

NEP-9500 SERIES TURBIDITY PROBE



Document History

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Revision History

This document has been revised by:

Revision Number	Revision Date	Summary of Changes	Author
V1.01	24-10-17	Updated general content	Ludovic Grosjean

Reference Documents

Please see the following documents for more information:

Document Name	Download from	Author
Online Training documents	http://download.observator.com/files/?dir=User manuals/NEP-9500	Ludovic Grosjean
Latest NEP5000 Manual	http://download.observator.com/files/?dir=Software/NEP50xx Provides an in-depth information of the configuration and calibration.	Niran Pelpola

Distribution list

This document has been distributed to:

Name	Company, Position	Action
Dana Galbraith	Director at Observator Instruments	Review



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1. NEP-9500 INTRODUCTION

Thank you for purchasing an ANALITE NEP-9500 series turbidity probe. It will give you years of service if you install and maintain it according to guidelines set out in this Manual.

The ANALITE NEP-9500 series of turbidity probes are an enhanced version of our successful ANALITE 90 and 95 series probes. They offer better performance, more output options and greater ease of deployment yet are available in the same mechanical package (Glanded version).

The ANALITE NEP-9500 series turbidity probes are designed for monitoring and process applications where turbidity levels of up to 1,000NTU may be encountered. Standard ranges are 0NTU, 10NTU, 400NTU, 1,000NTU, 3,000NTU and 5,000NTU.

Specifically, the ANALITE NEP-9500 probes are designed for applications that will not allow bio-fouling to build up such as short monitoring deployment or placement in fast and cold running water. The ANALITE NEP-9500 probes however, with their integral wiper assembly, are designed where bio-fouling or sedimentation buildup is likely. The ANALITE NEP-9500 series of probe with a stainless steel case may be submerged to a depth of 50 meters. The composite case version is rated to 200 meters.

The ANALITE NEP-9500 probes use 90° optics and employ infrared light in accordance with ISO7027. All probes use a unique modulation technique that ensures almost total rejection of ambient light conditions as well as a unique microprocessor controlled differential sample and hold circuit for enhanced performance particularly at low turbidity levels. 180 degrees is also available which measures up to 30,000NTU.

2. APPLICATIONS

ANALITE NEP-9500 probes typical use include applications such as:

1. **Monitoring of streams and rivers.**
2. **Monitoring of water storage bodies including stratification studies.**
3. **Intermediate and final effluent treatment monitoring.**
4. **Hydrological run off studies.**
5. **Ground and bore water analysis.**
6. **Drinking water filtration efficiency.**
7. **Industrial process monitoring.**
8. **Sludge and dredge monitoring.**
9. **Sediment load monitoring.**

Which model is best used is dependent on the application, the measuring environment, the logging equipment and the monitoring period (deployment times) required.

The ANALITE turbidity probes are not suitable in situations where they may be abraded by large particles such as sand and under these circumstances the reading may become erratic due to the large particles passing the optic sensor. Measuring turbidity under these circumstance will require a stilling well to allow the sand particles to settle away from the optic sensor in the probe tip.



3. SAFETY



For correct functioning of Observator NEP-9500, the sensors must be installed according installation instructions.



Never obstruct the wiper or prevent the wiper from wiping.



Always clean and dry the sensor after use.



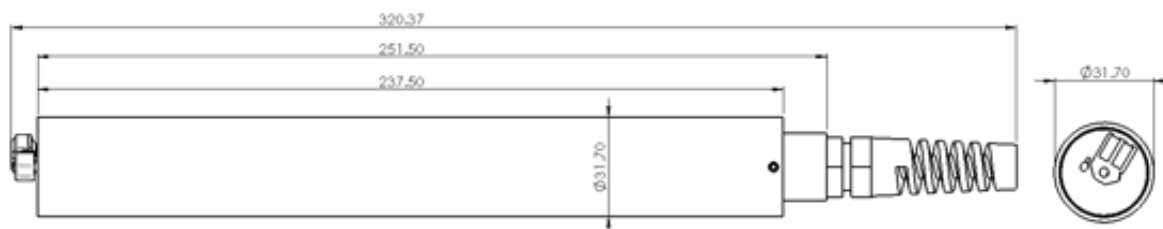
After end of life dispose this product according local regulations or return to manufacturer.

