

EV Controls user Guide

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Introduction

Thank you for purchasing the EVControls® Tesla drive unit controller. The EVControls® control panel is a stand alone device designed to provide a user interface to for the control of a Tesla drive unit in an automotive chassis of the users choice.

The EVControls® Tesla drive unit controller is the result of 2 years of extensive research and development by Tapp Auto Inc. and is available in 2 versions the the EVControls T-1 and T-1C.

Both units provide digital control of the Tesla drive inverter via CAN communication controlled by a multi function touch screen. More detail on the individual functions available in the EVControls T-1 and T-1C can be found on the [system features page](#).

Disclaimer

Under no circumstances shall EV Controls® be liable for direct, indirect, consequential or incidental damage or injury resulting from the use of EV Controls® components in the construction and operation of custom built electric vehicle.

The installation of the EV Controls® controller requires that the end user the have a thorough understanding of applicable electrical principles and is fully aware of the inherent dangers of working with electric vehicle high voltage systems as they apply to the design, construction and operation of an electric vehicle.

EVControls T-1 System features

The EV Controls T-1 is the base model controller for the Tesla drive unit. The EV Controls T-1 is designed to interface with the Tesla drive units via a touch screen and communicates the EVControls proprietary firmware to the drive unit via CAN bus digital messaging. The EVControls digital touch screen interface is programed to provide the operator with the following functionality.

- Select drive, neutral and reverse modes via the 7" touchscreen
- Adjust peak power output and regenerative braking power levels via the touchscreen
- Display the following data on the 7" touchscreen
- Drive mode (D, N ,R)
- Traction pack voltage (HV)
- Inverter 12V supply voltage
- Accelerator position
- Stator current
- Actual power in kilowatts, positive or negative (regenerative braking)
- Max power limit
- Max regeneration power limit

The EV Controls T-1C System features

The EVControls T-1C builds on the functions provided in the EVControls T-1 interface but takes it a step further by providing additional microprocessor controlled outputs that automate startup procedures and add several important functions that simplify your build and add drive-ability and reliability. The EVControls T-1C controls both the S-85 and P-85 drive units at at this time, support for the smaller "D" drive units is in currently in development.

- Select drive, neutral and reverse modes via the 7" touchscreen
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- Stator current
- Actual power in kilowatts, positive or negative (regenerative braking)
- Max power limit
- Max regeneration power limit

Additional Features for EVControls T-1C

- Brake lights operation; Brake light output is activated when the brake pedal is depressed or when regenerative braking exceeds a certain threshold.
- Inverter 12V power. Timed application of Inverter 12V power should only be applied at the correct point in the power up sequence, after CAN transmission has been initiated.
- Inverter cooling fan control. This output will trigger the inverter cooling fan at a user adjustable inverter coolant temperature, adjusted via the touchscreen.
- High voltage positive contactor.
- High voltage negative contactor.
- High voltage pre-charge relay. The controller will close the negative contactor, then the precharge relay, then after a set delay, it will close the positive contactor. this is to avoid welded contactors.
- The controller can also be configured to control a charger and DC/DC converter.

The inverter firmware needs to be updated to a version that is compatible with our controller, and we can do this remotely.

This product does not currently include a wiring harness. We suggest you source the inverter wiring harness, accelerator pedal, and brake pedal switch when you purchase the inverter.

What's included with your purchase

The purchase of the EVControls interface includes the 7" touch control panel with connector and the proprietary software. The unit will arrive in a ready to use state however a reflash of the Tesla drive unit may be required. The new drive unit firmware if required will be uploaded from our servers at no additional cost.

