

BLENDTEC

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DOCUMENT NUMBER

SRV-037

DOCUMENT TITLE

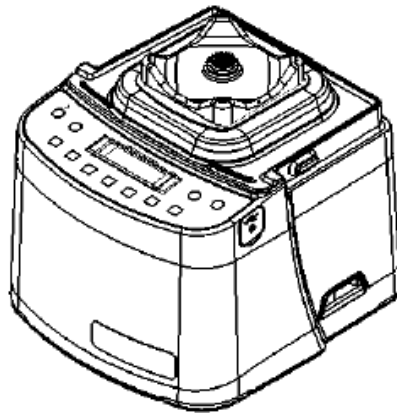
Service Manual for BLDC

REVISION

A02

RELEASE INFORMATION

Nov 2025

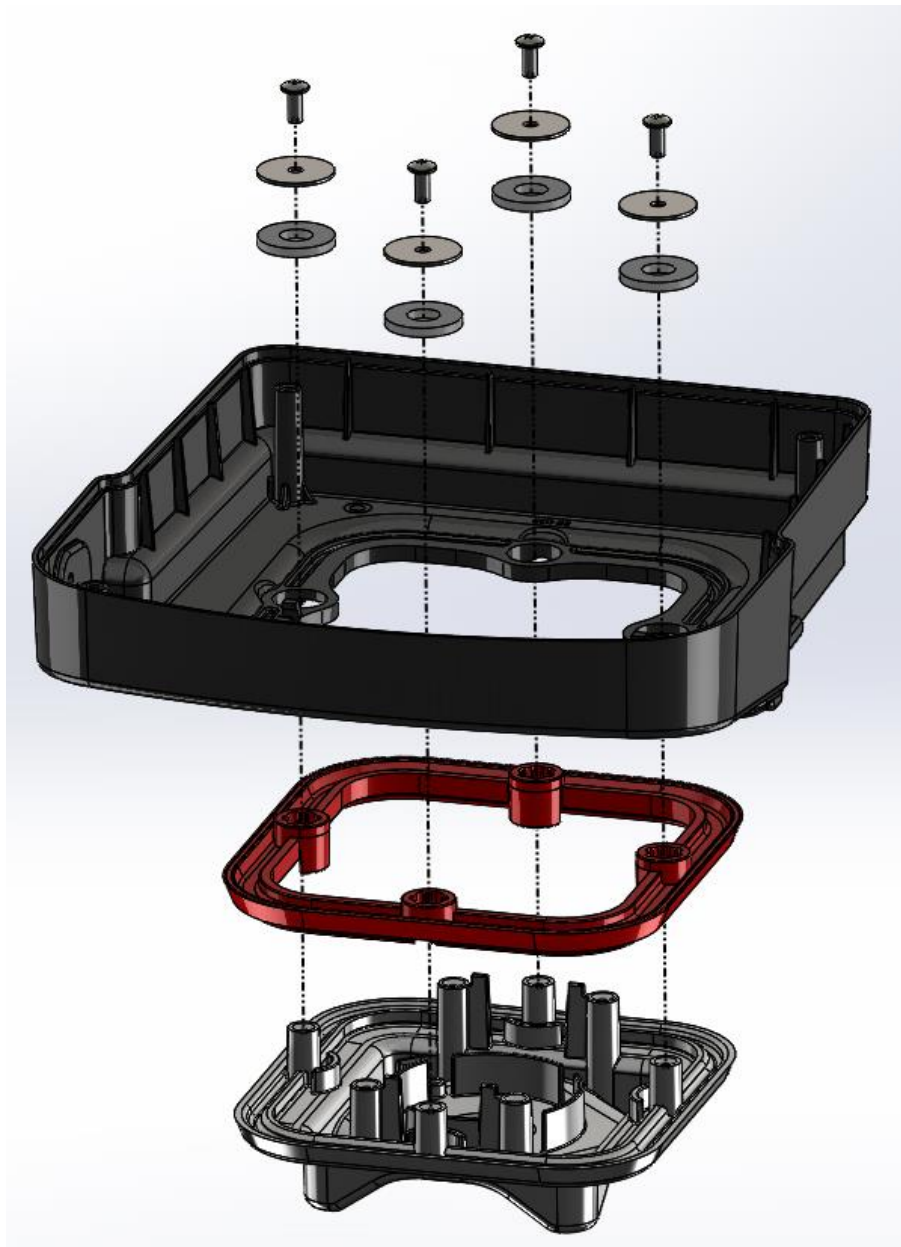


PROPRIETY INFORMATION:

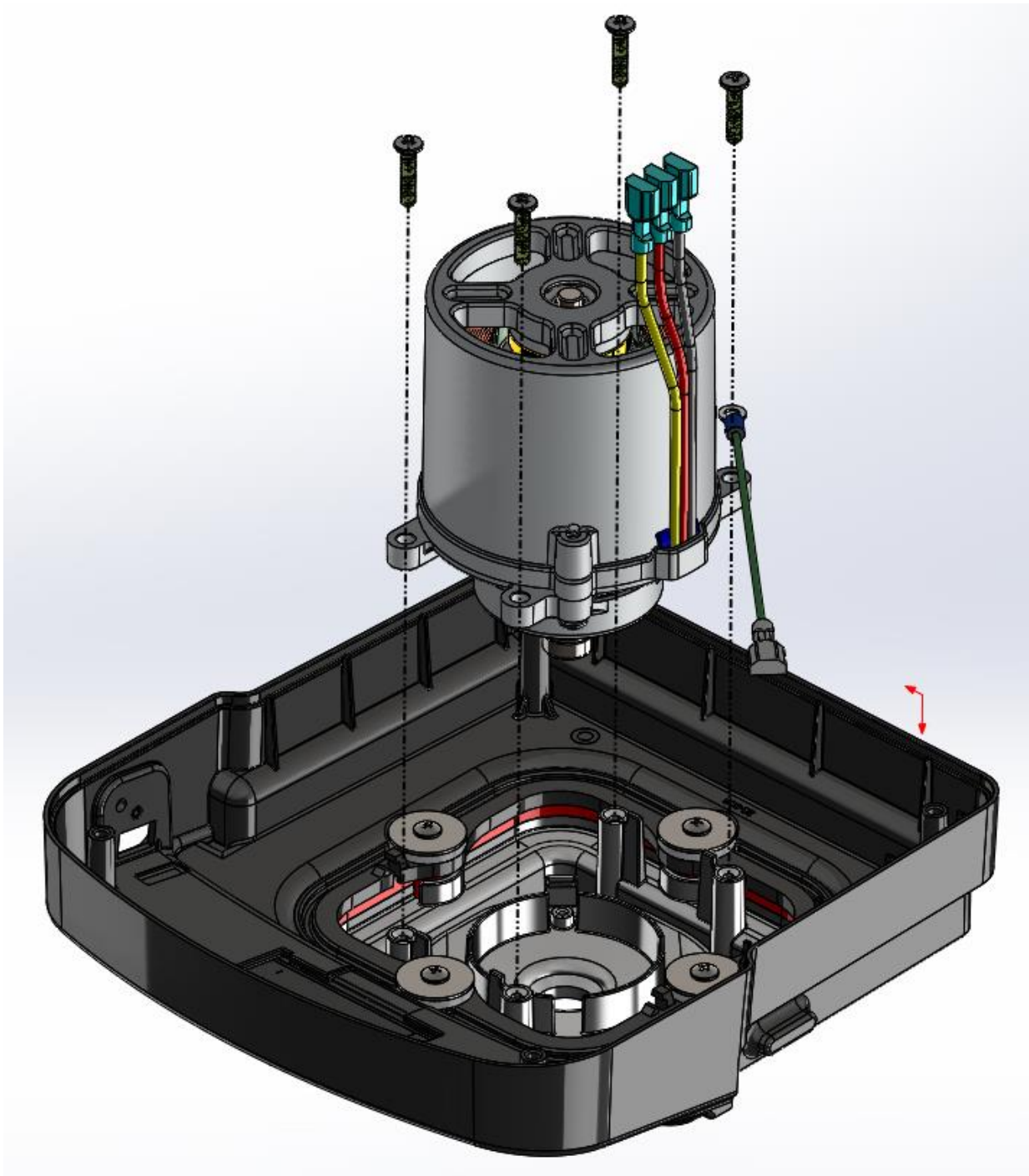
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Building the Motor Base:

1. With the **motor mount** (28-040 [metal casted], 28-040-01 [plastic Nitro system] or 28-043-01 [plastic Non-Nitro]) upside-down, place the **motor isolation gasket** (28-003) on the bottom of the motor mount. Place the **upper housing** (28-310-01) on top of the isolation gasket. Place the 4 **silicone washers** (28-004) on the mounting holes followed by the 4 **metal washers** (10-209-18). Fasten all the parts together with the 4 **screws** (28-036 [used on metal casted mount], or 10-012-D05CG [used on plastic mounts]).



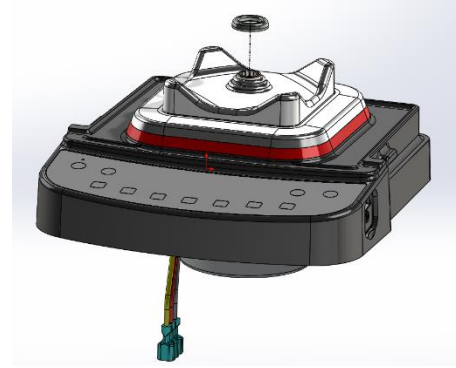
2. Secure the **Brushless Motor (11-402-01)** and the **ground wire (10-029-24)** to the **upper housing (28-310-01)** with the other 4 screws (**10-012-D07CG**). The ground wire is to be secured to the upper right motor mount hole as shown.



3. Using a **RUBBER** mallet, install the **sling ring (20-217-01)** by **gently** tapping it onto the socket of the brushless motor. **BE GENTLE!!! YOU DO NOT**



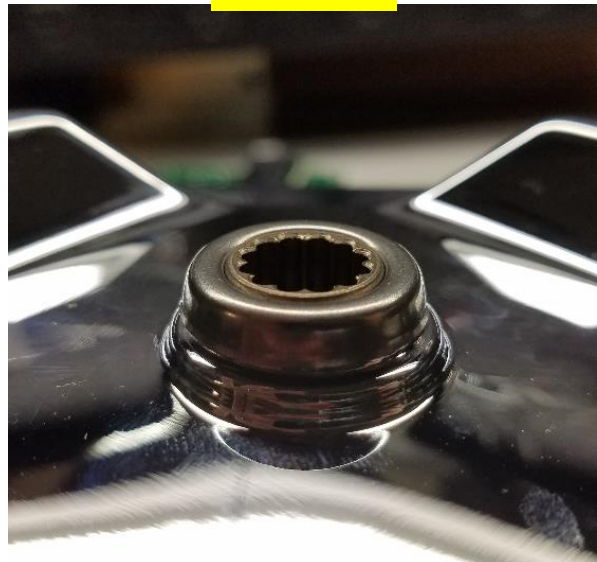
NEED A LOT OF FORCE TO SECURE THE SLING RING TO THE SOCKET. AS LONG AS YOU ARE GENTLE, YOU WILL NOT DAMAGE THE UNIT.



