Duralite 1000N

Installation Manual

Contents

1. Before Starting

Before you begin, check for all safety procedures that may apply. Follow site specific safety and security guidelines in accordance with the site company's internal safety and security requirements.

A safety harness for working at heights and proper training/certification may be required for this installation.

Check that all the assemblies and parts required for the installation are ready to use. You can check all items with their position, name, and quantity in the installation diagram below.

It is recommended that this document be read entirely before installing. Since many of the drills are of different vintages there may be differences required to the installation than described in this document.

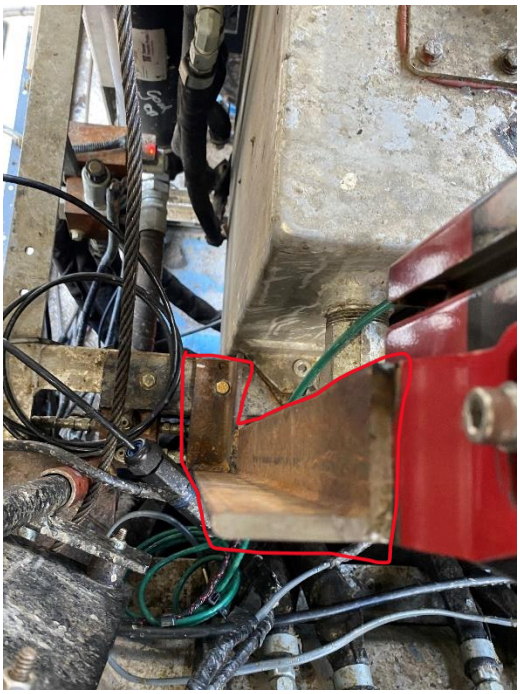
2. Install Rock5 Unit

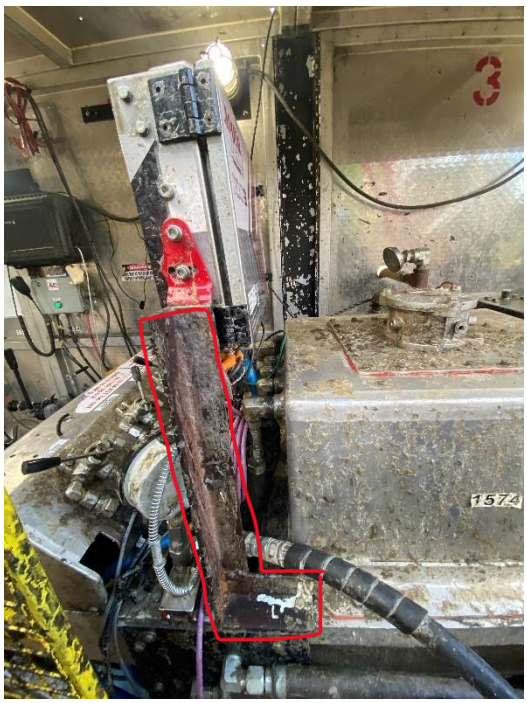
We are Installing the screen to the Power Pack using two upright stands. The Rock5 comes completely commission from Factory and will never need anyone to open the back panel unless a serious problem occurs.

Figure 1 Main Enclosure Assembly Front View

2.1 Main Enclosure Assembly

The Enclosure is recommended be installed as shown above. The screen enclosure comes with 2 installation legs and bolts. The enclosure needs plenty of room below for the cabling and enough room for the screen's functionality (side buttons etc.). It should be installed in a location that is easy for the operator to touch and view the screen.





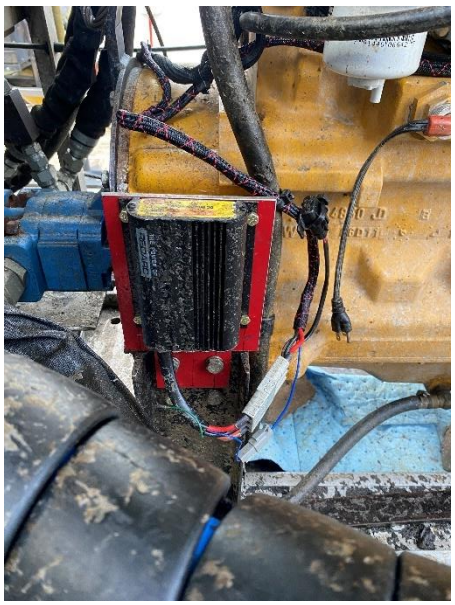
Figures 2 and 3 Left and Right mounting of Rock5 Unit to Power Pack

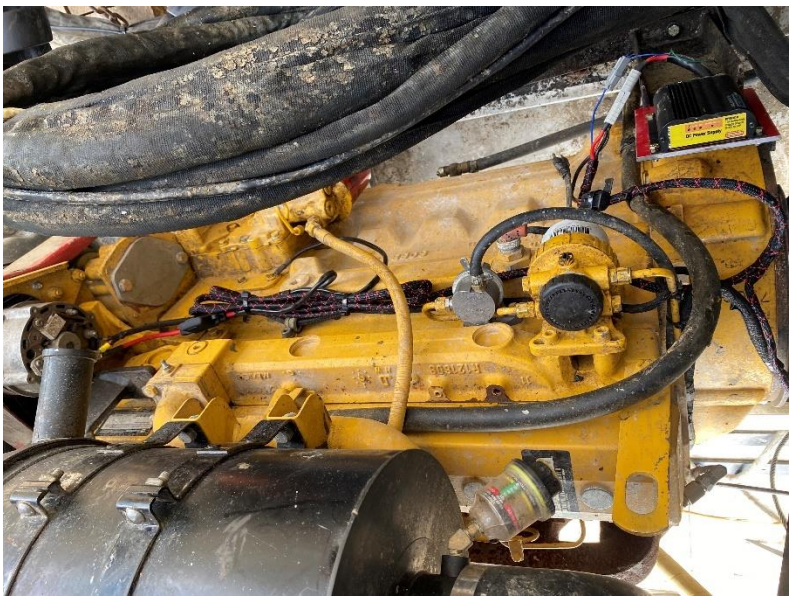
2.2 Power Harness Installation

To install the harness, lay it in position on the rig from front to back, with the harness starting at the engine alternator and finishing at the screen mounted on the control cab.

