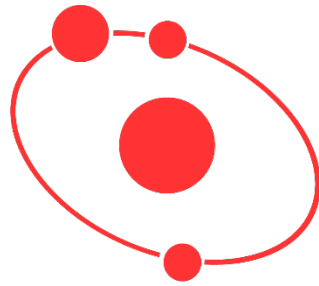


**AMPERE**  **EV**



**ATOM**  
DRIVE SYSTEM

**LOW VOLTAGE WIRING HARNESS DATASHEET**

Version 5.7



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## Wire Bundle Reference Table

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<u>3</u>	<u>HV Junction Box</u>
<u>4</u>	<u>CCS Junction Box</u>
<u>5</u>	<u>Park Pawl</u>
<u>7</u>	<u>VCU Grounds</u>
<u>8</u>	<u>VCU 12V Power</u>
<u>9</u>	<u>Brake Switch</u>
<u>10</u>	<u>Parking Brake</u>
<u>11</u>	<u>Vacuum Pressure Sensor</u>
<u>12</u>	<u>AC Pressure Sensor</u>
<u>13</u>	<u>Ambient Air Temp Sensor</u>
<u>14</u>	<u>Battery Module LV</u>
<u>15</u>	<u>Ignition</u>
<u>16</u>	<u>Brake / Reverse Lights</u>
<u>17</u>	<u>Throttle</u>
<u>18</u>	<u>Main Power Relay (MPR)</u>
<u>19</u>	<u>Charger</u>
<u>20</u>	<u>GUI</u>
<u>21</u>	<u>Cooling Fan 1</u>
<u>22</u>	<u>Cooling Fan 2</u>
<u>23</u>	<u>Motor / Inverter</u>
<u>24</u>	<u>Motor Cooling Pump</u>
<u>25</u>	<u>Vacuum Pump</u>
<u>26</u>	<u>AC Compressor</u>
<u>27</u>	<u>Battery Cooling Pump</u>
<u>28</u>	<u>Battery Heater</u>
<u>29</u>	<u>Cabin Heater</u>
<u>30</u>	<u>Cabin Heat Pump</u>
<u>31</u>	<u>Charge Controller</u>
<u>32</u>	<u>Charge Port</u>
<u>33</u>	<u>CAN Keypad</u>
<u>36</u>	<u>AC Fan Relays</u>
<u>37</u>	<u>Auxiliary Power/Ground 1</u>
<u>38</u>	<u>Auxiliary Power/Ground 2</u>
<u>39</u>	<u>Auxiliary Power/Ground 3</u>
<u>40</u>	<u>Auxiliary Power/Ground 4</u>
<u>41</u>	<u>Gauges</u>
<u>42</u>	<u>Auxiliary Sensor 1</u>
<u>43</u>	<u>Auxiliary Sensor 2</u>
<u>44</u>	<u>OBD-II Port</u>



# JUNCTION BOXES

## HV JUNCTION BOX

Wire Bundle 3



PIN	COLOR	DESCRIPTION
01	Blue	MAIN - CTR FEEDBACK
02	Red	MAIN - CTR 12V
03	Pink	PRECHARGE RELAY 12V
04	Yellow	DISCHARGE RELAY 12V
05	Grey	JB HVIL IN
06		Reserved
07	Orange	MAIN - CTR FEEDBACK
08	Black	MAIN - CTR GND
09	Black	PRECHARGE RELAY GND
10	Black	DISCHARGE RELAY GND
11	GREEN	JB HVIL OUT
12		Reserved



## CCS JUNCTION BOX

### Wire Bundle 4



PIN	COLOR	DESCRIPTION
01	Blue	CCS + CTR FEEDBACK
02	Yellow	CCS – CTR FEEDBACK
03	White	CCS VS 12V
04	Pink	CCS CTR 12V
05	Purple	CCS HVIL IN
06	Green	CCS VS CAN LO
07	Grey	CCS + CTR FEEDBACK
08	Orange	CCS – CTR FEEDBACK
09	Black	CCS VS GND
10	Black	CCS CTR GND
11	Green	CCS HVIL OUT
12	Yellow	CCS VS CAN HI



# THROTTLE

Wire Bundle 17

## THROTTLE PEDAL



PIN	COLOR	DESCRIPTION
01	Red	THROTTLE 2 5V
02	Blue	THROTTLE 1 5V
03	Black	THROTTLE 1 GND
04	Yellow	THROTTLE 1 SIGNAL
05	Grey	THROTTLE 2 GND
06	Orange	THROTTLE 2 SIGNAL





## CABLE THROTTLE



PIN	COLOR	DESCRIPTION
01	Red	THROTTLE 2 5V
02	Grey	THROTTLE 2 GND
03	Orange	THROTTLE 2 SIGNAL
04	Yellow	THROTTLE 1 SIGNAL
05	Blue	THROTTLE 1 5V
06	Black	THROTTLE 1 GND



## SENSORS

### VACUUM SENSOR

*Wire Bundle 11*



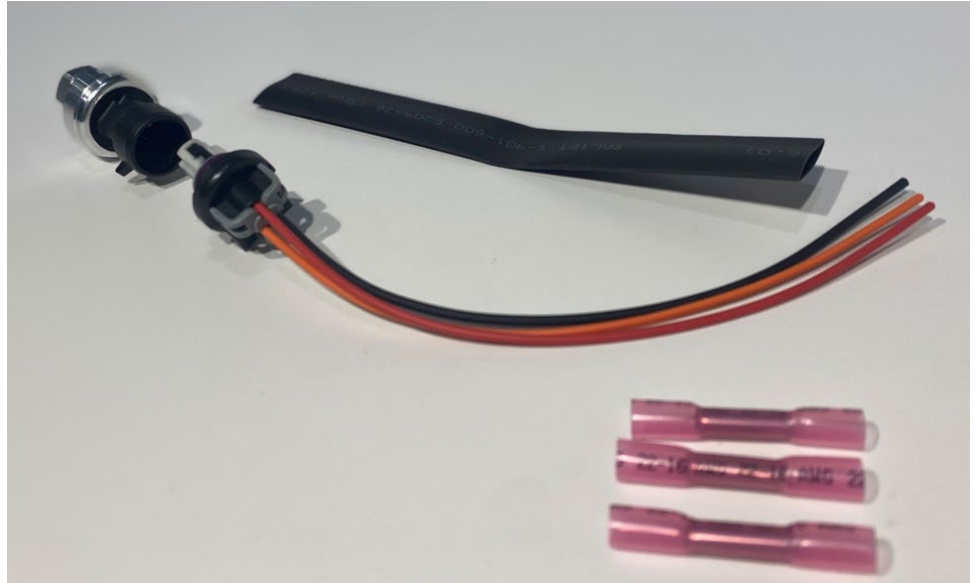
PIN	COLOR	DESCRIPTION
01	Blue	VAC SENSOR 5V
02	Grey	VAC SENSOR GND
03	Yellow	VAC SENSOR SIGNAL



## AC PRESSURE SENSOR

### Wire Bundle 12

The AC pressure sensor comes with a pre-terminated pigtail. Use the supplied heat shrink butt connectors and heat shrink to attach the wires to the Atom Drive Harness.



**\*\*\* Note that the wire colors for AC Pressure Signal and AC Pressure 5V do not match up. The correct pairing is orange to red and red to orange as in the table below. \*\*\***

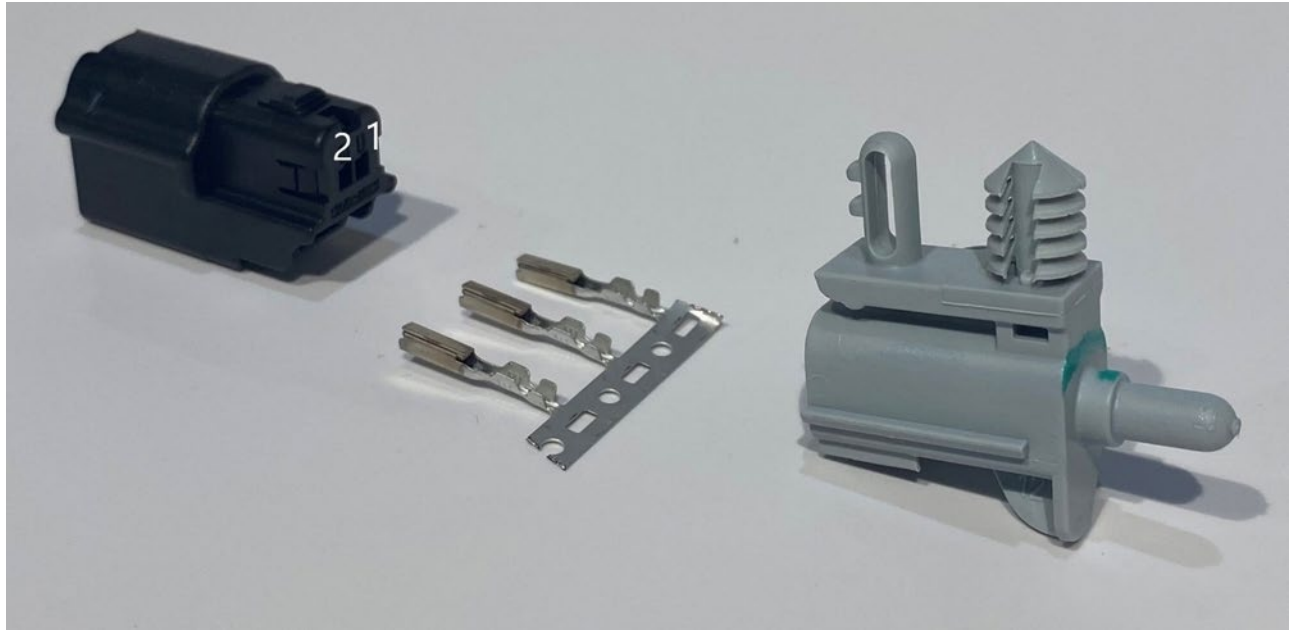
PIN	COLOR	PIGTAIL COLOR	DESCRIPTION
01	Orange	Red	AC PRESS SIGNAL
02	Black	Black	AC PRESS GND
03	Red	Orange	AC PRESS 5V



## AMBIENT AIR TEMP SENSOR

### *Wire Bundle 13*

The Ambient air temperature sensor is an important part of the Atom Drive control system. Be sure to mount the sensor in a location where it will be able to measure ambient air conditions. Common locations are behind the front grille, bumper, or any other protected location away from excessive heat.



