

# Load and solar circuit control using IQ System Controller auxiliary contacts

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## Overview

This document provides installers and design engineers with the information required to plan and configure the load and solar circuit control using IQ System Controller auxiliary contacts.

The Enphase Energy System (EES) must have sufficient power capability to sink all the power from the PV system during transitions to off-grid and must source power to support all loads in intentionally islanded (standalone) operation. This may not always be feasible. In such situations, auxiliary contacts in IQ System Controller can be used to disconnect (shed) excess solar or heavy loads.

In addition, low-priority loads with high power requirements may deplete energy storage. Auxiliary contacts can be used to shed these large loads to help maintain energy in the storage system.

## What are auxiliary contacts and how do they work?

The IQ System Controller has five relays rated for pilot duty at up to 24 VAC/VDC and 1 A continuous current. One is dedicated to the generator function while the others are available for general use. The contacts/terminals of the pilot relays are not energized by IQ System Controller. They have no voltage on them and are “dry.” When these contacts are connected to a voltage source, they are “wetted.” This document refers to these as auxiliary relays or contacts.

The configuration of the relays is as follows:

- Two Normally Open (NO)
- Two Normally Closed (NC)
- One NO relay used for starting a generator (optional)

**While the auxiliary contacts have NO and NC electrical configurations, the Enphase Installer App overrides this behavior when configuring the contacts.** Once configured, the auxiliary contacts are closed when on-grid and open when off-grid. In special load control modes, the contacts may be closed when off-grid if the battery charge exceeds a threshold or if a generator is running. **Hence, IQ System Controller can only be used with NO-type external definite purpose contactors or power relays to implement load control or solar circuit control as described in this technical brief.**



**NOTE:** Refer to the [“Generator Integration with the Enphase Energy System”](#) technical brief for documentation related to generator integration. This document covers load and solar circuit shedding using auxiliary contacts.

## Auxiliary contact labeling in IQ System Controller

The following figure illustrates the auxiliary contacts at the bottom of the IQ System Controller. It also shows the AC combiner, generator, and IQ Battery lugs.

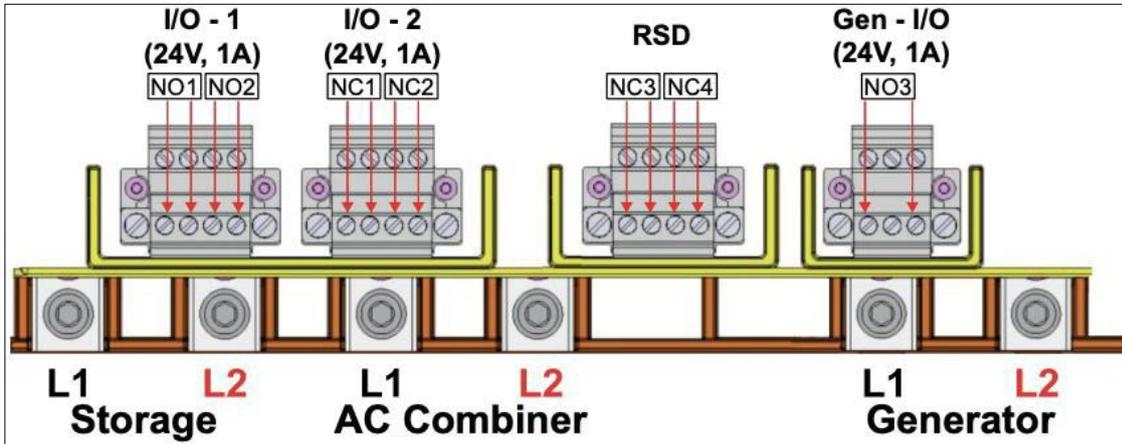


Figure 1: Auxiliary contact labeling and usage

Refer to the [IQ System Controller QIG](#) for installation instructions.



**NOTE:** Use a 3/32"/2 mm flathead screwdriver to work on auxiliary contact terminals.

## Auxiliary contact usage

Enphase recommends using Normally Open (NO) auxiliary contacts for PV shedding and Normally Closed (NC) auxiliary contacts for load control. The load/solar circuit behavior represented in this document requires that a NO definite purpose external contactor be used. The Enphase App is tailored to work with these as these are the most readily available.

IQ System Controller’s auxiliary contacts can be used with two different types of external contactors:

- Normally Open external contactor with a 24 VAC coil
- Normally Open external contactor with a 120 VAC coil (with an interposing power relay)



**NOTE:** The definite purpose external contactor may make a humming or buzzing sound when its coil is energized. This is normal and does not indicate issues with the equipment.

## Enabling load control on a site

The auxiliary contacts can be used for load shedding or PV shedding. Load shedding can be used to shed non-essential loads on a site during a grid outage to ensure that the essential loads are backed up for a longer time. Alternately, you may want to use the auxiliary contacts for PV shedding to maintain the Solar-To-Storage ratio in off-grid mode on sites with IQ6, IQ7, M215, or M250 Microinverters.

In either case, you will require a general-purpose or definite-purpose contactor, a power supply, and additional accessories to set up a site to use the load control feature. Enphase has launched a new product, the IQ Load Controller, which is a complete solution for using the IQ System Controller’s load control feature. Installers are required to follow the simple and detailed instructions provided in the

instructions guide with the product to complete the wiring to integrate the IQ Load Controller with the IQ System Controller in order to set up load control (or PV shedding) at a site.

Installers may also choose to set up a similar kit by themselves. Enphase has provided a list of recommended contactors, control transformers, and other components to set up a self-assembled kit.

For more information, go to the [Installing a custom kit for Load/PV Shedding](#) section.

## Using the IQ Load Controller with IQ System Controller to enable load control or PV shedding

The IQ Load Controller, when used in conjunction with the IQ System Controller, enables control of up to two heavy loads running at 240 VAC (or four 120 VAC loads) or shedding of up to two solar branch circuits when operating in an off-grid mode with the Enphase Energy System.

The IQ Load Controller has a UL-listed, outdoor-rated, NRTL-certified NEMA type 4X enclosure with a DIN rail that contains two 40 A contactors, a power supply, wires for control connections, and other wiring accessories. Use the IQ Load Controller for controlling heavy, split-phase loads or for solar circuit shedding when solar power exceeds allowed solar-to-storage ratios (for systems with IQ6/IQ7 Series or M Series PV inverters). Heavy loads are those that exceed the power or surge capabilities of your Enphase Energy System. Each 240 V load can be controlled independently, but the 120 V loads can be controlled in groups of up to two loads.

**IMPORTANT:** The IQ Load Controller is an accessory for the IQ System Controller. The IQ System Controller is required to control loads or shed excess solar circuits using the IQ Load Controller.

### Using the IQ Load Controller for load shedding

The IQ Load Controller, when used in conjunction with the IQ System Controller smart switch, enables control of up to two 240 V loads or four 120 V loads or shedding of up to two solar circuits when operating in an off-grid mode with the Enphase energy management system.

To install the IQ Load Controller, read and follow all warnings and instructions mentioned in the QIG provided with the product. Safety warnings are listed on the back of the QIG. The IQ Load Controller must be installed by a qualified electrician. These instructions are not meant to be a complete explanation of a renewable energy system. All installations must comply with national and local electrical codes. Professional installation is recommended.

