Megapack 2 XL Operation and Maintenance Manual

Revision 2.1.1

PRODUCT SPECIFICATIONS

All specifications and descriptions contained in this document are verified to be accurate at the time of printing. However, because continuous improvement is a goal at Tesla, we reserve the right to make product or documentation modifications at any time, with or without notice.

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IMPORTANT SAFETY INFORMATION

SAVE THESE INSTRUCTIONS

THIS MANUAL CONTAINS IMPORTANT INFORMATION THAT MUST BE READ, UNDERSTOOD, AND FOLLOWED DURING OPERATION AND MAINTENANCE OF THE MEGAPACK SYSTEM.

SYMBOLS

This manual uses the following symbols to highlight important information:

DANGER: Indicates a hazardous situation which, if not avoided, could result in severe injury or death.

WARNING: Indicates a hazardous situation which, if not avoided, could result in injury.

CAUTION: Indicates a hazardous situation which, if not avoided, could result in minor injury or damage to the equipment.

NOTE: Indicates an important step or tip that leads to best results but is not safety- or damage-related.

PRODUCT WARNINGS

DANGER: Servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing unless you are qualified to do so.

DANGER: Electric shock can occur when touching live components.

DANGER: Risk of electrical shock. Multiple energy sources terminate inside this equipment. Always check with a properly rated voltmeter that there is no voltage on the bus before touching.

DANGER: Control all forms of hazardous energy at the source before servicing Megapack or removing the Megapack AC circuit breaker or bus bar access panels in the Customer Interface Bay.

DANGER: Controlling hazardous energy by isolating Megapack from other sources does not de-energize the battery, and thus a shock hazard may still be present.

DANGER: Hazardous voltage can cause severe injury or death.

DANGER: Megapack, even in a normally discharged condition, is likely to contain substantial electrical charge and can cause injury or death if mishandled.

DANGER: The batteries used in this device may present a risk of fire or chemical burn if mistreated. Do not disassemble, operate above 50°C (122°F), or incinerate.

WARNING: Failure to read, understand and comply with all instructions in this manual may result in injury.

WARNING: Personal Protective Equipment (PPE) is required when working inside Megapack enclosures. Service personnel must wear safety glasses and gloves with a minimum voltage rating of 1500 V DC, Class 0 per ASTM D120 and IEC EN60903 standards.

WARNING: Megapack has no user-serviceable parts. All service must be performed by Tesla authorized parties or Tesla employees. Only trained service personnel are allowed access.

WARNING: Only use this equipment as specified by Tesla. Use of this equipment in a manner not specified by Tesla may result in impaired protection features and injury to personnel.

WARNING: Batteries are not user-serviceable. Only Tesla-approved personnel must remove, replace, or dispose of batteries.

WARNING: For continued protection against risk of fire, use only replacement fuses of the same type and rating as the original fuse. Fuses must only be replaced by trained personnel.

CAUTION: Do not paint any part of Megapack other than external white metal surfaces, using only Tesla-provided touch-up paint. Internal or external components such as exterior cabinets or grilles should not be painted.

CAUTION: Do not use cleaning solvents to clean the Megapack or expose the system to flammable or harsh chemicals or vapors.

CAUTION: Do not use fluids, parts, or accessories other than those specified in Tesla manuals, including use of non-genuine Tesla parts or accessories, or parts or accessories not purchased directly from Tesla or a Tesla-approved party.

CAUTION: Hearing damage could occur if not wearing hearing protection while Megapack is in operation.

Refer to the Tesla *Industrial Lithium-Ion Battery Emergency Response Guide* for detailed hazard information specific to the lithium-ion battery. The guide also provides hazard information for a single Tesla Megapack.

Voltage Classification

This section defines voltage classification as used in this document.

The table below represents Tesla's standard voltage ranges. The defined ranges, comparable to global codes and standards, help categorize potential electrical hazards where applicable.

NOTE: Any voltage referred to in this document is low voltage unless otherwise specified.

CAUTION: In general, voltages above 49 V are potentially hazardous. What is considered hazardous depends on many factors including your local codes and regulations.

Table 1. Voltage Classifications

Classification	Short Form	Alternating Current (AC) Range	Direct Current (DC) Range
Ultra-low voltage	ULV	0-49 V	0-49 V
Low voltage	LV	50-1,000 V	50-2,000 V
Medium voltage	MV	1,001-35,000 V (1 kV-35 kV)	2,001-35,000 V (2 kV-35 kV)
Sub-transmission medium voltage	STMV	35,001-69,000 V (35 kV-69 kV)	35,001-69,000 V (35 kV-69 kV)
High voltage	HV	Above 69,000 V (>69 kV)	Above 69,000 V (>69 kV)

Shutting Down in an Emergency

DANGER: If smoke or fire is visible, do not approach the Megapack and do not open any of its doors.

DANGER: Refer to the *Industrial Lithium-Ion Battery Emergency Response Guide* for details on response to a hazardous event (*Emergency Response Guide on page 26*).

CAUTION: External safety features such as E-Stops and upstream breakers differ by region and design. Always be aware of your site's safety design and external safety features.

To shut down the system in an emergency or for unknown behavior:

1. If an external E-Stop button or remote shutdown contact to Megapack is present, engage it.
2. If Megapack is serviced upstream by an external AC circuit breaker or disconnect, open the breaker or disconnect.
3. Only if safe to do so and if needed, proceed with de-energizing the Megapack (*Performing Lockout/Tagout on page 56*).
4. Contact Tesla (*Contact Information on page 28*) to advise that the system has been shut down.

Reference Documents

Visit the Tesla Partner Portal at *https://partners.tesla.com/* to find reference material referred to within this guide and other relevant content, including:

- Application Note: Megapack Capacity Augmentation – *https://partners.tesla.com/home/en-us/content/download/megapack_capacity_augmentation_appnote.pdf*
- Application Note: On-Site Maintenance infrastructure Requirements – *https://partners.tesla.com/home/en-us/content/download/on-site_maintenance_infrastructure_requirements_appnote.pdf*
- Application Note: Megapack Site Design Best Practices – *https://partners.tesla.com/home/en-us/content/download/megapack_site_design_application_note.pdf*
- Controls and Communications Manual – *https://partners.tesla.com/home/en-US/content/download/Controls_and_Communications_Manual.pdf*
- Emergency Response Site Information Form – *https://partners.tesla.com/home/en-US/content/download/Emergency_Response_Site_Information_Form.docx*
- Industrial Lithium-Ion Battery Emergency Response Guide – *https://www.tesla.com/firstresponders*
- Megapack 2 XL Design and Installation Manual – *https://partners.tesla.com/home/en-US/content/download/Megapack_2_XL_Design_and_Installation_Manual.pdf*
- Megapack 2 XL Safety Overview – *https://partners.tesla.com/home/en-us/content/download/megapack_2_xl_safety_overview.pdf*
- Megapack 2 XL Transportation and Storage Guidelines – *https://partners.tesla.com/home/en-US/content/download/Megapack_2_XL_Transportation_and_Storage_Guidelines.pdf*
- Microgrid Controller Owner's Manual – *https://partners.tesla.com/home/en-US/content/download/MicrogridController_Manual_Owners.pdf*
- Application Note: Powerhub for Megapack and Powerpack – *https://partners.tesla.com/home/en-US/content/download/Powerhub_for_Megapack_Powerpack_Appnote.pdf*
- Tesla Energy Operations Contact List and Response Times – *https://partners.tesla.com/home/en-US/content/download/Tesla_Energy_Operations_Contact_List_and_Response_Times.pdf*
- Tesla Industrial Energy Controls and Communications Manual – *https://partners.tesla.com/home/en-us/content/download/tesla_industrial_energy_controls_and_communications_manual.pdf*
- Tesla Industrial Energy Approved Vendor List – *https://partners.tesla.com/home/en-us/content/download/tesla_industrialenergy_approved_vendor_list.pdf*
- Application Note: Considerations for Hazardous Materials Business Plans (HMBP) – *https://partners.tesla.com/home/en-US/content/download/Considerations_for_Hazardous_Materials_Business_Plans_AppNote.pdf*
- Application Note: Medium-Voltage Transformer Relay Program – *https://partners.tesla.com/home/en-us/content/download/medium-voltage_transformer_relay_program_appnote.pdf*

1 Introduction

1.1 About this Publication

Tesla Megapack 2 XL (Megapack) is a modular, fully integrated, AC-coupled battery energy storage system (BESS). This publication is targeted for operators of large sites in which the Megapack System is in an operational state. It provides guidance for the safe and productive lifetime operation and maintenance of the Megapack System, which is defined as one or more Megapack 2 XL units and the Tesla System Controller.

An operator is the person responsible for the day-to-day operations of the Megapack site, which consists of the Megapack System plus additional equipment required by the site and supplied by the customer. The operator includes owner-operators, control room operators, performance engineers, maintenance engineers, facility managers, site managers, and non-Tesla field staff.

In addition to the work that you perform to operate the site, which typically includes the maintenance of the site and balance of plant, a Service Provider also performs work that includes various activities to ensure Megapack performance over the system's life.

A Service Provider is defined as one of the following:

- Tesla Energy Service
- Certified Service Provider:
    - System owner certified by Tesla
    - Third party certified by Tesla

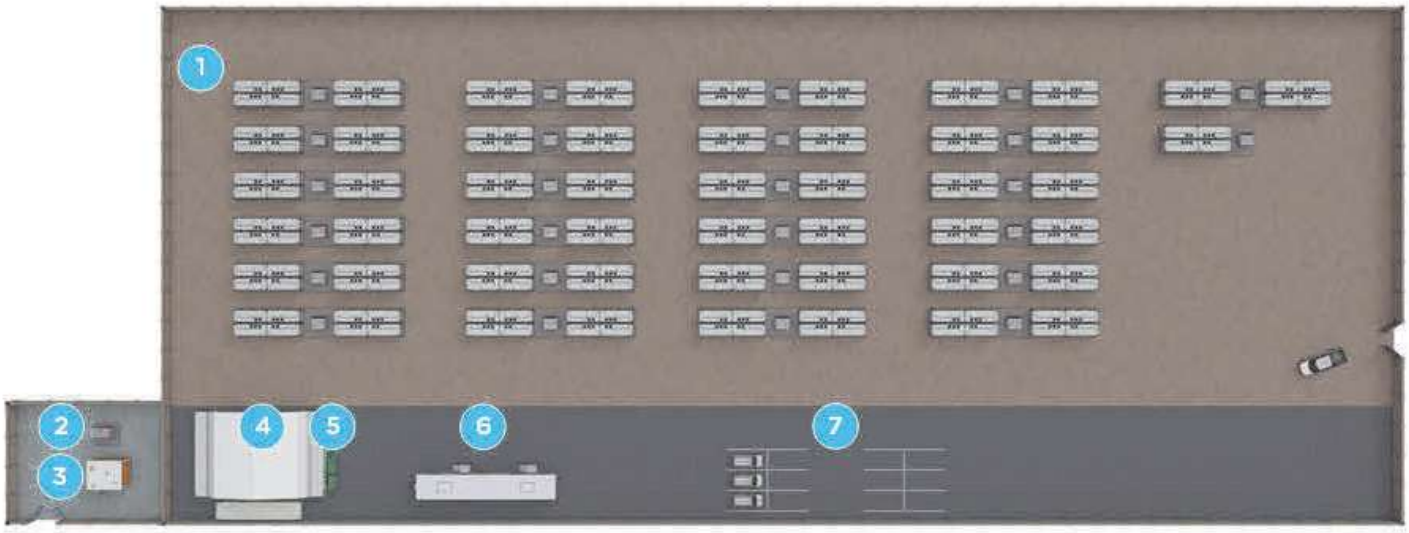
Service activities can include:

- Corrective maintenance as part of the Manufacturer's Limited Warranty and your contracts
- Preventative maintenance as part of your contracts
- Supporting system augmentation or capacity maintenance, if applicable

The Service Provider performs the required preventative maintenance services, or “services,” to ensure Megapack System performance. The operator typically performs the required maintenance for the "balance of plant" and of the site. Refer to your contracts for details regarding your maintenance responsibilities.

The following figure shows an example site layout for a large utility with a typical supporting maintenance infrastructure for a Megapack site. Your infrastructure may differ. For more information regarding Megapack maintenance infrastructure requirements, refer to the *Application Note: On-Site Maintenance Infrastructure Requirements*.

Figure 1. Example ~400 MWh Megapack Site with Supporting (Level 4) Infrastructure



1. Megapack area
2. Medium voltage (MV) switchgear
3. Tesla System Controller in control room
4. Storage container and staging area
5. Waste disposal dumpsters
6. Office trailer for Tesla use
7. Parking area

CAUTION: If you are making changes to the site that may affect its design, you must ensure that the site continues to abide by all requirements in the product's *Design and Installation Manual*.

NOTE: For information about typical routes and zones at the site, refer to *Routes and Zones on page 35*.

1.2 Tesla System Components

A Tesla System consists of the following components:

- One or more Megapacks – part number 1848844-XX-Y[1] (*Megapack on page 9*)
- Tesla System Controller: Standard Tesla System Controller – part number 1471208-XX-Y[1], or Large Tesla System Controller – part number 1700130-XX-Y[1] or 1459155-XX-Y[1] (*Tesla System Controller on page 19*)

[1]*Where X is a number between 0 and 9, and Y is a letter.*

Figure 2. Example Megapack Site

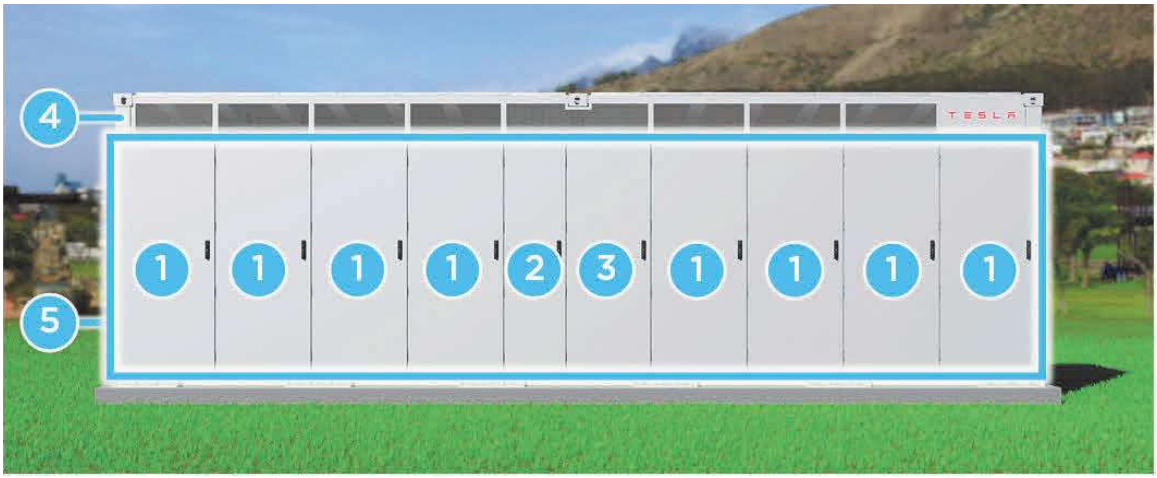
1.3 Megapack

Megapack is a fully integrated battery energy storage unit capable of charging and discharging real power and injecting and absorbing reactive power. Megapack converts power for storage in rechargeable lithium-ion battery modules and is designed to support a range of AC power and energy.

NOTE: Individual Megapack specifications are detailed on the product label (see *Megapack Labels on page 21*).

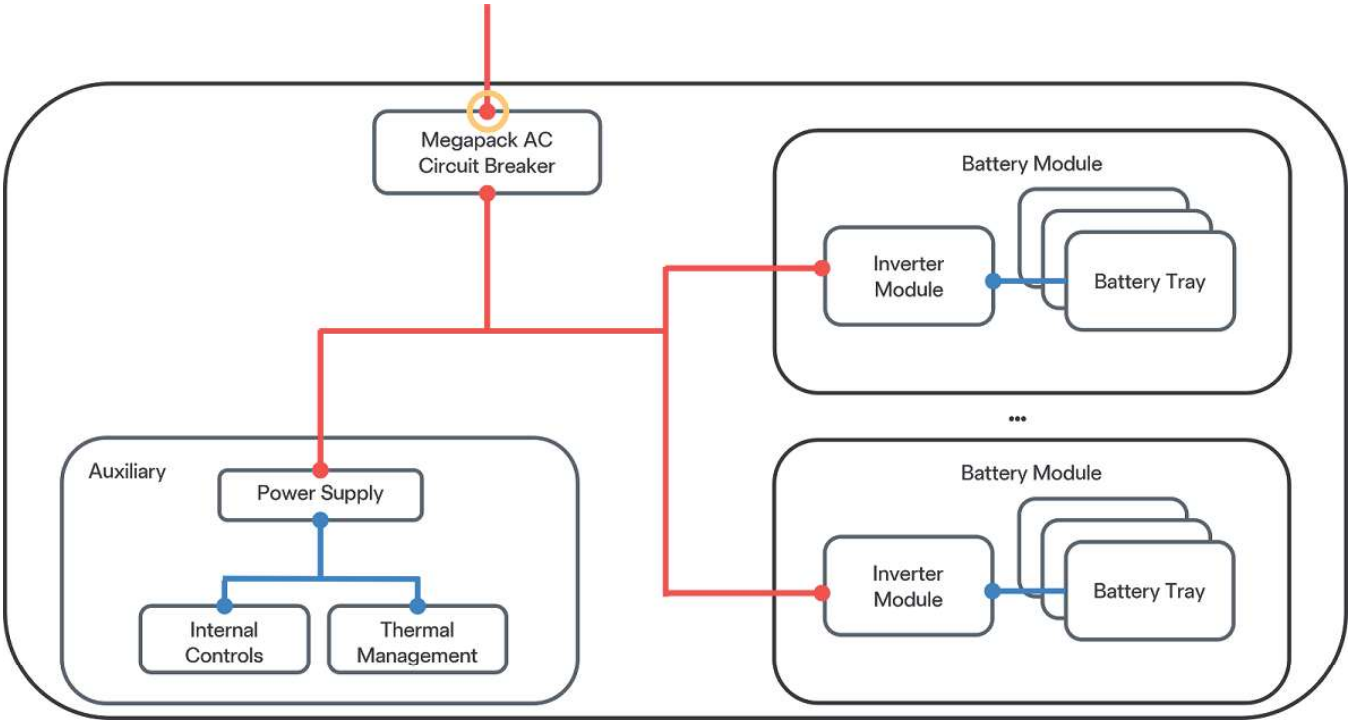
A Megapack unit consists of the following components:

Figure 3. Megapack Overview



1. Battery module bays (*Battery Modules on page 13*)
2. Thermal cabinet (*Thermal System on page 14*)
3. Customer Interface Bay (*Customer Interface Bay on page 14*)
4. Thermal roof (*Thermal System on page 14*)
5. IP66 enclosure (*Enclosure on page 18*)

Figure 4. Megapack Internal Architecture



AC
AC Output Terminals
Internal DC

The AC output terminals are the point on the AC bus bars at which the external AC connections to the Megapack are terminated.

1.3.1 Product Configurations

A Megapack unit is configurable and may vary based on **options** or **variants**. The product (Megapack unit) as built or later reconfigured, complete with its customizations including variants and options, is known as a **configuration**.

