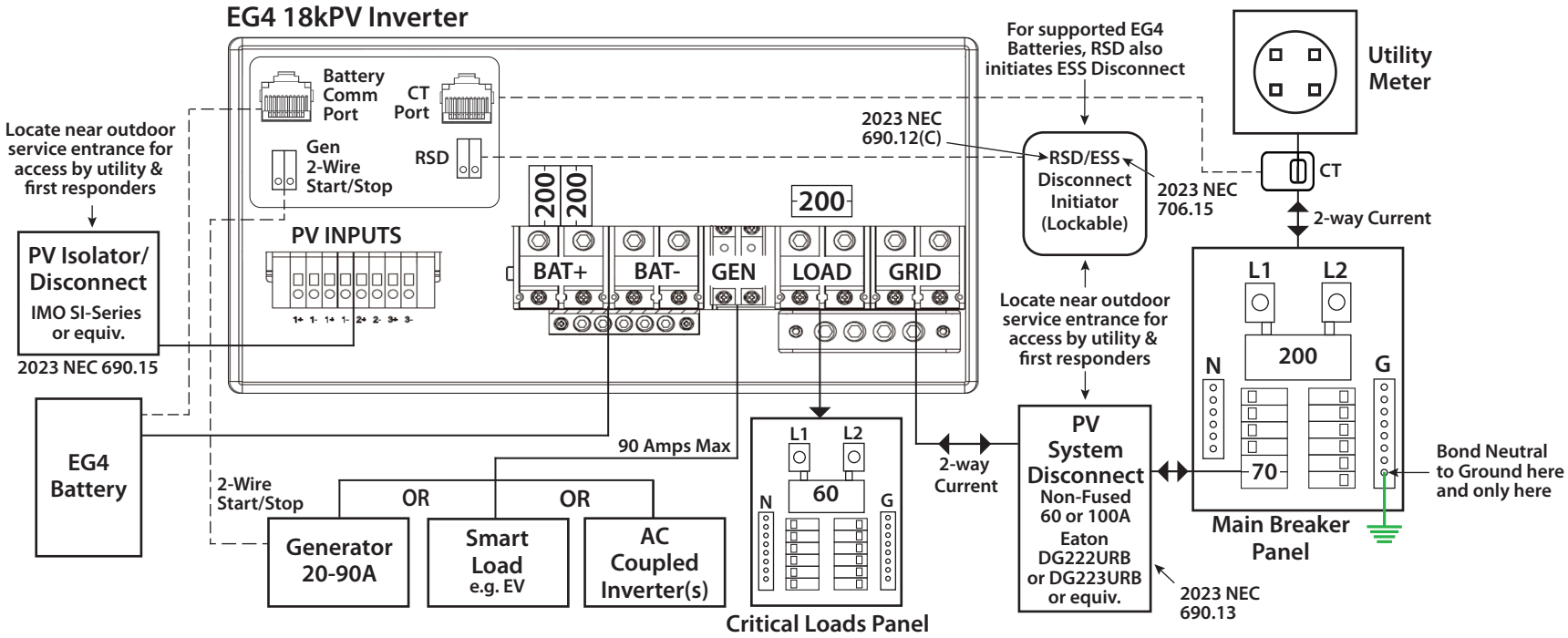
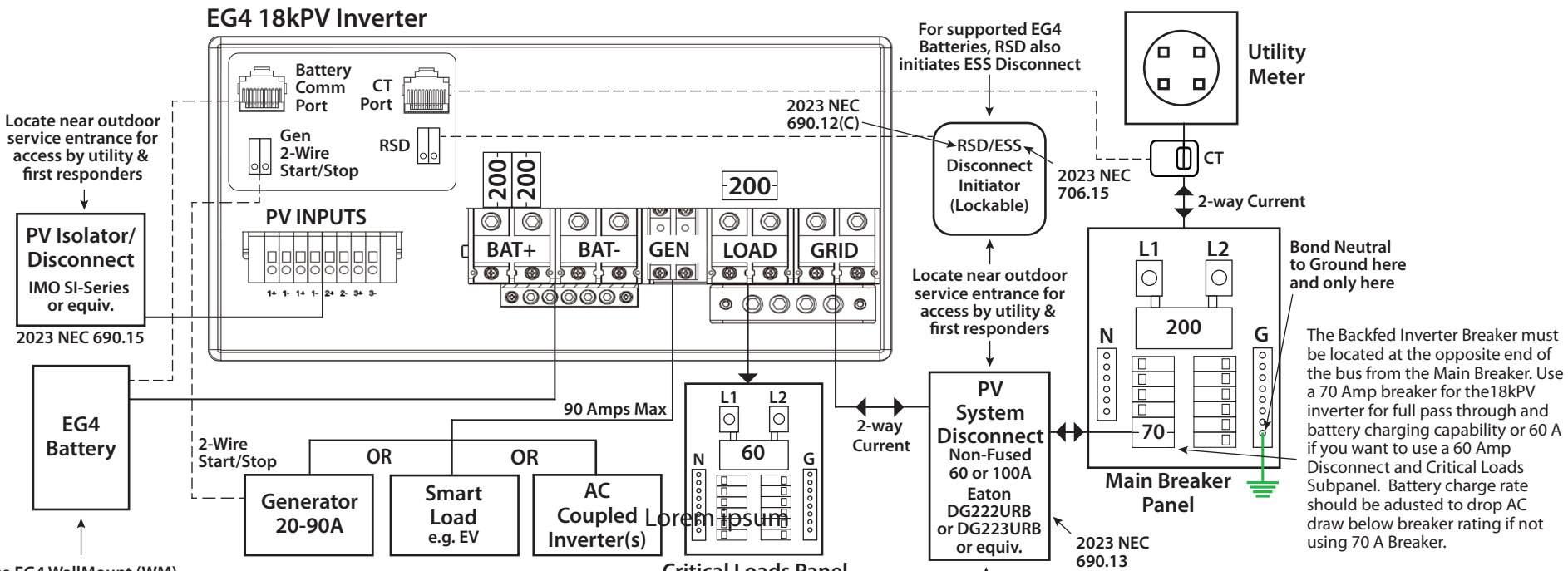
18kPV 1Line Diagrams - v1.3

18kPV with Backfed Breaker and Partial Home Backup



18kPV with Backfed Breaker and Partial Home Backup with Notes



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

- **Up to 3 WM batteries can utilize internal bus bars with no need for external bus bars or fusing.**
- **Up to 12 SR batteries in 2 EG4 racks can utilize internal bus bars with no need for external bus bars or fusing.**

For larger battery configurations:

- **Use a fused positive battery bus bar rated >=250 Amps per battery or per inverter using Class-T fuses.**
- **Use a negative battery bus bar or power distribution block rated >=250 Amps per battery and per inverter.**

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 (Self-Consumption) when the grid is on (through grid sell-back through the Backfed Breaker). When the utility goes down only loads in the critical loads subpanel are backed up.

For Backfed Breaker fed inverters, the Critical Loads Panel and Breaker can be sized up to the Amperage of the Backfed Breaker Size or to 50 Amps whichever is greater. 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 an inverter fed by a backfed breaker the amperage rating of the PV System Disconnect should be at least 50 A but not less than the backfed breaker. By using a 60 A Backfed Breaker one can use a 60 A Disconnect.

(*)Derating the Inverter: EG4 can derate inverters as needed to meet the 120% rule and/or utility kW limits on inverter size. Derating is programmed remotely from EG4 Technical Support and a letter can be sent to AHJs or Utilities certifying a given serial number has been derated to the requested amperage

Backfed Breakers and the NEC [Refer to 2023 NEC 705.12(B)(2)]

The easiest way to interconnect a hybrid solar system to the utility grid is a backfed breaker. This is simply a breaker installed on your main breaker panel that is backfed for Sell-Back to the Grid.

However, to use a backfed breaker, the NEC code for permitted combinations of service entrance main breaker rating, main breaker panel bus bar rating, and the inverter's continous output rating must be met.