PIN	COLOR	DESCRIPTION
01	Blue	AIR TEMP SIGNAL
02	Black	SENSOR GND



## BRAKE SWITCH

### Wire Bundle 9

In order to know which wire to use for the brake switch, you must first determine whether the vehicle's brake switch pulls to ground, or 12 volts. If the switch goes to ground, use wire labeled "BRAKE SWITCH LO". If the switch output pulls high to 12V when activated, use the wire labeled "BRAKE SWITCH HI". Use only one wire or the other. No special settings or calibrations are needed as the VCU will automatically detect which wire is being used. Leave the unused wire unterminated. It is good practice to apply some tape or heat shrink over the end of the unused wire to be sure it is not activated inadvertently.

PIN	COLOR	DESCRIPTION
01	White	BRAKE SWITCH LO
02	Blue	BRAKE SWITCH HI

**\*\*\* Note: If the vehicles brake switch directly drives the brake light relay, it will be necessary to sever this connection so that only the VCU controls the brake lights. Failure to disconnect the direct control from the brake switch may result in the brake lights turning on, but not ever turning off. \*\*\***

## PARKING BRAKE

### Wire Bundle 10

The Atom Drive System is designed to accept a low side trigger (pull to ground) input for the manual parking brake. When engaged, the wire should be grounded. When disengaged the wire should be floating (not connected to a power or ground source). The parking brake input wire is labeled "PARK BRAKE LO". The parking brake input wire is not required to be connected to the car but is useful for indication on the Ampere GUI. If the parking brake wire is not connected, this functionality will not be operational. Additionally, the parking brake light will not display on the user interface screen when the parking brake is applied. The vehicle will otherwise function normally without the parking brake input.

PIN	COLOR	DESCRIPTION
01	Grey	PARK BRAKE LO



## IGNITION

### *Wire Bundle 15*

The Ignition wire is a high side trigger wire which initiates the startup and shut down procedures within the VCU control logic. This wire can be connected to any wire with 12V when the vehicle is keyed on. You can use the output wires from the ignition barrel if using a standard key or even a simple toggle switch connected to constant power. This decision is up to you as long as the wire is powered when the vehicle is intended to be on and not powered when the vehicle is intended to be off.

PIN	COLOR	DESCRIPTION
01	Yellow	IGNITION

## MAIN POWER RELAY

### *Wire Bundle 18*

The Main Power Relay controls the switched power to the entire system. The relay is controlled directly by the VCU as part of the startup and shut down procedures. This relay should be mounted and wired according to the Atom drive 12V schematic. The coil of the relay will be controlled via the two wires in the VCU pigtail harness labeled “MPR DRIVER” and “MPR CONST 12V”. It does not matter which blade of the relay coil the two wires are connected to.

PIN	COLOR	DESCRIPTION
01	White	MPR DRIVER
02	Red	MPR CONST 12V



## FANS

The wires coming from the fan should be pinned to the male connector, and the car side to the female connector. The 12V input to the fan is blue, and the ground is black. Connect the blue wire to pin 01 on the fan side connector.

**\*\*\* Both fans are identical assemblies; however, they are NOT interchangeable from a wiring perspective. Be sure to connect fan 1 to the correct connector and wires for fan 1 on the car side of the harness and vice versa. If the fans are wired improperly, the VCU will not be able to control the cooling system appropriately for the respective cooling loops in addition to AC condenser cooling. \*\*\***

### FAN 1

#### Wire Bundle 21

#### FAN SIDE CONNECTOR

PIN	COLOR	DESCRIPTION
01	Blue	FAN 1 12V
02	Black	FAN 1 GND

#### CAR SIDE CONNECTOR

PIN	COLOR	DESCRIPTION
01	Green	FAN 1 12V
02	Black	FAN 1 GND

### FAN 2

#### Wire Bundle 22

#### FAN SIDE CONNECTOR

PIN	COLOR	DESCRIPTION
01	Blue	FAN 2 12V
02	Black	FAN 2 GND

#### CAR SIDE CONNECTOR

PIN	COLOR	DESCRIPTION
01	Blue	FAN 2 12V
02	Black	FAN 2 GND



## CHARGE PORT

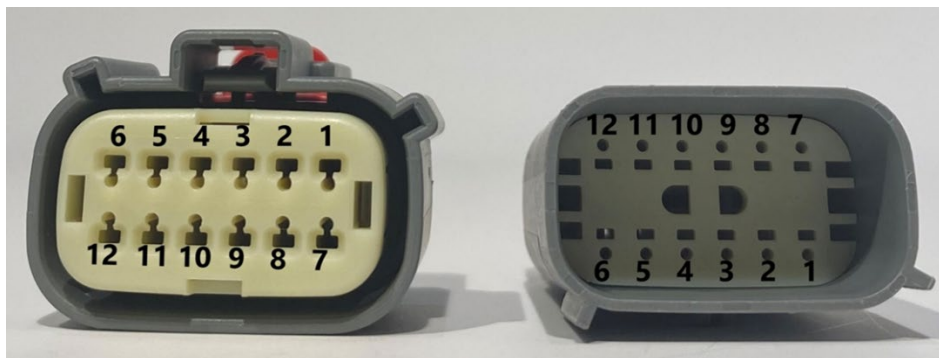
### *Wire Bundle 32*

The charge port supplied with the Atom Drive System includes features such as a charge port lock motor and thermistors to monitor the temperature of the power pins for both AC and DC fast charging if equipped. The wires for these features, as well as proximity and pilot control wires, are supplied with several feet of length from the charge port itself. It is up to the installer how long or short to leave these wires. The main factor of importance is that enough slack be left between the car side and charge port side of the harness so that the wires can be routed and tucked away as desired. It is good practice to determine your proper length so that the two ends meet exactly along your desired routing path and then add a few inches to each side to avoid cutting the harnesses too short by mistake.

There is a large gauge green and yellow protective earth wire from the charge port which should be grounded to the vehicle chassis. One possible location for this is the ground lug on the charger itself. The Protective Earth (PE) wire coming from the low voltage connector on the charge port side should be routed to the same chassis ground location as the green and yellow PE wire. A 4ga Lug and black wire with M8 ring terminal have been included for the PE grounds.

## CHARGE PORT LOW VOLTAGE

**NOTE:** Pin one side of the supplied black wire with the M8 ring terminal in the PE ground kit to pin 7 on the charge port side connector. Bolt the other end to the same ground location you choose for the 4ga green and yellow PE cable coming from the charge port. A good location, if convenient, is the ground lug on the charger unit itself. You must make sure that the ground lug on the charger is also supplied with a good chassis ground using 8ga or larger cable.







## CAR SIDE

PIN	COLOR	DESCRIPTION
01	Grey	AC TEMP
02	Grey	AC TEMP GND
03	Brown	DC TEMP GND
04	Black	DC- TEMP
05	White	DC+ TEMP
06	Blue	EVSE CP
07	Yellow	EVSE PE
08	Brown	EVSE PROX
09	Green	PLUG LOCK +
10	Pink	PLUG LOCK -
11	Purple	LOCK POS FEEDBACK +
12	Orange	LOCK POS FEEDBACK -

## CHARGE PORT SIDE

PIN	COLOR	DESCRIPTION
01	Grey	AC Thermistor Signal
02	Brown	AC Thermistor GND
03	Brown	DC Thermistor GND
04	Green	DC- Thermistor Signal
05	Yellow	DC+ Thermistor Signal
06	White	EVSE Control Pilot
07	Black	EVSE PE(GND w/ yellow/green cable)
08	Black	EVSE Proximity
09	Blue/Red	Plug Lock Motor +
10	Blue/Brown	Plug Lock Motor -
11	Blue/Green	Lock Position Feedback +
12	Blue/ Yellow	Lock Position Feedback -



