

Interconnecting IQ8D Microinverters to Other Grid Voltages

Enphase IQ8D Microinverter supports grid interconnection for 208V/120V three phase applications. For interconnection to system voltages other than 208V/120V three-phase, a transformer is required to connect to the grid. This application note provides brief guidelines for interconnecting IQ8D with different grid voltages.

Specify the transformer kVA size to meet the inverter output in kW AC. Some additional deratings, such as adjustments for power factor and temperature may apply. Refer to the transformer manufacturer’s specifications for transformer sizing. The transformer’s primary connection must match that of the grid configuration at the site, and its secondary connection should be 208/120V WYE configuration for IQ8D System. The following Table 1 lists utility voltage values and transformer requirements. Consult transformer manufacturer for appropriate sizing and loss analysis for the system. Also refer to AHJ requirements in your region for transformer installations.

Installers can choose transformers with adjustable taps. Use the tap to make minor adjustments when the utility-provided voltage is high or when optimizing conductor sizing versus expected voltage rise for the value engineered PV system. It is common to specify high-efficiency or ultra-high efficiency, general purpose, dry-type transformers for an Enphase Microinverter System.

Utility Voltage Configurations	Nominal Primary Voltage L-L	Nominal Primary Voltage L-N/G	Secondary Voltage	Transformer requirements
208V/120V WYE	-	-	-	No transformer required for interconnection “Depending on existing meter service panel size”
480V/277V WYE Configuration	480V	277V	208/120V WYE	Transformer configuration should be selected by electrical installer per NEC and local code
480V DELTA Configuration	480V	-	208/120V WYE	
600V/347V WYE Configuration	480V	347V	208/120V WYE	
600V DELTA Configuration	600V	-	208/120V WYE	
240V High Leg DELTA Configuration	240V	-	208/120V WYE	

Table 1 : Transformer specifications Various Voltage Configuration

Note: Transformer procurement, installation, maintenance, and support are the responsibility of the installer. Damage to the IQ8D microinverter due to incorrect transformer installation will render the Enphase warranty invalid.

Note: Enphase IQ8D system interconnection using transformer for grid voltage other than 208V/120V is presently not compliant under IEEE 1547: 2018 standards unless a third-party meter instrument is added at primary meter service location. Installer should install IQ8D system with transformer only when the system meets all the correct compliance standards applicable for your AHJ.

MODULES:
 234 PV SOLAR MODULES, 2 PV MODULES PER MICROINVERTER
 - 425W PV MODULES ON UL 2703 LISTED RACKING
 - BARE 12 AWG EGC BONDED TO RACKING WITH UL LISTED LUGS
 - EACH MODULE EFFECTIVELY BONDED TO RACKING.

