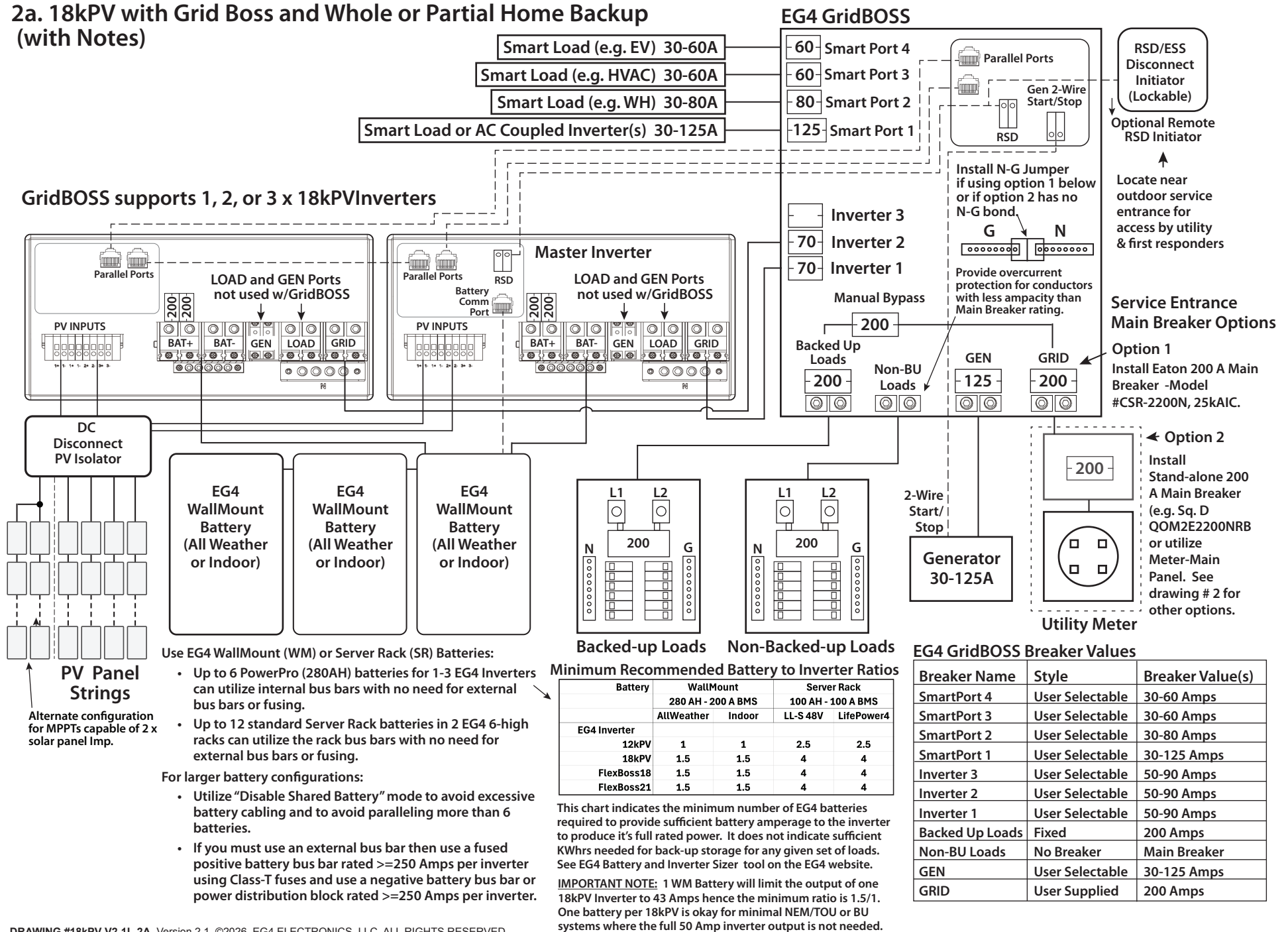
1. EG4 18kPV and GridBOSS Basic Architecture



2. 18kPV with Grid Boss and Whole or Partial Home Backup



2a. 18kPV with Grid Boss and Whole or Partial Home Backup (with Notes)

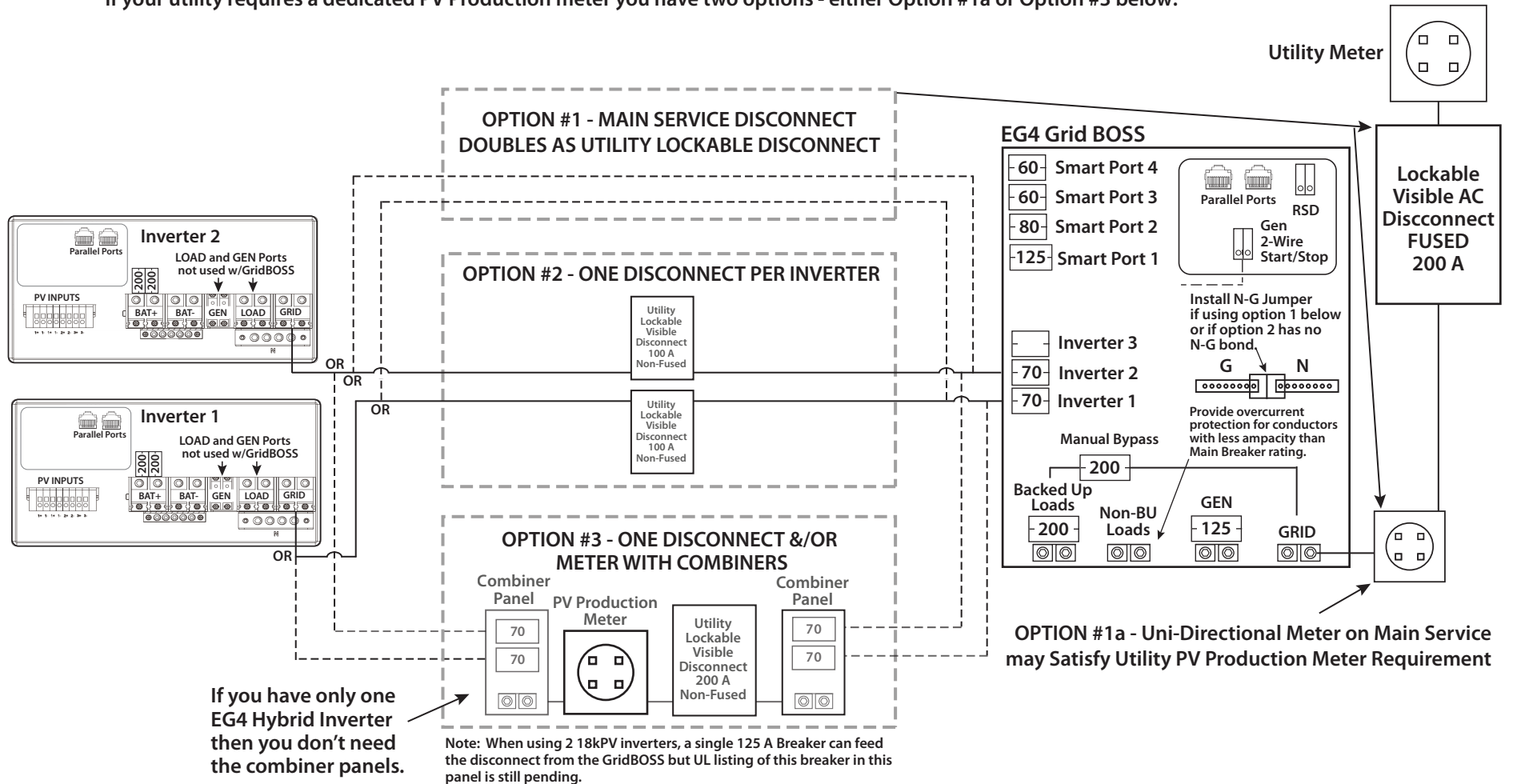


3. 18kPV with GridBOSS: Options for Utility Lockable Disconnect(s) and Meter Requirements

Some Utilities will approve using the Inverter (1,2 & 3) Breakers in the GridBOSS as the Utility PV System Disconnect(s). The GridBOSS door is lockable. In this case you can connect the Inverter's GRID ports directly to the Hybrid Inverter Breakers.