BEFORE

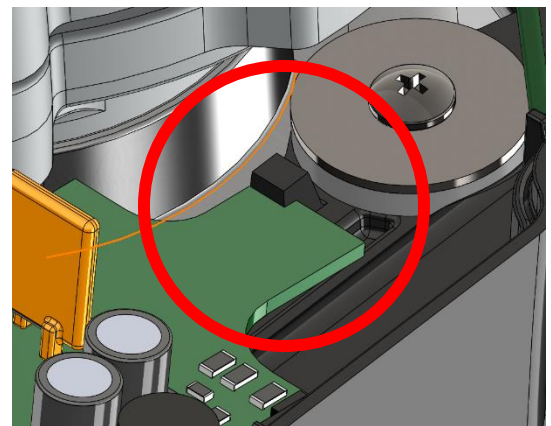
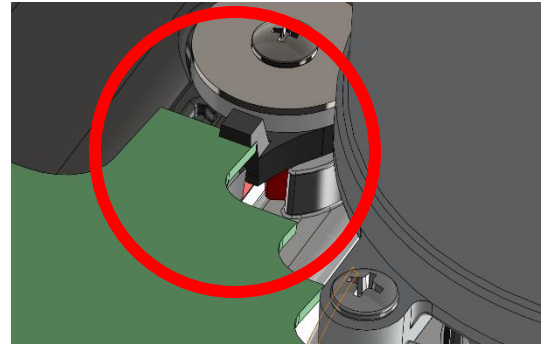
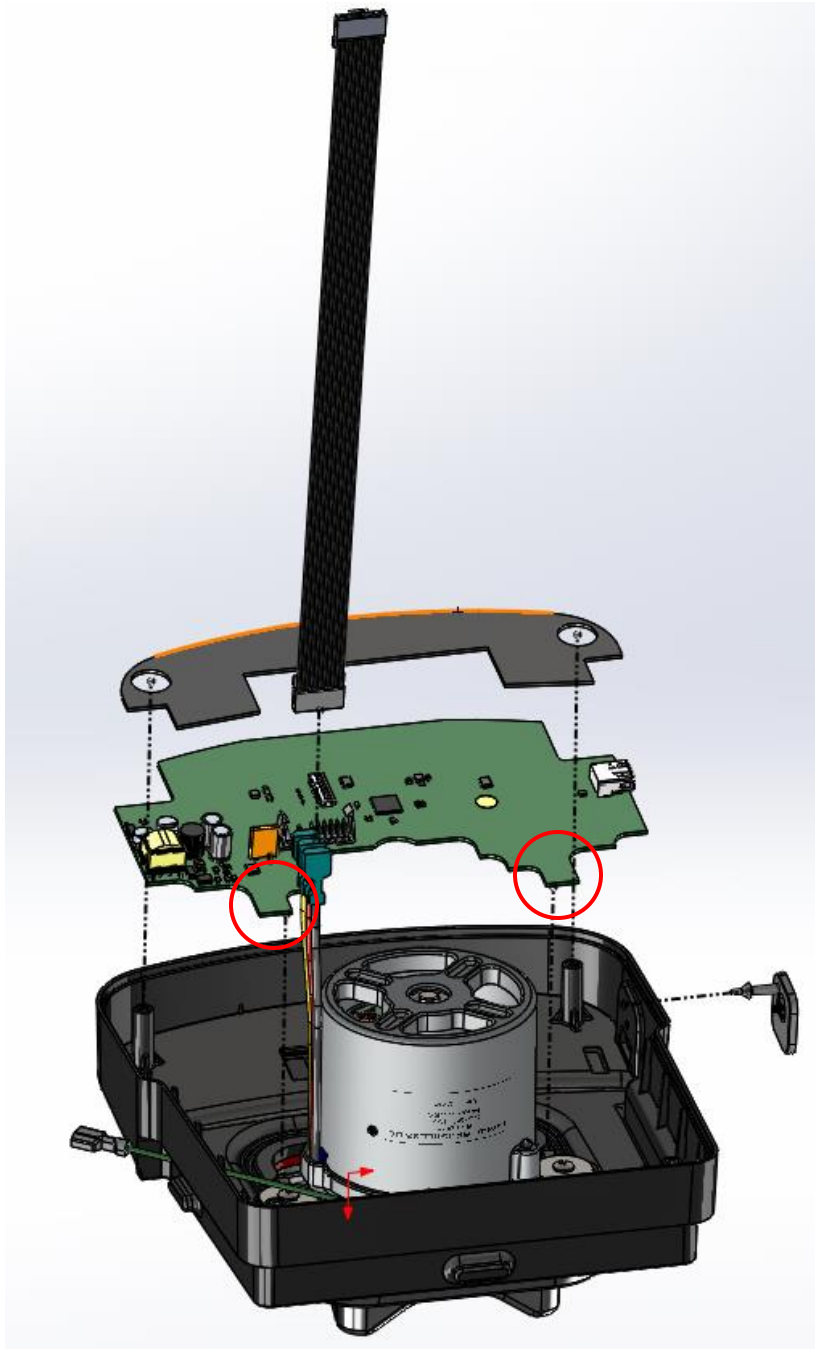


AFTER

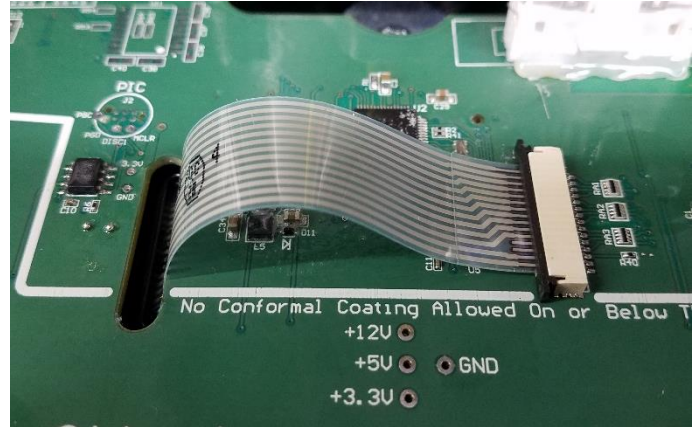
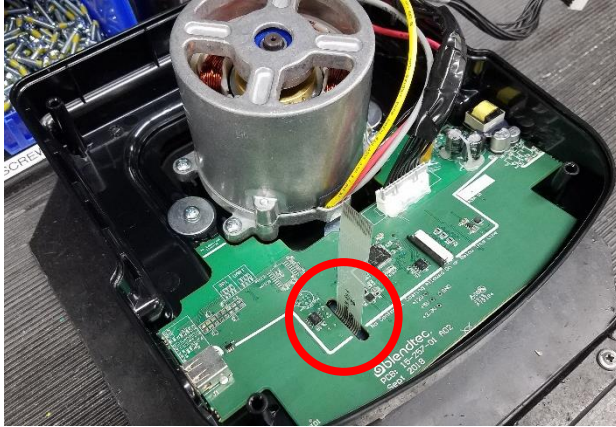


- a. Ensure the **sling ring (20-217-01)** is evenly pressed onto the socket and that it does not rub on the top of the **motor mount (28-040)**. Rotate the motor 360° to make sure it does not contact the **motor mount (28-040)**.

