Operating Instructions

iScan+ EC-OM-Moisture-Temperature

Table of Contents

iScan+ EC-OM-Moisture-Temperature
SoilViewer Version 4.0 or Above

Section 1
Warranty

Veris Technologies warrants this product to be free of defects in materials and workmanship for a period of one (1) year from the date of delivery to the purchaser. Veris Technologies will repair or replace any product returned to Salina, Kansas, which appears upon inspection to be defective in materials or workmanship. Veris Technologies shall have no obligation under this warranty for the cost of labor, down-time, transportation charges, or for the repair or replacement of any product that has been misused, carelessly handled, modified, or altered.

ALL OTHER WARRANTIES OF ANY KIND, WHETHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WAR RANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE AND ALL CLAIMS FOR CONSEQUENTIAL DAMAGES, ARE SPECIFICALLY DISCLAIMED AND EXCLUDED.

Safety

Look for Safety Symbol

The SAFETY ALERT SYMBOL indicates there is a potential hazard to personal safety involved and extra safety precaution must be taken. When you see this symbol, be alert and carefully read the message that follows it. In addition to design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment.

Be Aware of Signal Words

Signal words designate a degree or level of hazard seriousness.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Important! Read the following SAFETY PROCEDURES before operating the Veris system:
• Read and understand all instructions on safety decals

⚠ WARNING

• Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic lines. Use a piece of paper or card-board, NOT BODY PARTS, to check for suspected leaks.
• Wear protective gloves and safety glasses or goggles when working with hydraulic and high-pressure wash systems.
• If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

⚠ WARNING

• Pinch point hazard: to prevent injury, stand clear when raising or lowering any part of the implement.
• Install all transport locks before transporting or working underneath.
• Detach and store implements in an area where children normally do not play. Secure implement by using blocks and supports.

⚠ CAUTION

• Read Operations Manual before operating machine
• Review safety instructions with operators before operating machine and at least annually
• Riders obstruct the operator's view. They could be struck by foreign objects or thrown from the machine.
• Never allow children to operate equipment.
• To prevent possible electrical shock, or damage to the instrument, do not connect to any power source greater than twelve (12) volts DC.
• Do not grease or oil implement while it is in operation.
• Disk edges are sharp. Be careful when working in this area.
• Disconnect battery ground cable (-) before servicing or adjusting electrical systems or before welding on implement.

Section 2

V-Sense Controller and Electronics Overview

The iScan electronics kit includes the items shown below

EC test box

USB Serial Adapter (not incl on implement-mounted iScans)

SoilViewer Software

EC Test Load

OM Reference Block

OM Test Load

Figure 1

Moisture calibration solution (99% isopropyl alcohol) and tray

Figure 2

Note: V-SENSE controllers manufactured after 9/01/2016 contain an internal Garmin 15x GPS. No external GPS is provided on these units, however external GPS receivers can be used. The controller will automatically give preference to any external GPS source connected to the GPS input. If no external connection is recognized, the controller will automatically source the internal GPS for signal.

The use of an external GPS requires the correct settings. The GPS needs to output only two NEMA strings (GGA and VTG OR RMC). **The system will not run with more than two strings.** The strings need to output at 4800 baud and 1Hz refresh rate.

V-Sense Controller and cables will be attached to iScan module AFTER iScan module is attached to toolbar. After the V-Sense Controller is mounted on the iScan it can remain on the implement due to weatherproofing, unless opened by operator and lid seal is damaged. If the implement is stored outside for long-term storage, remove Controller and store it indoors.

Figure 3 iScan EC-OM

Figure 4 V-Sense Controller

Figure 5 V-Sense Controller (rear)

OM Comm
Serial communication to PC, and external GPS input

12V Power
Power cord shipped with the unit that connects to the available 12V system or optional battery pack

Figure 6 V-Sense Controller (front)

Optic Power
Delivers power to Optical sensor with supplied cable

EC Signal

U3 pH Comm port (not used on EC-OM units)

On/Off
Turns power to V-Sense Controller On/Off

3A Fuse

Power Indicator
Indicates when power to the controller is on

Bluetooth Antenna

Depth Sensor

Software Installation

Note: For computers outside the United States of America, please make the following change to the computer's regional settings before installing the Veris SoilViewer Software.

Step 1: Open control panel and double click on **Region**

Step 2: Click on **Additional Settings**, the following screen will appear. The **Decimal symbol** needs to be a "." while the **Digit grouping symbol** needs to be a ",". The will ensure proper operation of the software. Once the changes have been made click **OK** and proceed with installation.

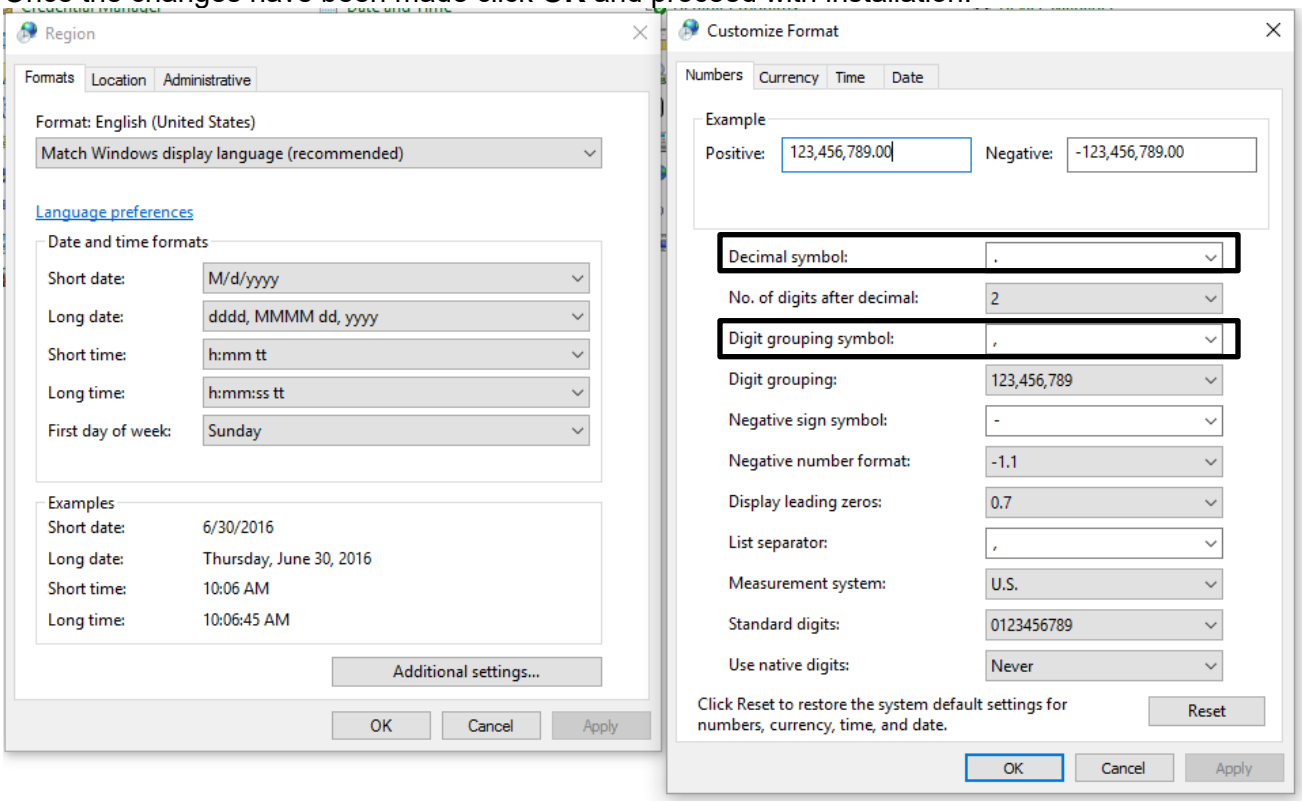
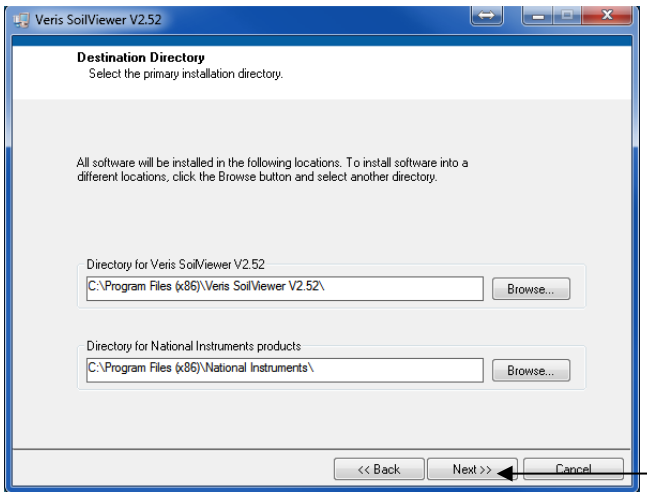


Figure 7



Open Veris flash drive and double click on setup.exe to start the installation.

Click **Next** to continue through installation

Figure 8

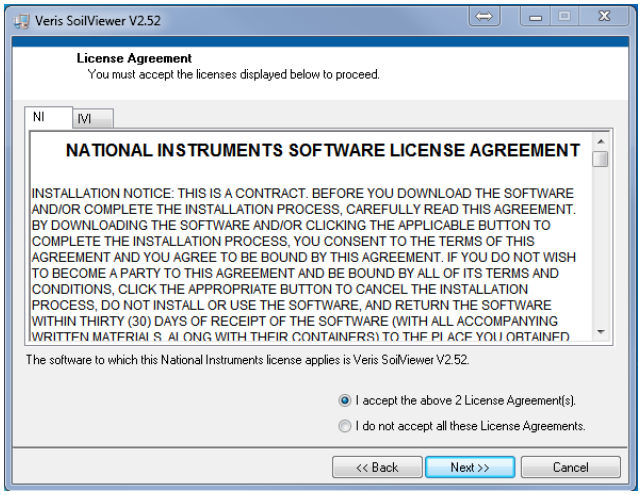
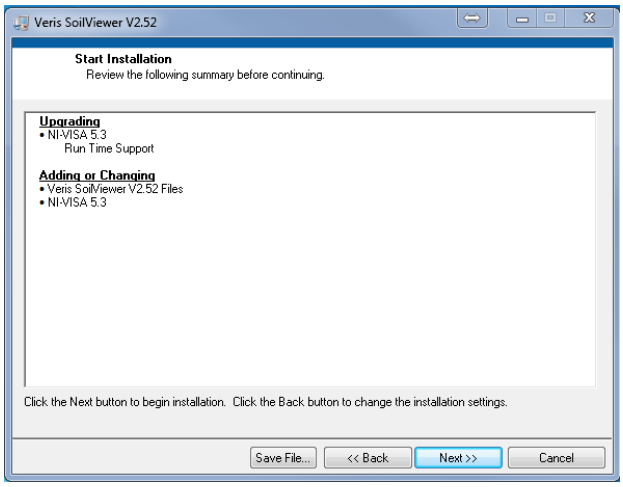


Figure 9

Next two license agreements will need to be accepted before continuing.



Figures 10

Click **Next** to continue through installation

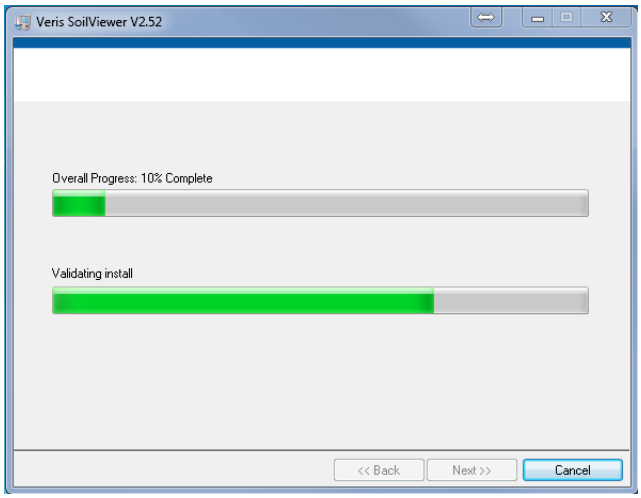


Figure 11

The installer will install all necessary components.