1.3.1.1 Megapack Options

An **option** is a product difference that the customer or sales team can select to configure the Megapack unit in a certain way to meet customer or project needs, such as number of battery modules or cell type (*Battery Modules on page 13*). Product options are defined using **option codes**. Not all combinations of option codes are possible, as some option codes are pre-defined by other option codes.

Option codes appear in a list of alphanumerical digits separate from the part number, determined at the time of product configuration during the sales process, and referenced throughout the order-to-delivery process. Finally, they are printed on the Megapack unit's labels (*Megapack Labels on page 21*) for reference throughout the Megapack's operational lifetime.

Option codes are described at a high level below. Refer to the *Megapack 2 XL Option Codes Quick Reference Guide* for detailed calculation and ratings information.

Table 2. Product Options

Option	Option Code	Description
Cell	C###	Cell options can denote different cell characteristics such as specifications or manufacturing location. The following cell options are available: • C010 • C011 • C012
Fan Type	FN##	Fan type options affect the maximum audible noise specification. The following fan type options are available: • FN01 • FN02 • FN03
Number of Battery Modules	EC##	Where ## is a number between 08 and 24, which indicates the number of battery modules. Combine with GT## to derive the Megapack unit's energy capacity (kWh). Combine with GT## and P### to derive the Megapack unit's real power capability (kW).
Inverter Module Configuration	GT##	GT01: 4-Hour inverter module configuration GT02: 2-Hour inverter module configuration Combine with EC## to derive the Megapack unit's energy capacity (kWh).
Apparent Power Configuration	P###	Where ### is a number between 040 - 240, which indicates the Megapack unit's apparent power capability.

Option	Option Code	Description
		Additionally allows for calculation of maximum continuous charge/discharge current (A).
Low-Voltage Augmentation Configuration	CMA#	CMA0: The hardware configuration does not support future low-voltage battery augmentation CMA1: The hardware configuration supports future low-voltage battery augmentation
Grid-Forming Firmware Configuration	VF##	VF00: The configuration does not support grid-forming VF01: The configuration supports grid-forming

Tesla may also configure options (**manufacturing options**) that become part of the product's option codes, such as circuit breaker manufacturing options. Manufacturing options are not customer-configurable.

Table 3. Manufacturing Options

Option	Option Code	Description
Thermal Configuration	TC##	Preconfigured based on heat rejection requirements of the power electronics and battery module count. Option: TC2P — Refrigerant: R-1234yf Option: TC4P — Refrigerant: R-1234yf Option: TC2H — Refrigerant: R-134a Option: TC4H — Refrigerant: R-134a
Internal Bussing Configuration	QB##	Preconfigured based on the inverter module and apparent power configurations. QB01: 1600 A QB02: 3000 A
Megapack AC Circuit Breaker	BB##	Preconfigured based on the inverter module and apparent power configuration. BB01: 1600 A BB02: 3000 A
Shipping Firmware Configuration	SE##	Preconfigured based on delivery location of the Megapack. SE00: Configuration supports transportation over water SE01: Configuration supports transportation over land only
Cellular Configuration	CR##	Preconfigured based on delivery location of the Megapack.

Option	Option Code	Description
		CRNA: North America CRCN: China CRRW: Rest of world

1.3.1.2 Product Variants

A **variant** is a part or product difference that is not optionally configured but is, for example, an incremental product improvement, such as an enclosure variant (*Enclosure on page 18*).

1.3.2 Battery Modules

Battery modules are factory-installed into Megapack battery module bays and contain prismatic lithium-ion battery cells, the smallest non-divisible energy storage components of the Megapack. A battery module in turn is the smallest field-replaceable battery unit. Each Megapack contains up to 24 battery modules.

Battery modules may consist of C010, C011, or C012 cell options.

Figure 5. Battery Module - C010 or C011 Cell Option

Figure 6. Battery Module - C012 Cell Option

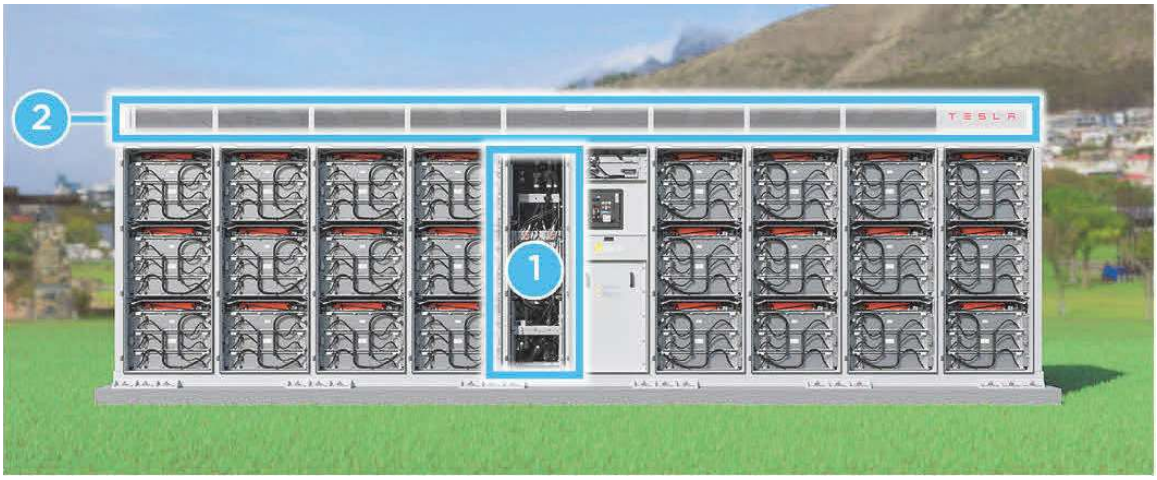
Each battery module includes an integrated inverter module for power conversion. Battery modules are connected in parallel to Megapack's internal AC bus, each with an AC power and communications output connection. The modules do not require any field assembly or adjustments and may only be replaced by Service Providers.

1.3.3 Thermal System

The thermal system provides active cooling and heating to the internal Megapack components. An external HVAC or thermal system is therefore not required for Megapack to operate.

The thermal system is comprised of the thermal cabinet and the thermal roof.

Figure 7. Thermal System



1. Thermal cabinet
2. Thermal roof

WARNING: The thermal management section is locked during operation. Do not open this cabinet while fans are in use, to avoid hazard from moving parts.

NOTE: Megapack includes an enable circuit as a safety feature. Opening the door to the thermal bay shuts down the Megapack. The thermal components located on the roof should not be serviced during operation.

1.3.4 Customer Interface Bay

All of the interface customers require for installation, operation, and maintenance is located in Bay 6, the Customer Interface Bay:

Figure 8. Customer Interface Bay

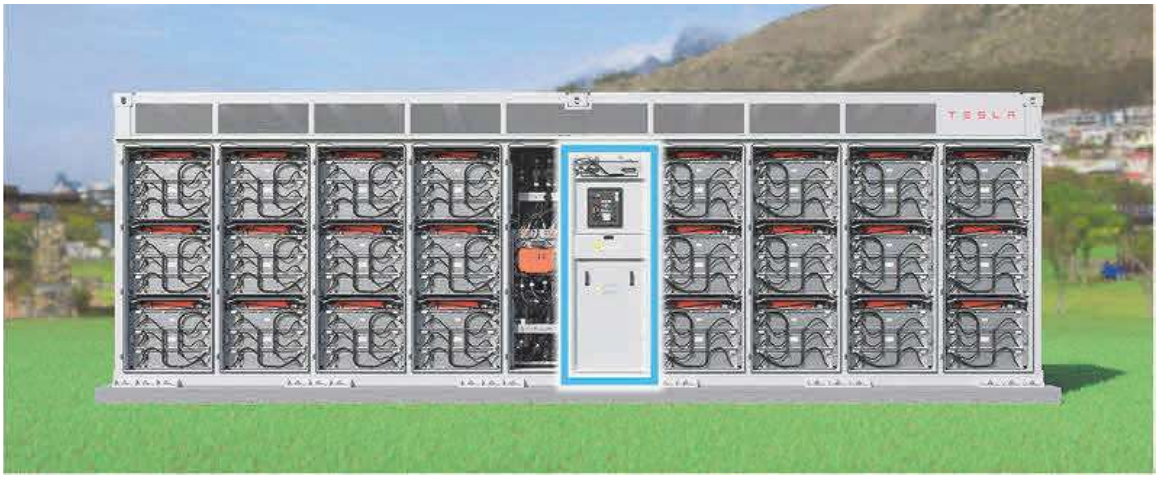


Figure 9. Customer Interface Bay Details

1. Megapack AC circuit breaker - provides distribution system protection
2. Customer I/O area - where all terminations aside from AC bus bars are made
3. AC bus bar area - where terminations to the site distribution transformer or AC distribution panel are made
4. Wireway openings

1.3.5 Megapack AC Circuit Breaker

The Customer Interface Bay contains the Megapack AC circuit breaker, a pre-installed circuit breaker that provides distribution system protection. This breaker is lockable for safe maintenance of the Megapack. Refer to *Safety Disconnect Features on page 31*.

NOTE: Additional protection or switching means at the output of the Megapack may be required depending on the jurisdiction. Protection and switching philosophy must be verified by the customer's engineer of record and should comply with regional and local codes.

Figure 10. Megapack AC Circuit Breaker – UL 489

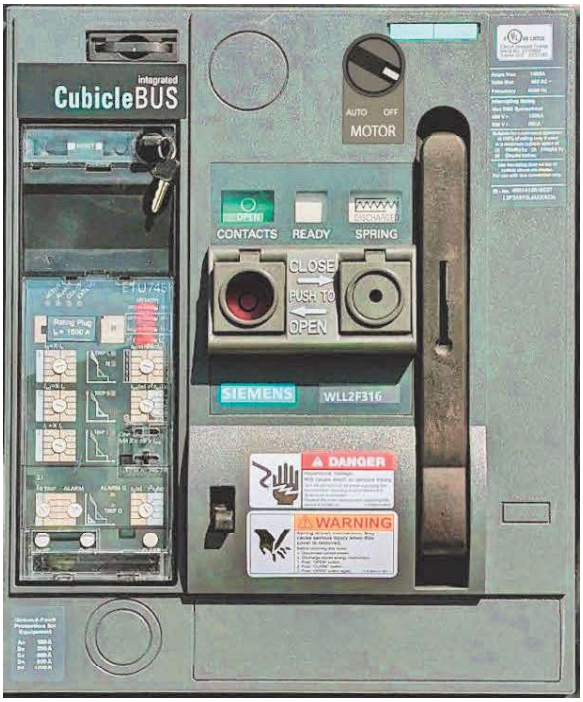


Table 4. Megapack AC Circuit Breaker Specifications – UL 489

Model	UL 489 Siemens WL model with an ETU745 programmable protection unit
Manufacturer Documentation	Siemens Low Voltage WL Circuit Breakers: *https://new.siemens.com/us/en/products/energy/low-voltage/low-voltage-circuit-breakers/wl-power-circuit-breakers.html*→ *UL 489* content
Control Power	A separate power source is not required. While operating normally (above 0% state of energy and not faulted), power is provided by the battery modules. If a separate power source is desired, jumpstart power can also be used.
Button Location	1818 mm (71.6 in) from the base of the Megapack. If the chosen foundation will place these buttons outside of local regulatory height requirements, ensure that another method of compliance is provided (such as raised workstation or remote open/close terminals).
Spring Charge	Megapack comes standard with motor to allow automatic charging of the spring-loaded breaker. The circuit breaker spring may also be manually charged for actuation.
Part Number	• Option code BB02: L2F330WGJAXEACN • Option code BB01: L2F316TGJAXEACN Refer to the unit's label (*Megapack Labels on page 21*) for the option code and the *Megapack 2 XL Option Codes Quick Reference Guide* for more information.

Figure 11. Megapack 2 XL Circuit Breaker – UL 1066

Table 5. Megapack AC Circuit Breaker Specifications – UL 1066

Model	UL 1066 Siemens WA model with an ETU600 programmable protection unit
Manufacturer Documentation	Siemens Low Voltage WA Circuit Breakers: *https://www.siemens.com/us/en/products/energy/low-voltage/low-voltage-circuit-breakers/3wa-power-circuit-breakers.html*→ *UL 1066* content
Control Power	A separate power source is not required. While operating normally (above 0% state of energy and not faulted), power is provided by the battery modules. To view the ETU600 screen, power must be supplied from laptop and/or portable power supply via USB-C port.
Button Location	1818 mm (71.6 in) from the base of the Megapack. If the chosen foundation will place these buttons outside of local regulatory height requirements, ensure that another method of compliance is provided (such as raised workstation or remote open/close terminals).
Spring Charge	Megapack comes standard with motor to allow automatic charging of the spring-loaded breaker. The circuit breaker spring may also be manually charged for actuation.
Part Number	• Option code BB02: 3WA3232-5AF02-2KA5-Z B30+D80+F40+P61+S40 • Option code BB01: 3WA3216-5AF02-2KA5-Z B30+D80+F40+P61+S40 Refer to the unit's label (*Megapack Labels on page 21*) for the option code and the *Megapack 2 XL Option Codes Quick Reference Guide* for more information.

For information about the default AC circuit breaker settings, refer to the *Megapack 2 XL Design and Installation Manual*.

1.3.5.1 Controlling the Circuit Breaker

A circuit breaker is either closed, allowing electricity to flow, or it is open, preventing the flow of electricity. Upon fault detection, the circuit breaker will trip to open state to isolate the Megapack. Megapack will only close the circuit breaker if the system has been deemed safe by Megapack firmware, based on the information provided by its status circuits:

- Enable circuit (*Enable Circuit on page 31*)
- Remote shutdown circuit
- Breaker close circuit

Generally, if all three of these status circuits are closed, the Megapack AC circuit breaker will close. Conversely, if any one of these status circuits are open, the breaker will not close.

A Megapack's circuit breaker can be controlled in three ways:

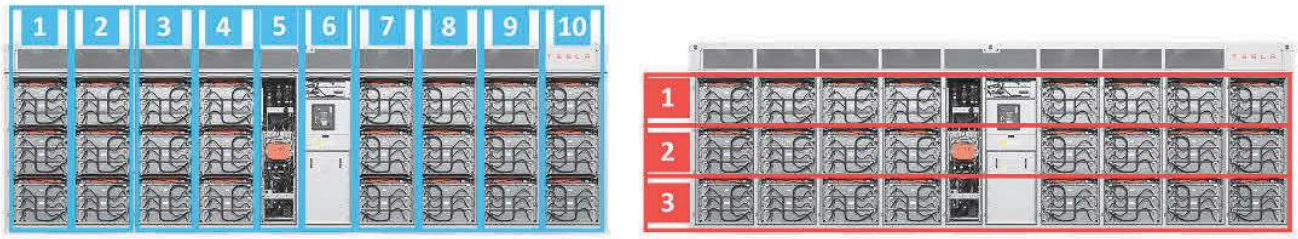
Table 6. Control Method Summary

Control Method	Open Circuit Breaker	Close Circuit Breaker
Manual	Open button	Close button
DNP3	Point = Open Megapack Breaker	Point = Close Megapack Breaker
Remote	Remote shutdown terminals	Breaker close terminals

1.3.6 Megapack Numbering Key

A numbering key can help identify locations of Megapack enclosure components to assist you when referring to them during installation or service. Below are the numbering keys for **bay** (vertical tower) and **shelf** (horizontal row) locations:

Figure 12. Megapack Bay Numbering (Left) and Shelf Numbering (Right)



For example, as depicted in *Megapack Overview on page 10*:

- The thermal bay is in bay 5
- The Customer Interface Bay is bay 6
- Battery modules are located on shelves 1-3 in bays 1-4 and 7-10.

1.3.7 Enclosure

Megapack's enclosure is rated according to IP (ingress protection) code IP66. This means it provides a high level of protection against particle and water ingress for components internal to the enclosure.

This high protection rating must be maintained at all times. In particular, special precautions must be observed while installing or servicing Megapack to prevent particles, water, or debris from entering the enclosure.

Refer to the *Megapack 2 XL Design and Installation Manual* for more information.

There are two enclosure variants:

Table 8. Megapack Enclosure Variants

Variant	Number of Anchor Brackets	Wireway Configuration
-C enclosure	12	Two single-channel trays
-D enclosure	10	Two four-channel trays

Graphics in this publication reflect the -C enclosure variant unless otherwise specified.

Refer to the *Megapack 2 XL Layout* drawings in the *Megapack 2 XL Drawings* package for detailed information.

1.4 Tesla System Controller

The Tesla System Controller is the single point of interface with which to monitor and control the entire Tesla System and approved third-party generation sources as specified in the *Tesla Industrial Energy Approved Vendor List*. It manages control functions of the Tesla System and approved third-party generation sources, aggregating real-time information and using it to optimize commands. The Tesla System Controller communicates over a private TCP network.

By default, Tesla provides two Tesla System Controllers (with the same part number). Refer to the *SCADA Design Manual* for additional details on alternative configurations. Tesla does not include additional networking equipment that may be required for the system to operate.

The Tesla System Controller has three network interfaces:

- LAN 1 RJ45/Ethernet port, which connects to the Customer Network and can be configured for WAN access
- LAN 2 RJ45/Ethernet port, which connects to the Tesla Network
- Integrated cellular modem, which by default provides cellular access for Tesla's remote connection (part numbers 1471208 and 1700130)

Refer to the relevant *Controls and Communications Manual* for complete instructions on how to interface with the Tesla System Controller.

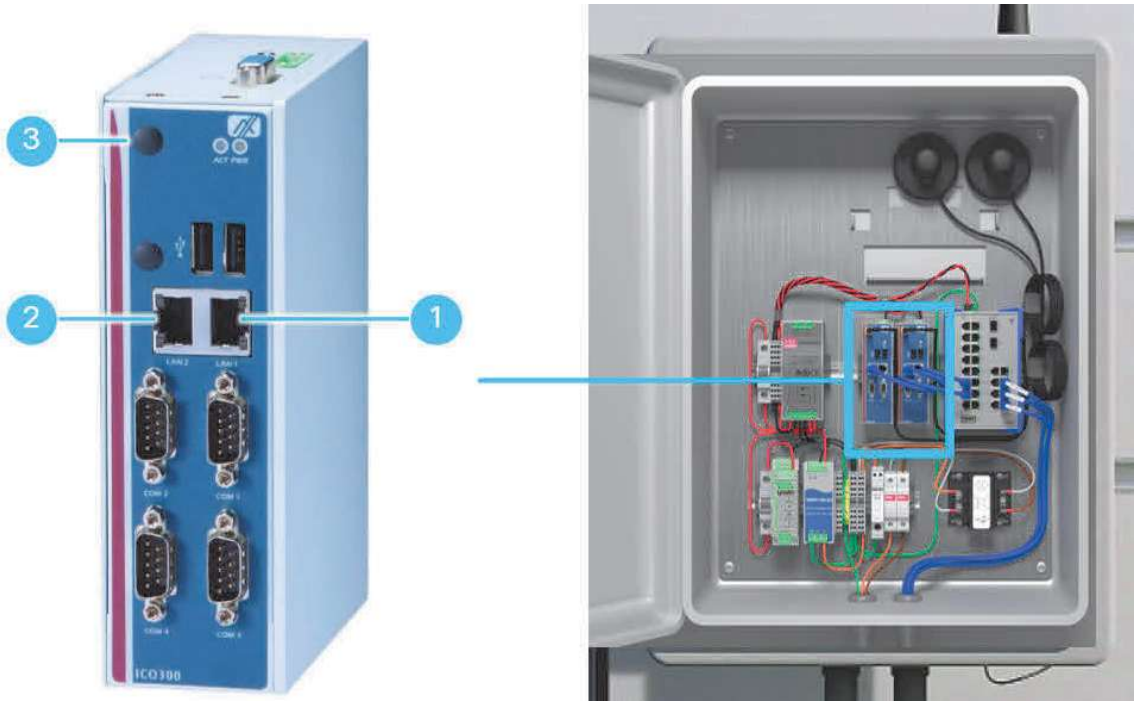
Tesla requires network separation between the Tesla Network and the Customer Network. The Tesla Network shall only contain devices that are critical for Tesla System operation. System operators can interface with the Tesla System Controller over the Customer Network.

