Stinger Pro™ Tools

WITH CAUTION - Confirm on site: 6 items (below).

Solar PV

Made 2026-11-01 16:52 • Example - 13 x 440 W on a 7.7 kW inverter

A PV system needs a permit, inspection and the utility's written approval to interconnect before it is turned on.

Inputs

Field	Value
Type	String inverter
Service	120/240 V, single-phase
Connection	Load side - in a panelboard or feeder
One- or two-family dwelling	Yes - a one- or two-family dwelling
Design temperatures	low -10 C, high 40 C, cell 70 C
Module	Voc 39.88 V, Isc 13.90 A, Vmp 33.33 V, Imp 13.20 A, Voc coefficient -0.24 % per C, Pmax coefficient -0.30 % per C, Isc coefficient 0.04 % per C (Vmp coefficient estimated from the Pmax and Isc coefficients)
Array wiring	PV wire
DC home run	THWN-2, EMT, 80 ft
Inverter output circuit	EMT, 30 ft
MPPT range	100 to 550 V
The array	On a roof
DC grounding configuration	Not solidly grounded (functionally grounded - most inverters)
DC disconnect	600 V, 30 A, rated for DC, Equipment disconnecting means - 690.15(C), Every conductor not solidly grounded (+ and -) together
Module (make, model, datasheet)	Qcells Q.TRON BLK M-G2+ 440 (datasheet Rev04 2024-08)
Inverter (make, model, datasheet)	SMA Sunny Boy 7.7-US-41 (SBxx-US-DS-en-41); MPPT input input A
Rapid shutdown device	not recorded
DC disconnect (make, model)	not recorded

Answer

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13 modules per string: 562.0 V cold (under the inverter maximum DC input's 600 V), 367.0 V hot (estimated
    from the Pmax and Isc coefficients); 12 AWG DC conductors; the inverter's breaker 40 A, within the
    120 % busbar rule. Confirm on site: 6 items (below).
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WITH CAUTION - Confirm on site: 6 items (below).

One-line - the verdict

WITH CAUTION - Confirm on site: 6 items (below).

String inverter - one-line

Limits met as entered

2 design checks to read (CHECK) - below.

6 items to confirm on site - listed below.

This string: 13. Allowed with this equipment: 4 to 13.

The most, 13: 600 V / 43.23 V per module cold - set by the inverter maximum DC input, the DC disconnect and the 600 V dwelling limit [690.7(2)].

The fewest for the MPPT minimum, 4: 100 V / 28.23 V per module hot, loaded.

Start-up, separately: 4 at the 125 V start voltage on the open-circuit voltage (35.57 V per module hot) - the maker's condition, to confirm.

MPPT window: 100 to 550 V; this string operates from 367.0 V hot to 484.9 V cold.

Series adds voltage (modules in a string); parallel adds current (strings on the MPPT).