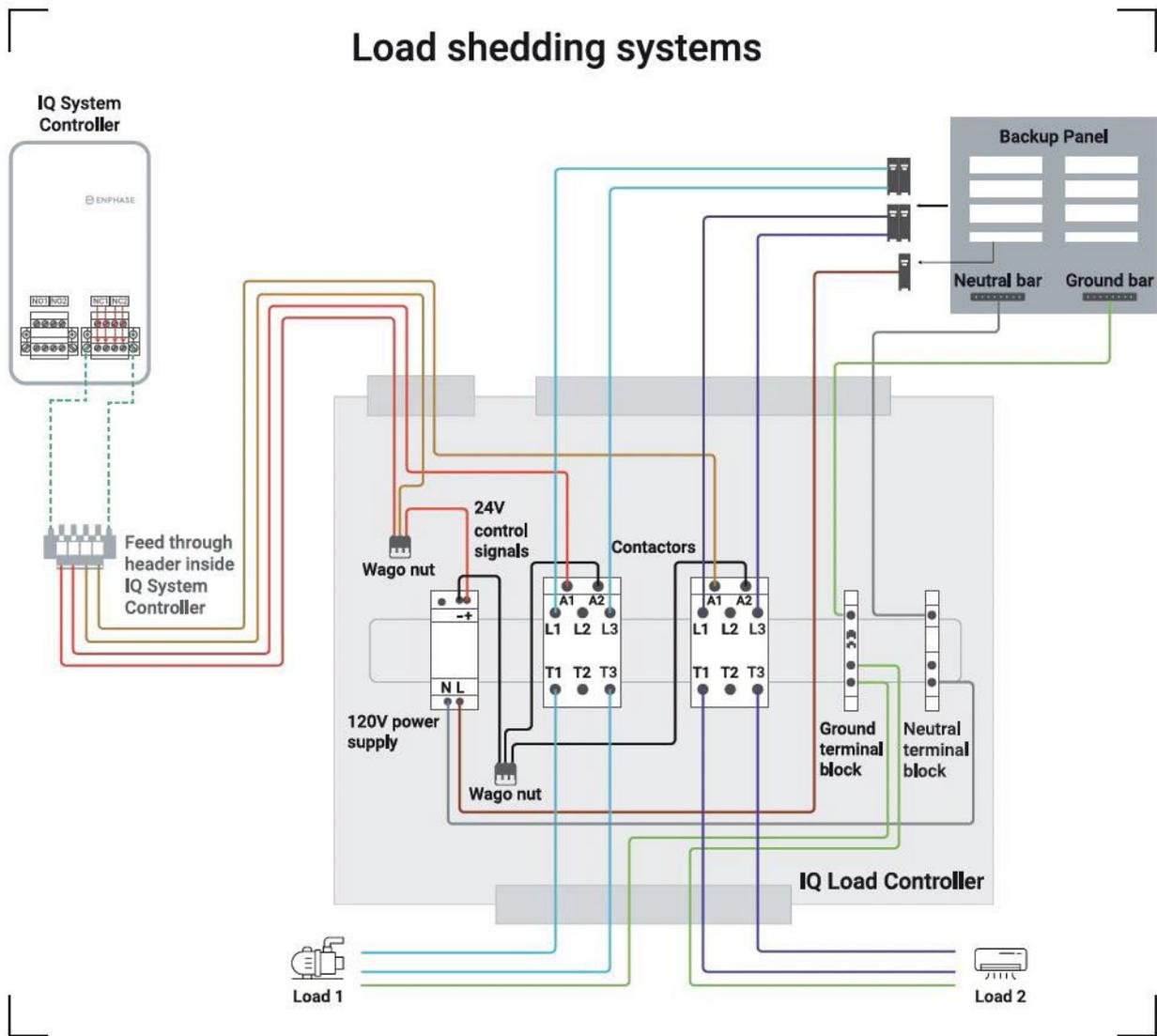


Figure 2: Load-shedding systems

As shown in the preceding diagram, the IQ Load Controller can be used to shed 36 A dedicated circuits powered from 45 A breakers or 32 A branch circuits powered from 40 A breakers. Follow all the instructions in the [Quick Install Guide](#) provided with the product to set up load shedding on a site.



**Note:** The IQ Load Controller can also be used to shed up to four loads running at 120 VAC. For this use case, it is important to ensure that the individual loads are connected to the outer poles of the contactors. Whenever possible, try to balance the current on the two poles of a contactor. To do this, connect the two loads with similar current requirements on the same contactor. This will prevent unequal wearing of the two poles of the contactors, thus ensuring a longer service life for the contactor.



**NOTE:** If there is a multi-wire branch circuit where two single-phase circuits share a neutral, both current-carrying conductors should be switched by a single contactor.

## Using the IQ Load Controller for PV shedding

The IQ Load Controller can be used for PV shedding as well. Note that this use case is only applicable for installations on sites with IQ6/IQ7 or M215, M250 Microinverters. IQ8 installations do not require PV shedding.

The IQ6, IQ7 and M215, M250 PV installations with an IQ Battery are required to maintain a solar-to-storage ratio of less than 1.5 when off-grid. By using an IQ Load Controller, you can install an additional two PV branches on a site, that function normally in an on-grid scenario but are shed when the system goes off-grid, thus preserving the solar-to-storage ratio. You can install up to two IQ Load Controllers on a site, thus having the provision to install up to four extra PV branch circuits for use in on-grid only mode.

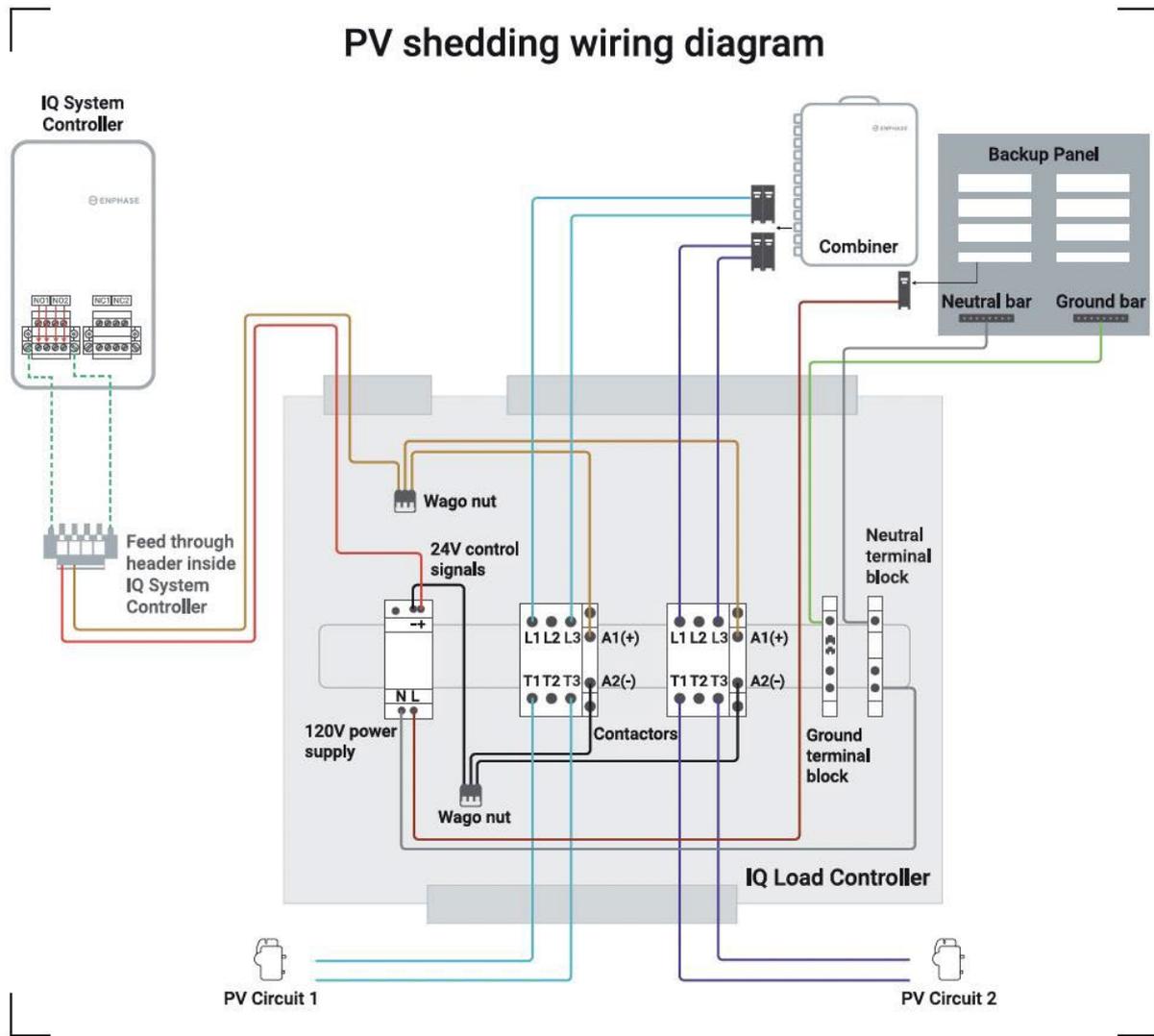


Figure 3: PV shedding systems

The above PV shedding wiring diagram is placed along with the Quick Install Guide inside the IQ Load Controller. If setting up PV shedding on a site, stick the PV shedding wiring diagram label shipped with the IQ Load Controller over the load shedding wiring diagram stuck on the inner door of the enclosure. Follow all the instructions in the QIG provided with the product to set up PV shedding on a site.

## Using load control in a Sunlight Backup system

A major use case of the load control feature is for a Sunlight Backup system. This is a system with grid-forming IQ8 Microinverters on the roof and an IQ System Controller but without an IQ Battery on site. Such a system can remain powered during sunlight hours even in the absence of the grid. For optimal energy utilization in such a system, Enphase recommends connecting up to four 240 V or eight 120 V critical loads on the backup panel and controlled by two IQ Load Controllers (each IQ Load Controller controlling 2 loads). This provides the homeowner with complete control over the loads enabling the homeowner to shed one or more of these loads if required to ensure the other loads can remain powered for longer. At least one IQ Load Controller must be used in a Sunlight Backup system.