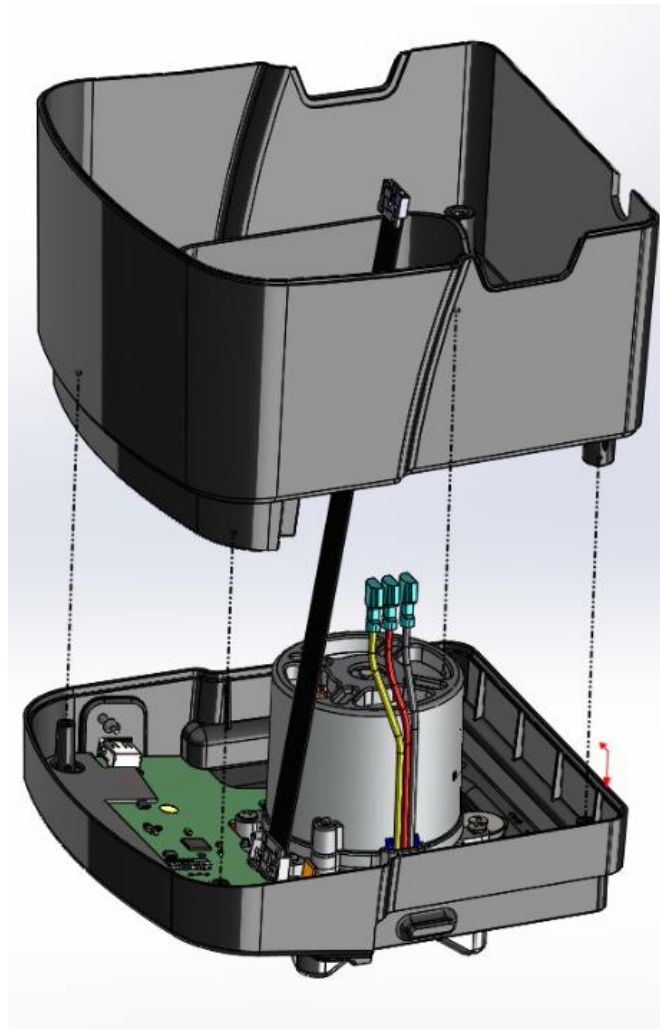
4. Place the **user interface board (15-456-01 [Non-Nitro] or 15-456-02 [Nitro])** in the upper housing. The circuit board fits under the mounting clips in the upper housing as shown in the red circles. Place the **PCB gasket (28-025)** on top of the circuit board. Pull the **USB cover assembly (28-303)** through the side of the top housing and fasten the screw.



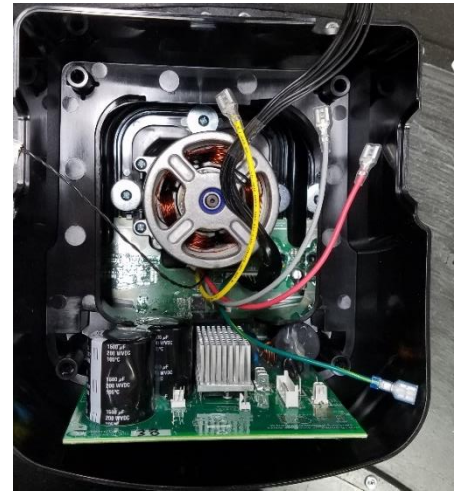
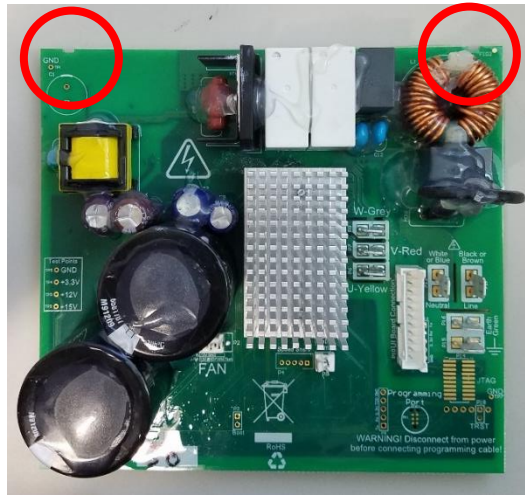
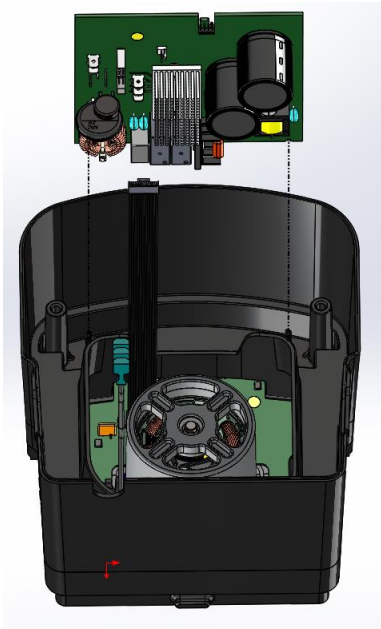
5. Carefully lift and pull the ribbon through the slot in the **circuit board (15-470-01)**. Be careful not to damage the traces in the ribbon. Insert the ribbon into the locking mechanism on the **circuit board (15-470-01)**. Ensure the clamp locks down on the ribbon.



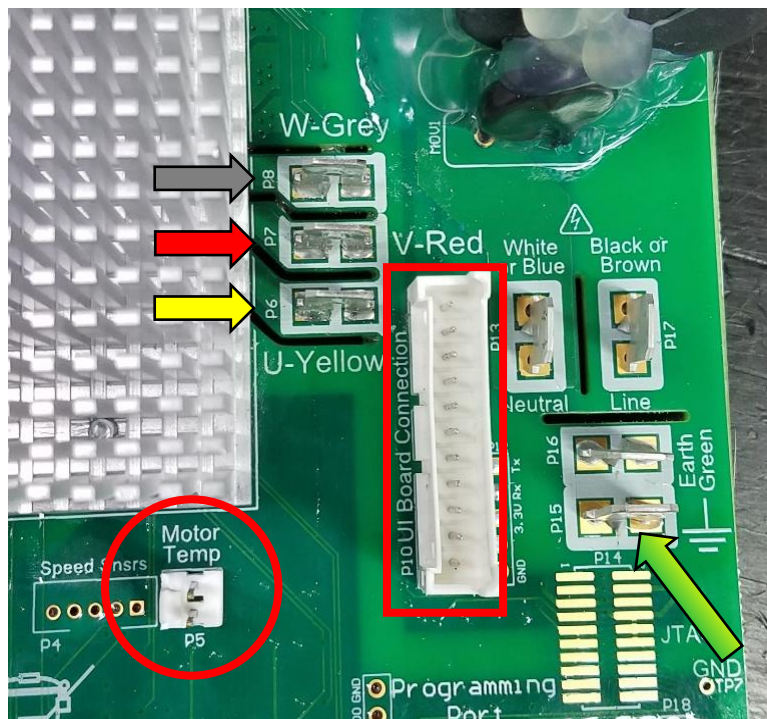
6. Place the **middle housing (28-013)** onto the top housing.