Checks

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OK - Module maximum system voltage 1000 V: the string's 562.0 V is within it [690.7(A)(1), NFPA 70-2026]
OK - Inverter maximum DC input 600 V: the string's 562.0 V is within it [690.7(A)(1), NFPA 70-2026]
OK - DC disconnect 600 V: the string's 562.0 V is within it [690.7(A)(1), NFPA 70-2026]
OK - Rapid-shutdown devices 1000 V: the string's 562.0 V is within it - voltage compatibility only; the
    rapid shutdown limits are to confirm (below) [690.7(A)(1), NFPA 70-2026]
OK - Conductor insulation 1000 V: the string's 562.0 V is within it [690.7(A)(1), NFPA 70-2026]
OK - One- or two-family dwelling, PV DC circuits not over 600 V: the string's 562.0 V is within it
    [690.7(1), (2), NFPA 70-2026]
OK - DC disconnect 30 A: the maximum circuit current, 17.38 A, is within it [690.15(C), NFPA 70-2026]
CONFIRM ON SITE - The DC disconnect's fault-current rating: at least the available fault current at its
    terminals - from the selected disconnect's listing (make and model), the basis of the available
    current, and the maker's conditions [690.15(C)(1), NFPA 70-2026]
OK - DC disconnect: rated for DC, as entered [690.15(C), NFPA 70-2026]
OK - DC disconnect: an equipment disconnecting means - 690.15(C) (externally operable, shows open or
    closed) [690.15(A), NFPA 70-2026]
OK - DC disconnect: opens every conductor not solidly grounded together [690.15(C), NFPA 70-2026]
OK - PV DC circuits not over 1000 V (this tool's scope as well): 562.0 V within it [690.7(1), (2), NFPA
    70-2026]
OK - MPPT minimum 100 V: the string at the design high gives 367.0 V (Vmp coefficient estimated from the
    Pmax and Isc coefficients) [the inverter datasheet]
OK - Start-up (the maker's condition - confirm it with the inverter's documentation): the string's
    open-circuit voltage at the design high, 462.4 V, against the start voltage 125 V [the inverter
    datasheet]
CHECK - MPPT maximum operating input 10 A: the strings' 13.20 A (Imp x strings) - the inverter limits it
    (clipping). Current limiting or clipping is acceptable only as the selected inverter's instructions
    permit; confirm the input and short-circuit limits [the inverter datasheet]
OK - MPPT maximum short-circuit current 18 A: 17.38 A (Isc x 1.25 x strings) [the inverter datasheet]
OK - No string fuse: one string and no other source on these circuits (assumed) - the current from all
    sources, 17.38 A (Isc x 1.25), is not over the module's 25 A maximum series fuse, and the conductors
    carry it [690.9(A)(1), NFPA 70-2026]
OK - DC conductors: 12 AWG copper [690.8(B), NFPA 70-2026]
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For estimating and planning - verify before relying on it. Not a substitute for a licensed engineer.
Based on the 2026 NEC and NFPA 70E-2027. Local amendments may apply - check with the authority having jurisdiction.

WITH CAUTION - Confirm on site: 6 items (below).

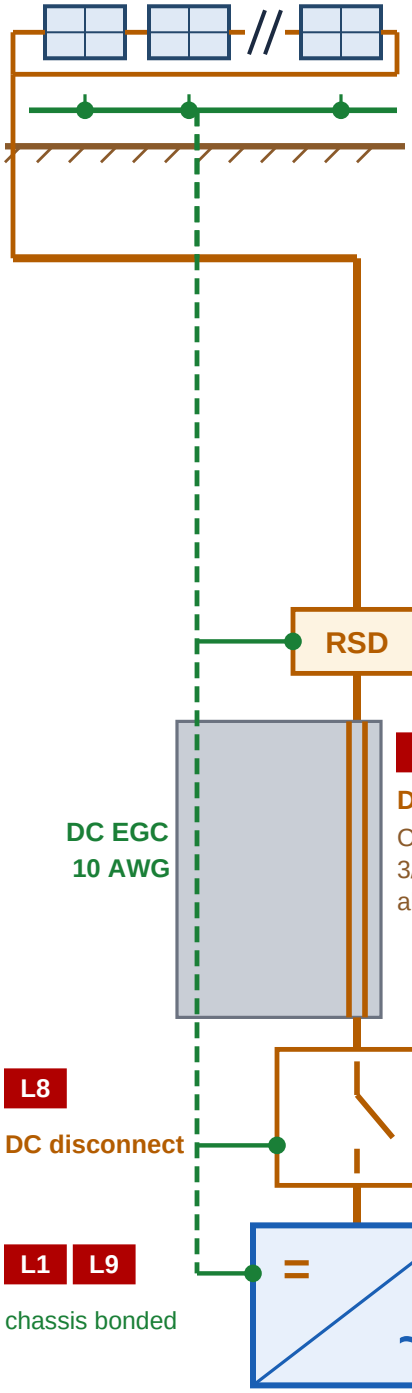
OK - DC voltage drop 1.14 % against your 2 % target (Vmp coefficient estimated from the Pmax and Isc coefficients) [Chapter 9 Table 8]
OK - Array wiring: PV wire - permitted for single conductors exposed outdoors in the array [690.31(C)(1)(a), NFPA 70-2026]
OK - DC home run: THWN-2, rated for the wet location inside a raceway outdoors [300.11; 310.10(C), NFPA 70-2026]
OK - DC home run in EMT outside; where PV DC circuits run inside a building: metal raceway, Type MC or metal enclosures [690.31(D)(1), NFPA 70-2026]
OK - MPPT maximum 550 V: the string operates near 484.9 V at the lowest ambient (Vmp coefficient estimated from the Pmax and Isc coefficients) [the inverter datasheet]
CONFIRM ON SITE - Arc-fault protection: the DC circuits run at 80 V or more - the inverter or another listed component provides PV arc-fault protection (check its listing or datasheet) [690.11, NFPA 70-2026]
CONFIRM ON SITE - Ground-fault protection: the DC circuits exceed 30 V or 8 A - the inverter or another listed device provides GFDI protection (check its listing or datasheet; equipment without it usually says so in its manual) [690.41(B), NFPA 70-2026]
CONFIRM ON SITE - The DC grounding configuration: not solidly grounded as entered - the inverter output circuit's EGC, through grounded distribution equipment, is the connection to ground [690.47(A)(1)] - confirm with the inverter's listing [690.47(A)(1), NFPA 70-2026]
CONFIRM ON SITE - Rapid shutdown limits: controlled conductors outside the array boundary (1 ft from the array) OR, inside a building, more than 3 ft past where they enter it - not over 30 V within 30 s of initiation, checked conductor to conductor and conductor to ground [690.12(B)(1)]; inside the boundary a listed PV hazard control system, or not over 80 V within 30 s [690.12(B)(2)] - by the equipment's listing [690.12(B), NFPA 70-2026]
CONFIRM ON SITE - The rapid shutdown initiation device: the service disconnect, the PV system disconnect, or a listed switch, readily accessible and OUTDOORS (a one- or two-family dwelling); its "off" position shuts down the PV system [690.12(C), NFPA 70-2026]
OK - The inverter allows a breaker up to 50 A: 40 A [the inverter datasheet]
OK - AC output conductors: 8 AWG copper, protected by the 40 A breaker [240.4] [705.28(B), NFPA 70-2026]
CHECK - Voltage rise on the inverter output circuit: about 0.62 % at 240 V over 30 ft - a design check, not an NEC limit: the inverter trips on high voltage when this rise and the utility's own voltage together pass its limit [Chapter 9 Table 9]
OK - The 120 % busbar rule: 240.00 A = 240.00 A exactly: it passes at equality, with no allowance left under this method - the PV breaker at the opposite end from the main, labeled [705.12(B)(2), NFPA 70-2026]