# MOTOR PUMP

## Wire Bundle 24

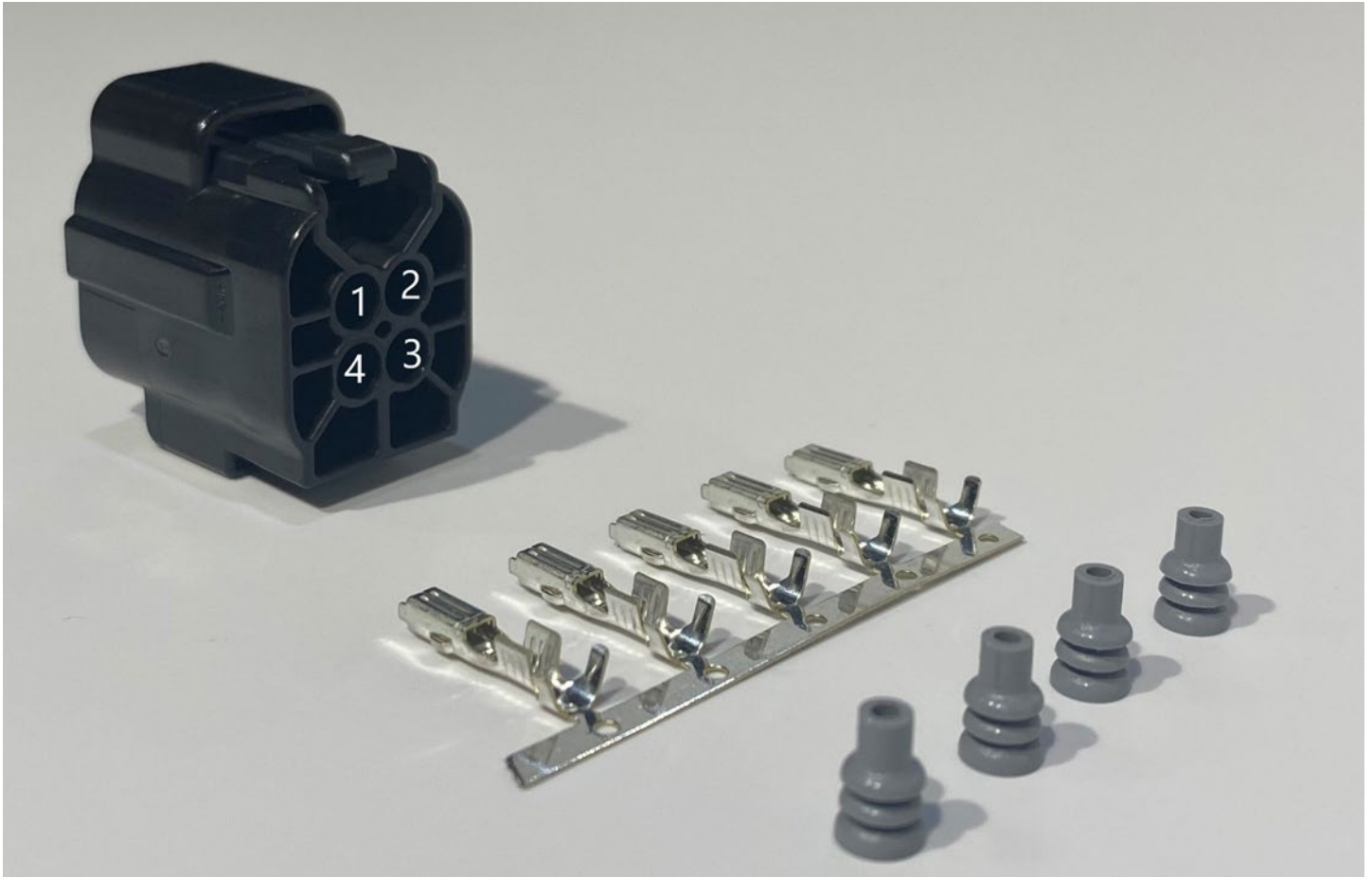


PIN	COLOR	DESCRIPTION
01	Pink	MOTOR PUMP MPR 12V
02	Yellow	MOTOR PUMP CAN HI
03	Green	MOTOR PUMP CAN LO
04	Black	MOTOR PUMP GND



# BATTERY PUMP

## Wire Bundle 27

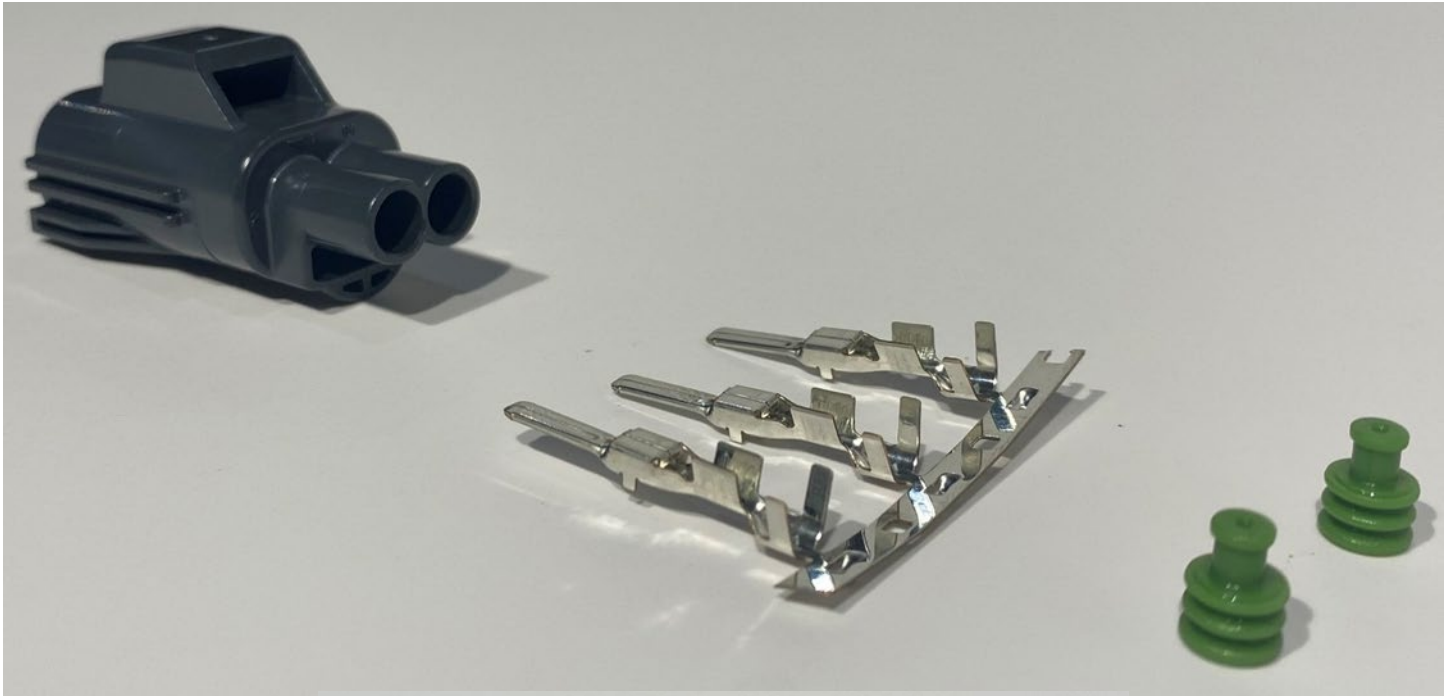


PIN	COLOR	DESCRIPTION
01	Black	BATT PUMP GND
02	Yellow	BATT PUMP CAN HI
03	Green	BATT PUMP CAN LO
04	Pink	BATT PUMP MPR 12V



# VACUUM PUMP

Wire Bundle 25



PIN	COLOR	DESCRIPTION
01	Pink	VAC PUMP 12V
02	Black	VACUUM PUMP GND



# CABIN HEAT PUMP

Wire Bundle 30



PIN	COLOR	DESCRIPTION
01	Red	CABIN HEAT PUMP 12V
02	Black	CABIN HEAT PUMP GND



# BATTERY HEATER

## Wire Bundle 28



PIN	COLOR	DESCRIPTION
01		
02	Yellow	BATT HEAT CAN HI
03	Green	BATT HEAT CAN LO
04	Black	BATT HEAT GND
05	Red	BATT HEAT 12V
06		





# CABIN HEATER

## Wire Bundle 29



PIN	COLOR	DESCRIPTION
01		
02	Yellow	CABIN HEAT CAN HI
03	Green	CABIN HEAT CAN LO
04	Black	CABIN HEAT GND
05	Blue	CABIN HEAT 12V
06		



# AC COMPRESSOR

## Wire Bundle 26



PIN	COLOR	DESCRIPTION
01	Green	AC COMP CAN LO
02	Yellow	AC COMP CAN HI
03	Black	AC COMP GND
04		
05		
06	Pink	AC COMP 12V





# MOTORS

Wire Bundle 23

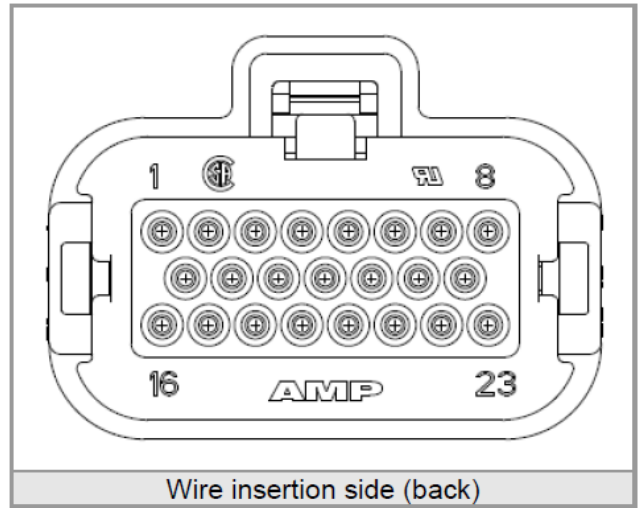
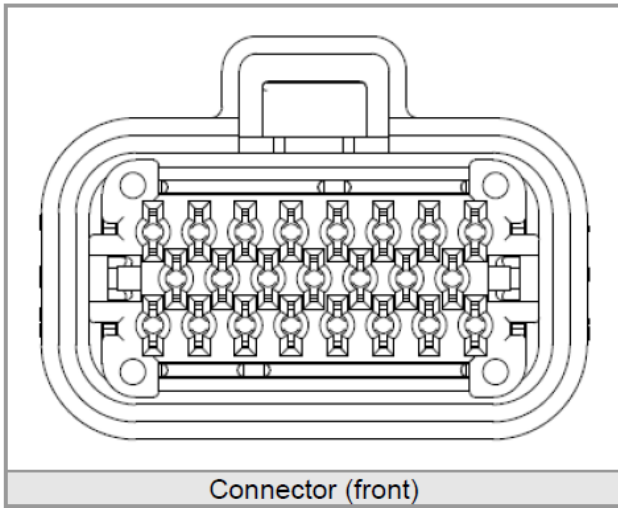
## CASCADIA & TESLA MOTORS