There are two physical variations of the Tesla System Controller:

- **Standard Tesla System Controller**: Used in Tesla Systems with up to 16 battery units (not including augmentation units). Delivered in the Standard Tesla System Controller Enclosure, which includes two Standard Tesla System Controllers. Refer to the *Standard Tesla System Controller Enclosure Installation Manual* for installation details.
- **Large Tesla System Controller**: Used in Tesla Systems with greater than 16 and up to 1,000 battery units (not including augmentation units). A single Large Tesla System Controller (or pair of controllers acting in automatic failover) supports up to 1,000 battery units. For projects with more than 1,000 battery units, additional Large Tesla System Controller(s) may be required. Contact your Tesla representative for more information on controller architectures for larger system sizes.

NOTE: If you have contracted a Certified Service Provider to operate and maintain your Tesla System, contact your Tesla representative for requirements.

Figure 13. Two Standard Tesla System Controllers in the Standard Tesla System Controller Enclosure (Part Number 1471208)

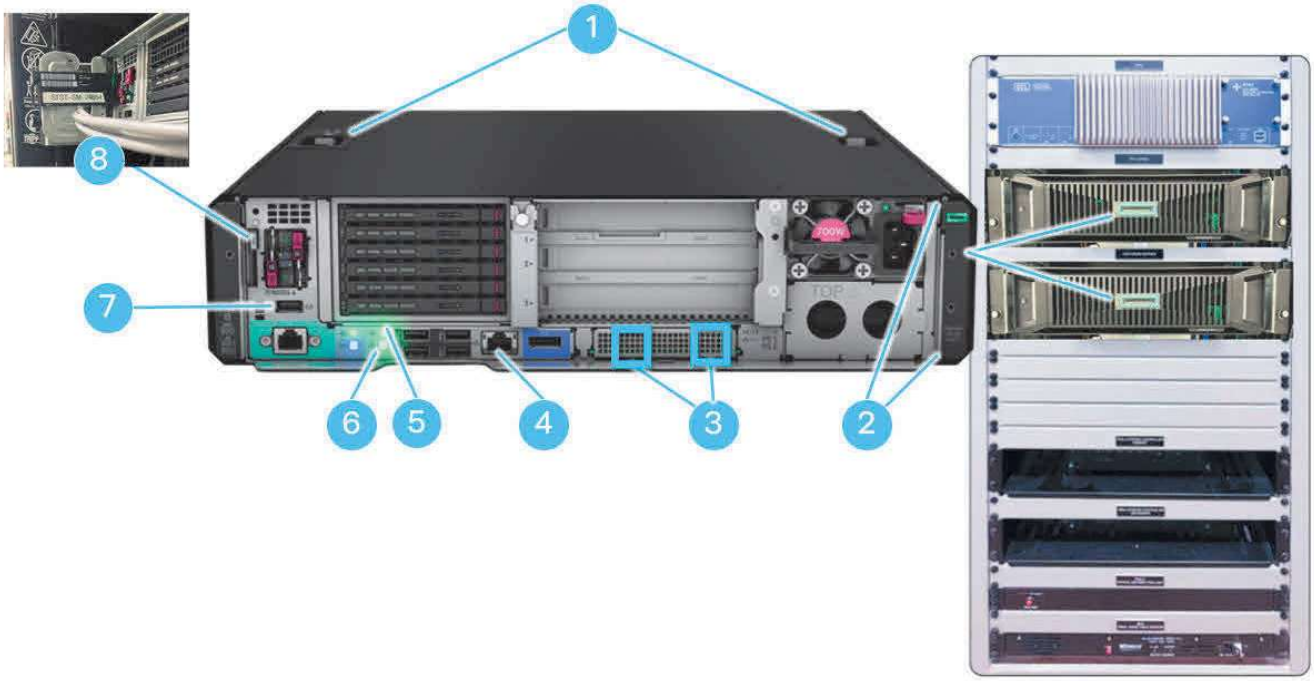


1. LAN 1 port - Customer Network
2. LAN 2 port - Tesla Network
3. Cellular WAN connection

Figure 14. Two Large Tesla System Controllers in a SCADA Network Enclosure (Part Number 1700130)

1. LAN 1 port - Customer Network
2. LAN 2 port - Tesla Network
3. Cellular WAN connection

Figure 15. Two Large Tesla System Controllers in a SCADA Network Enclosure (Part Number 1459155)



1. Quick Removal Access Panel
2. Two Power Supply Slots
3. LAN1 (left) and LAN2 (right) RJ45 ports
4. Remote Management Port
5. Health LED
6. Power On / Standby Button and System Power LED
7. Service Port
8. Information Pull Tab (Serial Number)

1.5 Product Labels

1.5.1 Megapack Labels

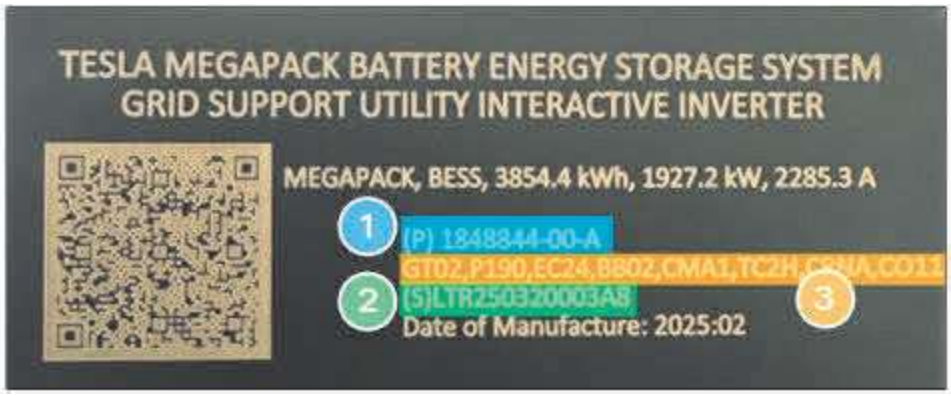
Megapack labels provide the specifications and product reference for each individual Megapack unit.

NOTE: The labels pictured here are example labels. Refer to the labels on the Megapack units themselves for specific product configuration information.

The **Megapack external label** is a small metal label laser-etched onto the outside of the Customer Interface Bay door above the handle. It contains:

- Description of the product, with kWh, kW, and amp ratings
- Part number followed by option codes
- Serial number
- Date of manufacture

Figure 16. Megapack External Label - Example

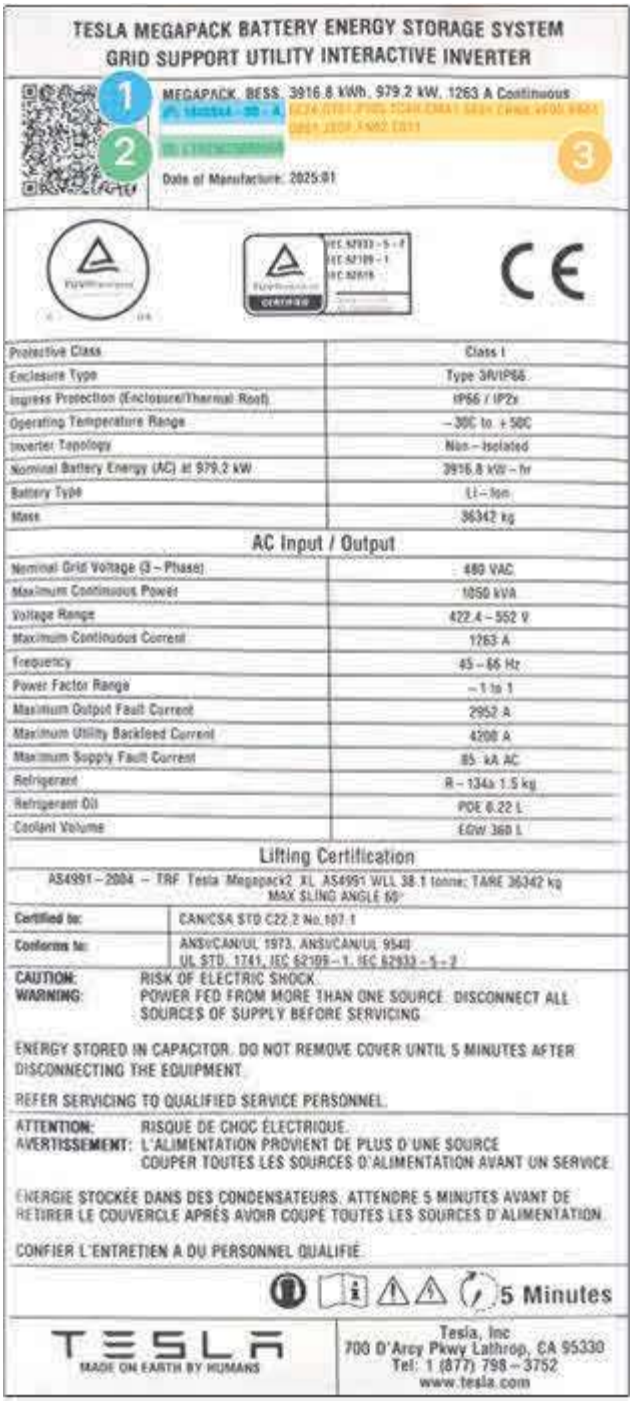


1. Part number
2. Serial number
3. Option codes

The **Megapack nameplate label** is a large sticker affixed to the inside of the Customer Interface Bay door, and contains nameplate information such as:

- AC input/output specifications including relevant power and energy ratings, in kWh, kW, and amps
- Part number followed by complete list of option codes
- Serial number
- Date of manufacture
- Weight (mass)
- Other detailed product specifics and compliance marks

Figure 17. Megapack Nameplate Label - Example



1. Part number
2. Serial number
3. Option codes

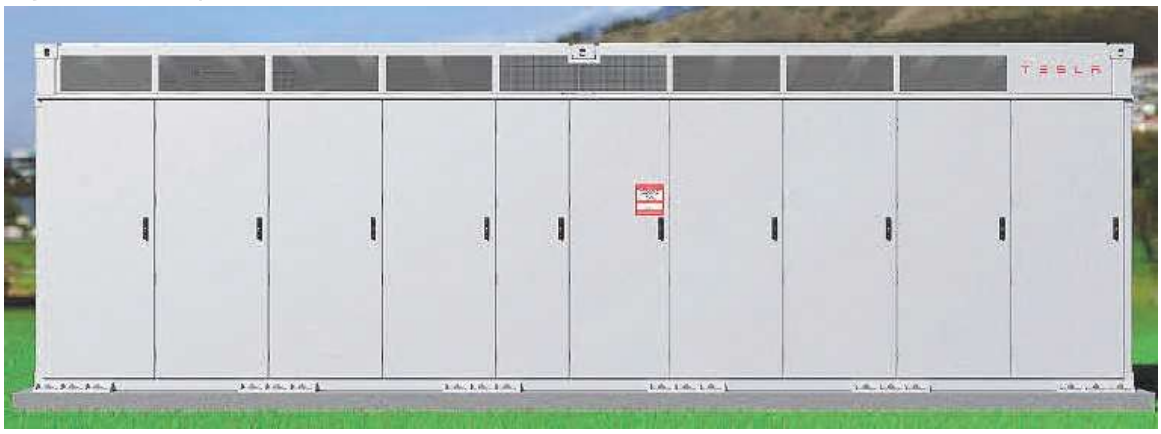
1.5.2 Arc Flash Label

An arc flash label is affixed to the outside of the Customer Interface Bay door for each Megapack. The label designates:

- Working distance
- Expected incident energy

- Recommended PPE
- Nominal voltage

Figure 18. Example Location of Arc Flash Label



NOTE: Arc flash labels are required for Service Providers to perform any work on Megapack. If the label is not present, Tesla will require Megapack and upstream devices to be completely de-energized before any work on Megapack can take place.

1.5.3 Tesla System Controller Labels

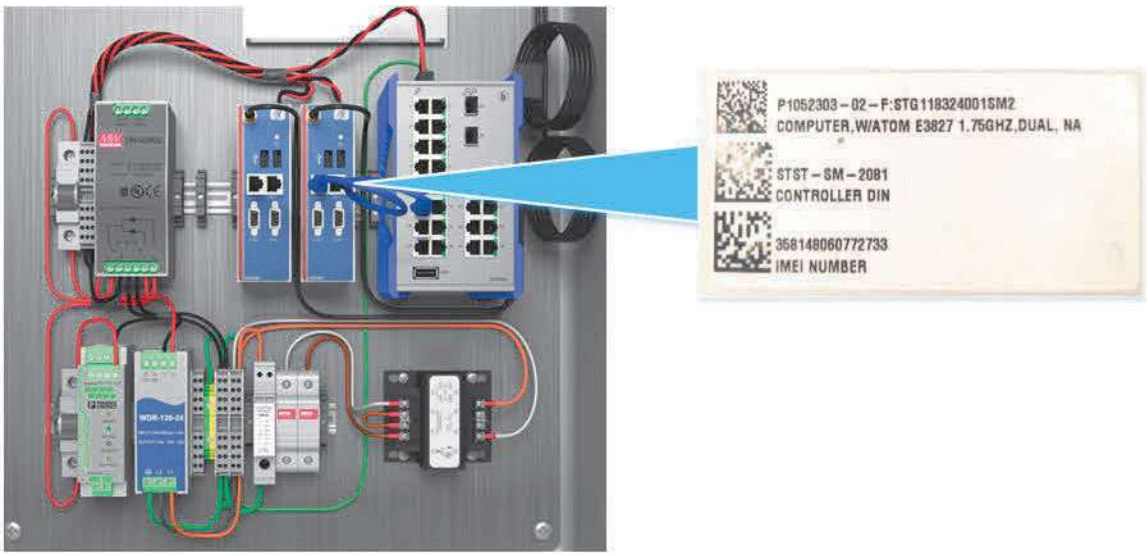
Look on the controller computer of any variant of the Tesla System Controller to locate its labels. The part number is typically identified with P or PN. The VIN is typically labeled *CONTROLLER DIN* and takes the format *STST-SM-####*.

For more information about the Tesla System Controller and its variants, refer to *Tesla System Controller on page 19*.

1.5.3.1 Standard Tesla System Controller

Standard Tesla System Controller labels are located on the side of the computers in the Standard Tesla System Controller Enclosure:

Figure 19. Standard Tesla System Controller Label (Example)



NOTE: There may be two Standard Tesla System Controllers in the Standard Tesla System Controller Enclosure. Each has its own identifiers.

1.5.3.2 Large Tesla System Controller

The labels for the Large Tesla System Controller (part number 1700130) are located on the top and side of the computer:

Figure 20. Large Tesla System Controller (1700130) Label on Top (Example)

Figure 21. Large Tesla System Controller (1700130) Label on Side (Example)

The labels for the Large Tesla System Controller (part number 1459157 or 1459158) are located on the top of the computer and on the information pull tab:

Figure 22. Large Tesla System Controller (1459155) Information Pull Tab Label (Example)

NOTE: Typically, two Large Tesla System Controllers are provided. Each has its own identifiers.

1.6 Emergency Response Guide

The *Industrial Lithium-Ion Battery Emergency Response Guide* (ERG) provides an overview of product materials, handling and use precautions, hazards, emergency response procedures, and storage and transportation instructions. Tesla recommends that a physical copy of the ERG is transported along with Megapack, and subsequently remains on site and accessible at all times for the life of the product. The ERG is periodically updated. Download the latest revision from *https://tesla.com/firstresponders*.

The ERG may be used in place of traditional Safety Data Sheets (SDS) commonly associated with the health and safety of a chemical product, however Safety Data Sheets are available for materials in Tesla Energy products. Refer to the Tesla Partner Portal or contact Tesla for more information.

NOTE: Tesla BESS coolant is not a regulated substance according to the United States Department of Transportation (USDOT). Tesla BESS refrigerant is a regulated substance according to the USDOT.

1.6.1 Available ERG Translations

The *Industrial Lithium-Ion Battery Emergency Response Guide* (ERG) is available in various languages as indicated below. As information in the ERG is periodically updated and translations are periodically added, always check the Tesla First Responders Information page at *https://www.tesla.com/firstresponders* for the latest revision of this guide, for ERGs for other Tesla products, and for the latest additional translated versions.

English	Deutsch	Español	Français
עִבְרִית	Italiano	日本語	한국어
Nederlands	简体中文	繁體中文	Português
Slovenščina			

1.7 Getting Support

For Megapack support or to provide product feedback, contact Tesla via *https://ion.tesla.com/*.

For urgent support, refer to *Contact Information on page 28*.

Have the following information ready when contacting Tesla:

- Site name
- Best point of contact for Tesla to return contact (name, phone number, email)

- Tesla System Controller VIN (*Example VIN format: STST-SM-XXXX*)
- Brief description of the observed issue, including the time, date, and symptoms of the event
- If the issue is specific to one Megapack, the Megapack serial number

1.7.1 Contact Information

In case of critical performance issues (for example, if the Tesla site is 100% non-operational), call the appropriate Tesla telephone number listed below and select **Urgent** for 24/7 support.

For other inquiries, visit the **Online Support and Ticketing Portal** or telephone the support contacts provided below.

Online Support and Ticketing Portal
https://ion.tesla.com/
For information about using the Energy Service Portal, refer to the *Energy Service Portal User Guide*:
https://partners.tesla.com/home/en-us/content/download/tesla_ion_user_guide_en-na.pdf

Urgent Support via Telephone (24x7)
Asia: +1 571 573 9163
Australia/New Zealand: +61 2 432 802 81
Europe/Middle East/Africa: +31 2 08 88 53 32
Japan: +1 571 573 9163
North America: +1 650-681-6060

Technical Support via Telephone		
North America: +1 650-681-6060	Asia/Pacific: +61 2 432 802 81	France: +33 173218702
Japan: +0120 312-441	The Netherlands: +31 208885332	Slovenia: +38 617778699
South Africa: +27 213004878	Switzerland: +41 445155607	United Kingdom: +44 1628450645

1.7.2 Contact Details

Team Member	Email	Phone	Expected Response Time
Project Engineer	Defined on a project-by-project basis. Tesla Project Engineer will provide their contact details.	Defined on a project-by-project basis	< 3 business days

Team Member	Email	Phone	Expected Response Time
Industrial Storage Support	Ticketing Portal: *https://ion.tesla.com/*	See *Contact Information on page 28*	< 5 business days
Sales Account Manager	Defined on a project-by-project basis. Tesla Sales Account Manager will provide their contact details.	Defined on a project-by-project basis	< 3 business days
Service Account Manager	*commercialaccounts@tesla.com*	N/A	< 3 business days
Field Service Coordinator	Defined on an as-needed basis.	Defined on an as-needed basis.	< 5 business days

2 Hazard Mitigation Features

There are hazards inherent in any energy system. In battery energy storage systems, chemical energy in the battery cells can be transmitted as electricity or heat and gases which, when unmitigated, may result in fire.