<u>NEC Code: The sum of the main service breaker rating plus 125% of the inverter output rating cannot exceed 120% of the breaker panel bus bar rating.</u>

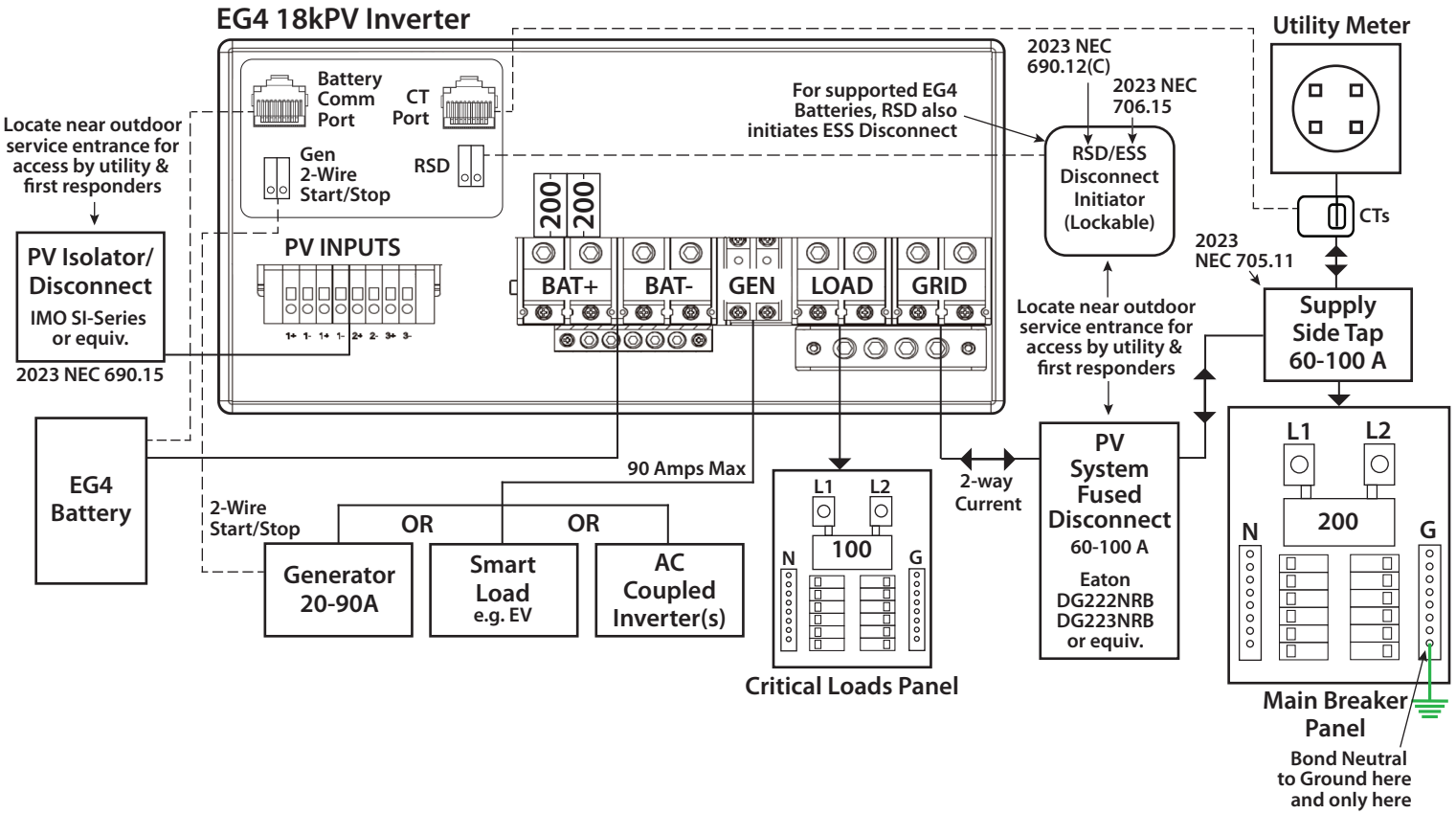
See table below for example combinations of main breaker rating, main bus rating and inverter derates for the EG418kPV that comply.

	Does Not Comply	Full Size Bus Bar	Inverter Derated (*)	100 Amp Main Breaker with 150 A Bus Bar	Downsize Main Breaker
Breaker Panel Bus Bar Rating	200	225	200	150	200
Main Breaker Rating	200	200	200	100	175
Inverter Rating (x1.25)	62.5 (1)	62.5 (1)	40 (2)	62.5 (1)	62.5 (1)
Meets NEC Code Safety?	X	✓	✓	✓	✓

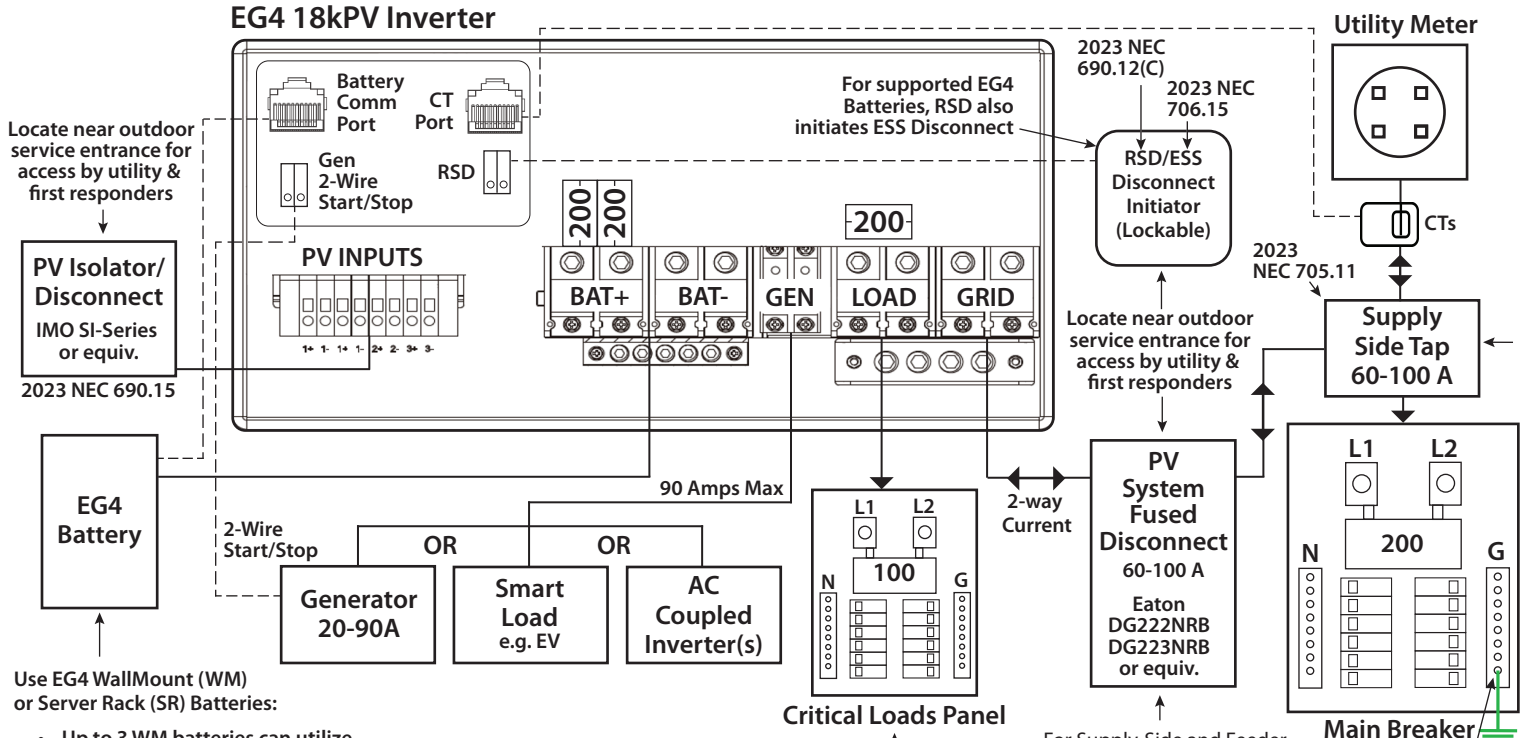
(1) 18kPV inverter output rating = 50A; 1.25 x 50A = 62.5A

(2) 18kPV inverter derated output rating = 32A; 1.25 x 32A = 40A

18kPV with Supply Side Tap and Partial Home Backup



18kPV with Supply Side Tap and Partial Home Backup with Notes



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

- **Up to 3 WM batteries can utilize internal bus bars with no need for external bus bars or fusing.**
- **Up to 12 SR batteries in 2 EG4 racks can utilize internal bus bars with no need for external bus bars or fusing.**

For larger battery configurations:

- **Use a fused positive battery bus bar rated >=250 Amps per battery or per inverter using Class-T fuses.**
- **Use a negative battery bus bar or powerdistribution block rated >=200 Amps per battery and 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.