PIN	COLOR	DESCRIPTION
01	Yellow	MOTOR CAN HI
02	Green	MOTOR CAN LO
03	Orange	MOTOR ENABLE
04	Red	MOTOR CONST 12V
05	Black	MOTOR CONTROL GND
06	Pink	MOTOR MPR 12V



# TM4 SUMO LD MV400



PIN	COLOR	DESCRIPTION
01	Pink	MOTOR MPR 12V
08	Orange	MOTOR ENABLE
09	Green	MOTOR CAN LO
15	Orange	MOTOR ENABLE
16	Yellow	MOTOR CAN HI
22	Black	MOTOR CONTROL GND
23	Black	MOTOR CONTROL GND



## BATTERY MODULES

### Wire Bundle 14

\*\*\*For more detailed instructions on wiring the battery modules, reference the 'Battery Module Low Voltage Wiring Guide'.\*\*\*

### Module Side MX-150

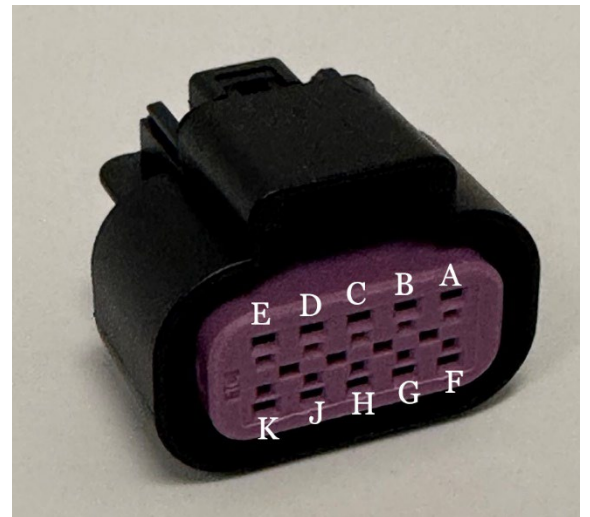
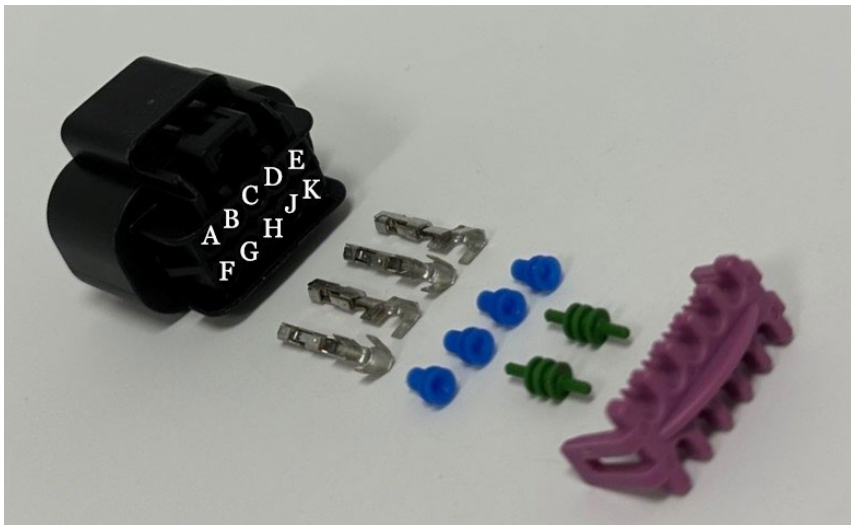


PIN	COLOR	DESCRIPTION
01	Red	BMS MPR 12V
02	Black	BMS GND
03	Yellow	BMS CAN 0 HI
04	Green	BMS CAN 0 LO
05	Orange	BMS FAULT
06	Purple	BMS VCU WAKE
07	Yellow	BMS CAN 1 HI
08	Green	BMS CAN 1 LO
09		
10		
11		
12		



**\*\*\*CAN 0 HI and CAN 0 LO are only needed between Module A and the Hub. All B modules only require CAN 1 HI and CAN 1 LO. CAN 0 is the connection between the A module and the vehicle’s CANBUS network. CAN 1 is the inter-module communication channel between the A module and all B modules. Since only Module A communicates with the vehicle CAN, it is the only one which requires CAN 0 to be pinned out.\*\*\***

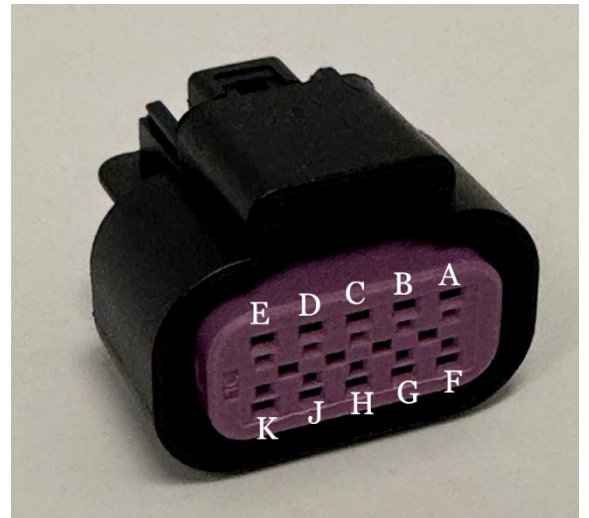
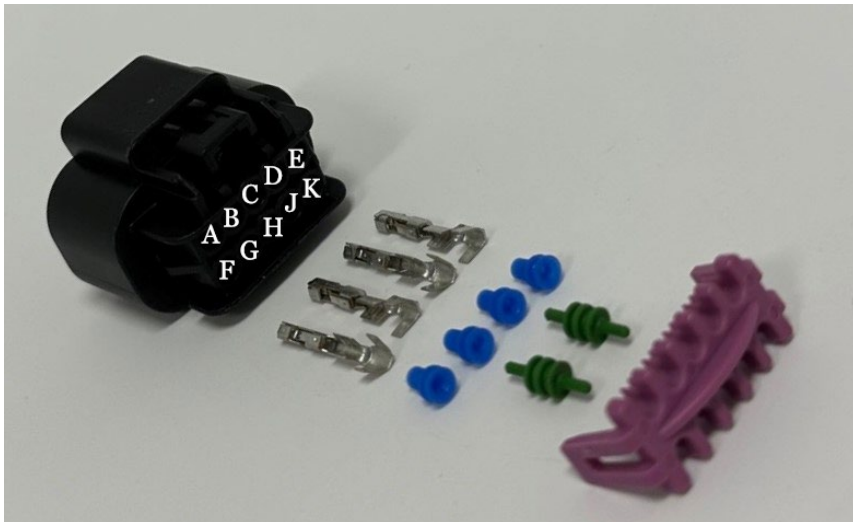
### Hub Side GT-150 (VCU to Hub)



PIN	COLOR	DESCRIPTION
A	Pink	BMS MPR 12V
B	Black	BMS GND
C	Yellow	BMS CAN 0 HI
D	Green	BMS CAN 0 LO
E	Orange	BMS FAULT
F	Yellow	BMS VCU Wake
G		
H		
I		
J		