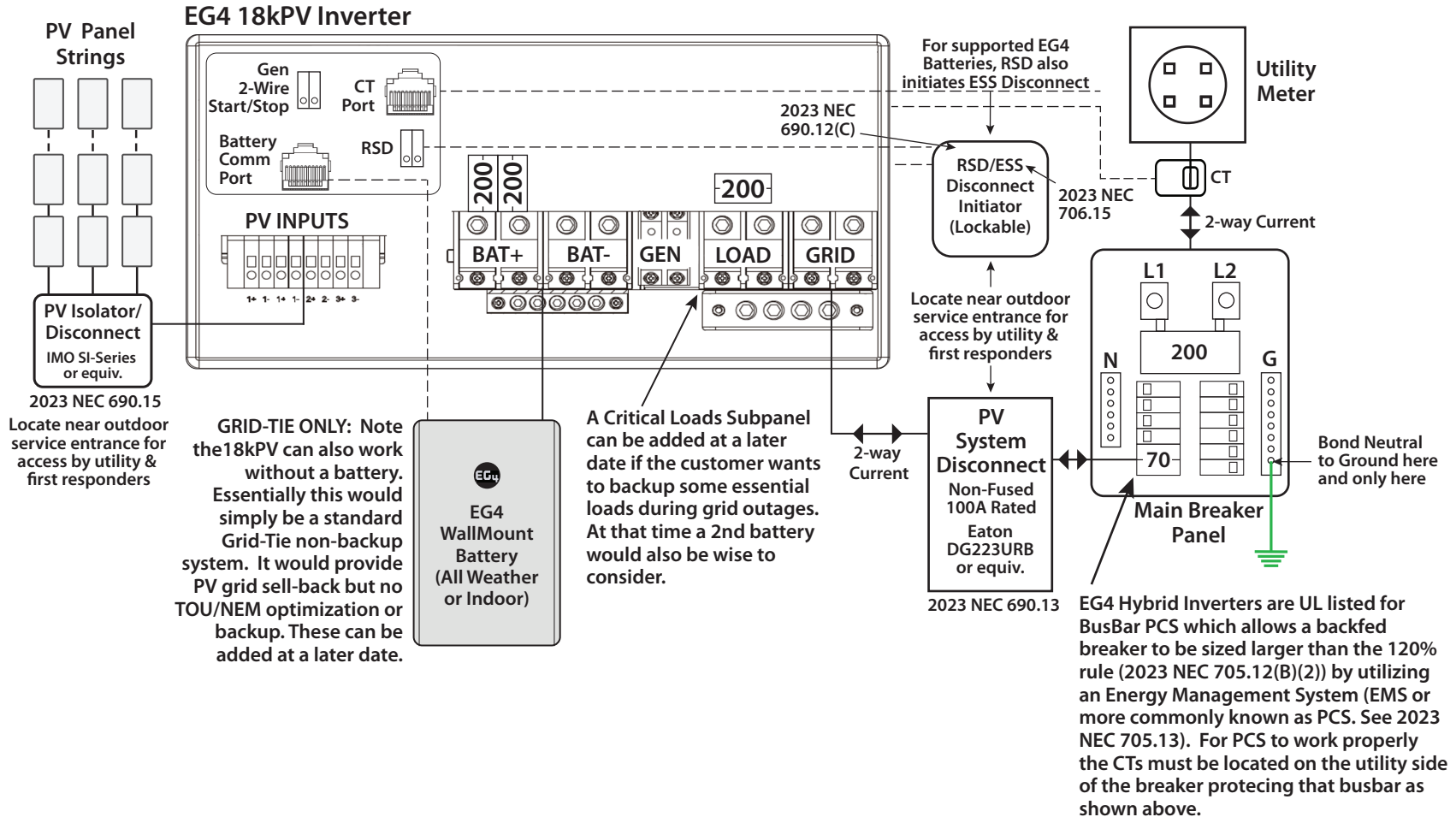
Other Utilities require Lockable, Visible Knife-Switch Type Disconnects- if your utility requires this then you have these 3 options below.

If your utility requires a dedicated PV Production meter you have two options - either Option #1a or Option #3 below:

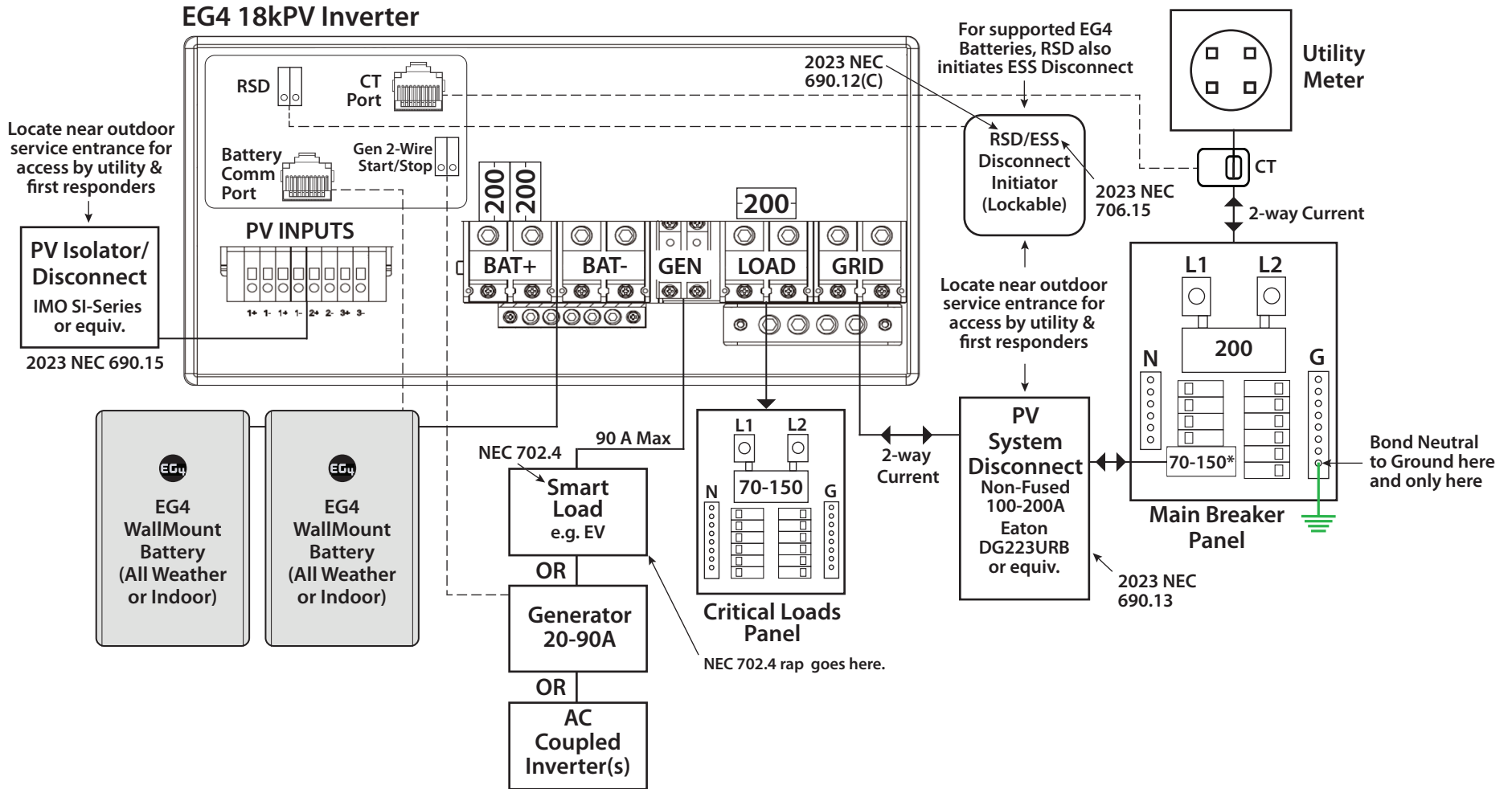


4. EG4 18kPV with Back-Fed Breaker - No Backup - Self Consumption and NEM/TOU only

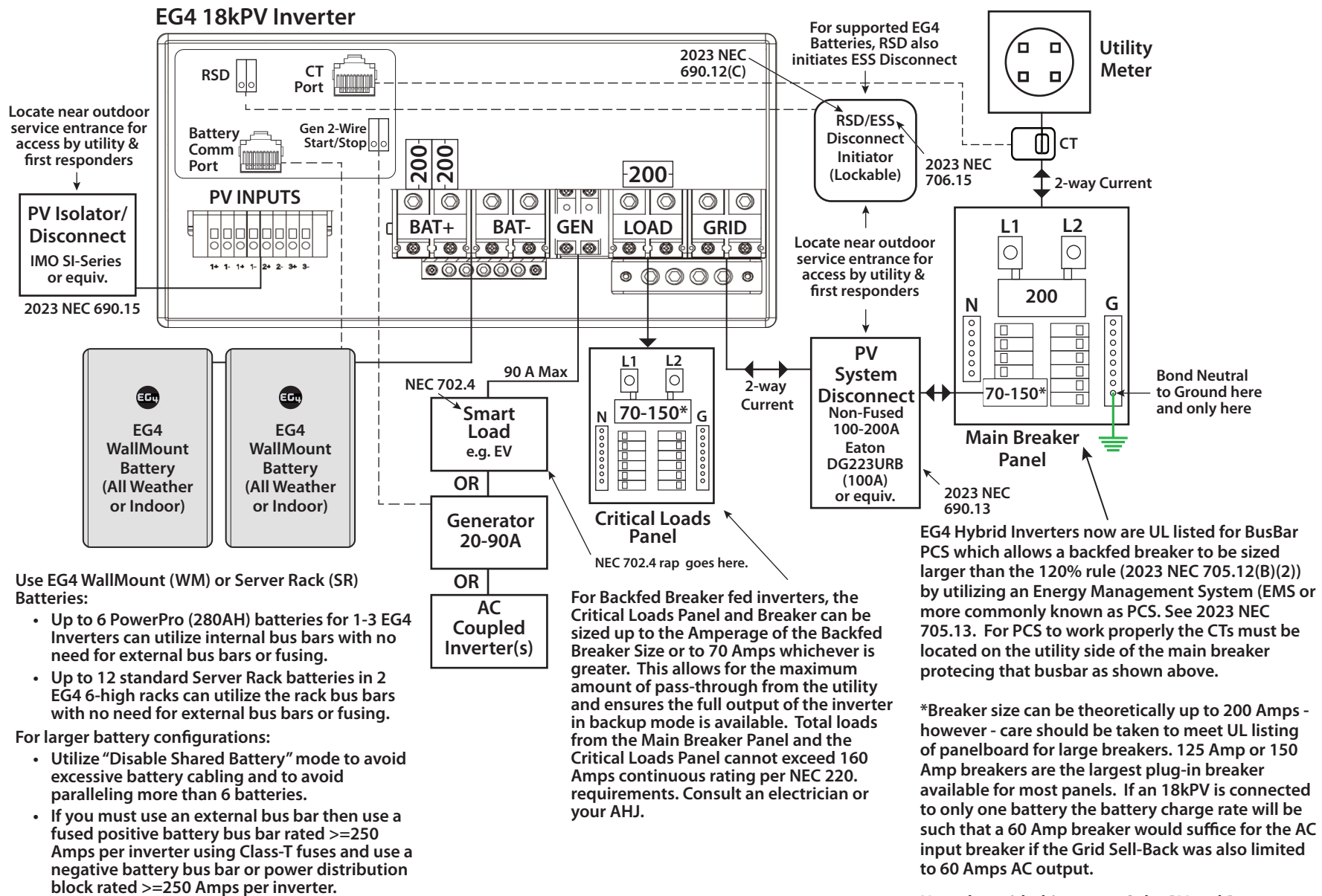
This system has no backed-up loads. It will simply serve to optimizing NEM/TOU economics by maximizing self-consumption of available solar and battery power of the loads in the Main Breaker Panel by providing battery cycling - applying daytime PV to nighttime loads or optimal TOU times. There will be no backup upon a grid outage in this system as it is wired below. See next page for system with backed-up loads panel. The number of batteries in this system is determined by how many kWhs needs to be cycled on a daily basis.