WITH CAUTION - Confirm on site: 6 items (below).

One-line, part 1 - the array to the inverter

WITH CAUTION - Confirm on site: 6 items (below).

1. The array to the inverter



1. **The array: 1 string of 13 modules in series, on a roof**
2. **String voltage: 562.0 V cold; 367.0 V hot (estimated from the Pmax and Isc coefficients)**
3. **Current: 17.38 A per string; 17.38 A in all**
4. **String conductors (in the array): 12 AWG Cu PV wire, exposed**
5. **Rapid shutdown devices: 1000 V rated**
6. **DC home run: 2 x 12 AWG Cu THWN-2, 1/2 in EMT, 80 ft**
7. **DC EGC: 10 AWG Cu, in the home run**
8. **DC disconnect: 600 V, 30 A, DC rated**
9. **Inverter: 32 A out; MPPT 100-550 V**

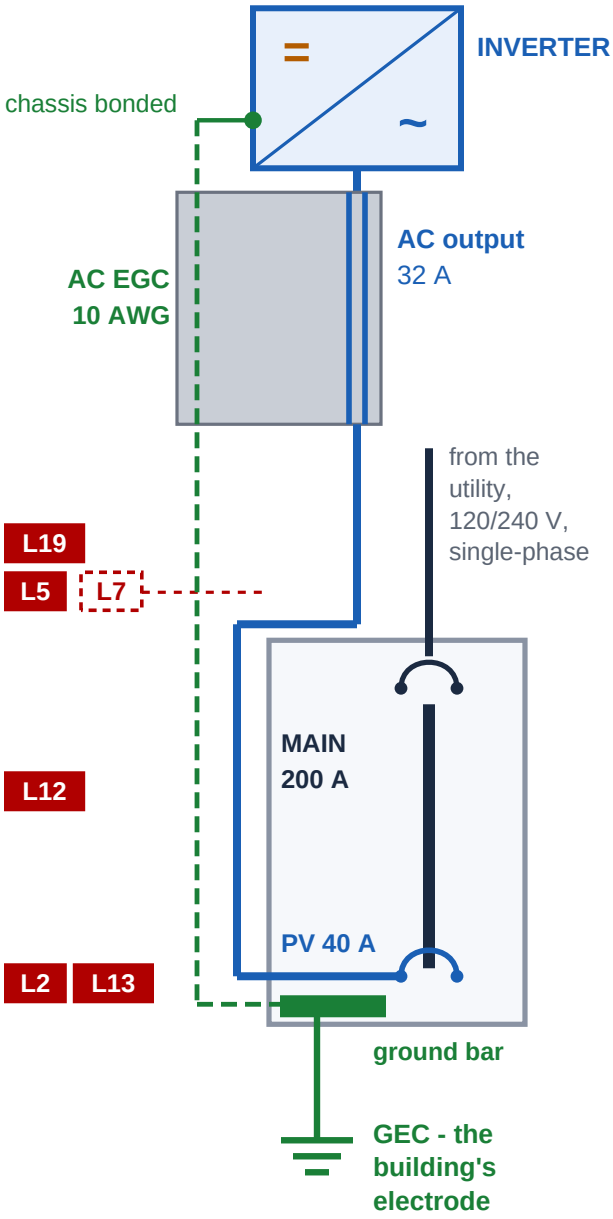
For estimating and planning - verify before relying on it. Not a substitute for a licensed engineer.
Based on the 2026 NEC and NFPA 70E-2027. Local amendments may apply - check with the authority having jurisdiction.

