REVOH

BLDC (Brushless DC) controller Datasheet

Category – 350 watts

Model number – RE-SQ0.35KW

Document Version – 1.0.3

Revised Date – 20/03/21

Content

About Company:

ACCESSIBLE TECHNOLOGY FOR TOMORROW

Revoh is an electric vehicle powertrain and subcomponents manufacturing company commenced in the year of 2017.

IITM RTBI incubated company

Vision:

Our vision and core values are to provide accessible technology for tomorrow and to reduce the dependability on foreign goods. We aim at providing quality and reliable products by means of localization.

The controller is built from the scratch both the hardware and the software with our own libraries. So, the controllers are 100 percent customizable based on the customer needs.

Customization:

The customer can change the following parameters

**Software code** – All the data parameters can be configured based on their vehicles.

Hardware – electronic components and PCB boards can be designed based on the customer needs.

Mechanical Enclosure – Aluminum enclosure can also be customized based on the customer needs.

Our product category ranges from 250 watts to 3 KW on specification.

- 250/350 watts
- 500/750 watts
- 1/1.5 KW

For any customization requirements contact the company through contact page number (**17**).

Product category:
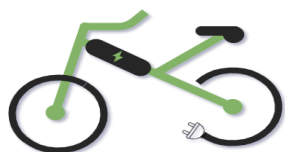
Controller model naming:

TYPE - 1	Type – 2
RE-SQ0.35KW	**RE-SN0.35KW**
Description	Description
RE – REVOH	**RE** – REVOH
SQ – SQUARE WAVE	**SQ** – SINE WAVE
0.35 KW – 350 WATTS	**0.35 KW** – 350 WATTS

SQUARE WAVE (SQ)	SINE WAVE (SN)
250 W	250 W
350 W	350 W
500 W	500 W
750 W	750 W
1 KW	1 kW
1.5 KW	1.5 kW
2 KW	2 kW
2.5 KW	2.5 kW
3 KW	3 kW

PCB model naming:

Example code - 20/RE/24/11/AX/SQ/0.1V

Description

20 – Year

RE – Revoh

24 – Day

11 – Month

AX – model

SQ – Square wave / **SN** – Sine wave

0.1V – Version

Product Introduction:

Power specification - **350 watts**

Read the manual carefully and thoroughly before using the controller.

This manual is about Revoh BLDC controller product for automotive Electric vehicle application. The datasheet covers up the Revoh BLDC square wave and sine wave controllers' general functions, installations and the features.

Revoh controllers are integrated with ROHS CERTIFIED high quality electronic components to provide a high-quality durable product. The application which includes electric cycle, electric bikes and hoverboards which has motor rating of 350watts. The controller uses Power MOSFETs and clocked maximum efficiency of 98 percent in most of the cases.

Revoh controller has both sensor and sensor-less application controllers. Both square wave and sine wave technology is available in Revoh products.

We use high performance and high-grade ARM processors for a complex and precious controlling methods. Revoh controllers are enabled with higher number of data parameter transfer in the controller for better communication performance for the end user.

Every Revoh controller products are provided with fault indications for better controller diagnostics.

The datasheet provided will be revised and updated on every quarter. For any quires in the datasheet kindly visit page no (17).

Testing and Validations:

Load test:

The controllers are tested for continuous hours in load machines for the reliability.

Field test:

The controllers are tested and validated in IITM Research park by integrating it to different electric vehicles.

Certifications:

RHOS Certified components

Every component that we use are RHOS certified. Revoh controllers are built to provide a long lasting highly reliable product for the end users. We assure you that we maintain the quality of our product.

Functions:

- BLDC square wave control

- Smooth start PID algorithm

- 97 % efficiency in most cases

- Lesser noise control benchmarked

- Efficient motor control technique

- Included general Circuit Protections

- Extended fault detection

- LED flashing pattern indicates the fault source

- Under voltage protection

- Over voltage protection

- Over current protection

- Over temperature cutoff protection - shutting down at 100°C

- Throttle fault detection

- Hall sensor failure detection

- Battery voltage detection

- Hall sensor encoder pull up provided

- Hard brake and soft brake

- Electronic braking

- Mode selection – Eco / Sports

- Ignition ON/OFF

- Vehicle lock / Antilock

- Forward/Reverse

- UART communication with 20 plus data parameters

- Walk assist – use push button and move the vehicle slowly < 5 Km/hr.