5. 18kPV with Backfed Breaker, BusBar PCS and Partial Home Backup

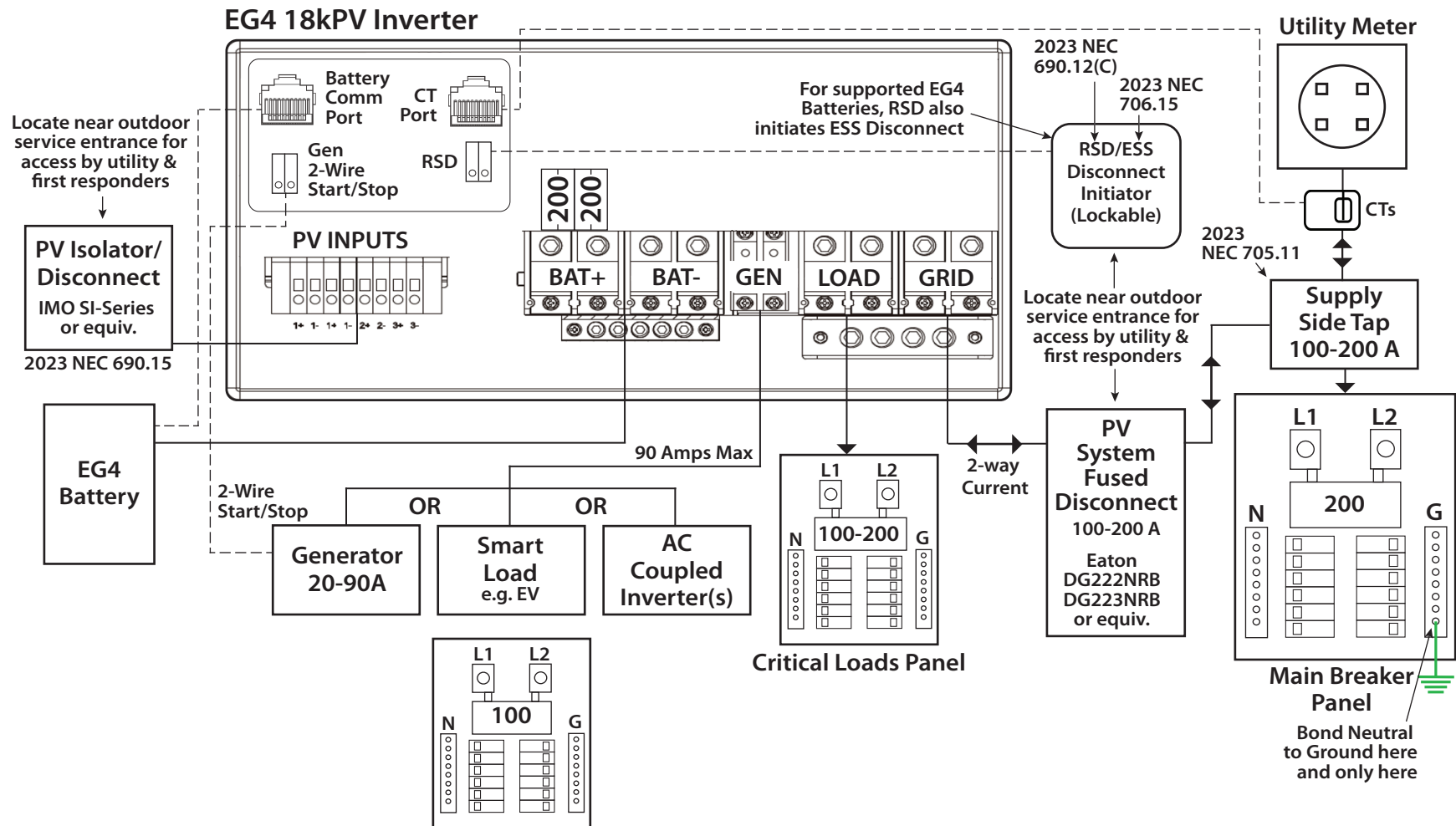


5a. 18kPV with Backfed Breaker, BusBar PCS and Partial Home Backup with Notes.



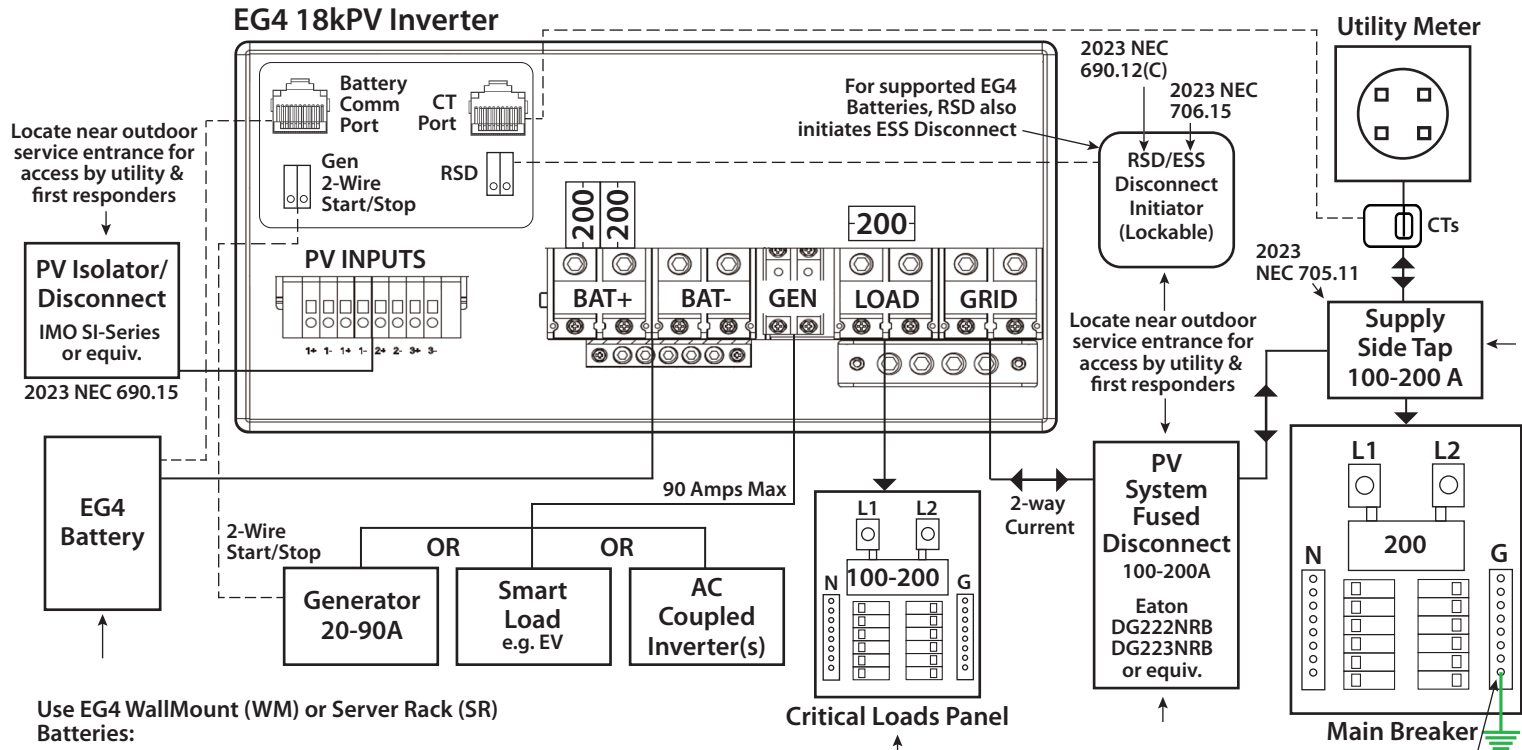
6. 18kPV with Supply Side Tap and Partial Home Backup

Note that while a Supply Side Tap is a viable option to interconnect an 18kPV system with the utility we highly recommend you consider using an EG4 GridBOSS. It will be less expensive, will take up less wall space and provide superior features including Load Management which is now required by code for ESS backup systems. The GridBOSS will also allow for easy installation of multiple inverters and provide a super easy upgrade path if adding inverters later. See drawings #1 and #2.



6a. 18kPV with Supply Side Tap and Partial Home Backup with Notes

Note that while a Supply Side Tap is a viable option to interconnect a 18kPV system with the utility we highly recommend you consider using an EG4 GridBOSS. It will be less expensive, will take up less wall space and provide superior features including Load Management which is now required by code for ESS backup systems. See drawings #1 and #2.



SUPPLY SIDE TAPS -if you want to exceed the amperage of the largest backed breaker that is available for your main panel then a SST may be a quick and easy alternative depending on the configuration of your existing service entrance equipment.

Supply Side Taps allow you to feed the full pass-through capability of the inverter to either your critical loads subpanel or to a transfer switch back to the Main Breaker Panel. Since the 18kPV has a 200 A pass-through rating you can achieve whole panel or whole home backup.

Caution: A Supply Side Tap will essentially add loads to your Service Entrance since each 18kPV adds 50 A to the total house loads with its battery charger. With this increased load there is the very real danger of overloading the Service Entrance conductors if the home is already using the full capacity of a 200 A Service. Do this only under advisement of your electrician and/or Electrical Inspector. Alternatively use a Feeder Tap to mitigate this risk. Feeder taps locate this extra load on the load side of the Main Breaker - thus protecting all Service Entrance Conductors. (See Feeder Tap Diagram).

Supply Side Taps should be installed by a professional electrician. IlSCO KUP-L-Taps are recommended, but the installer must adhere strictly to installation instructions with proper torque applied (as measured with 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. Refer to 2023 NEC Code 705.11 and 705.12.

