VE3LC's Electric Vehicle
2018 Hyundai IONIQ

Basic Specification:

Battery Pack: Lithium Ion Polymer

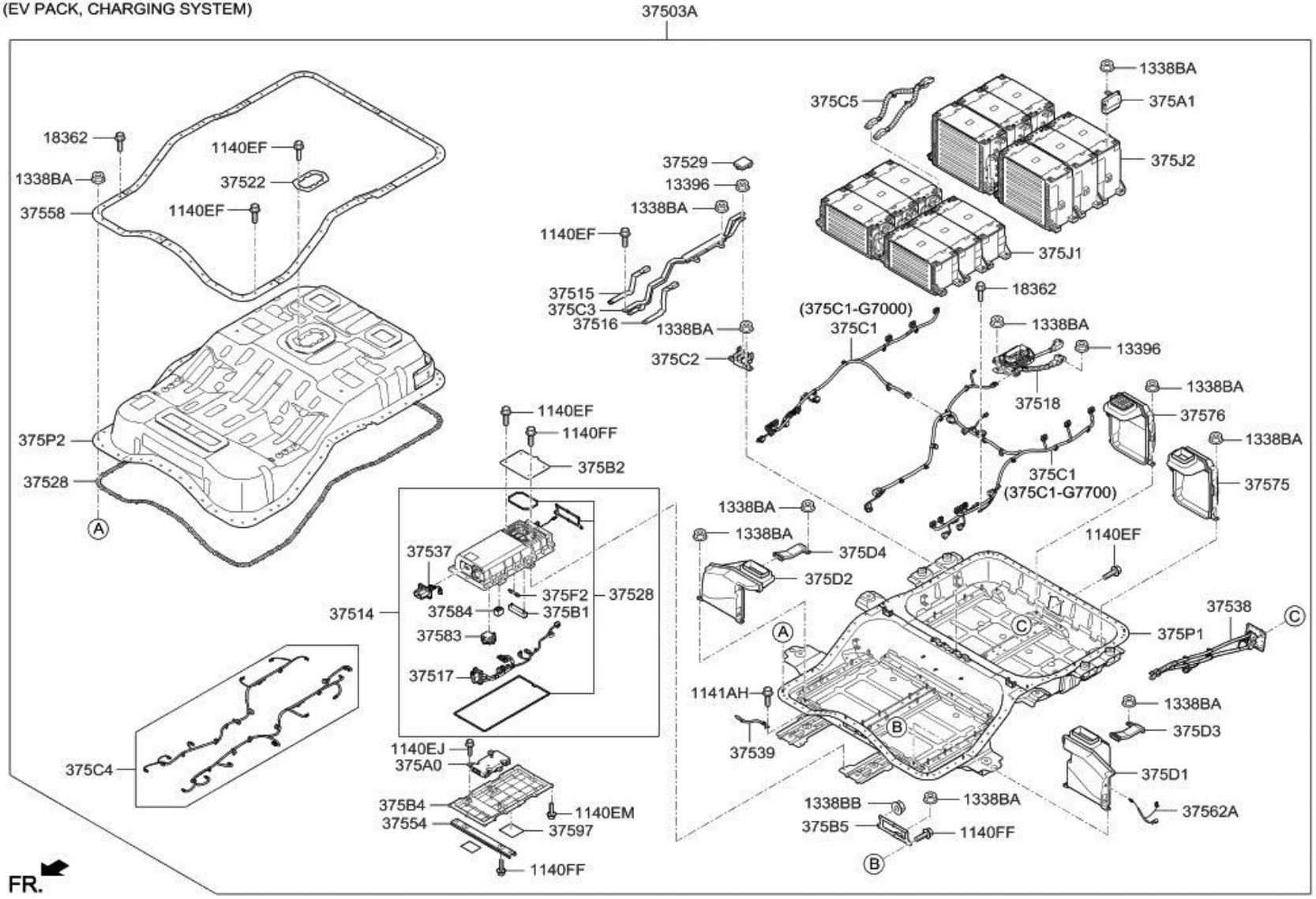
- 28.0 kWh
- 360 Volts nominal potential
- 96 cells arranged in modules
- cooling by forced air
- charging and health maintained by an integrated "Battery Management System"

Motor:

- 3 phase, Synchronous AC, neodymium permanent magnetic rotor revs up to 11,000 rpm
- 118 hp, 88 kW
- 218 ft-lbs torque throughout RPM range
- works in forward or reverse directions
- integrated into front wheel drive transaxle
- provides regenerative braking

Ioniq 28 kWh, 360 volt Battery Pack

(EV PACK, CHARGING SYSTEM)



Battery Pack Replacement cost:
$16,116 US not including installation

Home > Hyundai 37501G7200

Parts Questions

This part fits the vehicle you selected:

My Vehicle: **2017 Hyundai Ioniq Electric** Sedan - 5Door 5P; Motor - 88KW; Electric; …

Change Vehicle

The vehicle options this part fits:
- Fit Note: EV PACK, CHARGING SYSTEM(INLET) - AMERICAN TYPE C
- Production Date: 11/2016-

Hyundai Part No.: 37501-G7200

CALL TECHLINE-BATTERY SYSTEM A

Part Description	Battery System Assembly
Manufacturer	Hyundai. This genuine Hyundai part is guaranteed by Hyundai's factory warranty.

Your Price: $16116.04

Retail Price: ~~$18809.57~~

You Save: $2693.53

Qty: 1

ADD TO CART

Ships in 1-3 Business Days

This part is found within these 3 diagrams below

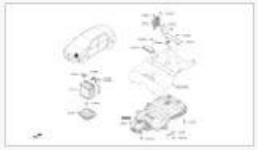


Diagram: BATTERY & CABLE (01/03)> [Motor - 88KW]

This part is Part Code 37503A in the diagram

Enlarge Diagram

Related Parts

Shop for related parts in: Engine > Battery & Cable

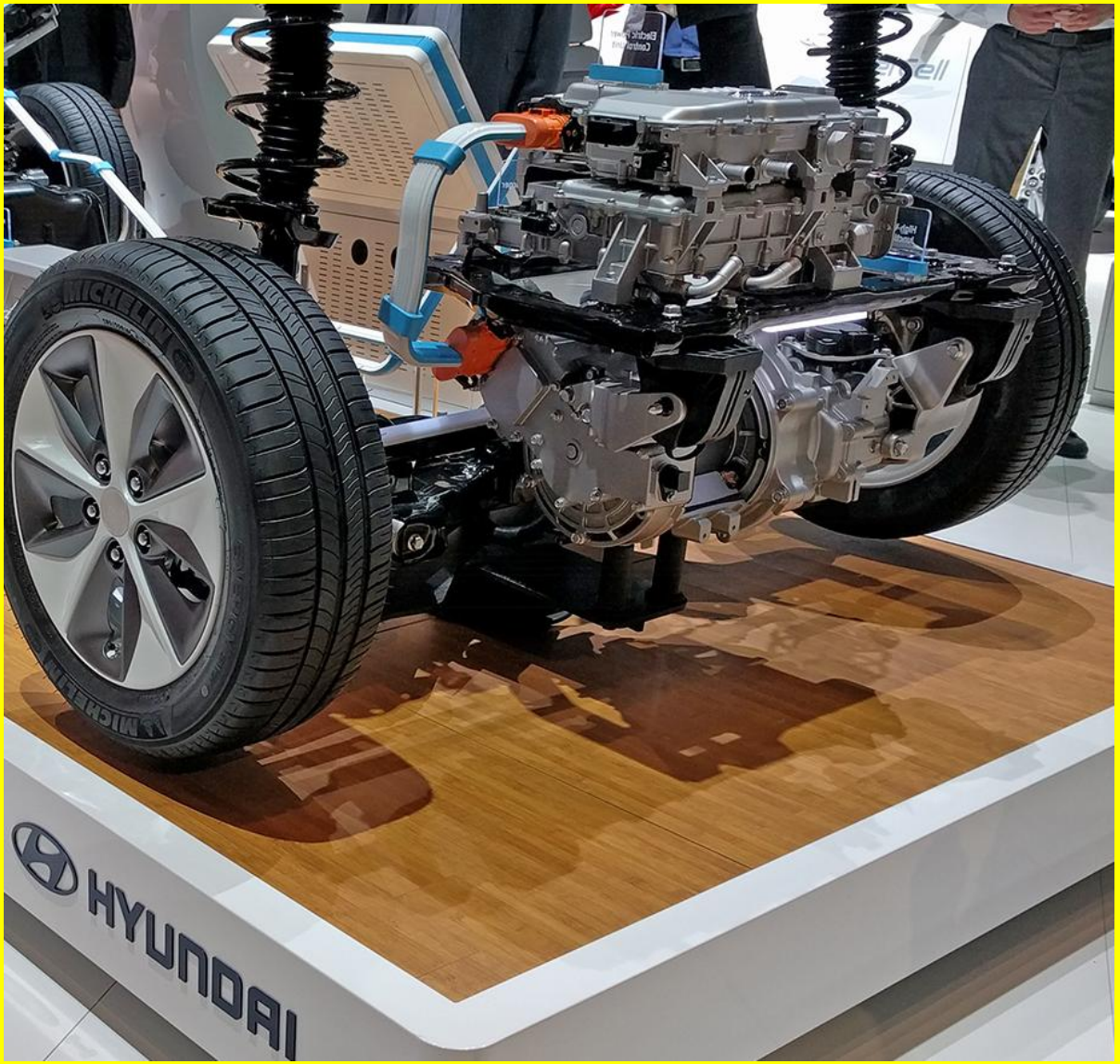
Genuine Hyundai Parts | Genuine Hyundai Parts | Genuine Hyundai Parts | Genuine Hyundai Parts

