



De-Icing Applicator Manual
305 LP, 500 ASM, 750 ASM, 1000 ASM, 1600 ASM,
Automated Power Bundle



NOTICE: READING THIS MANUAL IS MANDATORY BEFORE OPERATING THIS EQUIPMENT

Warranty Notice:

At VSI, nothing is more important to us than your complete and total satisfaction with our products and customer service. Proper setup, installation and best maintenance practices are vital to ensure longevity of your VSI equipment.

Please go through the warranty registration form and procedure for your equipment in order to register your three year Honda and one year overall product warranty. The warranty form was sent to the same email address to which you received your invoice. If you cannot find this form, please contact us at sales@vsinnovation.com . If the warranty is not registered, your warranty claim may be denied due to improper setup, use or install.

Our equipment is Honda tested and certified so your Honda engine comes with a three year commercial warranty backed by Honda and any Honda certified repair center.

All other parts* on your equipment are warrantied against defects through VSI for one year from the date of purchase.

*We do not offer a warranty on pump seals as over 99% of those failures are due to improper use or running pumps dry.

This warranty is a parts and technical support only warranty, labor is not included.

Corrosion related issues including wire connections are not qualified warranty items.

We are not responsible for loss of product or productivity due to failures of any kind.

Your warranty will be void due to abuse, misuse, neglect, alteration, modification, improper handling, improper installation, improper maintenance or failure to follow the instruction and procedures in the VSI manual and warranty registration form.

Warrantied parts must be sent back to VSI within 30 days in order for us to process your warranty claim. Replacement parts will be invoiced and will not be marked as paid until the warrantied part items are returned to our manufacturing facility at 150 E Sharon St, Le Center, MN 56057.

Installing Your Sprayer

Without a wiring harness running from cab to sprayer, installation is a breeze. Simply set your sprayer on the truck and strap, bolt or chain it down. Yes, it really is that simple!

There is a digital version of this manual that can be accessed by hitting the “Getting Started/FAQ” button on the “profile” tab of your VSI Spray Control app. There is also a “tech support” button that you can hit and it will pre-populate an email with your sprayer and other info, type your issue above that pre-populated data so our engineer can review and find a solution and so your salesperson can follow up with you with the right information.

Before First Use- VERY IMPORTANT

Your spray unit will heavily rely on the onboard deep cell battery. That is why we have included an onboard charger/battery maintainer. Before first use, plug this in overnight or until fully charged. The batteries do not come fully charged from the factory. Please also keep this battery maintained. It is strongly suggested that the sprayer be plugged in between uses to keep the battery in peak condition. Remember that lead acid batteries can lose as much as 2% of their charge per day even when sitting idle, this is why we include the on board battery maintainer and handy built in plug, to keep the batteries charged and ready for use at all times as pictured below.



After your battery is fully charged, the next most important step is to go to the “profile” page of the app and connect your sprayer to the nearest WiFi to where it will be

stationed or most often parked. Enter the WiFi name and password into the text fields and hit the “Save Credentials” button. The WiFi credentials will then be stored on the sprayer itself and do not need to be saved again. The sprayer is able to remember 10 sets of WiFi credentials and will connect to any available when you push “Connect to WiFi”. Once you have your WiFi credentials saved the sprayer will try to connect when it is powered up if any of the networks are in range.

Connecting to Your Sprayer

To begin using your VSI sprayer you must first download the VSI Spray Control App from either the Google Play store or the Apple App store. Search for “*VSI Spray Control*” and download the app with our logo on it.

