

Sensor Packages for Water Quality Data



RANMARINE

July 2023

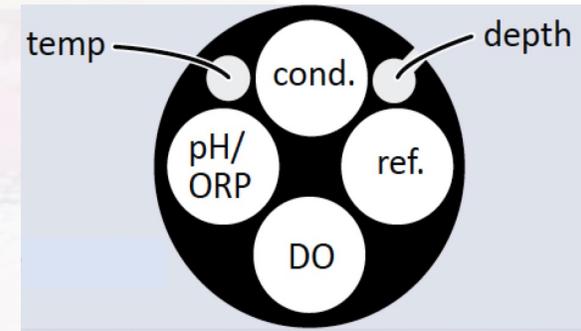


RanMarine offers x6 base Sensor Packages

- **Water Quality Essentials - Manta +20:**
 - Temperature, Dissolved Oxygen (DO), Oxidation Reduction Potential (ORP), pH, Conductivity
- **Trimeter: Turbidity Essentials**
 - Temperature, Turbidity
- **Water Quality Extended - Manta +30A:**
 - Temperature, Dissolved Oxygen (DO), Oxidation Reduction Potential (ORP), pH, Conductivity, Turbidity
- **Water Quality Extended + Algae Management - Manta +35A:**
 - Temperature, Dissolved Oxygen (DO), Oxidation Reduction Potential (ORP), pH, Conductivity, Turbidity, Chlorophyll A, BGA, Nitrate
- **Water Quality Extended + Hydrocarbon Monitoring - Manta +35A:**
 - Temperature, Dissolved Oxygen (DO), Oxidation Reduction Potential (ORP), pH, Conductivity, Turbidity, Crude Oil, Refined Oil
- **Water Quality Extended + Human Safety Monitoring - Manta +35A:**
 - Temperature, Dissolved Oxygen (DO), Oxidation Reduction Potential (ORP), pH, Conductivity, Turbidity, tryptophan, CDOM/FDOM, ammonia bromide

Note: Document may contain errors or variances to available product – Contact RanMarine to discuss final solution

Water Quality Essentials (Manta +20 sonde)



Note: the depth sensor in the Manta +20 refers to “vented depth” (i.e. depth of the sensor within the water body) – it is not measuring water depth to the floor bottom/bed

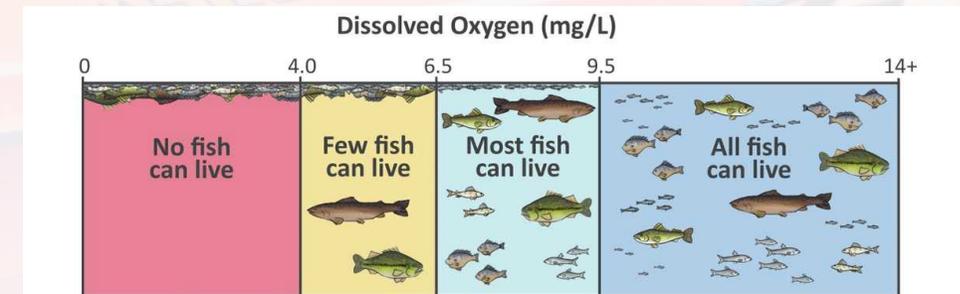
- **Temperature**

Influences water chemistry: rate of chemical reactions increases at higher temperatures



- **Dissolved Oxygen (DO)**

*A measure of how much oxygen is dissolved in water
- the amount of oxygen available to living aquatic organisms*

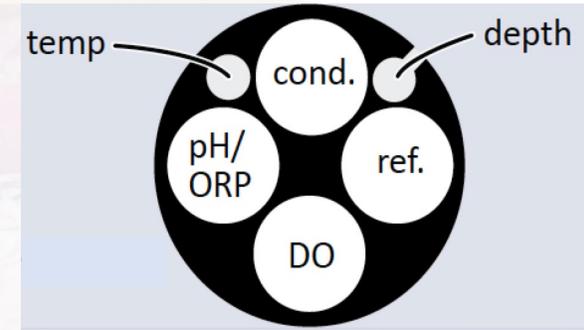


- **Oxidation Reduction Potential (ORP)**

Measures the ability of a lake or river to cleanse itself or break down waste products, such as contaminants, dead plants & animals