Features:

- Intelligence with Powerful ARM microprocessor.

- Synchronous rectification, ultralow drop to achieve very high efficiency.

- Electronic forward and reverse function.

- Voltage monitoring on 3 motor phases, bus, and power supply.

- Voltage monitoring on voltage source 12V and 5V.

- Current sense on all 3 motor phases.

- Current control loop.

- Hardware over current protection.

- Hardware over voltage protection

- Hardware under voltage protection.

- Configurable limit for motor current and battery current.

- Low EMC.

- LED fault code.

- Battery protection: current cutback, warning and shutdown at configurable high and low battery voltage.

- Rugged aluminum housing, thermal silicon pad and PCB thermal pad for maximum heat dissipation.

- Rugged high current terminals, bullet connectors and automotive connectors for small signal.

- Thermal protection: current cut back, warning and shutdown on high temperature.

- Controller can do auto-Identification angle for different degrees of hall sensors.

- Configurable high pedal protection: the controller will not work if high throttle is detected at power on.

- Current multiplication: Take less current from battery, output more current to motor.

- Adjustable speed limit (50%, 75 % & 100%)

- Soft switching

- Support motors with any number of poles

- Works on In-runner and out-runner BLDC motors

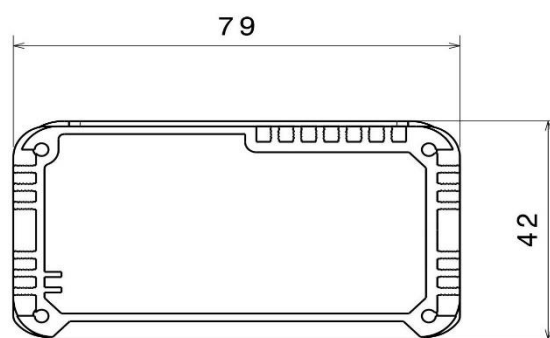- Achieves 97 % efficiency in most cases

Specifications:

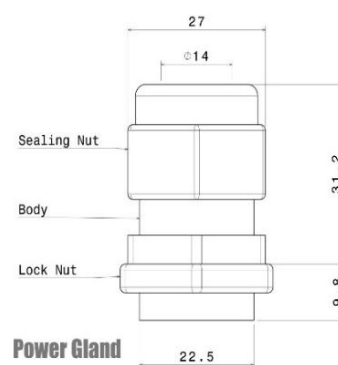| SPECIFICATION	VALUE
Rated power	350 Watts
Rated voltage	36 V
Rated Current	12 A
Maximum Current / Current limit	20 A
Full power operating temperature	0℃ to +80℃
Operating temperature (MOSFET)	-55℃ to +100℃
Frequency range	8KHz to 15KHz
Efficient Operating frequency	10KHz
Sensor type	Hall sensor
Hall sensor angle	120 degree
Throttle voltage	0 - 5 V
Undervoltage protection	30 V
Efficiency	97%
Operation mode	Square wave
Processor	ARM