What you must provide

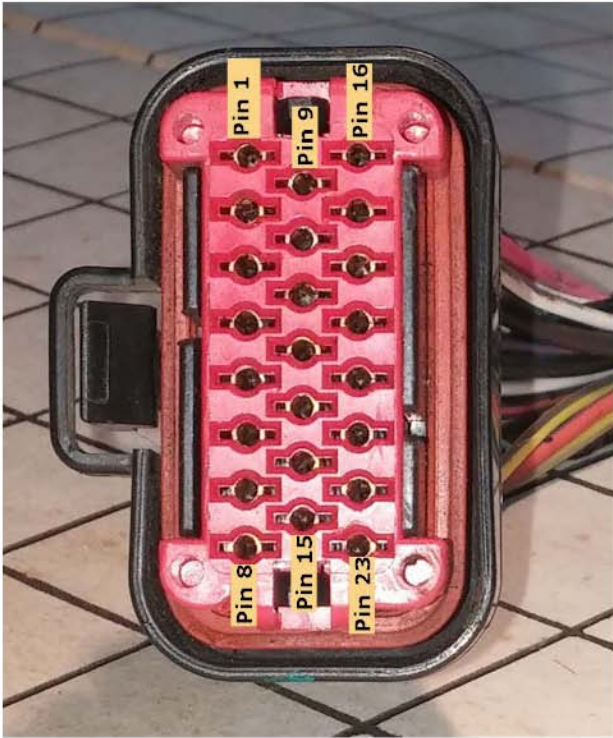
This guide is based on the assumption that you will have the following components in your possession

- Suitable drive unit (please email our support department to verify suitability)
- Drive unit wiring harness including inverter connector and shielded encoder harness with connector
- Tesla accelerator pedal with connector and a portion of the associated harness
- Brake switch with connector and a portion of the associated harness
- All associated wiring, fuses, contactors and switches
- A 12volt power source

Wiring diagrams

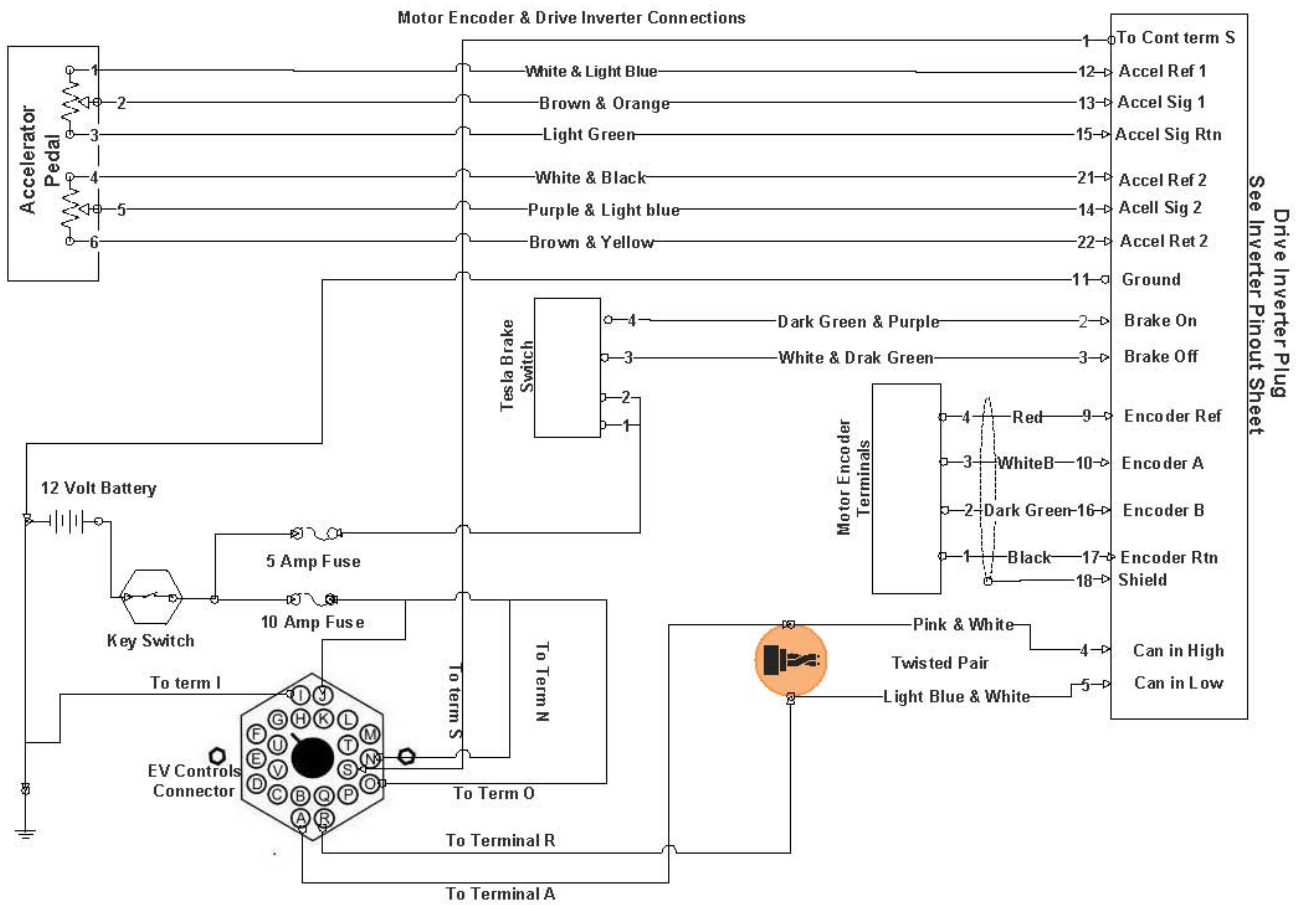
The following pages include details of the wiring schematics to help with your installation. Wiring color codes and pin locations assume you are using Tesla components.