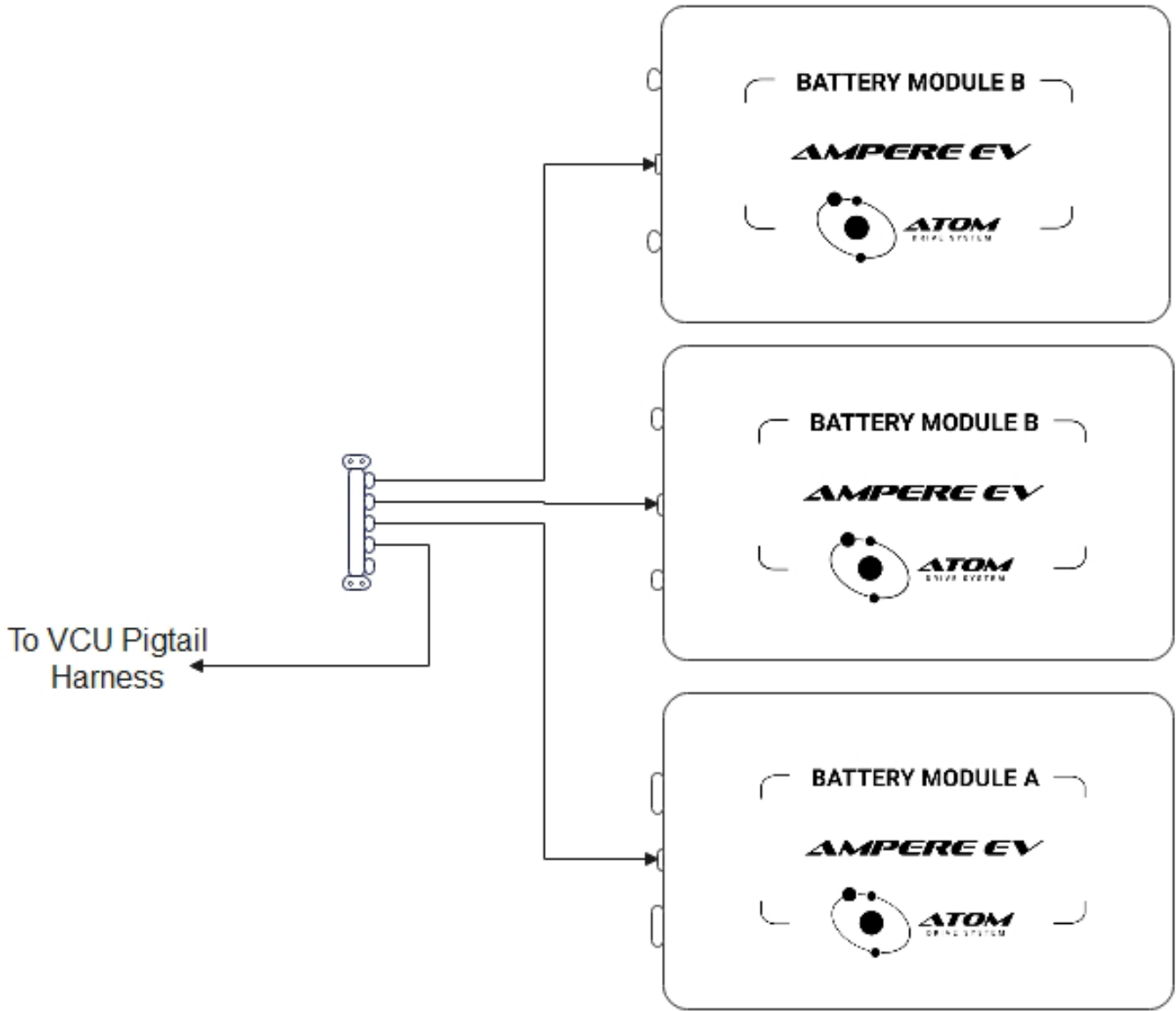
## Hub Side GT-150 (Module to Hub)



PIN	COLOR	DESCRIPTION
A	Red	BMS MPR 12V
B	Black	BMS GND
C	Yellow	BMS CAN 0 HI
D	Green	BMS CAN 0 LO
E	Orange	BMS FAULT
F	Violet	BMS VCU WAKE
G	Yellow	BMS CAN 1 HI
H	Green	BMS CAN 1 LO
I		
J		

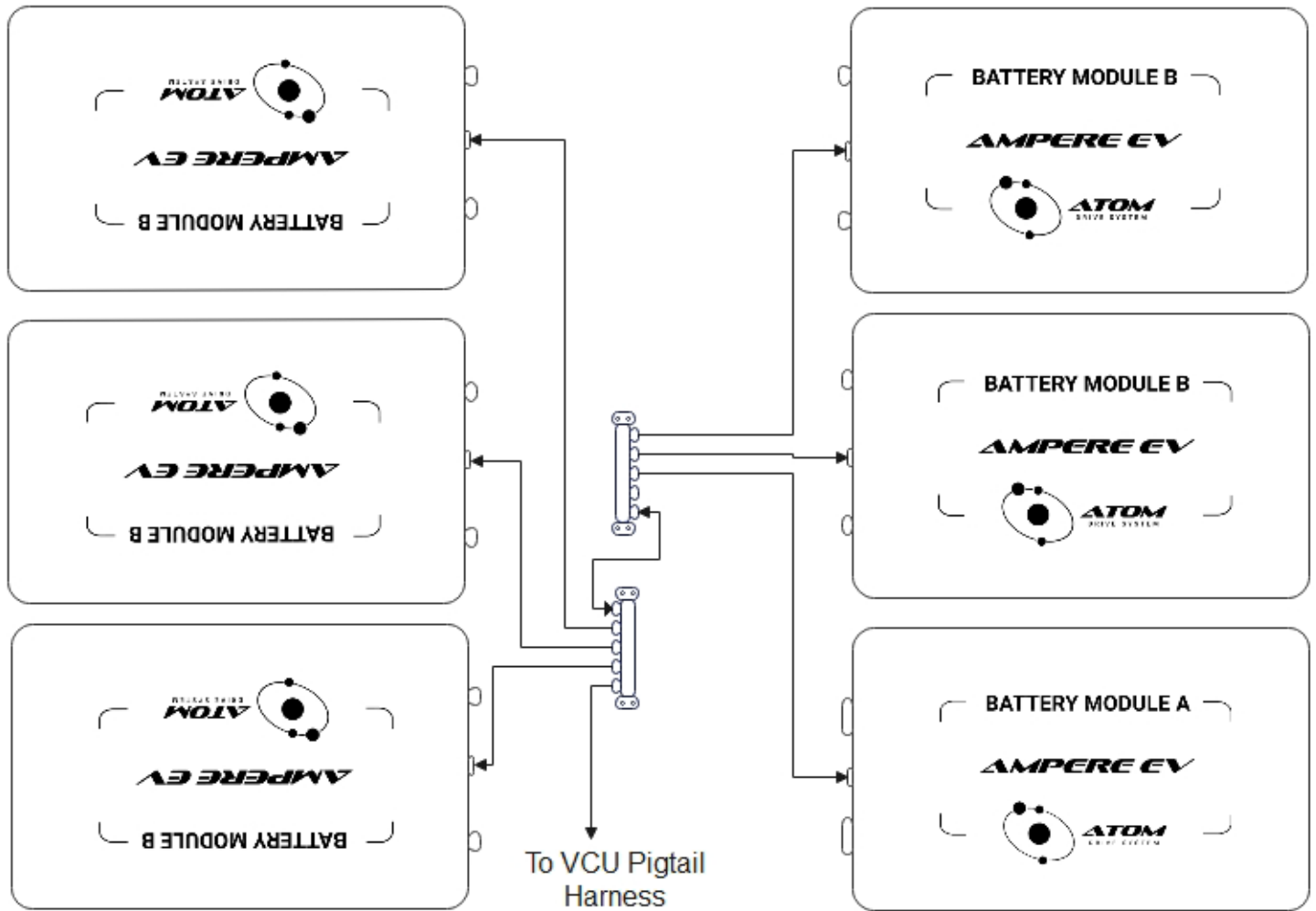


### 3 MODULE DIAGRAM





# 6 MODULE DIAGRAM

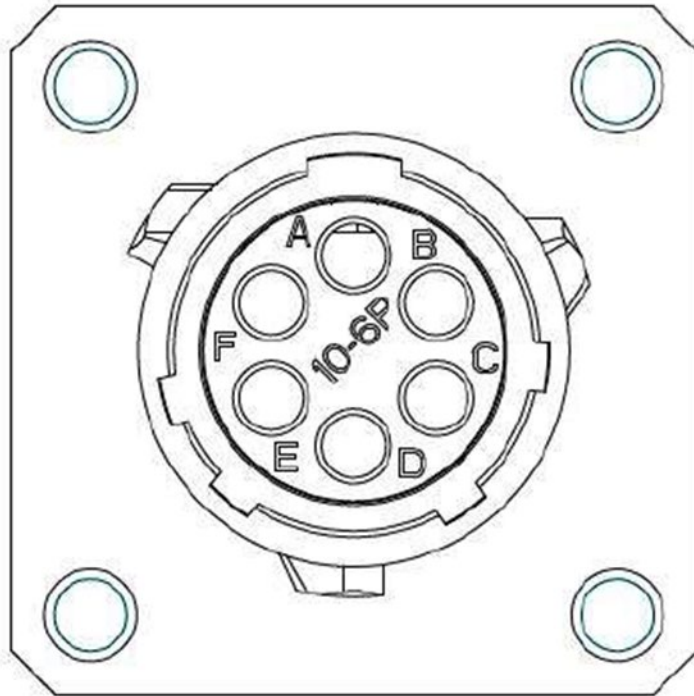




## CHARGERS

Wire Bundle 19

### OVAR TECH CHARGER



PIN	COLOR	DESCRIPTION
A	Green	CHARGER CAN LO
B	Yellow	CHARGER CAN HI
C		
D	Pink	CHARGER MPR 12V
E	Black	CHARGER GND
F	Orange	DCDC ENABLE