In Sunlight Backup mode, the system uses granular control of every load to try each load individually when it restarts post a collapse. Loads that repeatedly cause a collapse are shed automatically after a few tries so that the homeowner gets the microgrid back with the loads that can be supported. The homeowner can manually reconnect the load when the available power has increased.

## Load control configurations in Enphase Installer App

Refer to “[Enphase Energy System Commissioning using Enphase Installer App 3.X](#)” guide.

## Load control configurations in Enphase App

Refer to the section "Load control configurations" in the "[Understanding Sunlight Backup system for homeowners](#)" technical brief.

## Troubleshooting steps

Table 1: Troubleshooting

Test	Expected observation	Implication	Possible cause for deviation from expected observation
<ol style="list-style-type: none"> <li>1. Open the breaker connected to the power supply input.</li> <li>2. Use a voltmeter to test the terminals of the contactor.</li> <li>3. Close the load breaker.</li> </ol>	The supply side of the contactor should have 240 V, load side should have 0 V.	The contactor has been correctly configured	Check L1 and L2 line connections.
Close the breaker connected to the power supply input	You should see 240 VAC on both sides. The armature pin is sucked in.	The load is successfully connected and operating.	Ensure power supply wiring is as described in the IQ Load Controller QIG.

## Installing a custom kit for load/PV shedding

The IQ Load Controller (EP-NA-LK02-040) can only be used for controlling dedicated loads of up to 36 A connected to a 45 A breaker or for controlling 32 A branch circuits or PV circuits connected to a 40 A breaker. The following sections provide details on setting up an installer self-assembled kit for controlling larger loads.



**NOTE:** The “APPENDIX” section contains reference BOMs for 20 A, 30 A, and 40 A circuits that can be used as an alternative to the IQ Load Controller.

### Using an external contactor with a 24 VAC coil

A 24 VAC low voltage is created with a control transformer protected with an OCPD such as an inline fuse. The 24 VAC power supply should be connected to a definite purpose contactor via the auxiliary contact.

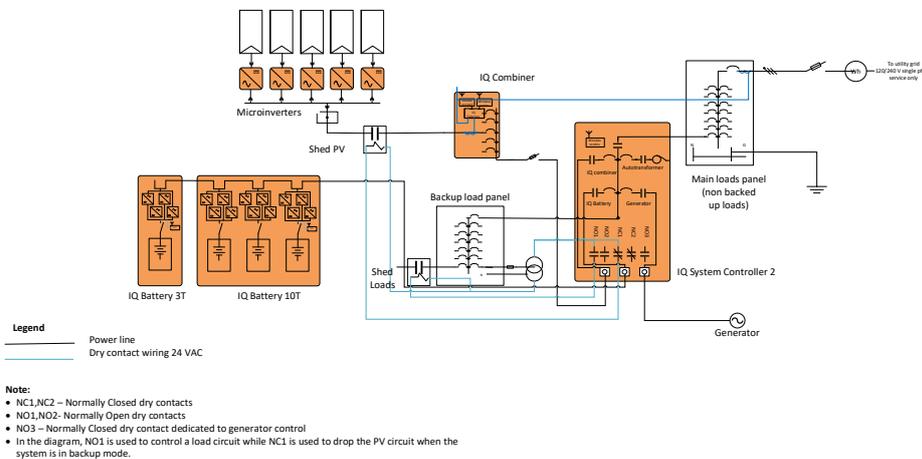


Figure 4: IQ System Controller auxiliary contact wiring diagram

The line diagram represents both the Normally Opens auxiliary contacts configured for PV shedding and load shedding.

Refer to [Appendix A](#) for a detailed single-line diagram.

### Supported contactors and transformers

Definite purpose contactors must meet or exceed the following parameters to work with IQ System Controller.

Table 2: Definite purpose contactor parameters

Parameter	Value
Continuous Current	< 1 A
Coil Voltage	24 V
Inrush VA	40 VA or rating of the transformer being used
Opening time	≤ 30 ms



**NOTE:** Follow all guidelines by the contactor manufacturer regarding installation. Ensure that the load connected does not exceed the contactor rating.

Table 3: Supported contactors

Supplier	Part Number	Full load amperage (A)	Poles & NO/NC	Coil voltage
Eaton	C25BNB220T	20	2 pole, NO	24 VAC
Cutler- Hammer	C25BNF240T	40	2 pole, NO	24 VAC
Protactor	PT-C240A	40	2 pole, NO	24 VAC
Packard	L45-038 C240A	40	2 pole NO	24VAC
Eaton	C25FNF260T	60	2 pole, NO	24 VAC
Square D	891ODP32V14	30	2 pole, NO	24 VAC
Square D	891ODPA63V14	60	3 pole, NO	24 VAC

Table 4: Supported transformers for power supply

Supplier	Part number	Secondary voltage	Primary voltage	VA rating
Fiada	B07RDBS6NK	24 VAC	120/208/240 VAC	40
Endurance Pro	EP4031OF	24 VAC	120/208/240 VAC	40

## Recommended fuses and fuse holders

- 1 A, Littelfuse 239 Series, 5×20 mm, Slo-Blo® Fuse in Series 150 fuse holder or equivalent
- Eaton BP-AGC-1-RP 250 V glass fuse in BP/HMK-RP fuse holder
- 3AG/AGC Screw Terminal Fuse holder

## Reference bill of materials (BOM) for 60 A load control

Reference BOM that can be used to design load shedding circuit of 60 A total load.

Table 5: Reference BOM for a 60 A load control

Item	Description	Quantity
Control transformer	Fiada B07RDBS6NK	1
Fuse Retainer	Littelfuse Universal Fuse Retainer Part No: 150145	1
Fuse	NTC 74-6SG1A-C 1 A 250V glass fuse	1
Contactor	Square D 891ODPA63V14 <sup>1</sup> 60 A	1
Box	6X6 PVC box rated for outdoor use (NEMA 3R or better) (Carlson junction box, for example)	1
Quick Disconnects/Fast on Terminals/Receptacle lug	PIDG, Quick Disconnects, Receptacle, 22 – 18 AWG Wire Size TE Internal #: 640911-1	2

Item	Description	Quantity
(required for contactors without screw-on terminals)		

