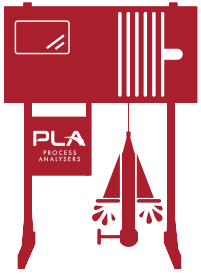
PLA
PROCESS
ANALYSERS




# SmartDiver®
## MUD DIVER®

# POCKET GUIDE

## PREVENTATIVE CARE & MAINTENANCE

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# SMARTDIVER® COMPONENTS

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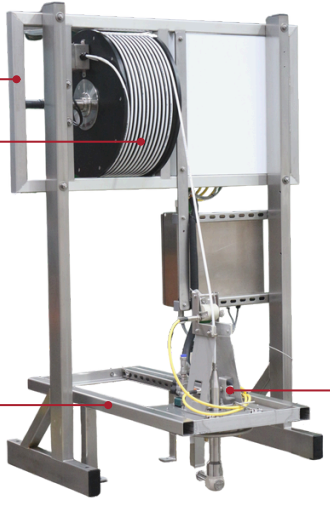
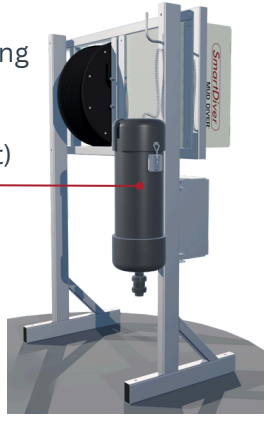
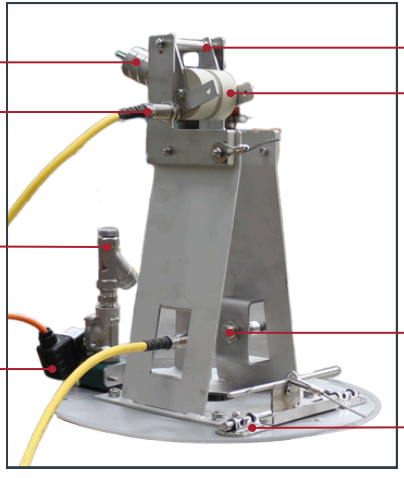
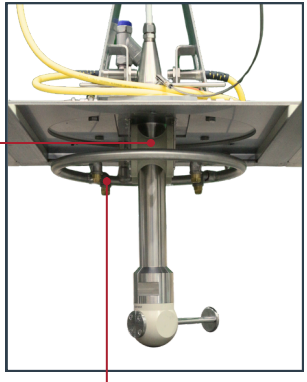


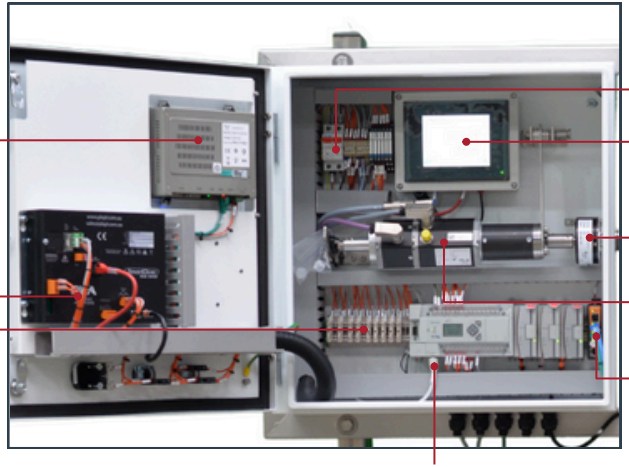



# WASHBAY COMPONENTS



# ENCLOSURE COMPONENTS



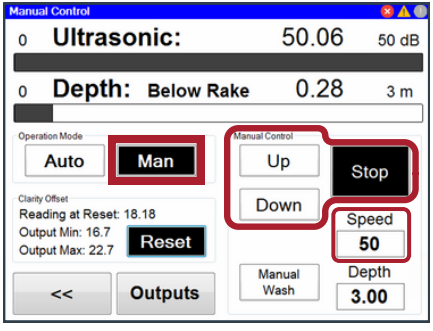
## MAINTENANCE SCHEDULE - PREVENTATIVE CARE

| COMPONENT | CARE REQUIRED | FREQUENCY |
|---|---|---|
| Sensor | Inspect/Descale | 1 to 3 weeks* |
| Slip-Ring & Grub-Screw | Inspect, Clean, Tighten | Monthly |
| Water Nozzles | Clean in-line Mesh Filter | Monthly |
| Washbay - Rollers | Descale | Monthly |
| Control Cabinet | Clean | Quarterly |
| Washbay Assembly | Descale | Quarterly |
| Drum | Descale | Quarterly |

