GE Energy

DuraStation™ EV Charger

Application Guide

imagination at work

DuraStation™ EV Charger

Introduction

The GE DuraStation offers Level II charging capable of reducing charge time from 12-18 hours to 4-8 hours with service needs of 208-240VAC at 40A, assuming a 24kWh battery and a full-cycle charge. GE recognizes that this is an industry that will develop and change over time and, as a result, the DuraStation is designed to accommodate future changes and technological advances. The DuraStation is "future proof" through a modular design, giving the owner the ability to upgrade the unit with field installable modules without replacing the charging station.

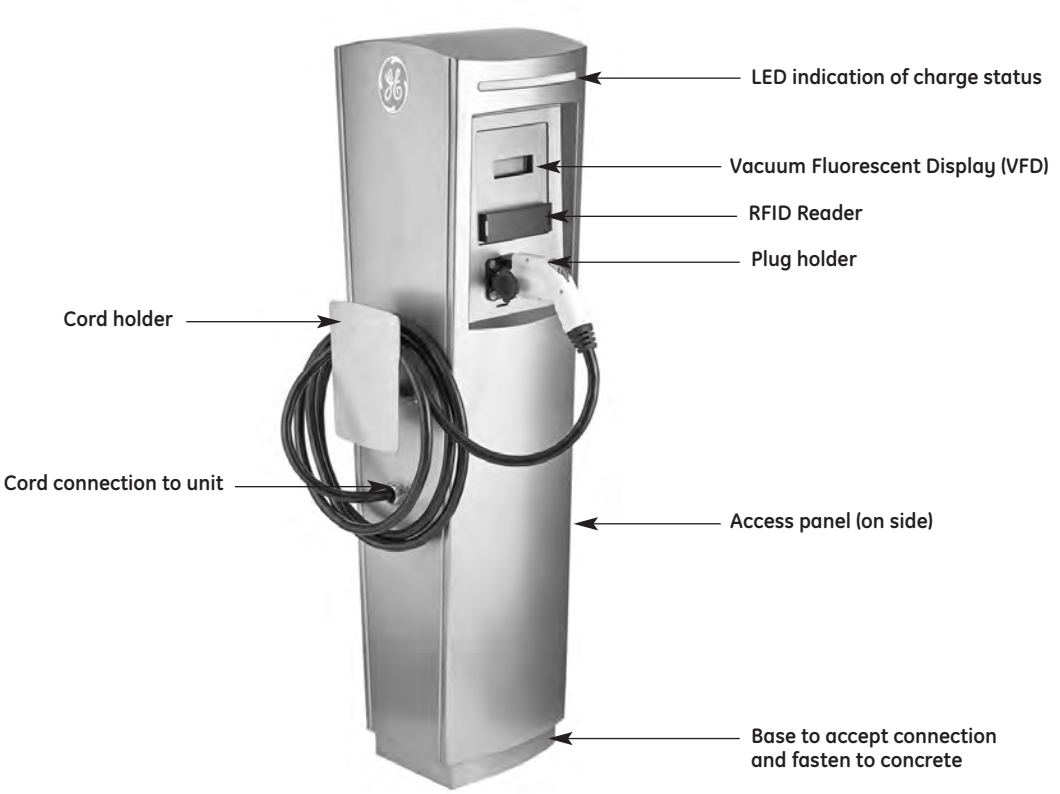
GE has over 40 years of experience in the manufacture of RV pedestals, which provides knowledge and familiarity for the manufacture of EV charging stations. In addition, a crucial component to the implementation of EV charging stations is the upstream infrastructure needed for installation. GE has over 100 years of experience in the manufacture of electrical distribution systems. As a result, we are able to offer a complete EV infrastructure solution that includes the DuraStation and the associated upstream infrastructure.

Product Details

The DuraStation has a list of features that are upgradeable, resulting in a robust and reliable solution for the needs of EV charging infrastructure.

- The cord holder serves to keep the cord organized and out of the way of parking spaces, sidewalks and streets
- LED light to display charger status
- Option for a Radio Frequency Identification (RFID) reader: users can gain charging authorization by swiping RFID cards in front of the readers
- Ethernet network offered for RFID authorization service
- RFID software application registers usage of the DuraStation, enabling data collection, and will also monitor status of communication between RFID and charging station
- Vacuum Fluorescent Display (VFD) screen showing greetings, instructions and charging station messages
- Nuisance tripping avoidance and auto re-closure
- Vehicle ground monitoring circuit
- Single phase metering, displayed on included VFD
- A building ventilation interface signal can be provided to operate facility and garage fans when required