WITH CAUTION - Confirm on site: 6 items (below).

One-line, part 2 - the inverter to the panel; the grounding

WITH CAUTION - Confirm on site: 6 items (below).

2. The inverter to the panel; the grounding



10 **Inverter output circuit: 3 x 8 AWG Cu THWN-2, 3/4 in EMT, 30 ft**

11 **AC EGC: 10 AWG Cu, in the output circuit**

12 **Output breaker: 40 A**

13 **The panel: 200 A bus, 200 A main; 240.00 A = 240.00 A (120 %)**

14 **Grounding electrode conductor: the building's electrode system**

The PV breaker is at the OPPOSITE end of the bus from the main (the 120 % method).

Numbers 1-14 match The figures; the red tags L1-L19 match the label schedule (a dashed tag is provisional). Green: the EGCs, the bonds and the GEC. NEC values: NFPA 70-2026.

The figures

#	Figure	Value	Section
1	The array	1 string of 13 = 13 modules, on a roof; module: Qcells Q.TRON BLK M-G2+ 440 (datasheet Rev04 2024-08)	

WITH CAUTION - Confirm on site: 6 items (below).

#	Figure	Value	Section
2	String voltage	562.0 V cold (maximum); 367.0 V hot (estimated from the Pmax and Isc coefficients)	690.7(A)
3	Current	17.38 A per string (Isc x 1.25); 17.38 A in all	690.8(A)
4	String conductors (in the array)	12 AWG copper PV wire, 1000 V insulation; exposed	690.8(B); 690.31(C)(1)(a)
5	Rapid shutdown devices	1000 V rated (voltage compatibility only); make / model not recorded	690.12
6	DC home run	2 x 12 AWG copper THWN-2, 1000 V insulation; 1/2 in EMT; on the roof, 3/4 in or more above it; 80 ft; drop 1.14 %	690.8(B); 690.31
7	DC EGC	10 AWG copper, with the DC home run; sized on an assumed 25 A device by 690.9(B) - only the EGC's sizing basis, no fuse is installed	690.45; 250.122
8	DC disconnect	600 V, 30 A, rated for DC; Equipment disconnecting means - 690.15(C); make / model not recorded	690.15
9	Inverter	32 A output; MPPT 100-550 V; SMA Sunny Boy 7.7-US-41 (SBxx-US-DS-en-41); MPPT input: input A	the inverter datasheet
10	Inverter output circuit	3 x 8 AWG copper THWN-2; 3/4 in EMT; 30 ft; rise 0.62 %	705.28(B)
11	AC EGC	10 AWG copper, with the output circuit to the panel's ground bar (on the 40 A breaker)	250.122
12	Output breaker	40 A (125 % of 32 A, next standard size)	705.30(B); 240.6
13	The panel	200 A bus, 200 A main; 240.00 A against 120 % = 240 A	705.12(B)(2)
14	Grounding electrode conductor	the building's grounding electrode system; not solidly grounded (as entered): no separate GEC - the output circuit's EGC is its connection to ground	690.47(A)(1)

WITH CAUTION - Confirm on site: 6 items (below).