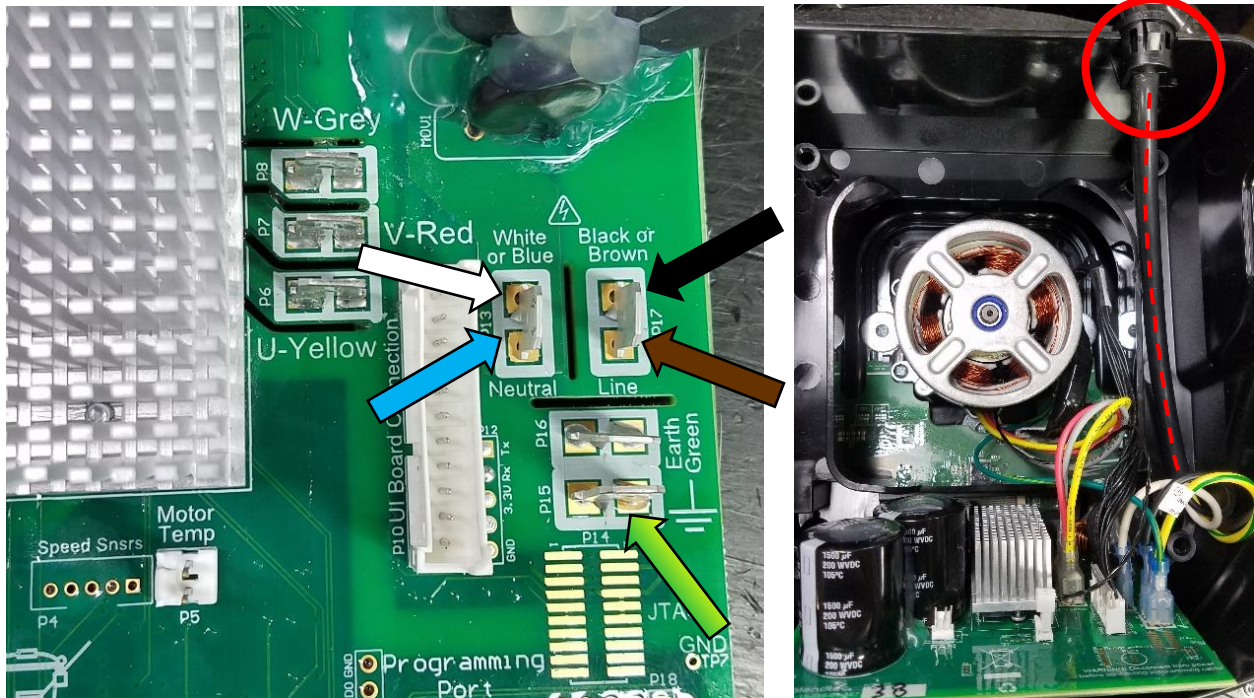
7. Place the **Motor Control Board (15-456-01)** in the middle housing. The two notches on the board (circled in red) mate with the two tabs in the middle housing.



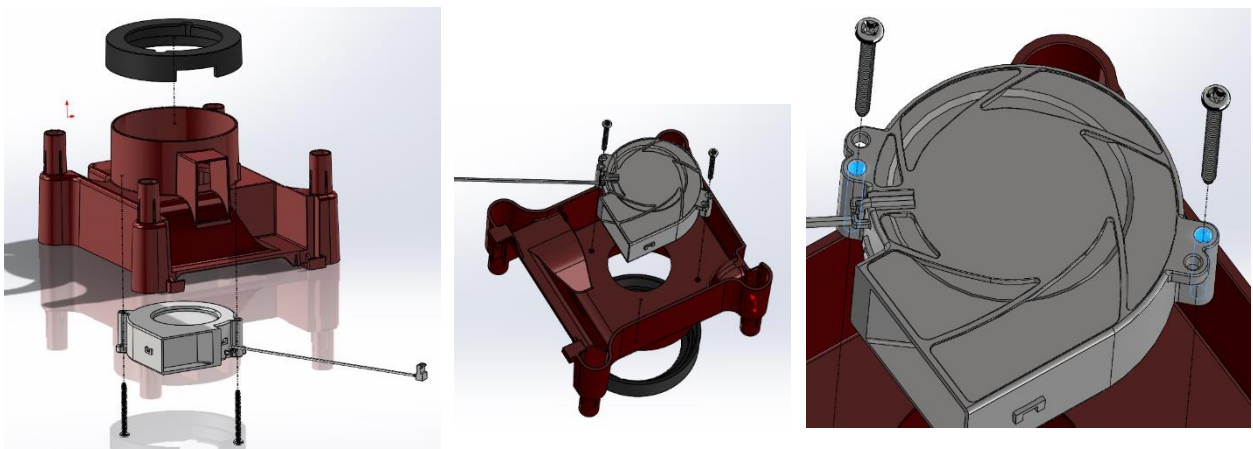
8. Connect the 3 motor wires (grey, red and yellow) to their corresponding terminals on the board. Terminals are labeled: “W-Grey”, “V-Red”, “U-Yellow”. Connect the temperature sensor to the terminal labeled “Motor Temp.” Connect the wire harness to the Motor control board. Be sure to fully connect the harness, press until it clicks in place.