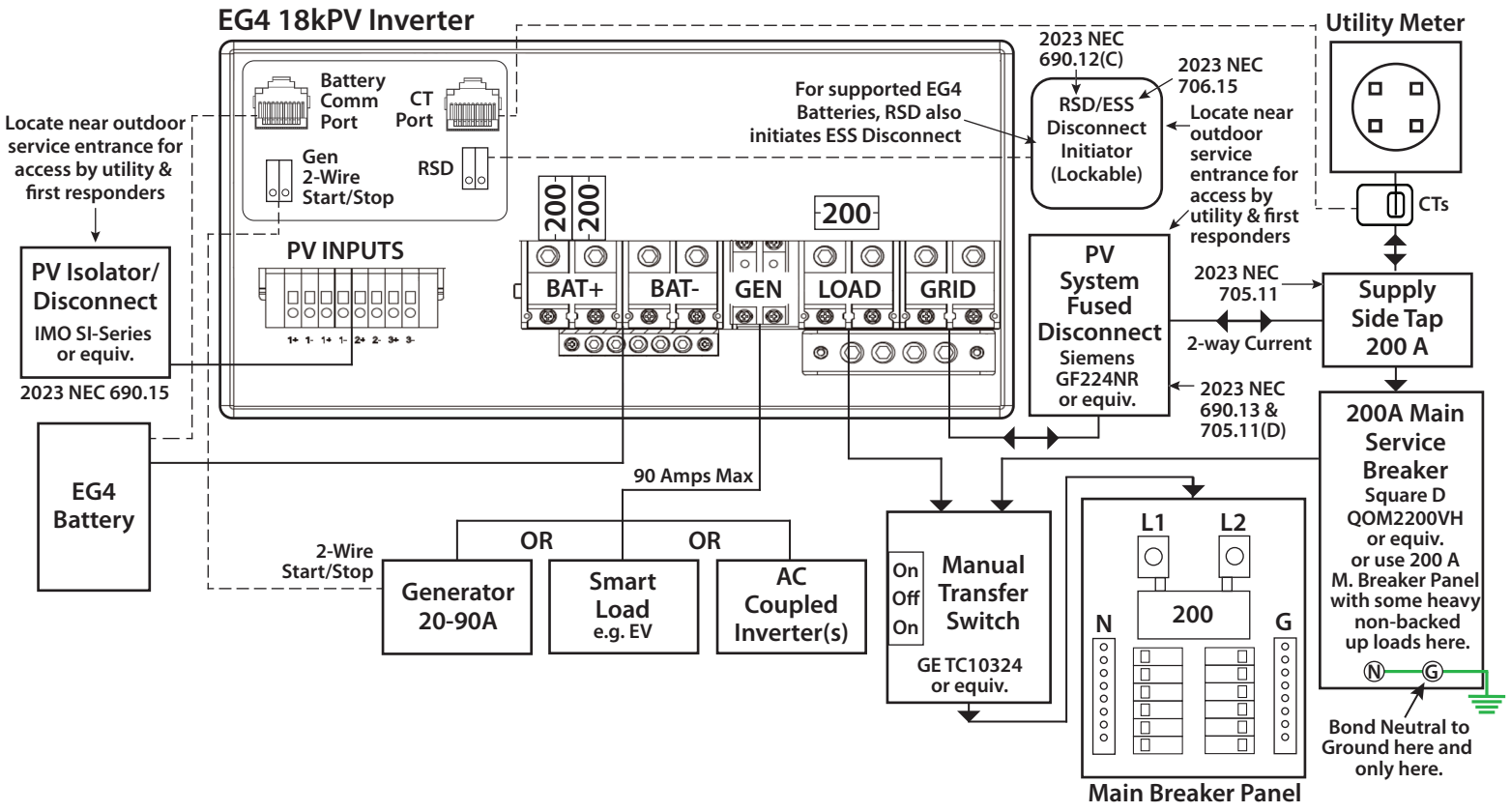
SUPPLY SIDE TAPS - If your Service Entrance has a 200 A rated Main Panel bus and a 200 A Main Breaker and therefore cannot use a 60 or 70 A Backfed Breaker (see Backfed Breaker diagram) then a Supply-Side Tap may be your solution for point of utility interconnection.

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 tools).

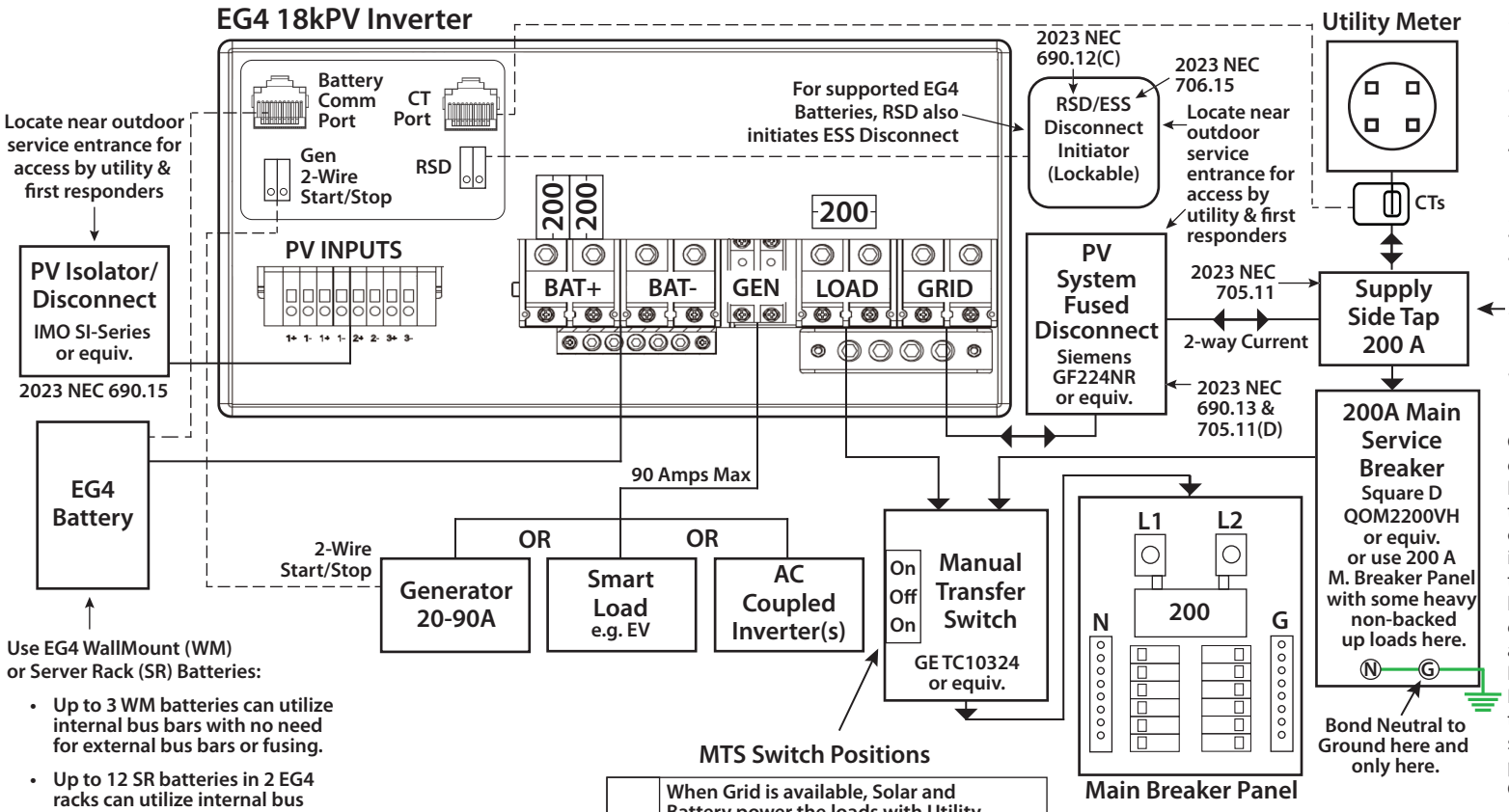
Caution: A Supply Side Tap will essentially add loads to your Service Entrance since the 18kPV adds 50 A to the total house loads with it's battery charger. With this increased load there is the very real danger of overloading the Service Entrance conductors if the home is already using the full capacity 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 protecing 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.