Once downloaded, open the app and read the liability prompt. Press OK and go to the Details tab at the bottom. Make sure your sprayer engine key is in the “on” position. Your switch can remain in this position all the time without draining the battery. Now turn on the main switch on the control box and you should see a green light appear on the switch. You can now press connect on your phone or tablet. You will be shown all sprayers available within range. Select the sprayer from the list that matches the serial number of the one you are attempting to connect to. (The serial number can be found on the side of the control box.) You have now connected to the sprayer and have control over the unit. No other devices can connect to a unit that is actively paired to a device. If you want to name it to match the truck it is in or name it for the operator instead of the serial number you can do so on the details page. **VERY IMPORTANT:** To properly save this change and all other data and settings, make sure to press the “disconnect” button on the details page when you are done with the sprayer. When you disconnect from the sprayer, the sprayer will save all of the data and settings that have changed. **WAIT 10 SECONDS AFTER DISCONNECTING FROM THE SPRAYER BEFORE TURNING THE SPRAYER OFF TO ALLOW THE SPRAYER TO SAVE THE DATA.** Simply turning the sprayer off may not save all of your settings or data.

Running Your Sprayer

Once you are connected, you will either have to manually start your engine with the key, or, if your unit is equipped with our Total Control upgrade, you can go to the Accessories tab (ACC) and start your engine from that screen.

Once your sprayer is running, your next likely step will be to go to the Details page and punch into your first job (If you are not tracking the product applied without our app, continue to the next paragraph.) You can type in which job you are on and then press Start to begin your job. This will track gallons used, acres covered, gallons sprayed out of hose reel, and any notes you left for the job. When you are finished spraying for the

day, you press Submit Report and the system will send a CSV file to an email of your choosing. This file can be integrated into other snow tracking systems if you contact your provider and ask them to allow the CSV file to sync with their system.

Once you are punched into your job you are ready to go to the Spray tab at the bottom. Here you have the ability to turn on the lights and strobes on the unit. Next to that is Operation Mode which lets you toggle between Auto and Manual modes. GPS rate control is only active on Auto mode, manual mode is a gallons per minute based flow rate that is not gps/speed dependent.

When in Auto mode, you will be able to change the App Rate, which always defaults to 80 GPA (Gallons Per Acre.) The plus and minus buttons will adjust the GPA by 5 up or down for each press. When in manual mode, these buttons move the Proportional Valve, open and close. By holding open or close, you will be allowing more or less liquid GPM to flow through and be applied out of the selected boom sections.

The three buttons below that are Hose Tracking (with hose reel upgrade,) Ice Buster, and Boom Lock. Hose Tracking is selected when using the hose reel and will track the gallons applied through the hose. The Ice Buster button is used when you are spraying a steady rate but have a section of snowpack, ice or a high priority area that needs a higher application rate for a short stretch. By pressing this button, your boom sections will put out a predetermined rate that will be higher than your standard application rates. This predetermined rate can be changed in the settings menu. The Boom Lock button will lock out the boom sections so you aren't able to accidentally turn them on when you are driving down the road or doing other things on your phone/tablet.

At the bottom of the screen you will find your Boom Section Control buttons. These control your left, center, and right nozzles. (Only center nozzles if you don't have the Three Lane Boom upgrade.)

App Settings

Most of the app settings should be left alone unless you've consulted with a VSI employee first. The tank size is pre-programmed to the size of the sprayer, except on Automated Power Bundles as we do not know which tank size you plan to connect. The Tank Level will need to be reset every time your sprayer is filled up. Brine blend can be set to whatever blend the sprayer is running in order to track this information on your job reports for job costing/margin tracking. The Boom Widths, Minimum Flow, Servo Speed, and Flowmeter Cal settings should be left alone unless otherwise noted. This is where you can adjust your Ice Buster setting as previously mentioned. If for

some reason your settings have been changed and you don't remember what they need to be at, you can reset them to factory settings at the bottom of the screen. Make sure that after any settings changes or tank reset you hit the "Save" button at the bottom right of the screen

Boom Connection Positions

The picture below shows where your hose camlock sections hook up from your spray boom to your sprayer. The left valve connects to the driver's side of the three lane boom. The center valve connects to the middle boom. The right right valve connects to the passenger side boom. When assembling your hoses, make sure you make it long enough to reach the furthest of two connection points for each connection on the boom. A roll of 1" hose and a bag of barbed parts and hose clamps is included with each spray unit as pictured below.