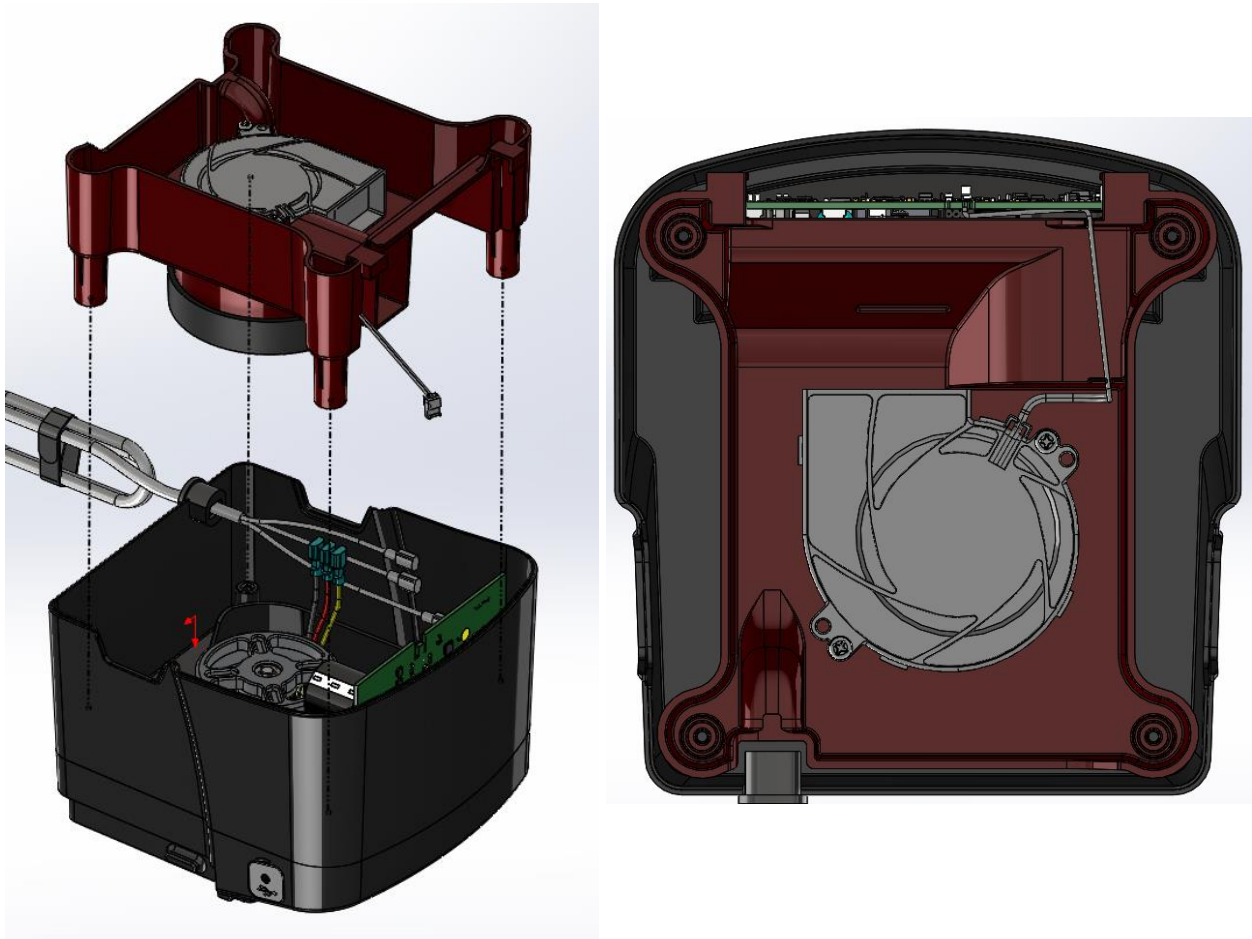
9. Connect the **power cord (28-309-xx)** to the appropriate terminals on the motor control board. Follow the labels on the board to make the correct connections. The power cord is to be routed as shown in the picture. The red dotted line shows the path of the power cord. The red circle shows where the clip attaches to the middle housing.



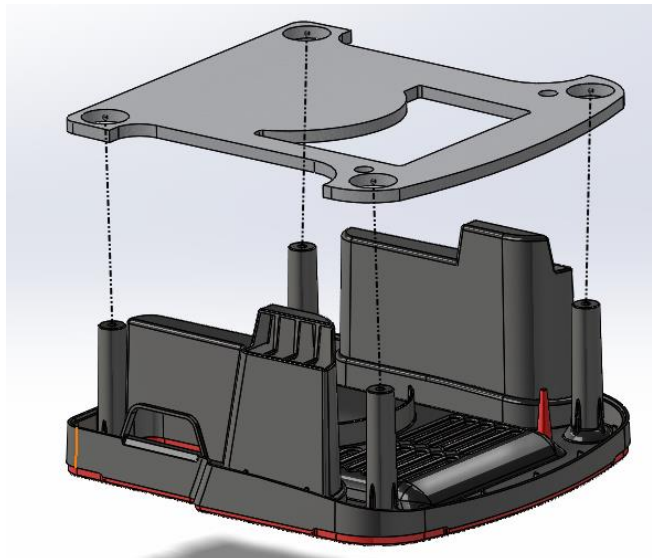
10. Place the **Baffle Gasket (28-052)** onto the **Baffle (28-050)**. Fasten the **Fan (28-051)** to the bottom of the baffle with the 2 screws (**10-012-D14CG**). The screws go into the long holes on the fan, see images for clarification.



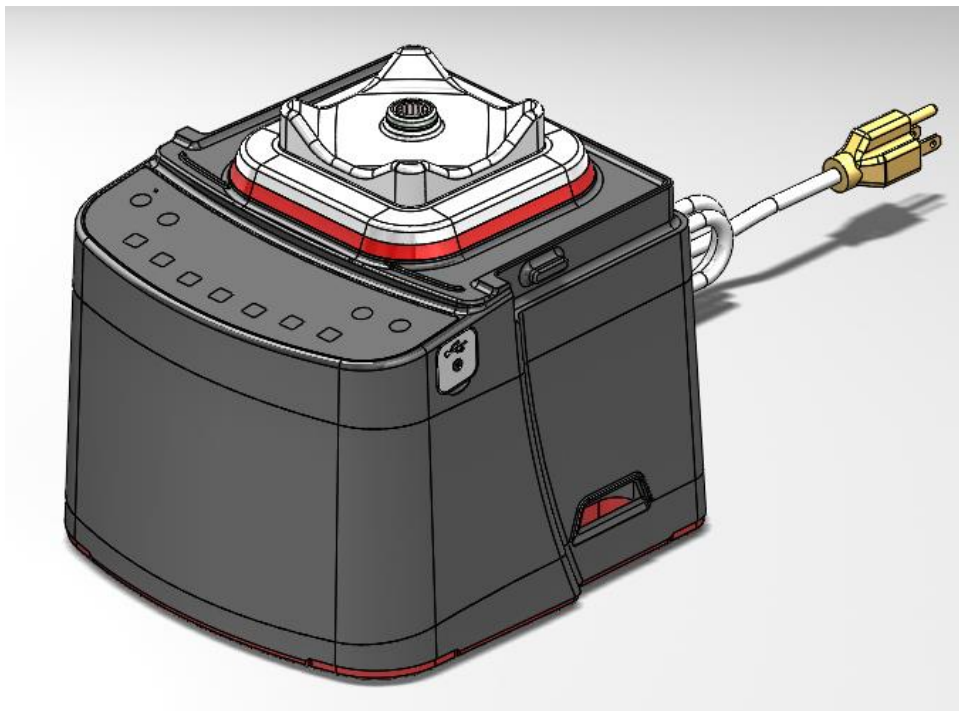
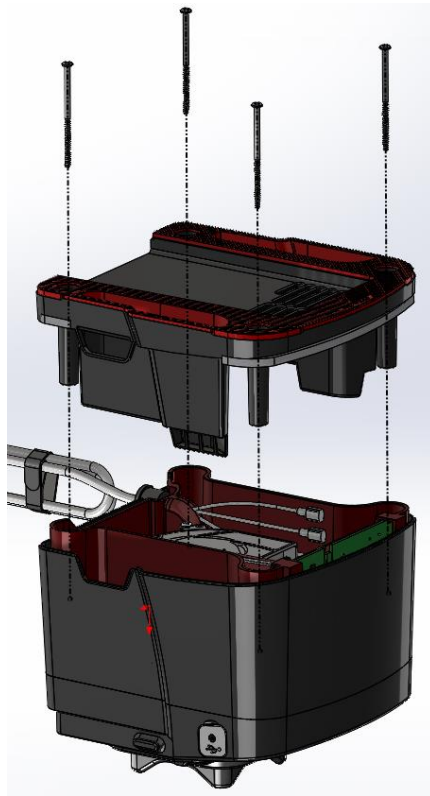
11. Place the baffle assembly in the middle housing as shown. Connect the fan to the terminal on the motor control board labeled “Fan.” Be careful not to pinch any wires or cords.