Hazards are mitigated in multiple ways by the Tesla System, as described in this section.

2.1 Electrical Hazard Mitigation

Electrical hazards can include shock from unexpected voltage, heat from unanticipated escape of stored energy, and environmental hazards such as electrical storms. Megapack's electrical hazard mitigation includes:

- **Battery module overcurrent protection:** The battery modules contain DC single-use fusible links.
- **Inverter DC protection:** Each inverter module is equipped with its own high-speed DC disconnect.
- **Inverter AC protection:** Each inverter module is equipped with its own AC contactor and AC fuses.
- **Ground fault protection:** Megapack is provided with a DC ground fault detection system. Megapack measures insulation resistance prior to operation and looks for ground fault during operation. Megapack also contains an AC circuit breaker with ground-fault trip settings.
- **Protective internal frame**: The enclosure's internal frame can act like a Faraday cage, diverting currents from electrical storms to flow around the internal components but not through them to ground.
- **Power electronics sizing:** The power electronics of the unit provides component sizing and creepage clearance in addition to monitored surge protection on the load side of the Megapack breaker.

2.2 Explosion Hazard Mitigation

The Megapack battery enclosure has an explosion control system that mitigates the potential of the enclosure to fail in the event of a deflagration. This system includes:

- **Sparker System:** A protective feature that uses spark plugs ("Sparkers") to proactively ignite flammable discharge gases from compromised battery cells before the gases accumulate within the enclosure and could lead to an explosion hazard.
- **Overpressure vents:** Vents installed in the ceiling of the battery bay's IP66 enclosure that are designed to open during an overpressure event, such as the rapid ignition of flammable gases by a Sparker. Once opened, the overpressure vents permit gases, products of combustion, and flames to exhaust in a controlled path from the battery bay into the thermal roof. From the thermal roof, this exhaust releases out of the roof vents.

2.3 Fire Hazard Mitigation

If fire occurs as a result of these hazards, the battery enclosure is designed to prevent it from propagating to nearby enclosures or exposures.

2.4 Other Safety Features

In addition to features provided to mitigate hazards, the Tesla System provides additional features that you can use to enhance safety, including:

- *Safety Disconnect Features on page 31*
- **Battery management system:** Megapack provides firmware and software that can be used to monitor the system including battery cell temperature and fault tolerance.

2.5 Safety Disconnect Features

2.5.1 Megapack AC Circuit Breaker

The Customer Interface Bay contains an AC circuit breaker that can be locked in the open position.

WARNING: Operating the Megapack AC circuit breaker does not completely remove potential electrical hazards from the Megapack unit. See *Performing Lockout/Tagout on page 56* for more information.

2.5.2 Enable Circuit

Megapack includes an internal safety circuit called an *enable circuit* (also known as *HVIL - high-voltage interlock loop*) that isolates all major power components whenever the circuit is opened. Certain factors trigger opening this circuit, including opening bay doors or turning the enable switch (*Enable Switch on page 31*) off.

The Megapack internal monitoring system uses the enable circuit to monitor for critical system faults and prevent operation of the Megapack unit if needed. It is not recommended to open a Megapack door during operation.

WARNING: Opening the enable circuit does not completely remove potential electrical hazards from the Megapack unit. See *Performing Lockout/Tagout on page 56* for more information.

Figure 23. Enable Circuit Examples

1. The enable circuit is closed. Megapack is able to operate.
2. The enable circuit is open due to an open bay door. Megapack is unable to operate.
3. The enable circuit is open because the enable switch in the off position. Megapack is unable to operate.

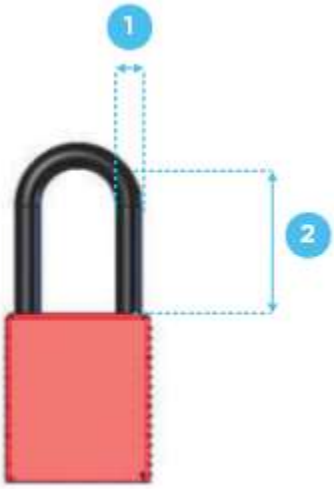
2.5.3 Enable Switch

The customer I/O area in the Customer Interface Bay includes an enable switch that can interrupt the enable circuit and prevent the system from energizing. This switch is part of the enable circuit, and provides a lockable isolation point for procedures that involve actively working inside Megapack. It is the recommended customer interface to the enable circuit. When the switch is turned off, the enable circuit is open and the product will not actively operate.

WARNING: The enable switch must be turned off at any time when working inside Megapack. See *Performing Lockout/Tagout on page 56* for more information.

If applying a lock to the enable switch, the lock must observe the specifications indicated below:

Figure 24. Lock Specifications



1. Nominal shackle diameter: 6.4 mm (¼ in)
2. Minimum shackle clearance: 38.1 mm (1 ½ in)

2.5.4 Remote Shutdown Terminals

The customer I/O area in the Customer Interface Bay contains a pair of terminals used to perform a remote shutdown, which commands the inverter to cease operation (isolating the Megapack AC bus from the battery DC source) and opens the Megapack AC circuit breaker. These terminals may be used by the customer to provision an E-Stop button, for example, which can be activated to place the system in a standby state. Refer to *Controlling the Circuit Breaker on page 18* for more information.

Table 9. Remote Shutdown Trip Times

Component	Time
Inverter shutdown time	35 ms
Breaker clearing time	100 ms
Combined total	**135 ms**

NOTE: Remote shutdown is software-driven functionality that may not comply with emergency stop regulations in all locales. Check with the local codes and AHJ before using this functionality to provision an E-Stop button.

2.5.5 Remote Shutdown in Islanding Applications

Systems used in islanding applications may be configured to provide an additional source of power in the absence of utility power. Therefore, an additional means may be required to prevent the Megapack System from creating a hazardous situation by introducing unexpected power to interconnected equipment during emergency response.

Using the remote shutdown terminals or a locally accessible human machine interface (HMI), an E-Stop button shall prevent the connected Megapack unit from providing an additional source of power to interconnected equipment. Tesla strongly recommends the E-Stop be readily accessible to emergency responders.

NOTE: As a best practice, add any E-Stop information to the *Emergency Response Site Information Form* and use that to inform local fire authorities about this functionality at your site.

2.6 Fire Response

Megapack does not contain built-in smoke, gas, or fire detection or suppression features. Megapack provides hazard mitigation as described in *Hazard Mitigation Features on page 30*.

If fire or smoke is observed emanating from a Megapack at any time, evacuate the area and notify appropriately trained first responders and the local fire department. Consult the *Industrial Lithium-Ion Battery Emergency Response Guide* (*Emergency Response Guide on page 26*) for details around hazards and recommended response. For emergency shutdown procedures, see *Shutting Down in an Emergency on page 5*.

NOTE: As part of a site's fire safety preparations, site owners can use the *Emergency Response Site Information Form* provided by Tesla to coordinate and establish communication with local fire departments.

2.7 Service De-Energization

In order to perform many of the service actions, de-energization of the Megapack is required, including of the line-side bus bars entering the Megapack.

Follow the procedures in *Performing Lockout/Tagout on page 56* to de-energize Megapack.

3 Operations

Operators, as designated by system owners, are responsible for the day-to-day operations of the Megapack site. Responsibilities of operators include:

- Monitoring and operating the site as required
- Providing for site access for Service Providers (*Maintaining Access, Routes, and Zones on page 47*)
- Providing a safe work environment for Service Providers (*Providing a Safe Work Environment on page 54*)
- If requested by a local authority, providing total material quantities as indicated in the *Application Note: Considerations for Hazardous Materials Business Plans (HMBP)*
- Arranging for decommissioning (*Decommissioning and Disposal on page 66*)
- Reviewing and acknowledging the site's *Electrical Control Plan on page 54*

The Tesla System Controller provides the single point of interface through which you control and communicate with the Megapack System. For more information about the Tesla System Controller, refer to the *Controls and Communications Manual - Tesla System Controller*.

For troubleshooting the Megapack System, refer to *Appendix A: Troubleshooting on page 70*.

3.1 Critical Operational Considerations

If the system reaches a 0% state of energy, energy must be restored within 30 days. Tesla recommends maintaining a minimum of 20-30% state of energy. If the system stays at 0% state of energy for more than 30 days, it may result in permanent system damage and loss of warranty. Contact Tesla for more information.

4 Site and Balance-of-Plant Maintenance

Typically, as the operator, you are responsible for the maintenance of the site and the balance of plant, which may include MV transformers, MV switchgear, meters, field network enclosures, cabling connecting these units, thermal imaging cameras, air quality, and site lighting. You are also responsible for the upkeep of the maintenance infrastructure for the Megapack System, described in *On-Site Maintenance Infrastructure Requirements Overview on page 47*.

Refer to your contracts with Tesla to confirm the maintenance obligations between the parties.

Refer to *Application Note: Megapack Site Design Best Practices* for additional information on the site design best practices for operations and maintenance.

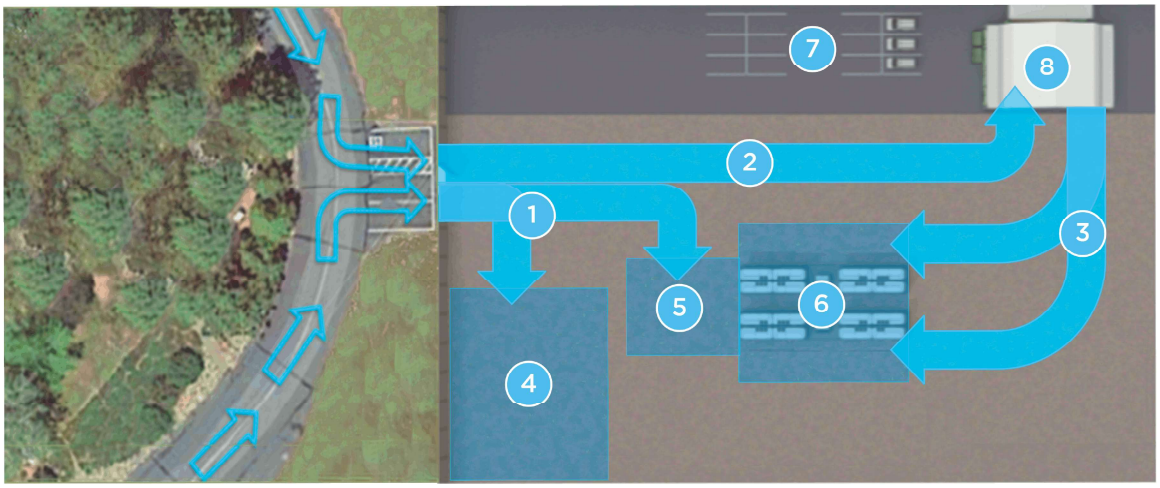
WARNING: Before operating or maintaining Megapack, read and understand all safety information as detailed in *IMPORTANT SAFETY INFORMATION on page 3*.

4.1 Routes and Zones

A site generally consists of routes and zones as indicated below. A **route** is defined as the full path between two or more locations and includes the surface being traveled upon. A **zone** is a defined area of the site that is typically distinguished by function. A zone can be in multiple locations on a site and is dependent on the site layout. Routes and zones are generally allowed to overlap as needed.

NOTE: Route and zone requirements are for non-emergency operations only. Follow local codes and standards as appropriate for emergency vehicle access.

Figure 25. Routes and Zones -- Example



1. Delivery Route
2. Service Access Route
3. Battery Service Route
4. Construction Staging Zone
5. Crane Zone
6. Battery Zone:
    - Foundation Zone
    - Battery Service Zone
7. Parking Zone
8. Service Staging Zone

4.1.1 General Requirements

The site must maintain routes and zones to the requirements described in this section for the life of the project. For vehicle de
refer to *Typical Vehicles on page 42*. Any temporary obstructions to routes or zones, such as snow or storm debris, are the res
clear and may impact service if left unaddressed.

CAUTION: Standing water in any routes or zones may impact serviceability or structural integrity and should be mitigate

NOTE: The requirements for routes and zones generally apply at any site regardless of whether it is a single- or multiple
Tesla representative for more information.

Table 10. General Requirements for All Routes and Zones

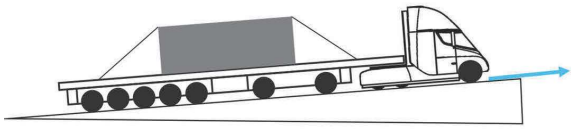
Slope	Vehicle Requirements	Surfac
Battery Service Zone: • Maximum 5% in any direction Foundation Zone: • Refer to the product *Design and Installation Manual* All other routes and zones: • Maximum 5% cross slope • Maximum 10% slope (grade) 	• Support for axle loads for designated vehicle types. • Support for adequate width for designated vehicle travel. • Support for minimum turning radii of designated vehicle types.	Required: • No potholes, ruts • Adequately comp work on and for d operate on (*Grou page 38*). • Engineered with s traction. Recommended: • All-weather surfa upkeep and resur weather events. • A material that ha or regional Depar • Graded or crowne prevent ponding.

Figure 26. Ground Surface Conditions

For additional information, refer to *Ground Surface Maintenance Considerations on page 43*.

4.1.2 Route Requirements

Uses and additional requirements and recommendations specific to each route are described below.

Table 11. Route Uses and Requirements

Route or Zone	Use	Designated Vehicle Types	Requirements and
Delivery Route	Transport between the public right-of-way, the designated project entrance, and the vehicle unloading point (Crane Zone or Construction Staging Zone).	• Megapack delivery vehicle • Crane • Utility vehicle • Telescopic forklift • Fixed-mast forklift • Service delivery vehicle	Required: • Delivery vehicles and cr to all designated Crane Staging Zones for instal Recommended: • Looped route or cul-de- reverse the delivery veh • Ability for delivery vehic alongside the Crane Zor
Service Access Route	Transport between the public right-of-way and the Service Staging Zone.	• Megapack delivery vehicle • Crane • Utility vehicle • Telescopic forklift • Fixed-mast forklift • Service delivery vehicle	No additional requirements.
Battery Service Route	Transport between the Service Staging Zone and each Battery Service Zone.	• Fixed-mast forklift • Utility vehicle	Required: • Designated vehicle type the public right of way t **every** Battery Service Z

4.1.3 Zone Requirements

Descriptions and additional requirements and recommendations specific to each zone are described below.

Table 12. Zone Descriptions and Requirements

Route or Zone	Description	Designated Vehicle Types	Requireme
Construction Staging Zone	Portions of the site set aside for construction activities. Typical uses include material handling and temporary stockpiling, equipment and contractor parking, and occasionally the storage of battery units.	• Megapack delivery vehicle • Crane • Utility vehicle • Telescopic forklift • Fixed-mast forklift	Recommende • Conside construc with the
Crane Zone	Portions of the site that have been allocated for the set up or operation of a crane.	• Crane	Required: • Depend plan, ac load co if delive close pr
Battery Zone – Foundation Zone	The area upon which the battery unit is installed. Figure 27. Megapack Foundation Zone - Side View 	• None	Refer to the pr *Manual*. **CAUTIO** must be more th standin 30 minu down ar be cont
Battery Zone – Battery Service Zone	The area in which service actions take place, as defined in *Clearance - Battery Service Zone on page 46*.	• Utility vehicle	Required:

Route or Zone	Description	Designated Vehicle Types	Requireme
		• Fixed-mast forklift	• Suppor routes, people the eve
Parking Zone	Vehicle parking, required at all stages of the project life, but the quantity and usage of the parking will vary.	• Utility vehicle	Required: • Cannot clearan • Does nc or servi • Parking 2.75 m Recommende • Tempor option f during t project.
Service Staging Zone	Portions of the site set aside for service preparation activities. Typical uses include material handling and temporary stockpiling, and occasionally the storage of supplies. **NOTE:** Details of this zone are provided in the *Application Note: On-Site Maintenance Infrastructure Requirements*.	• Utility vehicle • Telescopic forklift • Fixed-mast forklift • Service delivery vehicle	Required: • Must be delivery forklift forklift the deli

4.1.4 Typical Vehicles

Various vehicles are required to access routes and zones at the site as designed by the engineer of record.

The figure below shows the relative scale of typical vehicles compared to the Megapack:

Figure 28. Typical Vehicle Scale Compared to Megapack (Examples)

Examples of vehicles that may require access during construction, delivery, and for serviceability are listed below.

Table 13. Typical Vehicle Examples and Requirements

Type and Usage	Design Gross Vehicle Weight	Design Axle Weight	Approx. Dimensions	Vehicle (Example) - Not to Scale
Utility vehicle Van or truck. Transports personnel and supplies.	4,545 kg (10,000 lb)	2,723 kg (6,000 lb)	Length: 6.7 m (22 ft) Height: 2.7 m (9 ft) Width: 2.4 m (8 ft)	 
Service delivery vehicle Transports personnel and supplies for service and maintenance activities.	15,000 kg (33,000 lb)	8,165 kg (18,000 lb)	Length: 8 m (26 ft) Height: 4.2 m (13.6 ft) Width: 2.6 m (8.5 ft)	
Fixed-mast forklift Used during certain service activities to move components, most notably the battery module, as well as to unload service delivery vehicles.	6,350 kg (14,000 lb)	3,629 kg (8,000 lb)	Length: 3.8 m (12.4 ft) Height: 2 m (6.8 ft) Width: 1.6 m (5.4 ft)	

Type and Usage	Design Gross Vehicle Weight	Design Axle Weight	Approx. Dimensions	Vehicle (Example) - Not to Scale
				Shown with battery module removal tool for context.
Telescopic forklift Typically used during construction to move various materials or components. Not typically used by Tesla during service.	5,910 kg (13,000 lb)	3,175 kg (7,000 lb)	Length: 5.8 m (19 ft) Height: 6 m (20 ft) Width: 3 m (8 ft)	
Crane Lifts heavy equipment such as Megapack units and other units for system augmentation or other construction activities.	112,000 kg (246,918 lb)	9,072 kg (20,000 lb)	Length: 15.7 m Height: 4 m (13.1 ft) Width: 3 m (9.3 ft)	
Megapack delivery vehicle Brings Megapack units to a Construction Staging Zone or a Crane Zone.	63,200 kg (139,000 lb)	9,072 kg (20,000 lb)	Length: 24.1 m (79 ft) Height: 4.2 m (13.5 ft) Width: 2.6 m (8.5 ft)	

4.1.5 Ground Surface Maintenance Considerations

When designing or maintaining ground cover and ground improvements within the site's routes and zones, consider the *Typical Vehicles on page 42* that will be traveling the site in addition to the following recommendations:

- Structural fill to be compacted to minimum 95% of maximum dry density as determined by a Standard Proctor (ASTM D698) and placed in loose lifts not exceeding 200 mm (8 in) to within 4 % of the optimal moisture content or as specified in the geotechnical report.
- Moisture content and compaction to be within the value determined by in the geotechnical report.
- Recommended compaction testing shall be performed on each lift of the compacted material at a rate of one test for every 460 m^2 (5000 ft^2) within the Foundation Zone and 920 m^2 (10,000 ft^2) elsewhere.
- Test recommendations: ASTM D698, ASTM D1557, California Bearing Ratio (CBR).