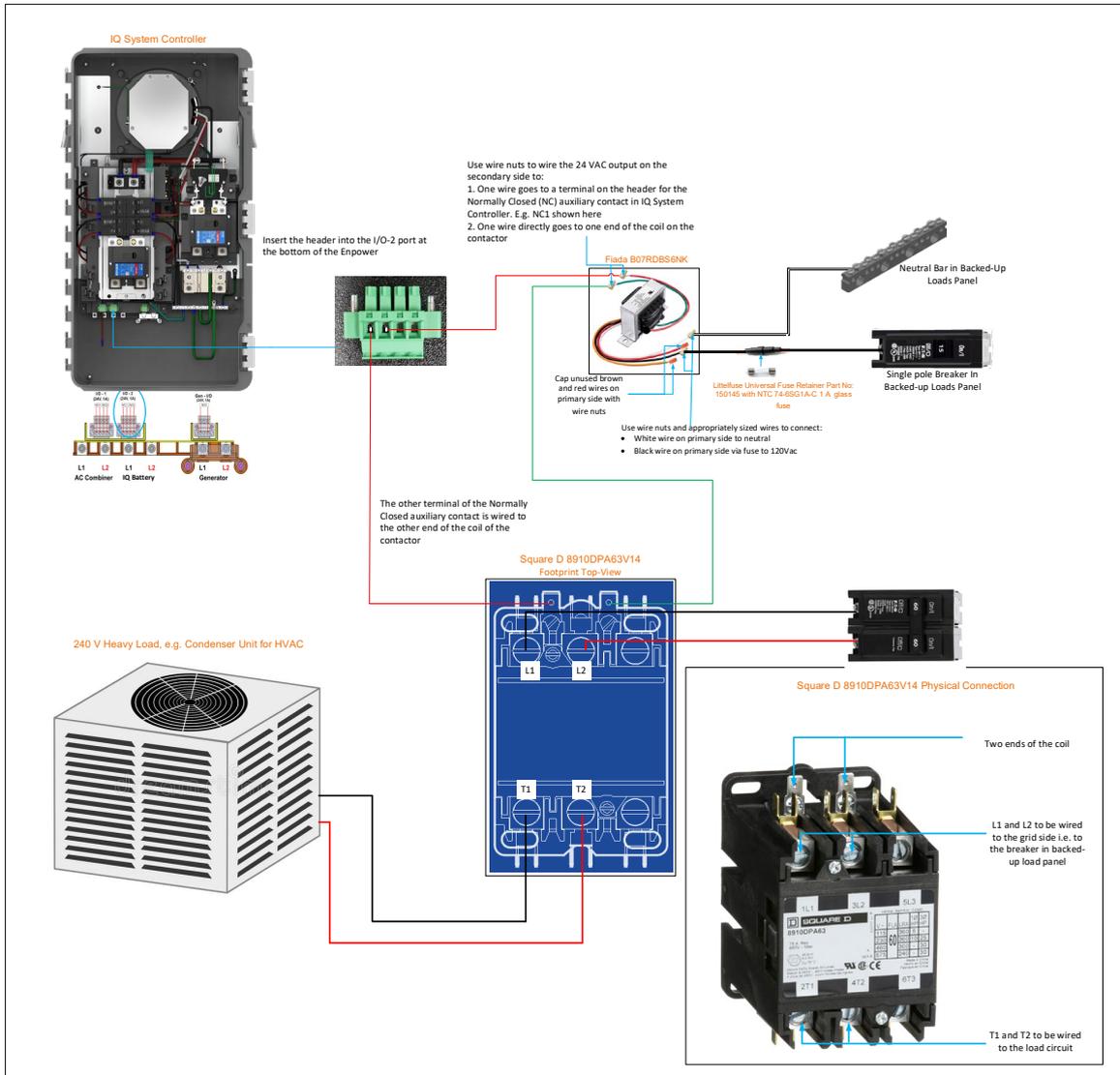


Figure 5: Example wiring: Heavy 240 V load shedding for one circuit

## Using an external contactor with a 120 VAC coil

The 24 VAC coil-based definite-purpose contactors for large loads typically have holding currents that exceed the IQ System Controller auxiliary contact rating of 1 A. In such cases, an external contactor with a 120 VAC coil can be used with the bill of materials and wiring details as specified in this section. A 12 VDC power source is used to drive an interposing power relay and the auxiliary contacts in IQ System Controller control the current to the coil of the power relay. The output of the power relay is used to control the 120 VAC coil of the external contactor.

Editorial updates

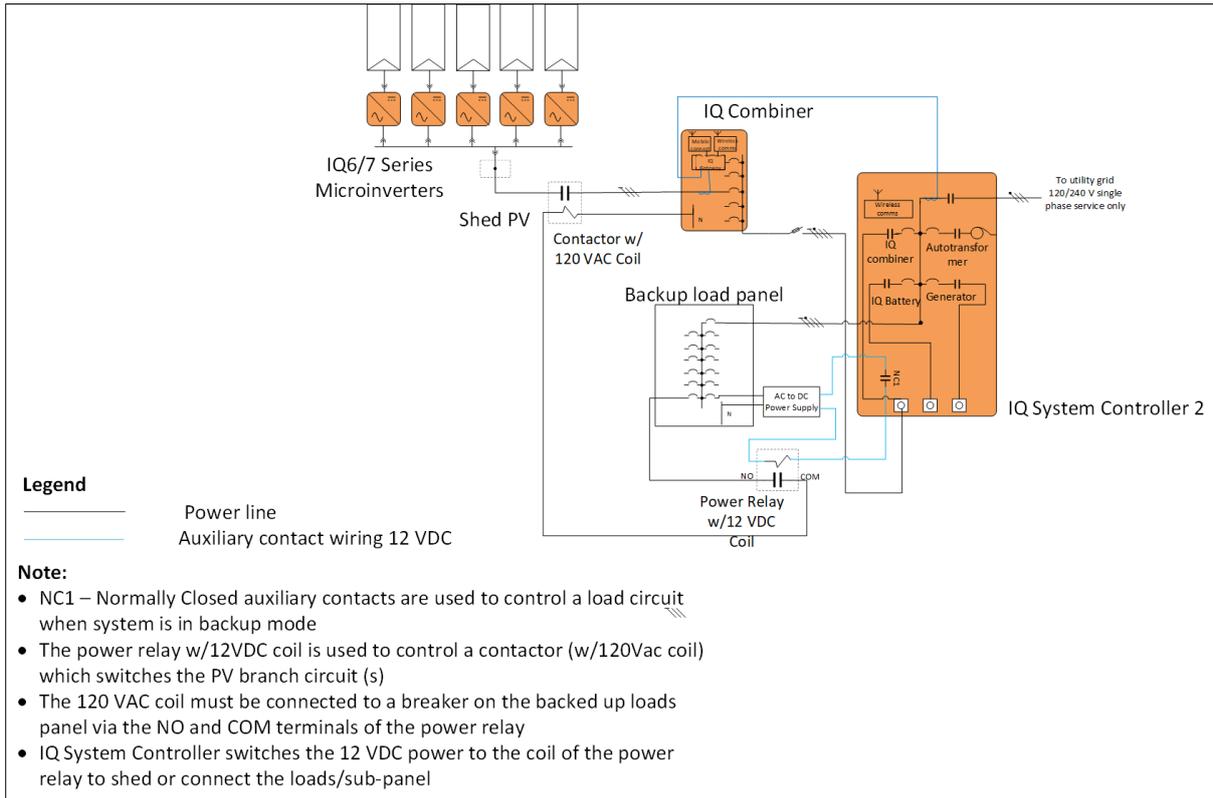


Figure 6: PV shedding using external contactor with 120 VAC coil

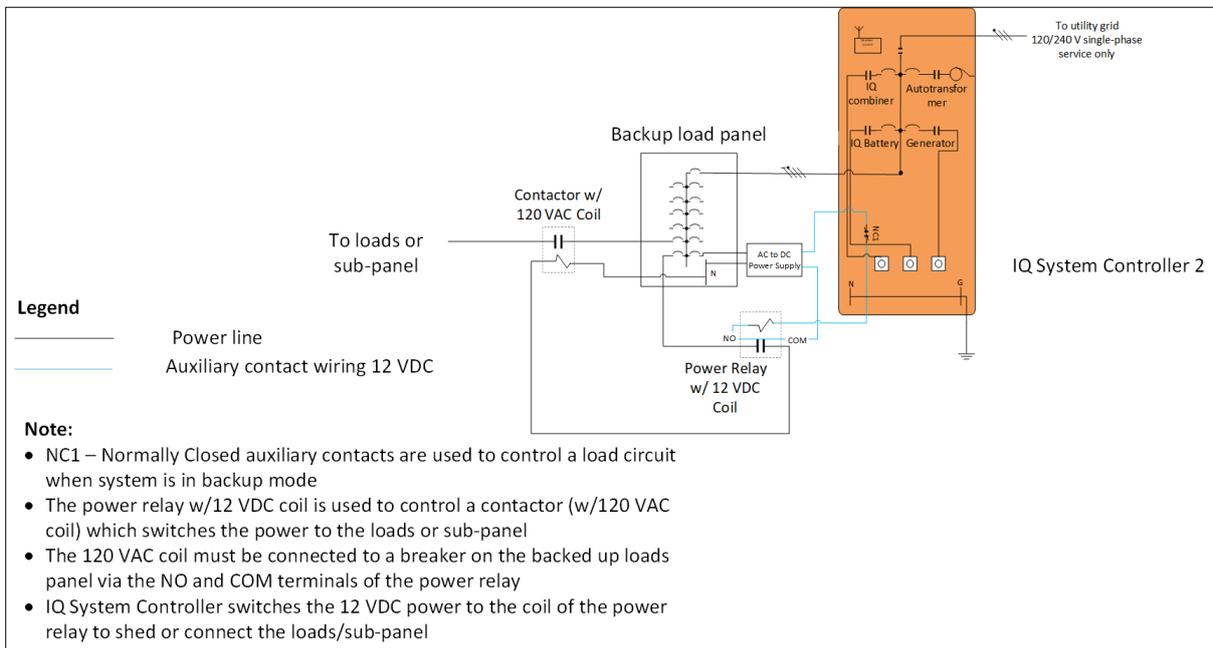


Figure 7: Load shedding using external contactor with 120 VAC coil

Reference BOM for 120 A load or PV shedding circuit

Table 6: Reference BOM for 120 A load or PV shedding circuit

Item	Description	Quantity
DC power supply	12 V 1 A APV-12-12 Meanwell AC-DC Switching Power Supply	1
Power Relay	Schneider Electric Relays W9AS5D52-12	1
Contactor	120 A Contactor C25HNE3120A Eaton / Cutler Hammer • 3 Pole • 110/120V Coil	1
Box	QILIPSU Hinged Cover Stainless Steel Latch Junction Box with Mounting Plate, ABS Plastic DIY Electrical Project Case IP67 Waterproof Dustproof Enclosure Grey (14.6"x10.6"x5.9")	1
Quick Disconnects/Fast on Terminals/Receptacle lug (required for contactors without	PIDG, Quick Disconnects, Receptacle, 22 – 18 AWG Wire Size TE Internal #: 640911-1	2