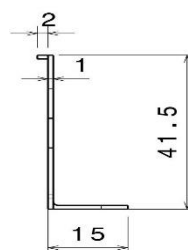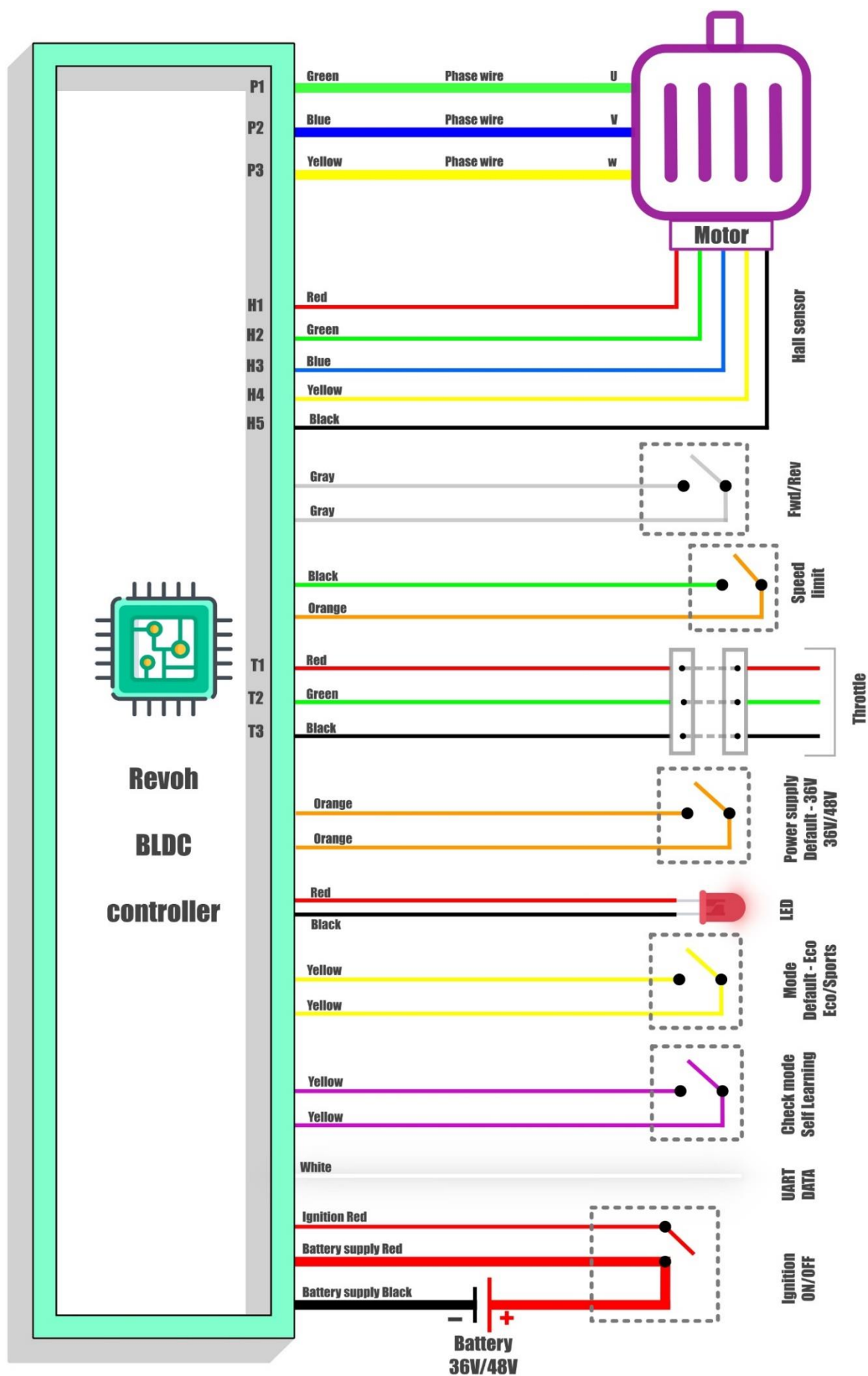**Mounting diagrams:**
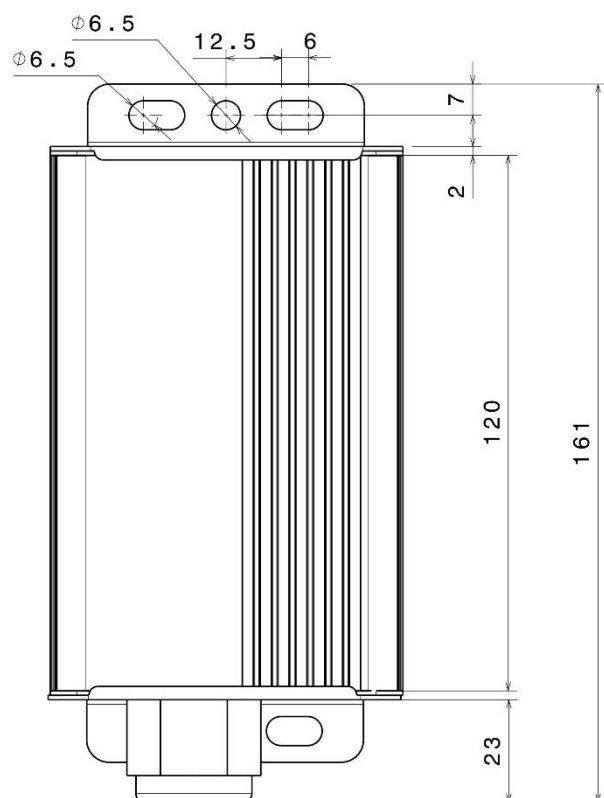
Casing top view

