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		Hydrology Operations Manual		

Overview:

Horizons Regional Council's Catchment Data Team uses SmartTroll MP handheld meters for determining and recording the following field parameters at all SoE, point discharge and groundwater sites where possible (the exception being sewage treatment ponds and effluent discharges). Horizons also use these meters for lake profiling and to provide check data for continuous water quality sites.

Horizons Regional Council generally records the following parameters with the smart troll:

Parameter	Sensor Type	Range	Accuracy	Resolution	NEMS
Water Temperature	PT100	-5 to 50°C	± 0.1°C	0.01°C	Yes
Air Temperature	Thermistor	-20 to 70°C	± 2.0°C	± 0.1°C	No
Barometric Pressure	Battery Pack	300 to 1100 mbar	± 3.0 mbar	0.1 mbar	Yes
Depth	Non vented absolute PT	0 – 76 m	0.1% FS	0.01 m	No
Dissolved Oxygen (%)	Optical (RDO)	0-80% 80-200 % 200-500 %	± 1% ± 2% ± 10% of reading	0.1%	Yes
Dissolved Oxygen (mg/l)	Optical (RDO)	0-8 mg/L 8-20 mg/L 20-50 mg/L	±0.1mg/L ±0.2mg/L ± 10% of reading	0.1mg/L	Yes
Conductivity	4-Electrode Cell	5 to 100000 μs/cm	± 0.5% + 1µs/cm	0.1µs/cm	n/a
рН	Glass electrode	0 to 14 units	± 0.1 units	0.01 units	n/a
ORP	Platinum button	-1400 to +1400 mV	±5mV	0.1mV	n/a

TRAINING REQUIREMENTS:

Prior to field use, all staff are required to be trained by the Discrete WQ Portfolio Holder. Once trained to the Discrete WQ Portfolio Holder's satisfaction the Training Log [Section 15.6 Appendix 8] will be updated in the Ops Manual.



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Hydrology Operations

Manual



Smart Troll Calibration

FIELD METER CALIBRATION:

Calibration of handheld field meters must be carried out prior to each sampling run. Record the calibration and complete the end of day checks (form: 14.2 Appendix 1) which must be filled out by the operator. Record the marked number of the Troll (e.g. Smartroll 1).

Turn on Troll and start the iSitu App on the idevice (iPhone, iPad)

BAROMETER CALIBRATION:

Record the barometric pressure at the time of calibration of the Troll unit. This is checked against is the Manawatū at Victoria Avenue (VIC) barometer, which is, also recorded (simply read from the display screen). Note we use true (raw) barometric pressure. Calibrations should occur at the WQ Lab where this check is completed. Otherwise, mark the Manawatū at Victoria Avenue field as OFFSITE. Do not record these values at the end of the day in lieu of at the time of calibration.

SmartTroll unit barometer vs. VIC barometer value: If the difference is >+/-5mbars between the two notify the Discrete Water Quality Portfolio holder/proxy. Consider using a different Troll.

DISSOLVED OXYGEN CALIBRATION:

NOTE: The calibration process starts with the Dissolved Oxygen calibration (it has been noted that the current calibration form shows this below the pH and Conductivity fields). The SmartTroll should have been left stored in the cup with a moist sponge. This means that it is already stored in 100% saturated air and is ready to go. If the Smart Troll is not you are required to allow it to stabilise in the calibration cup (with a damp sponge for at least 30 minutes).



- Place the Sonde in the calibration cup with a damp sponge or a few mm of water (wait 30 minutes) 1) -Best practise to leave the Sonde with the damp sponge after its last use so it is ready to calibrate - you can more to 2) below immediately.
- 2) Press the calibration button
- Select RDO sensor
- 4) Select 100% Saturation
- 5) Press Start
- Wait till the Sonde says "Stable"
- 7) Press accept
- 8) Press home and record the RDO sat% value in the calibration log.

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pH CALIBRATION: (Always start with pH 7 buffer as this sets the offset)



- Press the calibration button
- 2) Select pH Sensor
- Select 3-Point calibration
- 4) Rinse and fill calibration cup with pH buffer (repeat for the three buffers pH 7.0, 4.0 & 10.0)
- 5) Press start
- 6) Wait until the Sonde says "Stable" Record current pH value and the calibration value.
- Press accept
- 8) Press home.

NOTE: The pH/ORP probes have a limited lifespan and do require regular maintenance by the Discrete Water Quality Portfolio holder. If you observe above normal stabilisation times and/or high mV readings when in the pH7 buffer [high = greater than +-35mV] please comment on the bottom of the form and notify the Discrete Water Quality Portfolio holder.