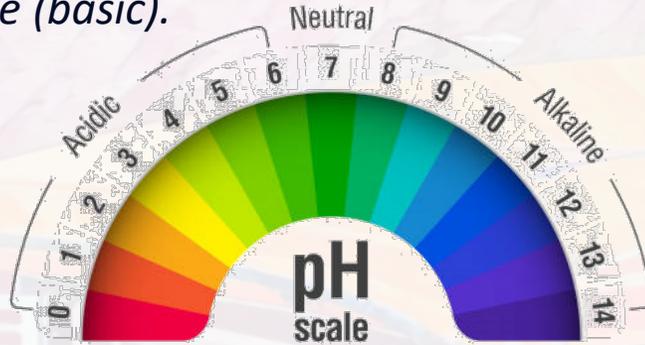


Water Quality Essentials cont.



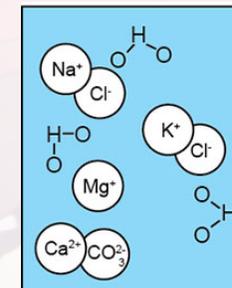
- pH

A measurement of water's acidity or alkalinity. Water with pH less than seven is acidic; water with pH greater than seven is alkaline (basic).

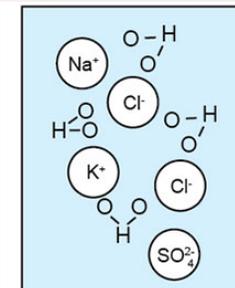


- Conductivity

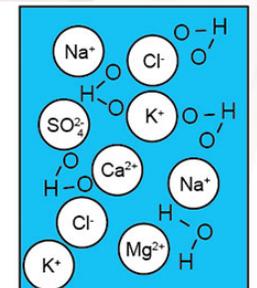
Conductivity is how we measure the ionic content (such as chloride, nitrate, sulfate, sodium, magnesium, calcium, or iron) in a body of water by measuring the water's ability to conduct electricity.



Salts dissolve in water to release ions (charged chemicals)



Fewer ions = lower electrical conductivity



More ions = greater electrical conductivity



Larger format “sondes” (probe housings)