4. SPECIFICATION



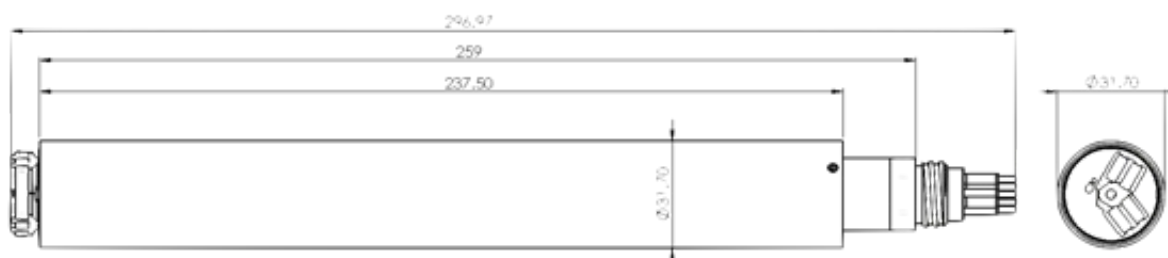
Glanded cable option (default)

Turbidity sensor Dimensions	
Length	320.4mm
Diameter	31.70mm



Subconn option

Turbidity sensor Dimensions	
Length	297mm
Diameter	31.7mm



Measurement	NEP-9500-PLUS			
Technique	ISO7027-90°			
Range	To customer requirements			
Output Span	±2.5Volts or 4 – 20mA, where -2.5V or 4mA = 0NTU 0 to + V and 0 to +2.5V outputs are also available. Specify output at time of order.			
Response Time	Approx 1 second.			
Linearity	1% 0 to 10NTU	1% 0 to 400NTU	2% 0 to 1,000NTU	5% 0 to 3,000NTU
Repeatability @ 25°C	± 2% across the board			
Temperature Coefficient (0 to 40°C)	< ±0.05%/°C			
Calibration compliance using APS AEPA polymer solutions	3 points calibration to range 2 points calibration to output span			

Environmental	
Static Depth Rating	200m (stainless steel casing), 50m (composite casing)
Operating Temp.	-5°C to +40°C
Storage Temp.	-20°C to +50°C

Wiper	
Wiper Arrangement (NEP-9500 SERIES only)	Disposable and consumable – Foam Pad on PVC or Acetal arm. Field replaceable. Mounted on central shaft, fixed by hex set screw onto flat of wiper shaft.
Actuation (NEP-9500 SERIES only)	1. By external TTL/CMOS active low pulse or momentarily contacting the wiper actuation conductor (pin 5) to 0V (pin 3). 2. Automatic wipe (periodic and power on). Please specify during the order.
Actuation Pulse Duration	On NEP-9500 series only. >50mSec, <500mSec
Actuation Pulse Current Sink	On NEP-9500 series only. 1mA max.
Wiping Time	On NEP-9500 series only 8 second nominal. During the wipe the output is held to the output value just prior to the wipe.

Power	
Operating Voltage	8-30V DC
Current Consumption	25mA maximum when not wiping plus up to 60mA if current output fitted.
Power Settling Time	2 Sec
Wiping Current	NEP-9500 series only. Additional 25mA approx. at less than 10m submersion.

5. PINOUT & WIRING DIAGRAM

Because long cable lengths are common some electrical factors should be taken into account and these are discussed below.

There are two wiping protocols available on the NEP-9500 probes:

1. **A single wipe externally initiated by momentarily resetting the probe (specify during the ordering).**
2. **A periodic automatic wipe (specify during the ordering).**