1. The REDARC DC converter should be installed by mounting to a plate and that plate being bolted to the Engine Frame as shown in the picture below
2. Connect the Harness's Ring Terminals to the Drill's Alternator.
3. Run the rest of the Harness towards the Power Packs along with the existing cabling for engine controls
4. The harness will then split into two
    a. An Ignition Wire that must be connected to a source of ignition voltage.
    b. A two-pin deutsche Plug for Supply Power into the Rock5 Unit.
5. All connections need a pea sized amount of di-electric grease.

Notes:
The harness should follow the existing cabling/hosing, being careful not to cross over or go under hosing to eliminate rub throughs.
Ensure all Fuse Holders contain unblown fuses.





Figures 4 and 5 Mounting of 24v Inverter and Connection to Engine Alternator

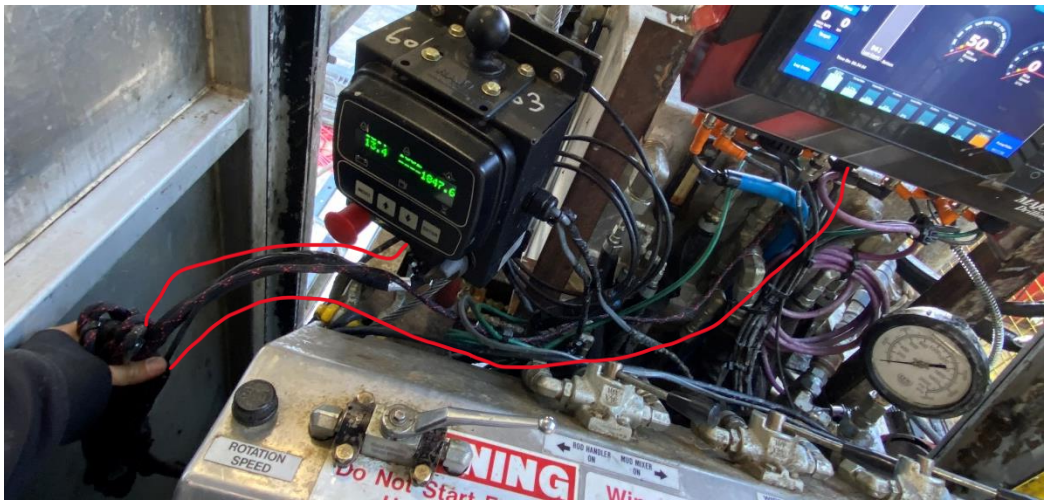


Figure 6 Rock5 End of Harness, 2 pin deutsche to Rock5 and Ignition wire to Engine control unit wiring.

3. Install Pressure Sensor

3.1 Pressure Sensor Preparation

1. Make fitting for Diagnostic Tee, O-ring, 1/8 to 1/4 adaptor, sensor with O-ring
2. Obtain cable with labels on it, add labels if not. Add di-electric grease to sensor and Cable.
3. When possible, try to run Cables together to form a harness of sorts.
4. Roll up any slack of cable if lengths are a little longer.

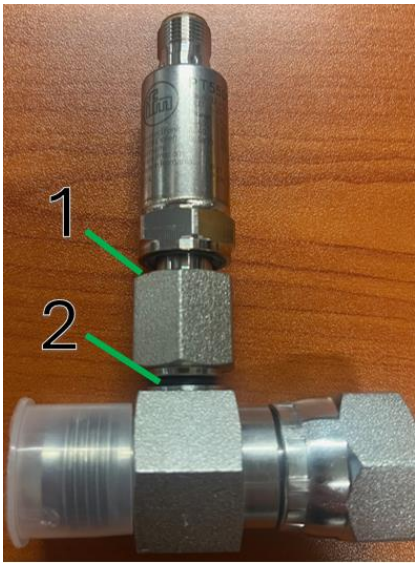


Figure 7 Assemble T piece with 1 factory IFM sensor seal and 2 Oring with back up ring supplied

3.2 Holdback, Pulldown, Rotation, Wireline Pressure Sensors

To install these sensors, you will need:

- 4x PV7000 Pressure Sensors
- 4x In-line Tee (Diagnostic Tee XXX JIC MF W/- 1/8 BSP T/PORT) 2x -4, 2x -5
- 4x Adapter 1/8 BSPP M X 1/4 BSPP F
- 4x RING TO SUIT 1/8 BSPP C/W RING
- 4x M12 Cable M12, 4 core, 2 metre, 90 to 90 (EVC740)