Valve Functions

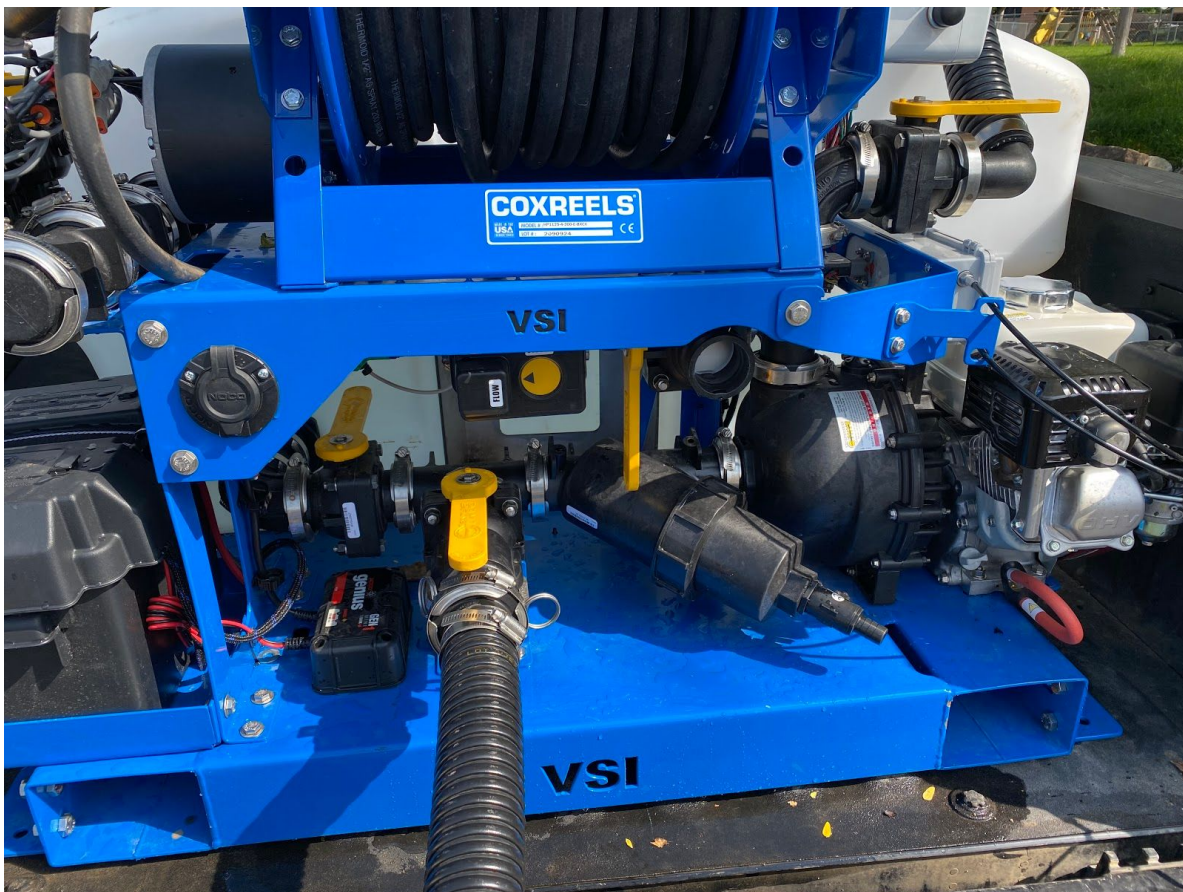
Proper valve positioning is vital to your sprayer working correctly for each given task. Best rule of thumb is that any valves low down on the unit entering the lower part of the pump housing are suction side valves and any valves high up or connected to the top side of the pump are pressure side valves.

The images on the following pages indicate proper valve positions for different functions of the sprayer.