NOTE:

- Always consult a geotechnical engineer and have a site-specific geotechnical investigation performed prior to design and construction.
- All recommended guidance does not constitute approval of site-specific geotechnical conditions.

4.2 Maintaining the Perimeter

- When deterring access, maintain fence height as specified in the product's *Design and Installation Manual*.
- Fencing may be locked and posted with a placard stating "Authorized Users Only" or similar. Refer to local code for fencing placard requirements.
- Any fencing must follow clearance requirements as designated in *Maintaining Megapack Clearance on page 44* and *Maintaining Exposures and Fire Clearances on page 46*, or as noted per the following exceptions:
  - If the installation is located within a property that already contains perimeter fencing to prevent unauthorized public access, additional fencing might not be required.
  - Permanent chain link fence without fill or slats can be installed according to the designated clearances.
  - Removable chain link fencing (such as with a swing gate, or similar) without fill or slats may be installed according to the designated clearances. When removed, the fence and its support structure must allow unobstructed equipment maintenance access and clearance for equipment door swing.

4.3 Maintaining Megapack Clearance

The clearances listed in this section are as required by the product. Additional clearances to non-Megapack equipment may be required per local codes and regulations.

Equipment clearances must be maintained throughout the operating life of the system. See the *Equipment Clearance Requirements on page 45* table below for dimensions. Shaded areas indicate the Battery Service Zone.

Figure 29. Equipment Clearance Requirements - Side View

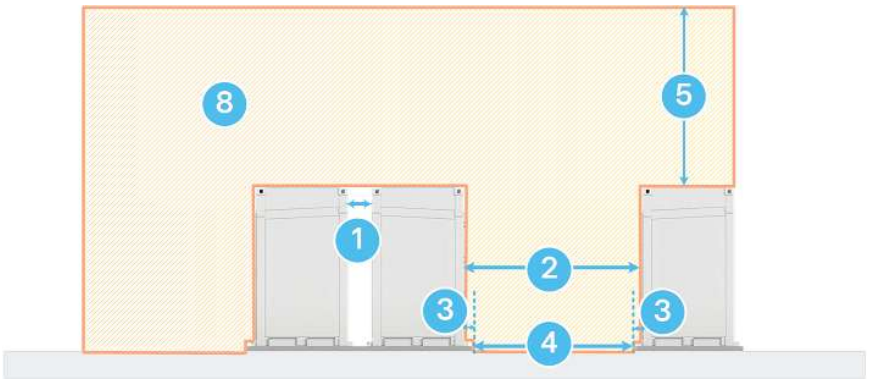


Figure 30. Equipment Clearance Requirements - Front View

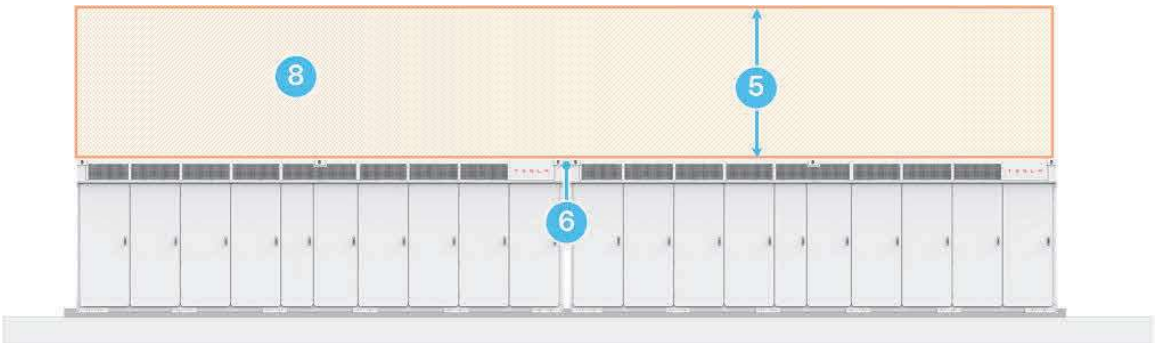
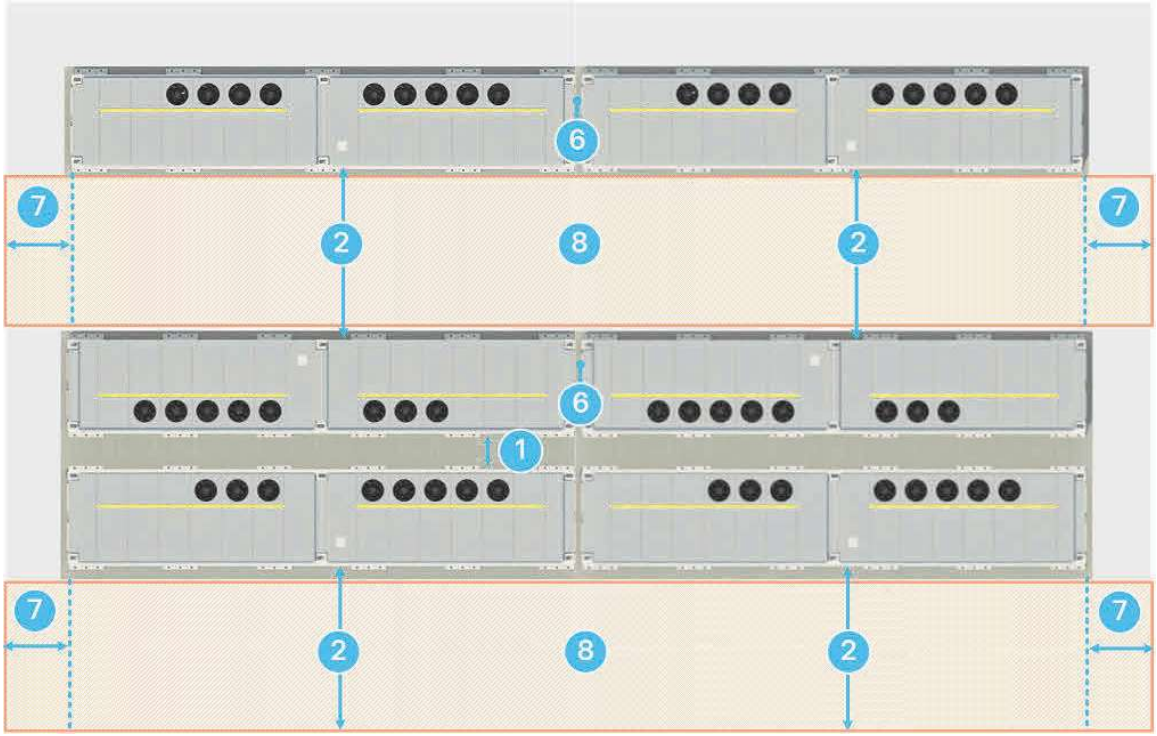


Figure 31. Equipment Clearance Requirements - Plan View



NOTE: All clearances listed must be observed from Megapack to any obstruction, including customer equipment or structures as well as other Tesla-provided components such as the Standard Tesla System Controller Enclosure.

Table 14. Equipment Clearance Requirements

Callout	Type	Minimum	Maximum	Notes
1	Back-to-back clearance	460 mm (18 in) *recommended* for access purposes. 230 mm (9 in) with prior Tesla review.	None	Measured from the back faces of the Megapacks.
2	Front clearance	2440 mm (96 in)	None	Measured from the face of the door(s). Tesla-required clearance for maintenance access. **NOTE:** Removable bollards may be installed within this area with prior Tesla approval. No permanent obstructions are allowed.
3	Foundation overhang	100 mm (4 in)	305 mm (12 in)	Varies depending on anchor and site design but must fall within this range.
4	Drive aisle clearance	1960 mm (77 in)	None	Measured from foundation. Tesla-required clearance for maintenance access.
5	Vertical clearance	2440 mm (96 in)	None	Must extend across the Battery Service Zone, as some service equipment extends beyond the roof of the enclosure.

Callout	Type	Minimum	Maximum	Notes
				Megapack may only be installed by a crane, thus actual clearance during installation will be greater.
6	Side-to-side clearance	150 mm (6 in)	None	Measured from the side faces of each Megapack.
7	Service side clearance	915 mm (36 in)	None	Measured from the face of each side of the Megapack, except where side-by-side with another Megapack.
8	Battery Service Zone	--	--	The Battery Service Zone, shown shaded above, consists of the *Front* **(2)**, *Vertical* **(5)**, and *Service side* **(7)** clearances. **NOTE:** Small inclusions for foundations are allowed as long as the foundation does not infringe on the *Foundation overhang* **(3)** and *Drive aisle* **(4)** clearances.

4.4 Maintaining Exposures and Fire Clearances

The dimensions and requirements as specified below are the product minimums and persist throughout the design, installation, and operating life of the system. Many jurisdictions have guidelines or restrictions about how close potentially combustible objects can be located to battery systems. Designers, owners, and operators are responsible for ensuring that the site meets the requirements of the local jurisdictions.

Figure 32. Exposure Clearances - Isometric View / Side View

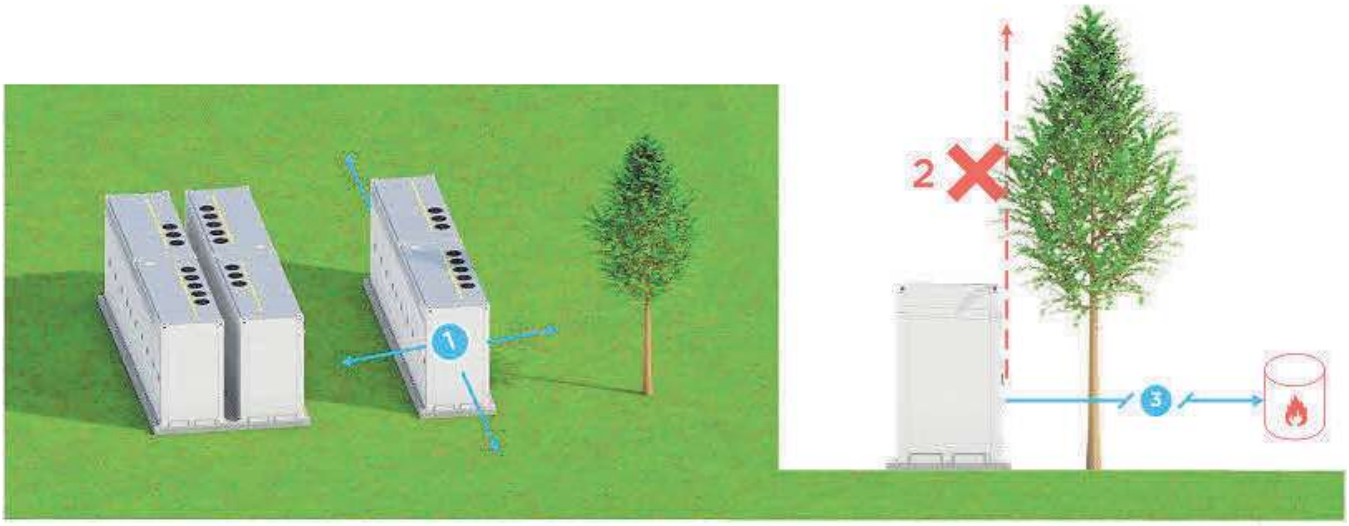


Table 15. Exposure Clearance Requirements

Callout	Type	Minimum	Maximum	Notes
1	Ordinary combustibles	1530 mm (60 in)	None	Minimum clearance as noted is required on all sides to ordinary combustible objects including trees, wooden fences, and other combustible structures.
2	Vertical combustible or ignitable	NA	NA	**Do not install Megapack under combustible or ignitable objects, at any distance.**

Callout	Type	Minimum	Maximum	Notes
3	Ignitable liquids	6096 mm (240 in)	None	Minimum clearance as noted is required on all sides to ignitable liquids sources.

NOTE:

- Megapack is not intended to be installed within 3050 mm (120 in) from accessible means of egress and exposures (such as buildings, public ways, and hazards not associated with electrical grid infrastructure as defined by the clearance requirements in the International Fire Code and NFPA 855).
- Any installation that requires clearances of less than 3050 mm (120 in) to accessible means of egress or exposures may require a freestanding fire barrier per requirements in the International Fire Code and NFPA 855.

4.5 Maintaining Access, Routes, and Zones

To service Megapack, Service Providers will require frequent access to the site and to the Megapacks themselves, over the full duration of the project's life. Routes and zones at the site must allow for year-round access, including for support of all vehicles as designated by the site's engineer of record. Refer to *Routes and Zones on page 35* for more information.

NOTE: For installations not at grade, owners must provide the ability for Service Providers to safely service Megapack and the Tesla System Controller. A written agreement must be approved by Tesla before commissioning for installations not at grade.

4.5.1 Megapack Access

- The Service Provider must be allowed to have the ability to remove any locks preventing access. Refer to *Megapack Door Security on page 62* for information on securing and locking doors while retaining Service Provider access.
- You must keep the doors of all enclosures free of all obstructions such as snow, sand, and blown debris during system operation.
- You must ensure the area in front of each Megapack can support any of the vehicles described in *Typical Vehicles on page 42*.

4.5.2 Lift Plan

The original lift plan used to install Megapack at commissioning must be provided to Service Providers. This provides background information that can be used to plan for Megapack removal or replacement during the operations phase.

4.6 On-Site Maintenance Infrastructure Requirements Overview

On-site maintenance infrastructure (OMI) is essential to the rapid and effective maintenance of Megapack sites. The table below summarizes the aspects of the installed infrastructure for on-site maintenance infrastructure. Most on-site maintenance infrastructure is contained within the Service Staging Zone.

Refer to your contracts for more information.

NOTE: Regional differences may apply. Australia and New Zealand have distinct requirements that must be followed. Contact Tesla for more information.

Table 16. On-Site Maintenance Infrastructure

Level	Applicability	Minimum On-Site Maintenance Infrastructure Requirements	Minimum Critical Services Requirements
1	Projects with 1 or more Megapacks require Level 1 or higher	• Service Staging Zone • Parking Zone	• Portable Restroom • Cellular service • Electricity
2	Projects with 15 or more Megapacks require Level 2 or higher	• One 20-foot storage container • Service Staging Zone • Parking Zone • Storage Clearance Area	• Portable Restroom • Cellular service • Electricity • Waste disposal
3	Projects with 36 or more Megapacks require Level 3 or higher	• One 40-foot storage container • Service Staging Zone • Parking Zone • Storage Clearance Area	• Portable Restroom • Cellular service • Electricity • Waste disposal
4	Projects with 75 or more Megapacks require Level 4 or higher	• Two 40-foot storage containers • Service Staging Zone • Parking Zone • Storage Clearance Area	• Portable Restroom • Cellular service • Electricity • Waste disposal
5	Projects with 146 or more Megapacks require Level 5 or higher	• Three 40-foot storage containers • Service Staging Zone • Parking Zone • Storage Clearance Area	• Portable Restroom • Cellular service • Electricity • Waste disposal
6	Projects with 261 or more Megapacks require Level 6 or higher	• Four 40-foot storage containers • One 60 x 12-foot office trailer • Service Staging Zone • Parking Zone • Storage Clearance Area	• Restroom • Electricity • Internet and cellular service • Waste disposal • Water
7	Projects with 376 or more Megapacks require Level 7	• Five 40-foot storage containers • One 60 x 12-foot office trailer • Service Staging Zone • Parking Zone • Storage Clearance Area	• Restroom • Electricity • Internet and cellular service • Waste disposal • Water
8	Projects with 501 or more Megapacks require Level 8	• Six 40-foot storage containers • One 60 × 24-foot double-wide office trailer	• Restroom • Electricity • Internet and cellular service

Level	Applicability	Minimum On-Site Maintenance Infrastructure Requirements	Minimum Critical Services Requirements
		• Service Staging Zone • Parking Zone • Storage Clearance Area	• Waste disposal • Water
9	Projects with 651 or more Megapacks require Level 9	• Eight 40-foot storage containers • One 60 × 24-foot double-wide office trailer • Service Staging Zone • Parking Zone • Storage Clearance Area	• Restroom • Electricity • Internet and cellular service • Waste disposal • Water
10	Projects with 800 or more Megapacks require Level 10	• Ten 40-foot storage containers • One 60 × 36-foot triple-wide office trailer • Service Staging Zone • Parking Zone • Storage Clearance Area	• Restroom • Electricity • Internet and cellular service • Waste disposal • Water
11	Projects with 1000 or more Megapacks require Level 11	• Contact Tesla for infrastructure requirements	• Contact Tesla for infrastructure requirements

NOTE:

- This table provides general guidance on the minimum requirements for the preliminary development of a site
- Project-specific requirements may vary based on site-specific factors
- The applicable category of maintenance and project-specific requirements are defined in the contract
- Always follow all local codes and regulations

4.7 Environmental Considerations

Each Megapack contains coolant and refrigerant in its thermal system (*Thermal System on page 14*). Depending on the number of Megapacks installed on a site, storage, use and handling of these substances may require reporting, hazard management plans, or containment procedures as required by local codes and regulations. All local codes and regulations related to this matter must be followed. Refer to the *Megapack 2 XL Design and Installation Manual* on the Tesla Partner Portal for more information.

4.8 Energy Meters

The Tesla System Controller uses various meter inputs for different control functions. The meters are expected to be installed during the installation phase of the project and are the operator's responsibility to maintain.

For additional information and for a list of supported meters, refer to the *Megapack 2 XL Design and Installation Manual*.

NOTE: When communication to any of the meters is lost during on-grid normal operation, the system ceases to operate until communication is resumed. If communication is lost, the values reported are the last values read from the meter until communication is resumed.

5 Megapack System Maintenance

The Megapack System requires maintenance to ensure performance over its lifetime. The Service Provider performs this maintenance, which includes Megapack preventative maintenance, Megapack corrective maintenance and Tesla System Controller maintenance.

For Tesla to perform this service, you must provide access to the system and a safe work environment. For accessing the Megapack System, refer to *Maintaining Access, Routes, and Zones on page 47*. For providing a safe work environment, refer to *Providing a Safe Work Environment on page 54*.

It is not recommended that personnel without sufficient training and product knowledge work within Megapack without explicit guidance from Tesla. If individuals other than Service Providers perform maintenance on Megapack or the Tesla System Controller, the project's warranty may be voided.

NOTE: Access is only allowed for Service Providers.

CAUTION: Do not power wash the unit. Only use a low-pressure hose to wash it.

5.1 Tesla System Controller Maintenance

If required, Service Providers will need to be able to safely work at the Tesla System Controller, wherever the Tesla System Controller is installed.

5.2 Megapack Maintenance

5.2.1 Preventative Maintenance

Service Providers will perform specific preventative maintenance activities that are scheduled annually. This section outlines these maintenance schedules. Preventative maintenance includes inspection or part replacements specified explicitly below. All other actions that result from preventative maintenance will not be considered preventative maintenance.