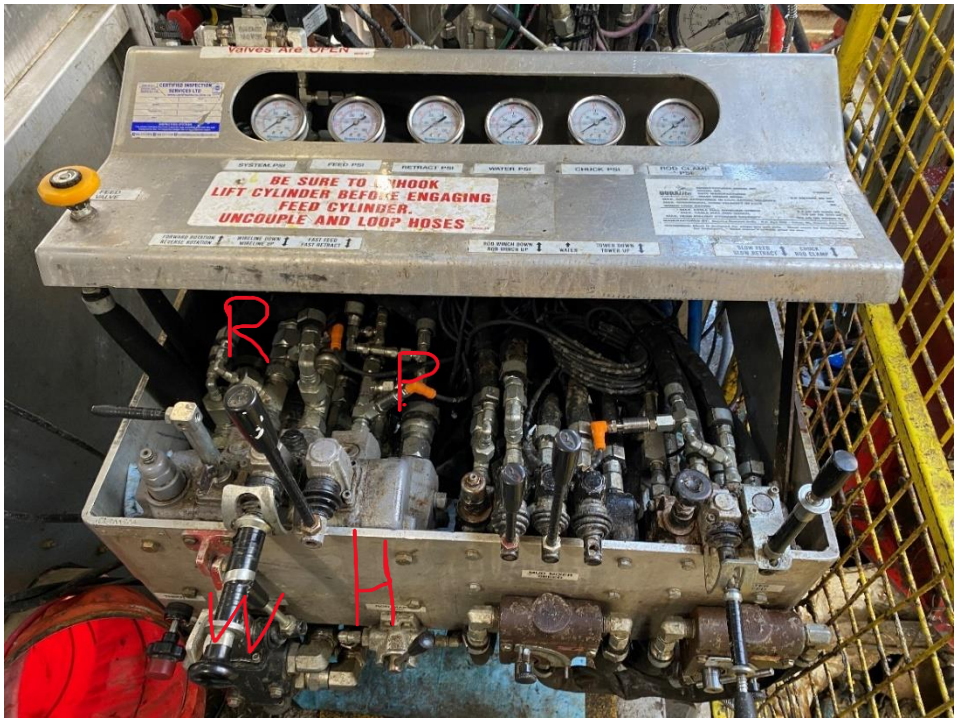


Figure 8 Holdback, Pulldown, Rotation Pressure, Wireline Sensor Locations

The Four sensors will be installed on the hydraulic Port lines from the back of the valves.

1. Install the Diagnostic Tee in their respective locations
2. Ensure the Correct O-rings are included in the assembly
3. Install the Pressure Sensor to the Diagnostic Tee.
4. Apply Di-Electric Grease to both the sensor and ends of the cable.
5. Run Cable from Sensor to the engraved position on the bottom of the Rock5 Unit

Notes:

- Be careful when installing the Sensor to the Diagnostic Tee as they can easily snap with too much force.
- Applying Di-electric grease will get multiple times for life out of the sensors. Especially in wet and salty conditions.

- The cable should be run neatly and away from rubbing hazards.
- For Wireline Pressure, install sensor to the port that results in the Wireline Pulling upwards

Figure 9 Closer View of Holdback, Pulldown, Rotation Pressure, Wireline Sensor Locations

3.3 Chuck and Footclamp Pressure Sensors

To install these sensors, you will need:

- 2x PT5500 Pressure Sensor
- 2x In-line Tee (Diagnostic Tee 3/4 JIC MF W/- 1/8 BSP T/PORT) (JMJFSBPF-08-0802)
- 2x Adapter 1/8 BSPP M X 1/4 BSPP F (BPMBPF-0204)
- 2x RING TO SUIT 1/8 BSPP C/W RING (OR-BP-02)
- 2x M12 Cable Labelled. (M12, 4 core, 2 metre, 90 to 90) (EVC740 and Labels Chuck 1, Footclamp 4)

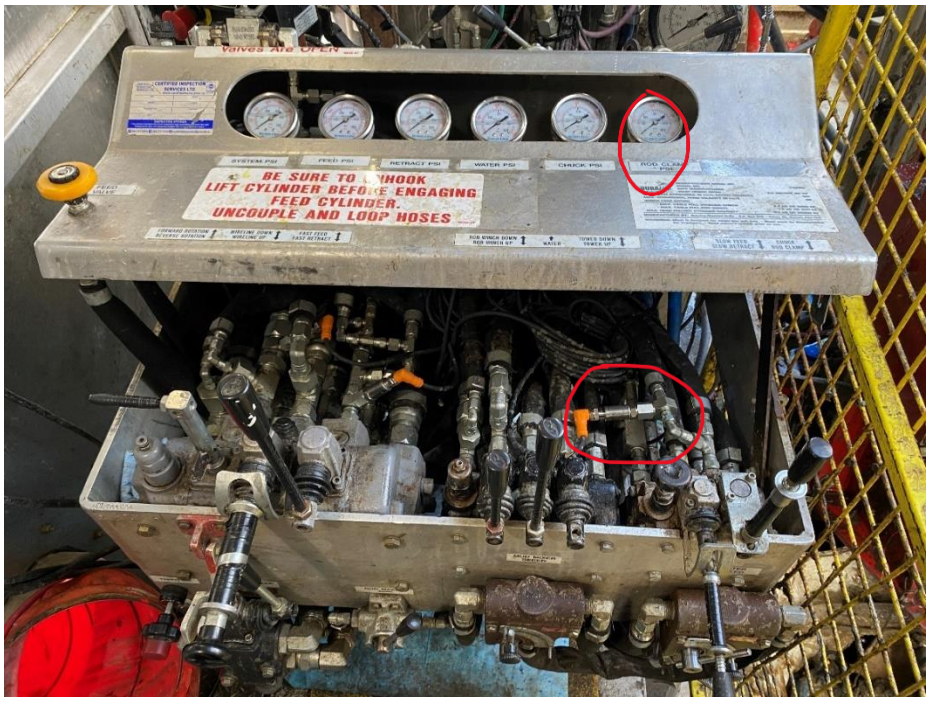


Figure 10 Chuck and Footclamp Pressure Sensor Locations

The Footclamp Pressure Sensor can be installed directly on the Pressure Line coming off the Valve. The Chuck Pressure Sensor can be installed just before the gauge.