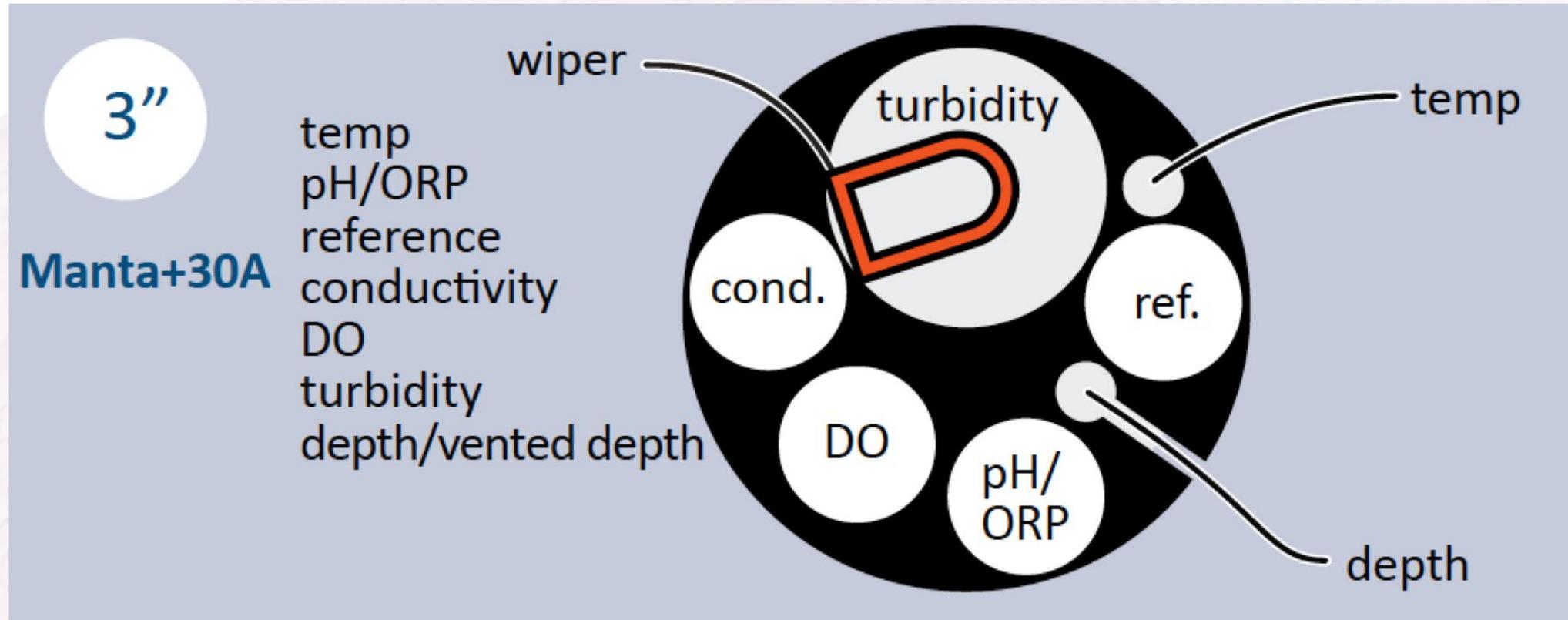
Manta +30



Manta +35