Why choose Hyundai Parts Deal

Dedicated Service
Your complete satisfaction is our #1 goal

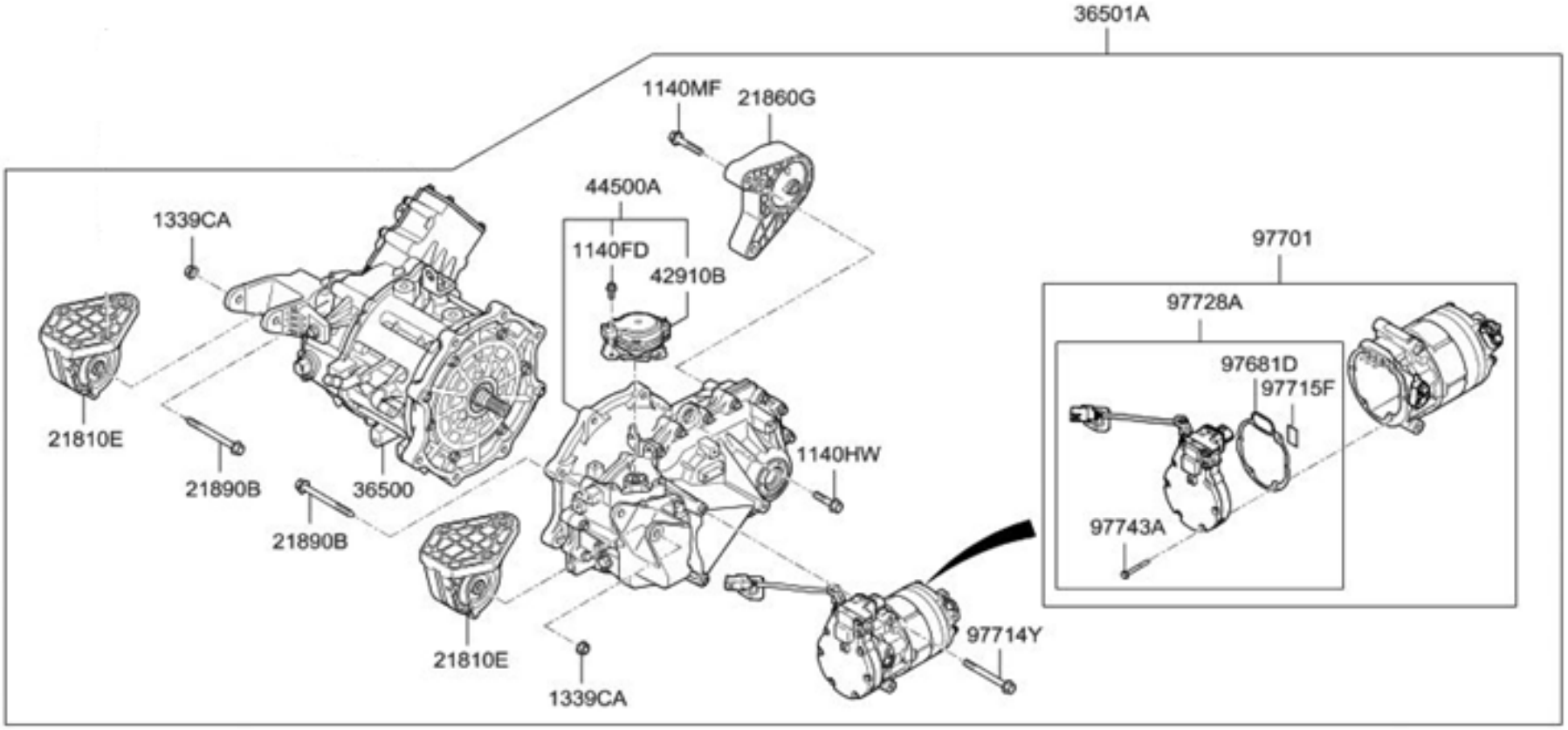
Lowest Prices
Best deals on genuine OE parts from dealerships