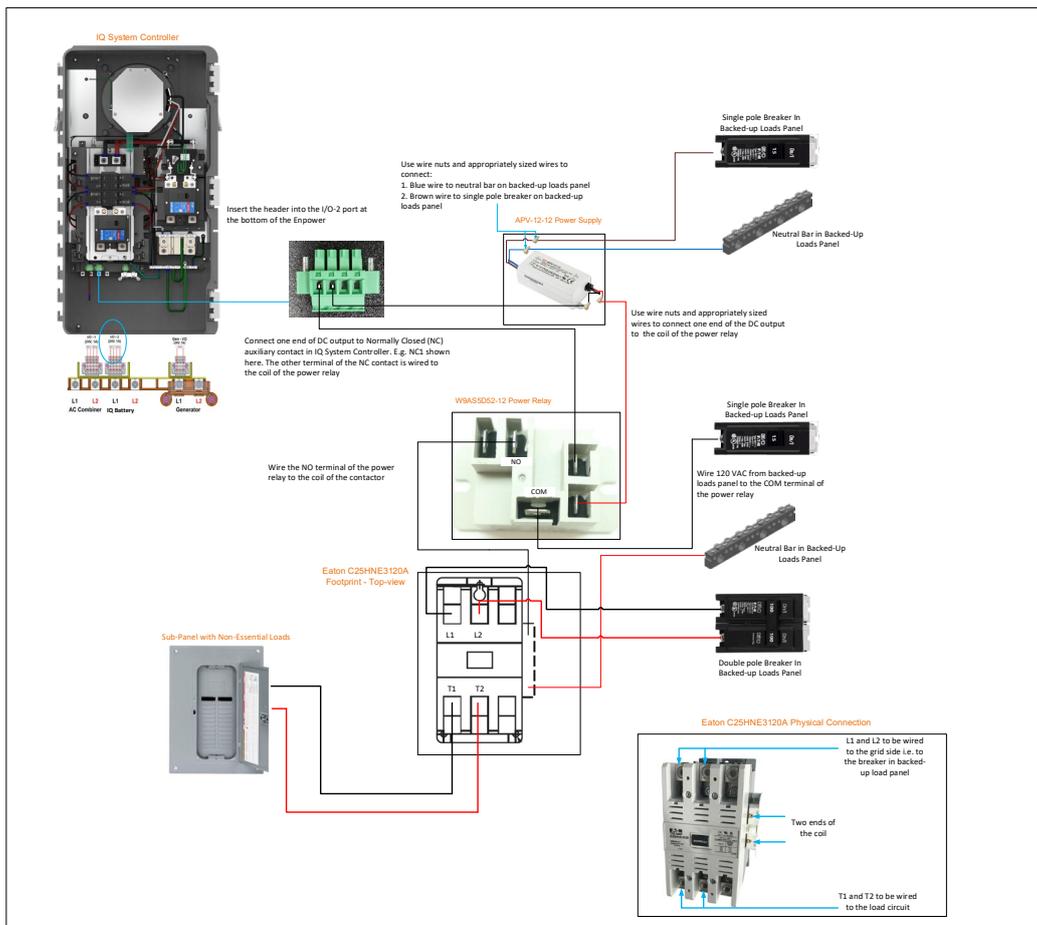


Figure 8: Example wiring: Load shedding using definite purpose contactor with 120 VAC coil

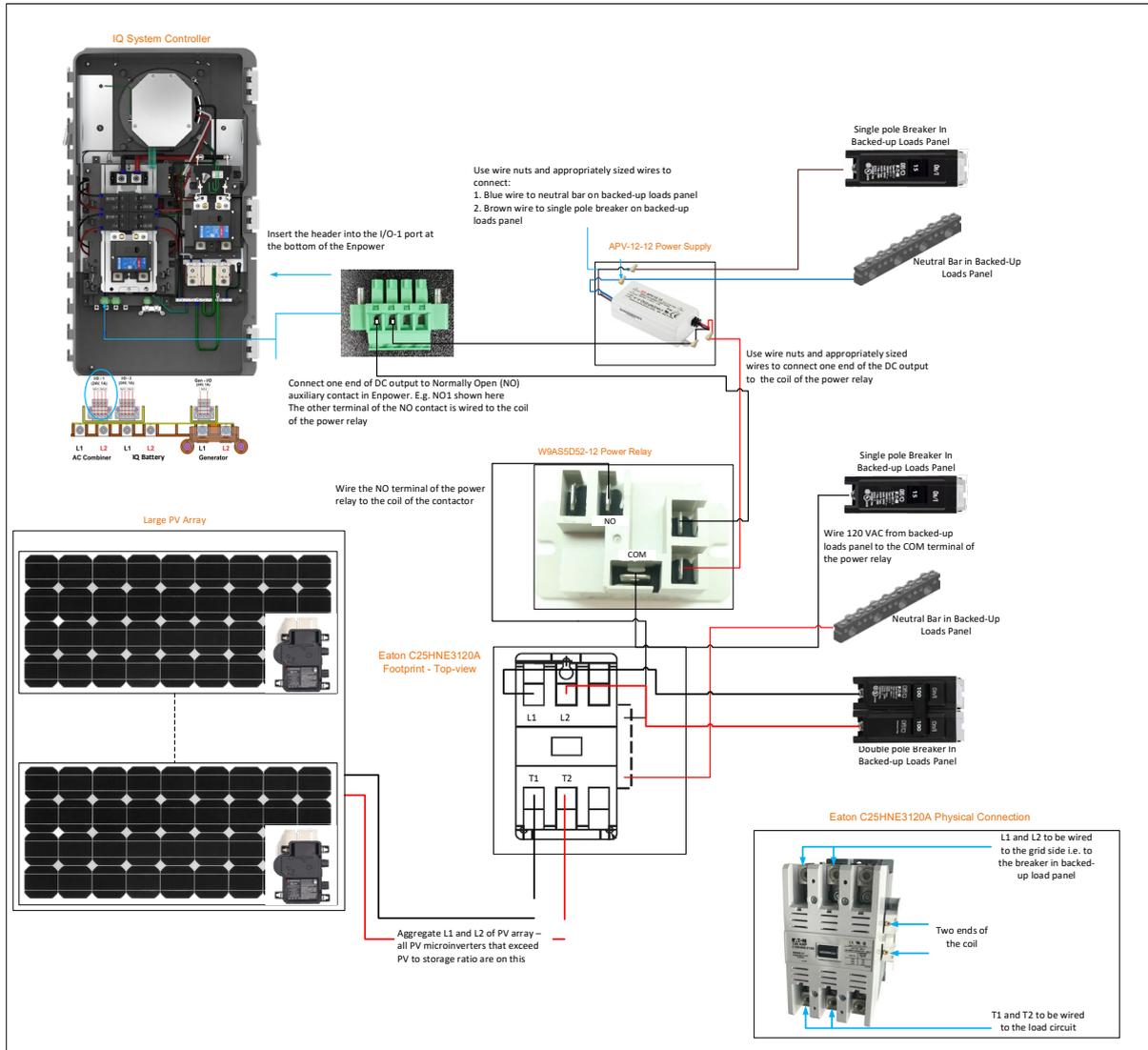


Figure 9: Example wiring: PV shedding using definite purpose contactor with 120 VAC coil

Refer to [Appendix C](#) for more wiring configurations.

## Validation and troubleshooting guidelines for setting up a custom load control kit

### Installation validation

- Ensure the control transformer is wired correctly.
  - Confirm that there is 120 VAC to primary with appropriate fusing.
  - Confirm that there are no shorts on the secondary
  - Confirm that there is 24 VAC on the secondary.

**Important:** Never wire 120 VAC to the auxiliary contactors on IQ System Controller. The auxiliary contactor inputs on IQ System Controller must be 24 VAC or 12 VDC.

- Prevent overloading of control transformer:

- a. The secondary current must be less than 1 A and must be capable of delivering contactor inrush.
  - b. Always match the control transformer output to the inrush and steady state power drawn by the external contactor. Overloading the control transformer will cause the control transformer to fail or the fuse on the primary side to blow.
  - c. Recommend using one control transformer per external contactor. If you are not certain about the inrush and steady state power requirements of the external contactor.
  - d. Use a fuse on the secondary and the primary side of the control transformer if two or more external contactor control circuits are powered using a single control transformer.
3. Ensure contactor coils are wired correctly:
- a. Check the contactor specification and ensure that the wire the output of the control transformer output is wired to the appropriate contactor coil terminal.
  - b. Close the external contactor when energized. An on-grid contactor should have 24 AC across its coils.
  - c. Ensure that the voltage across the output terminals of the contactor must be the same as the input terminals.