**Monitor the Sensor on a regular basis for scale-build up.*

# WASHBAY SENSOR REMOVAL

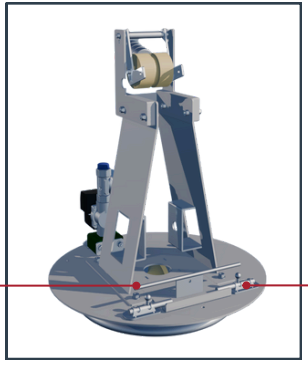
1. Notify the control room of SmartDiver® stoppage.
2. Toggle the two-position switch from RUN to STOP
3. Make sure the sensor is docked in the Washbay.
4. **Switch to MANUAL mode through the Control HMI:**
   a. Navigate to the System Page and select MANUAL.
   b. Switch Operation Mode from AUTO to MAN
   c. Select 30% speed
   d. Press DOWN button and lower the sensor about 1 metre from its docked position.
   e. Press STOP when there is enough length.




**TWO POSITION SWITCH:**
**RUN/STOP**

# WASHBAY SENSOR REMOVAL

5. **Remove Sensor from Washbay:**
    a. Unlock the 2 pad-bolts on top of the Washbay & remove the top latch.
    b. Extract the sensor from the Washbay



# SENSOR CLEANUP & RE-INSTALLATION

**5. Sensor Cleanup:**

- Examine the sensor head for damage, buildup, or wear. Clean the ball, the reflector plate & the complete sensor shaft using a clean oil-free cloth.
- Soak the sensor as required in ‘de-scaler’ or phosphoric acid.
- Reset the Clarity Drift Offset (if used).

**6. Sensor Re-installation:**

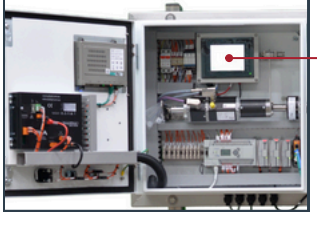
- Place sensor back into Washbay (avoid excessive cable twisting).
- Position the removable roller and secure with 2 pad bolts.
- Ensure cable sits properly in roller grooves.
- Select MANUAL mode and press UP.
- Monitor cable winding on winch drum - ensure no crossovers.
- Press STOP just before sensor reaches home position.

# SENSOR HEALTH CHECK

**Every two weeks, conduct a sensor health check.**

Follow the above steps 1 to 3 :

- Immerse the sensor in a bucket of water.
  ***Note:*** *Sensor HMI will show noise error if its in air, this is not an issue.*
- Open the enclosure door, on the Sensor HMI, touch the screen to remove screensaver.
- Ideal PLE reading in clear water should be between -2 to -15 dB.
- Ideal Sound Speed reading in clear water should be between 1450 to 1550 m/s or if its showing SG, it should be around 1000.
- Check echo wave readings.*
- Re-install the sensor as per step 5.