Labels

	Label [section]	Where	Says / shows	This job
L1	Maximum DC voltage [690.7(D)]	At one of: the DC PV system disconnect, the inverter, or the distribution equipment of the PV system	The highest maximum DC voltage in the PV system (rounding up is permitted) (Permanent, readily visible)	562 V (the 562.0 V worked, rounded up - a higher figure is permitted, for standardized labels)
L2	PV system disconnect [690.13(C)]	Each PV system disconnecting means	"PV SYSTEM DISCONNECT" or equivalent (Permanently marked)	the backfed PV breaker in the panel, or the separate PV system disconnect where one is installed
L5	Rapid shutdown - the building [690.12(D)]	Each service equipment location the PV system connects to, or an approved readily visible location	Where the rapid shutdown initiation devices are; a simple diagram of a building with a roof; and the label's two lines, "SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN." over "TURN RAPID SHUTDOWN SWITCH TO THE “OFF” POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY." (Permanent; "SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN" in capitals at least 3/8 in high; all text legible and contrasting)	the location of the rapid shutdown initiation device - write it on the label
L7	Rapid shutdown switch [690.12(D)(2)]	On the switch, or not more than 3 ft from it	"RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM" (Reflective; capitals at least 3/8 in high; white on red)	PROVISIONAL - on the rapid shutdown switch, or within 3 ft of it, once the initiation device is chosen; shown at the service until then
L8	Line and load both energized [705.20(F)]	A disconnect whose line and load terminals can be energized in the open position	"WARNING ELECTRIC SHOCK HAZARD TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION." or equivalent (Marked)	the DC disconnect where its line and load terminals can be energized open (the array on one side, the inverter on the other) - and any other disconnect where they can; whether both sides are energized while open depends on the equipment [690.15(C), 705.20(F)]
L9	DC polarity [690.31(B)(2)]	Every DC termination, connection and splice (unless evident by spacing or arrangement)	Positive: + or POSITIVE or POS; negative: - or NEGATIVE or NEG. Where color is used on conductors not solidly grounded: positive not green, white or gray; negative not green, white, gray or red [705.25(B)] (Permanent; suitable for the conductor size)	at the DC disconnect and the inverter's DC terminals; not solidly grounded (as entered): the color limits apply [690.31(B)(2), 705.25(B)]
L10	DC wiring methods and enclosures [690.31(D)(2)]	Exposed raceways and other DC wiring methods; pull and junction box covers; conduit bodies with an unused opening	"PHOTOVOLTAIC POWER SOURCE" or "SOLAR PV DC CIRCUIT" (Capitals at least 3/8 in high; white on red; on every section separated by enclosures, walls, partitions, ceilings or floors; not more than 10 ft apart)	along the 80 ft DC run, not more than 10 ft apart - at least 8, plus every box cover and every section beyond a wall, ceiling or floor; a planning count - route breaks, covers and visibility govern final placement
L12	All sources present [705.30(C)]	The panel with the PV breaker (equipment with overcurrent devices fed from more than one source)	The presence of all sources (the code sets no words) (Marked)	utility and PV (the inverter output, 32 A)
L13	The 120 % connection [705.12(B)(2)]	On the panel, next to the PV breaker	"WARNING: POWER SOURCE OUTPUT. DO NOT RELOCATE THIS OVERCURRENT DEVICE." or equivalent (Permanent warning label)	next to the 40 A PV breaker
L19	Directory of power sources [705.10]	Each service equipment location, or an approved readily visible location	Where each power source disconnect is; the emergency phone numbers of any off-site entity servicing the sources; and "CAUTION: MULTIPLE SOURCES OF POWER" (Permanent plaque, label or directory)	where the PV system disconnect is; the emergency phone numbers of any off-site company servicing it

WITH CAUTION - Confirm on site: 6 items (below).

Checks and what to confirm on site (1 of 2)

WITH CAUTION - Confirm on site: 6 items (below).