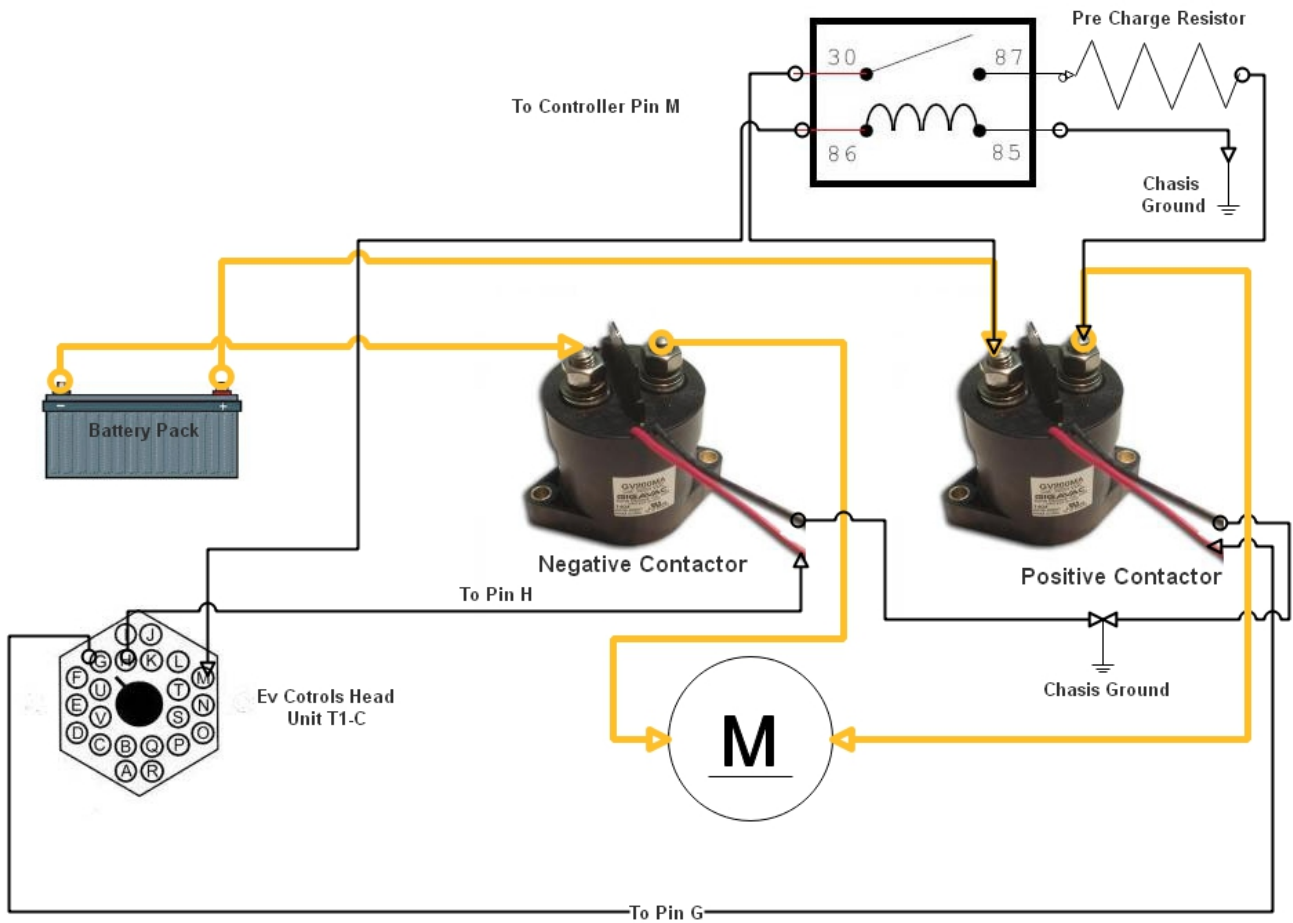
Drive inverter connector (Not Supplied)



