90-degree turbidity with depth and temperature

180-degree backscatter turbidity

SDI12 BUS

Application note

NEP-5000 SDI-12 option Hydrospider Halytech logger

Document history

The Observator range is in continuous development and so specifications may be subject to change without prior notice. When in doubt about the accuracy of this document, contact the Observator Group.

Reference documents

Type of document / tool	Product type and name (incl. url)
Software	NEP-5000
CFG files	NEP-5000
Datasheet	NEP-5000
Manual	NEP-5000
Application notes	NEP-5000-SDI-12 option with Campbell logger
	NEP-5000-SDI-12 option for H-522+ & H-500XL loggers
	NEP-5000-SDI-12 option with Hydrospider logger
	NEP-5000-SDI-12, RS485 and analogue: wiper operations
	NEP-5000 multi-point calibration
	NEP-5000 firmware updating procedure
	Pressure calibration
	Shroud installation
	Temperature calibration
	Wiper replacement
Videos	NEP-5000

Revision history

Date	Amendments	Company, position
2019-03-06	Initial document creation	Observator Australia, Document Controller
2019-03-17	Added reference documents	Observator Australia, Document Controller
2019-04-12	Removed section "Advanced Operations"	Observator Australia, Document Controller
2019-07-03	Quality review	Observator Australia, Operation Manager
2020-01-30	Updated document format	Observator Australia, Document Controller
2020-03-08	Updated configuration section	Observator Australia, Document Controller
2022-10-09	Update video links	Observator Australia, Document Controller

Procedure sign-off:

Date	Company, position	Status
2019-03-09	Observator Australia, Document Controller	Finished
2019-12-06	Observator Australia, Managing Director	Approved
2020-03-05	Observator Group, Communication Officer	Approved

Distribution list

Date	Company, position

Summary

This document describes the integration of NEP-5000 family sensors with Hydrospider Halytech loggers using Serial Digital Interface SDI-12 protocol.

The NEP-5000 family of sensors offers a comprehensive list of functions using its build in SDI-12 interface. Configuration of the NEP-5000 sensor using its Personal Computer (PC) configuration software and implementation of Halytech software will be discussed for the following scenarios.

Chapter 3: "Basic operations"

- **Section 3.1**: "Simple reading of turbidity (general use)"

- **Section 3.2**: "Reading of turbidity using auto-range feature after an optical wipe (recommended option)"

Important note: All examples and procedures that are discussed in this document are best applied to firmware version C2.027 and above.

Important note: End users may request NEP-5000 settings from the factory according to above scenarios during the time of ordering.

Important Note: All sensor configurations that are described below require the user to connect to the sensor's calibration software. Please refer to NEP-5000 manual.

Table of contents

1 Wiring diagrams

This chapter describes the required wiring to connect Hydrospider loggers to your NEP-5000 turbidity probe using Serial Digital Interface SDI-12 communication protocol.

The Hydrospider has three connector groups on the right side of the case. The user will need to connect the Input/Output (I/O) and power to the NEP-5000 Probe and external power supply. The "Comms" connector will be connected to the computer (please refer to logger manual for complete installation instructions).
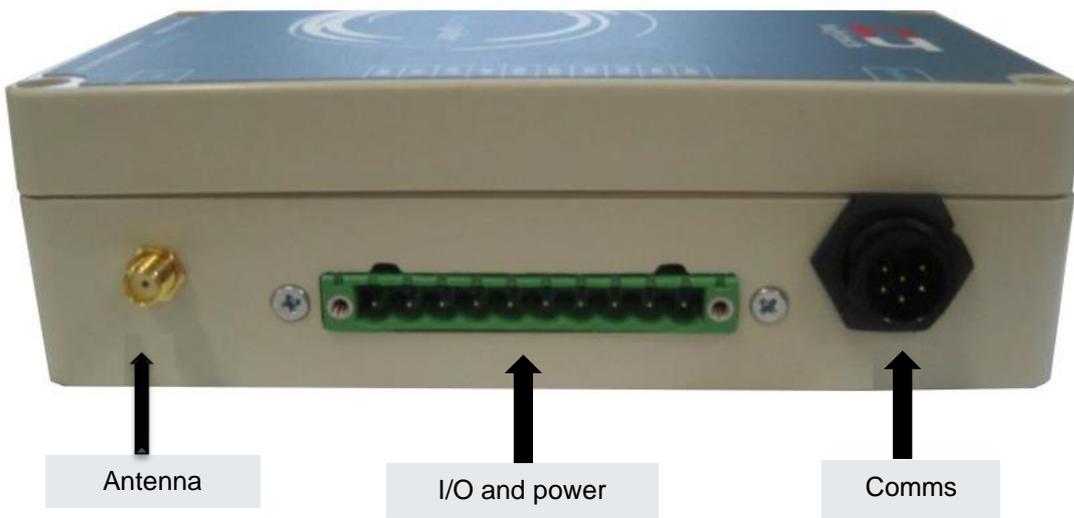
| Antenna | I/O and power | Comms |