## Troubleshooting

Table 7: Troubleshooting

Step	Symptom	Possible cause	Solution
1	The transformer is not powered. Diagnosed by measuring AC voltage on the secondary.	Tripped breaker or blown fuse. This can occur due to short on secondary, such as the control wires landing on a single terminal of the contactor coil. This can also result in transformer damage. When overloaded, the transformer primary may be damaged.	Ensure correct over-current protection is installed on the primary and optionally secondary and replace the transformer. Confirm there are no shorts and there is a circuit through all components.
2	The contactor is not powered. Diagnosed by measuring AC voltage on the contactor coil and NO1/NO2 auxiliary contact.	NO1/ NO2 auxiliary contact is not configured. As a result, there will be a voltage drop across NO1/NO2.	Ensure auxiliary contacts are configured and provisioned in Enphase Installer App.
3	The contactor is not powered. Diagnosed by measuring AC voltage on the contactor coil.	The contactor is not energized. Faulty wiring between auxiliary contact in IQ System Controller and definite purpose contactor.	Confirm 24 VAC across aux contacts when the terminal block is unplugged.  Refer to <a href="#">Figure 1 Auxiliary contact labeling and usage</a> for identifying the auxiliary contact terminals in IQ System Controller.

Step	Symptom	Possible cause	Solution
			If you suspect miswiring or if the auxiliary contact is not working, check the continuity across the auxiliary contact terminals. When the system is on grid both NC and NO auxiliary contacts will be in closed position.
4	The contactor is underpowered. Diagnosed by measuring AC voltage on the contactor coil.	The contactor produces loud buzzing and there is no voltage on the load side (not closed.) A quiet 60 Hz hum is expected, and a loud buzzing indicates that the contactor may not be closing due to insufficient transformer size or excessive voltage drop.	Confirm definite purpose contactor coil voltage is 24 V. Increase wire size if a single contactor. Change to a single contactor per control transformer.
5	The contactor does not open when expected.	NC 1/ NC 2 auxiliary contact is not configured. Unplug the terminal block to ensure that the contactor opens.	Ensure auxiliary contacts are configured and provisioned in the Enphase Installer App.

## APPENDIX

### Appendix A: Single-line diagram

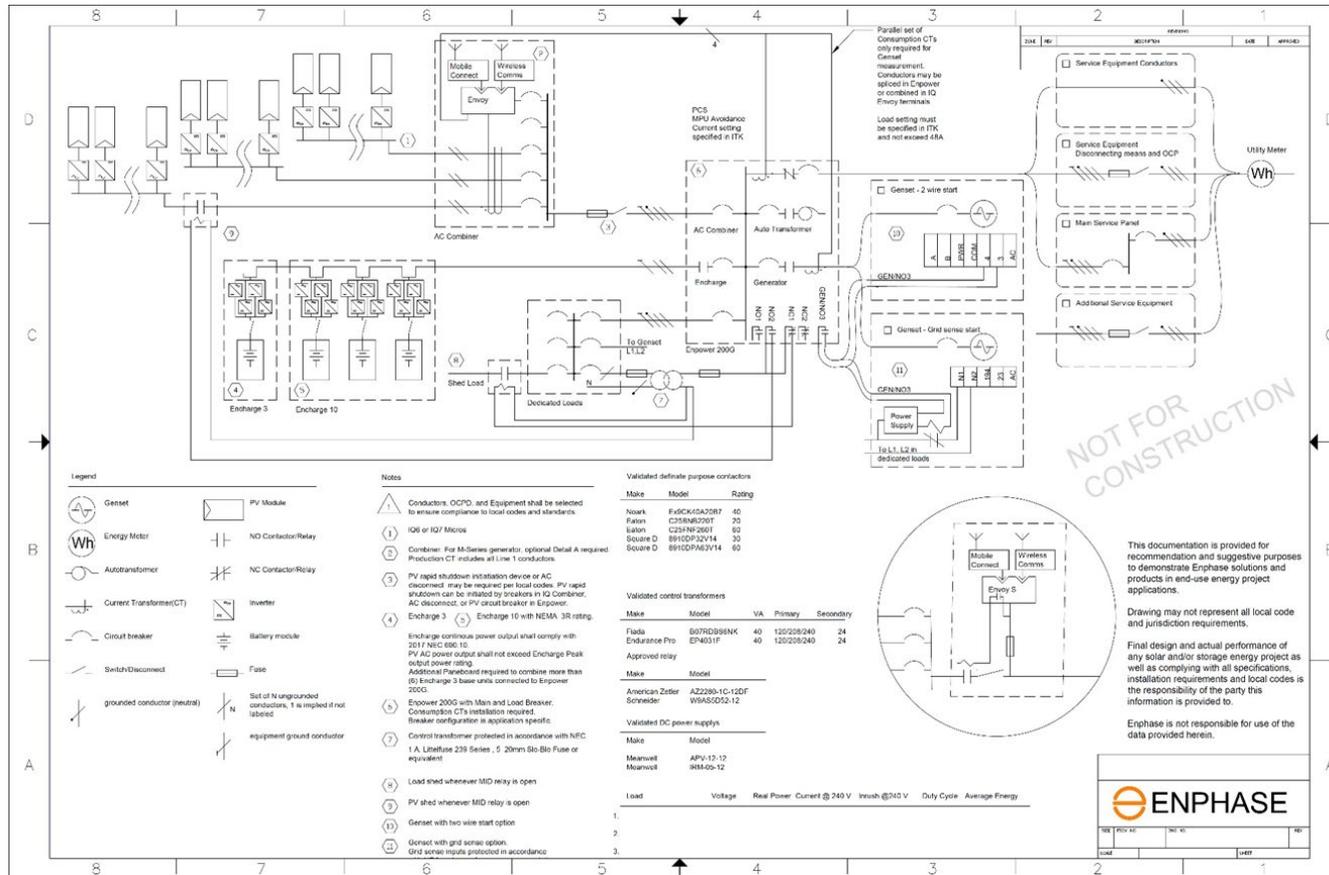


Figure 10: Detailed Single-Line diagram

## Appendix B: Controlling air conditioning unit using a thermostat

Auxiliary contact can be wired to intercept the control wire of a thermostat to an air conditioner.

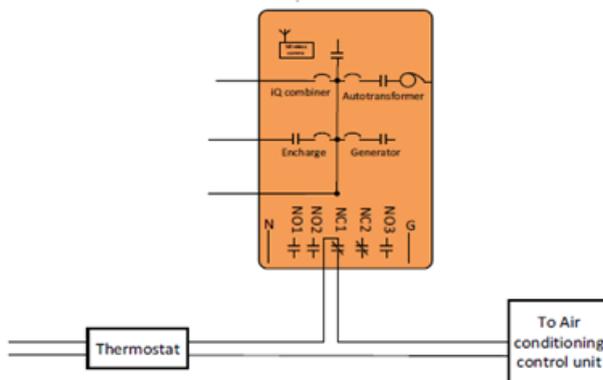


Figure 11: Using auxiliary contact for controlling the air conditioning unit

Air conditioning units are usually controlled by the thermostat. The air conditioner starts when it receives a signal from a thermostat. The signal from the thermostat usually goes into an air handler unit (typically indoors). The air handler unit in turn signals the condenser unit which is outdoors.

An auxiliary contact can be used to intercept the “cool” wire from the thermostat to the air handler. The “cool” wire may also be called a “cool call” wire. Once this is done the IQ System Controller auxiliary contacts need to be configured to shed loads automatically in off-grid as outlined in the sections above.

When this is done:

- When the system is on-grid, the auxiliary contact stays closed. This ensures that the thermostat’s signal goes to the air handler thereby ensuring the air handler and condenser operate as normal.
- When the system goes off-grid, the auxiliary contact opens, interrupting the control signal from the thermostat to the air handling unit. Depending on the state of the condenser during the grid transition the following can happen:
  - If the condenser was running during grid transition, it will run for a cool-down period, typically a few minutes. The IQ Batteries must be sized appropriately to support the steady state current requirement of the condenser, to ensure there is no microgrid collapse during the cooldown period.
  - If the condenser was not running during the grid transition, it will not start again during the off-grid mode.
- If the condenser is signaled to start at the same instant as the grid transition happens, the condenser may try to start. The surge current may collapse the microgrid unless the system has been designed to support the surge current. This is a very rare scenario, and the system recovers within a few seconds to form the microgrid again. As the thermostat has been disconnected during the initial microgrid transition, the condenser will not start again in off-grid mode.

**NOTE:** IQ Battery must be sized appropriately to handle the power requirements of the external compressor.



**NOTE:** Use Normally Closed auxiliary contact to wire the thermostat as the contact opens when the grid power goes off by default

## Appendix C: Recommended maximum distance between IQ System Controller and IQ Load Controller

The IQ System Controller sends a 24 VDC signal from the auxiliary contact to the IQ Load Controller. The DC power source inside the load controller takes power from the backup panel (120 VAC). There will be a voltage drop across both these cables on account of the inherent resistance of the cables. It is essential to ensure that the cable length selected is such that the voltage drop across both the lines (IQ System Controller to IQ Load controller and Backup panel to IQ Load Controller) is within the limit of the contactor and the power source.