Annual Maintenance

Table 17. Annual Maintenance Activities

Type	Activity
General Walkthrough	• Inspect anchor torque marks • Inspect drain valve • Inspect door locks • Inspect enclosure cleanliness and integrity – touch up paint or clean as needed • Inspect exposure clearances as specified in *Maintaining Exposures and Fire Clearances on page 46* • Inspect grade conditions as specified in the product *Design Manual*
Bay Checks	• Inspect door latches • Inspect door gaskets

Type	Activity
	• Inspect door grounding conductors • Inspect door switch • Harness inspection • Thermal system inspection • Torque checks • Check for moisture
Thermal Roof	• Coolant level check • Inspect cabinet ventilation system • Clean radiators if needed • Remove any debris blocking air inlets
Close Out	• Secure door locks • Secure fascia covers, if applicable • Update service records
--	• Tesla System Controller inspection, service as applicable
--	• Field Network Enclosure inspection, service if applicable

5-Year Maintenance

Table 18. 5-Year Maintenance Activities

Preventative Maintenance Services for the System
Annual maintenance
Sparker inspection, cleaning if needed

10-Year Maintenance

Table 19. 10-Year Maintenance Activities

Preventative Maintenance Services for the System
Annual maintenance
Stirring fan replacement, if needed
BESS coolant refill
BESS radiator fan replacement, if needed
BESS coolant pump replacement, if needed
BESS door gasket replacement, if needed
BESS compressor replacement, if needed
BESS coolant valve replacement, if needed

15-Year Maintenance

Table 20. 15-Year Maintenance Activities

Preventative Maintenance Services for the System
Annual maintenance
BESS radiator replacement, if needed
BESS heater replacement, if needed
BESS coolant pump replacement, if needed

5.2.2 Corrective Maintenance

As part of the Manufacturer's Limited Warranty, Service Providers will perform corrective maintenance on the Megapack System. This includes component replacements, configuration, and troubleshooting.

5.2.3 Maintaining the Enclosure

- Enclosures must be regularly visually inspected for any areas of damage, which shall be reported to a Service Provider.
- Enclosures must be regularly visually inspected to ensure they remain free of debris or rodents.

5.2.3.1 Responding to Imperfections or Damage

Transportation, installation, and operation of the Megapack unit can result in minor or cosmetic imperfections on the unit. Such imperfections are not damaging to the unit and do not usually require remediation. The following table provides guidance to help determine what conditions may be considered minor, what should be considered for remediation, and how to respond.

Table 21. Megapack Imperfection or Damage Classifications

Condition	Classification	Possible Remediation
Imperfections in color or finish, or dirt on the Megapack unit.	Minor imperfection	None required. Customer may wash unit with automotive grade soap or automotive buffing compound for persistent discolorations.
Areas of bare metal less than 25 mm (1 in) diameter in size.	Medium damage	Customer should report to Tesla or remediate using touch up paint.
Leaking coolant, apparent water ingress, structural damage, mechanical failures.	Major damage	Contact Tesla if not already advised (*Contact Information on page 28*). Tesla to investigate on site or return unit.

DANGER: Refer to the *Industrial Lithium-Ion Battery Emergency Response Guide* for details on response to a hazardous event (*Emergency Response Guide on page 26*).

6 Providing a Safe Work Environment

Over the operating life of your Megapack System, you may need to isolate and de-energize the Megapack for various reasons:

- For Tesla to perform service on the Megapack System
- For providers other than Tesla to perform work upstream or around the Megapack
- To put the Megapack in an idle state by de-energizing the equipment due to an upstream fault or other reason

If a Service Provider needs to perform maintenance, you will need to provide both access to the Megapack System and a safe work environment. Providing a safe work environment will typically require the Megapack to be isolated and de-energized.

Depending on the scope of service and the site design, the Megapack will either need to be de-energized at the Megapack AC circuit breaker or at an upstream AC disconnect.

6.1 Maintaining Electrical Protection

Sites may use different kinds of electrical protection equipment as designated by the Engineer of Record, including relays, fuses, and other schemes as described in the *Application Note: Electrical Protection Architecture*. These protections must be maintained and updated according to applicable code for the life of the site in order to preserve safe working conditions for Service Providers.

For more information about safe working conditions, refer to *Isolating Megapack from Upstream AC Sources on page 56*.

DANGER: Operators must not manipulate protection equipment without contacting Tesla first.

6.2 Electrical Control Plan

An Electrical Control Plan is a document that outlines the design, implementation, and operation of an energy site's electrical system, its hazards, and how any parties on site are expected to control the electrical hazards. For Tesla sites, such plans are required to include control of the battery system's electrical hazards (for example, those detailed in *Electrical Hazard Mitigation on page 30*).

Generally, an Electrical Control Plan may include details on how the site's electrical components, such as inverters, transformers, batteries, and protection relays, are properly integrated and function according to requirements. Such details may be communicated in the plan using wiring diagrams and schematics, operational and safety sequences, fault response, and documentation of compliance with regulatory standards.

The Electrical Control Plan is typically developed by the installation contractor and the site owner or operator with the support of the electrical engineer of record. It is then reviewed by the electrical engineer of record and Tesla to ensure that the document is consistent with how the site has been designed and how on-site activities are intended to be conducted. It then serves as an electrical safety plan for the site in order to ensure the safety of any parties on site including customer and Tesla parties.

If the plan is updated at any point during the life of the project, the site owner or operator must review with Tesla.

For Tesla systems, the Electrical Control Plan serves as an electrical safety plan for the site in order to ensure the safety of any parties on site including customer and Tesla parties, and must include the following elements:

- **Levels of isolation:** The approved levels (for example, block, feeder, site) at which isolation can be established, and the identified lockout device for each level

- **Control procedures:** Detailed procedures for isolating power supplies, including automatic switching devices and circuit reclosers, particularly at the medium-voltage transformer (MV transformer) and any interconnect power supplies
- **Responsible parties:** The name of the party responsible for executing each step in each of the procedures
- **Verification of isolation:** Detailed procedures for confirming isolation, such as using open viewing windows or designated testing points
- **Lockout participation:** Description of how Tesla will engage in the owner / operator lockout process, specifically using a group lock box to ensure multiple personnel can secure the system

6.3 AC Disconnect Responsibilities

AC disconnect responsibilities encompass the operation of a disconnect device and the maintenance thereof. Responsibilities may vary depending on the service provider or the scope of work. A Certified Service Provider is responsible based on the specific terms agreed upon with the Operator.

If Tesla is your service provider, the following applies to safely perform maintenance:

Table 22. Division of Service Responsibilities

Disconnect Location	Disconnect Operating Responsibilities	Disconnect Maintenance Responsibilities
Megapack AC circuit breaker	Tesla Energy Service	Tesla Energy Service
Upstream low-voltage disconnect devices	Tesla Energy Service	Operator
All medium-voltage disconnect devices	Operator	Operator

There are some exceptions and regional considerations. Contact your Tesla representative to confirm AC disconnect responsibilities.

Any deviations from standard practice that are not documented in the contracts must be provided in writing to Tesla. For example, if you determine that you want to own all medium-voltage disconnect and breaker operation responsibilities upstream of the Megapack AC breaker, this must be provided in writing.

Service Providers will begin maintenance services when the Megapack(s) that need to be serviced are safely de-energized (*Performing Lockout/Tagout on page 56*).

6.4 Accessing the Megapack Enclosure

Megapack is an IP66-rated enclosure (*Enclosure on page 18*) and affords high protection against particle and water ingress. This section contains critical information about when and how to properly access Megapack in order to both maintain its high protection rating and to provide a safe work environment.

At any time when accessing the enclosure is required, ensure that all information in this section is taken into account.

6.4.1 Critical Door-Opening Considerations

Do NOT open a Megapack's doors in any of the conditions below.

CAUTION: Megapack doors should never be opened when it is actively raining or snowing, with no exceptions, to prevent damage to Megapack.

Do NOT Open Megapack Doors When:		
Actively raining or snowing.	Wind speeds 25 MPH or higher. Wind speed must be monitored.	Airborne dust and debris present on site.

Do NOT Open Megapack Doors When:		
		

CAUTION: When opening a Megapack door, do not force its door handle. Excessive torque could damage the handle. If the handle does not readily rotate, contact Tesla for assistance.

6.4.2 Performing Lockout/Tagout

Operators are responsible for ensuring a safe work environment. When work is required inside Megapack, the unit must first be de-energized the unit by performing the lockout/tagout procedure (LOTO). Before beginning these procedures, refer to *AC Disconnect Responsibilities on page 55* and ensure you are aware of whether operators or Tesla must perform certain steps in this section.

The LOTO procedure for Megapack consists of the tasks below, which must be performed in order:

1. *Isolating Megapack from Upstream AC Sources on page 56*
2. *Opening and Locking the Megapack AC Circuit Breaker on page 57*
3. *Turning the Enable Switch Off on page 60*
4. *Verifying Load-Side De-Energization on page 60*
5. *Verifying Line-Side De-Energization on page 61*

DANGER: Refer to *IMPORTANT SAFETY INFORMATION on page 3* for information on safety warnings and PPE recommendations before beginning any work on Megapack.

NOTE: Only Service Providers shall perform any corrective maintenance within the Megapack.

NOTE: Some equipment isolation can be performed by sending commands using the Tesla System Controller or other SCADA devices. For more information, see the *SCADA Design Manual* or the *Controls and Communications Manual – Tesla System Controller*, or reach out to your Tesla project engineer.

NOTE: When active work is **not** being performed, and AC grid power can be restored to the AC output terminals, Tesla recommends that the enable switch remains **on**.

6.4.2.1 Isolating Megapack from Upstream AC Sources

Megapack may need to be isolated from upstream AC sources, including other Megapacks, before performing work. Isolating Megapack is required if work is being performed in the AC bus bar area or if the arc flash incident energy values exceed the maximum allowed. Isolating from upstream AC sources requires an AC disconnect device capable of supporting lockout/tagout.

To determine arc flash incident energy, check the arc flash label on the outside of the Customer Interface Bay door (*Arc Flash Label on page 23*). The arc flash label contains information about expected arc flash incident energy and recommended PPE.

Figure 33. Arc Flash Label -- Danger and Warning Examples

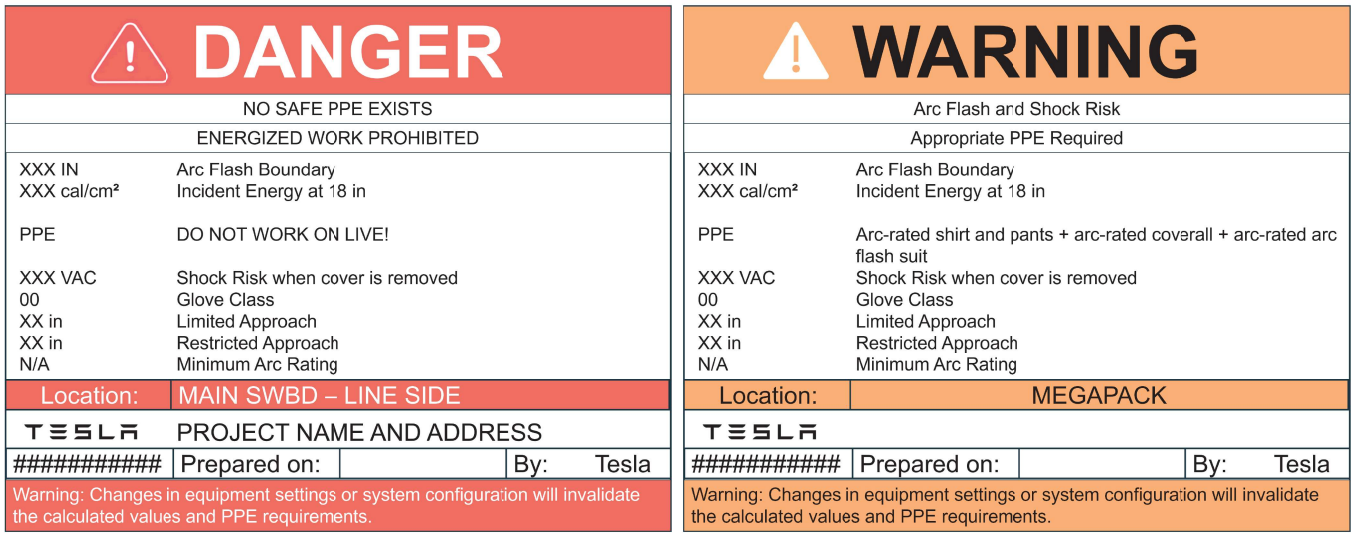


Table 24. Maximum Allowable Arc Flash Incident Energy

All Regions
14 cal/cm^2

If the label specifies either that no safe PPE exists or the arc flash incident energy exceeds the maximum allowed per the table above, you must first ensure that external AC power is removed from the Megapack by opening the upstream AC disconnect before continuing the LOTO procedure.

Customers must employ a protection scheme that does not exceed maximum allowable energy. For recommended protection schemes, refer to the *Application Note: Electrical Protection Architecture*. Customers must adhere to Telsa-required administrative controls when using relays as the protection scheme. For more information, refer to the *Application Note: Medium-Voltage Transformer Relay Program*.

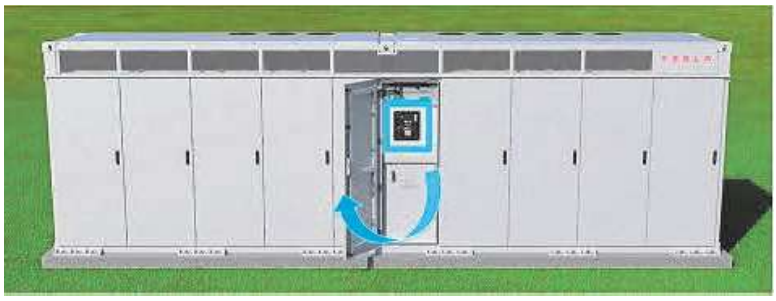
If the label specifies that the arc flash incident energy falls below the maximum allowed, opening an upstream AC disconnect is not required unless work is being performed in the AC bus bar area or if it is required by a Service Provider. Follow the recommended PPE and other details on the label and then continue the LOTO procedure.

DANGER: If no arc flash label exists and Megapack has already been commissioned and is operating, all upstream devices must be completely de-energized before work can take place. Contact your site owner or Tesla about the arc flash label requirement.

6.4.2.2 Opening and Locking the Megapack AC Circuit Breaker

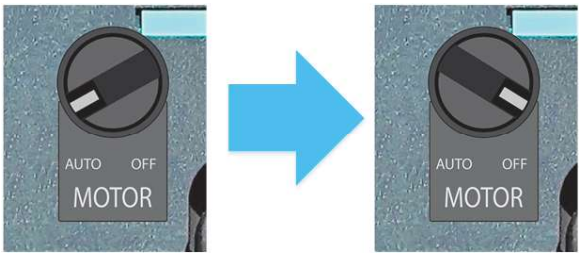
Perform this procedure only after *Isolating Megapack from Upstream AC Sources on page 56*.

1. Assess the steps in *Critical Door-Opening Considerations on page 55* and proceed if conditions allow.
2. Open the Customer Interface Bay door to access the Megapack AC circuit breaker:

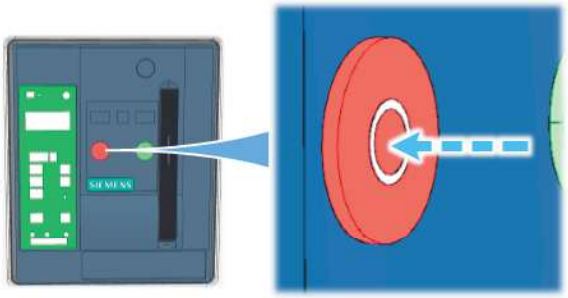


1 - Lock ring. 2 - Motor switch (some models). 3 - Contacts window. 4 - Open button. 5 - Spring-loaded lever.

3. If present, turn the motor switch from **auto** to **off**:

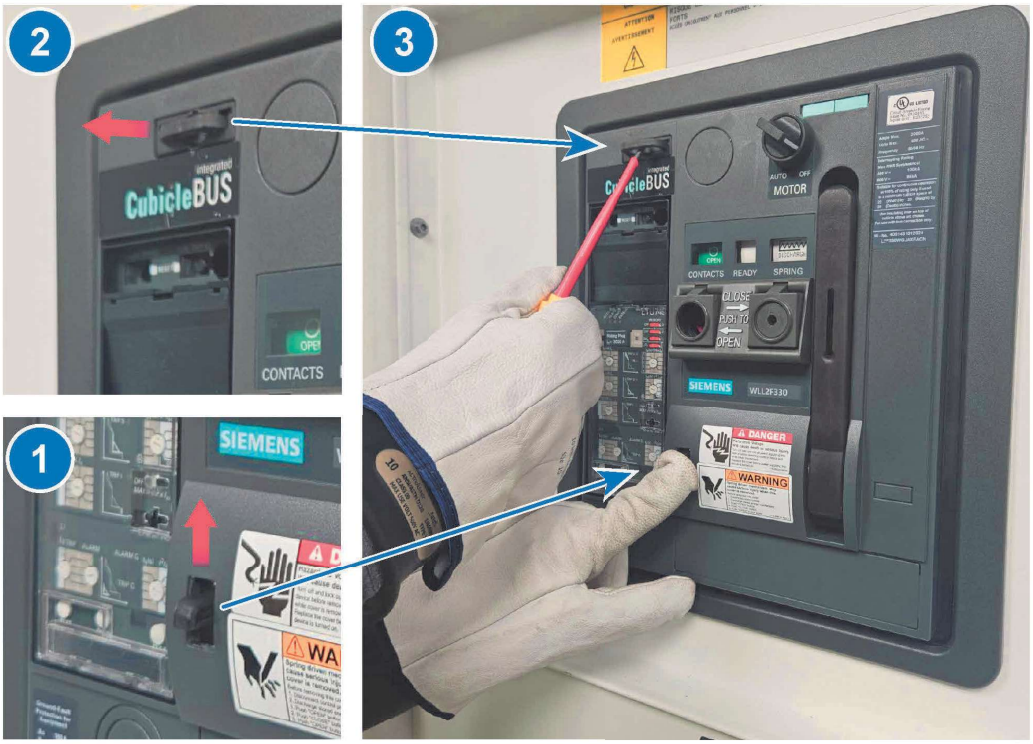


4. Open the breaker by pressing the red open button firmly until it clicks. When the breaker is open, the contacts window displays green and **OPEN**:



NOTE: Pressing the button manually opens the breaker. You may use other methods to open the Megapack AC circuit breaker (*Controlling the Circuit Breaker on page 18*).