Checks

- ✓ Module maximum system voltage 1000 V: the string's 562.0 V is within it [690.7(A)(1), NFPA 70-2026]
- ✓ Inverter maximum DC input 600 V: the string's 562.0 V is within it [690.7(A)(1), NFPA 70-2026]
- ✓ DC disconnect 600 V: the string's 562.0 V is within it [690.7(A)(1), NFPA 70-2026]
- ✓ Rapid-shutdown devices 1000 V: the string's 562.0 V is within it - voltage compatibility only; the rapid shutdown limits are to confirm (below) [690.7(A)(1), NFPA 70-2026]
- ✓ Conductor insulation 1000 V: the string's 562.0 V is within it [690.7(A)(1), NFPA 70-2026]
- ✓ One- or two-family dwelling, PV DC circuits not over 600 V: the string's 562.0 V is within it [690.7(1), (2), NFPA 70-2026]
- ✓ DC disconnect 30 A: the maximum circuit current, 17.38 A, is within it [690.15(C), NFPA 70-2026]
- ✓ DC disconnect: rated for DC, as entered [690.15(C), NFPA 70-2026]
- ✓ DC disconnect: an equipment disconnecting means - 690.15(C) (externally operable, shows open or closed) [690.15(A), NFPA 70-2026]
- ✓ DC disconnect: opens every conductor not solidly grounded together [690.15(C), NFPA 70-2026]
- ✓ PV DC circuits not over 1000 V (this tool's scope as well): 562.0 V within it [690.7(1), (2), NFPA 70-2026]
- ✓ MPPT minimum 100 V: the string at the design high gives 367.0 V (Vmp coefficient estimated from the Pmax and Isc coefficients) [the inverter datasheet]
- ✓ Start-up (the maker's condition - confirm it with the inverter's documentation): the string's open-circuit voltage at the design high, 462.4 V, against the start voltage 125 V [the inverter datasheet]
- ! CHECK - MPPT maximum operating input 10 A: the strings' 13.20 A (Imp x strings) - the inverter limits it (clipping). Current limiting or clipping is acceptable only as the selected inverter's instructions permit; confirm the input and short-circuit limits [the inverter datasheet]
- ✓ MPPT maximum short-circuit current 18 A: 17.38 A (Isc x 1.25 x strings) [the inverter datasheet]
- ✓ No string fuse: one string and no other source on these circuits (assumed) - the current from all sources, 17.38 A (Isc x 1.25), is not over the module's 25 A maximum series fuse, and the conductors carry it [690.9(A)(1), NFPA 70-2026]
- ✓ DC conductors: 12 AWG copper [690.8(B), NFPA 70-2026]
- ✓ DC voltage drop 1.14 % against your 2 % target (Vmp coefficient estimated from the Pmax and Isc coefficients) [Chapter 9 Table 8]
- ✓ Array wiring: PV wire - permitted for single conductors exposed outdoors in the array [690.31(C)(1)(a), NFPA 70-2026]
- ✓ DC home run: THWN-2, rated for the wet location inside a raceway outdoors [300.11; 310.10(C), NFPA 70-2026]
- ✓ DC home run in EMT outside; where PV DC circuits run inside a building: metal raceway, Type MC or metal enclosures [690.31(D)(1), NFPA 70-2026]
- ✓ MPPT maximum 550 V: the string operates near 484.9 V at the lowest ambient (Vmp coefficient estimated from the Pmax and Isc coefficients) [the inverter datasheet]
- ✓ The inverter allows a breaker up to 50 A: 40 A [the inverter datasheet]
- ✓ AC output conductors: 8 AWG copper, protected by the 40 A breaker [240.4] [705.28(B), NFPA 70-2026]

WITH CAUTION - Confirm on site: 6 items (below).

Checks and what to confirm on site (continued, 2 of 2)

WITH CAUTION - Confirm on site: 6 items (below).

- ! CHECK - Voltage rise on the inverter output circuit: about 0.62 % at 240 V over 30 ft - a design check, not an NEC limit: the inverter trips on high voltage when this rise and the utility's own voltage together pass its limit [Chapter 9 Table 9]
- ✓ The 120 % busbar rule: 240.00 A = 240.00 A exactly: it passes at equality, with no allowance left under this method - the PV breaker at the opposite end from the main, labeled [705.12(B)(2), NFPA 70-2026]