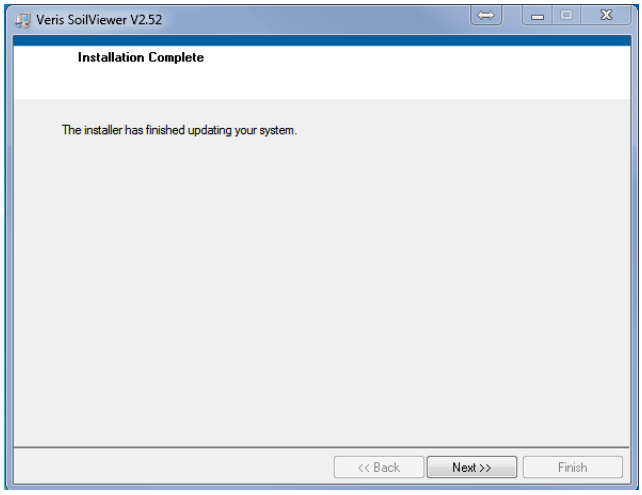


Figure 12

Click Next to install the USB drivers.

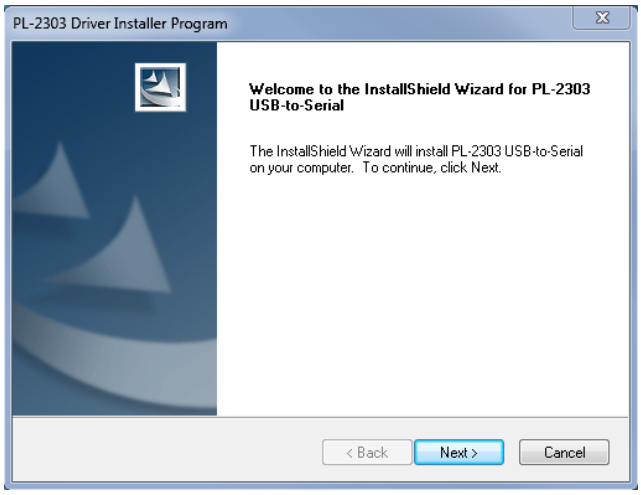


Figure 13

Click **Next** to continue through installation

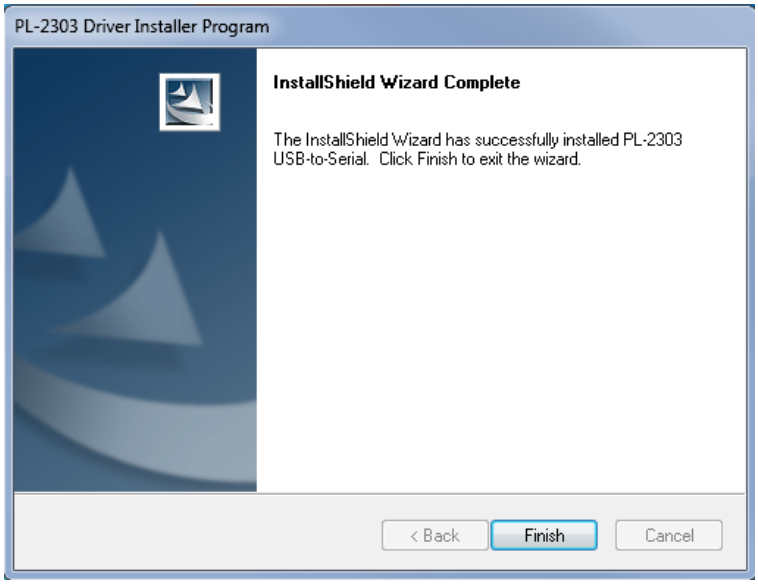


Figure 14

Click **Finish** to complete the installation of SoilViewer.

Section 3

iScan Overview and Set-up

If the unit is crated, some assembly may be required. To do so, please take precautions to ensure that the framework is properly supported to ensure safety. Figures 1 and 2 show the key components of the unit.

Figure 1.

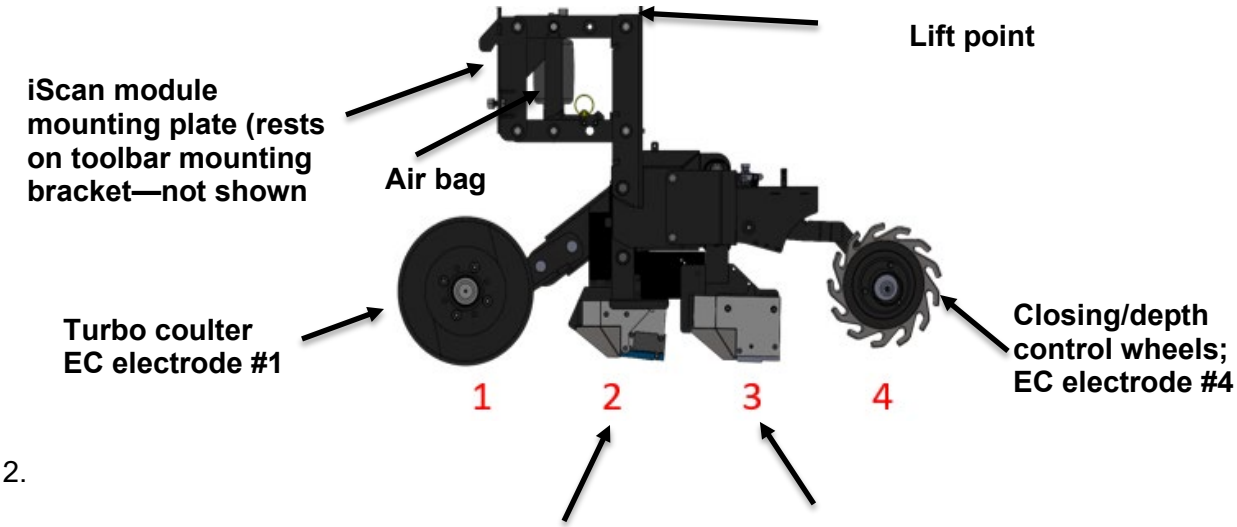


Figure 2.

Note: EC electrodes 1 and 4 inject EC current; electrodes 2 and 3 measure voltage drop

iScan Installation Instructions—toolbar mounting

Step 1. Determine toolbar location.
12” (30 cm) of open toolbar space is needed with no obstructions around the mounting location. Ideally this is near the middle of the toolbar but can be near the outside end if that is only location with adequate clearance.

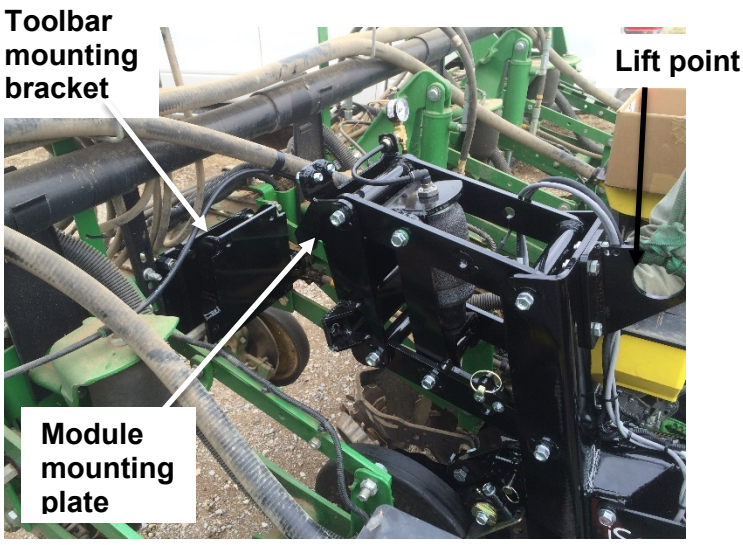
Figure 3

Step 2. Install mounting bracket.
Using supplied U-bolts, attach bracket to toolbar and tighten nuts securely. Position bracket centered between any existing implement row units. Be careful not to pinch any existing cables or hoses. Reroute these as needed.

Figure 4.

Step 3. Lower iScan module onto mounting bracket.
Attach chain or straps to lift point, raise iScan using loader or forklift, and carefully move module between row units. Position iScan mounting plate above mounting bracket on toolbar and lower onto mounting bracket. Bracket has centering tabs that self-align the two pieces together for easy bolt installation.

Figure 5.



WARNING **Stand clear to avoid injury**

Step 4. Complete module mounting. Attach four cross bolts to secure iScan module to toolbar mounting bracket. (Figure 6) Tighten securely. Attach V-Sense Controller to mounting plate. (Figure 7) Multiple positions are provided to clear existing hoses and cables.

Figures 6 and 7.

Step 5. Attach V-Sense cables and 12V power. Attach cables to controller (refer to Electronics overview and Setup section). Attach power cable to 12V power source. Route all cables carefully and secure to prevent damage.

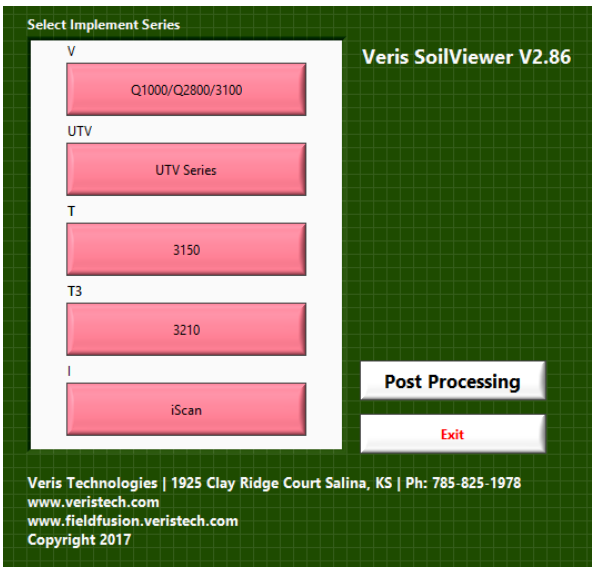
Figure 8.

Step 6. iScan removal. Reverse installation process described above. After V-Sense Controller and four bolts attaching iScan module mounting plate to toolbar mounting bracket have been removed, attach strap or chain to lift point and raise module from toolbar mounting bracket. If the mounting bracket and mounting plate do not separate, press down on closing wheels to shift weight of module and free it from mounting bracket (Figure 9). Do not loosen U bolts or remove toolbar mounting bracket until iScan module has been completely removed.

WARNING **Stand clear to avoid injury**

Section 4

SoilViewer and V-Sense Controller Set-up



Select iScan Series.