1. Install the Diagnostic Tee in their respective locations
2. Ensure the Correct O-rings are included in the assembly
3. Install the Pressure Sensor to the Diagnostic Tee.
4. Apply Di-Electric Grease to both the sensor and ends of the cable.
5. Run Cable from Sensor to the engraved position on the bottom of the Rock5 Unit

Note:
Remember to use the PT5500 Pressure Sensors, not the PV7000 as previously for Holdback, Pulldown, Rotation and Wireline Pressures.

3.5 Water pressure Assembly

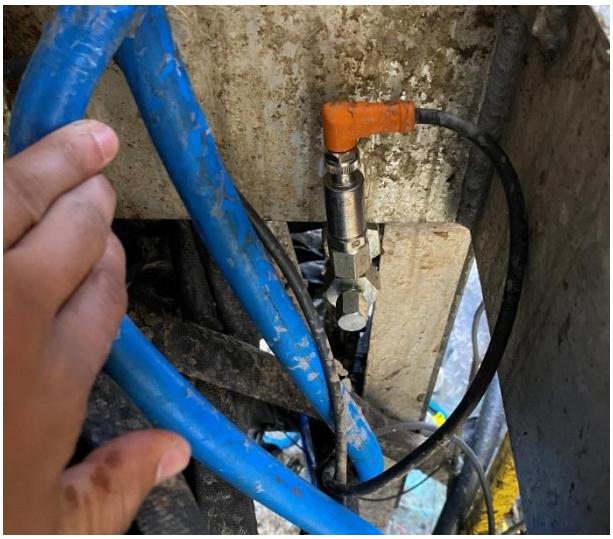


Figure 11 Water Pressure Sensor Installed at the Back of the Power Pack

To install this sensor, you will need:

- PT5502 Pressure Sensor
- Gauge saver 1/4 BSPP DOWTY SEAL (GAUGE-SEM-GSB.14.BSP)
- In-line Tee (Diagnostic Tee 1 JIC MF W/- 1/8 BSP T/PORT) (JMJFSBPF-16-1602)
- M12 Cable Labelled with Water Pressure. (M12, 4 core, 5 meter, 90 to 90) (EVC741, Water Pressure)

Sensor installation and Cable run

The Water Pressure sensor must be installed inline with running downhole water. To ensure the health of the sensor. The Sensor will not last long if it is installed away from the inline running water path. It is highly recommended to use the provided gauge saver when installing the water pressure.

1. Install the Diagnostic Tee in their respective locations
2. Ensure the Correct O-rings are included in the assembly
3. Ensure the gauge saving stays upright with it's black cap so no oil escapes when we remove the cap.
4. Remove the gauge saver's black cap.
5. Screw the water pressure sensor into the gauge saver.
6. Install the Pressure Sensor with Gauge saver to the Diagnostic Tee.
7. Apply Di-Electric Grease to both the sensor and ends of the cable.
8. Run Cable from Sensor to the engraved position on the bottom of the Rock5 Unit

4. Install All Other Sensors

4.1 Water Flow Assembly

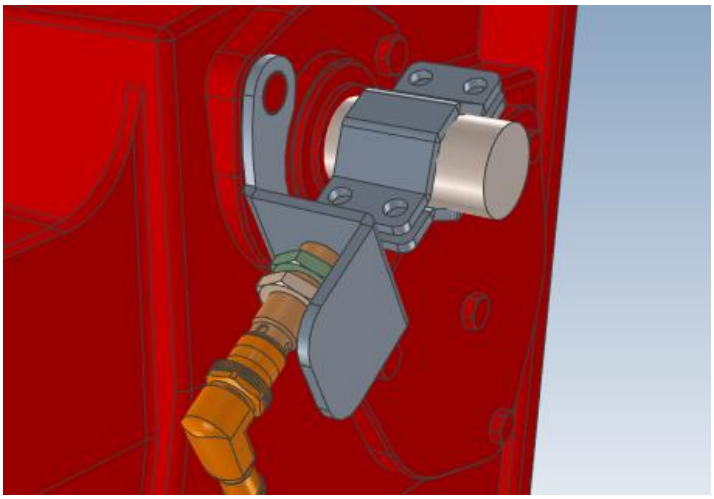


Figure 12 – Model of Water Flow Sensor Assembly

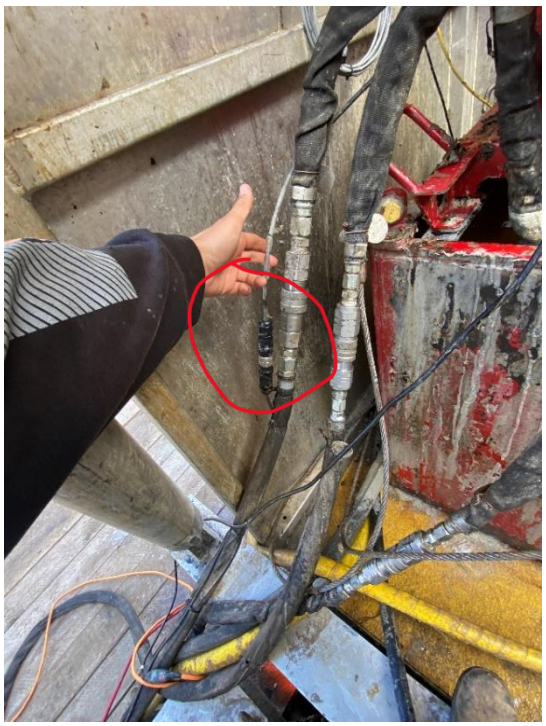


Figure 13 – Location of Water Flow Disconnect

To install the Water Flow sensor, you will need:

- IFM204 Proximity Sensor
- Custom Water Flow Cable M12 Part A (Long – Power Pack Side)
- Custom Water Flow Cable M12 Part B (Short – Sensor Side)
- Bean pump sensor mount Part #109158

Sensor installs and Cable run

The Water Flow is a counter on the Water Pump's Shaft. To ensure correct installation, freely spin the bracket and make use the proxy maintains a 4mm gap with the Two Flag of the bracket. Run the cable with the existing hydraulic disconnects as shown in the photo above.