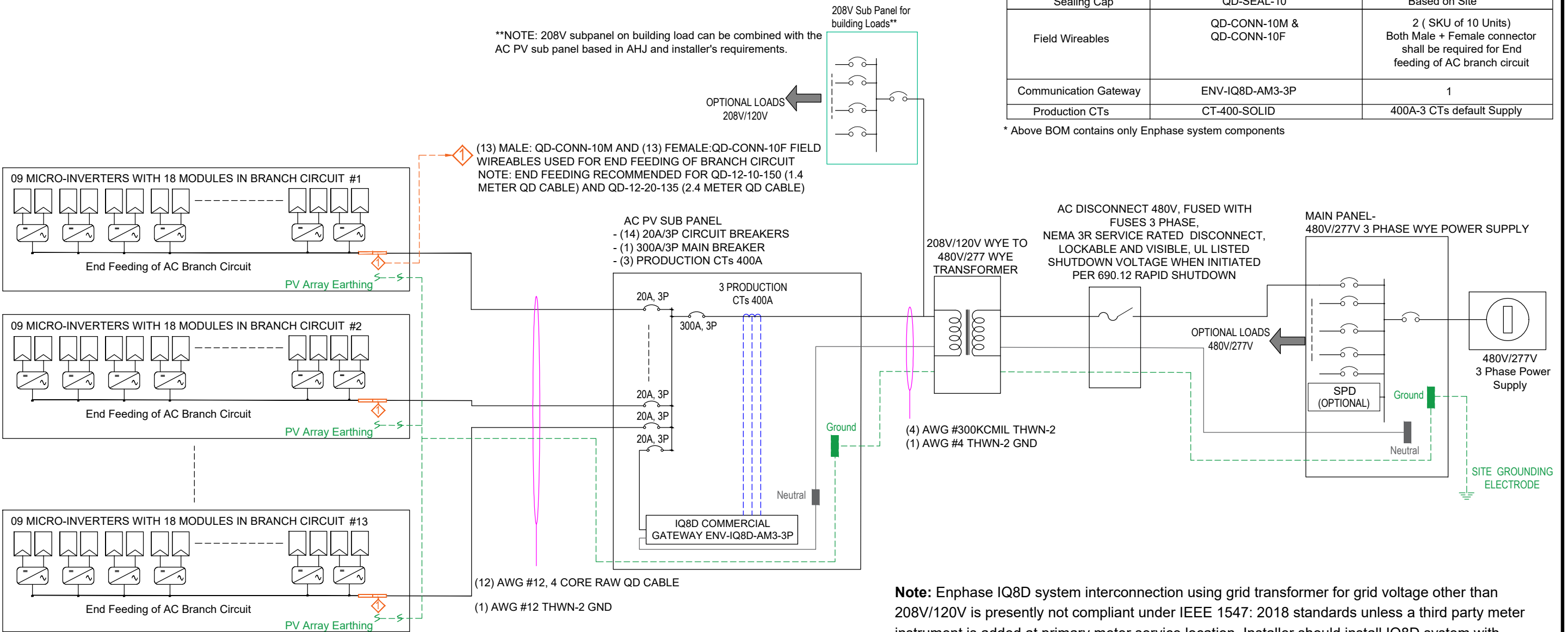
MICROINVERTER:
 117 MODULE LEVEL MICROINVERTER, MAXIMUM 9 PER BRANCH CIRCUIT
 - ENPHASE, IQ8D-72-E-US MICROINVERTERS
 - UL 1741, NEMA 4, 208VAC, 3.04A L-L, FUNCTIONALLY GROUNDING

BRANCH CIRCUIT CURRENT :
 $3 \text{ (MICROS PER PHASE)} \times 3.04\text{A (IQ8D MICROINVERTER CURRENT)} \times 1.732 \times 1.25 = 19.8\text{A}$

COMBINED CIRCUIT CURRENT PV SIDE OF TRANSFORMER :
 $39 \text{ (MICROS PER PHASE)} \times 3.04\text{A (IQ8D MICROINVERTER CURRENT)} \times 1.732 \times 1.25 = 256.7\text{A}$

COMBINED CIRCUIT CURRENT GRID SIDE OF TRANSFORMER :
 $39 \text{ (MICROS PER PHASE)} \times 3.04\text{A (IQ8D MICROINVERTER CURRENT)} \times 1.732 \times (208/480) \times 1.25 = 111.4\text{A}$

****NOTE:** 208V subpanel on building load can be combined with the AC PV sub panel based in AHJ and installer's requirements.



System Details

SYSTEM SIZE (DC)	SYSTEM SIZE (AC)	DC/AC RATIO
99.5kW	74.1kW	1.34

Enphase BOM

SYSTEM COMPONENT	SKU DETAILS	QUANTITY
IQ8D MICROINVERTER	IQ8D-72-E-US	117
EN4 TO MC4 bulkhead adapter cable	ECA-EN4-S22 (Default Supply with IQ8D)	117 Pairs
QD cable	QD-12-10-150 (1.4 m pitch) OR QD-12-20-135 (2.4 m pitch)	117 Drops (Assumption: No drops skipped)
Cable Termination	QD-TERM-10	2 (SKU of 10 Units)
Cable Clip	ET-CLIP-100	Based on Site
Disconnect Tool	QD-DISC-10	1 (SKU of 10 Units)
Sealing Cap	QD-SEAL-10	Based on Site
Field Wireables	QD-CONN-10M & QD-CONN-10F	2 (SKU of 10 Units) Both Male + Female connector shall be required for End feeding of AC branch circuit
Communication Gateway	ENV-IQ8D-AM3-3P	1
Production CTs	CT-400-SOLID	400A-3 CTs default Supply

* Above BOM contains only Enphase system components

Note: Enphase IQ8D system interconnection using grid transformer for grid voltage other than 208V/120V is presently not compliant under IEEE 1547: 2018 standards unless a third party meter instrument is added at primary meter service location. Installer should install IQ8D system with transformer only when the system meets all the correct compliance standards applicable for your AHJ.

Note: Sizing for AC Disconnect and Main Service Panel breaker connecting to transformer should be done based on 208V/120V Optional load + PV Microinverter peak output.