DuraStation EV charger – a closer look



Control Unit

- Provides user with charger status and messages via LED bar, Vacuum Fluorescent Display (VFD) and external communications
- Allows user configurable overload protection
- Performs CCID20 ground fault protection per UL 2231
- Provides single phase metering
- Handles SAE J1772 functions

Contactor

- Responsible for energizing and de-energizing the connector
- Operates in conjunction with controller to meet UL and NEC requirements

Connector

- Compliant with SAE J1772 standard
- UL listed for EV charger applications

Fuses

- Provides overload and short circuit protection

Specifications

SAE Compliant	Level II per J1772
Vehicle Interface	SAE J1772 EV connector
Cable Length	20' cable
AC Charging Power Output	7.2kW (240VAC @ 30A)
Voltage and Current Rating	208-240VAC @ 30A
AC Power Input	208-240VAC requiring only Line 1, Line 2, and Earth ground
Recommended Service Panel Breaker	Pole, Wall, Single Pedestal: 2-pole 40A breaker on dedicated circuit. Double Pedestal: (Qty. 2) 2-pole 40A breaker on dedicated circuit
Ground Fault Protection	Internal 20mA CCID with auto re-closure, does not require a GFCI in service panel
Cold Load Start	Random start up between 0 and 15 minutes
Local Area Network	CAT5 Ethernet
Network Communication Protocol	TCP/IP
Network Security	GE recommends that network be VPN and Firewall protected
Metering Accuracy	2% accurate on voltage and current; 4% accurate on power and energy
RFID Reader	ISO 15693 compliant
Display Screen	Vacuum Fluorescent Display
Standby Power	5W typ.
Indoor Ventilation	Signal provided to turn on facility fans
Outdoor Rated	NEMA 3R
Safety Compliance	UL 2231, UL 2251, UL 2594, cUL 2231, cUL 2594, NEC 625, SAE J1772
Surge Protection	6kV @ 3,000A
EMI Compliance	FCC Part 15 Class A
Operating Temperature	-30°C to +50°C ambient
Operating Humidity	Up to 95% non-condensing
Approximate Shipping Weights	Single Pedestal: 90 lbs
	Double Pedestal: 90 lbs
	Pole: 45 lbs
	Wall: 45 lbs
Dimensions	Single Pedestal: 51.1"H x 14.9"W x 13.8"D
	Double Pedestal: 51.1"H x 14.9"W x 13.8"D
	Pole: 31.52"H x 11.82"W x 11.16"D
	Wall: 31.52"H x 11.82"W x 11.16"D

Enclosure

The DuraStation features a NEMA 3R enclosure for all four mounting options.

Single pedestal
Free standing pedestal with a robust footing to bolt the unit to the ground

Double pedestal
Free standing pedestal featuring a back to back design with a robust footing to bolt the unit to the ground

Wall mount
Surface mounted unit

Pole mount
Wall mount design with an additional pole mounting kit

Control Unit

The control unit will integrate SAE J1772 Functions, Metering, Overload monitoring and will manage HMI and all local monitoring.

- The SAE J1772 functions include the following:
- Energization and De-energization of the system
- Verification of vehicle connection; the DuraStation de-energizes output when the connector is uncoupled
- Continuous monitoring of ground connection between the EV and the DuraStation
- Automatic De-energization of the cable in case of rupture or separation of the cable
- Continuous monitoring of DuraStation current capacity with supply rating recognition by PWM 1kHZ signal
- Determination of ventilation requirements depending on battery type of vehicle

The GE DuraStation provides communications through the controller prompting proper cord management. A message on the VFD screen instructs the operator to return the plug to the charger inlet, thereby reducing the possibility of plug and cord damage. The proximity detection feature, which is part of the SAE J1772 connector, enables the coupler to communicate the presence of the connector when it is inserted into the DuraStation coupler.

Overload monitoring is provided by the control unit which features protection above 125% nominal current. This threshold limit will be below the breaker protecting the DuraStation's limit to avoid local maintenance of the system during an overload event. The control unit will include a 15-20 mA ground fault protection according to UL2231. An integrated single phase meter will measure current and voltage in addition to calculating energy and power. The control unit also performs monitoring of the contactor to ensure the contactor is in the correct state when charging or not charging.