Confirm on site

- ? The DC disconnect's fault-current rating: at least the available fault current at its terminals - from the selected disconnect's listing (make and model), the basis of the available current, and the maker's conditions [690.15(C)(1), NFPA 70-2026]
- ? Arc-fault protection: the DC circuits run at 80 V or more - the inverter or another listed component provides PV arc-fault protection (check its listing or datasheet) [690.11, NFPA 70-2026]
- ? Ground-fault protection: the DC circuits exceed 30 V or 8 A - the inverter or another listed device provides GFDI protection (check its listing or datasheet; equipment without it usually says so in its manual) [690.41(B), NFPA 70-2026]
- ? The DC grounding configuration: not solidly grounded as entered - the inverter output circuit's EGC, through grounded distribution equipment, is the connection to ground [690.47(A)(1)] - confirm with the inverter's listing [690.47(A)(1), NFPA 70-2026]
- ? Rapid shutdown limits: controlled conductors outside the array boundary (1 ft from the array) OR, inside a building, more than 3 ft past where they enter it - not over 30 V within 30 s of initiation, checked conductor to conductor and conductor to ground [690.12(B)(1)]; inside the boundary a listed PV hazard control system, or not over 80 V within 30 s [690.12(B)(2)] - by the equipment's listing [690.12(B), NFPA 70-2026]
- ? The rapid shutdown initiation device: the service disconnect, the PV system disconnect, or a listed switch, readily accessible and OUTDOORS (a one- or two-family dwelling); its "off" position shuts down the PV system [690.12(C), NFPA 70-2026]

Each stays to confirm until the listing or instructions of the equipment actually installed are recorded. A rapid shutdown device's voltage rating proves voltage compatibility only.

WITH CAUTION - Confirm on site: 6 items (below).

What people get wrong

WITH CAUTION - Confirm on site: 6 items (below).

Assumptions

- No string fuses assumes no other source can feed current back into the strings - no battery or other DC source on these circuits [690.9(A)(1)]. The module's maximum series fuse is checked against the current from all sources (Checks). The 25 A device under the DC EGC is only the basis for sizing the EGC [690.45] - no fuse is installed.
- Current limiting or clipping is acceptable only as the selected inverter's instructions permit; confirm the input and short-circuit limits.

What people get wrong

- Adding one more module: 14 modules x 43.23 V cold = 605.2 V - OVER the inverter maximum DC input, the DC disconnect and the 600 V dwelling limit [690.7(2)] (600 V)
- Tying two strings in series instead of in parallel doubles the voltage: 26 modules, 1124.0 V cold. Strings go in PARALLEL - series adds voltage, parallel adds current
- THHN exposed on a roof: exposed single conductors in the array must be PV wire, or USE-2 and RHW-2 marked sunlight resistant [690.31(C)(1)(a)]; THHN alone is not even permitted in a rooftop raceway (a wet location) [300.11, 310.10(C)]
- The 120 % rule: the main 200 A + 125 % of 32 A = 240.00 A against 120 % of the 200 A busbar, 240 A - it passes at equality, with no allowance left. For the two methods evaluated here, use the 120 % method for the shown opposite-end connection; otherwise evaluate the 100 % method. Other methods in 705.12(B), and equipment specifically listed for combining sources, require separate evaluation [705.12(B)(1), (B)(2)]
- Rapid shutdown on a house: PV circuits on or in a building need it [690.12], and at a one- or two-family dwelling the initiation device is outdoors [690.12(C)(1)(b)]
- Over 600 V on a dwelling: PV DC circuits on or in a one- or two-family dwelling are limited to 600 V [690.7(2)] - this string is 562.0 V cold

How it was worked out

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MAXIMUM VOLTAGE [690.7(A)(1), NFPA 70-2026]
  13 modules x 39.88 V x (1 + (-10 C - 25) x -0.24 %/C) = 562.0 V

HOT OPERATING VOLTAGE (the inverter maker's MPPT range - a design check, not code)
  the Vmp coefficient estimated from the Pmax and Isc coefficients: -0.3 - 0.04 = -0.34 %/C
  13 x 33.33 V x (1 + (70 C - 25) x -0.34 %/C) = 367.0 V

START-UP (the maker's condition - a design check, not code)
  13 x 39.88 V x (1 + (70 C - 25) x -0.24 %/C) = 462.4 V open-circuit at the design high; the start
      voltage 125 V - met. The MPPT minimum (above) is checked on the loaded voltage; start-up is checked
      here, apart from it.