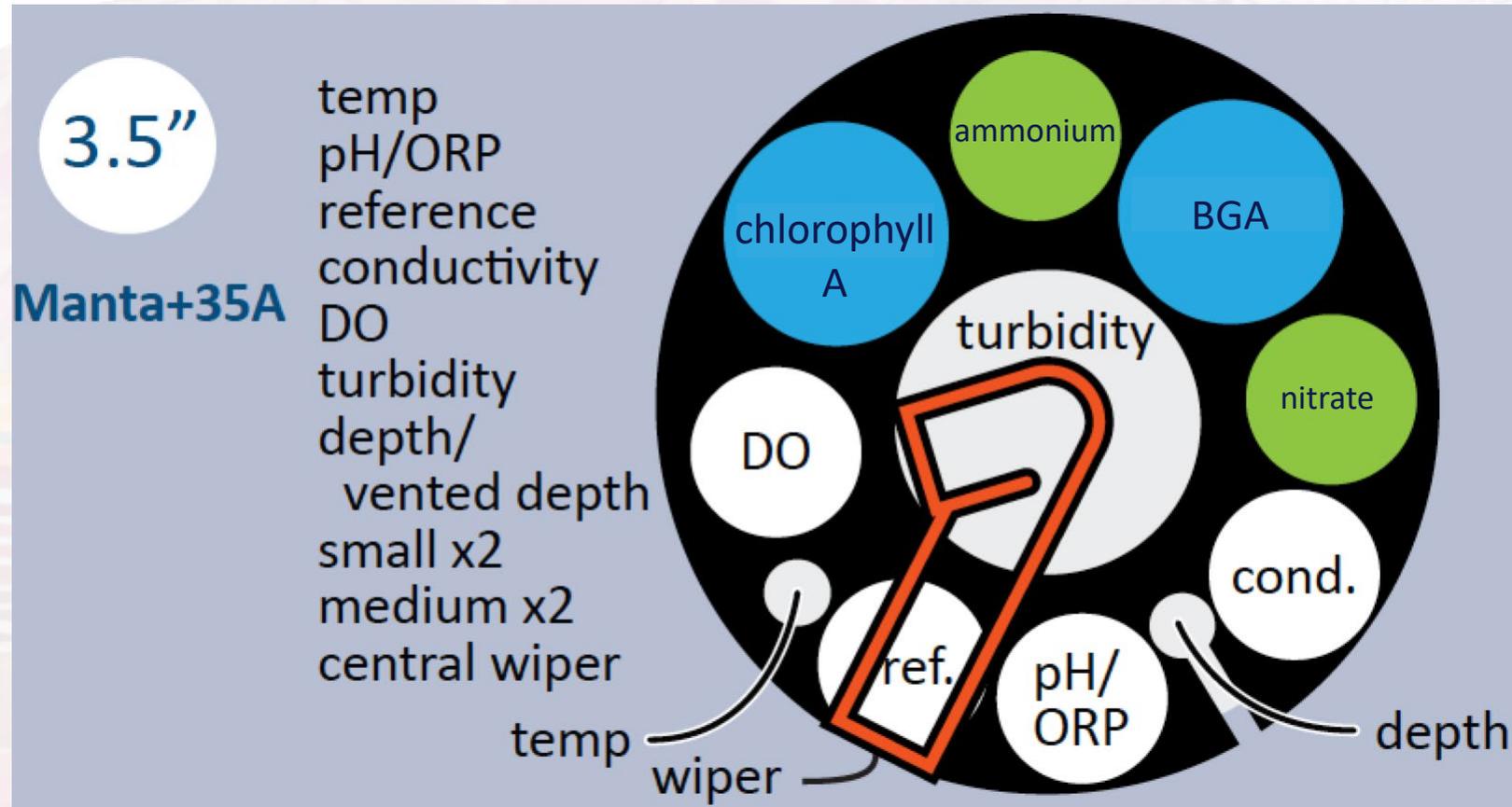
Water Quality Extended (Manta +30 A Sonde)