Figure 1

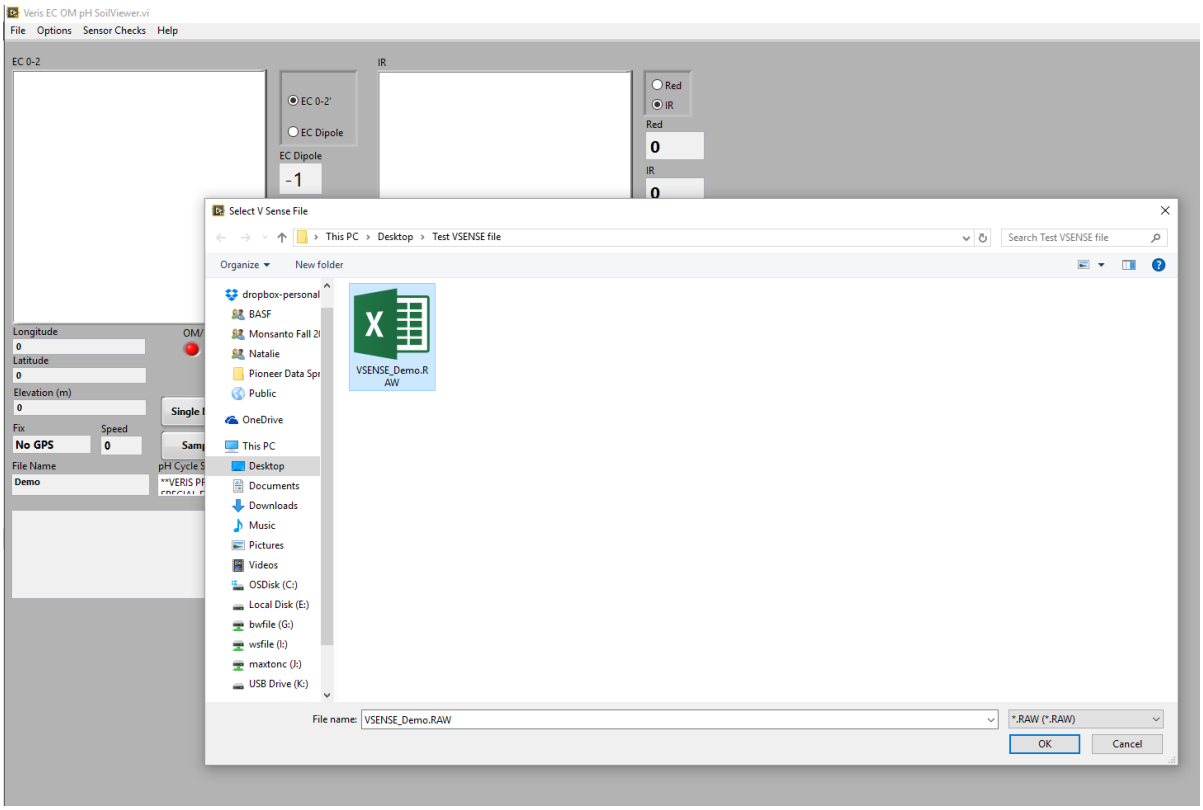


Figure 2

Name the data file for sensor data. All sensor data is stored in a single file (VSENSE.RAW).

The SoilViewer mapping software will automatically detect the Bluetooth or Serial port the controller is connected to, and begin communicating. If the V-Sense controller is not detected, the software will wait 45 seconds for the connection of the electronics and search again; this will repeat until the connection is established. If the connection is not found, unplug the serial or USB cable, restart the PC, reboot the controllers, and reconnect USB cable to the PC. If using Bluetooth, exit the software, and ensure the controller is paired per procedure #11.

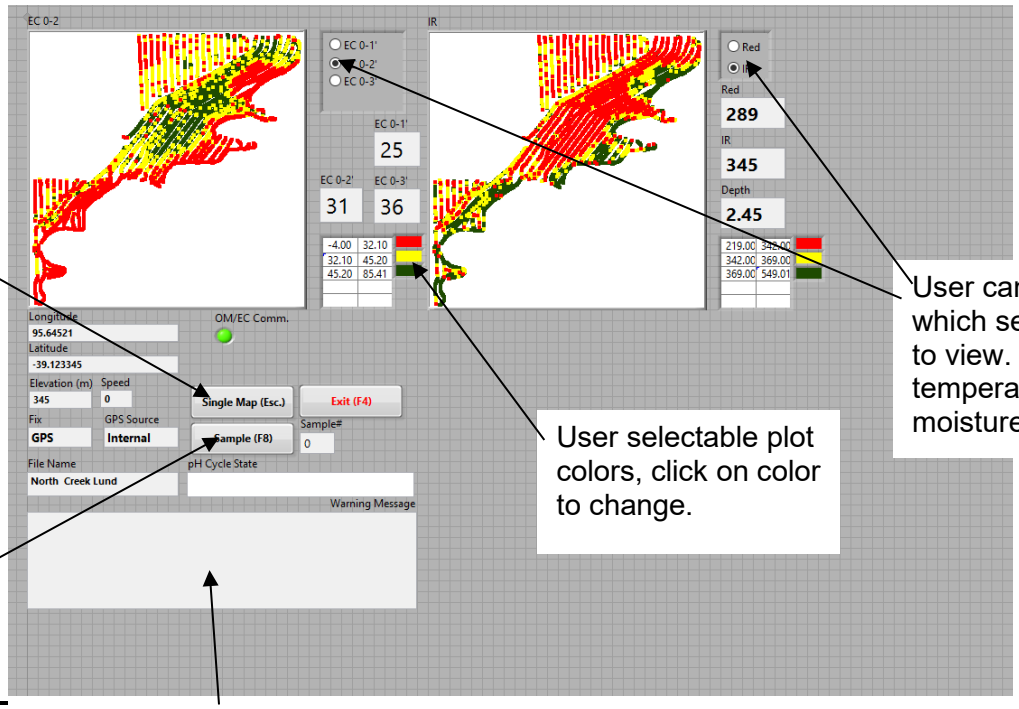
The conditions for mapping and storing EC and Optical data are as follows:

- The unit must be traveling a speed greater than 1 mph
- There must be a GPS signal received
- The OM/EC Comm Light must be green, indicating the PC and V-Sense controller are communicating properly
- The EC value must be greater than -1.

When all these conditions are met, the Saving Data light will be green and the EC and Optical points will be mapped.

Before mapping, perform the OM system checks to ensure proper sensor operation.

If mapping has stopped, files may be appended by selecting a previous file when prompted at the startup of the software. Do not append to a previous day's file or if equipment or soil conditions have changed. Start a new file on each field.



Use single map view to show a larger map, and help identify where to take calibration soil samples

User can select which sensor map to view. (incl soil temperature and moisture)

User selectable plot colors, click on color to change.

Sample button for marking lab sample locations

Various system warnings will appear here see **Warning Messages** for additional details

Figure 3

SoilViewer Warning Messages

There are warning signals programmed into the SoilViewer to warn the operator that data are not being recorded, so that corrective action can be taken. If data aren't being recorded, a warning beep will sound from the computer, and the text indicator of the data that is missing information will blink. Fr example, if the DGPS isn't being received (or the NMEA string containing speed) the Fix indicator text will blink. If EC values are negative, they will also blink. Additional messages may appear in the Warning Message Box as follows:

Figure 4

Potential SoilViewer Warning Messages

Error EC_RPBT - Unit Raised out of ground, but EC readings are positive. Check for a moist soil buildup or a pinched cable causing a short between EC electrodes.

Error EC_NP - Row unit is engaged in soil, but EC readings are negative. Check for continuity, and make sure EC electrodes are penetrating soil at least 2".

Error EC_N30 - Excessive Negatives in EC data, check coulter continuity and soil contact.

Error OM_DPT - Row unit not penetrating soil enough. Depth should be 1.5" or > when mapping.

Error EC_EXMD - Excessive noise on EC readings; check continuity.

Error OM_LW - OM readings are too low. Check wearplate window for clarity.

Error_No Comm.- Check USB/serial or Bluetooth connections to V-Sense Controller. Unplug USB or re-pair bluetooth connectivity and restart PC if communication does not reestablish.

Error No_GPS - Check GPS settings (4800 baud, 1 hz, and only VTG and GGA Strings enabled)

SoilViewer OM System Check

Select OM from the Sensor Checks drop down menu.

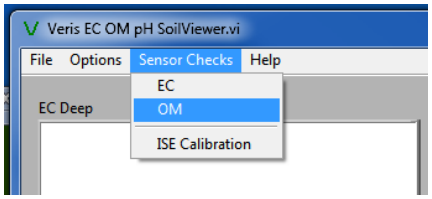


Figure 5

After clicking the button the following will appear:

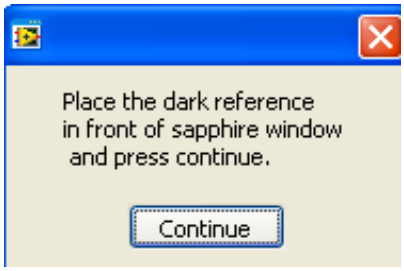


Figure 6

Make sure the window is clean and in good condition. (see below) Place the dark side of the reference block under the window, and click continue. Then the next message will appear.

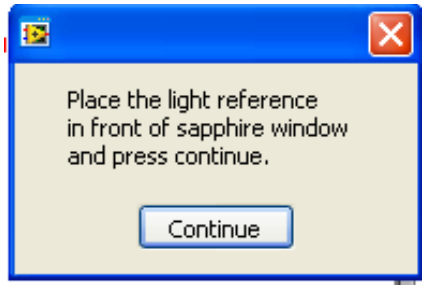
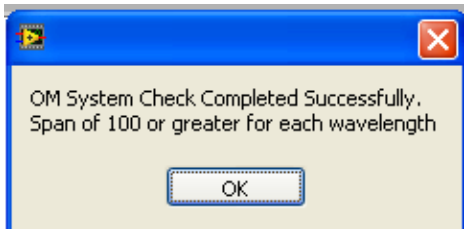


Figure 7

Flip the reference block over to the light side and place under the window, and click continue. Then this message will appear:



or

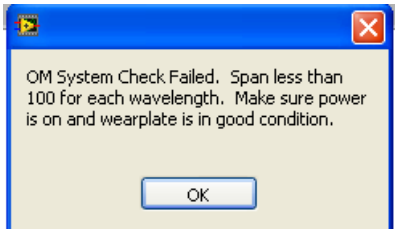


Figure 9

The reference values have been stored, and the system is ready for mapping.

Optical Wearplate

Below is a comparision of two wearplates. The left is a brand new wearplate, and the right has about 2500 acres on it. Inspect the leading edge,shown below, as the steel wears the window can chip or crack. As this contiues to wear it will eventually need replaced.

Figure 10

Wearplates will wear differently in every type of soil, so check it often. To replace wearplate refer to Procedure #9

Section 5: Field Operations

Checking Electrical Signal Continuity and Electrode Isolation

It is recommended that you perform the Electrical Signal Continuity and Electrode Isolation test procedure before first field use (see Service Procedure 3). While these tests were made at the factory, there is the possibility a problem developed during shipping. Performing these tests on the new implement allows you to get familiar with the process under ideal conditions. It is advised that you perform this test after long periods of non-use and on a routine basis (every 40 hours of data collection) to ensure you are obtaining reliable data. **KEEP OHMMETER, TEST LOAD AND TEST BOX WITH THE MACHINE AT ALL TIMES.**

Proper Operating Depth

Begin field operation by lowering implement into soil. iScan+ module must be operated in level position. For good electrical conductivity readings, all four electrodes must be in direct contact with moist soil. A depth of 1.5-3” (3-6 cm) is recommended (Figure 1).

iScan+ module must be operated level with soil engaging components contacting moist soil.

EC electrodes #1 and #4 inject current into the soil and #2 and #3 measure voltage drop.