1. Install Shaft Clamp to the Shaft of the Water Pump by tightening the 4 bolts.
2. Install Sensor Bracket to the water pump by bolting to existing holes.
3. Using the locking nuts, secure the proxy to maintain a safe 4mm gap from the Clamp.
4. Apply Di-Electric Grease to all electrical connections.
5. Connect Part B M12 Cable to the proxy and zip tie to the existing Quick Connect Hoses.
6. Connect Part A to Part B M12 Cable and run along the hydraulic hoses back to the power pack.

4.2 Azimuth Sensor

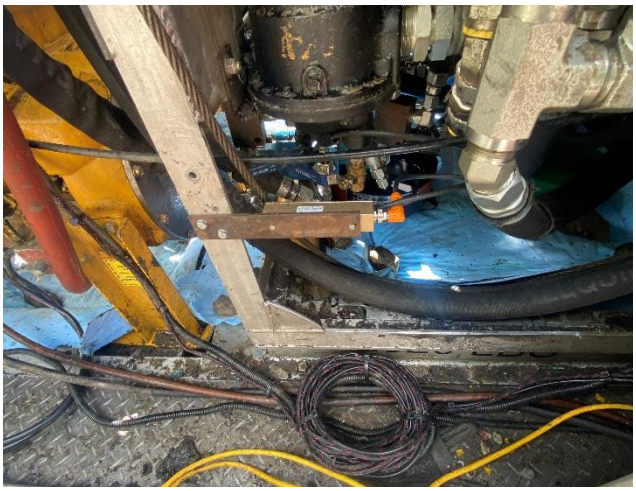


Figure 14 Azimuth Sensor mounted, Inside Hydraulic Tank Frame

To install The Azimuth sensor, you will need:

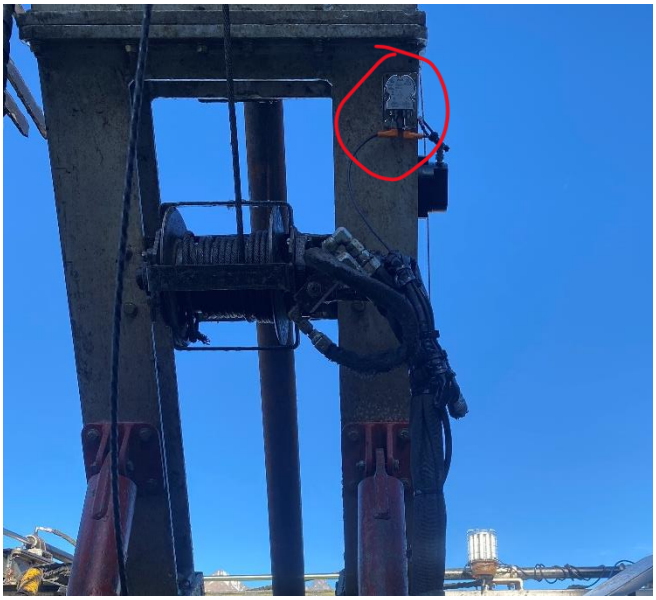
- HCM508B Azimuth Sensor
- Azimuth Sensor Bracket
- M12 Cable Labelled with Azimuth Sensor. (M12, 4 core, 5 meter, 90 to 90) (EVC741, Azimuth 3)

Sensor installation and Cable run

It is critical the Azimuth Sensor is installed the exact same direction and orientation as the photo above. The bolt will be mounted with the supplied m6 stainless bolts. It is important to have some distance between the sensor and metallic material. Aluminium is fine. The sensor has no disconnect for the cabling.

1. Mount Azimuth Sensor to supplied aluminium bracket.
2. Mount Aluminium Bracket to the Drill's Power Pack Frame
3. Obtain cable with labels on it, add labels if not. Add di-electric grease and locate correct side plug into sensor mounted.
4. Run cable neatly back to screen box and locate on corresponding plug with di-electric grease added again.

4.3 Mast Inclinometer Sensor



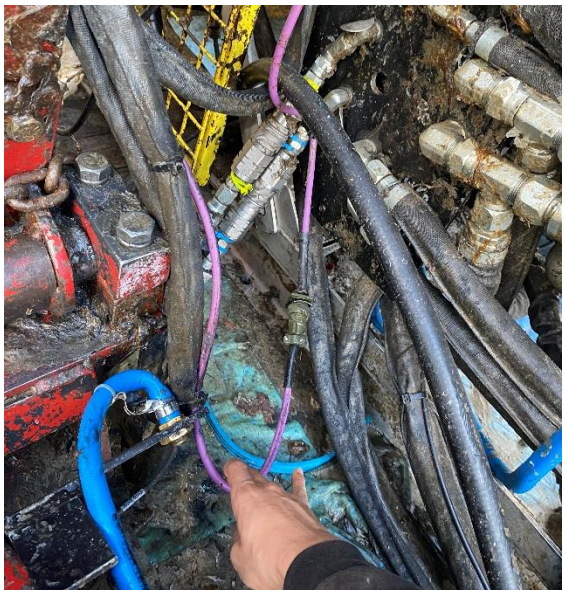


Figure 15 and 16 Location of Mast Inclinometer and Milspec Disconnect.