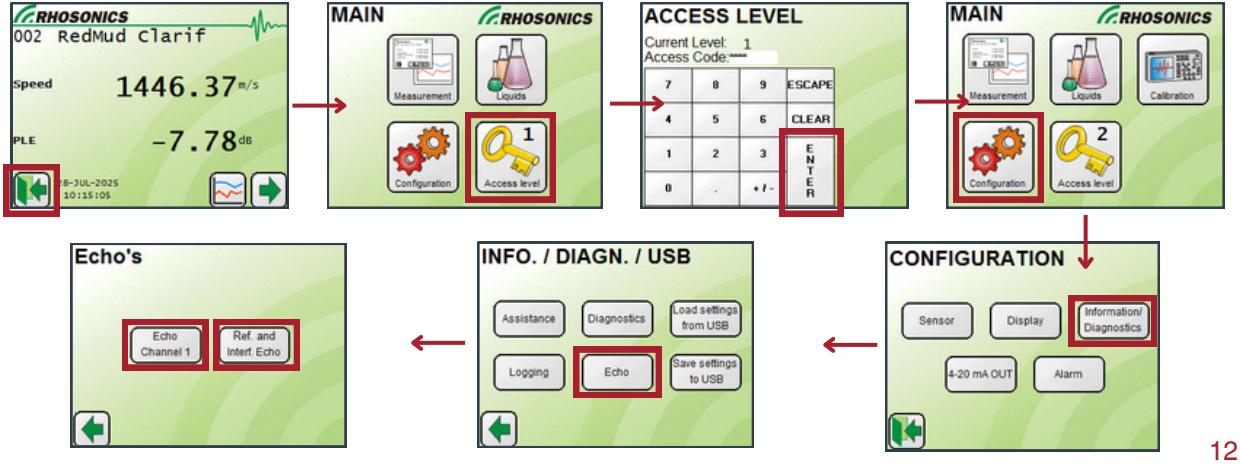



**Check the following page.*

# SENSOR ECHO WAVES

When the sensor is submerged in water for a health check, access the echo readings on the Sensor HMI.

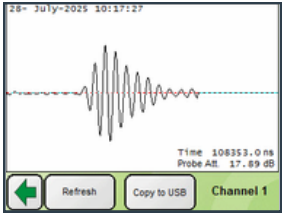
*Access code is 7410*



# SENSOR ECHO WAVES

**Echo Channel 1: (Liquid  Reflections)**

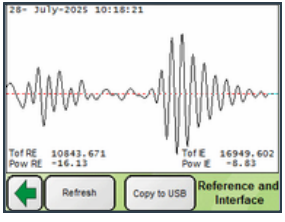
Example of a good echo: No noise on either side of the echo.




**Reference & Interface Echo: (Internal Sensor Reflections)**

Example of a good echo: Short waves followed by longer waves.

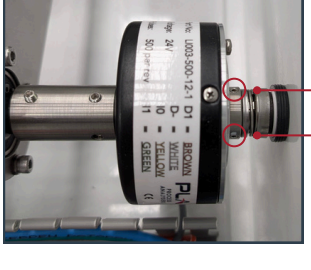
- **Power of Reference Echo (Pow RE).** A good reading in water is -3 to -25 (closer to zero is better). A bad reading is -40.
- **Power of Interface Echo (Pow IE).** A good reading in water is -3 to -17 in water (closer to zero is better). A bad reading is -40.



# ENCODER GRUB SCREWS

- Locate the two grub screws on the stainless steel ring of the encoder assembly.
- Check both grub screws for tightness & apply low-strength Loctite 222 if loose.
- Push the encoder against the spring and tighten the grub screws.
- Inspect all wiring terminals connected to the encoder assembly; especially on terminals D1, D-, I0 & I1. Refer to the SmartDiver® wiring diagram for terminal locations.
- Tighten all loose terminal connections as required.

Encoder

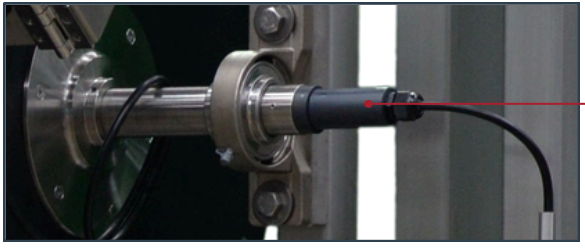



2 Grub Screws:
Located 90°
apart

## SLIP-RING

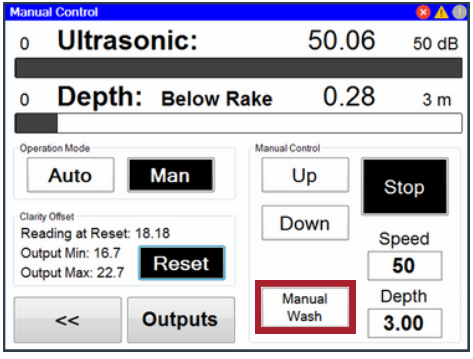
1. Check the slip-ring rotates smoothly without resistance. Grease bearings every 6 months.
2. Inspect the polypropylene cone for any damage or cracks. Also, ensure the grub screw remains tight and secure.*
3. Verify that the hose clamp is properly secured and tightened. (6-pole only)
4. Check that the slip ring support system is properly aligned.