Cav	Col	Gauge
1	BN	1
2	DG/VT	0.5
3	WH/LG	0.5
4	PK/WH	0.5
5	LB/WH	0.5
6	OG/VT	0.5
7	YE/GY	0.5
8	YE/BN	0.5
9	RD	0.5
10	WH	0.5
11	BK	1
12	WH/LB	0.5
13	BN/OG	0.5
14	VT/LB	0.5
15	LG	0.5
16	DG	0.5
17	BK	0.5
18	SH	4.01
19	LG/RD	0.5
20	LG/DB	0.5
21	WH/BK	0.5
22	BN/YE	0.5

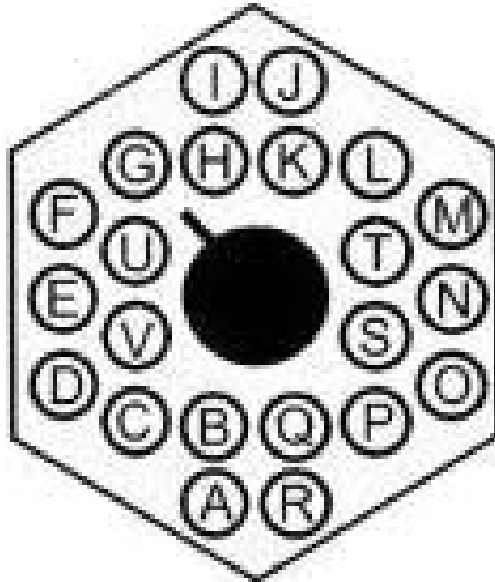
PIN NUMBER	Application
1	Key Power
2	BRAKE ON
3	BRAKE OFF
4	CAN HIGH IN +
5	CAN LOW IN -
6	NOT USED
7	NOT USED
8	NOT USED
9	ENCODER REF
10	ENCODER A
11	GROUND
12	ACCEL REF 1
13	ACCEL SIG 1
14	ACCEL SIG 2
15	ACCEL 1 SIG RTN
16	ENCODER B
17	ENCODER RETURN
18	ENCODER SHIELD -
19	CAN HIGH OUT
20	CAN LOW OUT
21	ACCEL REF 2
22	ACCEL SIG RTN