NOTE:
 THIS DOCUMENT IS PROVIDED FOR RECOMMENDATION AND SUGGESTIVE PURPOSE TO DEMONSTRATE ENPHASE IQ8D SOLUTIONS AND PRODUCTS IN END USE ENERGY PROJECT APPLICATIONS. FINAL DESIGN AND ACTUAL PERFORMANCE OF ANY SOLAR ENERGY PROJECT AS WELL AS COMPLIANCE WITH ALL SPECIFICATIONS, INSTALLATION REQUIREMENTS AND LOCAL CODES IS THE RESPONSIBILITY OF THE PARTY THIS INFORMATION IS PROVIDED TO. THIS SINGLE LINE DIAGRAM IS NOT INTENDED TO REPLACE SITE SPECIFIC DIAGRAM FOR INSPECTION OF PROJECT. ENPHASE IS NOT RESPONSIBLE FOR USE OF THE DATA PROVIDED HEREIN.



MODULES:
 234 PV SOLAR MODULES, 2 PV MODULES PER MICROINVERTER
 - 425W PV MODULES ON UL 2703 LISTED RACKING
 - BARE 12 AWG EGC BONDED TO RACKING WITH UL LISTED LUGS
 - EACH MODULE EFFECTIVELY BONDED TO RACKING.

MICROINVERTER:
 117 MODULE LEVEL MICROINVERTER, MAXIMUM 9 PER BRANCH CIRCUIT
 - ENPHASE, IQ8D-72-E-US MICROINVERTERS
 - UL 1741, NEMA 4, 208VAC, 3.04A L-L, FUNCTIONALLY GROUND

BRANCH CIRCUIT CURRENT :
 $3 \text{ (MICROS PER PHASE)} \times 3.04\text{A (IQ8D MICROINVERTER CURRENT)} \times 1.732 \times 1.25 = 19.8\text{A}$

COMBINED CIRCUIT CURRENT PV SIDE OF TRANSFORMER :
 $39 \text{ (MICROS PER PHASE)} \times 3.04\text{A (IQ8D MICROINVERTER CURRENT)} \times 1.732 \times 1.25 = 256.7\text{A}$

COMBINED CIRCUIT CURRENT GRID SIDE OF TRANSFORMER :
 $39 \text{ (MICROS PER PHASE)} \times 3.04\text{A (IQ8D MICROINVERTER CURRENT)} \times 1.732 \times (208/480) \times 1.25 = 111.4\text{A}$

NOTE: CENTER FEEDING RECOMMENDED FOR INSTALLATIONS WITH QD-12-42-63 (4.6 METER QD CABLE) WITH > 6 MICROINVERTERS IN BRANCH CIRCUIT ; END FEEDING RECOMMENDED FOR <= 6 MICROS IN BRANCH CIRCUIT

NOTE: CENTER FEEDING ADAPTER CABLE TO BE USED ONLY FOR INSTALLATIONS WITH QD-12-42-63 (4.6 METER QD CABLE SKU)