User Interface

The GE DuraStation offers a user interface that is easy to operate and guides a user through charging their vehicle. A Vacuum Fluorescent Display (VFD) screen features greetings, instructions, and charging station messages as well as featuring communications for the single phase metering. The LED light located at the top of the charging station displays charger statuses as follows:

- Green = Station active
- Blinking green = Vehicle connected, not charging
- Amber = Charging
- Red = Fault occurred

Radio Frequency Identification

GE DuraStations offer the option for Radio Frequency Identification (RFID). The ISO 15693 compliant RFID can be used with key cards provided by GE. Users will simply wave their key cards in front of the RFID reader at the particular DuraStation intended for use and will be authorized to start charging. There are a few benefits associated with implementing RFID:

- Ethernet network offered for RFID authorization service
- Provides security, enabling only authorized users to operate the charging station through RFID
- Secure software application offering different privilege levels for owner/operator of the DuraStation

RFID Software Application

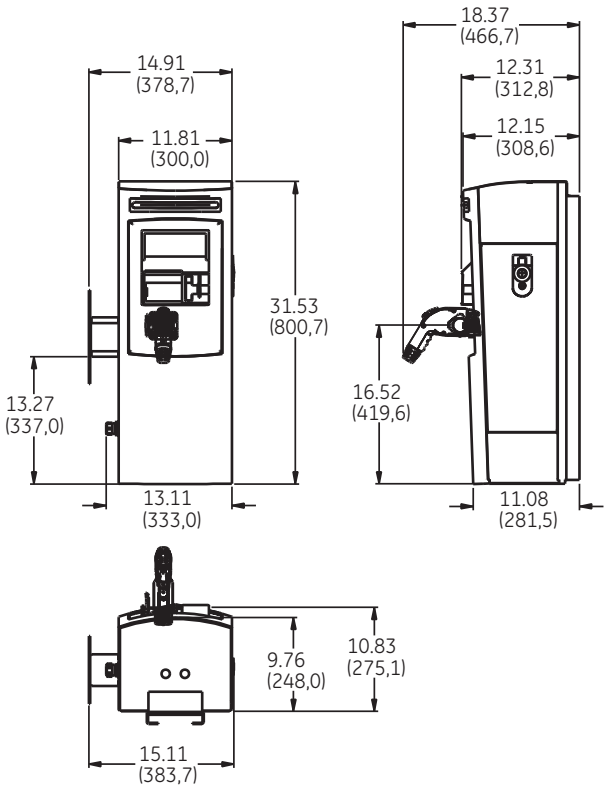
The RFID software application is responsible for maintaining and processing authorization of users for the DuraStations it supports. Operators will be able to control adding, removing, or suspending user authorization. The software application also supplies reports on the DuraStation usage, enabling data collection, and monitors the status of communication between the RFID software and DuraStation EV charger. This is a local desktop application which runs on a Windows® operating system, requiring Windows XP or Windows 7. The software desktop application, which stores data in a relational database, communicates with the DuraStation controller over TCP/IP protocol.

Safety Features

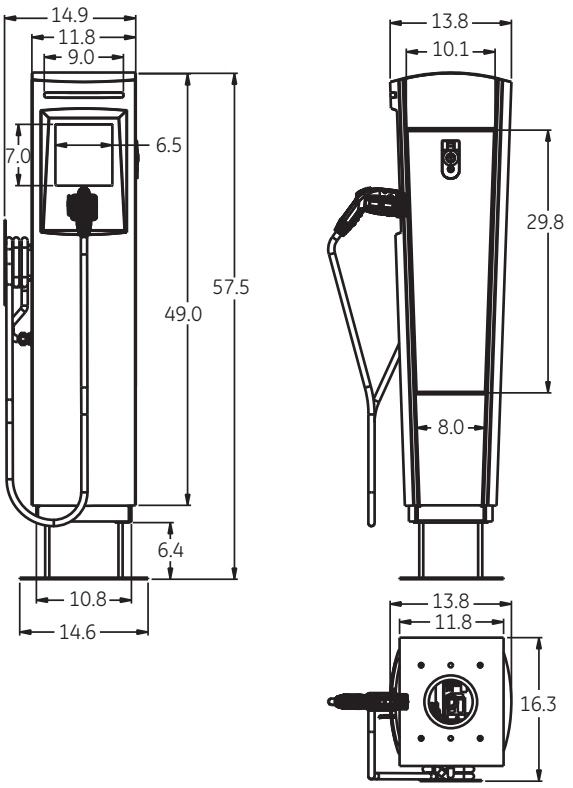
- Ground Fault Protection
  - — 4 automatic retries before station lockout
  - — CCID 20-charging circuit interrupting device 20mA per UL2231
- Automatic self tests of CCID
- Vehicle Ground monitoring per UL 2231
- Contactor monitoring designed to alert the customer when the contactor fails to open or close
- Secondary overload protection to prevent breaker tripping on vehicle faults
- Automatic energizing and de-energizing of charging circuit per NEC 625 and SAE J1772
- Support for personal lock on DuraStation connector; enabling driver to lock the connector when charging their EV
- Secured key entry on service door of DuraStation
- Control user authorization with RFID option
- Handle holder securely locks DuraStation connector into place when not being used
- Visible Vacuum Fluorescent Display and light indicator to communicate fault alerts
- Instruction displayed on VFD to return plug to the DuraStation socket when not in use to prevent damage to the plug