5. Push up on the spring-loaded lever (1) to unlock the lock ring (2), and use a flat-head screwdriver to pull out the lock ring: (3):

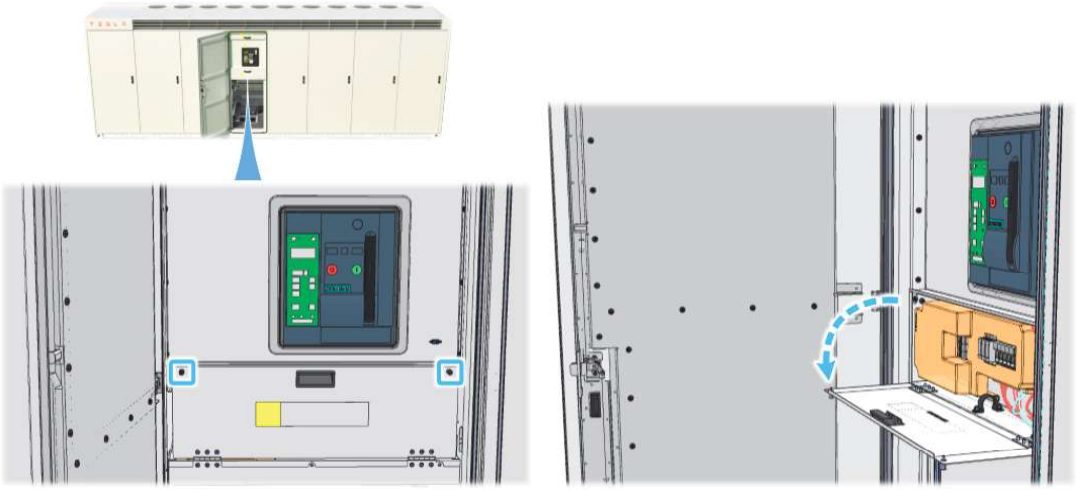


6. Insert the lock and lock it to secure the Megapack AC circuit breaker:

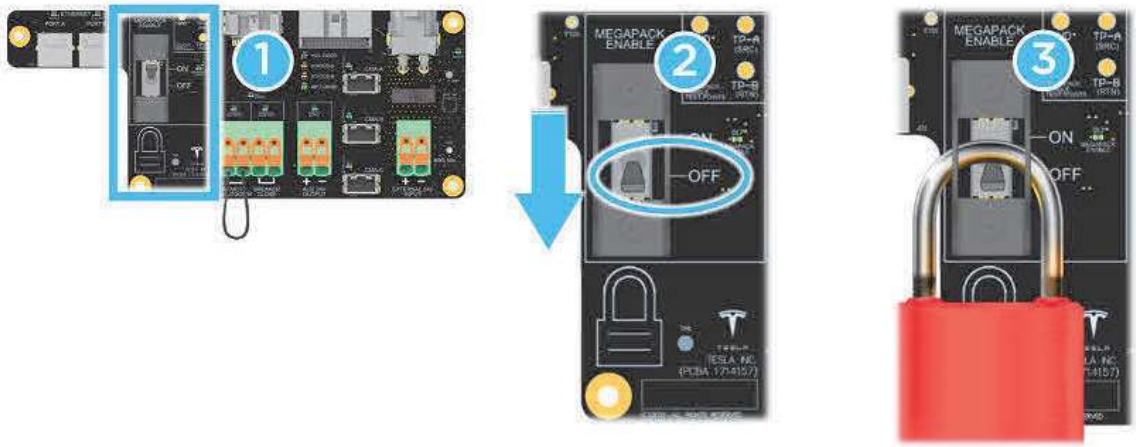
7. If isolation is required per *Isolating Megapack from Upstream AC Sources on page 56* and more than one Megapack is connected to the same circuit or transformer, repeat this procedure for each Megapack.

6.4.2.3 Turning the Enable Switch Off

1. Use a T30 Torx bit to remove the 2 screws securing the customer I/O area cover to the enclosure. Grab the handle and pull outward, then downward to expose the customer I/O area:



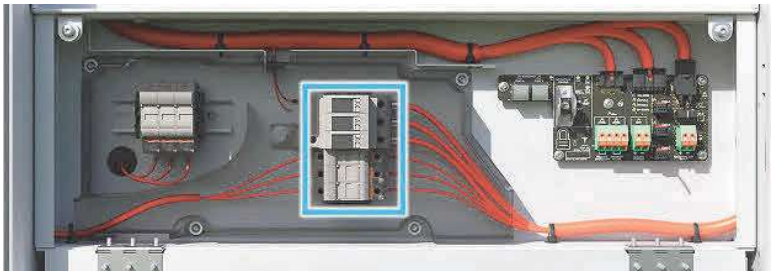
2. The Megapack enable switch is located on the customer interface board (1). Press **down** to turn the enable switch to the **off** position (2), and apply a lock (3):



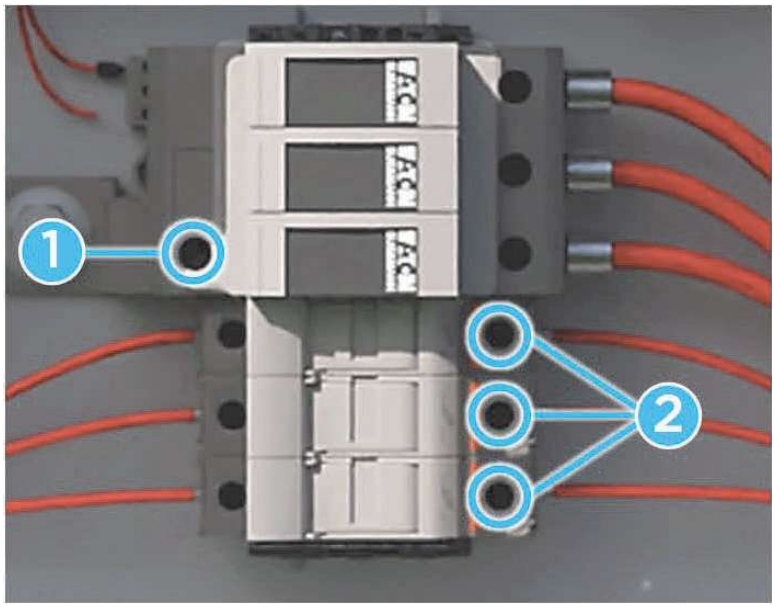
6.4.2.4 Verifying Load-Side De-Energization

NOTE: This check for dead should only take place after all previous steps were successfully completed.

Check the load-side (inverter-side) voltage in the customer I/O area at the terminals indicated below:



1. Using a CAT IV voltmeter rated for 1000 V AC, first verify the voltmeter on a known live source.
2. Measure AC phase-to-phase and phase-to-ground voltage at the load-side test points as shown below:



1 - Ground. 2 - Phase test points.

3. Confirm that the voltage is 0 V AC.

WARNING: You may initially measure greater than 0 V AC due to residual capacitive energy. Stop and wait five minutes before testing again. **Do not proceed unless you have measured 0 V AC.**

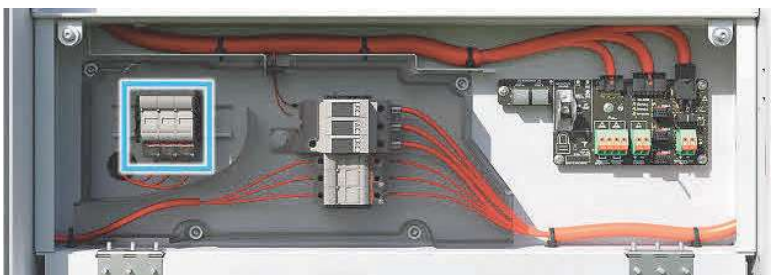
4. Re-verify the voltmeter on known live source.
5. Repeat the above, now measuring DC voltage.

NOTE: You will measure a voltage of up to 50 V DC. This is normal and expected. If voltage above 50 V DC is detected, stop and contact Tesla.

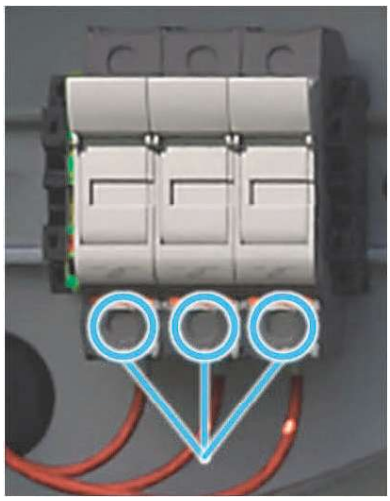
6.4.2.5 Verifying Line-Side De-Energization

NOTE: This check for dead should only take place after all previous steps were successfully completed.

If isolation is required per *Isolating Megapack from Upstream AC Sources on page 56*, check the line-side (grid-side) voltage at the line-side tap in the customer I/O area:



1. Open the fuse holder for the line-side tap.
2. Using CAT IV voltmeter rated for 1000 V AC, first verify the voltmeter on a known live source.
3. Measure AC phase-to-phase and phase-to-ground voltage at the line-side test points as shown below:



4. Confirm that the voltage is 0 V AC.

   WARNING: You may initially measure greater than 0 V AC due to residual capacitive energy. Stop and wait five minutes before testing again. **Do not proceed unless you have measured 0 V AC.**

   NOTE: If upstream isolation was **not** required per *Isolating Megapack from Upstream AC Sources on page 56*, you may measure a nominal voltage.

5. Re-verify the voltmeter on known live source.

6.4.3 Megapack Door Security

All Megapack doors have the provisions for the use of a padlock. The Customer Interface Bay (*Customer Interface Bay on page 14*), as the primary customer interface for Megapack, is recommended to be locked. The other doors do not need regular access and should remain closed and locked.

NOTE: Access to the Customer Interface Bay may be subject to local codes and regulations.

About the Locks

Combination locks are shipped with Megapack, either pre-installed on Megapack doors or delivered in the accessory kit. Install these locks to ensure doors are not left open unnecessarily:

- **Set combination to 4585** for coordinated access with Service Providers. Tesla must have ability to unlock doors. If you choose a different combination, advise your Tesla contact in writing.
- If Tesla field service personnel arrives on site and observes locks are not installed on all doors except the Customer Interface Bay door, they will communicate the requirement with on-site personnel.
- For keyed locks, a double hasp is required to allow Tesla access by unlocking Tesla's lock.

6.5 Energizing, Site Isolation, and Storage

For all procedures, follow the guidelines in the site's *Electrical Control Plan on page 54*. Work with the site owner or operator with any questions related to the Electrical Control Plan.

6.5.1 Energizing the Megapack

After Tesla has completed the commissioning and initial start-up of Megapack, the system is ready for operation. You should not need to perform extra steps to start the system.

If a Service Provider gives the direction to re-energize a Megapack during installation or after upstream maintenance or short-term storage, the steps below must generally be performed to energize the Megapack.

WARNING: Notify operations and on-site personnel and clear working areas as necessary before re-energizing.

NOTE: These are general steps. The procedure may vary during specific installation or operational phases or at specific sites.

NOTE: Refer to *AC Disconnect Responsibilities on page 55* for information about whether operators or Tesla must perform certain steps.

1. Verify that the equipment and area, including the inside of the Customer Interface Bay and AC bus bar area, is clear of tools, materials, workers, equipment, and debris.
2. Secure the bus bar access panel to the AC bus bar area, if it has been removed.
3. Reinstate the remote shutdown contact on the customer interface board, if it had been removed.
4. Turn the enable switch ON on the customer interface board (removing the lock if necessary) and close and secure the customer I/O area cover.
5. Remove the lock on the Megapack AC circuit breaker, if needed.
6. If present, turn the Megapack AC circuit breaker motor switch from OFF to AUTO.
7. Close the Megapack AC circuit breaker (*Controlling the Circuit Breaker on page 18*).
8. Close the Customer Interface Bay door.
9. Close any upstream external circuit breakers that had been opened.

6.5.2 Isolating the Site from Megapack

Follow the isolation procedures below to prevent Megapack(s) from providing energy to other components at the site.

6.5.2.1 Isolating a Single-Megapack System

Perform this procedure at sites with a single Megapack:

1. Command an off state using the Tesla System Controller or other SCADA equipment. If the site operator or system owner does not have the means to send commands, contact Tesla (*Contact Information on page 28*).
2. Isolate the Megapack from upstream AC if required (*Isolating Megapack from Upstream AC Sources on page 56*).
3. Open and lock the Megapack AC circuit breaker (*Opening and Locking the Megapack AC Circuit Breaker on page 57*).

6.5.2.2 Isolating a Multiple-Megapack System

Perform this procedure at sites with multiple Megapacks:

1. Determine whether all Megapacks should be isolated or only one Megapack:
    - If isolating all Megapacks, send the appropriate command using the Tesla System Controller or other SCADA equipment. The appropriate command varies depending on whether this is an on-grid or a microgrid site. If the site operator or system owner does not have the means to send commands, contact Tesla (*Contact Information on page 28*).
    - If isolating only one Megapack, the power commands do not require a change (but a change is permitted if desired).

2. Isolate AC power at the appropriate circuit breaker:
    - If isolating all Megapacks, open the site-wide external circuit breaker or disconnect to remove grid power.
    - If isolating only one Megapack, open the upstream AC disconnect.

6.5.3 Configuring for Short-Term Storage

This procedure is only to be performed when a Megapack needs to be shut down and removed from grid power **for more than 24 hours and up to 14 days**.

NOTE: Contact Tesla for assistance with configuring Megapack for storage periods of longer than 14 days.

WARNING: Active work cannot be performed inside Megapack while it is in storage. If active work is required, ensure the Megapack is de-energized per *Performing Lockout/Tagout on page 56*.

1. Ensure that conditions, including duration and temperature range, will abide by the requirements in the *Megapack 2 XL Transportation and Storage Guidelines* for the duration of storage.
2. Charge Megapack to at least 50% state of energy.
3. Open a ticket using Tesla's online support portal (*Contact Information on page 28*) and note the following in the ticket:
    a. Inform that the system will be shut down soon.
    b. State the amount of the time the system is expected to be idle.
4. Command to off state using the Tesla System Controller or other SCADA equipment. If the site operator or system owner does not have the means to send commands, contact Tesla (*Contact Information on page 28*).
5. Open the site or external circuit breaker or disconnect (if one is present).
6. Assess the steps in *Critical Door-Opening Considerations on page 55* and open the Customer Interface Bay door if conditions allow.
7. Turn the enable switch off (*Turning the Enable Switch Off on page 60*).
8. Wait five minutes.
9. Open and lock the Megapack AC circuit breaker (*Opening and Locking the Megapack AC Circuit Breaker on page 57*).
10. **Turn the enable switch back on.**
11. Close and secure the customer I/O area cover, and close the Customer Interface Bay Door.
12. Up to 14 days later, proceed with re-energization (*Energizing the Megapack on page 62*).

CAUTION: The enable switch must remain on during storage.

7 System Augmentation

Tesla provides guidance at the time of purchase for augmentation of energy storage. If the plans to augment the site have been made, you must also plan for and accommodate the activities surrounding augmentation and maintenance of these additional energy storage units, including site access. Refer to *Maintaining Access, Routes, and Zones on page 47*.

For more information on system augmentation and its site layout, refer to *Application Note: Megapack Capacity Augmentation*.

8 Decommissioning and Disposal

8.1 Purpose

This section provides details about decommissioning Megapack Systems that are no longer functional, including how to return Megapacks to either Tesla or another facility for recycling.

NOTE: To ensure compliant decommissioning, always refer to local regulations as applicable.

8.2 Safety

Refer to the *Industrial Lithium-Ion Battery Emergency Response Guide* (ERG) on the Tesla First Responders Information Page at *https://www.tesla.com/firstresponders* for detailed hazard information specific to Megapack's lithium-ion batteries. The *Transportation* section of the ERG provides guidance and cites example regulations for shipment of dangerous goods. All logistics and transportation companies in the supply chain are responsible for knowing and following all applicable regulations pertaining to the storage, handling, and transportation of dangerous goods. The ERG is periodically updated. Download the latest revision of the ERG from *https://www.tesla.com/firstresponders*.

Tesla recommends that a physical copy of the ERG is transported along with Megapack, and subsequently remains on site and accessible at all times, for the life of the product.

Safety Data Sheets (SDS) are available for materials in Tesla Energy products. Refer to the Tesla Partner Portal for more information.

8.3 Decommissioning

This section outlines the considerations necessary to decommission a Megapack System.

NOTE: Refer to *Decommissioning Damaged Equipment on page 68* for guidance if the system has sustained damages.

8.3.1 Verifying Maximum State of Energy

When planning decommissioning, you must first clarify the maximum state of energy (SOE) at which the system must be returned. Prior to shutting down and decommissioning Megapack, discharge the system accordingly as required by applicable regulations.

NOTE: If no regulations apply, Tesla recommends discharging the system below 30% SOE for transportation.

8.3.2 De-Energizing and Disconnecting the Equipment

After the system has been safely shut down and de-energized, take these steps to disconnect the equipment:

1. Follow the procedures in *Performing Lockout/Tagout on page 56* to de-energize the system.
2. Disconnect wires, referring to the appropriate procedure in the *Disconnecting AC Conductors on page 67* or reaching out to Tesla for more information.
3. Detach the foundation anchors as applicable. Reach out to Tesla for more information.

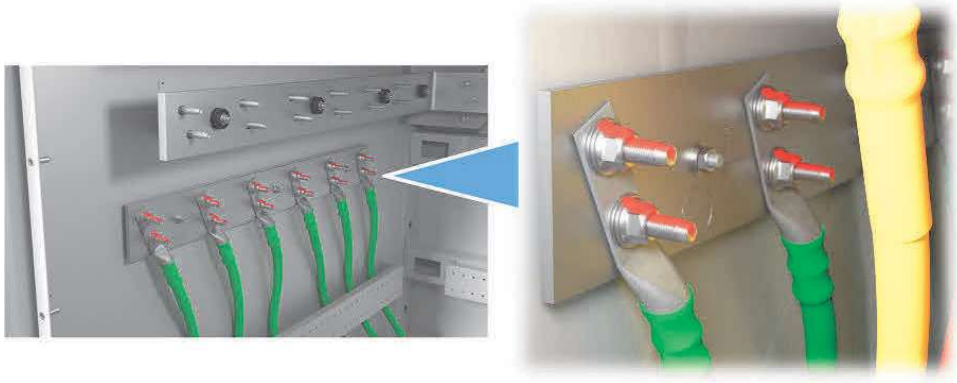
8.3.2.1 Disconnecting AC Conductors

DANGER: Ensure that the appropriate measures have first been taken to remove electrical hazards.

To disconnect the AC conductors:

1. Loosen all AC conductor lugs.
2. Disconnect all AC conductors from the Megapack bus bars using an approved disconnection method.

Figure 34. Unfastening the AC Conductors



3. Pull the conductors out of Megapack through the wireway openings.

8.3.3 Returning Equipment

Tesla energy products contain recyclable materials. Tesla recommends recycling our energy products by returning them to Tesla or to an alternate facility as described in the sections below.

CAUTION: Always refer to the latest applicable *Transportation and Storage Guidelines* for details about handling, lifting, and transportation of Megapack.

8.3.3.1 Returning to a Tesla Recycling Facility

Tesla strongly encourages recycling and recommends that when a Tesla energy product must be decommissioned, it be returned to a Tesla facility for disassembly and further processing. However, the customer may elect to send the equipment to an alternate recycling facility (*Returning to an Alternate Recycling Facility on page 67*).

Contact Tesla to confirm the facility to which Megapack should be returned.

8.3.3.2 Returning to an Alternate Recycling Facility

Tesla energy products should be disposed of or recycled in accordance with local, state, and federal regulations. Note that regulations regarding disposal of batteries vary by jurisdiction. As of December 2021, in the United States, batteries are classified as Universal Waste, and in addition, many individual states have specific regulations regarding disposal of battery packs. For example, in California, all batteries must be taken to a Universal Waste handler or authorized recycling facility.

If disposing without return to Tesla, consult with local, state, and/or federal authorities on the appropriate methods for disposal and recycling. If disassembly of the Megapack is necessary, contact Tesla for guidance.