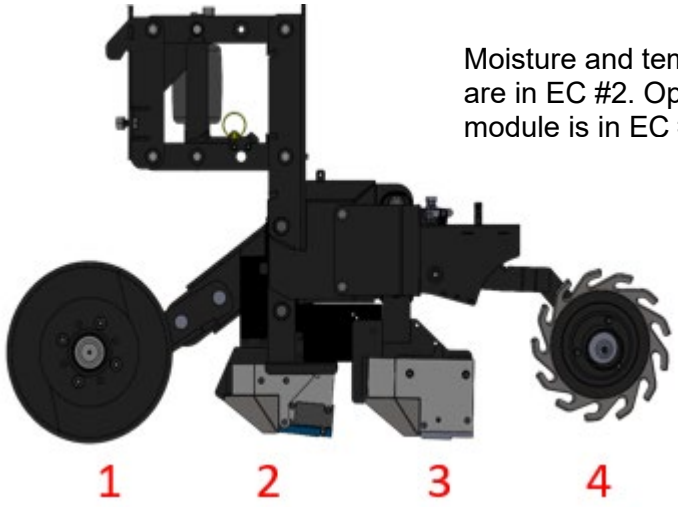


Figure 1

Setting Operating Depth—front turbo coulter

Unless conditions are excessively wet, the front coulter should be set approximately ½” (1 cm) deeper than the other soil engaging components. To adjust the coulter depth, loosen the pivot bolt and the cam adjusting bolt (Figure 2). Rotate cam to raise and lower coulter. Check depth relative to other components and retighten both bolts securely.

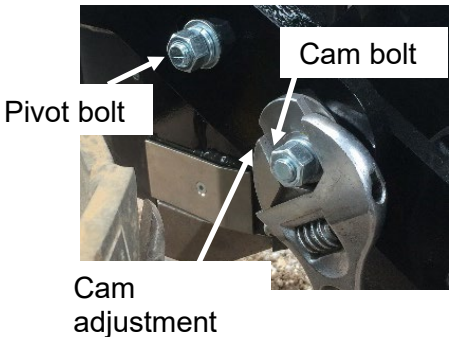


Figure 2.

Maintaining Depth and Soil Contact

Closing/depth control wheels have three functions: 1) close soil slot created by other soil engaging components, 2) serve as an EC electrode, and 3) aid in depth control. Adjust depth using T handle (Figure 3) so that they are making aggressive soil contact. This typically requires a shallow setting.

If soil slot is not closing properly, the rear closing/depth wheels are adjustable to increase or decrease the amount of soil pinched into the furrow made by the optic module (Figure 4). There are three adjustment positions, and the unit is shipped in the center position.

Figure 3

Move T handle forward to improve closing wheel soil contact

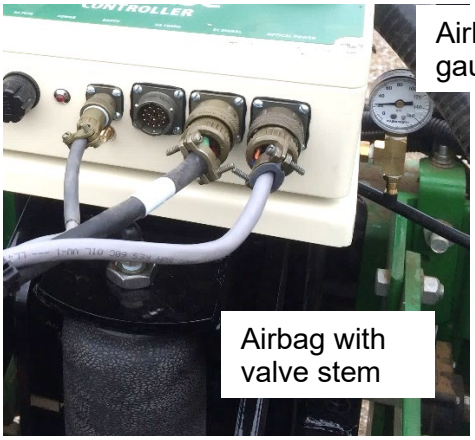
Adjustment bolts

Adjust forward for more aggressive closing action

Adjust rearward for less aggressive closing action

Figure 4.

Down pressure
To ensure depth is consistently achieved, fill airbag with up to 75 psi (520 kPa) with implement in raised position—no ground pressure on unit (Figure 5). DO NOT OVERFILL AIRBAG AS DAMAGE WILL OCCUR.



Airbag gauge

Airbag with valve stem

Figure 5.

Collecting High Quality Soil Data--Tips

1. Observe maps in SoilViewer as data is being collected. High quality data has good pass-to-pass repeatability and soil zones have distinct, natural shapes that follow known field soil properties. Poor data is jumpy or streaky, and maps don't appear like soil's natural continuum.
2. Observe any warnings that appear in the Warning Box.
3. Observe the depth sensor readings for proper depth and for iScan stability. If depth is inconsistent check airbag pressure and coulter settings.
4. Make sure EC values read -1 on headlands or whenever implement is raised. This code ensures data is only logged when the iScan is engaged in the soil. If data points are evident when implement is raised, some EC troubleshooting is needed.

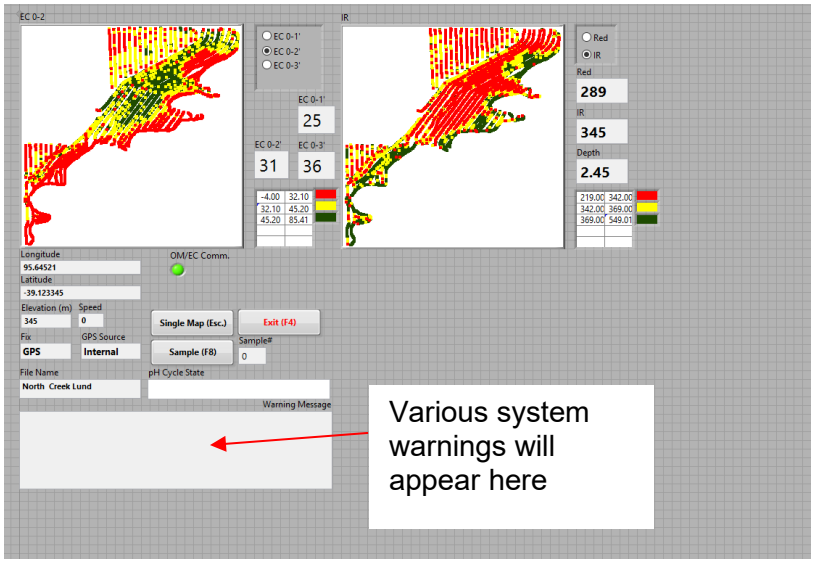


Figure 6.

Data Quality Troubleshooting: EC

If there are positive EC values appearing when implement is raised (should be -1), or if the EC values are extremely erratic, conduct Service Procedure #4. If the EC readings for the most part are acceptable but are noisier than desired:

1. Check depth and down pressure settings covered previously in this section. Make sure all soil engaging components are in consistent contact with moist soil.
2. Perform Signal tests
   - at least once a week during mapping season
   - every 40 hours of mapping
   - after extended periods of non-use
   - after replacing or repairing electrode components or wiring
   - whenever readings are questionable

Data Quality Troubleshooting: Optical

1. Inspect window for possible breakage or soil buildup
2. Check angle of implement: is system running level?
3. Verify optical module is firmly pressing into moist soil at a 1.5-3" (3-6 cm) depth.
4. Check plant residue buildup around iScan runners; remove if necessary and consider lowering front coulter

Data Quality Troubleshooting: Moisture

1. Perform System check daily
2. Check wear for possible wearplate replacement
3. Check angle of implement: is system running level?

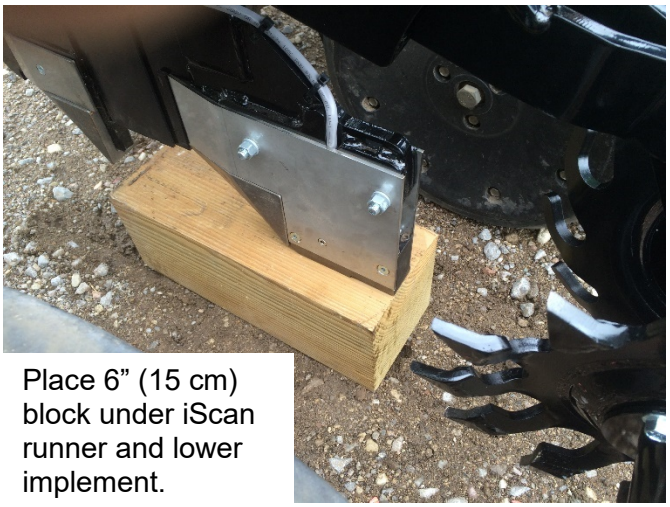
Data Quality Troubleshooting: Temperature

1. Check window for damage
2. Check wear for possible wearplate replacement

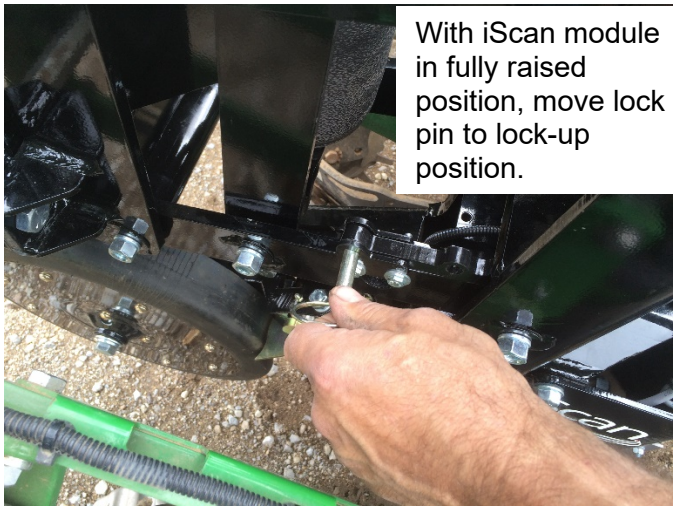
Soil and Residue Troubleshooting

Problem: iScan is plugging with crop residue
Solutions:

1. Lower coulter to improve cutting ahead of soil engaging components
2. Increase down pressure if not at the maximum recommended setting
3. Remove coulter gauge wheel if plugging is between the gauge wheel and coulter
4. As last resort, lock iScan into non-functioning position (Figure 8)



Place 6” (15 cm) block under iScan runner and lower implement.



With iScan module in fully raised position, move lock pin to lock-up position.

Figure .

Problem: iScan module is plugging with soil and/or leaving too much of a trench
Solutions:

1. Reduce down-pressure on airbag
2. Lower coulter depth wheel and closing wheels to carry iScan module at shallower depth
3. Adjust coulter depth shallower (only in very wet or soft conditions)
4. Adjust closing wheel camber to close soil slot more aggressively

Section 6: Service and Troubleshooting Procedures

Procedure #1 OM Signal Testing

Perform this test **monthly or every 100 hours of data collection** and whenever OM data is questionable. The purpose of this test is to ensure the instrument is performing properly.

The V-Sense Controller is shipped with an **Instrument Test Load** (Part No. 46403) that will enable you to quickly check the instrument to ensure that it is functioning properly. To perform this test:

1) Disconnect the optical power cable from the V-Sense Controller.
2) Connect the test load to the Optical Power port.
3) Switch on the Controller and view display on SoilViewer.
4) The display should show:
   Red: 833 +/-10
   IR: 289+/-10
5) If the readings vary significantly contact Veris service department.
6) Once the test is complete, remove the test load and reinstall the optical power cable.

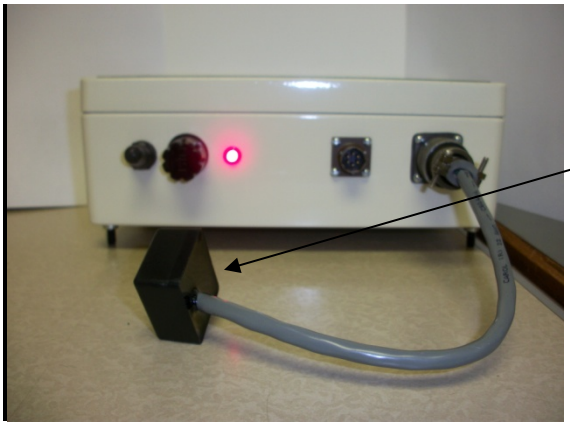


Figure 1.1 OM Signal Test Load installed

Procedure #2: EC Signal Testing

Perform this test **monthly or every 100 hours of data collection** and whenever EC data is questionable. The purpose of this test is to ensure the instrument is performing properly.