- **Application Mode:** Your valves are to be in this configuration when you are applying liquid de-icer. The most common error that is made in application mode is that the agitation valve (on the upper right of the image) gets left open. This will rob a majority of the pressure and liquid flow for your system and won't leave enough for your sprayer or hose reel to work correctly. The next most common mistake is that the tank valve (back left of image) gets left closed. With no liquid getting to the pump, your system won't work at all and eventually you will burn out your pump seal.



- **Self-Fill Mode:** Your hose must be connected to the bottom left camlock and your valves need to be in the configuration shown when you are using the pump on your sprayer to self fill from a holding tank. A common mistake made here is that the tank valve (back left) gets left open, this won't allow the pump to prime as it will be sucking air from the tank. The other common mistake when self filling is that the Agitation valve (top right) gets left closed. The system will still fill this way as the valve has a hole that allows constant flow through the valve even when closed (to protect the pump from being deadheaded) but it will take an exceptionally long amount of time through that bypass. If the tank you are pulling liquid from is lower than the height of the pump, you may have to prime the pump by unscrewing the top cap on the pump and allowing the air out of the system. In some cases you may need to fill the pump housing with liquid to purge the air fully. Most of the time when filling from a bulk storage tank, this is not an issue, especially if the fill hose is pre-charged with liquid.



- **Pump-Out Mode:** Your tank must have liquid in it, your hose must be connected to the top right camlock and your valves need to be in the configuration shown when you are using the pump to transfer liquid from the sprayer to another tank outside of the sprayer. One common mistake here is that the bypass valve (top right) gets left open, which will still allow the pump-out to work, but it will be substantially slower than if it is set up properly as shown.



Filter

Each sprayer is equipped with a filter right before where the liquid enters the pump. Inside is a stainless steel 30 mesh filter that is reusable. If you suspect it is clogged, close your tank valve and loosen the collar around the filter housing, pull outer housing off and remove the filter. Rinse clean and place back in the housing.

Spray Boom:

Your spray boom will require bolt together assembly before use. There is a simple walkthrough video of this process on our youtube channel:

<https://www.youtube.com/watch?v=gHtMyaZNyhM>

A finished boom can be seen below, and should be set at 20"-28" from bottom of boom shroud to the ground.



3 Lane Pre Treatment Nozzles

The pre-treatment tips are the bottom ones on each end and the center fan tip, these are lower flow rate and made for the lower application rates of typical pre-treatment . These nozzles are to be used when spraying at 20-50 gallons per acre at normal speeds (2-15 mph). These tips could also be used in applications where you are post treating in very small lots, on driveways, or other low speed or low volume applications.

3 Lane Post Treatment

The post treatment tips are the top ones on each end and the central boom with a vertical camlock in the middle that sprays out of the jet nozzle holes in the stainless pipe. These nozzles are to be used when spraying 70-120+ gallons per acre or when pre-treating at higher speeds than a typical parking lot such as roadways or large logistics centers where speeds commonly exceed 12mph.

It is very common for people to want to pre-treat with the jet nozzle holes because they see local roadway and highway departments leaving "lines" of brine on the road. The reason they do this is because of the high rate of speed at which they travel on roadways requiring a heavier jet pattern to not get diluted in the wind, plus they have very high traffic levels from cars to truck the product evenly. Parking lots are different, lower speeds and less traffic means that a fan tip is preferable, which is why our center pre-treat nozzle is a fan.

If you run the small outside pre-treat nozzles with the center jets, your application rate

WILL NOT be balanced and your outer nozzle performance will suffer due to the center jets robbing a majority of the liquid pressure/volume from the outside nozzles.

Total Control

The Total Control upgrade offers the ability to control the engine functions (ON/OFF, throttle position, choke) as well as other auxiliary functions (hose reel rewind and ON/OFF for strobe and work lights)

The Total Control controller is turned on by holding the red power button and can be charged using a Micro USB cord. The switch on the control box must be on to use the wireless Total Control remote.