Display of Power Conversion Unit and Transaxle Assembly

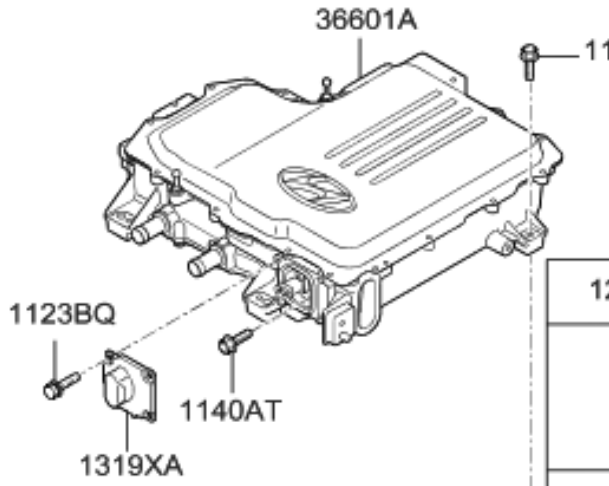


Simplicity of Electric Motor / Transaxle Assembly

There is No Conventional Transmission



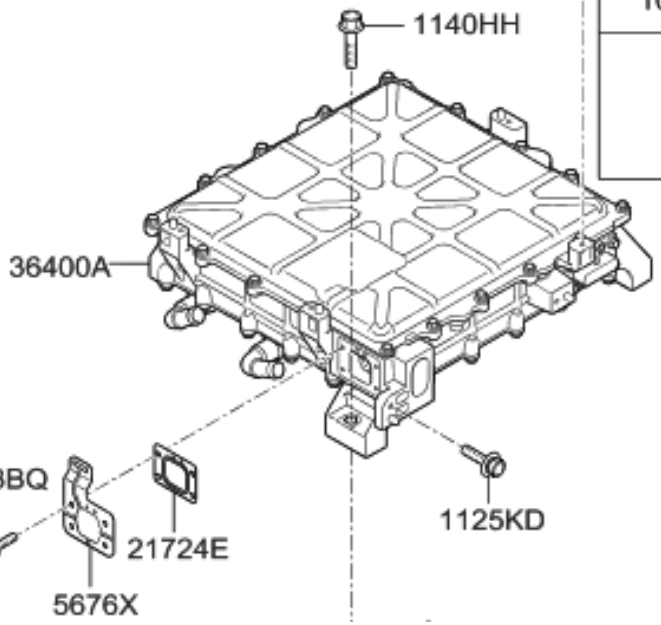
Ioniq under the Hood



Power Conversion Unit

1229AA


10317	1140HG	11403C
		



On Board Charger

Label on Ioniq On Board Charger

Operating Expenses Comparison for 20,000 Km driving per year
Convention *modern* ICE (Internal Combustion Engine) Car

Assuming fuel consumption rate of 9 litres per 100 km and $1.10 per litre.