18kPV with Supply Side Tap and Whole Home Backup



18kPV with Supply Side Tap and Whole Home Backup with Notes



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

- **Up to 3 WM batteries can utilize internal bus bars with no need for external bus bars or fusing.**
- **Up to 12 SR batteries in 2 EG4 racks can utilize internal bus bars with no need for external bus bars or fusing.**

For larger battery configurations:

- **Use a fused positive battery bus bar rated >=250 Amps per battery or per inverter using Class-T fuses.**
- **Use a negative battery bus bar or powerdistribution block rated >=250 Amps per battery and per inverter.**

MTS 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 Utililty 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 a Manual Transfer 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.

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.

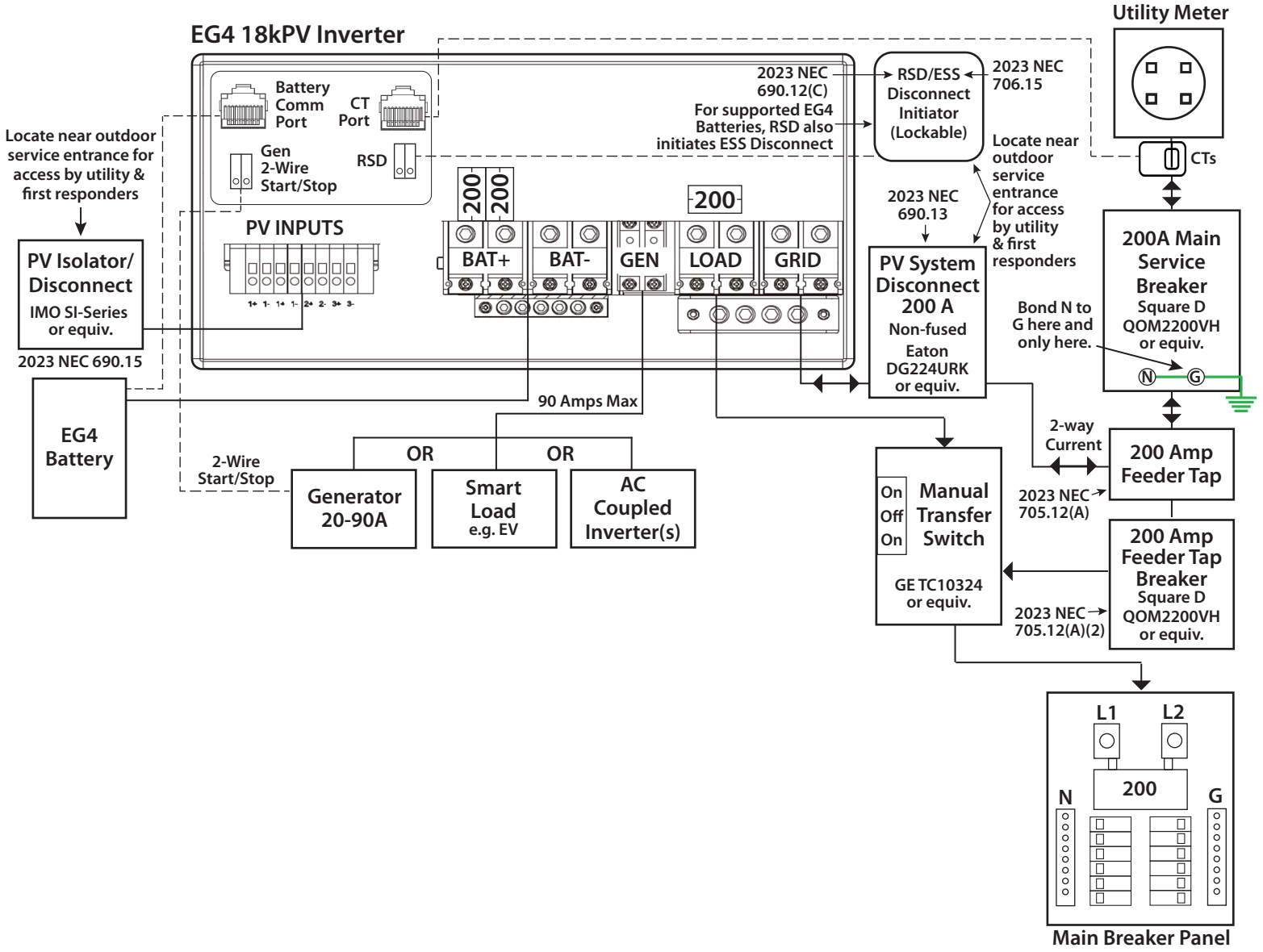
Supply Side Taps allow you to feed the full pass-through capability of the inverter to either your critical loads subpanel or to a transfer switch back to the Main Breaker Panel. Since the 18kPV has a 200 A pass-through rating you can achieve whole panel or whole home backup. (refer to EG4 Design Guides).

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 it's 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. Aternatively use a Feeder Tap to mitigate this risk. Feeder taps locate this extra load on the load side of the Main Breaker - thus protecing all Service Entrance Conductors. (See Feeder Tap Diagram).

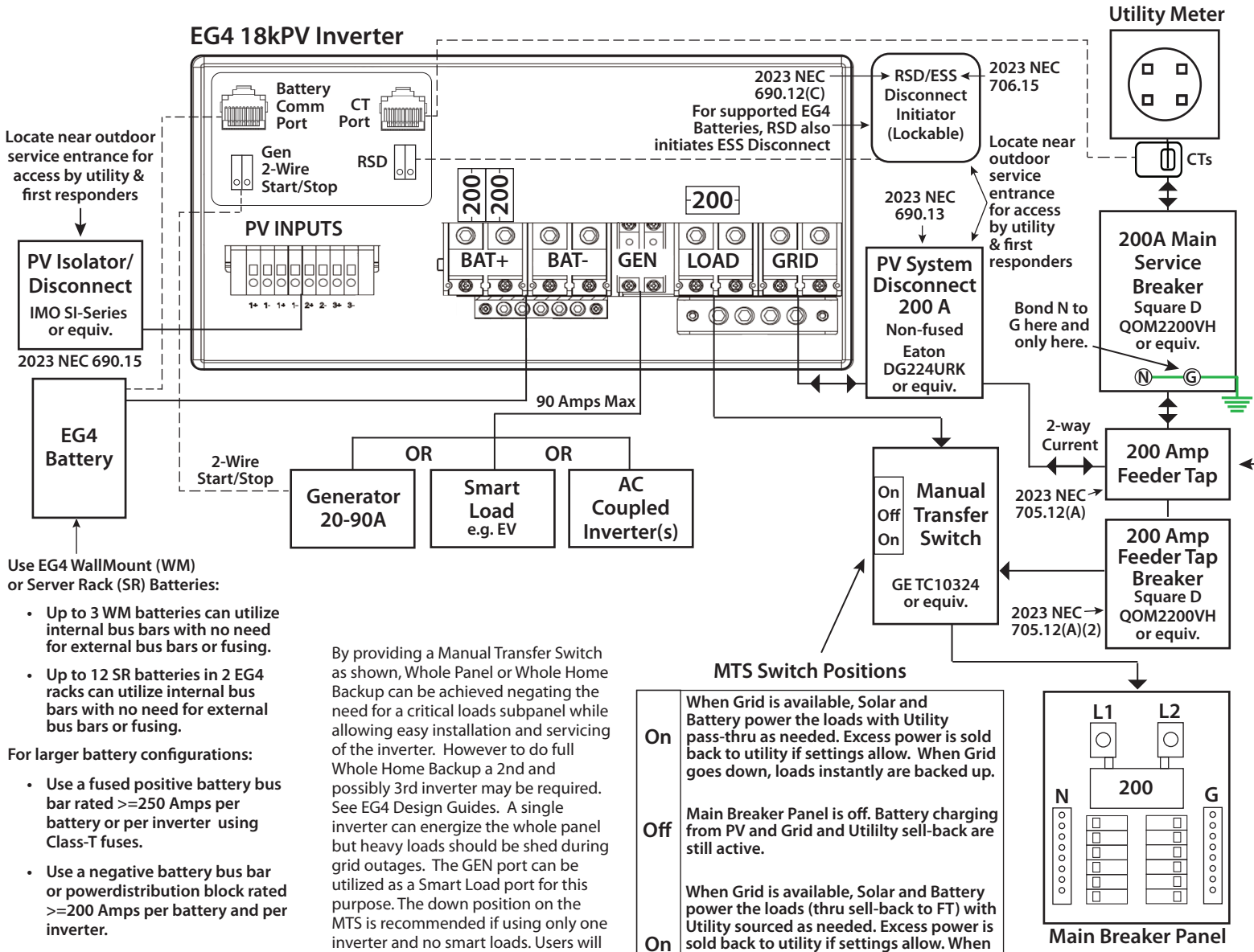
Supply Side Taps should be installed by a professional electrician. Ilsco KUP-L-Taps are recommended, but the installer must adhere strictly to installation instructions with proper torque applied (as measured with a torque wrench). Alternatively, a Polaris or Burnby Insulated MultiTap Connector can 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.