Voltage Output version

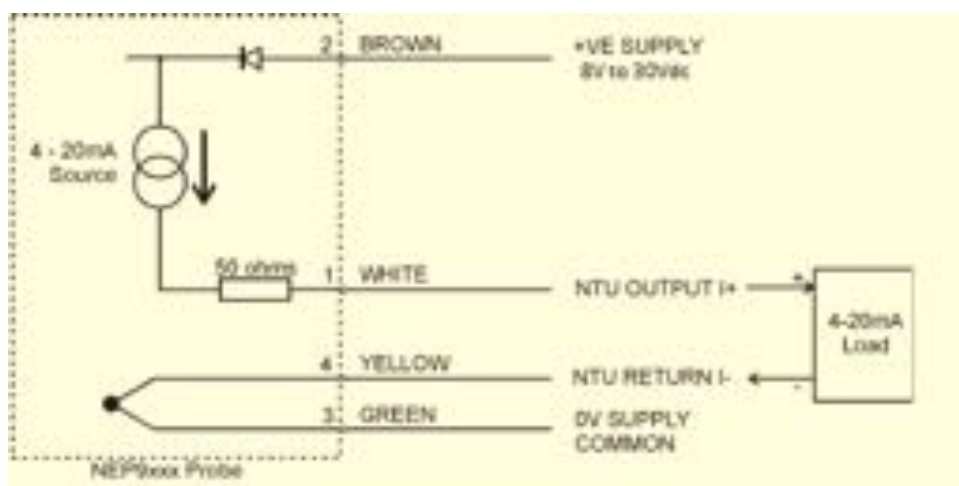
ANALITE NEP-9500 probes may have an analogue voltage output with a nominal output impedance of 500 ohms. For particularly long cable runs, the 4-20mA current output version is recommended.



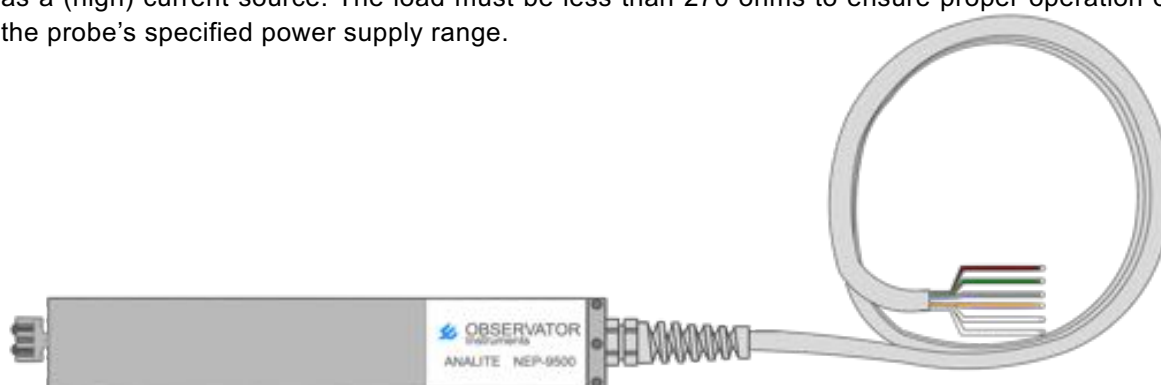
Wire color	Voltage option
Green	Ground (0V Common)
Shield	Shield (No connection within probe)
Brown	8 to 30V DC power supply (+Ve)
Grey	Wiper (Probe sleep/Wipe)
Yellow	NTU Voltage Common
White	NTU Voltage Output

4-20mA Current Output version

ANALITE NEP-9500 probes may have an analogue 4-20 current output with a maximum load rating of 50 ohms, consequently cable loop resistance should be taken into account. The PUR cable normally supplied with the probes has a nominal loop resistance of 4.6 ohms per 100m. A schematic of the probe and its load is shown below.



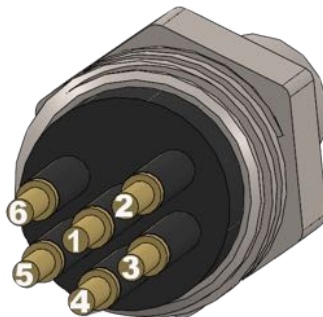
For very long cable runs (>200m), it may be advisable to connect the NTU Return conductor to the Supply Common conductor at the end of the cable to reduce the voltage drop along the run. When a NEP-9500 series probe is ordered with the 4-20mA current output, the probe is configured as a (high) current source. The load must be less than 270 ohms to ensure proper operation over the probe's specified power supply range.