To install the Mast Angle assembly, you will need:

- JN2100 Inclinometer
- Inclinometer Mount plate
- M12 5 Wire 90 Female to Milspec Cable Part B (Long – Sensor Side)
- M12 5 Wire 90 Male to Milspec Cable Part A (Short – Rock5 Side)

Sensor installation and Cable run

The Mast Angle Inclinometer needs to be mounted to the Mast, ideally as close to the photo above so the cable from the Draw wire can be as short as possible. The Cable can follow the existing hydraulic hoses needed for the Main Line.

1. After Inclinometer bracket has been secure, mount Inclinometer to plate with supplied bolts and washers.
2. Add di-electric grease to all electrical connections, Sensors, Milspec, Rock5 Unit.
3. Run Cable Part B from Inclinometer down the mast frame to the base of the drill where the Milspec Disconnect will be located as seen in the photo above
4. Run Cable Part A from the Base Disconnect up the powerpack into the Rock5 Unit

4.4 Head Speed Assembly

Figure 17 Head speed mounted on supplied bracket after being mounted.

To install the Head Speed Sensor, you will need:

- IFM204 Sensor
- Sensor bracket/sensor mount (109106)
- M12 Cable Labelled with Head Speed Part A (Long – Power Pack Side)
- M12 cable labelled with Head Speed Part B (Short – Head Side)

Sensor Bracket mounting

1. Install Bracket by Undoing 2 x 5/8 Bolts
    a. Be careful and quick as the bolts are holding in Head Oil.
2. Once the Bracket is secured, slide the Proxy through the hole and set the correct distance with one of the locking nuts.

Sensor Installation and Cable Run

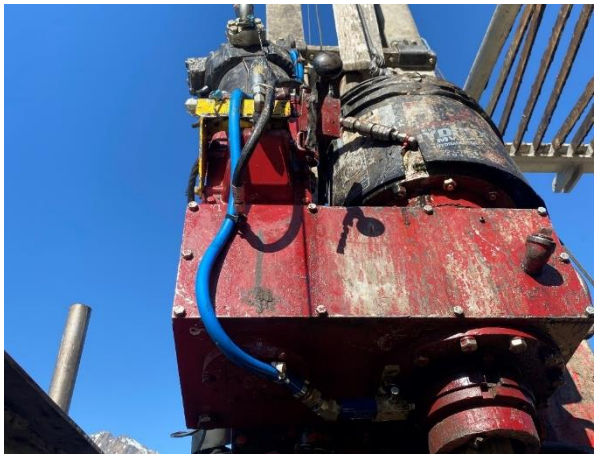
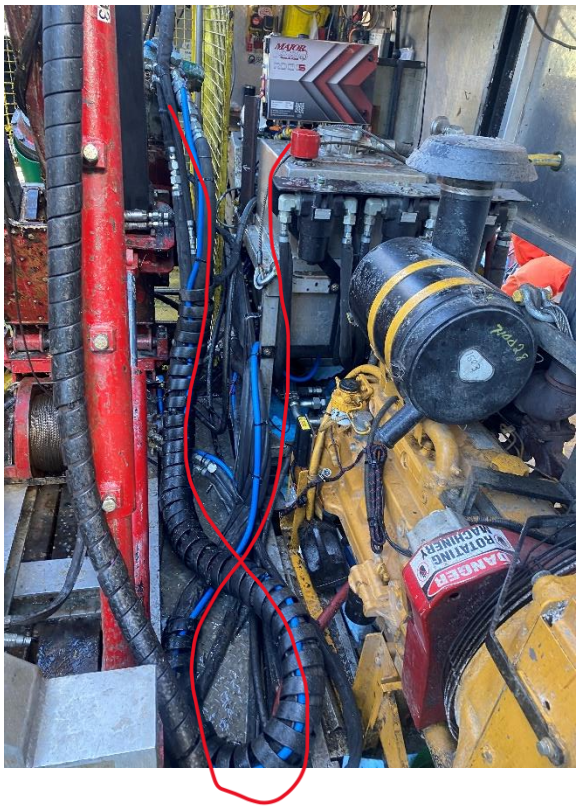


Figure 18, 19 Installation of Sensor, Cable Disconnect Location with Hydraulic Disconnect.

The sensor IFM204 will be supplied with 2 locking nuts. The nuts will go either side of the bracket to lock the sensor in place. The cable for the head rpm sensor will run upwards towards to top of the head where the hydraulic disconnects are located. This is the end of the Part A Cable. Part B Cable runs with the Rotation Hydraulic hose through the spiral wrap and back to the Power pack and finally the Rock5 Unit.

1. Mount head speed bracket to head bolts as per picture.
2. Add speed sensor into bracket facing head keyed rings with a 5mm gap.
3. Add Di-Electric grease to sensor and cable
4. Plug Part A Cable into the Sensor and run the cable upwards towards the existing Hydraulic Quick Disconnects. Remember to secure the cable with zip ties to ensure it does not get tangled.
5. Run cable up mast and neatly back to screen box and locate on corresponding plug with di-electric grease added again.



4.5 Wireline Speed Assembly



Figure 20, 21, 22, Wireline RPM Bracket, cut out Flag on Drum, Cable Disconnect

To install the Wireline Speed sensor, you will need:

- IFM204 Inductive pickup Sensor
- Mounting bracket (109100)
- Proxy Guard (109126)
- M12 Cable Labelled with Wireline Speed. (M12, 4 core, 10metre, 90 to straight) (EVC728, Wireline RPM 6)
- M12 cable labelled with Wireline Speed. (M12, 4 core, 5metre, straight to 90) (EVC734, Wireline RPM 6)

Sensor Bracket Mounting

Using the supplied bracket drill 2 holes into the wireline drum frame. Secure the bracket with 2 bolts. The idea is to mount a proxy in a location that can detect rotation of the Wireline Drum. We also must modify the wireline drum by cutting a square face off so the proxy has a section it can detect movement. The photo is using quite a large area, it is not recommended to cut any more than the photo, no less than half.