The V-Sense Controller is shipped with an **Instrument Test Load** (Part No. 223640) that will enable you to quickly check the instrument to ensure that it is functioning properly. To perform this test:

1) Disconnect the signal cable from the signal terminal on the V-Sense controller.
2) Connect the test load to the signal terminal.
3) Switch on the V-Sense controller and view display in SoilViewer or Data. The EC display should show: **50**
4) If the readings vary significantly (more than five) contact Veris service department.
5) Once the test is complete, remove the test load and reinstall the implement signal cable.

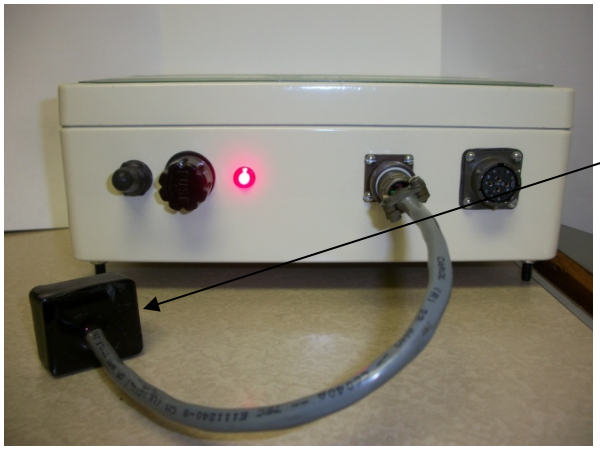


Figure 2.1 Signal Test Load installed

Procedure #3: Testing Electrical Continuity

Perform this **test daily or every 10 hours of data collection** to ensure you are obtaining reliable data, and whenever EC data is questionable.

The purpose of this test is to insure that each coulter-electrode has an uninterrupted signal path from the V-Sense controller to the disk blade. Think of each coulter-electrode and its wire path as a 'channel'. On an iScan, there are 4 signal channels that must be clear and isolated from one another. You will first test the complete pathway for each channel—each electrode. One easy-to-take reading for each channel tests the cable, wiring harness, and each electrode. If no problems surface during this test, there is no need to test individual components. This test should take only a couple of minutes to perform.

To perform this test, you will need the EC Signal Test Box and an ohmmeter (sometimes referred to as a multi-meter or voltmeter). Make sure the meter is set to ohms, **Ω**. If a range of ohms is available, choose the lowest setting--ohms rather than kilo or mega ohms. If unfamiliar with 'ohming-out' or resistance testing, make a few trial tests before performing the Veris signal test procedure. Touching the meter leads together will display a zero resistance reading, touching two places on the same piece of metal will produce a nearly zero reading, touching nothing will produce an OL (overload or over limit) reading—meaning complete resistance, and no continuity.

Remove the signal cable from the V-Sense Controller and connect it to the terminal on the test box. This cable attaches to the signal cable end and allows you to position the Signal Test Box in close proximity to the coulter-electrodes.

Terminal pins for iScan are labeled below the pins

Disconnect EC signal cable from V-Sense controller and connect to test box

Figure 3.1

Firmly press one lead of the ohmmeter to the #1 electrode—front coulter blade edge and the other lead to the #1 terminal on the test box (I series pins are labeled below the terminals). Maintain firm pressure on the ohmmeter lead touching the disk blade. A reading of less than 2 ohms is normal. Rotate blade ¼ of a turn back and forth as you view the ohmmeter. Any jump in the readings above 2 ohms indicates a problem.

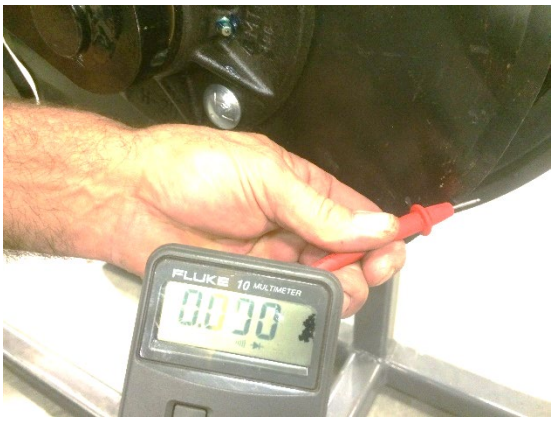
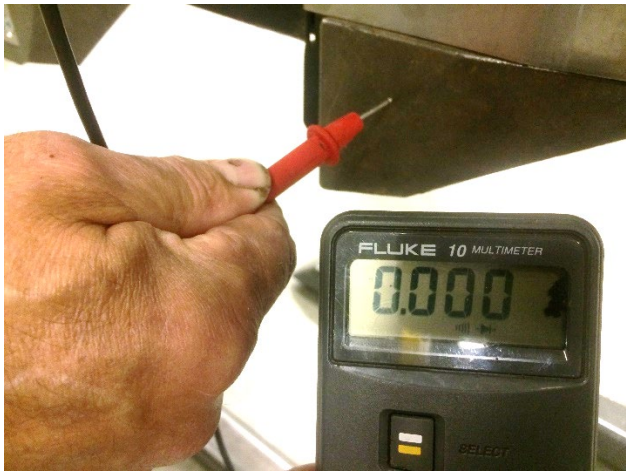


Figure 3.2

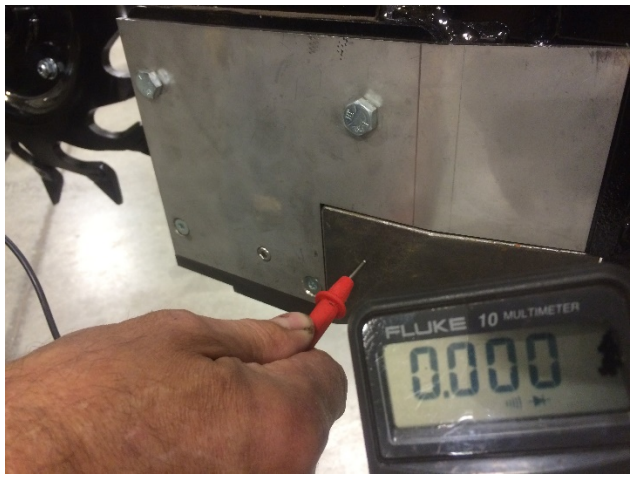
Next, move to pin number 2 on the test box and touch ohmmeter lead to electrode #2, which is the front chromium carbide runner.

Figure 3.3



Next, move to pin number 3 on the test box and touch ohmmeter lead to electrode #3, which is the rear chromium carbide runner with optical module.

Figure 3.4



Finally, move to pin number 4 on the test box and touch ohmmeter lead to electrode #4, which is closing wheel with the large silver hub cap. Rotate wheel ¼ of a turn back and forth as you view the ohmmeter. Any jump in the readings above 2 ohms indicates a problem.

Figure 3.5

If any electrode exhibits no continuity or shows resistance higher than 2 ohms, refer to Procedure #4 Diagnosing EC Signal Problems.

Procedure #4: Diagnosing and Correcting EC Signal Problems.

Figure 4-1.

Electrode Functions-

Each coulter electrode is part of a pair, and each pair has a distinct function.
On an iScan:

Coulters 2 & 3 are the receptors—they measure voltage drop.
Coulters 1 & 4 are the "charged" coulters that inject the current into the soil. If you are getting no (or intermittent) readings -- continuity to one of these two coulter-electrodes is likely the cause.

If the continuity ohm test indicates a problem on a channel, you will need to determine where the interruption is located. Listed below are detailed instructions on how to determine exactly where a continuity or isolation problem is located:

A. Testing Cable and Wiring continuity:

1. Once a high resistance reading (poor continuity) on a channel is confirmed, determine whether the problem is in the wiring or in the coulter-electrode. To test all cable and wiring, place one ohmmeter lead in the Test Box terminal pin for that channel and the other on the corresponding electrode wire terminal bolt (Figure 4-2). Repeat process on all electrodes.

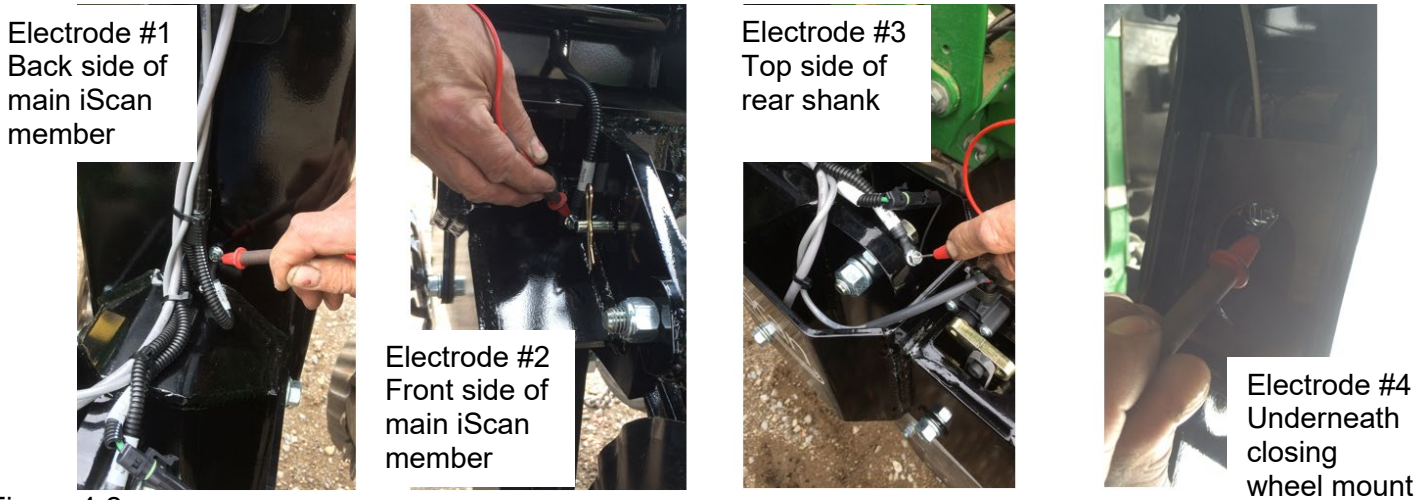


Figure 4-2.

2. If you see <2 ohms on all, the cable is likely ok; test the coulter electrodes as explained in B below.

3. If you see a > 2ohms reading on any channel from the test in A above, inspect the wires and cable for that channel for obvious breaks; field repair if possible. If none are found or are repairable, replacement of wiring harness may be required.

Note: intermittent electrical problems are difficult to diagnose. Flex wiring and connectors while checking continuity.

B. Testing Electrode continuity

1. It is unlikely that a continuity problem could exist between the terminal bolt and the soil engaging electrodes on electrodes 2 and 3, as the terminal bolt is tapped directly into the shank member for that electrode. If a non-cable related continuity issue arises, it most likely would be found on the rotating electrodes—electrode #1 front turbo coulter or electrode #4 rear closing wheels. Because electrical signals cannot be sent consistently through a bearing, Veris has designed a more reliable path for the EC signal to travel. A special hub with a spring plunger presses against the spindle of the coulter, serving as a commutator. Shown below is a cut-away view of the hubcap and plunger assembly. When ohm readings jump during blade rotation, it is due to the greased rollers on the bearing making intermittent and inconsistent contact.

2. Place ohmmeter lead on terminal wire bolt and other lead on rotating electrode. Rotate electrode ¼ turn. If readings are consistently above 2 ohms, check for excessive corrosion at the coulter blade mounting bolts, or the terminal located near the coulter pivot. Make sure that high ohm readings are not due to poor contact between blade and ohmmeter lead. Re-test holding lead firmly against edge of blade, removing rust or paint if necessary.

3. If ohms jump over 2 ohms when the blade is rotated, and you were careful to maintain good contact between the lead and the blade, the problem is likely inside the hub. See Maintenance and Service procedure #5: Spring Plunger adjustment and replacement on adjusting and replacing spring plungers.