SPECIFIC CONDUCTIVITY CALIBRATION:



- 1. Before calibration, check the reading **FRESH** 0.001M solution and record the value.
- 2. Press the calibration button
- 3. Select Conductivity Sensor
- 4. Select 1-Point calibration

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- 5. Rinse and fill calibration cup with **FRESH** 0.01M conductivity solution Press start
- 6. Enter the actual calibration value as written on the bottle e.g. 1414 µs/cm and record this value
- 7. Wait till the Sonde says "Stable" Record current conductivity value
- 8. Press accept
- 9. Press home.
- 10. After calibration, check the reading in **FRESH** 0.001M solution and record the value.
- 11. Discard solution

NOTE: The Conductivity calibration and check solutions are prone to contamination (i.e. they are not buffers). Use the solutions only ONCE before using a rinse solution and then discarding. The majority of noted fails regarding Specific Conductivity are due to solution contamination.

If either of the pre or post calibration Specific Conductivity checks fail (i.e. the 148 μ s/cm solution) the use is to first thoroughly rinse the Smartroll and replace the solution(s). If it still fails (i.e. the value displayed is outside of the set range detailed in the calibration form): (i) Discrete WQ portfolio holder is to be informed (ii) the Smartroll is to be removed from use (iii) an alternative Smartroll is to be used.

DEPTH CALIBRATION (Best to do this at the site):



- 1) Press the calibration button
- 2) Select Depth Sensor
- 3) Select Zero in Air
- 4) Press start
- 5) Wait till the Sonde says "Stable"
- 6) Press accept
- 7) Press home.

END OF DAY CHECKS:

After completing your sampling activities, it is required to check the instrument for drift by undertaking the following checks:

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pH 7 END OF DAY CHECK:



- 1) Turn on Smartroll and start the iSitu App on the idevice (iPhone, iPad)
- 2) Place the sensor (still within its protective metal cover) into the pH 7 buffer
- 3) Leave for a few minutes to stabilise
- 4) Record the value of the pH and the temperature (no need to leave the main screen)

5)

For the end of day check to be successful, the value displayed by the Smartroll should be between 6.8-7.2 pH. If the check fails, repeat the process with fresh standard solution and a re-rinsed sensor and allow sufficient time to stabilise.

If the check is, still a failure document the calibration form as appropriate and notify the Discrete WQ portfolio holder as soon as possible. Either remove the Smartroll from the WQ shed or mark it not for use to avoid it being used until the Discrete WQ portfolio holder can rectify the situation.

SPECIFIC CONDUCTIVITY END OF DAY CHECKS:



- 1) Place the sensor (still within its protective metal cover) into FRESH 0.001M solution
- 2) Leave for a few minutes to stabilise
- 3) Record the value of the conductivity and the temperature (no need to leave the main screen)
- 4) Discard solution

If the check fails, repeat the process with fresh solution and a re-rinsed sensor and allow sufficient time to stabilise. If the check is, still a failure document the calibration form as appropriate and notify the Discrete WQ portfolio holder as soon as possible.



Smart I roll Calibration

ORP END OF DAY CHECK:



- 1) Place the sensor (still within its protective metal cover) into the Zobells Standard Solution
- 2) Leave for a few minutes to stabilise
- 3) Record the value of the conductivity and the temperature (no need to leave the main screen)

The allowable range for ORP when using Zobells Standard Solution is **200.0mV-280.0mV**. If the check fails, repeat the process with fresh buffer solution and a re-rinsed sensor and allow sufficient time to stabilise. If the check is, still a failure document the calibration form as appropriate and notify the Discrete WQ portfolio holder as soon as possible.

CALIBRATION FORM:

Once the end of day checks are completed double check all fields are completed in the Handheld Meter Calibration Form, including adding any comments, prior to finishing for the day.

SMARTROLL STORAGE:

Once all checks are finished and deemed satisfactory turn the Smartroll off by holding down the power button on the baro/battery unit and exiting out of the idevice app (turning off the idevice afterward). For safe storage ensure that the sponge is still moist and place the probe(s) into the cup (as if carrying out a DO calibration). Disassemble the cable from the Sonde and baro/battery packs and carefully coil the cable up, using the Velcro cable tie.

Place the components on the shelving with the others.

If the backpack is damp or wet, dry out the case by either bringing into the building proper or hang the backpack up to dry.

If the Sonde, baro/battery pack, backpack or cable has been covered in mud/sand, please clean, immediately after completing all end of day checks.