The total control box contains actuators that control your throttle and choke as pictured below. It is incredibly important to keep your choke and throttle mechanisms lubricated and clean so that the total control system can function properly.



Hose Reel

The Hose Reel upgrade offers the ability to hand spray entryways, sidewalks, between cars, and anywhere else that can't be reached with the truck mounted boom. To use the hose reel, simply pull on the hose to the desired length. The spray pattern on the gun is controlled by the orange switch just above the handle. To retract the hose you can use the push button on the control box, the button on your smartphone or tablet, or the button on the Total Control remote if your unit has the Total Control upgrade. It is

Three Lane Boom

The Three Lane Boom upgrade offers the ability to spray over 30 feet wide with precision. Each section of the boom is controlled via the VSI Spray Control app by pressing the Boom Section Control buttons on the Spray tab in accordance with the boom section you want to activate/deactivate. If damage occurs to any part of your boom, contact us for replacement parts.

Wiring, Fuses and Electronics

Flow Meter

The flow meter on your unit is the green device inline with the plumbing on the pressure side of the pump. This vital instrument tracks the flowrate and volume going to your spray boom sections and your hose reel if so equipped. This realtime reading is what tells your GPS rate control system to increase or decrease the flow rate to your boom based on your speed by opening or closing your proportioning valve (see next item). The image below shows your flow meter as viewed from the back of your spray unit. These magnetic flow meters never require re-calibration due to the use of different brine blends like a conventional turbine flow meter would.



Proportioning Valve:

The proportioning valve is what regulates the flow to your spray boom based on GPS speed inputs when spraying in “auto” mode or user inputs for desired gallons per minute by the user when using “manual” mode. The proportioning valve is pictured below as viewed from the back of the sprayer and clearly indicates full flow (all the way counter clockwise, 9 o clock) or closed (all the way clockwise, 12 o clock).



Wiring Harness:

Our automotive grade wiring harness utilizes a high quality Deutsch connector to go from harness to circuit board (inside the main switch box with the VSI american flag logo). We expect there should be little to no maintenance with your harness unless a section is cut or abraded. Should you need to troubleshoot your harness, wiring inside the box or any components, the below diagrams and pictures show what each wire is for, what color each wire is, and the corresponding pin number for that color and function. The abbreviations listed at the end of each item are the pin socket location labels inside of the wiring box that are printed directly on the circuit board. The (rb) (mb) and (lb) after each abbreviation refer to which bank of connections on the board each one goes into, rb = right bank, mb= middle bank, lb= left bank
All wires are 16 gauge unless otherwise noted.



Pin 1: Main Power Wire 12V + ;Red, 10 gauge wire
Pin 2: Main Ground Wire ; Black, 10 gauge wire
Pin 3: Hose Reel Power 12v + ; Red, 10 gauge wire
Pin 4: Accessory Power Feed 12v + ; Red, 10 gauge wire
Pin 5: Light Bar Signal Wire; Red wire: L/S (rb)
Pin 6: Strobe Signal Wire; Yellow wire: SV (rb)

Pin 7: Left (driver side) Boom Signal; Yellow wire: LBV (rb)
Pin 8: Middle Boom Signal; Green wire: MBV (rb)
Pin 9: Right (pass. side) Boom Signal; Orange wire: RBV (rb)

Pin 10: Proportional Valve Signal 1; Pink wire: PM1 (mb)
Pin 11: Proportional Valve Signal 2; Blue wire: PM2 (mb)
Pin 12: Flow Meter Signal; White wire: FLO (mb)

Pin 13: Total Control Remote Engine Starter; Green Wire: RF1 (lb)
Pin 14: Total Control Remote Engine Kill Switch; White wire: RF2 (lb)
Pin 15: Total Control Remote Choke Down; Pink wire: RF3 (lb)
Pin 16: Total Control Remote Choke Up; Blue wire:RF4 (lb)
Pin 17: Total Control Remote Throttle Down; Orange wire: RF5 (lb)