Casing side view

Power Gland

Sealing Nut

Body

Lock Nut
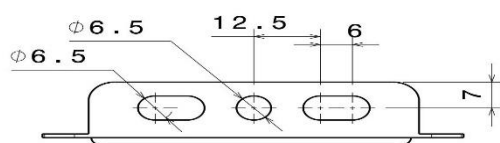
Bottom view
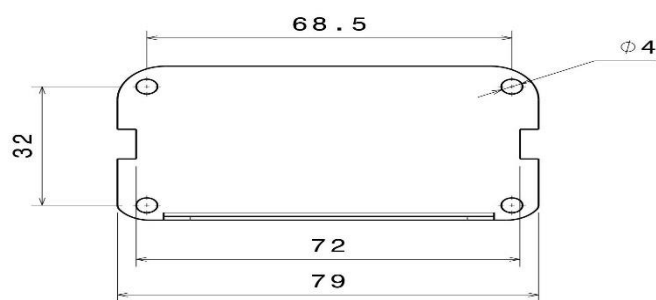
Front view

Left view

Side Closure

Wiring Diagram:

REVOH

Controller	Wire Color	Connection	Label
P1	Green	Phase wire	U
P2	Blue	Phase wire	V
P3	Yellow	Phase wire	W

Motor

			Hall sensor
H1	Red		
H2	Green		
H3	Blue		
H4	Yellow		
H5	Black		

Gray
Gray — Fwd/Rev

Black
Orange — Speed limit

T1	Red		Throttle
T2	Green		
T3	Black		

Orange
Orange — Power supply Default - 36V 36V/48V

Red
Black — LED

Yellow
Yellow — Mode Default - Eco Eco/Sports

Yellow
Yellow — Check mode Self Learning

White — UART DATA

Ignition Red
Battery supply Red
Battery supply Black — Ignition ON/OFF

Battery 36V/48V

Revoh BLDC controller

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Installation and other video links:

Will be updated soon

Configuration:

For first time installation in the vehicle please follow the procedure mentioned below.

Do the following steps below in the motor no-load condition to avoid damages to the controller and motor.

Step 1:

Connect the controller hall sensor 6-pin connector and phase wire with the motor. Phase wire sequence does not matter initially.

Step 2:

Connect the throttle with the 3-pin connector of the controller. Look for positive and negative with the 3-pin connector carefully.

Step 3:

Battery power supply selection in default the 350 watts controller is set in 36V system. If you are using 48V system short the orange wires as shown in the wiring diagram to change it to 48V system.

Step 4:

Connect the purple wires to run the controller on check mode for finding the phase sequence of the motor.

Step 5:

Now after successful wiring the above 4 steps now connect the main battery power supply positive (RED) wire and negative (Black) wire with controller positive (RED) and negative (Black) wire. For safety reasons use MCB or contractors to reduce the wire sparks that occurs due to capacitor charging.

Step 6:

Now connect the Ignition thin (RED) wire with the controller thick (RED) wire.

Step 7:

After successful connection now turn on the MCB and increase the throttle to check the motor rotation.

In order to find the correct phase sequence, the motor phase wire should be kept constant and change the phase wire of the controller in the following sequence given below and throttle each time to find out the best phase sequence.

Note: Turn OFF the MCB for every time while changing the phase wires.

Controller phase wire changing sequence

SEQUENCE	PHASE-1	PHASE-2	PHASE-3
1	GREEN	BLUE	YELLOW
2	GREEN	YELLOW	BLUE
3	BLUE	GREEN	YELLOW
4	BLUE	YELLOW	GREEN
5	YELLOW	BLUE	GREEN
6	YELLOW	GREEN	BLUE

In one phase sequence the motor will run smoother with lesser noise. Then that's the correct phase sequence.

Step 8:

Now turn OFF the battery and remove the purple wire check connection and turn ON the battery again.

Wiring has been completed successfully for any doubts check contact page no 17.
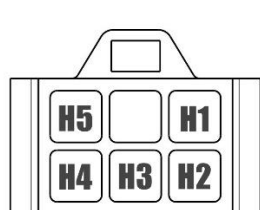
Connectors:

Phase wires - Bullet Connectors
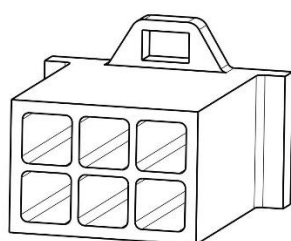
P1, P2, P3