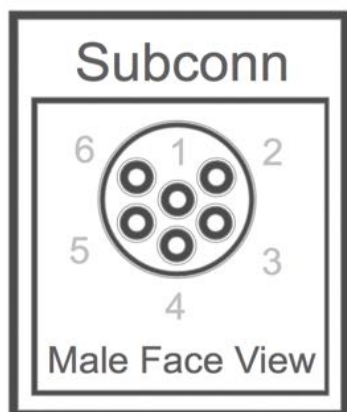
Wire color	Current option
Green	Ground (0V Common)
Shield	Shield (No connection within probe)
Brown	8 to 30V DC power supply (+ve)
Grey	Wiper (Probe sleep/Wipe)
Yellow	NTU Current Common
White	NTU Current Output

Subconn connection

The standard version of the NEP-9500 probes are Glanded cable connectors. Optional Subconn 6-pin marine connector are also available.



The Pinout configuration of the NEP-9500 is the following:



Subconn Pin Number	Meaning	Color
#1	Ground	Black
#2	Signal Output	White
#3	Power	Red
#4	Shield	Shield
#5	Signal Output	Orange
#6	Wiper	Blue

Surge and Lightning considerations

Surge and lightning protection may also have to be considered given that many installations are “in the wild”. It is important to note that the NEP-9500 series probes have the stainless steel casing terminated only to the cable shield. There is no electrical contact between the casing terminated only to the cable shield. There is no electrical contact between the casing and the probe electronics. The signal ground (4) and power ground (3) are electrically bound together within the probe.

6. DESCRIPTION

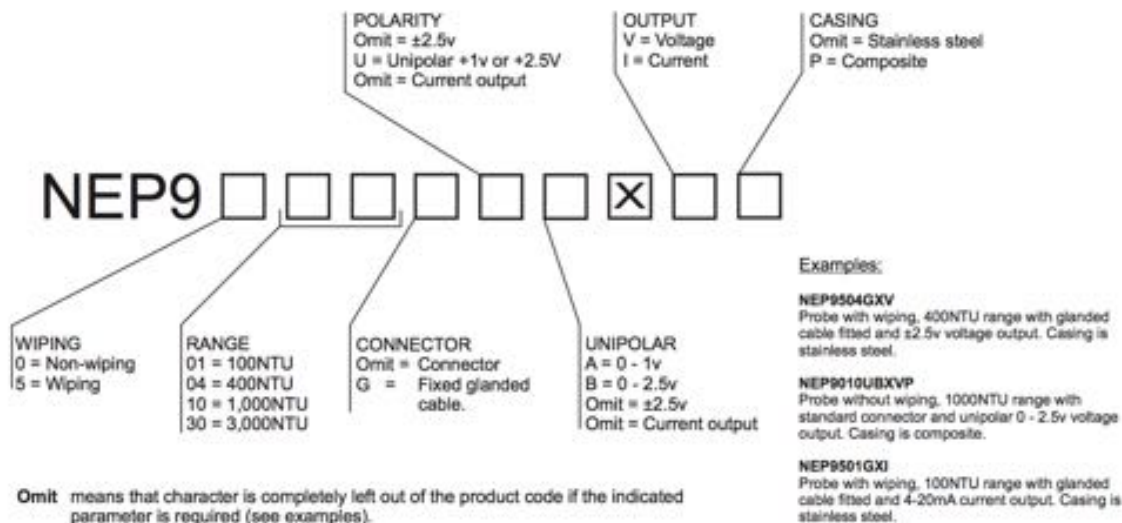
When the product is delivered, this is what you will find in the box:



Items found in the box		
Figure 1.1.	NEP-9500 Probe NEP-CBL-XX - Cable Length (XX) in meters to be specified at time of order	

Product identification

Each product code can be used to identify each product specification and determine which wiring must be used for the configuration as detailed in the examples below:



7. ACCESSORIES

Observator Instruments offers a wide range of accessories for NEP-9500 range of product directly available from the website:

Accessories		
Figure 2.1.	Case	
Figure 2.2.	Wiper replacement kit	
Figure 2.3.	Shroud NEP-9SHRD - Stainless protective shroud	

8. INSTALLATION

They are aspects to consider when preparing to install the ANALITE NEP-9500 series probes on the field:

1. Installation of the probe proper into the environment where measurements are to take place.
2. Physical cabling considerations.
3. Electrical cabling considerations.