This 3 inch (diameter) sonde provides for the same probes as [Water Quality Essentials](#), with the addition of [Turbidity](#)



Water Quality Extended + Algae Management (Manta +35A Sonde)



This 3.5 inch sonde provides for the same probes as **Water Quality Extended**, with the addition of probes to measure: **chlorophyll A**, **BGA**, **ammonium**, **nitrate**

***note there is a separate BGA sensor for saline water & freshwater**

Water Quality Extended + Algae Management

Description of added probes: chlorophyll A, BGA, nitrate, ammonium

- **Chlorophyll A**

Chlorophyll A is a measure of the amount of algae growing in a waterbody. It can be used to classify the trophic condition of a waterbody. Measuring the chlorophyll concentration in water is important to estimate the abundance of phytoplankton. If a high level of chlorophyll is detected, it is an indication that a high level of phytoplankton is present in the water.

- **BGA**

(Blue Green Algae aka Cyanobacteria). Monitoring BGA is important because they pose a serious threat to water quality, ecosystem stability, surface drinking water supplies, and public health through toxin production and the large biomass produced in algal blooms.

- **Nitrate**

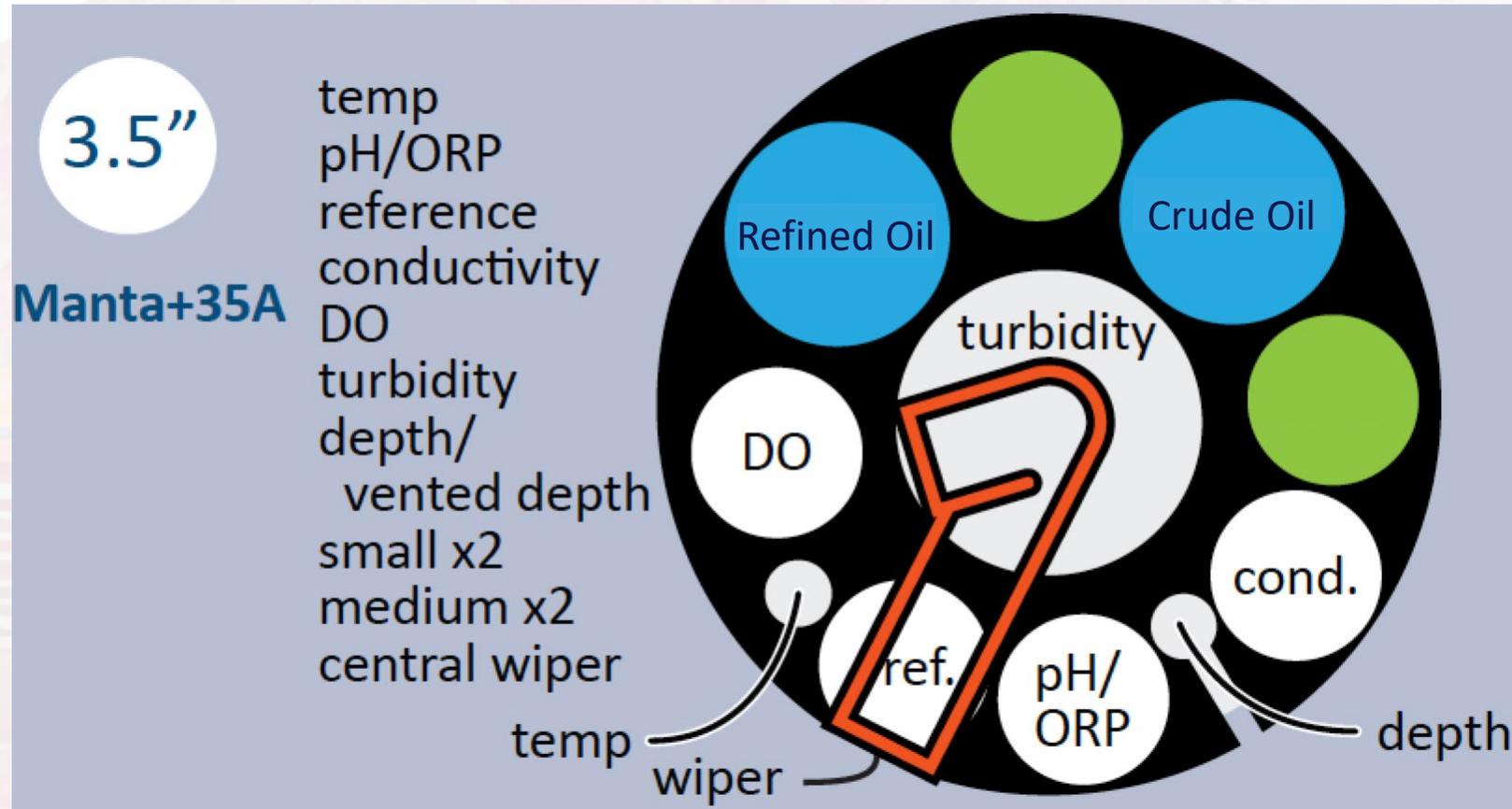
A nitrate meter is used to measure the concentration of nitrate in water. Nitrate is found naturally in water and is not harmful at low levels. At high levels, however, nitrate is harmful to aquatic ecosystems and, if found in potable water, can also be harmful to human health. Excess nitrogen can cause an overgrowth of algae in a short period of time.

- **Ammonium**

Ammonia needs to be monitored in surface and ground water because high levels of ammonia in water can be an indicator of faecal contamination or fertiliser run-off into the water. Excess amounts of ammonia will cause algae blooms.