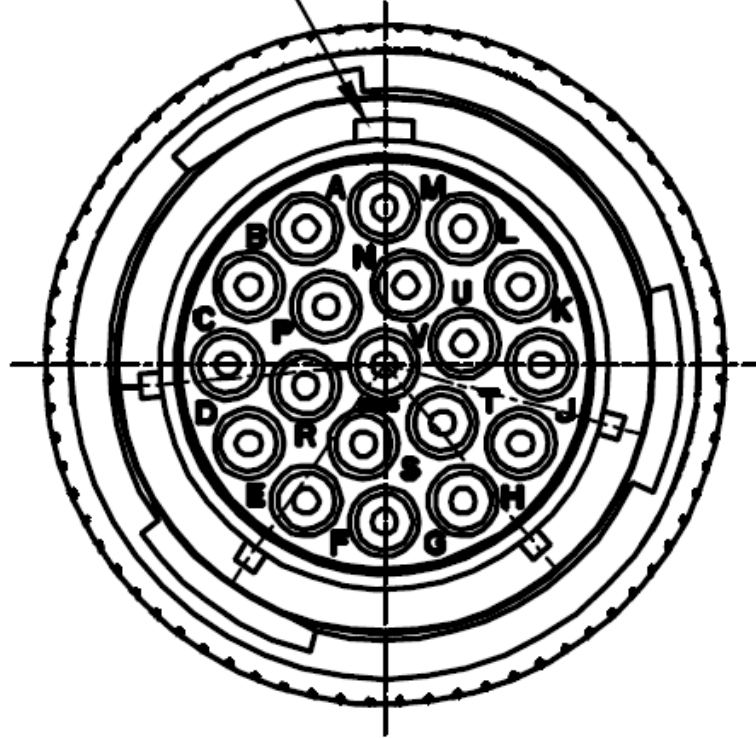




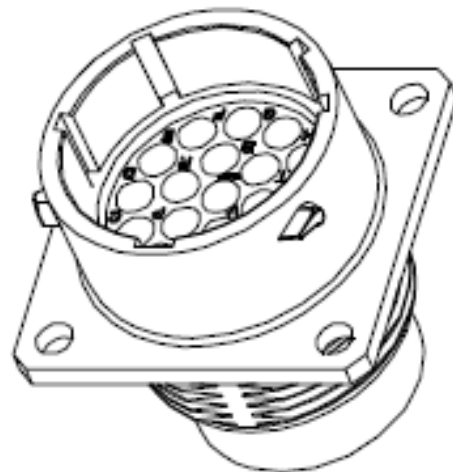
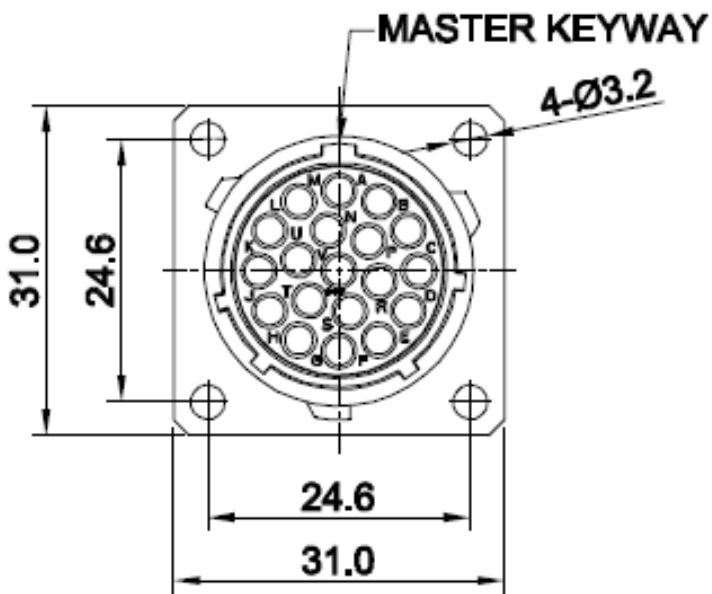
# DILONG CHARGER

## Mating Connector

**MASTER KEYWAY**



## Receptacle





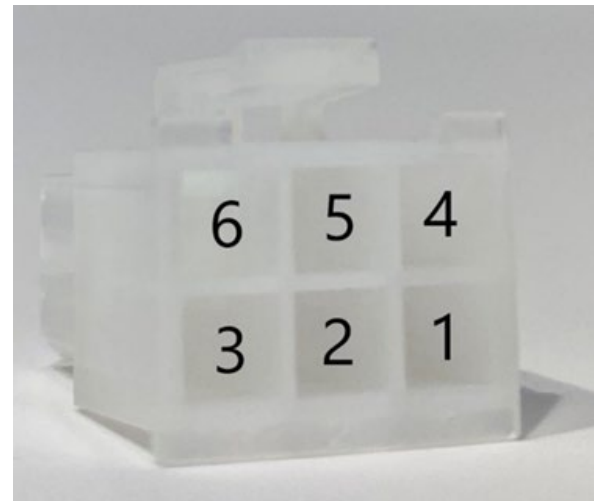
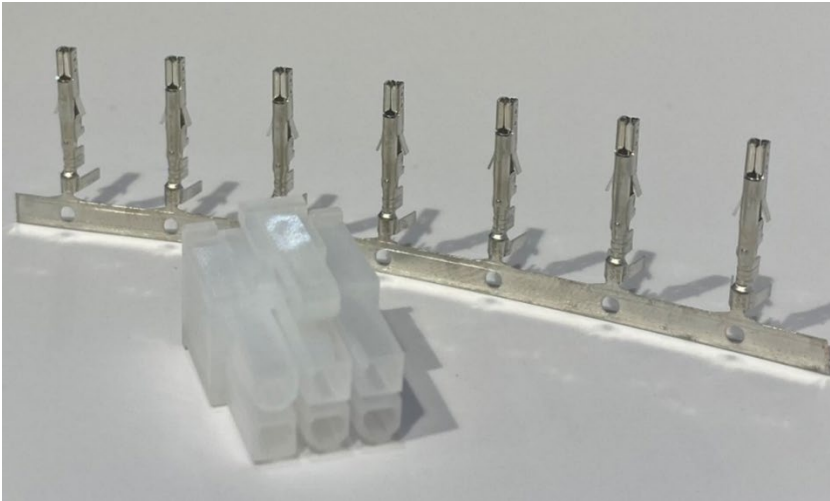
PIN	COLOR	DESCRIPTION
A	Yellow	CHARGER CAN HI
B	Pink	CHARGER MPR 12V
C	Black	CHARGER GND
D		
E		
F		
G	Green	CHARGER CAN LO
H		
J		
K		
L		
M		
N		
P		
R		
S	Orange	DCDC ENABLE
T	Orange	DCDC 12V POWER
U		
V		

**\*\*\*The DCDC enable wire must be spliced into two separate wires for the Dilong charger to function correctly. Utilizing the excess wire length in the VCU pigtail harness, splice the orange 'DCDC ENABLE' wire together with two 8" pieces of the same orange wire.\*\*\***



# GUI

## Wire Bundle 20



PIN	COLOR	DESCRIPTION
01	Red	GUI CONST 12V
02	Pink	GUI 12V
03	Black	GUI GND
04	Yellow	GUI CAN HI
05	Green	GUI CAN LO
06		



## CAN KEYPAD

Wire Bundle 33



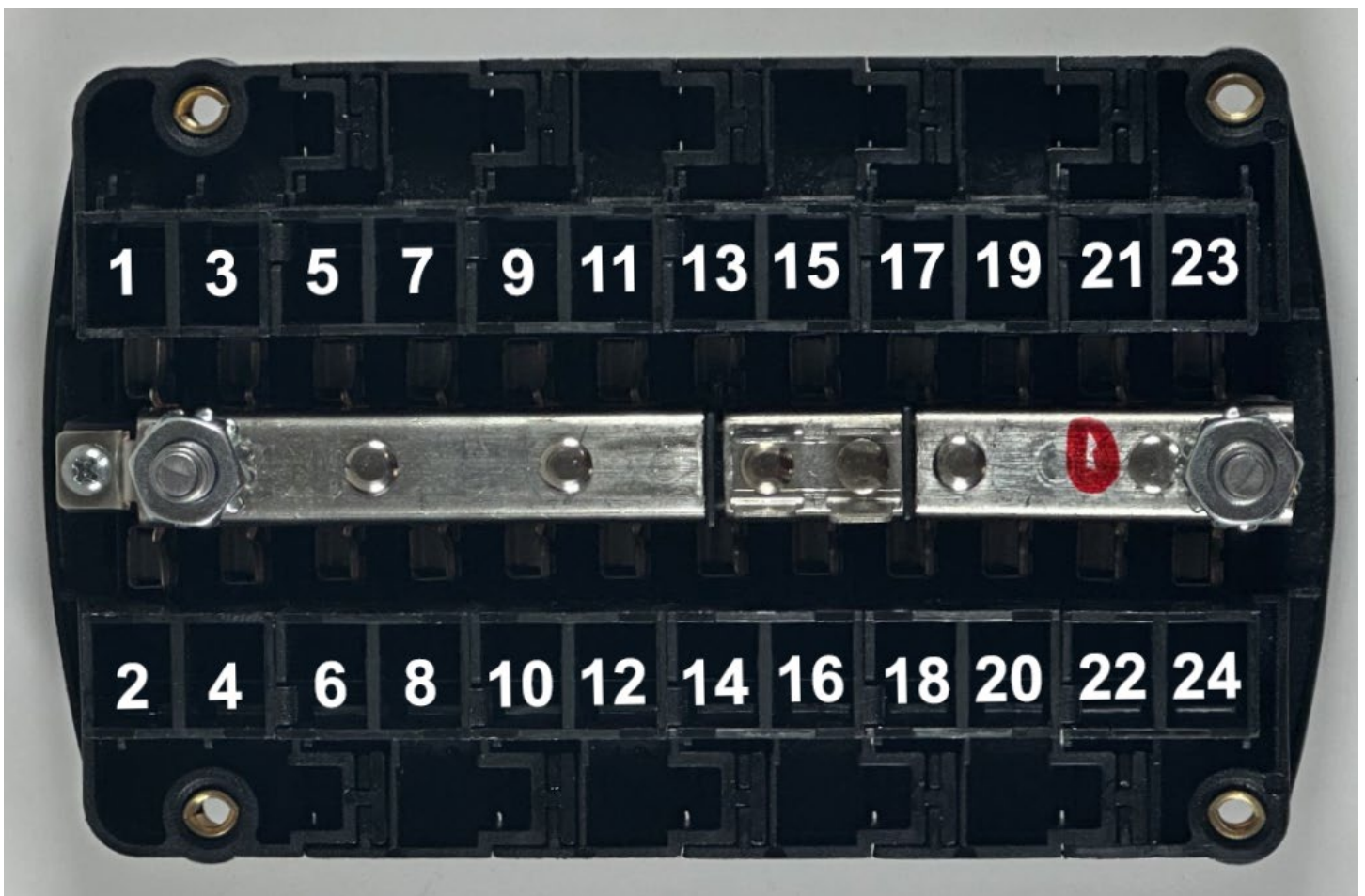
PIN	COLOR	DESCRIPTION
01	Green	CAN LO
02	Yellow	CAN HI
03	Black	CAN KEYPAD GND
04	Pink	KEYPAD MPR 12V





## FUSE BOX

The Atom Drive System utilizes a dual rail fuse box to distribute constant power, as well as main power relay switched power. The larger power rail should be connected to the output of the main power relay to feed pin positions 1 through 12. Constant power from the vehicle's 12V battery is supplied to the smaller rail, feeding pin positions 17 through 24. Fuse positions 13, 14, 15, and 16 can be wired to be either constant power or switched power. These fuses provide power to the auxiliary power wires in the harness. By default, they are not powered. To energize them with either constant or switched power, you will need to connect the rail to either the constant power post or switched power post with jumper wires between the spades on the power rail and the post of your choosing.