Install the probe for the first time

The probe is normally installed with the optics pointing downwards (but not vertical) or in a horizontal alignment. In a simple application the probe is simply immersed into the water to the desired depth, but within the depth rating of the probe. Please note the depth rating is based on static water. Allowances must be made for the effect of flowing water to ensure the static depth rating is not exceeded. If the probe is to be installed downwards then it is recommended to install it a few degrees away from the vertical to allow bubbles to escape away from the optic face.

Probes with integrated wiping should be installed such that they can be easily retrieved from time to time to replace the wiper arm assembly. It is important that the optic end of the probe is kept clear of obstruction such as the river bed. The minimum distance between the optic head and any object should be 50mm (2").

The standard casing of the ANALITE NEP-9500 series probes are made of 6 stainless steel but the optic face is made of plastic materials and so should be protected from accidental scratching or abrasion. The wiper arm assembly should be replaced periodically to avoid abrasive material build-up in the pad that may eventually abrade the optic face. The optic face is partially protected from damage by the protruding castellation in the probe casing.

To avoid crevice corrosion on the 6 stainless steel casing in salt and acidic water deployments it is strongly recommended that the probe be thoroughly washed in clean water after deployment and prior to storage. Failure due to crevice corrosion is not covered under warranty. A composite cased version is available for corrosive and sea water environments but its pressure rating is limited to 30m.

If the probe is to be installed in a glanded fitting (for insertion into a pipe etc.) then care must be taken to ensure the sealing surface pressures offered by the gland fitting are not excessive so as to not cause distortion of the probe casing and force leakage. The ANALITE NEP-9500 series probes are thin wall instrument and so glanding pressure must be minimal and spread over the largest possible area. Do not cut or damage the outer sheath of the cable. Water may enter the probe through holes or cuts in the cable sheath. Where damage may occur due to river rocks striking or rolling over the probe body, a protective shroud should be used which can be made of simple PVC piping or stainless steel whichever the situation warrants. A shroud is available for the NEP-9500 as an accessory under the part number NEP-9SHRD. Such a shroud not only protects the probe but also assist in maintaining a minimum distance between probe optics and any local obstructions.

Physical cabling considerations

Cable normally supplied with the ANALITE NEP-9500 series probes is a specially selected PUR sheathed and screened cable selected for strength, chemical resilience and exceptional resistance to cuts, nicks and abrasion. The cable part number is NEP-CBL.

Nevertheless, care should be taken during the installation process of the probe and its cabling ensure that the cable is not subjected to persistent pulling, snagging abrasion or severe compression.

This is particularly important for the probes with fixed and glanded cable as any water penetration through the cable sheath may find its way into the probe proper affecting the accuracy of the readings and possibly causing irreparable damage.

For probes fitted with connectors, care must be taken to ensure the connectors are properly mated to ensure a seal yet not screwed together too tightly so as to make their disconnection difficult after a long deployment.

Prior to mating make sure both the probe and cable connectors are dry in the termination area otherwise erratic operation may occur due to moisture.