Use EG4 WallMount (WM) or Server Rack (SR) Batteries:

- Up to 6 PowerPro (280AH) batteries for 1-3 EG4 Inverters can utilize internal bus bars with no need for external bus bars or fusing.
- Up to 12 standard Server Rack batteries in 2 EG4 6-high racks can utilize the rack bus bars with no need for external bus bars or fusing.

For larger battery configurations:

- Utilize "Disable Shared Battery" mode to avoid excessive battery cabling and to avoid paralleling more than 6 batteries.
- If you must use an external bus bar then use a fused positive battery bus bar rated ≥ 250 Amps per inverter using Class-T fuses and use a negative battery bus bar or power distribution block rated ≥ 250 Amps per inverter.

For Supply Side or Feeder Tap fed inverters for partial home backup, the Critical Loads Panel and Breaker can be sized up to the amperage rating of the Supply Side Tap and PV System Disconnect. This allows for the maximum amount of pass-through from the utility and ensures the full output of the inverter in backup mode is available. Total loads from the Main Breaker Panel and the Critical Loads Panel cannot exceed 160 Amps continuous rating per NEC 220. requirements. Consult an electrician or your AHJ.

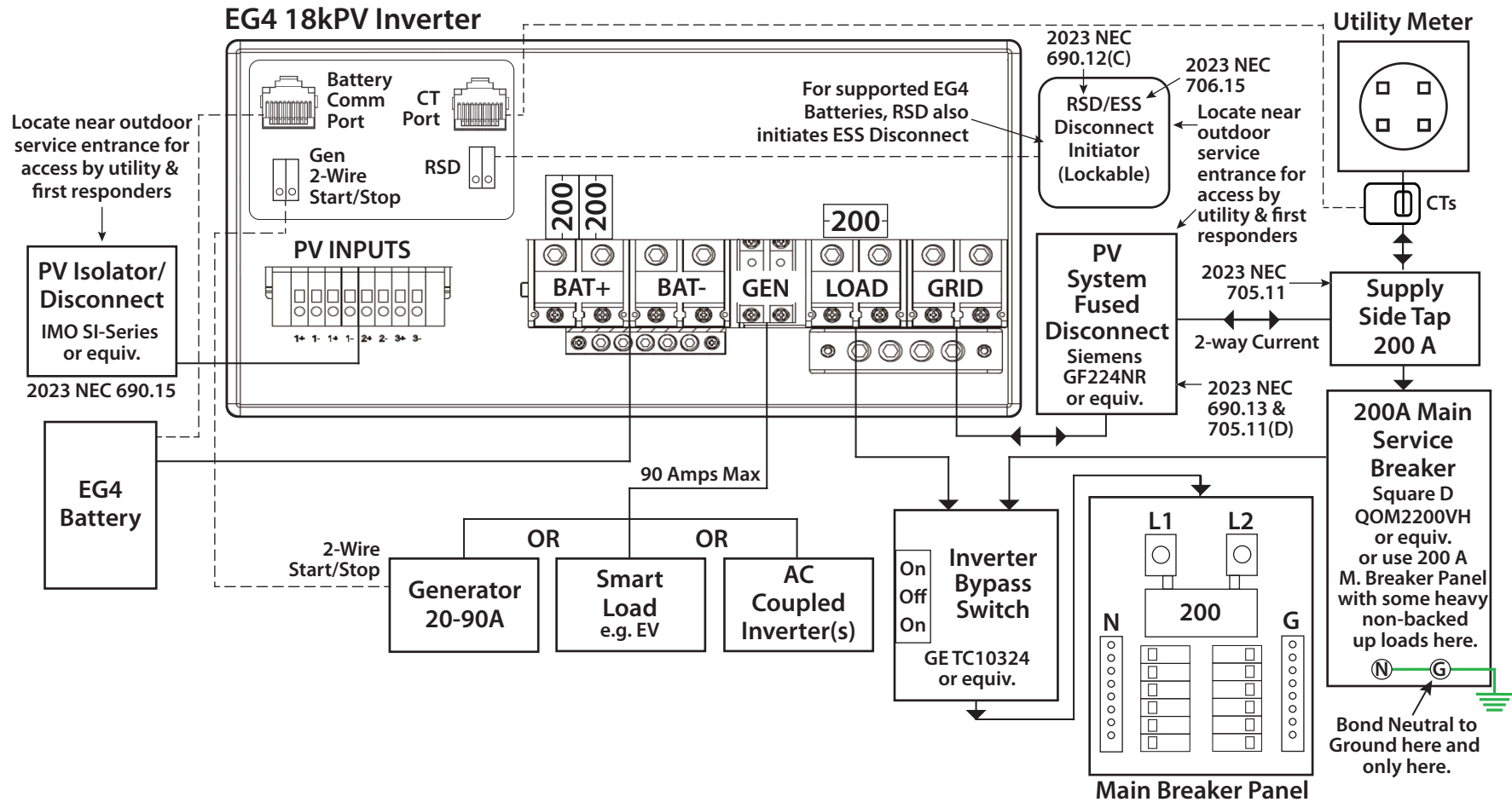
Refer to EG4 Design Guides for discussion of partial home and whole home backup.

For Supply-Side and Feeder Taps with Partial Home Backup, the Amp rating of the PV System Disconnect should be at least 60 A with 100 A Recommended and should match the A rating of the Supply Side Tap and Critical Loads Subpanel Main Breaker. Consult an electrician or your AHJ. Refer to 2023 NEC 690.13 & 705.11(D).

Note that with this system, Solar PV and Battery Power can power loads both in the critical loads subpanel and in the Main Breaker Panel (via backfeed through the SST) when the grid is on (Self-Consumption). When the utility goes down only loads in the critical loads subpanel are backed up.