12. Place the **Base Foam (28-026-01)** onto the **Housing Base (28-015-xx)**.



13. Fasten the base with the foam onto the middle housing with the last 4 screws (**10-245-01**).
The unit is now fully assembled.



14. Test machine to make sure it works.

Appendix A, Additional instructions

Remove the **sling ring**

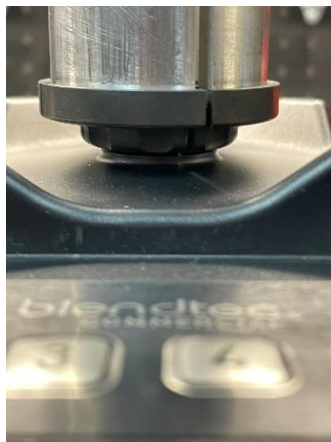
There are three methods for removing the sling ring: using a sling ring puller, screwdrivers, and a hammer. These methods and their procedures are listed below in order of preference.

a. Sling ring puller:

This is the preferred method since it is the quickest and least damaging method but requires a custom-made sling ring puller.



- i. Slide the sleeve to the top of the sling ring puller (up to the screw) and hold it there to ensure that it doesn't interfere with the four tines during the attachment.
- ii. Push the teeth of the puller down onto the top of the sling ring until all four teeth are fully closed around the bottom of the sling ring. Lower the sleeve until it is fully resting on top of the teeth, locking them around the sling ring.



- iii. With one hand, hold down the top of the blender to stabilize it. Then, tilt the sling ring remover and slowly increase the pressure downwards to pry the sling ring off the motor socket. To minimize any damage or warping of the sling ring, this can also be done while continuously rotating the puller in circles to more evenly lift the sling ring off the motor socket from all sides.
- iv. After removing the sling ring, flip the puller upside down and the sling ring will fall out of the top. Set it aside for reattachment to the new motor later.

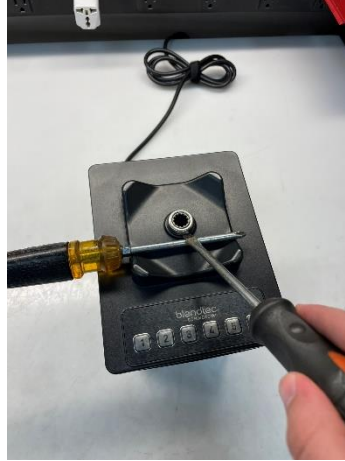


c. Screwdriver method:

This is the next preferred method if a sling ring puller is not available as this method does not cause damage to the motor but can potentially damage the plastic motor base and sling ring. Two standard screwdrivers are needed with at least one of them being a flathead screwdriver.

- I. Place one of the screwdrivers across the top of the blender base. This will act as a temporary fulcrum point for the flathead screwdriver. Insert the tip of the flathead in the small gap between the sling ring and the blender base. Possible arrangements for this are shown in the photos.
- II. Slowly push straight down on the flathead screwdriver handle to pry the sling ring off the motor socket. **DO NOT TWIST THE FLATHEAD SCREWDRIVER AT ALL**. Doing this will permanently damage and deform the blender base. Keep the tip of the flathead flush against the sling ring while lifting it up. If desired, these

steps can be repeated at multiple points around the sling ring to more uniformly lift it off the socket and minimize any damage or warping of sling ring.



III. Cover the sling ring with your hand while removing it. This will prevent it from getting lost or damaged since the sling ring tends to suddenly pop off the socket at a high speed when being removed.

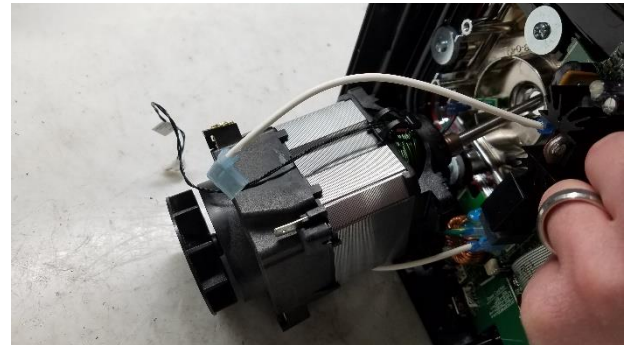
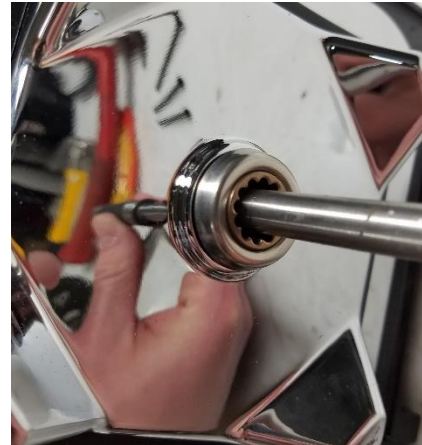
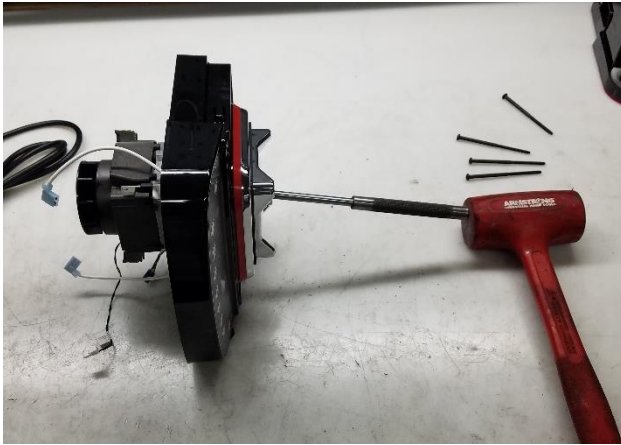
IV. After removing the sling ring, set it aside for reattachment to the new motor later.