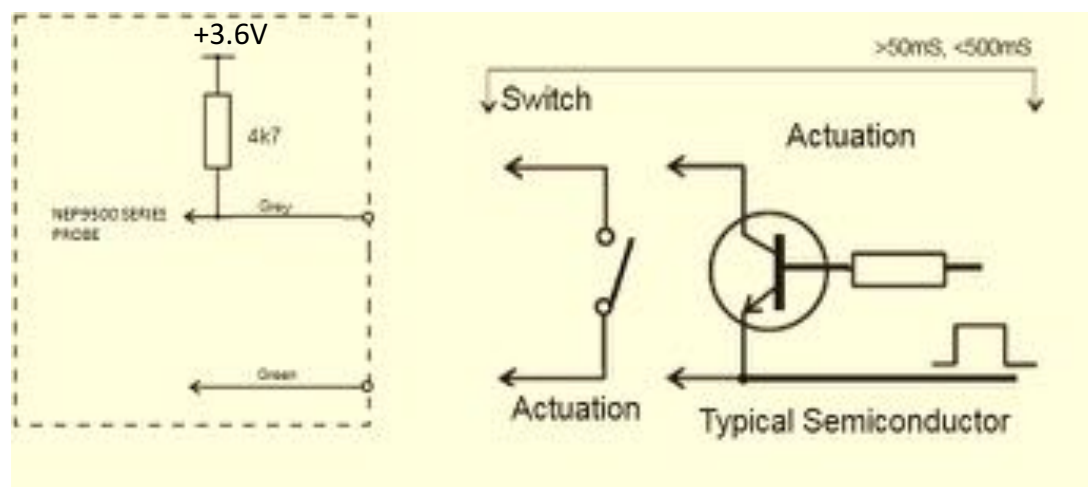
Miscellaneous

The wiper on the NEP-9500 probes can be actuated by momentarily connecting the Wipe conductor (5) to the Power Common conductor (0) for longer than 50msec.

This protocol can be implemented using a mechanical switch arrangement or open collector (drain) output available on most loggers. For multiple wipes each consecutive wipe must be actuated after the wiper has parked in its rest position (approx.. 8 seconds after a wipe actuation). Wipe pulses applied during a wipe action will be ignored.

Note: During the wipe period the NTU output will be held at the value measured just prior to the wipe (within 2%).

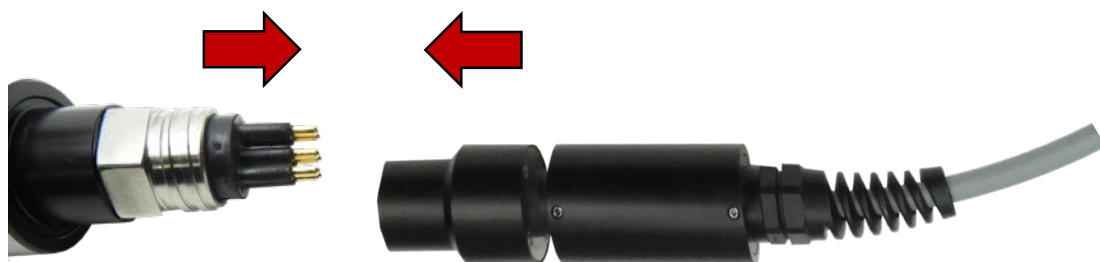
The recommended external wiper activation interface arrangements are shown schematically below:



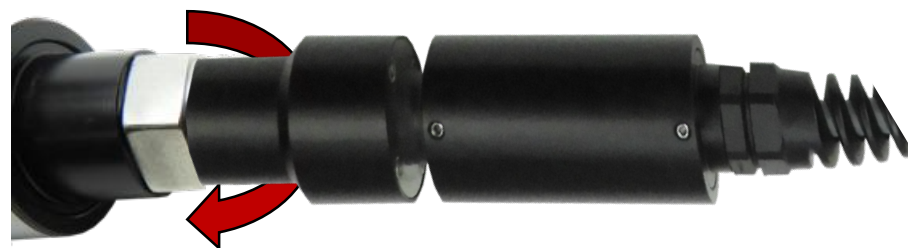
9. DEPLOYMENT

Installation

Installation instructions will vary depending on your project requirements. Typical example involves the use of an extension cable for Subconn connector Option which can be purchased separately. , Connect the Subconn Female extension cable to the probe according to the matching pin configuration as shown below:



Make sure the connector is sealed by screwing tight the connector.



Install the probe to the mounting location ready for deployment.



Deploy the probe

1. Start by **considering the environment of operation**: always operate wearing appropriate safety equipment in safe operation conditions.



2. The probe is normally installed with the optics **pointing downwards** (but not vertical) **or in a horizontal alignment**



3. In a simple application the probe **is simply immersed into the water** to the desired depth, but within the depth rating of the probe. Please note the depth rating is based on static water.



4. **Allowances must be made for the effect of flowing water** to ensure the static depth rating is not exceeded. If the probe is to be installed downwards then it is recommended to **install it a few degrees away from the vertical** to allow bubbles to escape away from the optic face.
5. Probes with integrated wiping should be installed such that they can be easily **retrieved from time to time to replace the wiper arm assembly**.
6. It is important that the **optic** end of the probe is **kept clear of obstruction** such as the river/sea bed. The minimum distance between the optic head and any object should be 50mm (2").