7. 18kPV with Supply Side Tap and Whole Home Backup

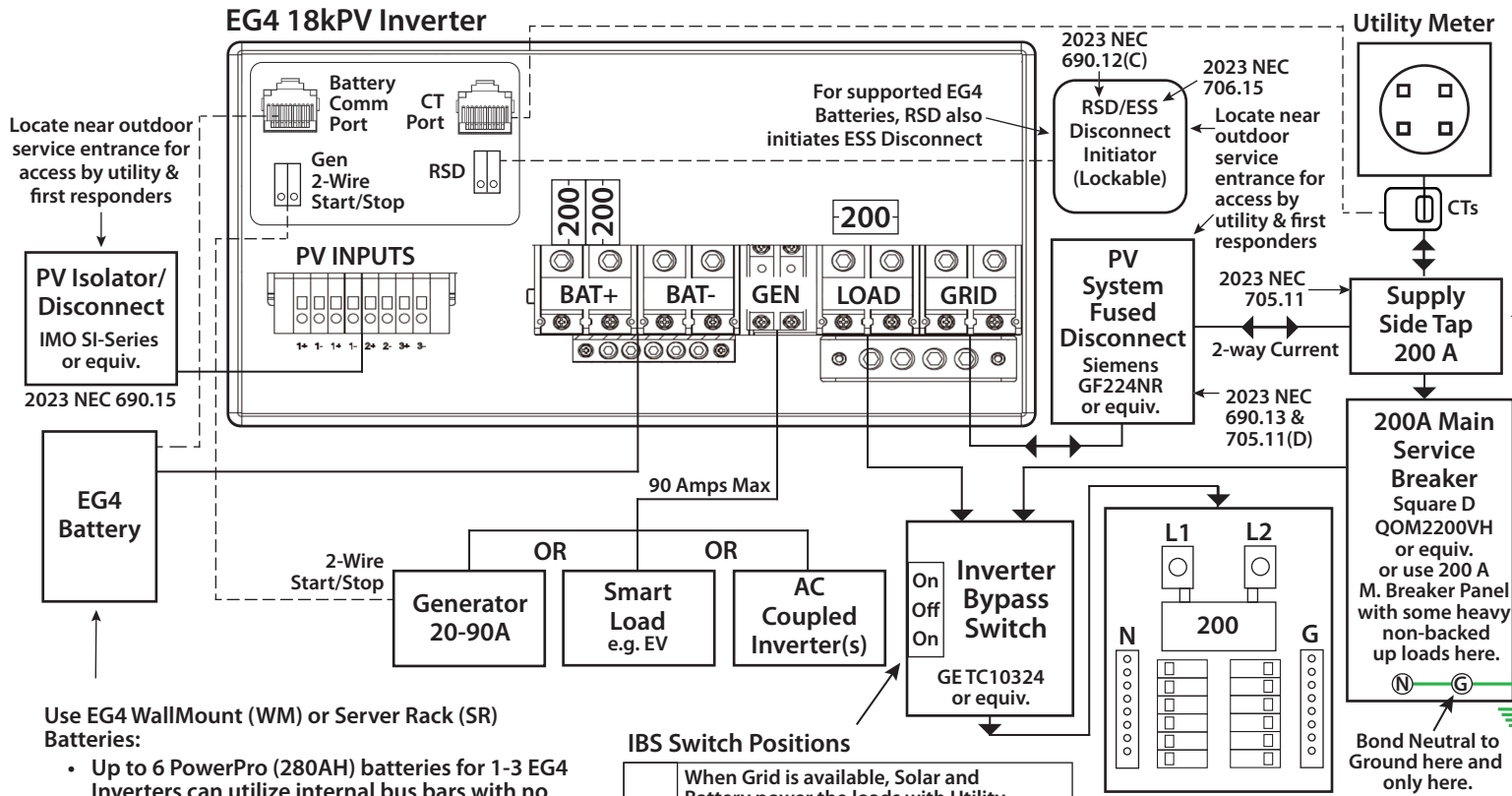
Note: This drawing is provided for legacy purposes. While a Supply Side Tap is a viable option to interconnect an 18kPV system with the utility we highly recommend you consider using an EG4 GridBOSS. It will be less expensive, will take up less wall space and provide superior features including Load Management which is now required by code for ESS backup systems. The GridBOSS will also allow for easy installation of multiple inverters and provide a super easy upgrade path if adding inverters later. It will also provide ease of wiring backed up loads vs non-backed up loads for Whole Home Backup. See drawings #1 and #2.



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7a. 18kPV with Supply Side Tap and Whole Home Backup with Notes

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SUPPLY SIDE TAPS - If your Service Entrance has a 200 A rated Main Panel bus and a 200 A Main Breaker and therefore cannot use a 60 or 70 A Backfed Breaker (see Backfed Breaker diagram) then a Supply-Side Tap may be your solution for point of utility interconnection.

Supply Side Taps allow you to feed the full pass-through capability of the inverter to either your critical loads subpanel or to a transfer switch back to the Main Breaker Panel. Since the 18kPV has a 200 A pass-through rating you can achieve whole panel or whole home backup. (refer to EG4 Design Guides).

Caution: A Supply Side Tap will essentially add loads to your Service Entrance since the 18kPV adds 50 A to the total house loads with its battery charger. With this increased load there is the very real danger of overloading the Service Entrance conductors if the home is already using the full capacity of a 200 A Service. Do this only under advisement of your electrician and/or Electrical Inspector. Alternatively use a Feeder Tap to mitigate this risk. Feeder taps locate this extra load on the load side of the Main Breaker - thus protecting all Service Entrance Conductors. (See Feeder Tap Diagram).

Supply Side Taps should be installed by a professional electrician. IlSCO KUP-L-Taps are recommended, but the installer must adhere strictly to installation instructions with proper torque applied (as measured with 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. Refer to 2023 NEC Code 705.11 and 705.12.

Refer to EG4 Design Guides for discussion of partial home and whole home backup.

- Use EG4 WallMount (WM) or Server Rack (SR) Batteries:
- Up to 6 PowerPro (280AH) batteries for 1-3 EG4 Inverters can utilize internal bus bars with no need for external bus bars or fusing.
 - Up to 12 standard Server Rack batteries in 2 EG4 6-high racks can utilize the rack bus bars with no need for external bus bars or fusing.
- For larger battery configurations:
- Utilize "Disable Shared Battery" mode to avoid excessive battery cabling and to avoid paralleling more than 6 batteries.
 - If you must use an external bus bar then use a fused positive battery bus bar rated ≥ 250 Amps per inverter using Class-T fuses and use a negative battery bus bar or power distribution block rated ≥ 250 Amps per inverter.