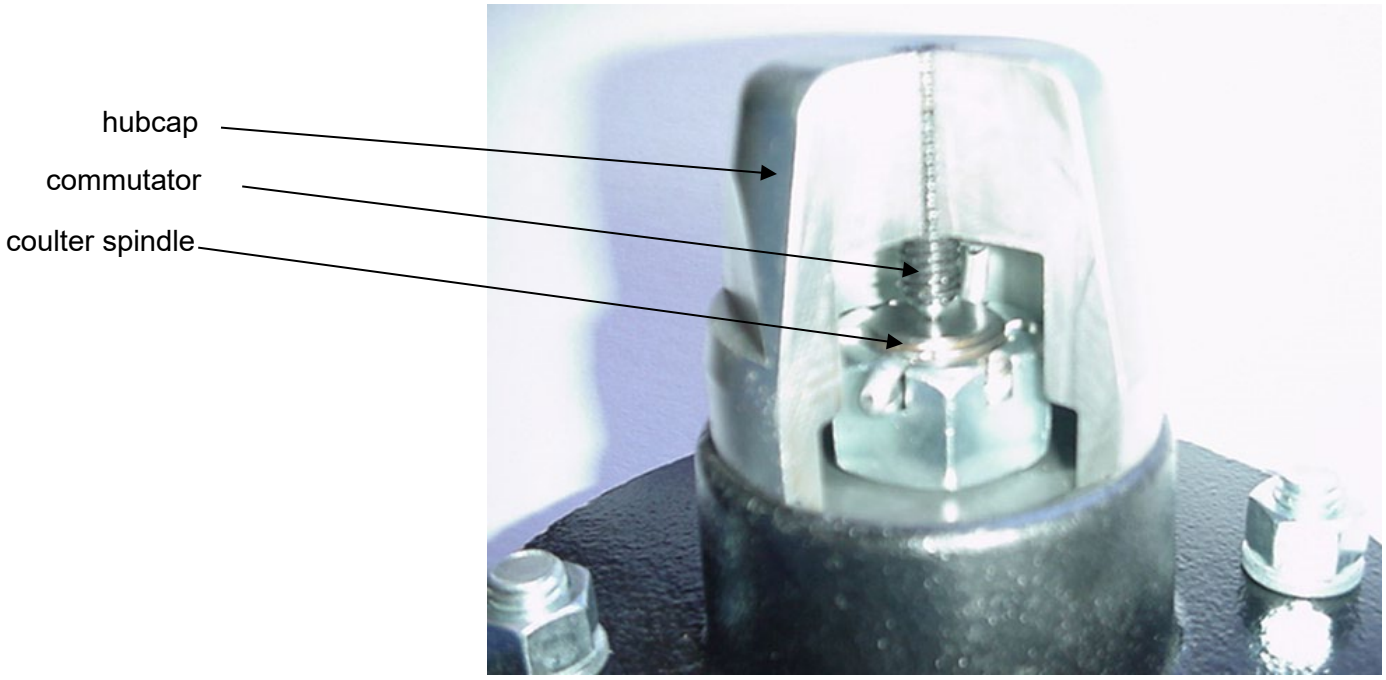


Figure 4.3

C. Testing Electrode isolation

If continuity tests show no excessive resistance on any channel, yet erratic soil EC readings continue, or if EC readings do not drop to –1 when unit is out of the soil, it is possible that the channels are not isolated. This could be the result of a pinched wiring cable, causing channels to short out. Or, one of the electrodes is no longer insulated properly from the frame or adjacent electrodes.

1. Electrode isolation. The iScan electrodes have insulators installed between each electrode. If mud builds up on the iScan module, the wet soil could bridge across an insulator and allow a signal pathway

between electrodes other than only through the field soil. To correct this, first identify which electrodes are exhibiting continuity. (Note: if there is no wet soil buildup, the problem may be a pinched cable—in which case you may want to begin with Step 2 below)

Test each electrode isolation by checking resistance between each of the electrodes. Any continuity from one electrode to another is not acceptable. Remove buildup of wet soil, especially if it bridges across insulators. It may be necessary to remove electrode and clean insulator, if problem persists.

Figure 4-4

2. If EC readings do not drop to –1 when unit is not in the soil, and no wet soil bridging across insulators is evident, the wires inside the EC signal cable may be shorting. Begin by ruling out any problem with the V-Sense controller: disconnect signal cable from V-Sense controller. If readings don't drop to -1, the problem is with the controller. If readings show -1 with the signal cable disconnected from the controller, re-connect the signal cable into the controller. Then disconnect each terminal connector wire from each electrode and keep terminal wire from contacting any metal—wrap with electrical tape if needed. If readings don't drop to –1, the problem is with the wiring harness. If this is the case, replacement of the wiring harness is needed. If readings do drop to -1 with all terminal wires disconnected and isolated, re-insert the signal cable extension into the implement. The problem is with one or more of the electrodes. Return to Step 1 above.

Procedure #5 Spring Plunger adjustment and replacement

The spring plungers are located in the center of each rotating electrode hub cap, and are vital to maintain good continuity through the coulter hub bearings. They are factory preset, and should not need routine adjustment. If a continuity test shows abnormally high resistance, the plungers should be checked. This may be performed in the following manner:

Front Turbo Coulter (electrode #1)

1) Check coulter hub bearing preload by grasping coulter blade and pushing from side to side. If there is any noticeable movement, bearing preload is incorrect, or bearings are failing --and this can damage the spring plunger; see procedure #8 for adjustment or replacement.
2) Remove the 3/8" allen head set screw.
3) Remove the plunger by turning counter-clockwise.
4) Depress the spring-loaded tip on a hard surface to determine if plunger has adequate tension and can move freely.
5) If the plunger will not move freely, replace. Coat the threads with di-electric silicone grease before installation.
6) If the plunger appears to be in good working order, reinstall in the hub, and adjust until it bottoms against the spindle end. Rotate 1/2 turn backward to allow adequate clearance. Improper adjustment will result in premature failure (too little tolerance) or poor continuity (too much tolerance). See below to view proper clearance.
7) Reinstall locking set screw and tighten firmly on top of plunger. The top of the setscrew should be even with the face of the hub. If not, remove and adjust the plunger inward or outward as necessary.
8) Re-test coulter electrode continuity

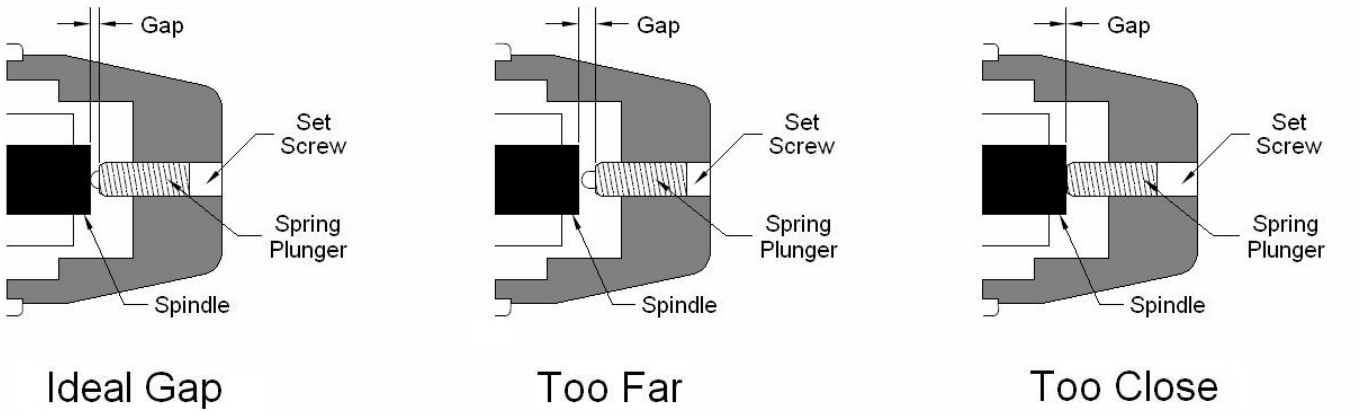


Figure 5.1

In some cases, you may have to remove the hub cap to service the spring plunger, if the plunger is rusted in the cap, or if the readings are still unsatisfactory with the new plunger installed.

Procedure:

1) Remove hub cap by turning clockwise with a pipe wrench or large adjustable wrench – these caps have left hand thread to prevent loosening during field rotation.
2) If plunger is frozen in cap, remove allen head set screw on top of plunger and apply penetrating oil on both sides of plunger. Let this stand for a few minutes and try to remove. If it will not back out with allen wrench, lock vise grips on the inside portion and turn out through inside of hub.
3) Clean all hub cap surfaces, install new o-ring, coat plunger and set screw with di-electric grease and install as outlined above.
4) Re-install hub cap and tighten firmly. You may have to re-set the plunger to compensate for the reduced length on the newly ground spindle. Re-adjust as outlined above.

Note: If you are still unable to obtain favorable resistance readings, check for excessive corrosion at the coulter blade mounting bolts, or at the terminal connection on the back of the main iScan body.

Rear closing wheel (electrode #4

Procedure for replacing spring plunger on closing wheel (electrode #4) is similar; the only difference is there is a nut holding the spring plunger in place instead of a set screw. When plunger is installed correctly, the outer end of the plunger is flush with the nut (Figure 5-2).

Figure 5-2

Nut holds plunger in place; plunger should be flush with nut

Procedure #6: Diagnosing GPS-related problems

If you do not see a GPS, DGPS, or RTK on SoilViewer screen, you do not have GPS coming in, and no data will be recorded.

Figure 6.1(No GPS)

Figure 6.2 (With DGPS fix)

Insure your GPS receiver is powered and outputting NMEA strings GGA, and either VTG or RMC at a 1hz rate; 4800 baud, 8 data bits, no parity, 1 stop bit. Verify that your GPS cable is sending GPS data through pin 2, pin 5 is ground, and no other pins have signal or power on them. The most common issue is hz rate. If the GPS has been used for lightbar guidance it may have been set to a 5 or 10 hz rate. It will need to be changed to 1 hz in order for the controller to accept it.

Shown below is a Troubleshooting tree for diagnosing GPS signal problems. It is not meant to replace your GPS receiver user manual—it merely shows how to determine if your receiver is sending the GPS signal that the EC Surveyor needs.