18kPV with Feeder Tap and Whole Home Backup



18kPV with Feeder Tap and Whole Home Backup with Notes



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

- **Up to 3 WM batteries can utilize internal bus bars with no need for external bus bars or fusing.**
- **Up to 12 SR batteries in 2 EG4 racks can utilize internal bus bars with no need for external bus bars or fusing.**

For larger battery configurations:

- **Use a fused positive battery bus bar rated >=250 Amps per battery or per inverter using Class-T fuses.**
- **Use a negative battery bus bar or powerdistribution block rated >=200 Amps per battery and per inverter.**

By providing a Manual Transfer 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.

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 Utililty sell-back are still active.**
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.**

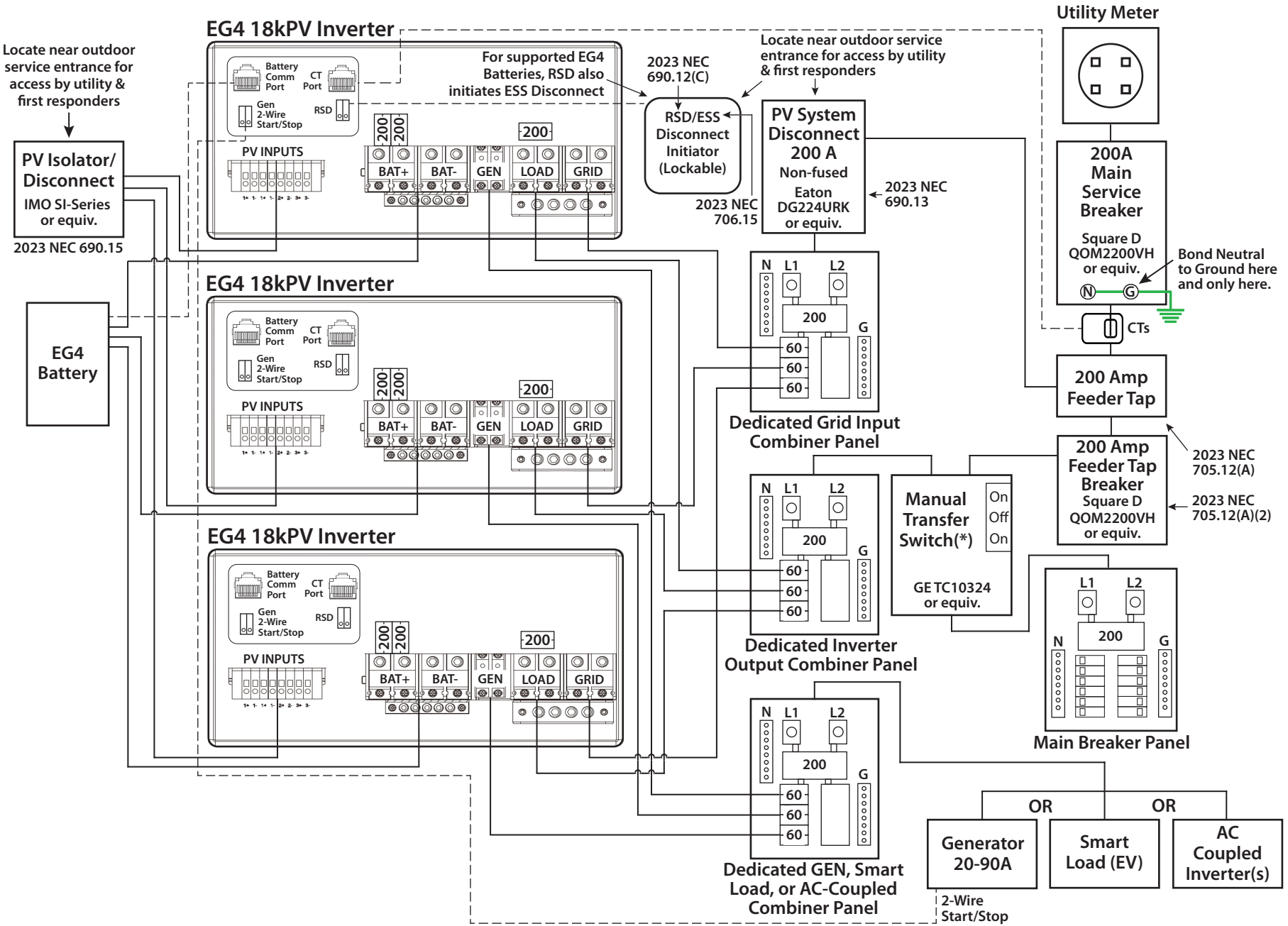
FEEDER TAPS ARE THE IDEAL AND SAFEST WAY TO TIE YOUR INVERTER TO THE UTILITY GRID while achieving whole home backup, full solar backfeed, and full battery charging capability while fully protecting your home's wiring. However, Feeder Taps must be installed correctly.

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

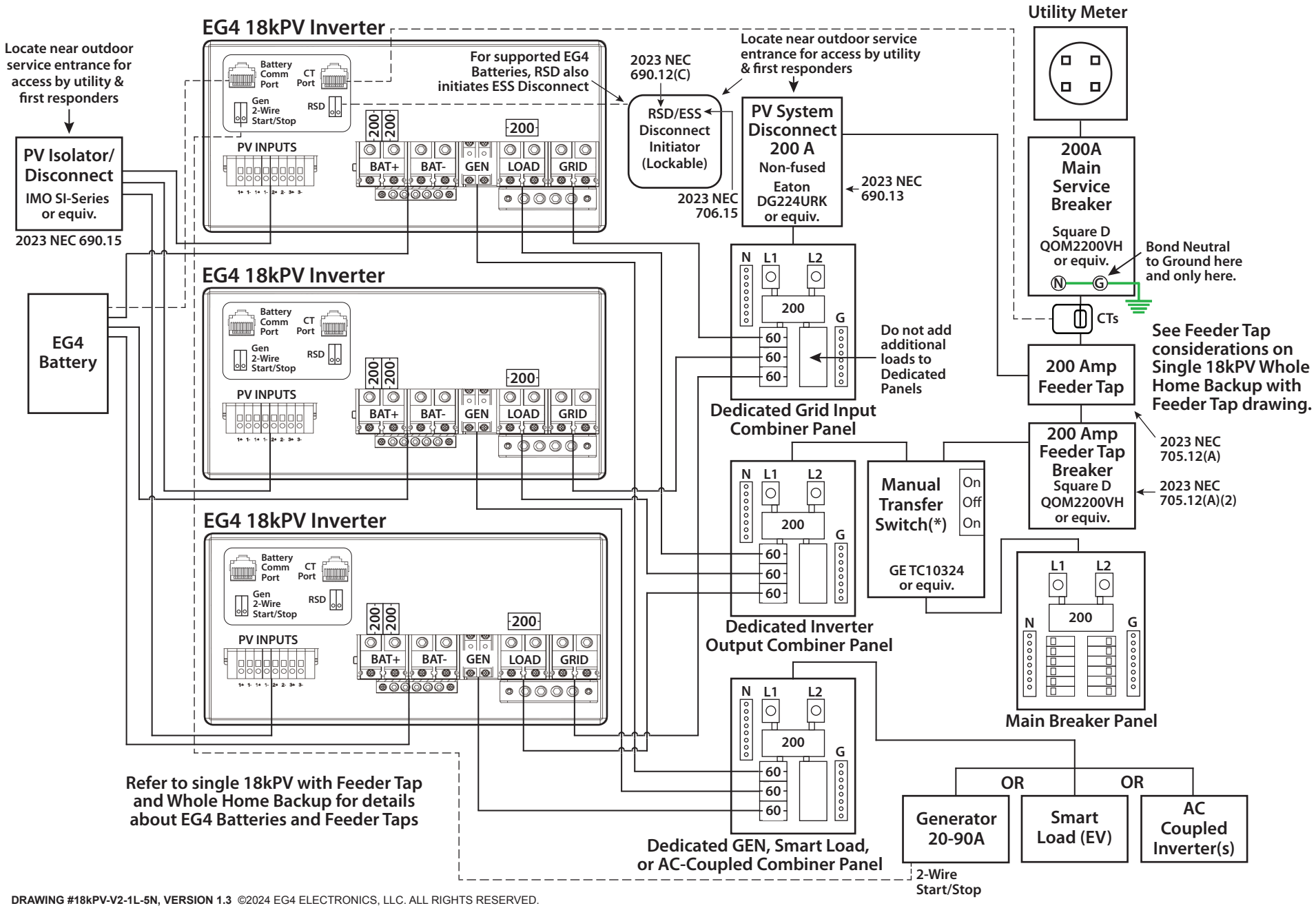
The Main Service Breaker and the Feeder Tap Breaker must be a stand-alone breaker -not a load center. **There can be no loads between the Utility Meter and the Feeder Tap.** If the Main Breaker Panel has a Main 200 Amp Breaker and it is within 10' of the Feeder Tap then some inspectors will allow omitting 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.