Water Quality Extended + Hydrocarbon Monitoring (Manta +35A Sonde)



This 3.5 inch sonde provides for the same probes as [Water Quality Extended](#), with the addition of probes to measure: **crude oil & refined oil**

Water Quality Extended + Hydrocarbon Monitoring

Description of added probes: crude oil & refined oil

- **Crude Oil**

Crude oil refers to oil straight from the ground, unrefined. Oil pollution can have a devastating effect on the water environment, it spreads over the surface in a thin layer that stops oxygen getting to the plants and animals that live in the water.

- **Refined Oil**

Crude and refined oils contain a broad range of petroleum hydrocarbons, many of which are highly toxic or carcinogenic. Ingestion of these chemicals during feeding or grooming may have both lethal and sublethal effects on marine mammals.

To detect oil slicks the sensor emits a UV beam at the surface and excites any oil molecules in the target area. Using the oil's natural fluorescence, the sensor takes a signal from the substance.

1. Crude oil: Crude oil is a naturally occurring, unrefined substance extracted from underground reservoirs. It is a mixture of hydrocarbons, containing various compounds such as paraffins, aromatics, and naphthenes. Crude oil is raw and has not undergone any refining processes to remove impurities.
2. Refined oil: Refined oil, also known as petroleum products or refined petroleum, refers to the processed and purified forms of crude oil. Through a refining process called fractional distillation, crude oil is separated into different fractions, each with specific properties and applications. Common refined petroleum products include gasoline, diesel, jet fuel, heating oil, lubricants, and various petrochemicals.

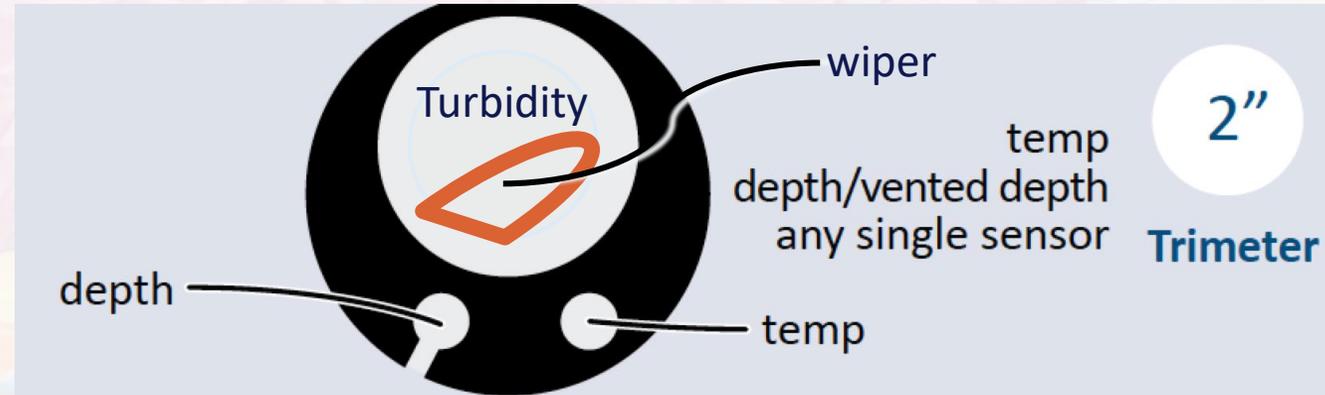
Monitoring both crude oil and refined oil in waterways or water bodies is crucial to understanding and mitigating their environmental impact, protecting aquatic life, responding effectively to spills, ensuring regulatory compliance, and safeguarding human health.