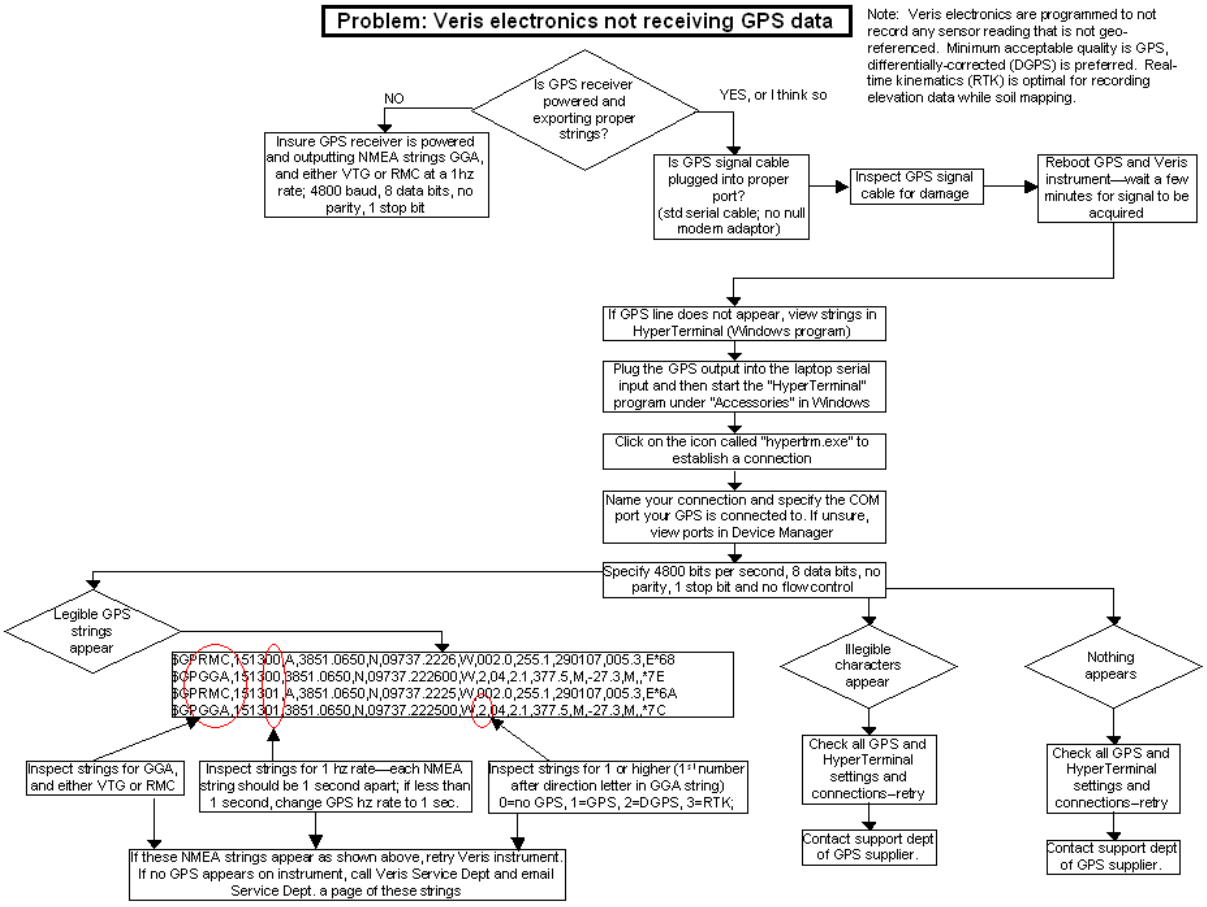


Figure 6.3

Procedure #7: Lubrication

⚠ WARNING Install all transport locks before transporting or working underneath.

Turbo coulter hub: Use good quality wheel bearing or lithium grease for lubrication, but we suggest that you grease the hub sparingly. Over-lubricating the hub will result in pre-mature seal failure, and an excessive amount of grease in the hub cap/commutator. On an interval of **150 hours,** 1-2 strokes of grease should be sufficient.

Figure 7.2

Procedure #8: Bearing Repair and Replacement

The turbo coulter (electrode #1) hub operates in a significantly harsh environment, and annual inspection is of utmost importance. The double-lip seals are designed to keep grease in, and contaminates out, but they are the cause of practically all hub failures. It is advisable to disassemble, clean and repair annually. To perform this maintenance, do the following:

1) Remove hub cap by turning in a **clockwise direction** (left-hand thread prevents loosening in operation).
2) Remove cotter pin, castle nut, thrust washer, and remove hub.
3) Remove outer bearing and knock out inner bearing and both races (cups)
4) Veris recommends that you purchase our Coulter Hub Repair Kit (PN 32641) that includes new bearings, races, seal, o-ring and cotter pin.
5) Thoroughly wash hub in solvent and dry.
6) Spindle end may need grinding—see spring plunger replacement Procedure #5
7) Reassemble and adjust bearing pre-load by fully tightening spindle nut, then backing off until you can turn the hub fairly easily with one hand– normally this involves backing off 1- 2 slots on the castle nut, and inserting cotter pin. Excessive pre-load may cause plugging in extremely loose soil conditions, and excessive endplay may damage the spring plunger. Hub should have no side play when assembled, but should turn with little resistance. Drive round end of cotter pin firmly into nut, and bend upper portion of cotter pin upward and trim of excess length of both top and bottom with cutting pliers. **Do not bend cotter pin over the end of spindle as it will interfere with spring plunger.**

8) Fill hub via grease zerk until grease pushes through outer bearing.
9) Install hub cap by threading counter-clockwise on the hub. Check to make sure that hub still rotates freely. If not, the cotter pin may too long, and is contacting hubcap –remove cap and check cotter pin length.
10) Adjust spring plunger clearance as mentioned in Procedure #5.

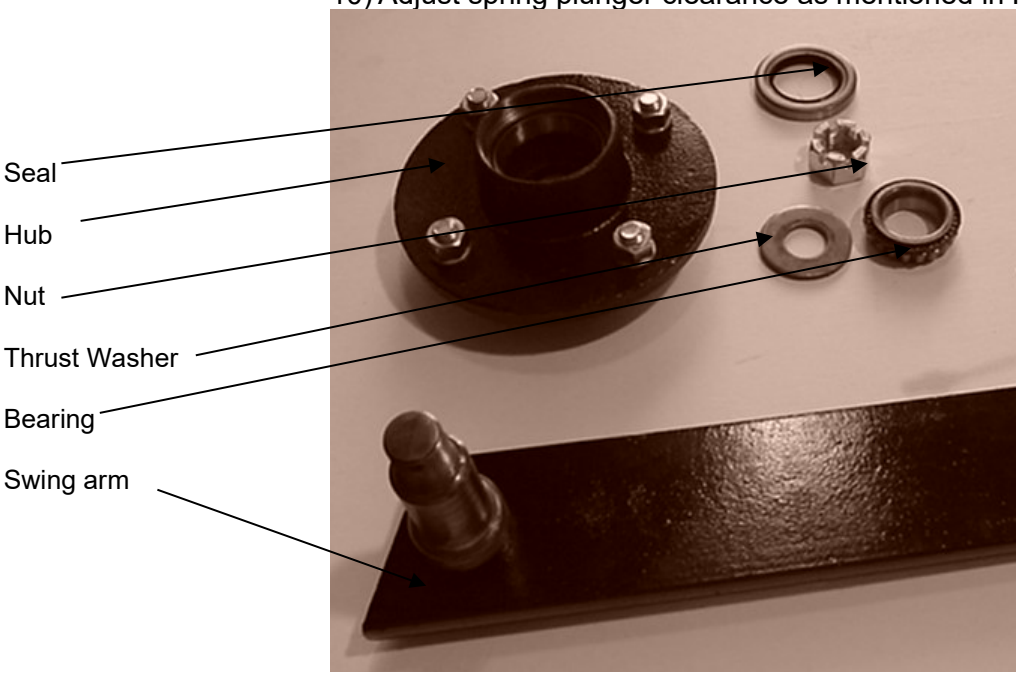


Figure 8.1

Procedure #9: Optical Wear plate and Side Wear plate replacement.

1. Remove the two 3/8” nuts on top edges of i-Scan side plate

2. Remove the two Torx screws attaching the side plates to the runner. (Figure 9.1)

3. To remove wear plate, unscrew the hex bolts on the top of the optical sensor as shown in figure 9.2

4. To replace the wear plate, ensure the O-ring is seated in the O-ring grove as shown in figure 9.3.

5. Install the wear plate, then mount the assembly back to the row unit. **Do not allow any dust or moisture to enter the optical module.**

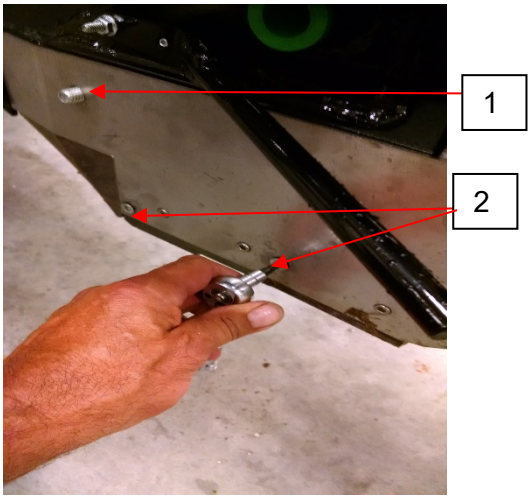


Figure 9.1

Figure 9.2

Figure 9.3

Procedure #10 SoilViewer Troubleshooting

V.Sense controller is not found/ No Communication in SoilViewer

Check to ensure the com which the V.Sense controller is connected to is present under the device manager. To get to the device manager go to Start→Settings→Control Panel→System Click on the Hardware tab and then click on the device manager button. Click on the "**+**" sign next to Ports and make sure the port is listed here. In this case a USB to serial converter is being used and the port is listed as USB Serial Port (COM33)

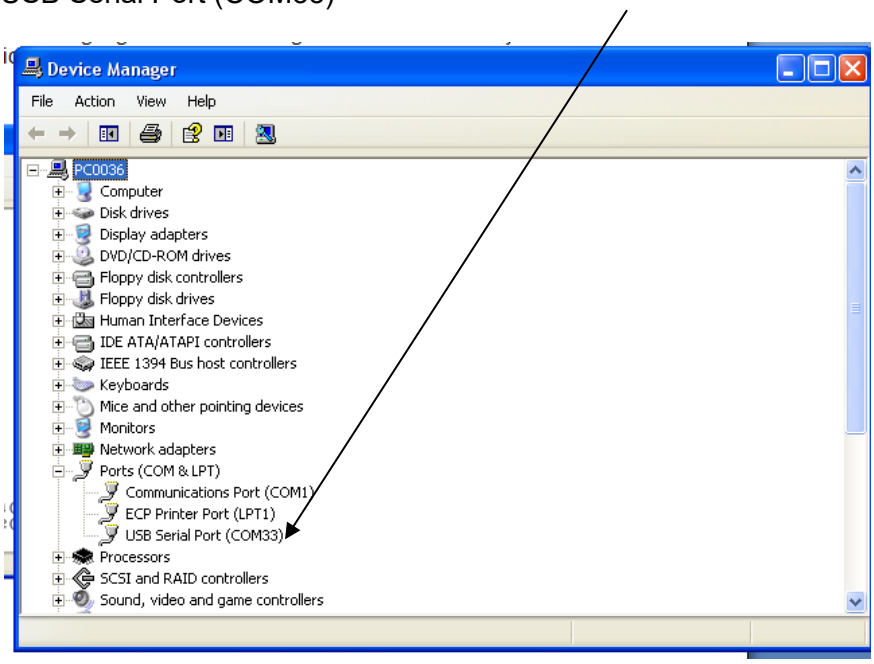


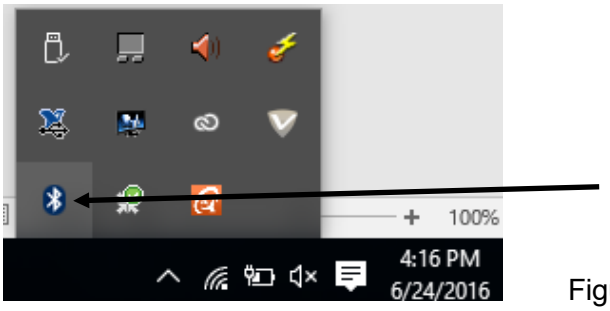
Figure10.1

If the port is not listed here, then unplug and replug the USB – Serial converter cable and replug. If USB – Serial port is still unavailable, or has a yellow exclamation mark next to it, then reinstall the drivers following the manufacturer's instructions for driver installation.

The drivers could be obtained from the internet via windows. If the PC has connectivity to the internet, right click on the USB-Serial converter, and choose "Update Driver"; when prompted select "Let windows update driver automatically".