Feeder Taps should be installed by a professional electrician. Ilsco KUP-L-Taps are recommended, but 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.

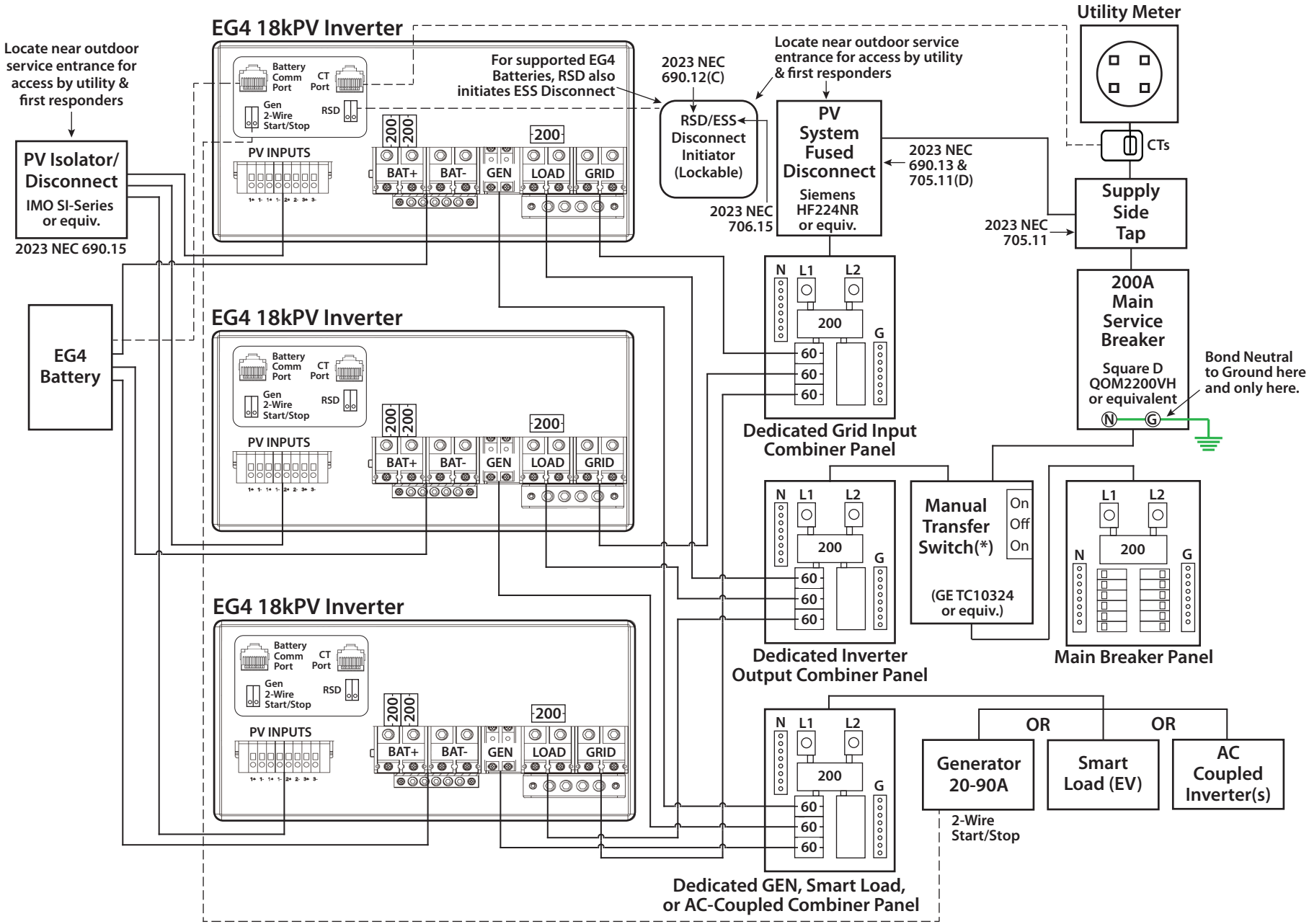
3 18kPVs with Feeder Tap and Whole Home Backup



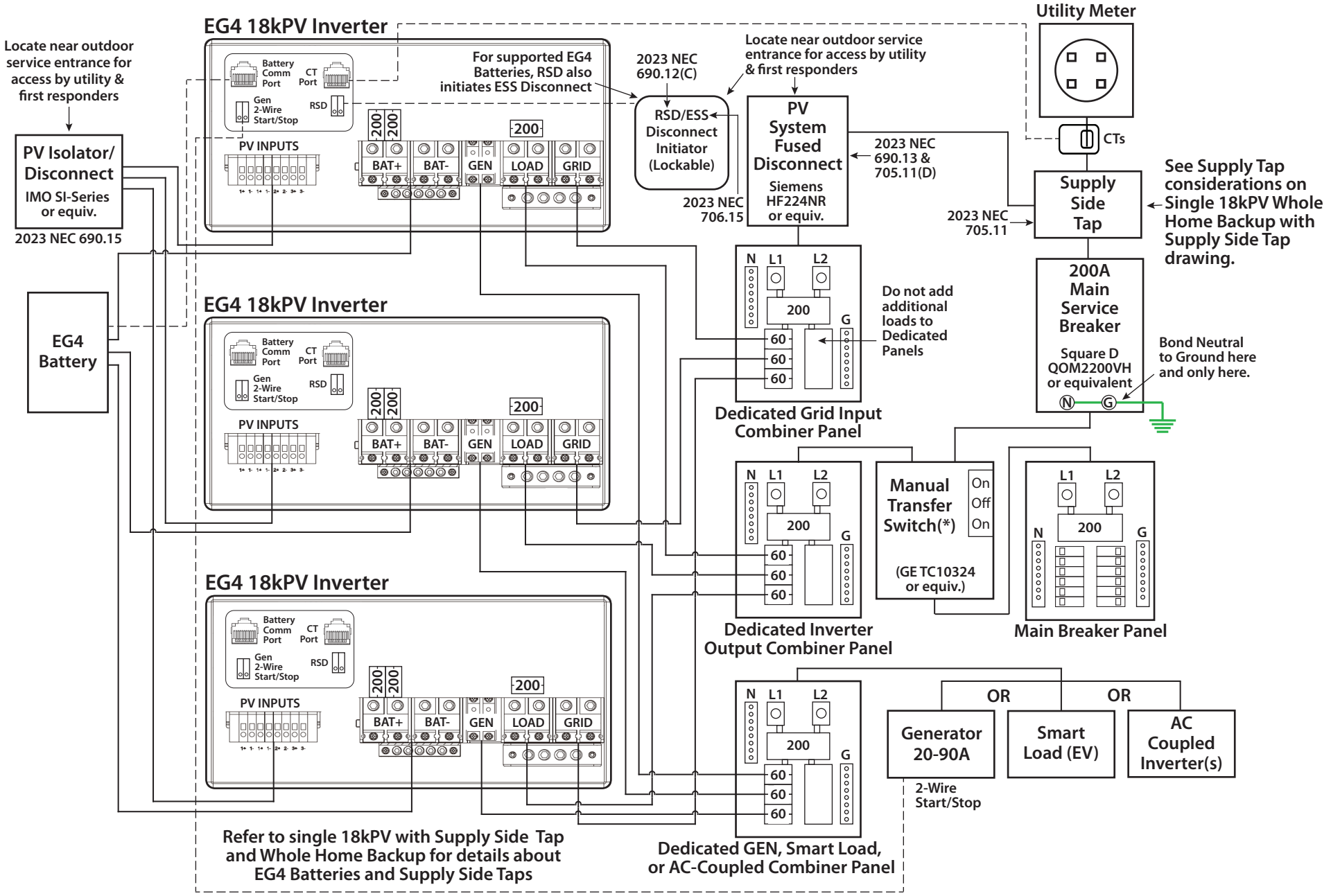
3 18kPVs with Feeder Tap and Whole Home Backup with Notes