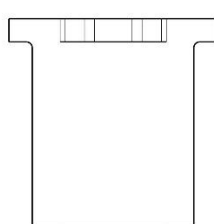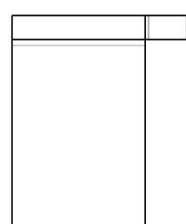
Hall sensor wire:

H1, H2, H3, H4, H5

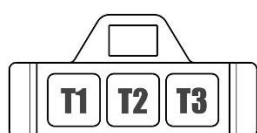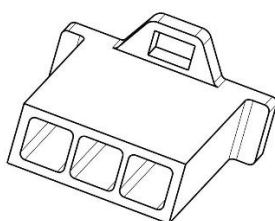Bottom view   Isometric view   Front view   Left view
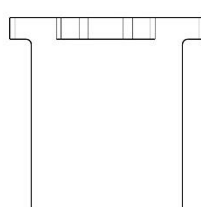
Throttle connector:
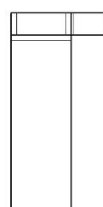
T1, T2, T3
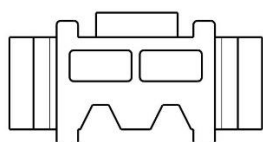

Bottom view   Isometric view   Front view   Left view
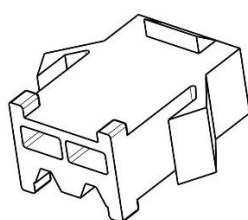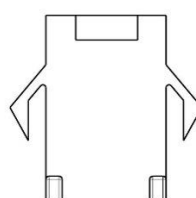
Speed limit, Direction, Power supply 36V/48V, Driving Modes, Self-learning mode, UART:

Bottom view   Isometric view   Front view   Left view

LED Error codes: Red LED

LED Code	Explanation	Solution
Red LED Off	No power or switched off	**1. Check if all wires are correct.** **2. Check fuse, MCB and power supply.**
Red LED On	Normal operation	**Working fine**

	Code		Explanation	Solution
1,1	¤	¤	Automatic error identification	**Wrong wiring of motor phase line or hall. Please suspend the motor when enable Auto-Identify function.**
1,2	¤	¤¤	Over voltage error	• **Battery voltage is too high for the controller. Check battery volts and configuration.** • **Regeneration over-voltage. Controller will have cut back or stopped regen.** • **This only accurate to ± 2% upon Overvoltage setting.**
1,3	¤	¤¤¤	Low voltage error	• **The controller will clear after 5 seconds if battery volts return to normal.** • **Check battery volts & recharge if required.**
2,1	¤¤	¤	Motor did not start	**Motor did not reach 25 electrical RPM within 2 seconds of start-up. Hall sensor or phase wiring problem.**
2,2	¤¤	¤¤	Over temperature	**The controller temperature has exceeded 100℃. The controller will be stopped but will restart when temperature falls below 80℃.**
2,3	¤¤	¤¤¤	Throttle error at power-up	**Throttle signal is higher than the preset 'dead zone' at Power On. Fault clears when throttle is released.**
3,1	¤¤¤	¤	Hall throttle is open or short-circuit	**When the throttle is repaired, a restart will clear the fault.**
3,2	¤¤¤	¤¤	Angle sensor error	**1. Speed sensor type error customers may set the correct sensor type through user program.** **2. Incorrect wiring.** **3. Speed sensor is damaged or defective. Or feedback signal is erratic.**

Dos and Don'ts:

Maintenance:

There are no user-serviceable parts inside the controllers. Do not attempt to open the controller as this will void your warranty. However, periodic, exterior cleaning of the controller should be carried out.

The controller is a high-powered device. When working with any battery powered vehicle, proper safety precautions should be taken that include, but are not limited to, proper training, wearing eye protection, avoidance of loose clothing, hair and jewelry. Always use insulated tools.

Cleaning:

Although the controller requires virtually no maintenance after properly installation, the following minor maintenance is recommended in certain applications.

- Remove power by disconnecting the battery, starting with battery positive.
- Discharge the capacitors in the controller by connecting a load (such as a contactor coil, resistor or a horn) across the controller's B+ and B- terminals.
- Remove any dirt or corrosion from the bus bar area. The controller should be wiped with a
  moist rag. Make sure that the controller is dry before reconnecting the battery.
- Make sure the connections to the bus bars, if fitted are tight. To avoid physically stressing the bus bars use two, well-insulated wrenches.

Contact details:

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