- **20,000/100 x 9 x 1.10 = $1980**

Calculations for Same Distance with Hyundai Ioniq BEV (Battery Electric Vehicle)

Assuming cost of electricity in Ontario, incremental off-peak rate of is about 8 cents / kWh and the following car energy charging and range per charge specifications are:

- **Nominal Driving range per full charge = 200 km (often in summer > 250 kms)**
- **Level 2 charging power = 4800 watts**
- **Time to charge a fully depleted battery = 6 hours**
- **Energy for a full charge = 6 x 4800 = 28.8 kWh**
- **Cost for complete charge cycle of fully depleted battery = 28.8 x .08 = $ 2.30**

Cost of electricity to drive 20,000 km = 20,000/200 = 100 x $2.30 = $230

Approximate annual fuel cost savings BEV vs ICE car = $1980 - $230 = $1750

Other savings of the BEV

- No Oil changes.
- Minimal brake maintenance due to regenerative breaking.
- Simplicity in mechanical design of drive train.
- No engine air filter to replace. Only filter is for outside air into cabin.
- Typical savings in insurance costs.
- Free Level 2 Charging at many locations.

Ontario Green Vehicle Licence Plate Program

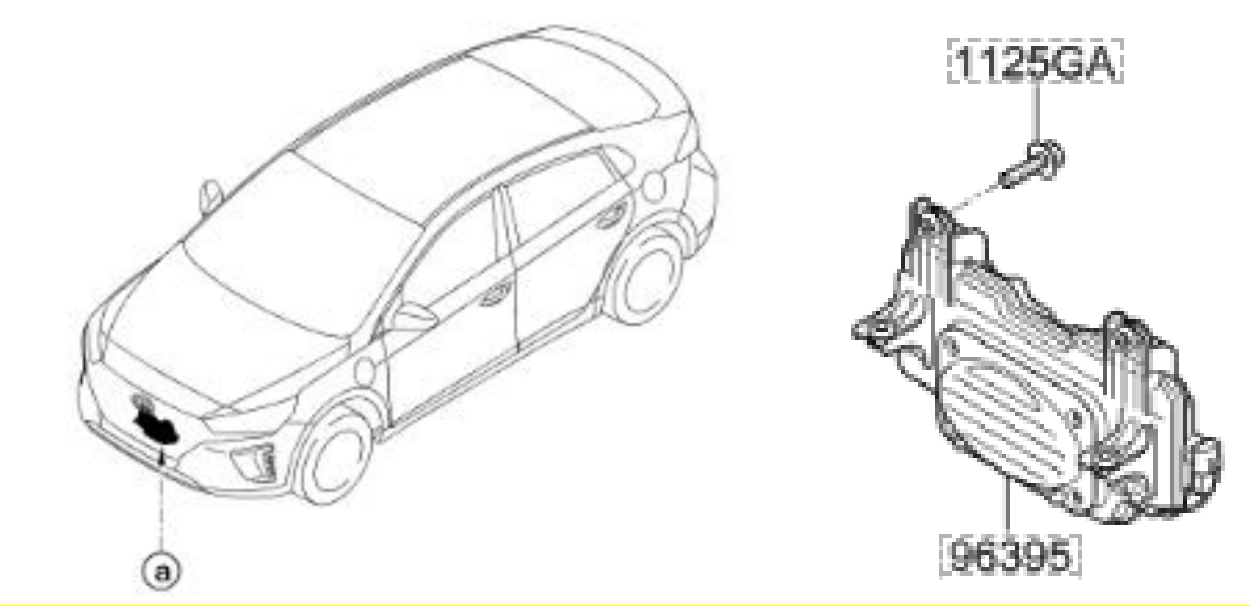
- Available for Battery Electric (BEV) and Plug-in Hybrid Electric Vehicles (PHEV)
- Also available for Hydrogen Powered Vehicles
- Non Plug-in Hybrid EVs don't qualify.
- Available in English & French : GV – Green Vehicle or VE – Véhicule Écologique
- Gives unrestricted access to HOV and (HOToll) lanes.

Some Unique Features of an Electric car:

- **Cabin Heat provided by an Energy Efficient "Heat Pump"**
- **Heat Pump also does Air Conditioning**
- **Cabin Climate Control can be directed on Driver Only**
- **Regenerative Braking – (braking reclaims energy)**
  Traction Drive Motor generates power to Re-charge Battery
- **Regenerative Braking**
  Allows for one pedal "Go & Braking" Function
- **12 VDC electrics run by Lead/Acid battery**
  Recharged from Big Battery by Inverter
- **Optional Scheduled Charging and Cabin Pre-Heating/Cooling**

Electric Cars are so <u>QUIET</u> in Operation
Therefore, by Regulation, they must have VESS
VESS= Virtual Engine Sound System

VESS in Hyundai Ioniq BEV



EV Charging

- **Level 1**

  Uses Standard 120 VAC fall plug outlet
  12 Amps, Charges slow taking up to 24 hours.