Sensor installation and Cable run

The supplied proxy comes with 2 locking nuts. Screw the first locking nut onto the proxy, place the proxy through the hole in the bracket. Adjust the locking nut to get the correct distance. You will want a 5mm gap from the proxy to the top edge.

1. Mount Proxy in Bracket by tightening both lock buts.
2. Add Di-Electric grease to sensor and cable.
3. Connect Part A Short M12 Cable to Proxy.
4. Connect Part B Long to Part A Short and Run cable back to the Rock5 Unit.
5. Secure all cabling and ensure Di-Electric grease is applied to all connections.

4.6 Head Position Draw-Wire Sensor

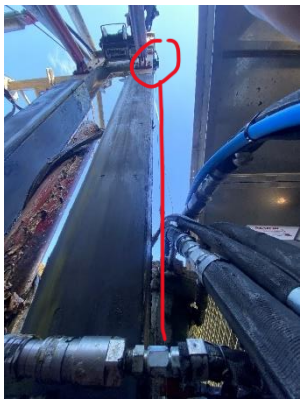


Figure 23, 24, 25, Full View of Wire, draw wire Tag Hook up Location, Draw wire Location

To install the Head Position assembly, you will need:

- Draw wire Sensor
- Draw-Wire Bracket
- M12 5 Wire Cable 1M

Sensor installation and Cable run

To install the Draw-wire correctly we first need to secure it to the driller's side of the mast just above the final stroke of the head, the tag attachment itself needs to just clear the nylon head slides. It is most important the draw wire is clear of any rubbing on the wire as it will break with enough rubbing. The Draw wire is connected to the system via the Mast Angles second M12 Port

1. Secure Bracket to the side of the mast in the photo above
2. Install the Draw wire sensor to the secured bracket.
3. Apply DI-Electric Grease to all electrical connections.
4. Connect the M12 5 Wire Cable from the Mast Angle's second port to the Draw wire.
5. Secure the Draw wire tag to the side of the Head.
6. Run the Head up and down and ensure that nothing collides with the Draw wire sensor and make sure the Wire is free of any rubbing.

Notes:
This is without a doubt the most important sensor of the system. Once installed please triple check it has been installed in a safe location. Where nothing with hit it when the Head travels to the top.
When transporting the drill, slowly retract the draw wire back into the sensor. If you let go of it, the sensor will break.