Be Careful: The standard casing of the NEP-9500 as well as the optic face is made of plastic materials and should be protected from accidental scratching or abrasion. The wiper arm assembly should be replaced periodically to avoid abrasive material build-up in the pad that may eventually abrade the optic face. The optic face is partially protected from damage by the protruding castellation in the probe casing.

If the probe body is to be installed in a glanded fitting (for insertion into a pipe, etc.) the care must be taken to ensure the sealing surface pressures offered by the gland fitting are not excessive so as to not cause distortion of the probe casing and force leakage. The NEP-9500 probes are thin wall instruments and so glanding pressure must be minimal and spread over the largest possible area. Do not cut or damage the outer sheath of the cable. Water may enter the probe through holes or cuts in the cable sheath. Where damage may occur due to river rocks striking or rolling over the probe body, a protective shroud should be used which can be made of simple PVC piping or stainless steel whichever the situation warrants. Such a shroud not only protect the probe but also assist in maintaining a minimum distance between probe optics and any local obstructions.

Retrieve the probe

Carefully pull the sensor out of water. Clean the sensor with fresh water and carefully dry the connector (blow air if necessary), then disconnect the cable from the connector. Store the probe in appropriate conditions.

10. MAINTENANCE

The new generation family of sensors can be fully configured and calibration using pc calibration software and calibration communication hardware. For more information, please refer to the analogue option of the NEP-5000 manual.

Wiper replacement

Note: This applies to the NEP-9500 versions only.

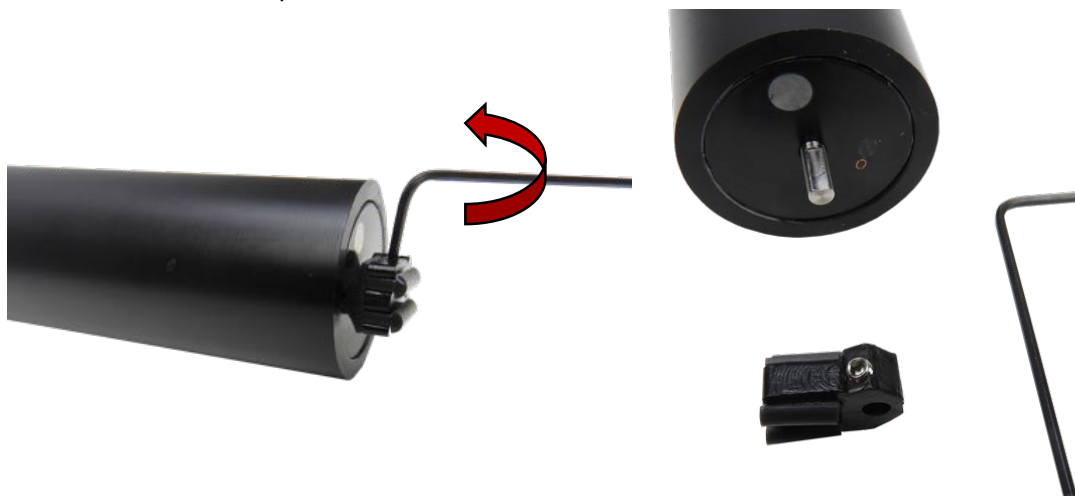
1. The effectiveness of the wiper in maintaining a clean optical surface will eventually be compromised, the time being dependent on the water under investigation and the number of wiping cycles carried out. We recommend periodic inspection of the wiper pad to determine if the material is deteriorating or is impregnated with material from bio-fouling. Normally the wiper should be replaced every 4 to 6 weeks of deployment. In addition, as a precaution we recommend changing the wiper prior each deployment. The wiper is a consumable item and a spare is provided with each NEP-9500 series probe along with a hex key to loosen and fasten the wiper set screw. Wiper packs containing four wipers and a hex key are available (Part Number NEP-9WIPE) as a standard accessory.



2. It is strongly recommended that the wiper be replaced prior to a new deployment. After a deployment, the wiper pad may dry out and the collected material adheres to the probe face. Operating the wiper under such conditions could then damage the internal mechanics. Such damage is not covered under warranty.



3. To change the wiper, loosen the set screw in the wiper arm until the wiper assembly can be removed from the wiper shaft.