- **Level 2**

  Uses 240 VAC typically with hardwire connection to electrical panel.
  Reasonably quick taking up to 6 hours.

- **Level 3**

  480 V DC, provided at some on-the-road charging stations. Typically will charge up to 80% SOC within 30 minutes.

My Level 2 Charger Self Installed in Garage

- Sun Country Highways SCH25 $829 Cdn + shipping & tax.

- Chargers my Ioniq BEV if battery fully depleted in about 6 hours

- Chosen for light power draw on the 100 amp residential panel.

- 4800 watts, 240 VAC, draws 20 amps

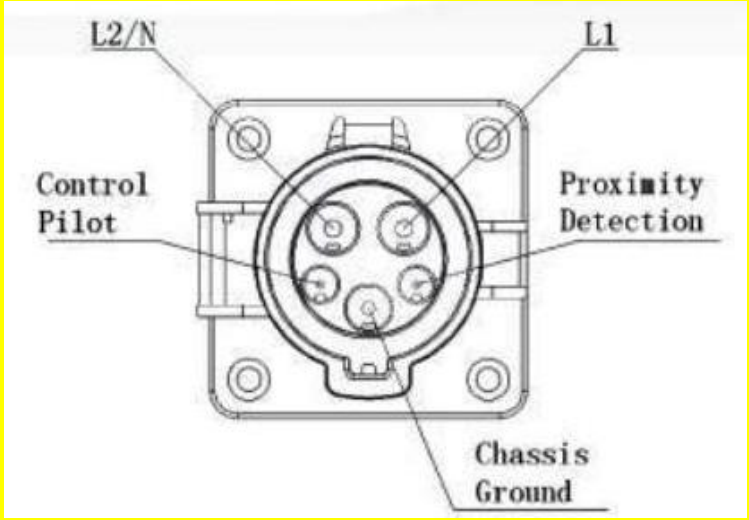
- 25 foot charging cable

SAE J1772 Connector Standard For most Electric Vehicles in North America except Tesla

- **Level 1 (120 VAC – 12 – 16 Amps)**

and

- **Level 2 (240 VAC – up to 80 Amps)**



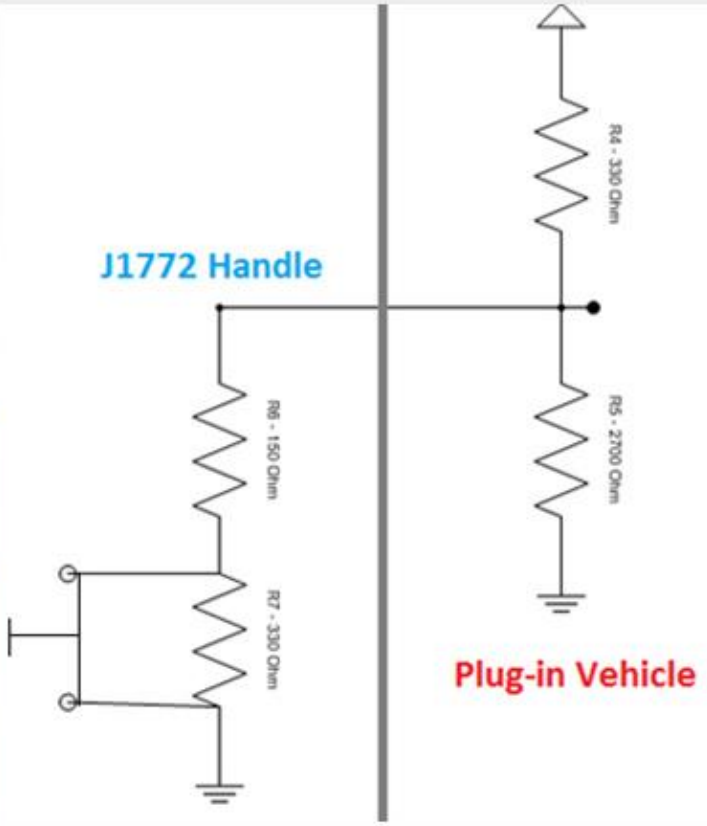
“Proximity” Pin connection on J 1772 plug

J1772 Proximity

The J1772 Proximity circuit is present in the Electric Vehicle and the J1772 plug. It uses a voltage divider circuit with resistors in Parallel and series to achieve different measured voltages for each state.