d. Hammer method:

This method is fast and only requires basic tools, but it damages the motor and should only be used if the motor is being replaced. The method occurs after the motor screws are removed.

- I. Place unit on its side.
- II. Using a flat punch and hammer, insert the punch into the socket and use the hammer to tap the socket through the sling ring.
- III. The old motor will fall out of the motor mount hole and will be free from the rest of the machine.

- IV. Examine the sling ring. If it is not bent, then it can be reused. If it shows signs of damage (dirty is not the same as damaged), then replace it with a new sling ring.



Error Code	What to do?	Description
Overload	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Verify connections between Motor control board and Motor are good. 3. Replace Motor. 4. Replace Motor control board.	The overload condition is intended to shut off and protect the blender if the blade is obstructed or the jar overloaded so it cannot spin. This error occurs when the motor rotor is unable to spin or reach the target speed. If overload occurs frequently during light use, there is a defect with the blender.
Motor Overtemperature	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Verify cooling fan is installed correctly and working, repair/replace as needed. 3. Verify baffle gasket is installed correctly repair/replace as needed. 4. Replace motor.	The max motor temperature of 85°C has been exceeded. This error mode persists until the motor cools below 75°C.

Inverter Overtemperature	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Verify cooling fan is installed correctly and working, repair replace as needed. 3. Verify baffle and baffle gasket are installed correctly repair/replace as needed. 4. Replace motor control board.	The max inverter module temperature of 80°C has been exceeded. This error mode persists until the inverter module cools below 75°C.
Motor Sensor Missing	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Check motor temp sensor plug in on motor control board. 3. Plug in working thermistor and see if this fixes the issue. 4. Replace motor control board.	The motor temperature sensor is not detected and could be due to a faulty sensor or circuit.
Inverter Sensor Missing	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace motor control board.	The inverter temperature sensor is not detected and could be due to a faulty sensor or circuit.
Inverter Fault	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The inverter fault output has been asserted due to either under-voltage lockout or over-current shutdown.
DC link Overvoltage	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The DC link voltage has exceeded the maximum limit of 460VDC.
Error Code	What to do?	Description
DC link Undervoltage	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The DC link voltage is below the minimum operable limit of 120VDC.
I-U Offset out of range	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The U phase ADC current offset is out of range.
I-V Offset out of range	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The V phase ADC current offset is out of range.
I-W Offset out of range	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The W phase ADC current offset is out of range.

V-U Offset out of range	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The U phase ADC voltage offset is out of range.
V-V Offset out of range	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The V phase ADC voltage offset is out of range.
V-W Offset out of range	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The W phase ADC voltage offset is out of range.
UI Communication Missing	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Ensure UI to MC plugs are pushed together entirely. 3. Plug in new UI board and test again. If this fixes the problem, replace UI board. 4. Replace Motor control board.	The MC board is not receiving any communication from the UI board.
Calibration Needed	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Ensure UI to MC plugs are pushed together entirely. 3. Plug in new UI board and test again. If this fixes the problem, replace UI board. 4. Replace Motor control board.	The MC board needs to receive valid calibration parameters or run the calibration routine (UI should send a calibration request) or receive valid calibration parameters from the UI board.
Error Code	What to do?	Description
Invalid PCB Revision Resistor	1. MC board and UI board have incompatible firmware. This may require reflashing the UI to the most recent firmware. 2. Try using plugging in a known working UI board. If this works replace, the UI board. 3. Replace the Motor Control board.	The measured value of the PCB revision resistor is outside the tolerance ranges of all possible revision resistor values.
Invalid Digital Supply	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Ensure UI to MC plugs are pushed together entirely. 3. Plug in new UI board and test again. If this fixes the problem, replace UI board. 4. Replace Motor control board.	The 3.3V digital supply voltage is out of range.

Invalid Fan Supply	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Ensure UI to MC plugs are pushed together entirely. 3. Plug in new UI board and test again. If this fixes the problem, replace UI board. 4. Replace Motor control board.	The 12V fan supply voltage is out of range.
Fan Missing	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Check the fan plug on motor control board. 3. Plug in working fan and see if this fixes the issue. 4. Replace motor control board.	The fan is not detected.
System Shutdown Required	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The MC needs to be power cycled. One possible cause is that an overvoltage condition has been detected.
MC FW incompatible with PCBA revision	1. Replace MC board.	The MC firmware is not compatible with the detected revision of PCB.
Input Line Voltage Out of Range	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Replace Motor control board.	The input line voltage is out of the acceptable low and high range. Low range is 100VAC-137VAC and high range is 220VAC-240VAC.
Error Code	What to do?	Description
Motor Not Detected	1. Unplug wait for cooling fan to stop running, plug in and see if this fixed the problem. 2. Rotate motor with fingers. If it is grinding or wiggles, replace the motor. 3. Plug motor into a working controller and test the motor. If it works correctly move to step. 4. Replace Motor control board.	The blender motor is not detected.
Getting Ready	1. Unplug wait for cooling fan to stop running, verify board to board ribbon connectors are fully plugged into both Motor Control and User Interface boards. 2. Replace board to board ribbon. 3. Replace UI board. 4. Replace MC board.	Communication error between motor control and user interface board.

BLDC Wiring Schematic