Pin 18: Kill Switch Signal; Orange wire: KILL (mb)
Pin 19: Starter Signal; Yellow Wire: STRT (mb)
Pin 20: Engine Voltage Sensor: Gray wire; VEN (mb)

Pin 21: Total Control Throttle Up: Yellow Wire; RF6 (lb)
Pin 22: Total Control Remote Hose Reel Button: Purple wire; RF17 (lb)

Pin 23: Actuator 5v+: Red wire; +5v (mb)
Pin 24: Not used
Pin 25: Total Control Remote Lights: Gray wire; RF8 (lb)
Pin 26: Not used
Pin 27: Choke Signal: Green wire; CHK (mb)
Pin 28: Not used
Pin 29: Throttle Signal: Blue wire; THR

Be very cautious when using a test light or multimeter inside of your VSI Control Box as shorting out a connection point could lead to your main computer being rendered inoperable.



The color coded diagram above shows the wire color for each pin, keep in mind, **this view is from the back of the plug (showing the wires going into the plug), so it is a reversed/mirror image from the numbered image above.**

Wiring Box and Fuses:

To open your circuit board/wiring box you will use a #1 phillips bit or screwdriver and remove the 6 screws that are countersunk in the front cover of your box. The inside of your circuit board/wiring box may look intimidating, but very little of what is inside will be serviced by the end user.

The table below along with the corresponding labeled image on the following page will help give you a better understanding of what is inside.

There is also a video here that runs through these items and the function of each fuse inside your box: <https://youtu.be/ZZ2pHgg68W0>

#1: Main switch- On/off power. Turn off ALWAYS when not in use, system will draw current even when not being used if switch is left on

#2: Hose Reel Button- In addition to being able to rewind your hose reel with your app or Total Control remote (if equipped), there is also a manual rewind button located below the switch on the box.

#3: Hose Reel Relay- This is the relay that operates your hose reel, if the hose reel should stop working and all fuses are good, this is one of the next things to check.

#4: Main Computer- This is the “brain” for your entire system. This is where the firmware is stored that allows this circuit board to talk to the smart phone/tablet application and properly run the spray system. A working computer should have a “breathing” white light on the front when the system is on. If your system is on and there is not a breathing white light, you may need to check your main fuse (#10) or ensure that your battery is fully charged.

The computer is a pin on connection, meaning that if your computer becomes damaged or corrupted, we can send you a new one to install, gently lift and wiggle straight up to remove the computer from the board.

The 2 wire leads that come off of the computer are for the antennas, one for WiFi (to perform firmware updates/diagnostics) and one for Bluetooth to talk with your smart device.

#5: Main harness bulkhead- This is where the main harness that connects to all of your electronic devices on your sprayer connects into your control box. See wiring diagrams on previous pages

#6: GPS signal wire out- This wire leads to your GPS puck that is magnetically mounted above your wiring/circuit board box. This is a water tight seal, do not remove wire unless instructed by a VSI associate.

#7: Right bank (rb)- This is the right bank of wire connections from the main harness as referenced in the numbered wiring harness diagram.

#8: Middle Bank (mb)- This is the middle bank of wire connections from the main harness as referenced in the numbered wiring harness diagram.

#9: Left bank (lb)- This is the right bank of wire connections from the main harness as referenced in the numbered wiring harness diagram.

#10: Main Fuse- This is a 10 amp 5x20mm bus fuse, behind the main switch inside of the box. If this fuse is blown, the light on the main switch will remain illuminated but no other functions or lights within the box will work. This is the only 5x20mm bus fuse in this box that is 10 amp capacity. All others are 5 amp, as noted.

#11: Kill Switch Fuse- 5 amp 5x20mm bus fuse that operates the kill switch for the Honda motor.

#12: Starter Fuse- 5 amp 5x20mm bus fuse that operates the signal for the starter for

the Honda motor.