Dimensions

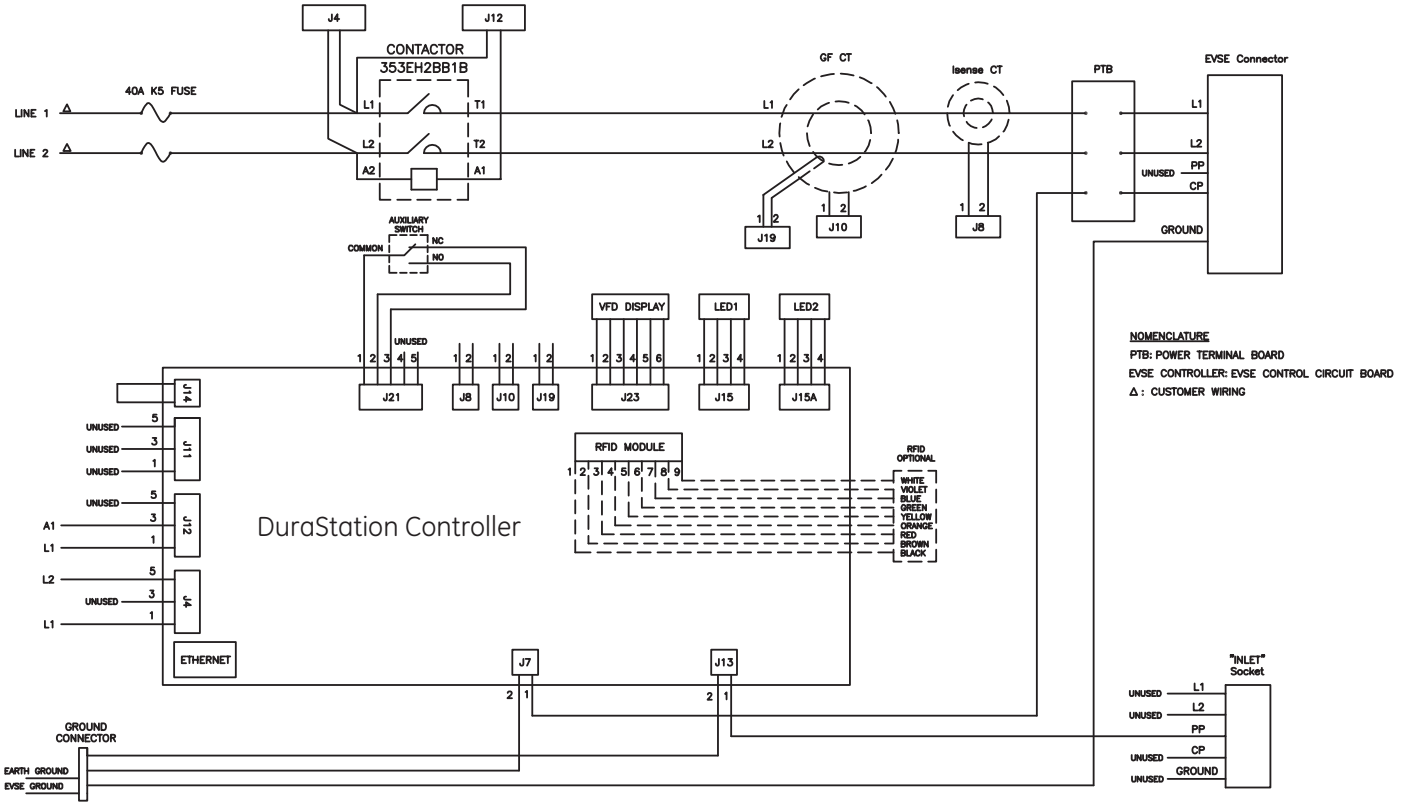
Wall and Pole Mounted Units



Single and Double Pedestal Units



Wiring Diagram

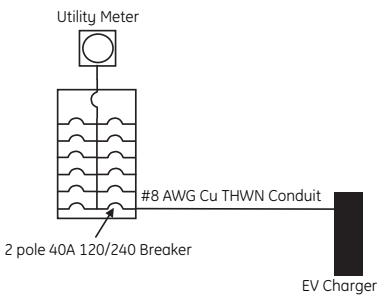


Catalog Numbers

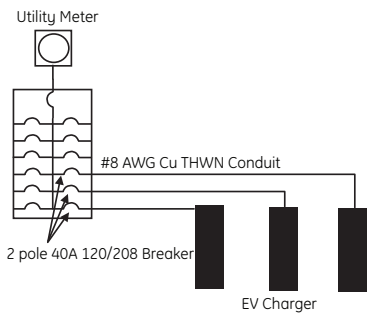
Type	Enclosure	Output	No. of Connectors	Single Phase Integrated Meter	RFID	Cat #
Single Pedestal	NEMA 3R	208-240V 30A 1 phase	1	Yes	No	EVSN3
					Yes	EVSRN3
Double Pedestal	NEMA 3R	208-240V 30A 1 phase	2	Yes	No	EVDN3
					Yes	EVDRN3
Pole	NEMA 3R	208-240V 30A 1 phase	1	Yes	No	EVPN3
					Yes	EVPRN3
Wall	NEMA 3R	208-240V 30A 1 phase	1	Yes	No	EVWN3
					Yes	EVWRN3

Preferred Architectures

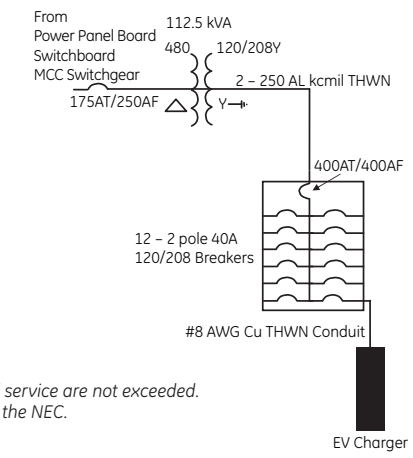
Example 1
Adding 1 GE DuraStation to a single-family residence



Example 2
Adding 3 DuraStations to a retail outlet



Example 3
Adding 12 DuraStations to a hotel, parking garage, etc.



Note
Verify capacity of panel board and service are not exceeded.
Select conductor size according to the NEC.

Upstream Infrastructure

As EV infrastructure extends beyond just the charging station, upstream electrical distribution equipment is critical to ensuring a safe, reliable EV infrastructure system is built and maintained. Whether it is installing brand new equipment or making upgrades to already existing infrastructure, GE has the domain expertise and channel partners to perform the type of upgrades that may be required to support the use of EV charging stations. The following information is a brief overview of upgrades in this space.

Spectra Series™ Switchboards

Spectra Series Switchboards offer a design that provides the high quality and reliability that has long been associated with GE group-mounted switchboards. All GE switchboards can incorporate our full line of circuit breakers, power management components, transient voltage suppressors and meters. Similar to our DuraStations, the Spectra Series Switchboards are designed and manufactured to meet GE internal standards along with NEMA, NEC, UL and CSA requirements. In addition, Spectra RMS Circuit Breakers meet all applicable NEMA, NEC, UL and CSA requirements, plus those for JIS and IEC.