Turbidity Essentials

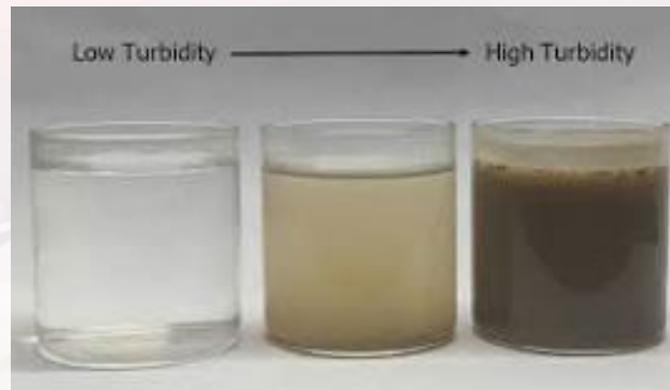
Trimeter format

(same size as a Manta +20)

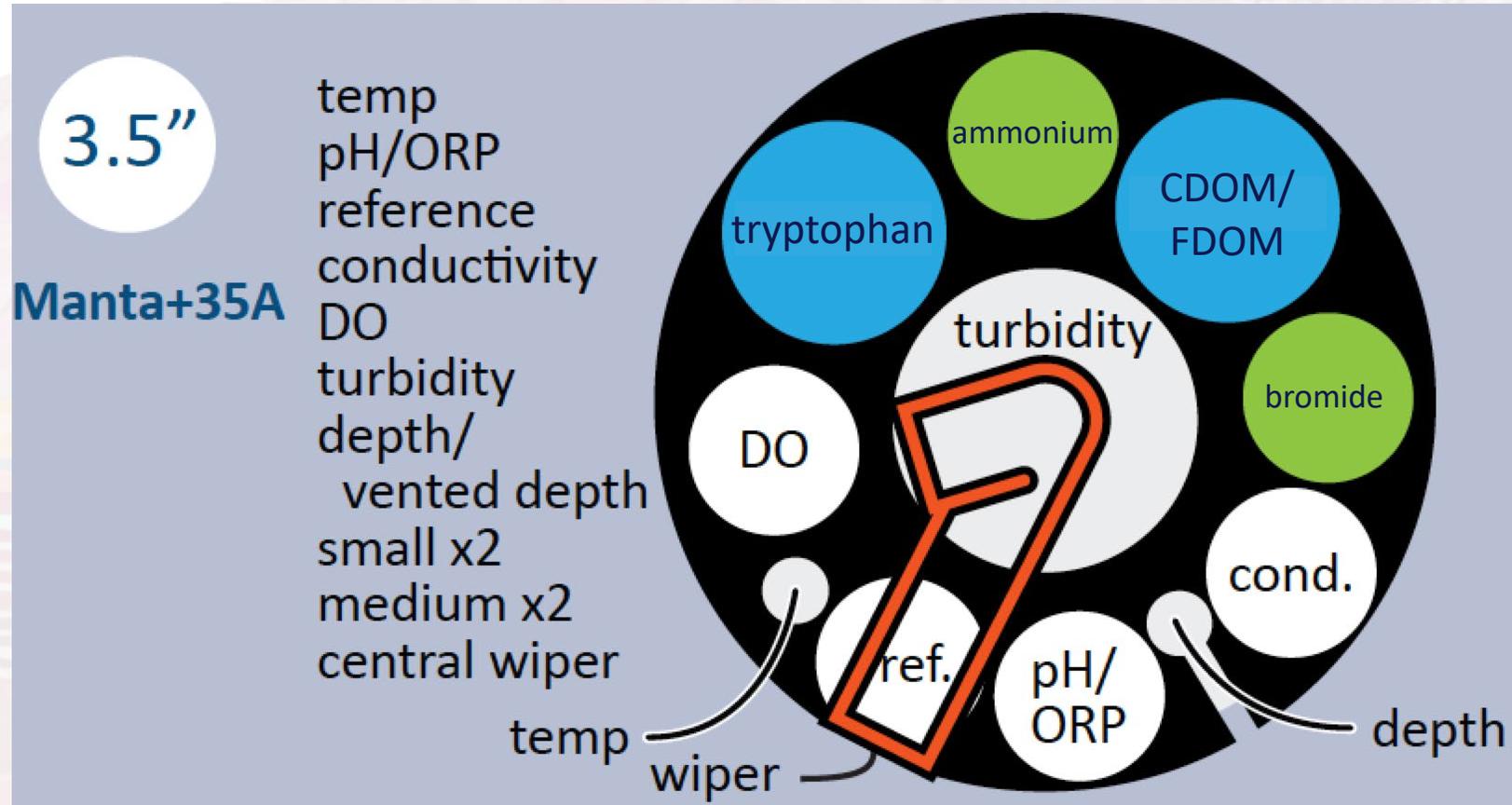


Turbidity

The measure of relative clarity of a liquid. It is an optical characteristic of water and is a measurement of the amount of light that is scattered by material in the water when a light is shined through the water sample.