#13, #14 and #16: Spare Fuses- In the 2020 model VSI de-icing sprayers, these 5 amp 5x20mm bus fuse is a spare. It can be used as a spare in the other fuse locations except the #10 main fuse location which requires a 10 amp fuse.

#15: Hose Reel Signal- 5 amp 5x20mm bus fuse that handles the hose reel signal.

#17: Strobe Lights- 5 amp 5x20mm bus fuse that handles the strobe light signal.

#18: Left Boom Valve- 5 amp 5x20mm bus fuse that handles the left (driver side) boom valve signal.

#19: Middle Boom Valve- 5 amp 5x20mm bus fuse that handles the middle boom valve signal.

#20: Right Boom Valve- 5 amp 5x20mm bus fuse that handles the right (passenger side) boom valve signal.

#21: Light Bar- 5 amp 5x20mm bus fuse that handles the light bar signal

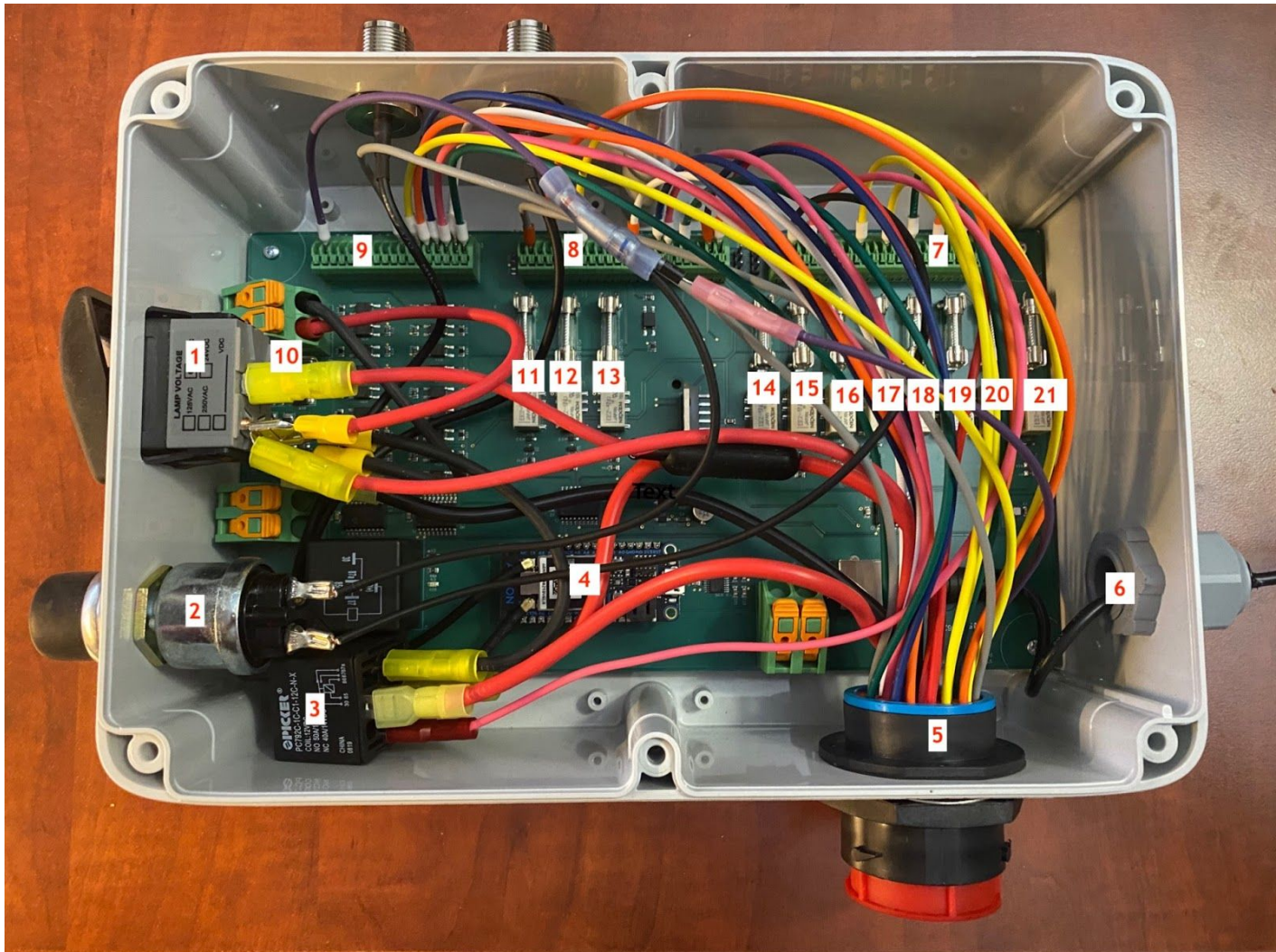
Additional Fuse:

There is an additional 40 amp automotive fuse inside of a water resistant fuse holder inside of the battery box. If your battery is charged and your main switch is not illuminated green, then more than likely, your 40 amp fuse inside of the battery box is blown.

Potential reasons for fuses blowing:

If you have fuses blowing the following could be common reasons for that happening-

- Your battery voltage has dropped too low due to lack of charging, this causes higher amperage draw and blown fuses. Charge your battery regularly to avoid this.
- Your boom section valves or proportioning valve has frozen or left salt brine in them for an extended period (ie, the off season) which has caused them to lock up and be immovable.
- Water or corrosion in wire connections or electronic components
- Wiring harness has been nicked, scraped or cut
- A component has failed, lights, proportioning valve, flow meter, or engine components.



Work Light and Strobes:

High quality work light bar and strobes are IP67 rated. One note of caution with the work lights; they draw more current than the Honda motor charging system is able to supply back, so if you will be running long shifts without time to charge your battery, we would suggest not running your lights more than necessary to preserve your battery for vital functions such as operating your boom section valves, flow meter and proportioning valve.



GPS Puck:

This is the device that receives the satellite signal that calculates your speed of travel as well as provides the GPS waypoints (lat. & long.) for the CSV file report. Keep in mind that areas such as underground parking may not receive signal from GPS, so these areas may need to be sprayed in manual mode. Tall buildings can also occasionally cause interference, but typically not severe enough to cause auto mode to stop working. The small round magnetic puck in the image below is your GPS Puck.



Total Control Remote:

The signal receiver for the 2.4ghz total control remote can be seen next to the gps puck in the image above. The remote controls all of the same functions as your VSI Spray App does, but for those that have rigid mounted phones or tablets in your trucks, the remote is a nice backup option for operating lights, strobes, throttle, choke, etc.. from outside of your truck without removing the phone or tablet. The total control remote is pictured below. It can be charged with a basic mini usb cable. This is only included when you purchase the Total Control upgrade.



Care and Maintenance

Proper care and maintenance is essential to the longevity of the sprayer. Be sure to clean the sprayer after use, ensuring that all salt and road spray are removed. Make sure the choke, throttle, and other engine components are sprayed down with a penetrant and lubricant product like Fluid Film, JB-80, or WD-40. Follow recommended oil, filter, and spark plug replacement intervals as recommended by Honda.

After the season is complete, be sure to rinse out your sprayer and run fresh water through the entire system to wash out any salt residue. Use dielectric grease on all connection points and cap them. Add stabilizer to the fuel tank and run the motor to ensure proper off season storage of fuel.

IMPORTANT

Avoid running the motor without liquid either due to not having your tank valve open while running or running your tank dry, this will cause damage to the pump seal and potentially the pump housing. This is NOT a warranty item.

You should tighten down your tank straps the first time you fill the tank full with liquid. After each storm you should check the straps to make sure they haven't loosened for any reason.

We recommend pre-treating at 30-50 gallons per acre, and post treating at 80-100 gallons per acre (sometimes more in cases of severe snow and ice pack) but we always recommend consulting the manufacturer of the de-icing product you are using for application rates as they can vary between products.

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