   *Caution: Misalignment will place stress on the slip ring as it rotates.*




**Tighten by hand. Excessive tightening may break the parts.*

# WASH NOZZLES




1. Remove sensor from Washbay.
2. Test Wash System: Press the MANUAL WASH button on the Control HMI.
3. Ensure the four wash nozzles are functioning and that there is a good flow of wash-water directed at the Sensor.
4. Fit sensor back in to Washbay.

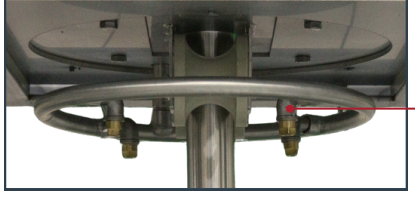
## ISSUE WITH WASH NOZZLES

1. Use a marking pen to witness-mark the Washbay position for proper reinstallation.
2. Disconnect the water supply to the Washbay Assembly.
3. Remove the Washbay from the tank entry point.

   **Note:** If removal is not possible, continue with step 6.
4. Remove all four wash nozzles.
5. Inspect and clean wash nozzles, removing any debris or buildup.
6. Remove and clean in-line mesh filter (Y-strainer).

Wash Water Connection to the Y-strainer inlet.

Solenoid Valve



Wash Ring & Spray Nozzles

## ISSUE WITH WASH NOZZLES

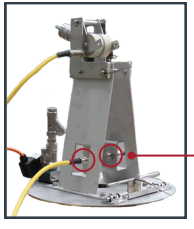
7. Reinstall the nozzles & filter.
8. Reinstall Washbay: Align with the witness mark.

**Note:** Ensure proximity sensor cables are not positioned between Washbay & mounting flange.

9. Turn the water supply back on to the Washbay.
10. Re-test: Press MANUAL WASH to verify all nozzles have a good flow.
11. If flow is inadequate, check solenoid valve operation: Disassemble, inspect, and replace solenoid valve if necessary.
12. Return the sensor to the Washbay and resume normal operation.

# CHECKING PROXIMITY SWITCHES

- To detect the docked sensor, the Washbay Assembly has two proximity switches (A & B).
- These switches to face within 2mm of the docked sensor, their sensing distance is 5mm.
- Clean any descaling on the sensors using a clean oil-free cloth.
- When the sensor is docked, verify if switch is working using any of the following 3 methods:
  1. The LED displays a static red light.
  2. Verify readings on the PLC: Check inputs 2 & 3.
  3. Verify on the I/O page on the Control HMI.



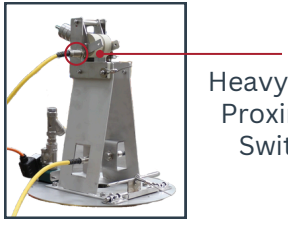
Docked Sensor Proximity Switches A & B

LED Light

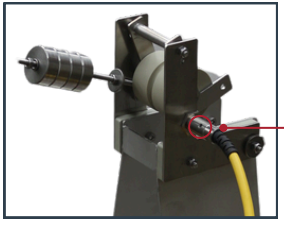
PLC

# CHECKING PROXIMITY SWITCHES

- To detect the heavy-mud level, the Washbay Assembly has a third proximity switch.
- When the cable is slack and counterweight tips, verify if switch is working using any of the following 3 methods:
  1. The LED displays a static red light.
  2. Verify readings on the PLC: Check input 8.
  3. Verify on the I/O page on the main Control HMI.



Heavy-Mud Proximity Switch

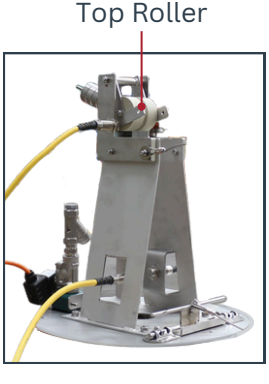


LED Light

# WASHBAY ROLLERS

**Top Roller**

1. Spin the top roller by hand - it should rotate freely.
2. If rotation is restricted:
    a. Remove the retaining bolt and roller.
    b. Clear scale buildup from roller sides using a straight-edge ruler or grid-mesh.
    c. Scale can catch on the roller frame and cause binding.
    d. Inspect roller bearings for rust and smooth rotation. Replace if damaged.
3. Replace the roller if the groove is worn deeper than the cable diameter or if the cable fits loosely in the groove.