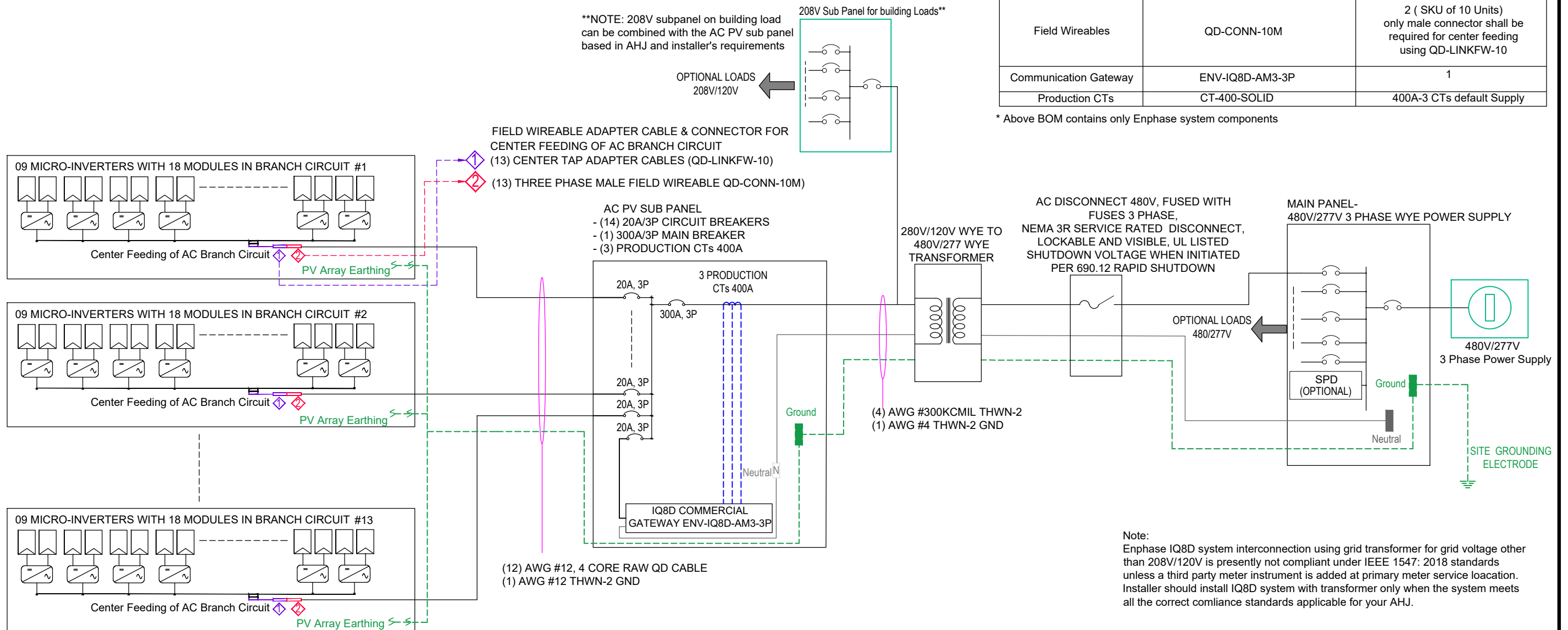
System Details

SYSTEM SIZE (DC)	SYSTEM SIZE (AC)	DC/AC RATIO
99.5kW	74.1kW	1.34

Enphase BOM

SYSTEM COMPONENT	SKU DETAILS	QUANTITY
IQ8D microinverter	IQ8D-72-E-US	117
EN4 TO MC4 bulkhead adapter cable	ECA-EN4-S22 (Default Supply with IQ8D)	117 Pairs
QD cable	QD-12-22-63 (4.6 m pitch)	117 Drops (Assumption: No drops skipped)
Cable Termination	QD-TERM-10	3 (SKU of 10 Units)
Cable Clip	ET-CLIP-100	Based on Site
Disconnect Tool	QD-DISC-10	1 (SKU of 10 Units)
Sealing Cap	QD-SEAL-10	Based on Site
Center Tap Adapter cable	QD-LINKFW-10	2 (SKU of 10 Units) for center feeding using CTAP connector only in QD-12-42-63 (4.6 mt cable)
Field Wireables	QD-CONN-10M	2 (SKU of 10 Units) only male connector shall be required for center feeding using QD-LINKFW-10
Communication Gateway	ENV-IQ8D-AM3-3P	1
Production CTs	CT-400-SOLID	400A-3 CTs default Supply

* Above BOM contains only Enphase system components



Note:
 Enphase IQ8D system interconnection using grid transformer for grid voltage other than 208V/120V is presently not compliant under IEEE 1547: 2018 standards unless a third party meter instrument is added at primary meter service location. Installer should install IQ8D system with transformer only when the system meets all the correct compliance standards applicable for your AHJ.

Note:
 Sizing for AC Disconnect and Main Service Panel breaker connecting to transformer should be done based on 208V/120V Optional load + PV Microinverter peak output.

NOTE:
 THIS DOCUMENT IS PROVIDED FOR RECOMMENDATION AND SUGGESTIVE PURPOSE TO DEMONSTRATE ENPHASE IQ8D SOLUTIONS AND PRODUCTS IN END USE ENERGY PROJECT APPLICATIONS. FINAL DESIGN AND ACTUAL PERFORMANCE OF ANY SOLAR ENERGY PROJECT AS WELL AS COMPLIANCE WITH ALL SPECIFICATIONS, INSTALLATION REQUIREMENTS AND LOCAL CODES IS THE RESPONSIBILITY OF THE PARTY THIS INFORMATION IS PROVIDED TO. THIS SINGLE LINE DIAGRAM IS NOT INTENDED TO REPLACE SITE SPECIFIC DIAGRAM FOR INSPECTION OF PROJECT. ENPHASE IS NOT RESPONSIBLE FOR USE OF THE DATA PROVIDED HEREIN.