Water Quality Extended + Human Safety Monitoring (Manta +35A Sonde)



This 3.5 inch sonde provides for the same probes as **Water Quality Extended**, with the addition of probes to measure: **tryptophan, CDOM/FDOM, ammonium, bromide**

Water Quality Extended + Human Safety Monitoring

Description of added probes: tryptophan, CDOM/FDOM, ammonium, bromide

- **Tryptophan**

Because human sewage fluoresces at the same wavelengths as tryptophan, then we can measure accidental spillages of human waste into a river with a tryptophan probe. Such a probe might also help identify mis-connections with sewer pipes in urban river locations.

- **CDOM/FDOM**

Chromophoric Dissolved Organic Matter or Colored Dissolved Organic Matter (CDOM): Both refer to organic matter in water that absorbs strongly in the ultraviolet (UV) spectrum. Fluorescent Dissolved Organic Matter (fDOM) refers to the fraction of CDOM that fluoresces. fDOM is a surrogate for CDOM, and a fast and easy means of tracking DOM in natural waters. Measuring CDOM/fDOM is important because concentrations of CDOM affect submerged aquatic vegetation, coral reefs and other benthic communities. fDOM fluorescence corresponds to total organic carbon (TOC), which is an indicator of discharge water quality.

- **Ammonium**

Ammonia needs to be monitored in surface and ground water because high levels of ammonia in water can be an indicator of faecal contamination or fertiliser run-off into the water.

- **Bromide**

Bromide does not pose a direct risk to humans or the environment, but it can react with other compounds and naturally-occurring organic matter to create brominated organic compounds that do have a health concern. Acute poisoning by bromate causes nausea, diarrhoea, vomiting and abdominal pain, as well as effects on the kidneys, nervous system and hearing loss and it may be a carcinogen.



Calibration

- **PH**-> using pH buffers - two-point calibration required, three points optionally.
- **Conductivity**->KCl standards, one point
- **DO**->one point in air-saturated water or two points (air-saturated water and zero). Replace sensor tip (5+ years life)
- **Turbidity**->two points with lab-qualified sample, Formazin or polymer beads solution
- **ORP**-> one point - quinhydrone
- **BGA**-> lab-qualified algae sample, secondary solid standard cap (“cal cube”)
- **Chlorophyll**-> lab-qualified sample, secondary solid standard cap (“cal cube”)
- **CDOM**-> lab-qualified sample, secondary solid standard cap (“cal cube”)
- **Tryptophan**->lab-qualified sample
- **Crude/refined oil**-> lab-qualified sample, secondary solid standard cap (“cal cube”)
- **Ammonium**-> Two-point calibration
- **Nitrate**-> Two-point calibration
- **Chloride**-> Two-point calibration
- **Sodium**-> Two-point calibration
- **Calcium**-> Two-point calibration
- **Bromide**-> Two-point calibration

Sensor lifetimes:

- PH 6+Years
- Conductivity 5+Years
- DO 6+Years.
- Turbidity 3 Years
- ORP 10 Years
- BGA 5+Years
- Chlorophyll 5+Years
- CDOM 5+Years
- Tryptophan 5+Years
- Crude/refined oil 5+Years
- Ammonium 6 Months
- Nitrate 6 Months
- Chloride 6 Months
- Sodium 6 Months
- Calcium 6 Months
- Bromide 6 Months