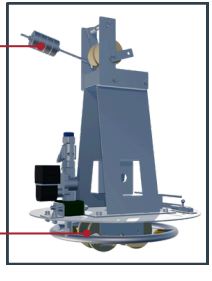


# WASHBAY ROLLERS

**Bottom Roller**

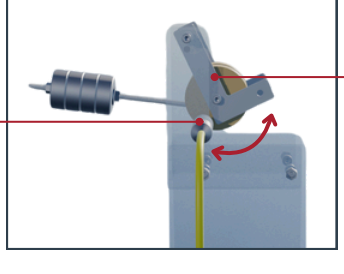
1. Spin the rollers by hand - it should rotate freely.
2. Remove scale buildup from inside the roller groove.

   *Note: Excessive buildup will jam the sensor shaft.*




**Counter Weight**

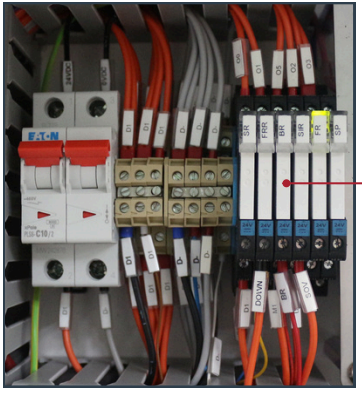
1. Check if it swings freely without jamming.
2. Metal Strip has to cross just past the proximity sensor & not further beyond.



# RELAY SWITCHES

Relays control the operation of the Motor, Motor Brake, Alarm and Solenoid Valve

**SR** - Start Relay*
**FRR** - Forward / Reverse relay (energise for reverse)
**BR** - Brake Relay*
**SIR** - Solenoid Valve (controls water to Washbay)
**FR** - Fault Relay
**SP** - Spare Relay




**Check the following page.*

# RELAY SWITCHES

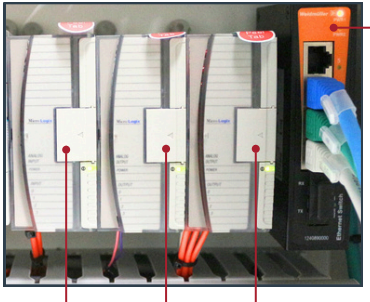
**BR - Brake Relay:** The motor contains a solenoid brake that is normally ON (engaged).

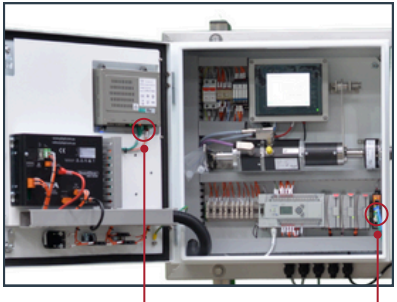
**Brake States:**

- No Power → Brake **ON** (engaged)
- Power **ON** (standby) → Brake **ON** (engaged)
- Brake **OFF** (disengaged) only when:
  - The PLC commands drum rotation **OR**
  - Manual mode is activated in **MANUAL** control.

**SR - Start Relay (Electronic Brake):** Holds the motor in position with an electronic stop command when the stop command is active.

# INPUT/OUTPUT CARD & NETWORK SWITCH




***Note:*** *If the HMI Ethernet cable is not connected to the main HMI or Network Switch, all sensor readings will display as #0.#0 on the main HMI screen.*

# INPUT/OUTPUT FUSES


Proximity A

Proximity B

Heavy Mud*

Mud*

Rake

Heavy Mud Switch

Washbay Solenoid

Clarity*

Interface*

***Note:*** *All fuses are 500mA except the SOV fuse (2A).*

**Analog Outputs*

# SmartDiver®

## MUD DIVER®

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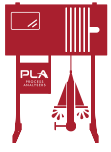


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