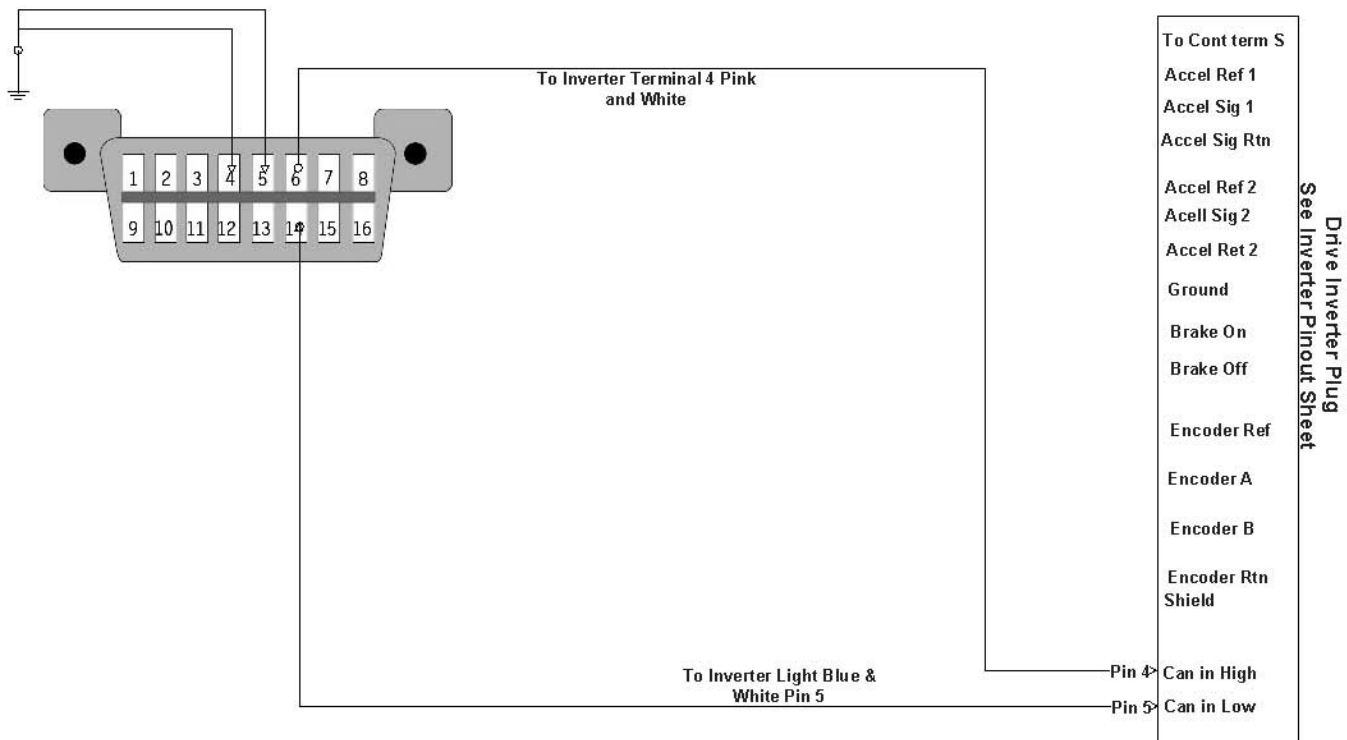


**EV Controls T1- C
High Voltage Contactor Circuit**

EVControls Pinout



- A. CAN 1 HIGH
- B. NOT USED
- C. NOT USED
- D. NOT USED
- E. INVERTER PUMP OUTPUT
- F. NOT USED
- G. POSITIVE CONTACTOR
- H. NEGATIVE CONTACTOR
- I. CHASSIS GROUND
- J. KEY POWER
- K. NOT USED
- L. NOT USED
- M. PRE-CHARGE RELAY
- N. FUSED (10 AMP) 12 VOLT POWER INPUT
- O. FUSED (10 AMP) 12 VOLT POWER INPUT
- P. NOT USED
- Q. NOT USED
- R. CAN 1 LOW
- S. TERMINAL 1 ON INVERTER