8.4 Decommissioning Damaged Equipment

This section provides generic guidance around how to handle a damaged Megapack System after all immediate risks following an incident have been mitigated. Damages can be the result of, but not limited to:

- Severe physical impact
- Thermal runaway event
- Transportation accident

Tesla will establish incident-specific guidance on-site as described in this section.

CAUTION: These instructions assume that any immediate risks to personal safety have been mitigated. If any signs of risk such as fire or smoke are still present, consult the *Industrial Lithium-Ion Battery Emergency Response Guide* and refer to contact information in *Contact Information on page 28*.

8.4.1 Determining if Megapack is Safe to Approach

If not already present on site or contacted, contact technical support for guidance prior to any interaction with the Megapack (*Contact Information on page 28*).

Once all immediate risks have been mitigated, follow these steps to determine whether Megapack is safe to approach:

1. Isolate the Megapack as required per *Isolating Megapack from Upstream AC Sources on page 56*.
2. Ensure that there have been no visible signs of risks (such as smoke, flames, suspicious odor) for 12 hours.
3. From a distance, use a thermal imaging camera to determine that the damaged Megapack's temperatures have decreased to safe enough levels to touch and that there is no evidence of cell vent gases.
4. From a safe distance, use a hydrogen meter to validate that no vented gases are present.

WARNING: Avoid contact with vented gases. Upon exit from a cell, their temperatures can exceed 600°C (1110°F).

DANGER: Do not make physical contact with a damaged Megapack unit until all the steps above have been completed. A damaged Megapack can present a hazardous situation which could result in severe injury or death.

8.4.2 Performing Diagnostics

Once Megapack is deemed safe to approach, Megapack diagnostics can begin.

WARNING: Megapack diagnostics must be performed by Service Providers.

Diagnosing the Megapack aims at evaluating its status and determining how to handle the damaged unit until recycling, and as a result whether, for example, to disassemble and ship its sub-components to various recycling facilities, or not disassemble and ship to a single recycling facility.

This process generally begins with a visual inspection of the unit in order to establish an initial plan that may evolve during the inspection. Subsequent steps generally proceed as per below:

1. Once Megapack temperatures are deemed touch-safe and no hydrogen gas is detected, you may begin to physically interact with the system.

2. Take electrical measurements of the Megapack System to determine if any faults are present.
3. If faults are found to be present, these must be cleared before proceeding with decommissioning.

8.4.3 Preparing Damaged Equipment for Transport

After performing diagnostics, Tesla will determine the best and safest way to handle the equipment and transport it to a recycling facility.

Refer to the local applicable transportation regulations for such equipment. Transportation regulations can vary by region. The shipper must always comply with the applicable regulations in the region in which Megapack will be transported.

Following Tesla's diagnostics, Tesla may establish that disassembly of battery modules is necessary in order to safely transport the equipment back to a recycling facility. Tesla may also determine that battery modules must be discharged for safe transportation. In this case, the following should be performed:

1. Identify whether energy is still stored in Megapack battery cells.
2. Discharge all detected energy per Tesla-approved methods.
3. Once all energy is removed from the Megapack System, disassembly and shipping can commence.

8.4.4 Returning Damaged Equipment to Tesla

When a damaged Tesla product must be decommissioned, we request that it be returned to a Tesla facility for disassembly and further processing. Contact Tesla with any questions regarding recycling of damaged equipment.

8.4.5 Returning Damaged Equipment to an Alternate Recycling Facility

If disposing without return to Tesla, please consult with local, state, and/or federal authorities on the appropriate methods for disposal and recycling. Contact Tesla with any questions regarding recycling of damaged equipment.

Appendix A: Troubleshooting

Operators can use a SCADA interface to monitor a Megapack System during operations. In the event of an alert, you can use t
alert and determine a course of action. If you see an alert that requires additional support, refer to *Getting Support on page 27*
accessing and viewing these alerts, refer to the *Controls and Communications Manual* associated with your specific site.

Priority 1 (P1) Alerts - Troubleshooting Actions

Alert	Description	Effect	Recommended Action/ Next Steps: Customer	Priority	S
Megapack Isolation Failure	Megapack has reported an isolation measurement below its acceptable threshold.	The impacted system will not operate, resulting in a potential decrease in available power. Impacted systems could range from individual battery modules to full Megapacks.	No action required.	P1: Critical	An ala Servic issue i Field S to exe action
Extreme Temperature Warning	The Megapack has detected a temperature increase above the temperature increase warning threshold.	Megapack has reached critical temperatures and the equipment is at risk for thermal runaway.	Clear the area and notify Tesla Industrial Storage Support and your Service Provider immediately.	P1: Critical	An ala Servic Servic exped require
Extreme Temperature Fault	The Megapack has detected a temperature increase above the temperature increase fault threshold.	Megapack has reached critical temperatures and equipment is at risk for thermal runaway.	Clear the area and notify Tesla Industrial Storage Support and your Service Provider immediately.	P1: Critical	An ala Servic Servic exped require

Alert	Description	Effect	Recommended Action/ Next Steps: Customer	Priority	S
Low State of Energy	Megapack is at a very low state of energy and at least one battery module has entered the battery off state as a protection. Remaining at low state of energy can lead to cell damage.	Remaining in this state could lead to permanent cell damage.	1. Attempt to execute a charge command on the system. 2. If unsuccessful, contact your Service Provider.	P1: Critical	An ala Servic issue i Field S to exe action

Priority 2 (P2) Alerts - Troubleshooting Actions

Alert	Description	Effect	Recommended Action/Next Steps: Customer	Priority
Sparker Fault	One or more Sparkers are behaving incorrectly. Sparkers are located inside the Megapack and control the levels of combustible gas by providing a spark to combust low levels of these gasses before they accumulate.	A faulted Sparker is one that does not spark in the expected fashion (pulse length, pulse interval) or at all. Pulse data is low-level and not exposed to the operators.	With a faulted Sparker, a service ticket will be created with follow-up actions. Contact your Service Provider.	P1: Critical - I multiple Sparkers are faulted P2: Non-Critical - if only one Sparker is faulted
Loss of Site Meter Communication	The Tesla System Controller has lost communication with the site meter.	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	1. Verify meter is powered on. 2. Power cycle the meter. 3. Inspect the physical network connection between the Tesla System Controller and the site meter. 4. Verify meter settings. 5. If additional support is needed, contact your Service Provider.	P2: Non-Critical
Loss of Battery Meter Communication	The Tesla System Controller has lost communication with the battery meter.	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	1. Verify meter is powered on. 2. Power cycle the meter. 3. Inspect the physical network connection between the Tesla System Controller and the battery meter. 4. Verify meter settings.	P2: Non-Critical

Alert	Description	Effect	Recommended Action/Next Steps: Customer	Priority
			5. If additional support is needed, contact your Service Provider.	
Loss of Load Meter Communication	The Tesla System Controller has lost communication with the load meter.	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	1. Verify meter is powered on. 2. Power cycle the meter. 3. Inspect the physical network connection between the Tesla System Controller and the load meter. 4. Verify meter settings. 5. If additional support is needed, contact your Service Provider.	P2: Non-Critical
Loss of Solar Meter Communication	The Tesla System Controller has lost communication with the solar meter.	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	1. Verify meter is powered on. 2. Power cycle the meter. 3. Inspect the physical network connection between the Tesla System Controller and the solar meter. 4. Verify meter settings. 5. Contact your Service Provider if additional support is needed.	P2: Non-Critical
Loss of Bus Meter Communication	The Tesla System Controller has lost communication with the bus meter.	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	1. Verify meter is powered on. 2. Power cycle the meter.	P2: Non-Critical

Alert	Description	Effect	Recommended Action/Next Steps: Customer	Priority
			3. Inspect the physical network connection between the Tesla System Controller and the bus meter. 4. Verify meter settings. 5. Contact your Service Provider if additional support is needed.	
Loss of Generator Meter Communication	The Tesla System Controller has lost communication with the generator meter.	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	1. Verify meter is powered on. 2. Power cycle the meter. 3. Inspect the physical network connection between the Tesla System Controller and the generator meter. 4. Verify meter settings. 5. Contact your Service Provider if additional support is needed.	P2: Non-Critical
Megapack Fault	One or more Megapacks is in a faulted state. The Megapack has stopped operating to protect itself, and will not charge or discharge.	The Megapack will stop operating to protect itself and will not charge or discharge.	No action required.	P2: Non-Critical

Alert	Description	Effect	Recommended Action/Next Steps: Customer	Priority
High Latency Megapack Communication	Tesla System Controller is experiencing high latency communication with one or more Megapacks.	The inverter block(s) power output may be reduced intermittently.	1. Inspect the physical network connections between the Tesla System Controller, the network switch, and the inverter block. 2. Contact your Service Provider if the issue persists.	P2: Non-Critical
Direct Real Power Command Timeout	The Direct Real Power Command has not been re-written, or the Heartbeat has not been toggled, before the expiration of the Direct Real Power Command Timeout.	The battery system power output will be curtailed to zero.	1. If the timeout was unintentional, verify direct commands are being properly sent to the Tesla System Controller within the calibrated command timeout. Refer to the *Tesla Energy Controls and Communications Manual* for more information. 2. Contact your Service Provider if additional support is needed.	P2: Non-Critical
Direct Reactive Power Command Timeout	The Direct Reactive Power Command has not been re-written, or the Heartbeat has not been toggled, before the expiration of the Direct Reactive Power Command Timeout.	The battery system power output will be curtailed to zero.	1. If the timeout was unintentional, verify direct commands are being properly sent to the Tesla System Controller within the calibrated command timeout. Refer to the *Tesla Energy Controls and Communications Manual* for more information. 2. Contact your Service Provider if additional support is needed.	P2: Non-Critical
Loss of Islanding Controller Communication	The Tesla System Controller has lost communication with the Islanding Controller.	If communication with the Islanding Controller is lost while on-grid, the battery system will not transition to an off-grid state in the event of a	1. Inspect the physical network connections between the Tesla System Controller LAN 1 and the Islanding Controller.	P2: Non-Critical

Alert	Description	Effect	Recommended Action/Next Steps: Customer	Priority
		grid issue or under command to intentionally island. The battery system can still continue to operate on-grid. If communication with the Islanding Controller is lost while off-grid, the system will shut down until communication is restored.	2. Verify that the Islanding Controller is powered on and power connections are secure. 3. Contact your Service Provider if additional support is needed.	
Loss of Megapack Communication	The Tesla System Controller has persistently lost communication with the Megapack, meaning the Tesla System Controller has not received Megapack communications for the timeout duration of 120 seconds, unless otherwise configured. Megapack power output will ramp down over the course of 60 seconds.	Megapack power output will be curtailed to zero.	1. Confirm that the enable switch on the customer interface board is in the "ON" position. 2. Inspect the physical network connections between the Tesla System Controller, the network switch, and the Megapack. 3. Verify that the Tesla System Controller LAN 2 lights are blinking. 4. Verify that the network switch is powered. 5. Contact your Service Provider if additional support is needed.	P2: Non-Critical
Megapack Communications Warning	The Tesla System Controller has not received communications from the Megapack for at least 133ms (8 control ticks at 60Hz). The	Megapack power output will be curtailed to zero.	1. Confirm that the enable switch on the customer interface board is in the "ON" position.	P2: Non-Critical

Alert	Description	Effect	Recommended Action/Next Steps: Customer	Priority
	communication interruption should be investigated.		2. Inspect the physical network connections between the Tesla System Controller, the network switch, and the Megapack. 3. Verify that the Tesla System Controller LAN 2 lights are blinking. 4. Verify that the network switch is powered. 5. Contact your Service Provider if additional support is needed.	
Megapack Inverter Fault	All inverters in the Megapack are faulted.	The inverter block(s) power output will be curtailed to zero.	No action required.	P2: Non-Critical
Breaker Irrational	The Megapack AC circuit breaker is reporting open and closed simultaneously.	The inverter block(s) power output will be curtailed to zero.	Visually confirm breaker status and contact your Service Provider with observations for additional support.	P2: Non-Critical
Bus Controller Prolonged Fault	Megapack has experienced several consecutive faults and has entered a prolonged fault state, which will stop operation .	The inverter block will be curtailed to 0 and will be unavailable for 1 hour.	No action required.	P2: Non-Critical
Megapack Disabled	The Megapack is disabled, meaning its battery modules and thermal system are commanded to the Off state. **Warning:** This does not replace the	The power command to the affected Megapack will be curtailed to 0 while under this condition.	1. Verify that the Shutdown Battery System command is not being sent. 2. Contact your Service Provider if additional support is needed.	P2: Non-Critical

Alert	Description	Effect	Recommended Action/Next Steps: Customer	Priority
	need for operators to follow proper de-energization procedures.			
Power Electronics Over Temperature	Over 25% of the Megapack power electronics are experiencing an overtemperature.	Megapack power output may be reduced.	Contact your Service Provider if the fault persists.	P2: Non-Critical
Enable Circuit Open	The Megapack enable circuit is open. This can be caused by door switch, enable switch, or remote shutdown.	The Megapack's power output will be curtailed to zero.	1. Verify that all doors are closed. 2. Verify that the bus bar access panel is installed. 3. Verify that remote shutdown is not enabled. 4. Inspect the CMA enable lines located on the customer interface board for signs of damage. 5. Contact your Service Provider if additional support is needed.	P2: Informational
AC Breaker Status	A value of 1 indicates that the Megapack AC circuit breaker is closed. A value of 0 indicates that the Megapack AC circuit breaker is open.	If status changes to 0 while the system is operating, the bus controller cannot utilize AC and the Megapack's power output will be curtailed to zero.	1. Visually confirm Megapack AC circuit breaker status. 2. If breaker is open and this was not done intentionally, contact your Service Provider.	P2: Informational

Priority 3 (P3) Alerts - Troubleshooting Actions

Alert	Description	Effect	Recommended Action/Next Steps: Customer	Tesla Path	
Coolant Low (P1 if leakage is found during visual inspection; otherwise P3)	Coolant level is low as reported by the coolant sensor.	The cooling system may not function properly, which may result in reduced Megapack power output.	Visually inspect exterior of Megapack and check for signs of coolant leakage. 1. If leakage is found, escalate this alert to P1 (critical path). 2. Communicate any notable findings to your Service Provider.	P1: Critical if leakage found; P3: Informational if no leakage	A cr re sit ce be Pr
Enable Switch Off	Megapack enable switch is in the off position, preventing operation.	The Megapack's power output will be curtailed to zero and will turn off within 500 ms of the alert triggering.	1. Verify that the enable switch on the customer interface board is in the "ON" position. 2. If the enable switch is on and the alert is still active, contact your The Service Provider	P3: Informational	Th pr ne su *Ge*
Door Switch Open	One or more of the Megapack doors is open. Does not apply to the Customer Interface Bay door.	Megapack power output will be curtailed to zero and the enable circuit will break.	1. Verify that door is closed. 2. If door is closed, inspect door switch for signs of damage. 3. Contact your Service Provider if additional support is needed.	P3: Informational	Th pr ne su *Ge*

Revision History

Revision	Date	Details
2.1.1	March 18, 2026	• Removed empty steps (*Energizing the Megapack on page 62*, *Configuring for Short-Term Storage on page 64*)
2.1	February 25, 2026	• Clarified AC disconnect responsibilities by breaker operations (*AC Disconnect Responsibilities on page 55*) • Clarified isolation requirements (*Isolating Megapack from Upstream AC Sources on page 56*) • Added troubleshooting alerts (*Appendix A: Troubleshooting on page 70*)
2.0	November 13, 2025	• Provided additional thermal system manufacturing option information (*Product Configurations on page 11*) • Provided remote shutdown trip times (*Remote Shutdown Trip Times on page 32*) • Clarified Electrical Control Plan responsibilities (*Electrical Control Plan on page 54*)
1.9	September 5, 2025	• Clarified Preventative Maintenance requirements and added guidance for 15-year maintenance (*Preventative Maintenance on page 51*)
1.8	May 29, 2025	• Updated the maximum allowable arc flash incident energy from 8 to 14 cal/cm^2 for all regions. Updated the protection scheme requirements to ensure admin controls related to relays are clearly defined (*Performing Lockout/Tagout on page 56*) • Provided details about the Electrical Control Plan (*Electrical Control Plan on page 54*) • Updated *Tesla System Controller on page 19*, *Tesla System Components on page 8*, and *Product Labels on page 21* to include additional Large Tesla System Controller • Updated troubleshooting to provide guidance for Service Providers (*Appendix A: Troubleshooting on page 70*)
1.7	February 12, 2025	• Provided additional considerations for ground surface maintenance (*Ground Surface Maintenance Considerations on page 43*) • Provided guidelines about responding to enclosure imperfections or damage (*Responding to Imperfections or Damage on page 53*) • Introduced the C011 cell option (*Battery Modules on page 13*, *Product Configurations on page 11*) • Introduced fan type options (*Megapack Options on page 11*)
1.6	December 2, 2024	• Provided product configuration, option, and variant descriptions (*Product Configurations on page 11*) • Introduced the C012 cell option (*Battery Modules on page 13*)

Revision	Date	Details
1.5	October 23, 2024	• Clarified considerations for maintaining state of energy (*Critical Operational Considerations on page 34*) • Provided requirements for maintaining electrical protection (*Maintaining Electrical Protection on page 54*) • Removed guidance about turning enable switch back on when active work pauses for 1 hour or longer (*Turning the Enable Switch Off on page 60*) • Provided considerations for turning the enable switch back on under conditions described in this *Note on page 56* • Provided equipment clearance, which must be maintained for the operating life of the system (*Maintaining Megapack Clearance on page 44*) • Updated safety features to provide improved context (*Hazard Mitigation Features on page 30*) • Provided additional contact details (*Contact Details on page 28*)
1.4	May 31, 2024	• Provided exposure and fire clearance information and requirements (*Maintaining Exposures and Fire Clearances on page 46*) • Added a topic describing routes and zones to clarify maintenance requirements (*Routes and Zones on page 35*) • Updated vehicle dimensions and added Megapack delivery vehicle (*Typical Vehicles on page 42*) • Removed inspection of drain valves from annual maintenance activities (*Annual Maintenance on page 51*) • Provided reference to the *Application Note: Considerations for Hazardous Materials Business Plans (HMBP)* (*Operations on page 34*)
1.3	March 6, 2024	• Added critical operational considerations (*Critical Operational Considerations on page 34*) • Clarified previous updates to on-site maintenance infrastructure Levels 1-5 (*On-Site Maintenance Infrastructure on page 48*)
1.2	January 30, 2024	• Updated on-site maintenance infrastructure levels (*On-Site Maintenance Infrastructure Requirements Overview on page 47*) • Provided specifications for UL 1066 circuit breaker (*Megapack AC Circuit Breaker on page 15*)
1.1	November 8, 2023	• Modified door-opening guidance and removed the requirement to contact Tesla before opening doors (*Critical Door-Opening Considerations on page 55*) • Introduced the -D enclosure variant (*Enclosure on page 18*) • Disambiguated safe work environment procedures including isolation and performing lockout/tagout (*Providing a Safe Work Environment on page 54*) • Provided arc flash label information (*Arc Flash Label on page 23*) • Updated Asia hotline information (*Contact Information on page 28*)
1.0	July 5, 2023	Initial Revision.

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Megapack 2 XL Operation and Maintenance Manual – Revision 2.1.1

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