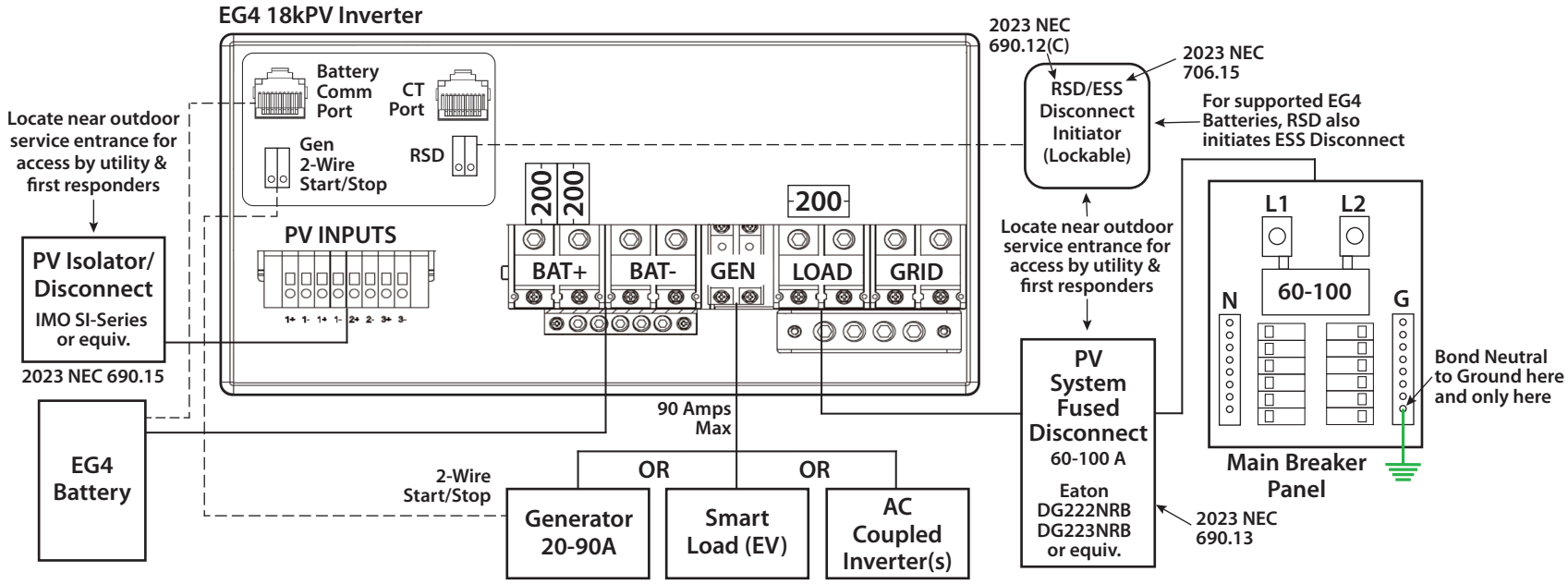
3 18kPVs with Supply Side Tap and Whole Home Backup



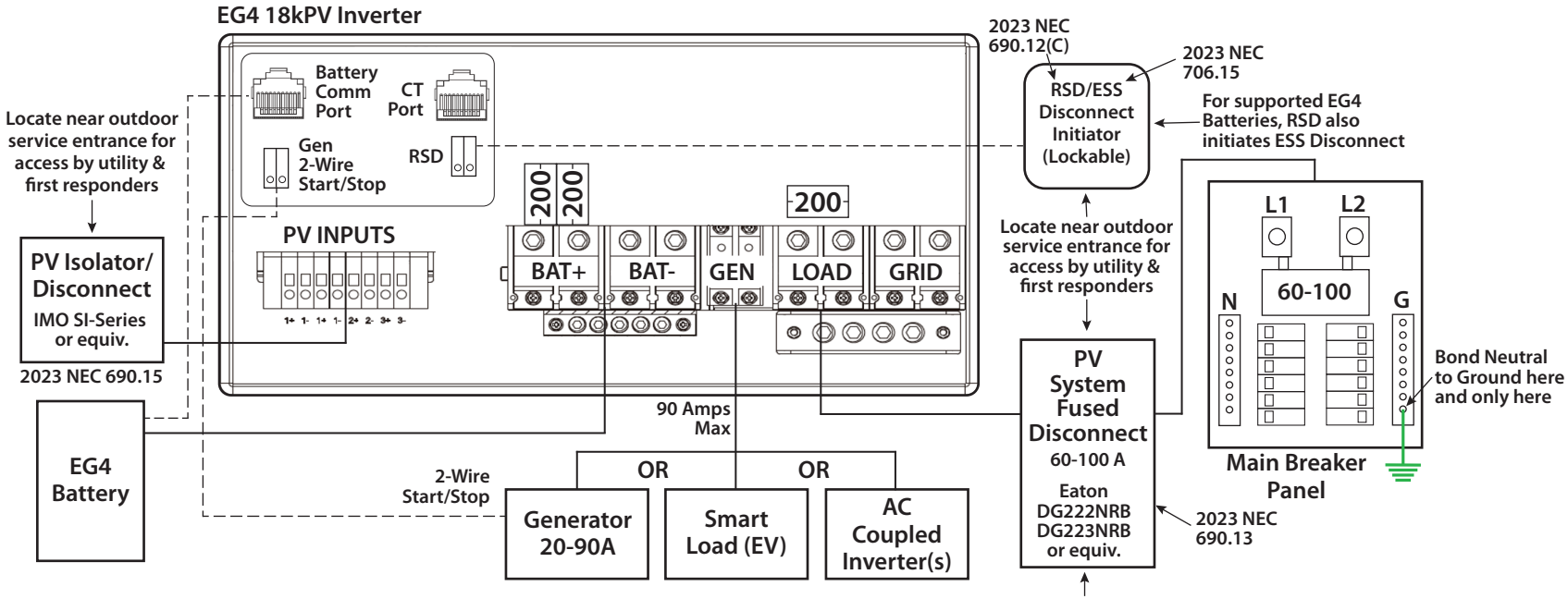
3 18kPVs with Supply Side Tap and Whole Home Backup with Notes