5. Starlink

5.1 Preparation

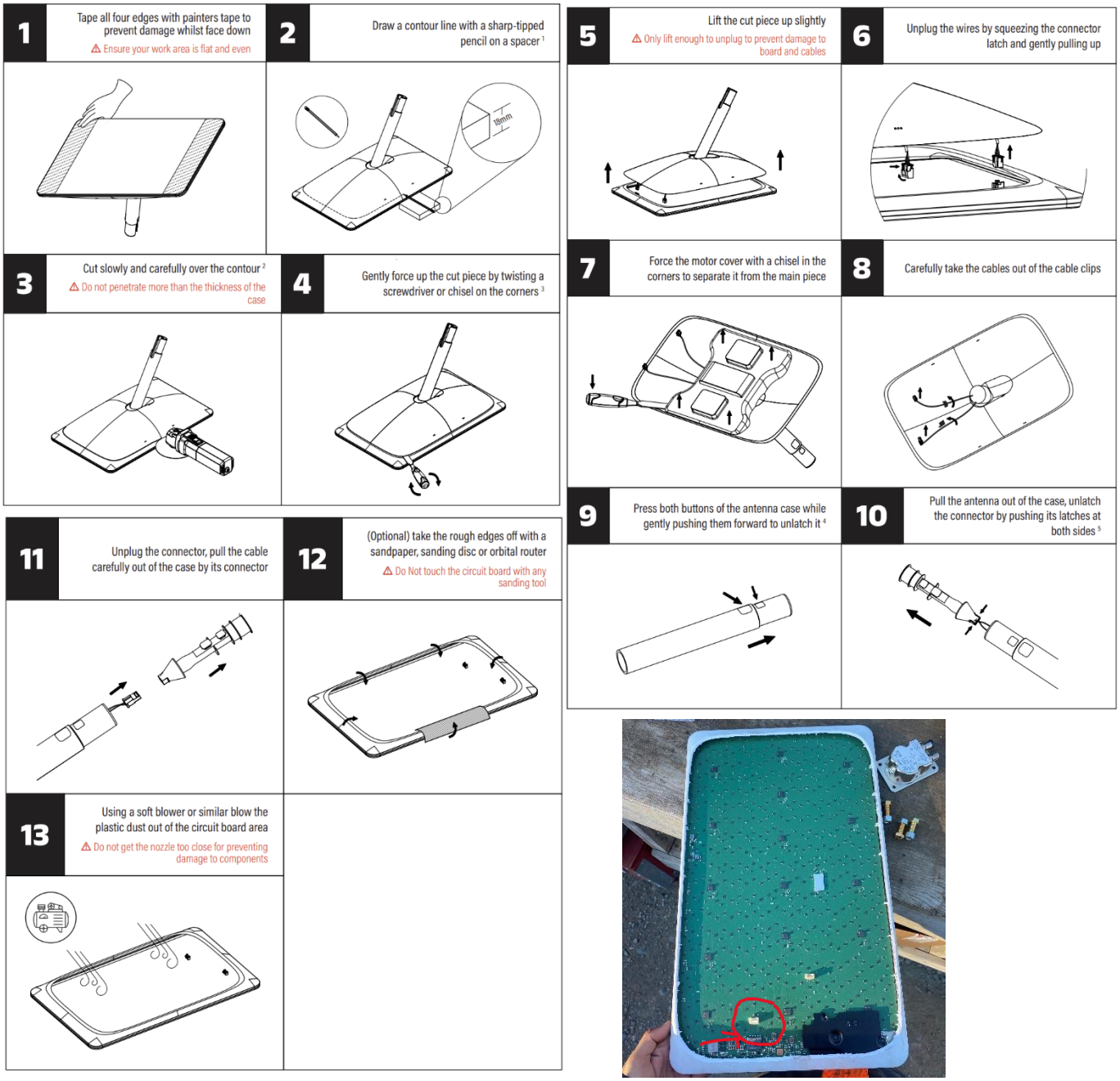


Figure 26, 27, 28, 29, Instructions for Cutting Starlink, Post Cut Starlink Dish

Once we have cut the Starlink system from the original case, connect the supplied Outback Comms cable into the socket circled in red. Place the Starlink system into the new supplied flat pack plastic case. Secure the Cable by tightening with a spanner.

Do not forget to ensure the Starlink has an Active Account, there are more details in the Final Checks Chapter Below

5.2 Installation

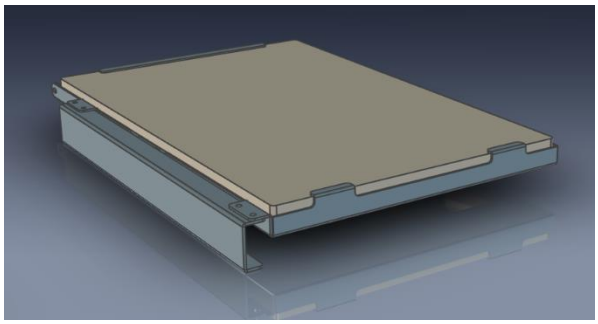


Figure 30, 31, Model View of Starlink Assembly, Location of Installed Starlink.

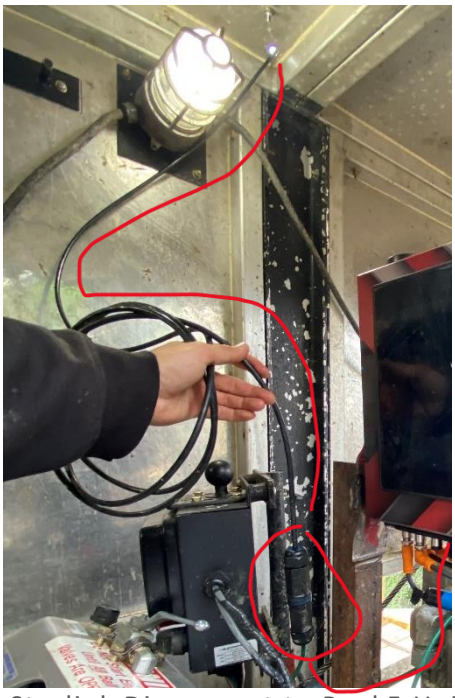


Figure 32, 33, Hole for Starlink Cable to Run through, Starlink Disconnect to Rock5 Unit

Install and Cable run

It is recommended but not overly important that the Starlink is installed in the corner of the roof, we had to drill 4 holes to bolt down the frame of the Starlink assembly. Rotate the Starlink in such a way that the wiring is in the corner of the roof panel. Drill a hole big enough to fit the Ethernet Cable through the roof and down to the Rock5 Unit. The Ethernet Cable is Connected to the Rock5 by the Waterproof Coupler supplied.

6. Inspect the Installation

Inspect the installation for water and hydraulic leaks. Repair any leaks if found.
Operate the drill and have a helper check for clearances of the sensor installations:

- Head RPM assembly.
- Laser assembly – move mast and head in various positions and check for position.
- Wireline RPM assembly
- Follow commissioning process on screen for completion.

7. Final Steps

- Power up the drill
- Check the screen for status
- In the diagnostic screen check for any red sensors or lines to be resolved

(Chris to add in section about commission through programmed screen method)

8. Final Inspection

- The installation process should end with checks to ensure that all tasks have been completed, that the drill is in a safe condition and that all waste generated during the installation process has been cleaned. When everything is checked and declared safe and clear, the task can be considered complete and ready.

- Ensure that all cables are routed properly and do not interfere with the operation of the drill. Use tie wraps to secure the cables to the drill as required.

- Verify Starlink has an Active Account by Connecting to the Rock5 Wi-Fi, Opening the Starlink App and viewing the Connected Starlink's status.
    - Password: MajorDr1lling

- After completing the installation of all sensors, the mechanic needs to follow all hydraulic and waterlines to ensure that there are no leaks. All new connections must be leak-free before checking the functionality of the sensors. If the mechanic sees any signs of a leak, he or she should stop the engine and repair the leaking part before proceeding to the next steps.

- Check no sensor is in danger of contact from components around it, i.e. setting the speed sensor too close to the component reading. That diagnostic T's are oriented correctly. The sensor isn't rubbing on other hoses or components. Cables are routed so they wont contact or rub through

- Check that all enclosures are securely closed, and the laser enclosure cover is tightened in place.

- Check that all cables are secure, make sure all cables and hoses are properly secured in place to prevent them from being cut, pressured, or strained when moving parts of the drill are in motion during drill operation.

- The drill can generate great vibrations during transport and operation, this vibration can collaborate to loosen the screws which can culminate in the displacement of the position of the rotation reading sensors, fall of the enclosures and ultimately fall of the HMI. As part of the final check, be sure to verify the tightness of the screws on the enclosures, sensor brackets and HMI brackets.

- Ensure all tools and unused parts are collected.