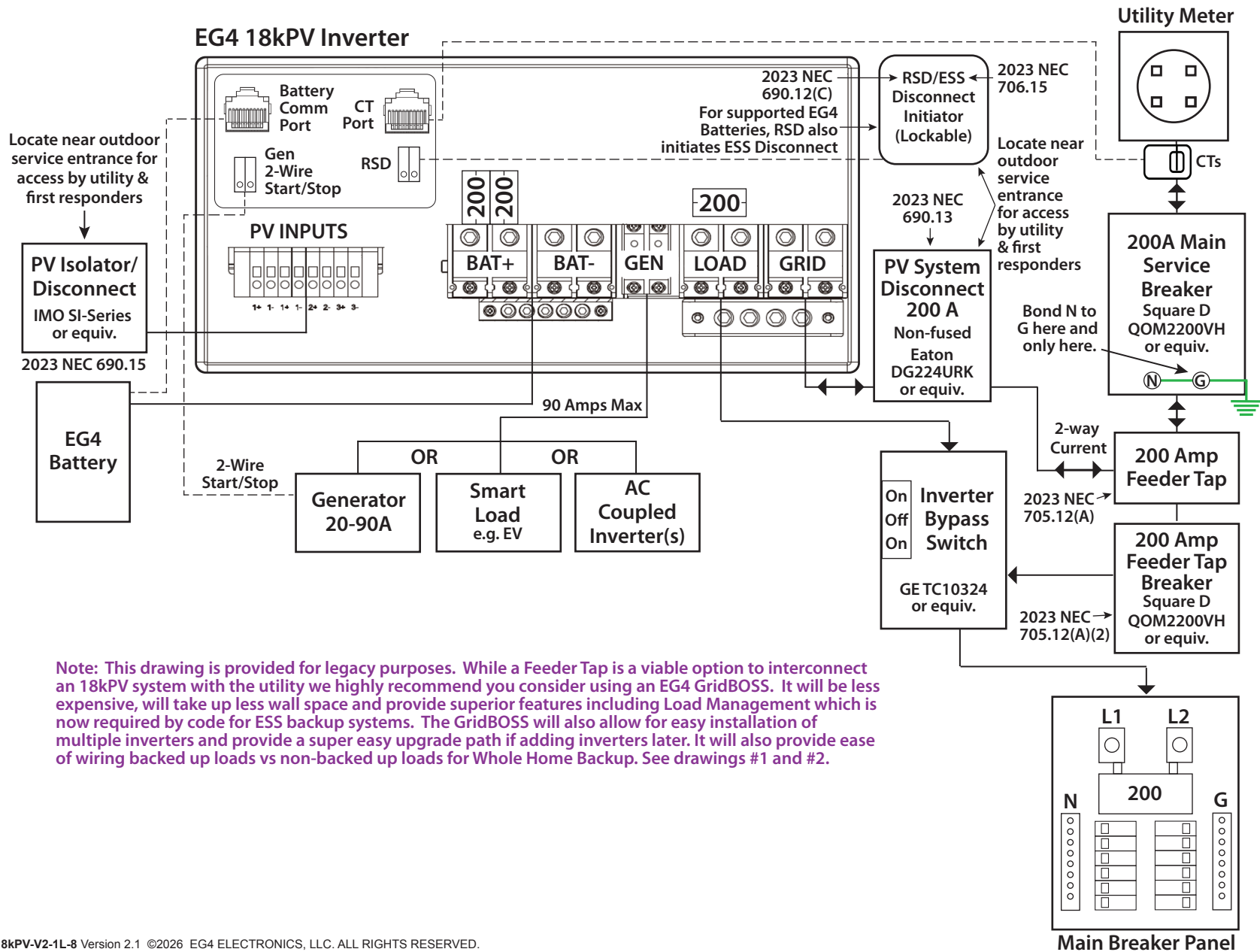
IBS Switch Positions

On	When Grid is available, Solar and Battery power the loads with Utility pass-thru as needed. Excess power is sold back to utility if settings allow. When Grid goes down, loads instantly are backed up.
Off	Main Breaker Panel is off. Battery charging from PV and Grid and Utility sell-back are still active.
On	When Grid is available, Solar and Battery power the loads (thru sell-back to SST) with Utility sourced as needed. Excess power is sold back to utility if settings allow. When Grid goes down, Loads are not backed up. User must throw switch to top position to utilize inverter backup power.

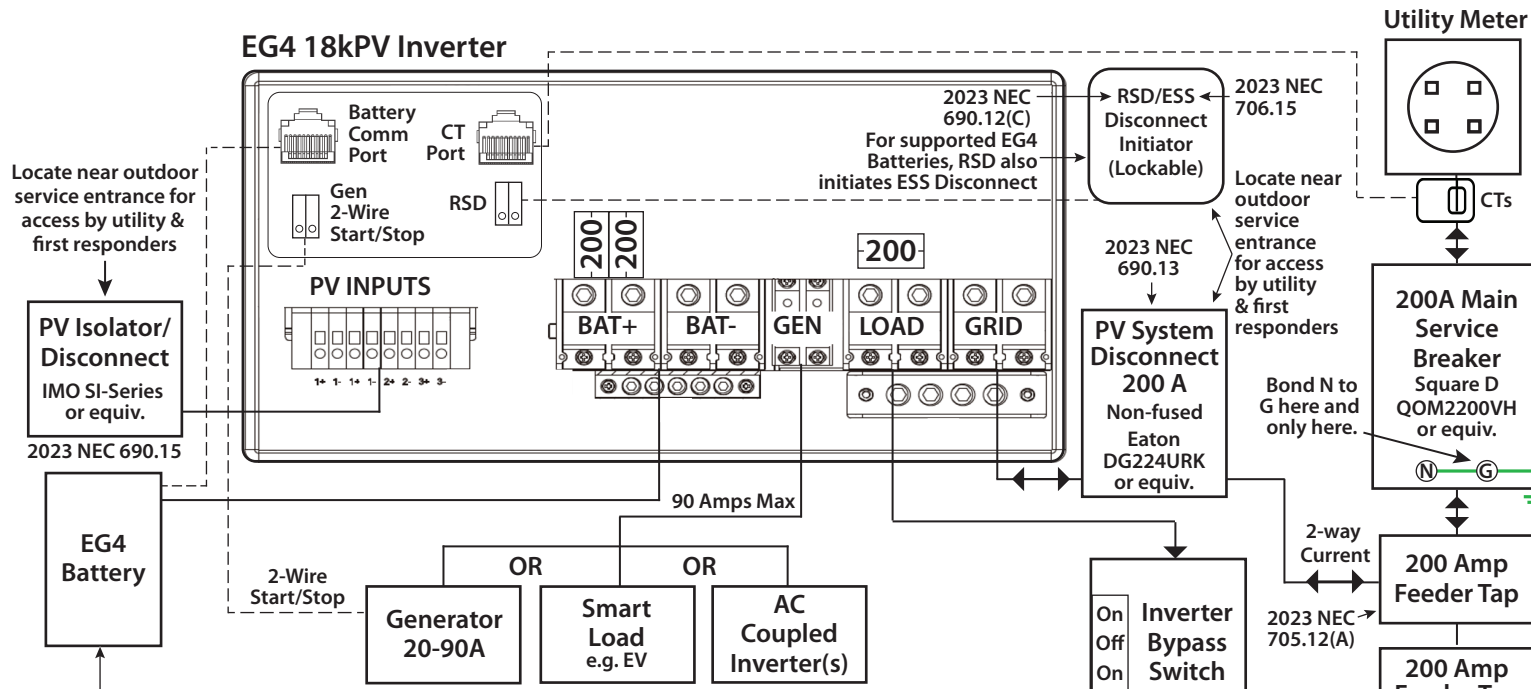
By providing an Inverter Bypass Switch as shown, Whole Panel or Whole Home Backup can be achieved negating the need for a critical loads subpanel while allowing easy installation and servicing of the inverter. However to do full Whole Home Backup a 2nd and possibly 3rd inverter may be required. See EG4 Design Guides. A single inverter can energize the whole panel but heavy loads should be shed during grid outages. The GEN port can be utilized as a Smart Load port for this purpose. The down position on the MTS is recommended if using only one inverter and no smart loads. Users will then notice grid is down and will need to go into a more frugal use mode before turning on backup.

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8. 18kPV with Feeder Tap and Whole Home Backup



8a. 18kPV with Feeder Tap and Whole Home Backup with Notes



Note: This drawing is provided for legacy purposes. While a Feeder Tap is a viable option to interconnect an 18kPV system with the utility we highly recommend you consider using an EG4 GridBOSS. It will be less expensive, will take up less wall space and provide superior features including Load Management which is now required by code for ESS backup systems. The GridBOSS will also allow for easy installation of multiple inverters and provide a super easy upgrade path if adding inverters later. See drawings #1 and #2.

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 to 2020 NEC Code: 705.12(B)(1&2)

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 200Amp 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. It's best to include that breaker as shown.

Locate near outdoor service entrance for access by utility & first responders

PV Isolator/Disconnect IMO SI-Series or equiv. 2023 NEC 690.15

EG4 Battery

Use EG4 WallMount (WM) or Server Rack (SR) Batteries:

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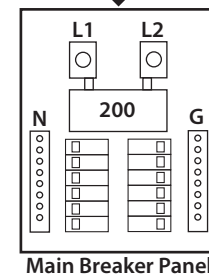
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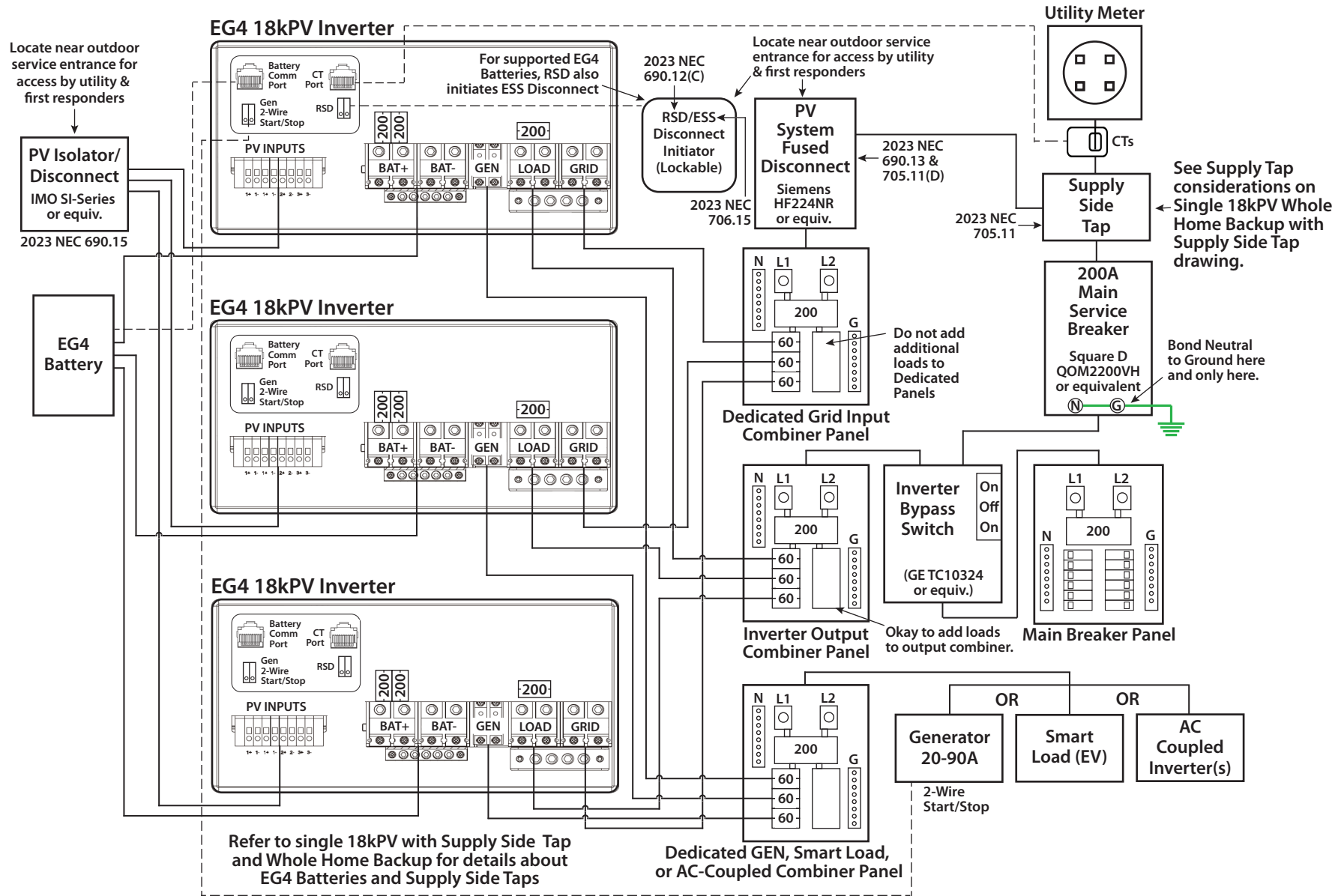
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On	When Grid is available, Solar and Battery power the loads (thru sell-back to FT) with Utility sourced as needed. Excess power is sold back to utility if settings allow. When Grid goes down, Loads are not backed up. User must throw switch to top position to utilize inverter backup power.



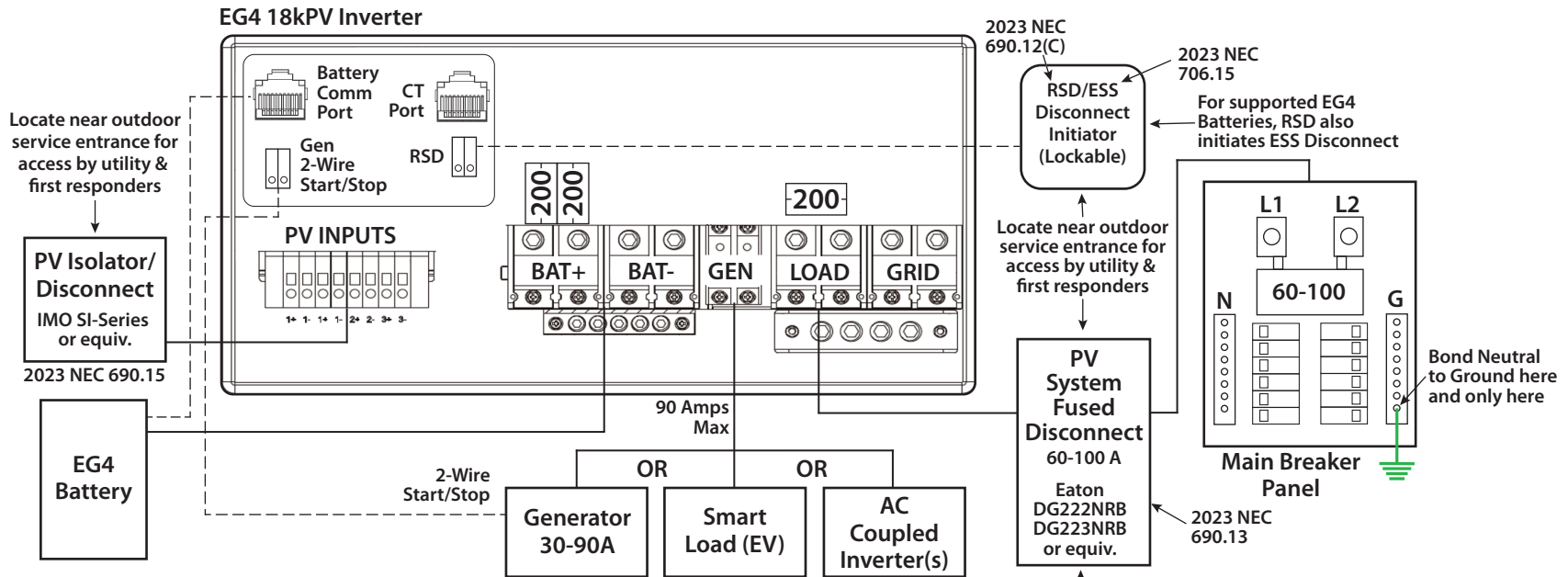
10. 3 18kPVs with Supply Side Tap and Whole Home Backup

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11. 18kPV Off-Grid



The inverter can accept BOTH DC-COUPLED AND AC-COUPLED SOLAR at the same time.
 The AC COUPLED SOLAR CAN BE UP TO 21.6kW (AC) or 80 Amps of AC output.
 The DC COUPLED MPPT CHANNELS CAN HANDLE UP TO 18kW of PV input (DC) with a maximum recommended Array size of 21.6 KWs. Maximum battery charging rate is 12 KWs per Inverter.

Dual and Triple Inverters can handle larger off-grid systems. Combine as per the corresponding on-grid drawings.

Minimum Recommended Battery to Inverter Ratios

Battery	WallMount		Server Rack	
	280 AH - 200 A BMS	100 AH - 100 A BMS	LL-S 48V	LifePower4
EG4 Inverter				
12kPV	1	1	2.5	2.5
18kPV	1.5	1.5	4	4
FlexBoss18	1.5	1.5	4	4
FlexBoss21	1.5	1.5	4	4

This chart indicates the minimum number of EG4 batteries required to provide sufficient battery amperage to the inverter to produce its full rated power. It does not indicate sufficient kWhrs needed for back-up storage for any given set of loads. See EG4 Battery and Inverter Sizer tool on the EG4 website.

IMPORTANT NOTE: 1 WM Battery will limit the output of one 18kPV Inverter to 43 Amps hence the minimum ratio is 1.5/1. One battery per 18kPV is okay for minimal NEM/TOU or BU systems where the full 50 Amp inverter output is not needed.