PIN	COLOR	Fuse Rating	DESCRIPTION
01	Pink	10 A	BMS MPR 12V
02	Pink	10 A	KEYPAD MPR 12V
03	Pink	10 A	CHARGER MPR 12V
04	Pink	10 A	MOTOR PUMP MPR 12V
05	Pink	10 A	BATT PUMP MPR 12V
06	Pink	10 A	MOTOR MPR 12V
07	Pink	20 A	PARK PAWL MPR 12V
08	Pink	10 A	AC FANS MPR 12V
09	Red	10 A	VCU MPR 12V
10	Red	10 A	VCU MPR 12V
11	Red	10 A	VCU MPR 12V
12	Pink or Blue	10 A	VECTOR MPR 12V ***
13	Pink	10 A	AUX POWER 1
14	Pink	10 A	AUX POWER 2
15	Pink	10 A	AUX POWER 3
16			
17	Red	10 A	MPR CONST 12V
18	Red	10 A	MOTOR CONST 12V
19			
20	Red	10 A	OBDII CONST 12V
21	Red	10 A	GUI CONST 12V
22	Red	10 A	VECTOR CONST 12V
23	Red	10 A	AUX POWER 4
24			

\*\*\* “VECTOR MPR 12V” may be unlabeled in your harness. Wire description names may still say “VECTOR” even when a system is configured with a Charge Byte controller. This is a legacy artifact that will be phased out over time. If your system utilizes a Charge Byte controller, assume that anything labeled “VECTOR” is referring to that Charge byte controller. In time, the word “VECTOR” will change to “CHARGE CONTROLLER” as the Vector controller is being phased out solely due to lead time and availability. \*\*\*



## BRAKE LIGHTS

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### *Wire Bundle 16*

The Atom Drive System is configured to control the vehicle's brake lights. This functionality can be in addition to your existing vehicle wiring or separate. When the brakes are applied, the control system will automatically enable the brake lights. It is important to allow the VCU control over the brake lights to ensure that they come on appropriately under both mechanical braking and regenerative braking events. For this functionality to work, the brake light control wire "BRAKE LIGHTS 12V" should be spliced into the 12V power wire for the brake lights in the vehicle.

PIN	COLOR	DESCRIPTION
	Red	BRAKE LIGHTS 12V

## REVERSE LIGHTS

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### *Wire Bundle 16*

The Atom Drive System is configured to control reverse lights. This functionality can be in addition to your existing vehicle wiring or separate. When reverse is selected on the CAN keypad, the control system will automatically enable the reverse lights. For this functionality to work, the reverse light control wire "REVERSE LIGHTS 12V" should be spliced into the 12V power wire for the reverse lights in the vehicle.

PIN	COLOR	DESCRIPTION
	Blue	REVERSE LIGHTS 12V





## AC FAN RELAYS

### *Wire Bundle 36*

The Atom Drive System can control fans for the AC system in two different ways. Firstly, the two supplied fluid coolers can be placed directly behind the AC condenser as would be found in an OEM vehicle setup. In this case, the fans are preconfigured to also engage when the AC system needs cooling separately from the other cooling loops in the vehicle. This may not be practical or possible in all applications and as such, the wiring harness includes two low side wires to control relays for AC condenser fans. These fans and relays are not included in the kit but can be wired in with the auxiliary power wires found in the harness to control remotely mounted AC condenser fans as needed. To use these wires in that way, connect the relay coil and input to one of the auxiliary power wires. Connect the output of the relay to one side of the fan and connect an auxiliary ground wire to the other. The AC FAN 1 RELAY (or both if there are two fans) wire should be connected to the other side of the relay coil. The control logic is preconfigured to recognize this change and will work properly without any other configuration or software modification.

PIN	COLOR	DESCRIPTION
	Green	AC FAN 1 RELAY DRIVER
	Brown	AC FAN 2 RELAY DRIVER
	Pink	AC FAN MPR 12V
	Black	AC FAN GND





## ELECTRIC PARKING BRAKE

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LEFT INTENTIONALLY  
BLANK FOR FUTURE  
ADDITIONAL  
INFORMATION



## PARK PAWL

### Wire Bundle 5

Systems including a parking pawl will be supplied with a park pawl patch harness which introduces 2 additional power relays and interfaces with the park pawl motor connector.



\*\*\* Wire bundle 5 also contains a purple wire and a green wire which are not labeled and are not used. These wires should be taped off or heat shrunk to ensure they do not short to ground. \*\*\*

PIN	COLOR	DESCRIPTION
01	White	PARK PAWL FEEDBACK GND
02	Grey	PARK PAWL FEEDBACK A
03	Orange	PARK PAWL FEEDBACK B
04	Red	PARK PAWL FEEDBACK C
05	Yellow	PARK PAWL FEEDBACK D
06	Blue	PARK PAWL MOTOR -
07	White	PARK PAWL MOTOR +
08	Pink	PARK PAWL MPR 12V
09	Black	PARK PAWL GROUND



## AUX POWER

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*Wire bundle 37, 38, 39, 40*

There are 4 additional sets of auxiliary power and ground wires included in the harness for use at the customer's discretion. These wires should be taped off or heat shrunk to ensure they do not short to ground if not used.

\*\*\*6-module battery systems will utilize AUX POWER 1 and AUX GND 1 in bundle 37 as auxiliary power wires for the second data hub required for a 6-module battery system low voltage wiring. More information can be found in the "Battery Module LV Wiring Guide" document\*\*\*

## GAUGES

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*Wire bundle 41*

An Auxiliary CANBUS connection has been included in the harness which is intended to send data to aftermarket legacy gauges. To power a set of legacy gauges the above auxiliary power wires may be used along with the CANBUS wires in bundle 41.

## AUX SENSORS

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*Wire bundle 42, 43*

There are 2 sets of auxiliary sensor wires included in the VCU pigtail harness. These wires are meant for 3 wire 5v sensors and contain 5V+, Ground, and Signal wires. These wires will be unused unless otherwise specified and should be taped up or heat shrunk to prevent them shorting to ground.

## VCU

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*Wire bundle 7, 8*

Bundles 7 and 8 contain the VCU power and Ground wires. The grounds in bundle 8 should be tied to the ground blocks with the supplied ring terminals and the power wires run to the 12V fuse box positions 9, 10, and 11.



## DIAGNOSTIC DB9 CONNECTORS

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There are 3 diagnostic DB9 connectors found in the VCU pigtail harness. These connectors are used for connecting to the VCU, CANBUS logging, and other diagnostic functions. They are not used otherwise and should be tucked away and secured in an easily accessible location.

## ACCESSORY EXPANSION CONNECTOR

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There is an unused Aptiv GT-150 connector which is reserved for future expansion or accessories. This connector may be plugged into an additional CAN Hub to provide CAN signals to other devices and accessories. This connector is not used by default and should be tucked away and secured in an easily accessible location.

## OBD-II PORT

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### *Wire bundle 44*

The VCU pigtail harness includes an OBD-II port for data capture, diagnostics, etc. This port should be mounted wherever convenient to access with a code scanner or other OBD-II compatible accessory.



## PRND ANALOG INPUTS

The VCU may be configured to accept low side analog inputs to select gear position. Each input is connected internally to a 681k pull up resistor. These inputs should be connected only to momentary buttons or switches and should be normally open. See the Analog Shifter Installation Guide for more information. These inputs are not enabled by default. Please contact [techsupport@ampereev.com](mailto:techsupport@ampereev.com) for implementation questions.

VCU PIN	GEAR POSITION	PULL UP $\Omega$	INPUT
A019	PARK	681k	Active Low
A042	REVERSE	681k	Active Low
A055	NEUTRAL	681k	Active Low
A082	DRIVE	681k	Active Low

## PRND LED STATUS OUTPUTS

The VCU may be configured to control low side outputs to drive LED status indicator lights for Park, Reverse, Neutral, and Drive. These outputs are not included in the VCU pigtail by default and must be added manually. The outputs are low side and there must be a current limiting resistor in line with the LED. These outputs are not enabled by default. Contact [techsupport@ampereev.com](mailto:techsupport@ampereev.com) for implementation questions.