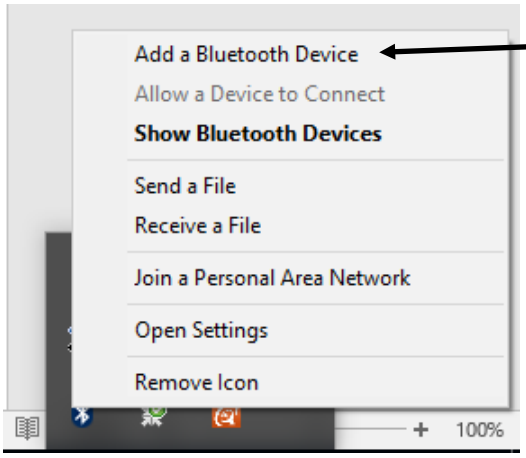
Procedure # 11 Establishing Bluetooth Connectivity

The V-Sense controller is equipped with a class 1 Bluetooth ® connectivity, capable of communicating at distances of 150 feet, and eliminating the need for a physical connection to the PC. Follow the directions below to establish this connection.



Click the Bluetooth icon in the lower right hand corner of the task menu

Figure 11.1



Select **Add a Bluetooth Device**

Figure 11.2

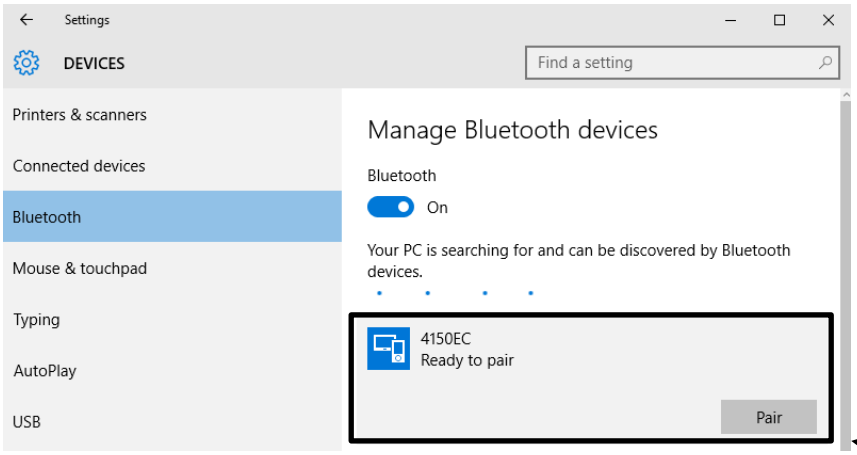
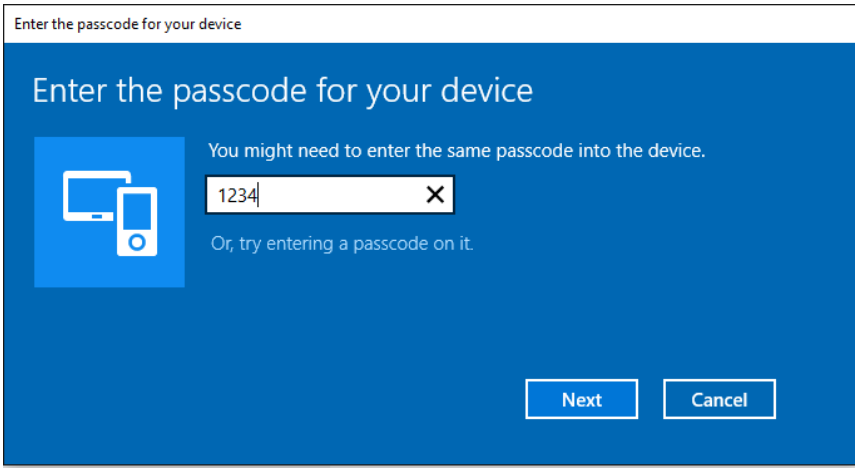


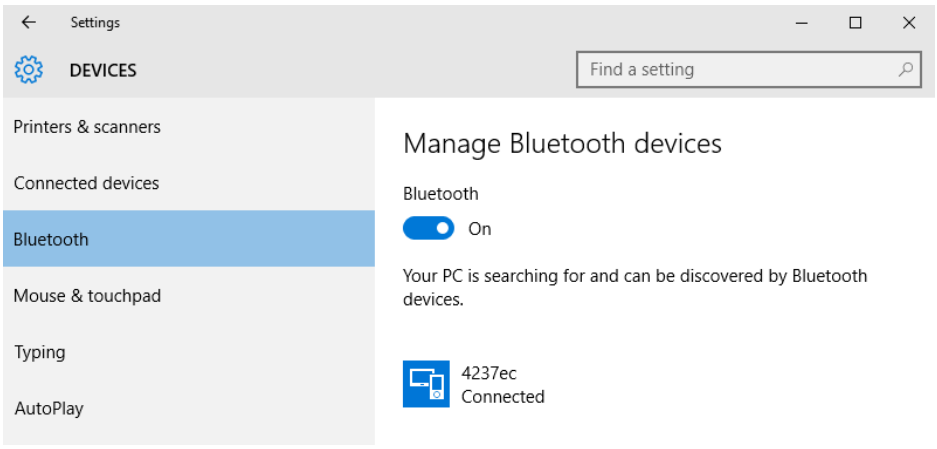
Figure 11.3

The serial number of the V.Sense controller will appear as *Ready to pair;* Select **Pair**



Enter the passcode **1234**, then select **Next**

Figure 11.4



V.Sense controller will show **Connected** and be ready for use

Figure 11.5

Procedure # 12 Moisture Sensor System Check

Moisture Sensor System Check

The moisture sensor response can change as the sensing prongs wear over time. The system check routine ensures there is adequate response from the sensor and provides a two-point calibration to compensate for this wear. This check should be performed every 320ac or anytime the operator suspects there has been significant wear in the prongs or plastic wearplate. The calibration is stored in memory and will be reimported for future use. These calibration coefficients will remain in effect until a new system check is complete, or the user selects restore defaults. **Always restore defaults or do a new system check if the moisture sensor has been replaced**

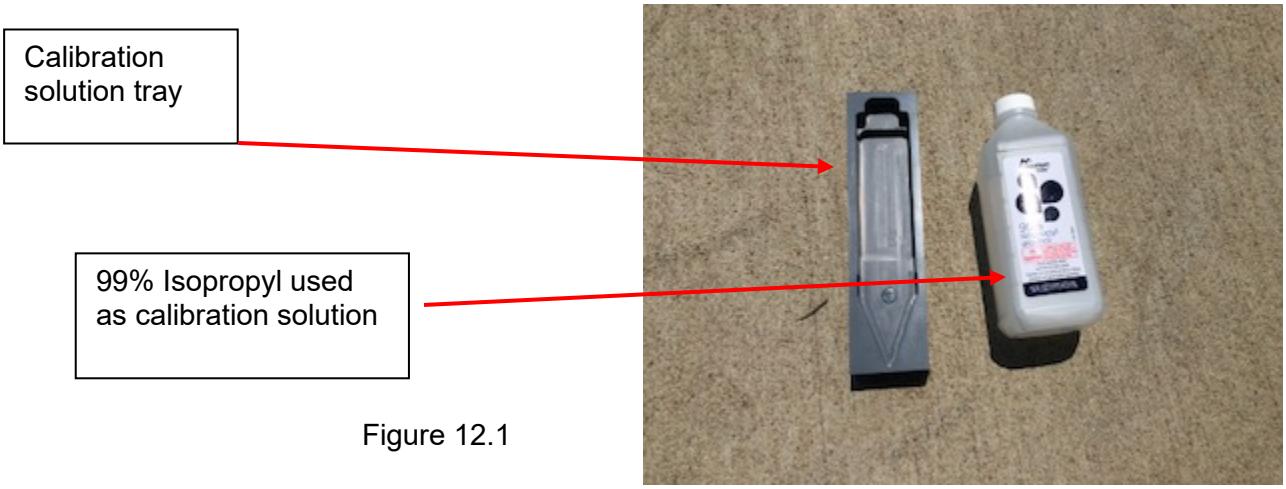


Figure 12.1

Select Sensor Checks → Moisture to begin

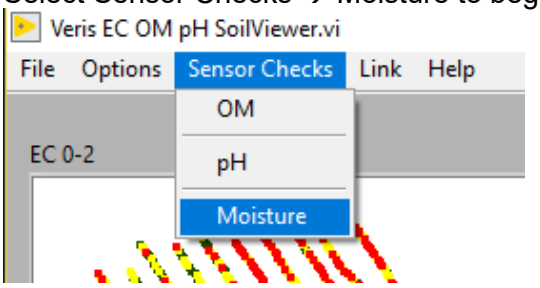
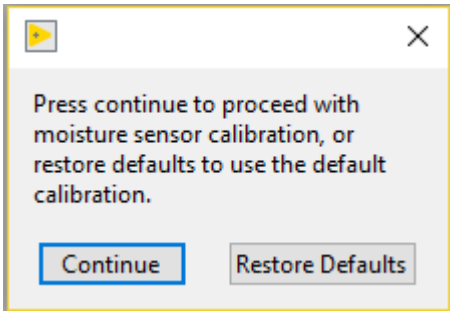


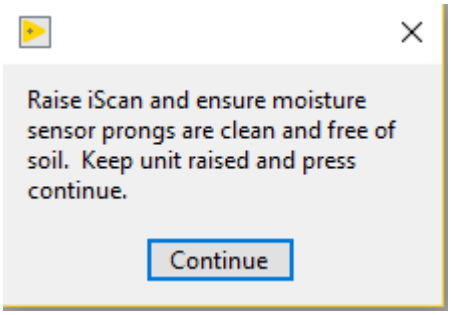
Figure 12.2

Press Continue or Restore Defaults



Restore defaults will use the standard calibration for a new moisture sensor. Use this option if you've replaced the moisture sensor with a new one.

Figure 12.3



Clean the soil from around the sensor and the bottom of the plastic sensor wearplate, then press continue.

Figure 12.4

Figure 12.5

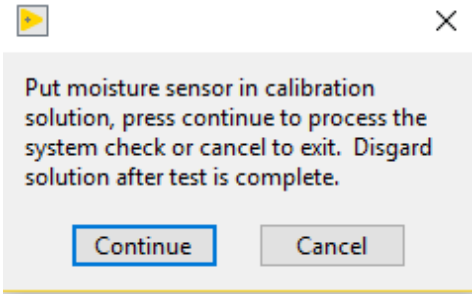


Figure 12.6

Ensure the solution cup is level, and fill to the top, then attach to the sensor as shown. The software will record the response for 15 seconds, then calculate the calibration.

Figure 12.7

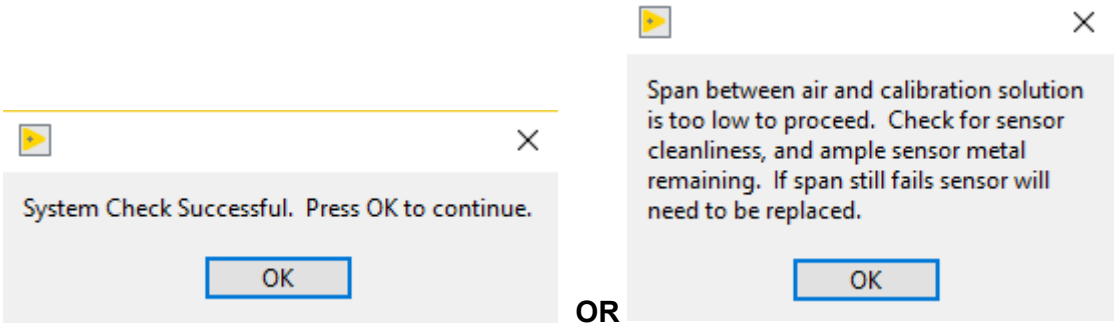


Figure 12.8

If system check fails, check for sensor cleanliness, and adequate calibration solution covering the prongs. Retry calibration or replace as necessary.