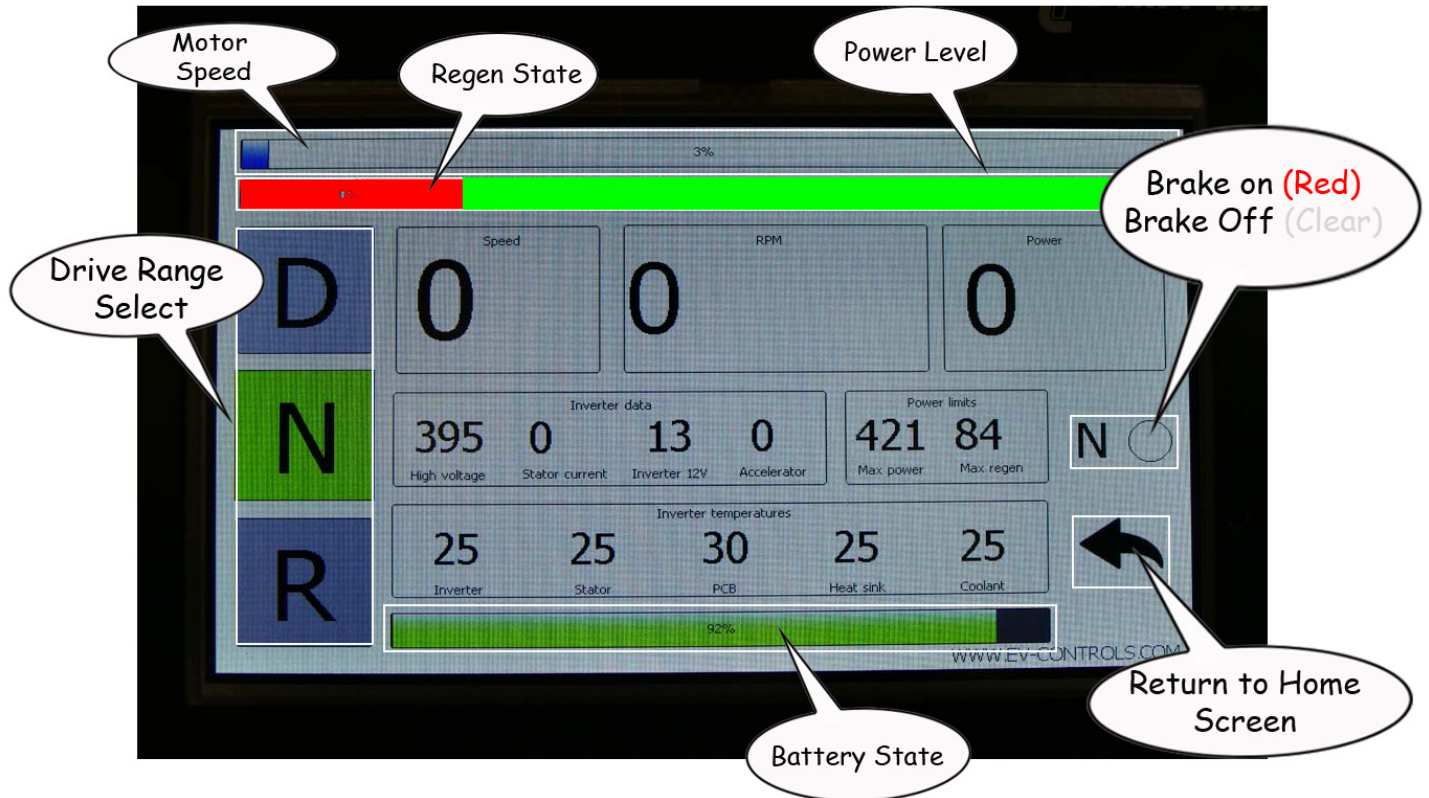


Q

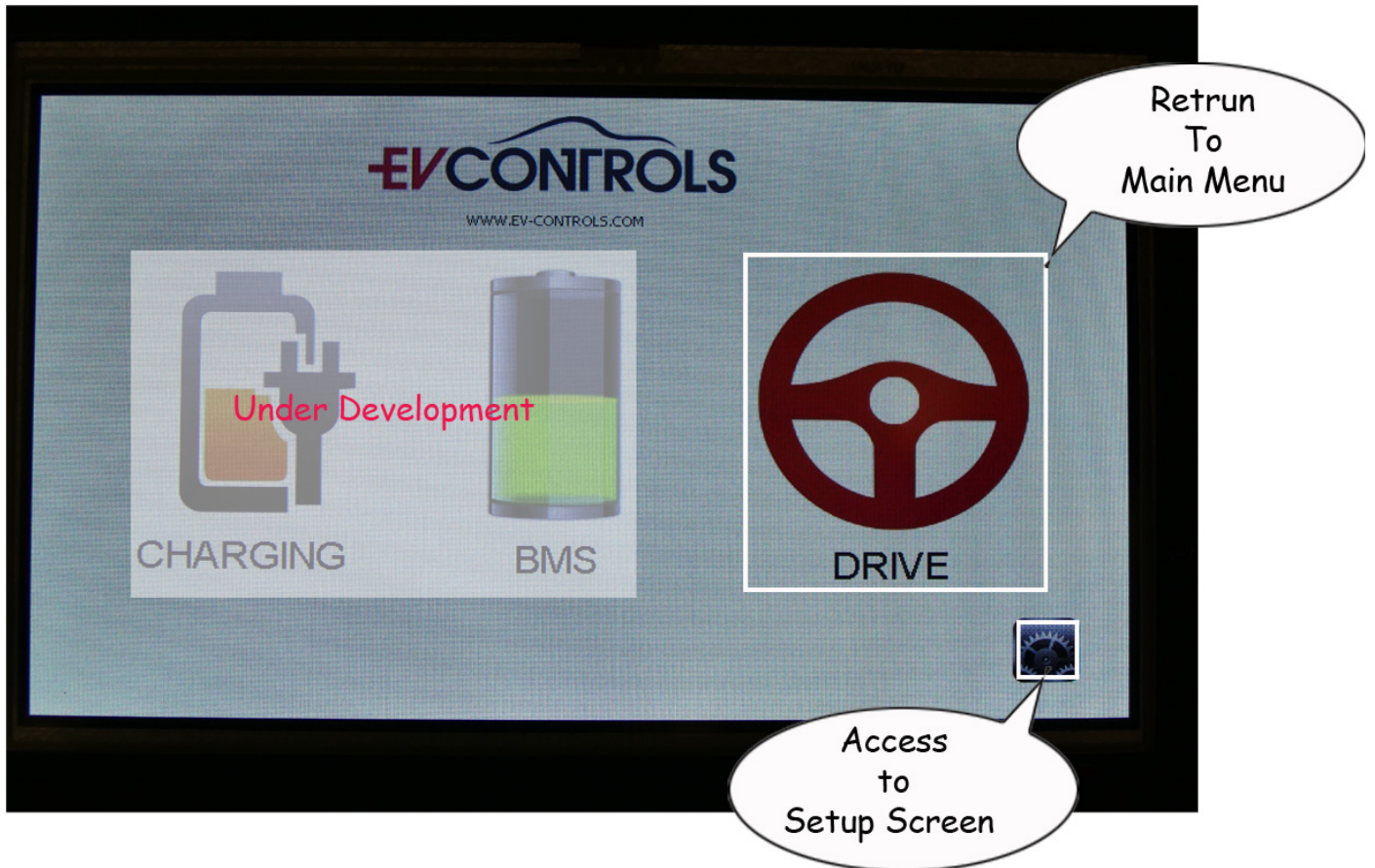
Main Menu

This screen is the main control and information feedback screen. Touch panel allows:

- ✓ Selection of desired drive range
- ✓ Monitoring of battery condition, regen level and power level
- ✓ Monitoring of brake switch condition
- ✓ Navigation to [home screen](#) for access to [setup screen](#)