**\*\*\* Failure to include an appropriate current limiting resistor may result in permanent damage to the VCU not covered under any manufacturer warranty. \*\*\***

VCU PIN	GEAR POSITION	DRIVER	OUTPUT	NOTE
A009	PARK	Active Low	Digital	2.2 (4A) Max
A011	REVERSE	Active Low	Digital	2.2 (4A) Max
A025	NEUTRAL	Active Low	Digital	2.2 (4A) Max
A033	DRIVE	Active Low	Digital	2.2 (4A) Max



## CHARGE CONTROLLER

### Wire bundle 31

Depending on the exact manufacture date of your harness, you may have a pre-terminated 18 and 30 pin Cinch connector pair or a 20 position Molex MX-150 connector with a patch harness to the Cinch connectors.

**\*\*\* Wire description names may say “VECTOR” as opposed to “CHARGE CONTROL” even when a system is configured with a chargebyte controller. This is a legacy artifact that will be phased out over time. Assume that anything labeled “VECTOR” is referring to the “CHARGE CONTROL” wires below. \*\*\***

### MX-150

PIN	COLOR	DESCRIPTION
01	Yellow	CHARGE CONTROL CAN HI
02	Green	CHARGE CONTROL CAN LO
03	Black	CHARGE CONTROL GND
04	Red	CHARGE CONTROL CONST 12V
05	Pink	CHARGE CONTROL MPR 12V
06	Grey	AC TEMP
07	Blue	EVSE CP
08	Brown	EVSE PROX
09	Yellow	EVSE PE
10	White	DC+ TEMP
11	Green	PLUG LOCK +
12	Pink	PLUG LOCK -
13	Black	DC- TEMP
14	Purple	LOCK POS FEEDBACK +
15	Grey	AC TEMP GND
16	Brown	DC TEMP GND
17	Orange	LOCK POS FEEDBACK -
18	Black	CHARGE CONTROL VCU WAKE



## CINCH 18 / 30

CINCH 18 Position		
PIN	COLOR	DESCRIPTION
A1	Grey	AC TEMP
A3	Black	DC- TEMP
B1	Blue	EVSE CP
B2	Grey	TEMP GND
B3	White	DC+ TEMP
C1	Yellow	EVSE PE
C2	Brown	EVSE PROX
D1	Green	PLUG LOCK +
D2	Purple	LOCK POS FEEDBACK +
D3	Orange	LOCK POS FEEDBACK -
F1	Pink	PLUG LOCK -

CINCH 30 Position		
PIN	COLOR	DESCRIPTION
A1	Red	CHARGE CONTROL CONST 12V
A2	Black	CHARGE CONTROL GND
D2	Black	CHARGE CONTROL VCU WAKE
F1	Yellow	CHARGE CONTROL CAN HI
G1	Green	CHARGE CONTROL CAN LO



## CHARGEBYTE LED OUTPUTS

The chargebyte control, by default, supplies 3 LED outputs for indicating charging state and/or status. These LEDs are red, green, and blue by standard convention. These outputs are not enabled by default and require special wiring consideration to implement. Please contact [TechSupport@AmpereEV.com](mailto:TechSupport@AmpereEV.com) for more information on how to implement these status LEDs into your project. Note that it may or may not be possible to utilize these LEDs with your specific hardware and any damage to the chargebyte controller caused by unauthorized use of these outputs will not be covered under warranty.

CINCH 18 Position LED Indicators		
PIN	DESCRIPTION	DEFAULT LED COLOR
E1	LED GND	
E2	LED 3	Blue
F2	LED 2	Green
F3	LED 1	Red





## TOOLS AND CRIMPERS

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The tools and crimpers listed here are not absolutely required for installation; however, they can improve the ease of installation substantially. This is particularly true for the Molex factory crimp tools, which while expensive, result in a very good very easy to install crimp.

### HYDRAULIC CRIMP TOOLS

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#### HYCLAT HWC007000 Hydraulic Crimping Tool

This Hydraulic crimp tool from HYCLAT is great for small to medium gauge crimping duties. We use this tool for all of the smaller gauge lugs used in the 12V wiring as well as for some of the smaller HV wires for the charger and DCDC.



#### WBHome Hydraulic Crimping Tool

This or any other 12+ Ton crimping tool, easily found on Amazon, will provide a good crimp on the 50mm<sup>2</sup> and 70mm<sup>2</sup> HV terminals connecting the battery and motor to the HV junction box.





## HAND CRIMP TOOLS

For crimping the individual pins for all the various connectors, it may be preferred to have several different styles of crimping tool. Some just tend to work better than others when you are not using the manufacturer suggested crimp tools which are often excessively expensive or just simply unavailable. The following tools are some of our favorites and/or what we have made work in the past. Most of these are readily available and affordable from vendors such as Amazon.

### IWISS IWS-1440L for AWG 28-14 Open Barrel Crimping Tool

This crimp tool from IWISS is a good all-around crimper for many different types of open barrel crimps. This tool is particularly good for tiny to small terminals and wire.



### Klein Tools VDV200-010 Ratcheting Crimper

The Klein VDV200 ratcheting crimp tool accepts different die sets for different crimp types. The VDV200 with the Barrel 10-20 AWG die set makes a good general purpose crimp tool for larger bulkier terminals.



### Molex 63811-6000 Crimp Tool for MX150 Series Connectors

This Molex factory crimp tool is expensive but worth every penny when time and quality are important factors. This tool makes a perfect crimp every time and is also very easy and quick to use. Consider this tool a valuable investment for your time.





## CUTTING TOOLS

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### TEMCo TH0001 4/0 Cable Cutter

This heavy-duty cable cutter makes quick work cutting through the shielded HV cabling as well as the smaller 4, 8 and 10 gauge cabling found in the Atom Drive System.



### Klein Tools D275-5 Diagonal Cutting Pliers

These flush cut snips are very sharp and a great tool for trimming individual wires to length.



### Klein Tools D248-8 Diagonal Cutting Pliers

This general-purpose set of cutters is good for cutting through small bundles of wire and nylon braid.





## WIRE STRIPPERS

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### Klein Tools 11063W Wire Cutter / Wire Stripper

These wire strippers are by far the best tool for the money we have found. They do a great job and are much easier to use than the plier type strippers.





## REVISION HISTORY

Version	Description of Version/Changes	Updated by	Date
1.0	First version of a document to match VCU pigtail wire numbers to connector pin positions.	Blakely Fabiani	3/18/22
2.0	Reformatted version of 1.0 including individual connector information.	Blakely Fabiani	5/7/22
3.0	Third formatting revision. Moved to word doc with searchable table of contents format.	Vinnie Dekarski	7/8/22
3.1	Rebuilt all tables inside of word to replace the static table images generated in Edraw.	Josh Chang	8/12/22
3.2	Added wire numbering scheme to match VCU pigtails built by JCC wiring company.	Blakely Fabiani	11/11/22
4.0	Updated wiring naming scheme to match production harnesses. Added new chargers, motors, and new battery wiring info.	Blakely Fabiani	1/11/23
4.1	Added a new section for tool recommendations.	Blakely Fabiani	1/18/23
4.2	Formatting and readability changes.	Blakely Fabiani	1/19/23
4.3	Fixed Motor Enable wire color error in Cascadia motor pinouts.	Blakely Fabiani	1/19/23
4.4	Fixed AC pressure sensor 5v and ground wires	Blakely Fabiani	1/31/23
4.5	Added Version Number to Document Cover Page	Blakely Fabiani	2/1/23
4.6	Fixed charge port AC thermistor wire color on the charge port side.	Blakely Fabiani	3/9/23
4.7	Fixed AC pressure sensor pinout and wire colors.	Lawson Sumner	4/5/23
4.8	Added wire for Vector MPR 12V and updated several wire colors to match current harnesses.	Blakely Fabiani	5/4/23



4.9	Updated Park Pawl wire information and added the Dilong charger wiring instructions.	Blakely Fabiani	6/6/23
5.0	Updated 12V fuse box pinouts and Tesla motor wiring instruction. Added constant power wire for Cascadia motors.	Blakely Fabiani	6/6/23
5.1	Added wire bundle reference table, wire bundle numbers to each connector, and updated for newest revision of harness.	Blakely Fabiani	8/10/23
5.2	Wire color and clarity fixes to bring the harness current with new vcu wiring harnesses.	Blakely Fabiani	8/28/23
5.3	Updated 12V fuse box to newest version and updated battery heat power wire color	Blakely Fabiani	9/1/23
5.4	Added clarification on battery CAN hub wiring to vcu pigtail and updated all colors to be in agreement with vcu pigtail version 3.3	Blakely Fabiani	9/8/23
5.5	Clarified that the DB9 connectors and CAN Hub connector are unused. Added OBD-II port bundle information.	Blakely Fabiani	10/18/23
5.6	Corrected AC Pressure Sensor wire colors to be compliant with harness version 3.3	Blakely Fabiani	10/24/23
5.6.1	Switched Park Pawl + and – wires to correct the direction of actuation on Cascadia motor park pawls. Fuse box position 19 deleted. Vector MPR 12V noted as Blue	Blakely Fabiani	11/16/23
5.6.2	Charge Controller Bundle 31 Info added for clarity. Added MPR 12V to Cascadia and Tesla motor connector for clarity.	Blakely Fabiani	11/17/23
5.6.3	Clarifications to Park Pawl and Charge Controller naming. Clarified VCU to BMS Hub pinout. Added future PRND Status LED output placeholder. Bundle 30 wire color update.	Blakely Fabiani	2/5/24
5.7	Updated Charge Control section to apply to the most current harness version. Changed “Positive Earth” to “Protective Earth.” Updated description cases to be consistent.	Blakely Fabiani	2/27/24