PV CIRCUIT CURRENT [690.8(A)(1)(a)(1), NFPA 70-2026]
  one string: 13.9 A x 1.25 = 17.38 A; 1 string(s) in parallel on the MPPT: 17.38 A

NOT DONE HERE - THE ENGINEERED METHOD [690.7(A)(3), NFPA 70-2026; 690.8(A)(1)(a)(3), NFPA 70-2026]
  At any system size, the code also permits the maximum voltage and current to be found by an industry
      standard method, in a documented and stamped design by a licensed professional electrical engineer
      [690.7(A)(3), 690.8(A)(1)(a)(3)]. That method needs the engineer; this tool does not do it - it
      works the datasheet coefficient or Table 690.7(A), and Isc x 125 %.

STRING FUSES [690.9(A)(1), NFPA 70-2026]: one string on the MPPT - nothing feeds back into it (no other
    source assumed); the current from all sources is the string's own 17.38 A, against the module's 25 A
    maximum series fuse.

DC CONDUCTORS [690.8(B), NFPA 70-2026] - sized as in Feeder Sizing
  ambient 40 C (on the roof, 3/4 in or more above it), 2 current-carrying in the raceway
  12 AWG copper: 25 A at the 75 C terminals >= 1.25 x 17.38 A = 21.72 A; 27.3 A after correction (0.91)
      and adjustment (1.00) >= 17.38 A
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WITH CAUTION - Confirm on site: 6 items (below).

DC VOLTAGE DROP (a design recommendation, not code) [Chapter 9 Table 8]
  2 x 80 ft x 13.20 A (Imp x 1 strings) x 1.98 ohm/1000 ft = 4.18 V = 1.14 % of 367.0 V

STRING CONDUCTORS IN THE ARRAY [690.8(B), NFPA 70-2026; 690.31(C)(1)(a), NFPA 70-2026]
  one string: 1.25 x 17.38 A = 21.72 A at the terminals -> 12 AWG copper PV wire

DC EQUIPMENT GROUNDING CONDUCTOR [690.45, NFPA 70-2026]
  no overcurrent device in the home run: the assumed device by 690.9(B), 1.25 x 17.38 A = 21.72 A -> 25 A; Table 250.122: 10 AWG copper
  the home run's raceway: 2 x 12 AWG and the EGC in EMT - 1/2 in (15.7 % fill) [Chapter 9 Tables 1, 4, 5]

THE ALLOWED STRING LENGTH
  the most: 600 V / 43.23 V per module cold = 13 (the inverter maximum DC input, the DC disconnect and the 600 V dwelling limit [690.7(2)])
  the fewest for the MPPT minimum: 100 V / 28.23 V per module hot, loaded = 4
  for start-up, separately: 125 V / 35.57 V per module hot, open-circuit = 4 - a separate figure, not a checked minimum: the maker states its start-up condition (its documentation)

INVERTER OUTPUT [705.28(B), NFPA 70-2026; 705.30(B), NFPA 70-2026]
  32 A x 1.25 = 40.00 A -> the next standard breaker 40 A [240.6]
  output conductors sized as in Feeder Sizing: 32 A continuous (125 %), three current-carrying at the design high 40 C, 240.4(D), 110.14(C)
  the output circuit's EGC: Table 250.122 on the 40 A breaker - 10 AWG copper [250.122]
  its raceway: 3 x 8 AWG THWN-2 (2 lines + neutral, the neutral counted) and the EGC in EMT - 3/4 in (24.6 % fill) [Chapter 9 Tables 1, 4, 5]

VOLTAGE RISE ON THE INVERTER OUTPUT CIRCUIT (a design check, not an NEC limit) [Chapter 9 Table 9]
  2 x 30 ft x 32 A x 0.78 ohm/1000 ft (8 AWG copper, AC resistance at unity pf, steel conduit) / 240 V = 0.62 %

LOAD-SIDE CONNECTION, BUSBAR [705.12(B)(2), NFPA 70-2026]
  main 200 A + 125 % of 32 A (40.00 A) = 240.00 A; 120 % of the 200 A busbar = 240.00 A

LABELS - L1, L2, L5, L7, L8, L9, L10, L12, L13, L19: see the label schedule (the required wording quoted, NFPA 70-2026). Not on this job: L6 (a roof plan for more than one rapid shutdown type), L11 (bipolar systems), L14 (the sum-of-breakers method - not offered), L20 (remote disconnect controls), L22 (grounded conductors of different systems); energy storage (Article 706) labels are not covered by this tool.

NFPA 70, National Electrical Code, 2026 edition (Articles 690 and 705). The makers' figures: the datasheets entered.