Spectra Series™ Power Panelboards

GE Power Panelboard interiors are offered in two different styles: plug-in and bolt-on. Spectra Plug-In interiors are designed for use with either fusible switches or molded case circuit breakers. A combination of the devices can be used on a common interior. Spectra Bolt-On interiors are designed for use with circuit breakers only. Main or branch devices (fusible switch or circuit breaker), as well as lugs only, can be installed at the factory or at the construction site providing application flexibility. Unique to GE, the design approach makes field reconfiguration possible, as well as having a universal platform that offers interchangeable boxes, fronts and interiors. All panelboards are manufactured in accordance with UL standards 50 and 67 and conform to the latest requirements of the NEC and NEMA standards.

A Series Panelboards

Our A-Series design is an extremely flexible Lighting Panel with over 12,000 combinations, most available within a 10 day production cycle. NEMA 3R, 12 and 4x enclosures are all available options. The panel's comprehensive design and ease of installation are two reasons why contractors turn to this panelboard. All GE A Series panelboards meet UL standards, as well as NEMA PB1, and NEC article 384.

General Purpose Transformers

GE has been building transformers for almost 100 years, but we continue to innovate and improve the reliable QL design. GE Type QL transformers meet NEMA TP-1 efficiency standards. Available in aluminium and copper and in all three temperature rise ratings, QL transformers utilize a UL recognized 220°C insulation system and are UL listed. The transformers are 100% factory tested for shorts and coil integrity, current and loss, voltage, impedance and noise.

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