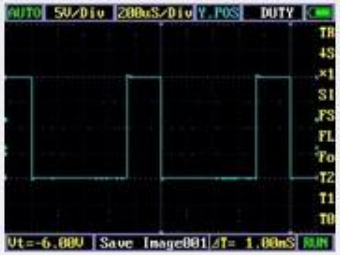
State	Voltage on Proximity pin
Not Connected	4.5v
Button Pressed	3.0v
Connected	1.5v

	Resistance
R4	330
R5	2700
R6	150
R7	330



“Pilot” Pin connection on J 1772 plug

J1772 Pilot Signal

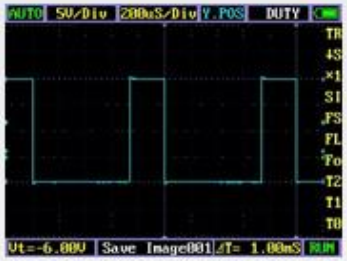


The J1772 Pilot is a 1khz +12V to -12V square wave, the voltage defines the state. The EV adds resistance pilot to Ground to vary the voltage. The EVSE reads the voltage and changes state accordingly.

State	Pilot High	Pilot Low	Frequency	EV Resistance	Description
State A	+12V	N/A	DC	N/A	Not Connected
State B	+9V	-12V	1000hz	2.74k	EV Connected (Ready)
State C	+6V	-12V	1000hz	882	EV Charge
State D	+3V	-12V	1000hz	246	EV Charge Vent. Required
State E	0V	0V	N/A		Error
State F	N/A	-12V	N/A		Unknown/Error

“Pilot” Pin connection on J 1772 plug, duty cycle of 1 kHz also determines max available current from charger.

J1772 Duty Cycle



The J1772 Pilot is a 1khz +12V to -12V square wave, the Duty cycle (ratio high state to low state) determined the maximum available current. The EVSE sets the duty cycle the EV must comply to original setting or changes to the duty cycle.

6A - 51A

Amps = Duty cycle x 0.6

Duty cycle = Amps / 0.6

51A - 80A

Amps = (Duty Cycle - 64) 2.5

Duty cycle = (Amps / 2.5) + 64

Amp	Duty Cycle	Amp	Duty Cycle
6A	10%	40A	66%
12A	20%	48A	80%
18A	30%	65A	90%
24A	40%	75A	94%
30A	50%	80A	96%

High Capacity Quick Charging

Combined Charging System “CCS”

2 additional pins to J 1772 Plug carry
200 to 450 VDC up to 90 kW
Adopted by Audi, BMW, Daimler, Ford, GM, Hyundai, Porsche, Volvo and VW

But not Nissan (Leaf)

High Voltage DC Connections

Nissan Leaf uses the “CHAdeMO” standard for High Capacity Level 3 Quick Charging

Charging Ports of Nissan Leaf

Level 3 - CHAdeMO on right

Level 1 & 2 – J 1772 on left

Most Public Level 3 Chargers provide both CCS and CHAdeMO Charge Cables

EV Parking in the World Exchange Building Parking Lot
The charge is free but you pay for parking there.

There are lots of free promotional Level 2 Charging Stations.
Most Car Dealerships provide free Level 2 Charging

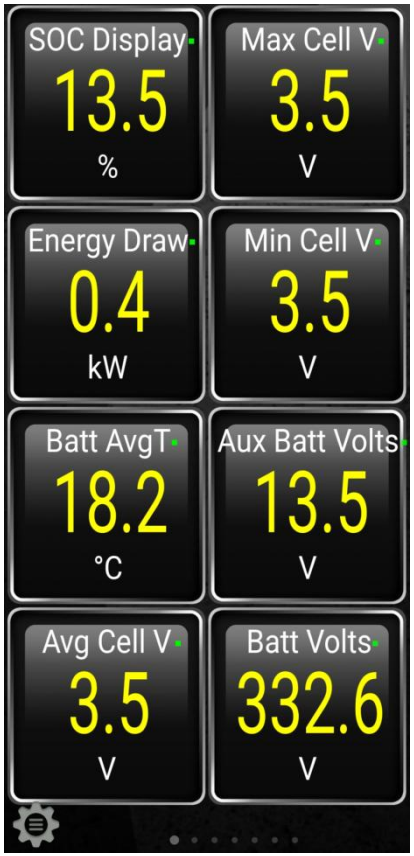
Free Charging
At Place d'Orleans
Shopping Centre