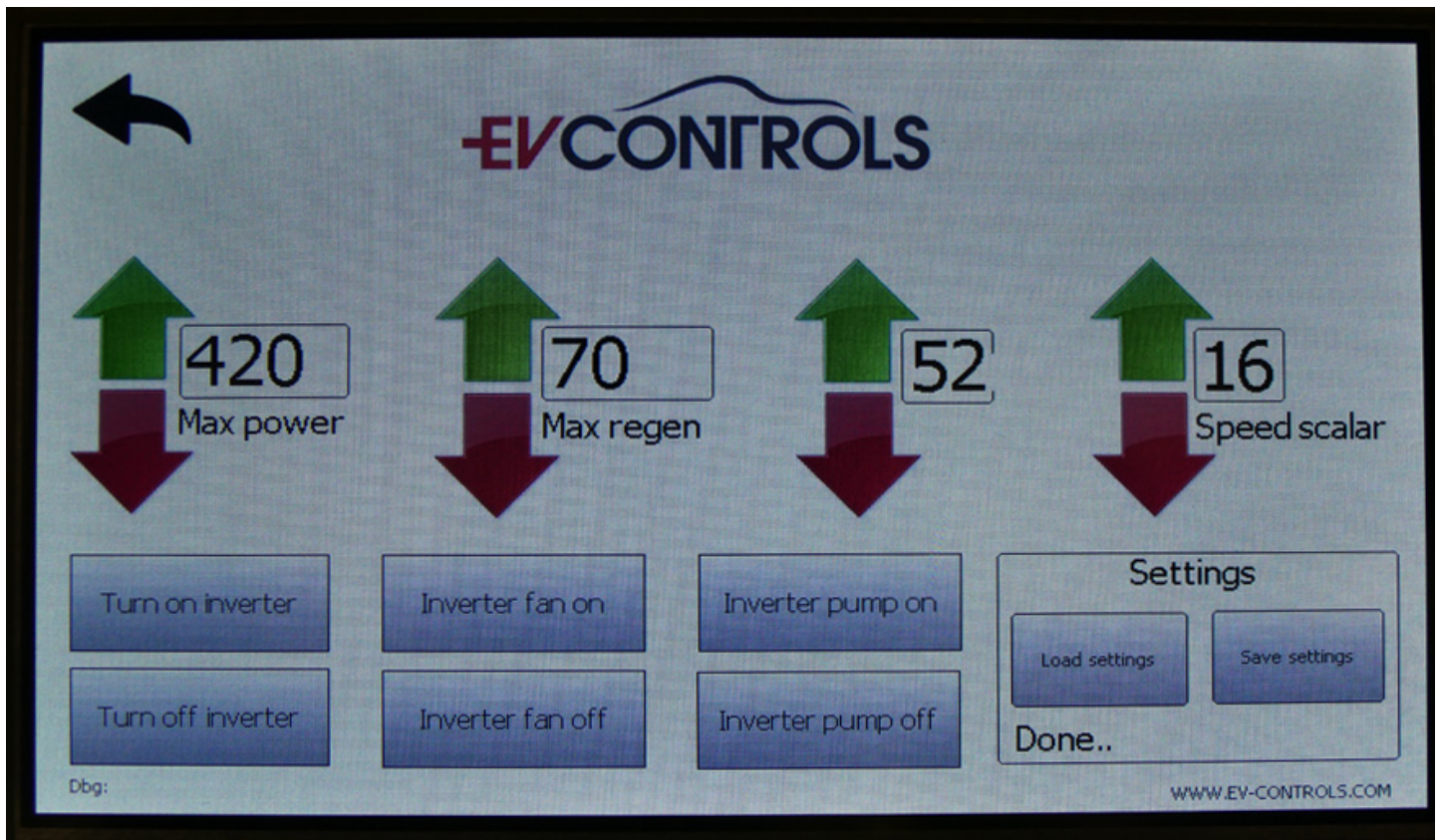


Home Screen



To access this screen use the [Return to Home Screen Icon](#) on the main menu screen. Gear icon will bring you to the setup screen. Steering wheel icon will return you to the main menu screen.

Setup Screen



Purpose

Allow user to select options best suited to their system setup. Must be accessed from the [Home Screen](#)

Up/Down Arrows

Max Power

This function will allow user to set the maximum power level in kilowatts

Maximum Regen

Adjust sensitivity of regenerative braking force. Select from 0 to 100%

Cooling Control

Allow user to select cooling system on off set point - TC-1 only

Speed Scaler

Setting allows user to select different multipliers used in calculating the control panel speed readout

On/Off Radio Buttons

Inverter On Off Selection

Allows deactivation of inverter with key on. This required to allow EVControls support to write new firmware to the inverter as it becomes available

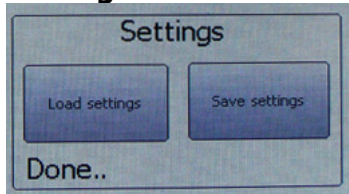
Inverter Fan On/Off

Activate or deactivate inverter cooling fan.

Inverter Coolant Pump

Activate or deactivate inverter coolant pump

Settings Selection Box



Load Settings: Loads current system settings

Save Settings: Saves new settings to memory

Return to Main Menu



Return user to [Home Screen](#) when settings are completed and saved to system memory.