The technical data for the products used in the IQ Load Controller are as below:

### Devices on the backup panel: IQ Load Controller line

Table 8: Devices on the backup panel

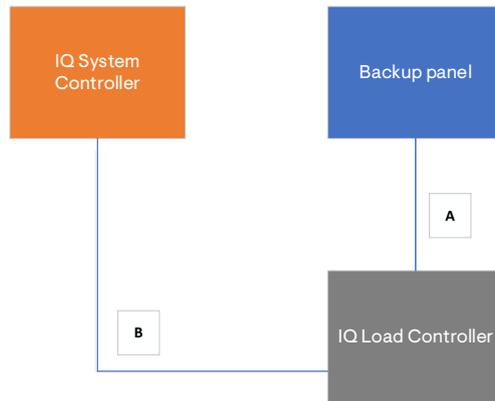
Serial no	Parameter	Value
1	Voltage	120 VAC
2	Max Current (in rush of power source)	25 A
3	Min possible voltage for the load center to operate	85 VAC
4	Max permissible voltage drop	35 VAC (120-85)
5	Wire Gauge used	18 AWG

### Devices on IQ System Controller: IQ Load Controller line

Table 9: Devices on IQ System Controller

Serial no	Parameter	Value
1	Voltage	24 VDC
2	Max Current (in rush of contactor)	2 A
3	Min possible voltage for the load center to operate	20.4 VDC
4	Max permissible voltage drop	3.6 VDC (24-20.4)
5	Wire Gauge used	18 AWG

Based on the above values the recommended distance between the devices will be as follows:



Max possible values for A and B are as follows:

Serial No	Component	Max. distance (in ft)
1	A	100
2	B	135

This calculation is assuming the wire resistance mentioned in the tables above. With increased wire resistance the distance will be reduced further.

To compute for different wire resistance, use the below formulae

$$New\ Distance = (Old\ distance\ (A\ or\ B) * New\ resistance) \div 21$$

What happens when the distance exceeds the recommendation?

- Contactors and power source do not get adequate voltage to startup. This leads to ‘chattering’ of the contactor, which is a high frequency ON/OFF of contactors. This leads to damage to the contactor if this state prolongs for a long time.
- The system experiences the inrush current for a longer period, which can lead to potential damage to the IQ System Controller and the cables if this state is allowed to persist for long.

Due to the above-mentioned reasons, it is highly recommended to mount the IQ Load Controller within the distances recommended from the IQ System Controller and backup panel.

## Appendix D: Additional reference BOM configurations

### 40 A Load shedding

Table 10: 40 A load shedding BOM

Item	Description	Quantity	Purchase Link
Enclosure	Gratry 15.7” *11.8” junction box	1	<a href="#">Gratry Junction Box</a>
Power supply	Fiada (B07RDBS6NK) control transformer	1	<a href="#">Control transformer</a>

Item	Description	Quantity	Purchase Link
Definite purpose contactor	Packard (C240 A) 24 VAC 40 A coil	1	<a href="#">Two pole contactor</a>
Fuse holder	Parts Express(3AGAGC) Screw Terminal Fuse holder	1	<a href="#">Fuse holder</a>
Fuse	Bussman (BP/AGC-1-RP) 1 A 250 V	As required	<a href="#">Fuse</a>
Wiring	Glass fuse		<a href="#">Standard copper wire</a>



**Reference BOM for two 40 A load/PV control**

Table 11: 40 A load shedding BOM 2

Item	Description	Part number	Manufacturer	Quantity
Box	WH-22 Hinged Nema Outdoor Enclosure(13.74 x 9.82 x 5.88 in)	WH-22	Polycase	1
Box internal mounting plate	WH-22K Panel for WH-22 Enclosures(12.51"x 8.58"x 0.06")	WH-22K-01	Polycase	1
Contactor	2-pole NO 40 A contactor (24 VAC coil)	C25BNB240T	Eaton	2

Item	Description	Part number	Manufacturer	Quantity
Control transformer	Edwards Signaling 599 120V/24V 40 W Transformer	599	Edwards	1
Fuse	312/318 Series Lead-Free 3AG, Fast-Acting Fuse	BP-AGC-1-RP	Littelfuse	3
Fuse holder	Littelfuse Fuse holder	03540801ZXGY	Littelfuse	3
Quick disconnects	AIRIC Female Spade Connector 22-16 Gauge	B06XCWFTJ9	AIRIC	4
Fork connector	Terminal Spade 8-10 Stud 12-10 AWG Yellow	10-116	Gardner Bender	2
Fork connector	#22-#18 AWG (0.8 mm <sup>2</sup> ) Vinyl-Insulated Spade Terminals (4 to 6 Stud)	20-111	Gardner Bender	2
Wing nut	Wingard Twist-On Wire Connector	13-086	Gardner Bender	3
Splicing connector	Wago Nut	221-413	Wago	3
Screws	Screws to hold components in place (Grabber #8 x 9/16 in. 14mm Waferhead Screw)	31ZV	Grabber	10
Feed through header	Pluggable Terminal Blocks 4 Pos 3.81mm pitch Plug 28-16 AWG Screw	1828362	Phoenix	2

### Reference BOM for two circuits, up to 30 A each

Reference BOM that can be used to design two solar or load-shedding circuit of up to 30 A each.

Table 12: Reference BOM for two circuits, up to 30 A each

Item	Description	Quantity
Control transformer	Fiada B07RDBS6NK	1
Fuse retainer	2x Eaton BP/HMK-RP fuse holder	2
Fuse	2x Eaton BP-AGC-1-RP 250 V glass fuse	2
Contactors	2 X Square D 8910DP32V14 30A	2
Box	Gratry Junction Box, Hinged Cover Stainless Steel Clip, IP67 Waterproof Plastic Enclosure for Electrical Project Includes Mounting Plate and Wall Bracket (11.4"x7.5"x5.5")	1
Quick disconnects/Fast on Terminals/Receptacle lug (required for contactors without screw-on terminals)	PIDG, Quick Disconnects, Receptacle, 22 - 18AWG Wire Size TE Internal #: 640911-1	As required