18kPV Off-Grid



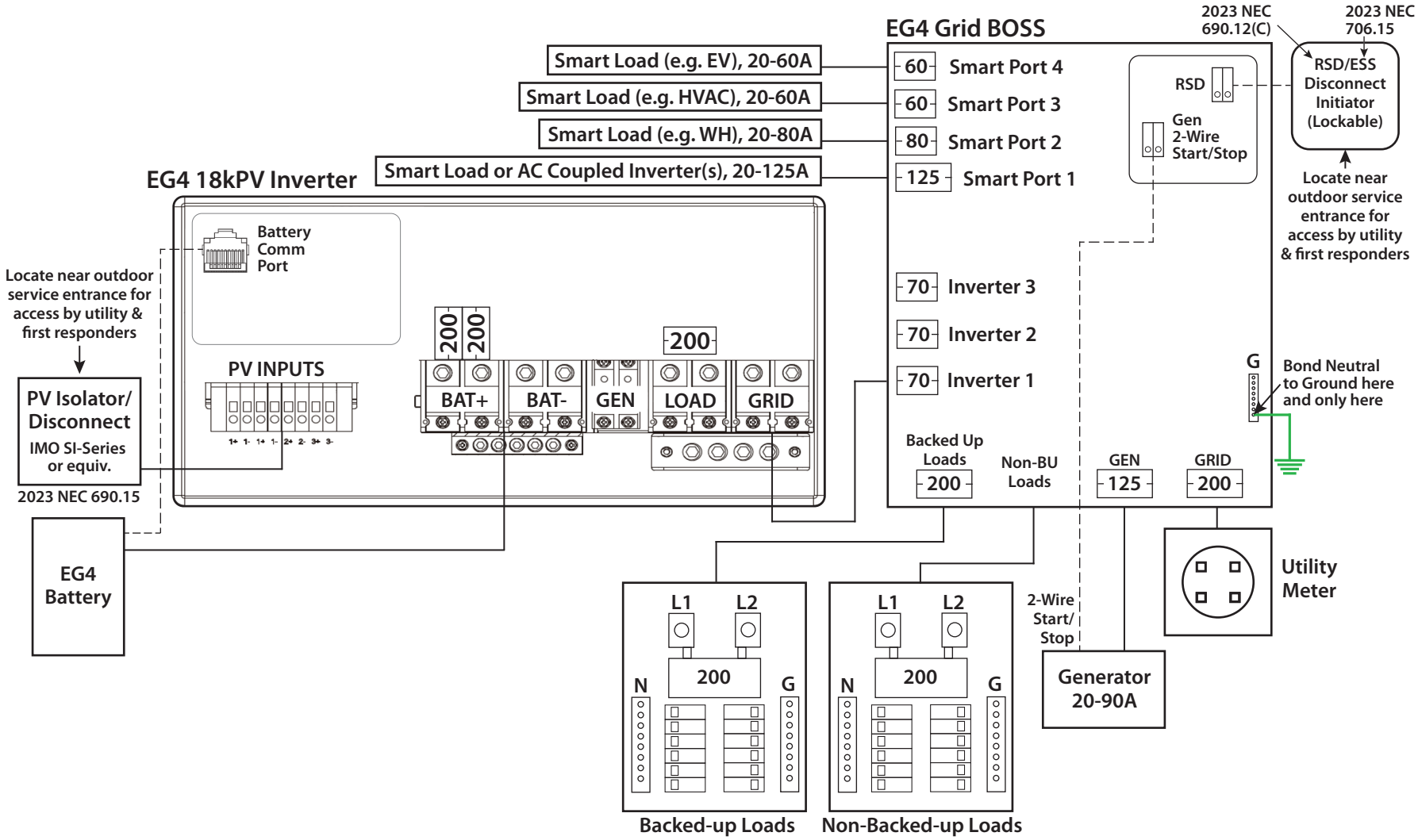
18kPV Off-Grid with Notes



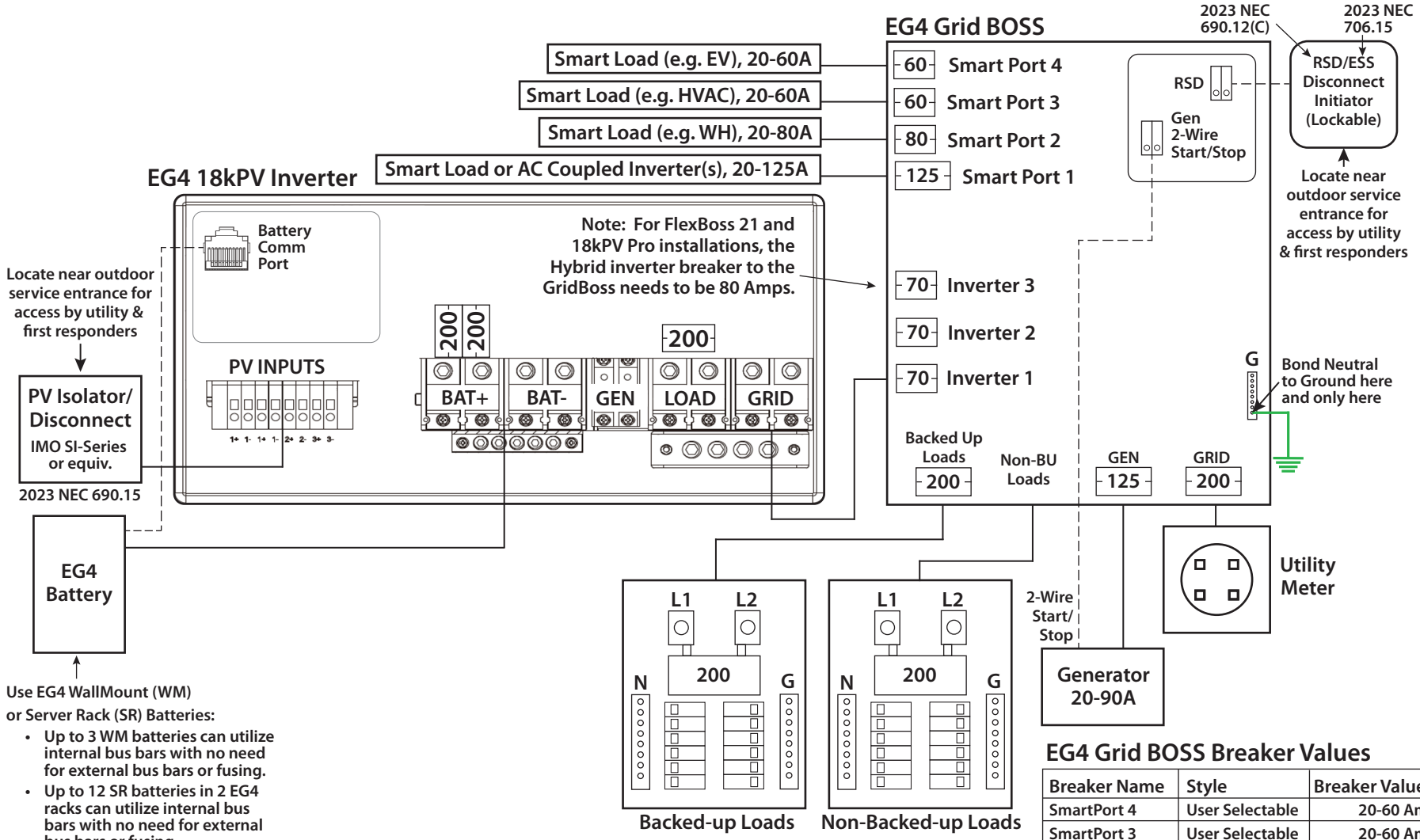
The inverter can accept BOTH DC-COUPLED AND AC-COUPLED SOLAR at the same time. The AC COUPLED SOLAR CAN BE UP TO 21.6kW (AC) or 80 Amps of AC output. The DC COUPLED MPPT CHANNELS CAN HANDLE UP TO 18kW of PV input (DC) with a maximum recommended Array size of 21.6 KWs. Maximum battery charging rate is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

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

18kPV with Grid Boss and Whole Home Backup



18kPV with Grid Boss and Whole Home Backup with Notes



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

- Up to 3 WM batteries can utilize internal bus bars with no need for external bus bars or fusing.
- Up to 12 SR batteries in 2 EG4 racks can utilize internal bus bars with no need for external bus bars or fusing.

For larger battery configurations:

- Use a fused positive battery bus bar rated >=250 Amps per battery or per inverter using Class-T fuses.
- Use a negative battery bus bar or powerdistribution block rated >=200 Amps per battery and per inverter.

EG4 Grid BOSS Breaker Values

Breaker Name	Style	Breaker Value(s)
SmartPort 4	User Selectable	20-60 Amps
SmartPort 3	User Selectable	20-60 Amps
SmartPort 2	User Selectable	20-80 Amps
SmartPort 1	User Selectable	20-125 Amps
Inverter 3	User Selectable	20-80 Amps
Inverter 2	User Selectable	20-80 Amps
Inverter 1	User Selectable	20-80 Amps
Backed Up Loads	Fixed	200 Amps
Non-BU Loads	Fixed	100 Amps
GEN	User Selectable	20-125 Amps
GRID	Fixed	200 Amps