4. Place a new wiper assembly on the shaft with the set screw aligned squarely with the flat on the wiping shaft. Gently press the wiper arm down until the wiper arm hits the stop of the shaft. The wiper pad should now be compressed to roughly one half its original thickness. Tighten the set screw – do not over tighten. It is important that the wiper arm does not make contact with the probe face – only the pad should be in contact. A gap of 0.5mm between the wiper arm and the optic face is typical when a new pad has been properly installed.



Note: It is imperative that the set screw be fastened squarely aligned onto the flat on the shaft otherwise proper operation will be affected.

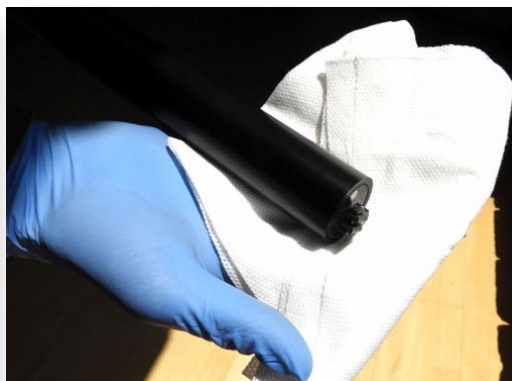
CAUTION: Do not over tighten the set screw or manually attempt to rotate the wiper arm once set onto the shaft. Any attempt to manually rotate the wiper may cause gearbox damage and void the warranty.



Cleaning the sensor

It is strongly recommended that the probe be thoroughly washed in clean water after deployment and prior storage. On the field, wash the probe with fresh water and clean it with a soft cloth.

In the office, we recommend to clean the sensor with isopropyl alcohol (available from grocery store) and dry the sensor with compressed air.



11. ELECTRICAL CONFORMITY

EC Declaration of Conformity according to Council Directive 89/336/EEC

We, Observator Instruments Pty. Ltd., declare under our sole responsibility that the product:

ANALITE NEP-9500 series of turbidity probes and accessories,

Manufactured by:

Observator Instruments Pty. Ltd.

To which this declaration relates, are in conformity with the protection requirements of Council Directives 89/336/EEC on the approximation of the laws relating to electromagnetic compatibility.

This Declaration of Conformity is based upon compliance of the product with the following harmonized standards:

Emissions:	EN50081-1:1992
Immunity:	EN50082-1:1997

Signed by:



Dana Galbraith – Managing Director

Date of Issue:	1 DECEMBER 2002
Place of Issue:	Observator Instrument Pty. Ltd. 8-10 Keith Campbell Court, PO Box 9039 Scoresby, VIC 3179 AUSTRALIA



12. SERVICE & SUPPORT COVERAGE



NEP-9500



Valid Warranty

Warranty on Analite products is one year.
See our Warranty and Terms and condition for details.



Telephone Technical Support

You can contact us any time about Technical Support.



Repair and Service Coverage

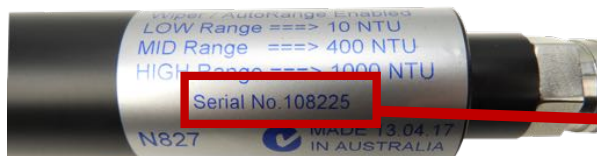
Please enquire about a maintenance program.

**If warranty or repair is required, please request an RMA
number at the Observator Website:**

<https://observator.com/en/support/rma-request>

You will need: 1. Your Serial Number (can be found on the probe sticker)

2. A valid E-Mail



S/N: 108-225

Warranty conditions

NEP-9500 probes are warranted against defects in material and workmanship for one year from date of warranty registration, exclusive of the wiper assembly. The **warranty does not cover the wiper arm assembly, corrosion or leakage due to corrosion. Unauthorized service, tampering or abuse will void this warranty. Damage as a result of improper installation will also void this warranty.**

Should you require service (under warranty or otherwise) please **contact Observator Instruments distributor from whom you purchased the probe, or our Service Centre.** If the probe is being returned for service under warranty, please supply proof of purchase and the Warranty document which has been emailed to you during the warranty registration.

All support enquiries must include:

1. The serial number of the probe labelled on the casing of the probe
2. The shipping address for probe returns

Contact & more information

Additional Information, including training video, this manual up-to-date and tutorials are available on our training page:

<http://download.observator.com/files/?dir=User manuals/NEP-9500>



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