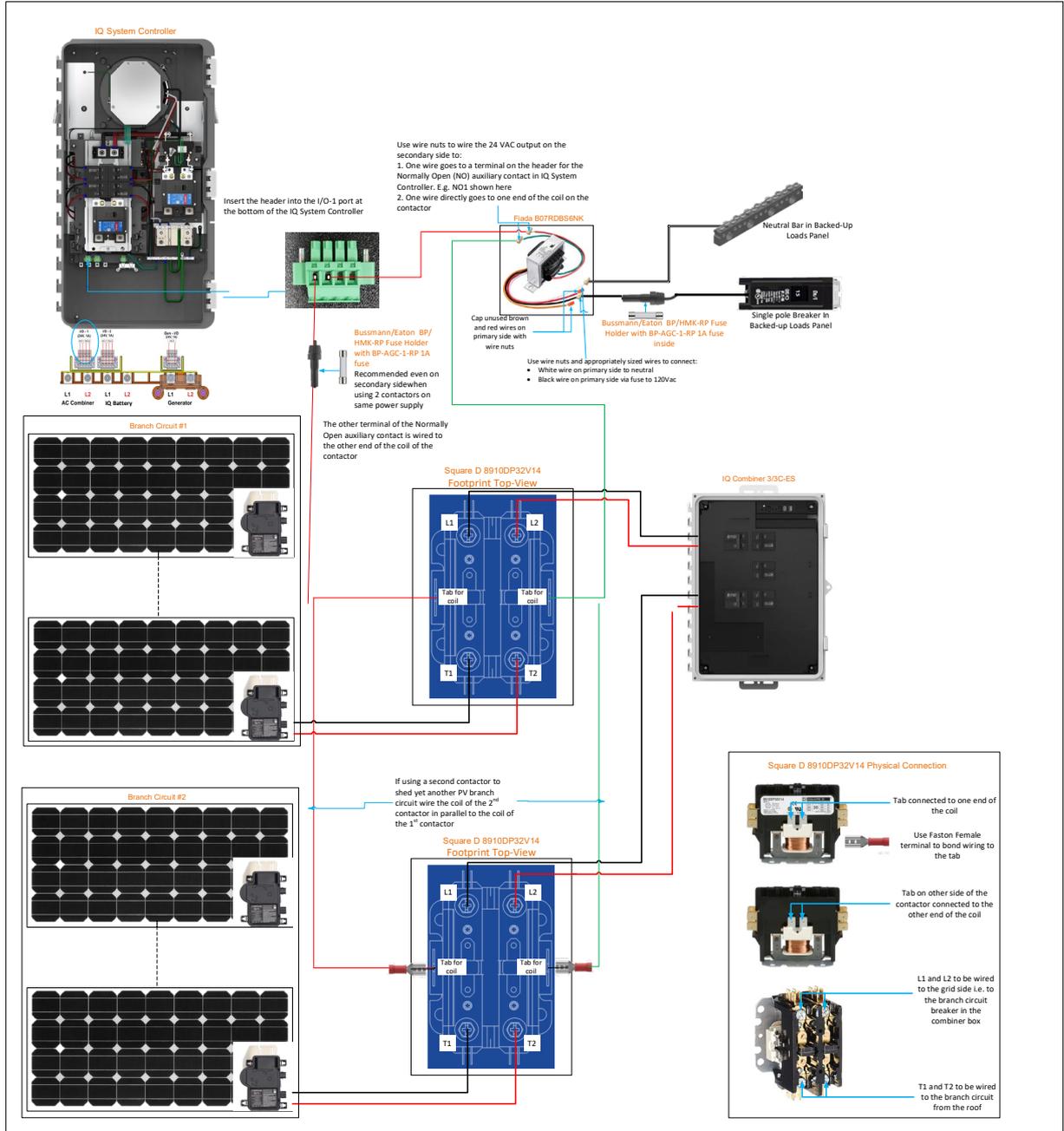


Figure 12: Example wiring two solar circuits using 30 A contactors for excess solar shedding

## Reference BOM for 20 A load or PV shedding circuit using a 20 A contactor

Table 13: Reference BOM for 20 A load or PV shedding circuit using a 20 A contactor

Item	Description	Quantity
Control transformer	EP40310F 24V 40VA	1
Fuse retainer	Bussmann BP/HMK-RP fuse holder	1
Fuse	NTC 74-6SG1A-C 1 A 250 V glass fuse	1
Contactor	Eaton C25BNB220T 20 A	1
Box	Gratory Junction Box, Hinged Cover Stainless Steel Clip IP67 Waterproof Plastic Enclosure for Electrical Project Includes Mounting Plate and Wall Bracket 290×190×140mm (11.4"×7.5"×5.5")	1
Quick disconnects/Fast on terminals/Receptacle lug (required for contactors without screw-on terminals)	PIDG, Quick Disconnects, Receptacle, 22 - 18 AWG Wire Size TE Internal #: 640911-1	2

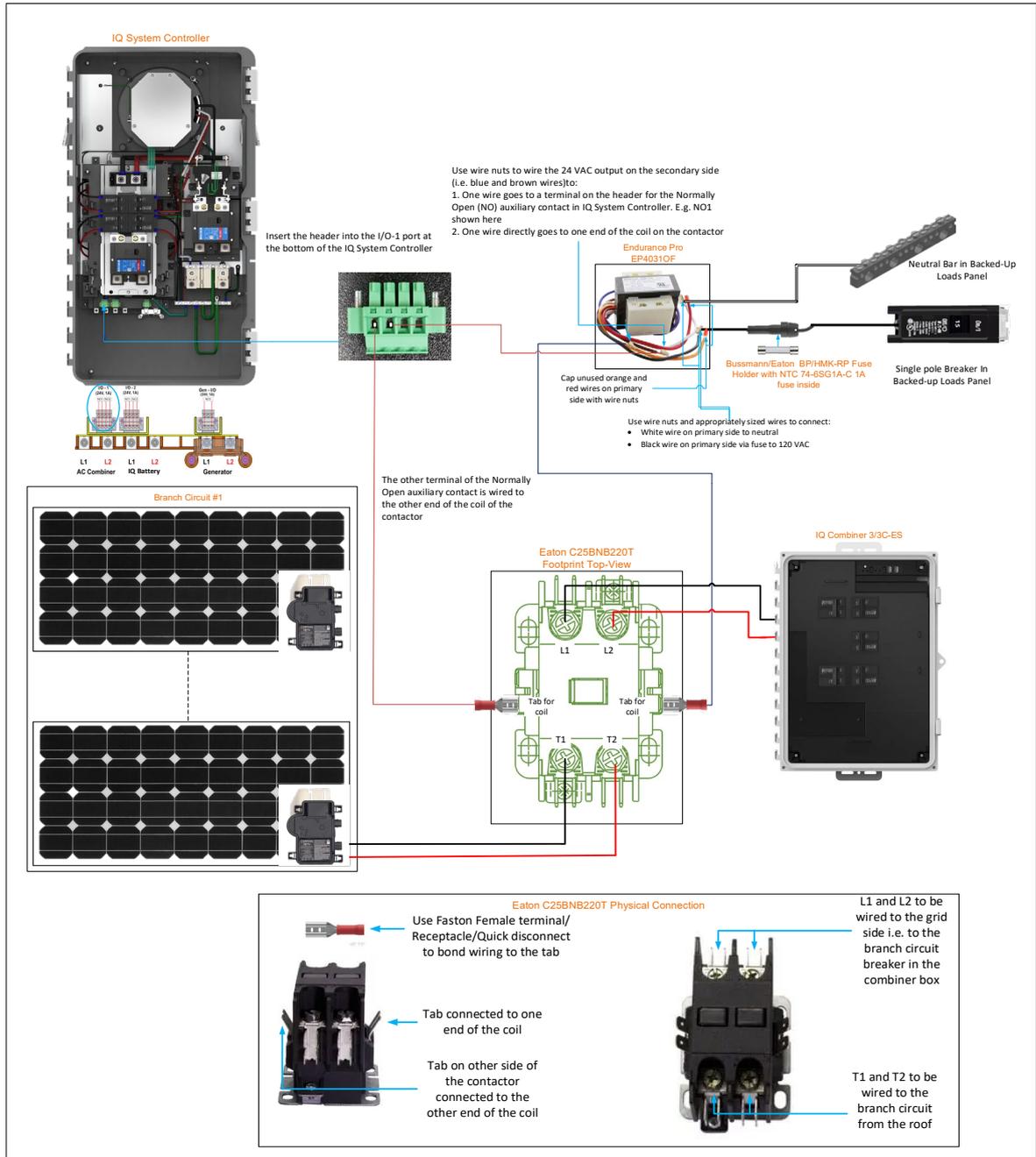


Figure 13: Example Wiring: Excess solar shedding for one branch circuit

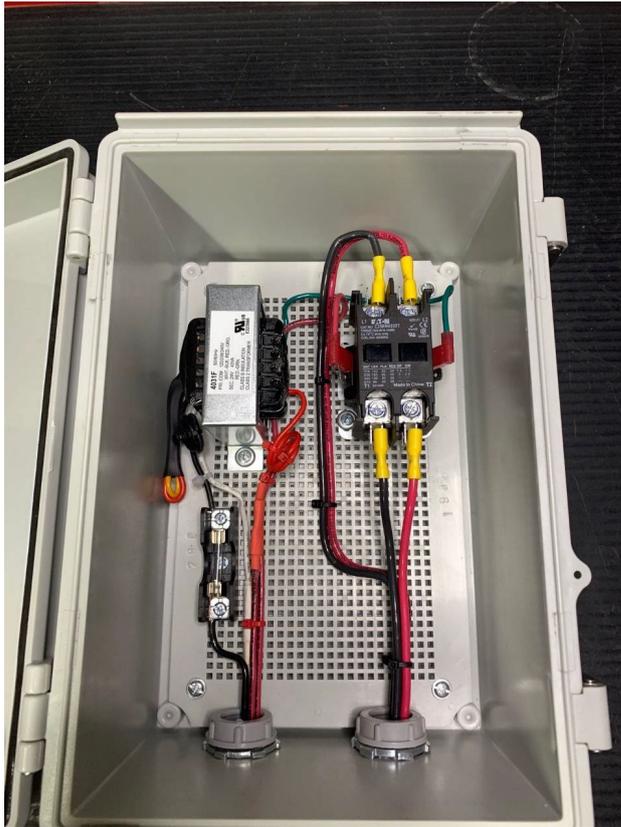


Figure 14: Reference wiring image

## Related documents

Document name	Link
IQ System Controller Quick Install Guide	<a href="#">Link</a>
IQ System Controller 2 Quick Install Guide	<a href="#">Link</a>
IQ Load Controller Quick Install Guide	<a href="#">Link</a>
Generator Integration with the Enphase Energy System technical brief	<a href="#">Link</a>
Enphase Energy System Commissioning using Enphase Installer App 3.X guide	<a href="#">Link</a>

## Revision history

Revision	Date	Description
USG-00002-2.0	April 2023	Editorial updates
USG-00002-1.0	April 2023	Internal release
Previous releases		

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