Android “Torque” Smart Phone Application to Monitor Workings of Electric Car from OBD2 Port

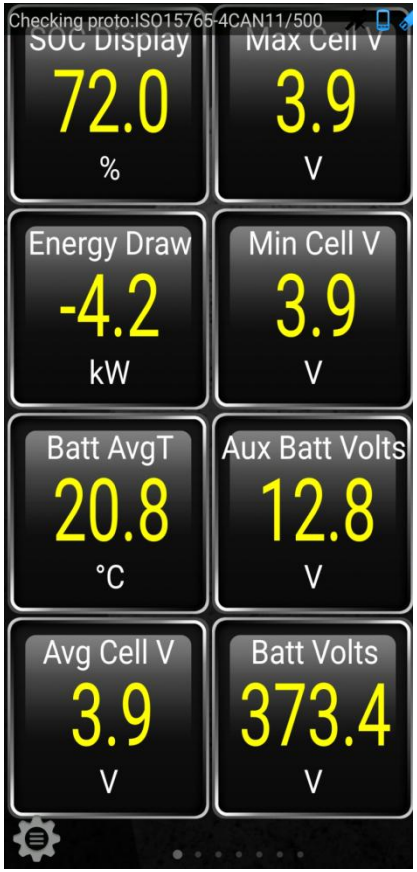
Bluetooth OBD2 Dongle

Torque OBD2 App

Before Charge Start



Charging Continuing



Monitoring Demand for power as you Drive

Some Current Battery Electric Vehicles Available

Battery Capacity and Ranges are changing every year.

• Smart Car for 2 Electric	145 km	17.6 kWh
• Ford Focus Electric	185 km	34.0 kWh
• Hyundai Ioniq Electric	200 km	28.0 kWh
• Kia Soul Electric	179 km	27.0 kWh
• Nissan Leaf	242 km	40.0 kWh
• VW E-Golf	201 km	34.0 kWh
• Chevy Bolt	383 km	60.0 kWh
• Tesla Model 3	354 km	50.0 kWh
• BMW i3	183 km	60 Ah ??
• Tesla Model S	416 km	75 kWh
• Tesla Model X	381 km	75 kWh

Testla Model 3 - top EV in sales

- 5455 sold in Canada May to November this year so far
- $46, 000 to $64,100 (up to 500 Km on biggest battery)
- Also available with Dual Motor AWD (3.5 secs 0 to 100 km/h)

Tesla Model 3 Interior

- Clean Dash, No Instrumentation Cluster
- Driver interfaces with car through 15” Touch Screen

Ron, VE3LBU's Nissan "Leaf" BEV

- 40 kWh Lithium Ion Battery Pac
- 147 hp electric motor
- nominal range – 241 kms
- "E-Pedal" one pedal go-stop control
- Level 2 recharge time – about 7.5 hrs

Toyota Prius Prime Plug-In Hybrid EV owned by Nicole, VE3GIQ

- 1.8 L Atkinson Cycle Gas Engine (long power stroke for high efficiency)
- Gas mileage: about 4.3 L/100 km
- CVT Transmission
- Permanent Magnet Synchronous AC Electric Motor, 71 hp
- Lithium-ion Battery, 8.8 kWh, 352 volts
- Recharge Time: about 5 hours at 120 VAC
- Battery Electric range: about 40 km

What we can expect for the Future

- Continued Improvement in EV Li-Ion capacity and <$ manufacturing cost.
- Solid State Batteries show promise of higher energy density and safety
- Super Capacitor development for Spurt Energy for high EV acceleration
- Changes in Electrical Codes and Building Codes to Facilitate EV Charging
- EV technology for Public Transportation – New Flyer Wpg a leader
- Induction Charging - EMI concerns

Questions ??