GND	AIN1	DIN1	SDI-12	485+	485-	SWP	BATT	CHG	GND
GND Probe			SDI-12 Probe			12V Probe	12V Battery		GND Battery

Use the following NEP-5000 sensor wiring for the following scenarios.

Chapter 3: "Basic operations"

- **Section 3.1**: "Simple reading of turbidity (general use)"

- **Section 3.2**: "Reading of turbidity using auto-range feature after an optical wipe (recommended option)"

Advanced operations:

- Reading the statistical view of turbidity in a fixed period of time.
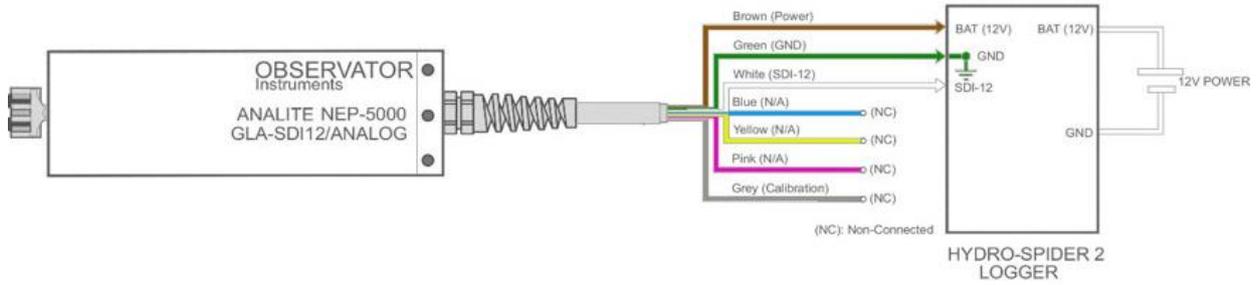
Figure 1.A: # Wiring Diagram WD8-A: SDI-12 (glanded)
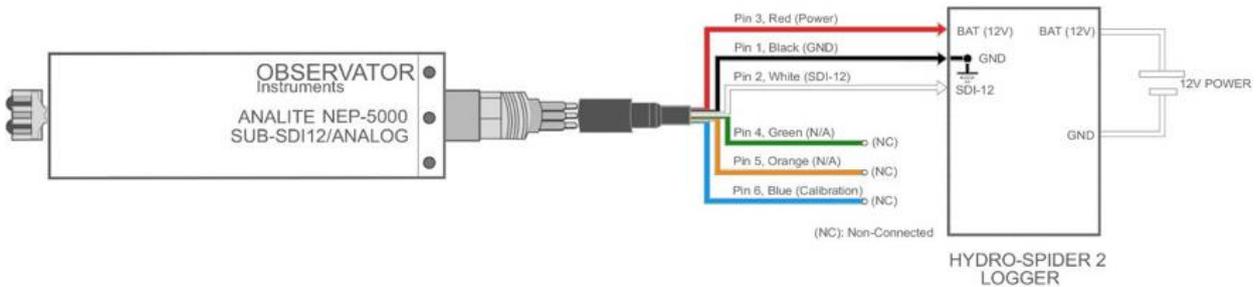
Figure 1.B: #WD7-A: SDI-12 (SubConn)

Note: Users experiencing higher voltage on the SDI-12 line (e.g. 6V instead of 5V), may require to place a 33k resistor between SDI-12 data and ground.

2   Configure Hydrospider

2.1.1   Logging instruction

1. Once powered and fully connected to your windows computer, disconnect your computer from all networks, wait 30 seconds and open a new browser (refer to **Chapter 1** for "Wiring diagrams").

2. Request the following address: http://192.168.0.177/

3. Enter your credentials:
    - Default username: **user**
    - Default password: **changeme**
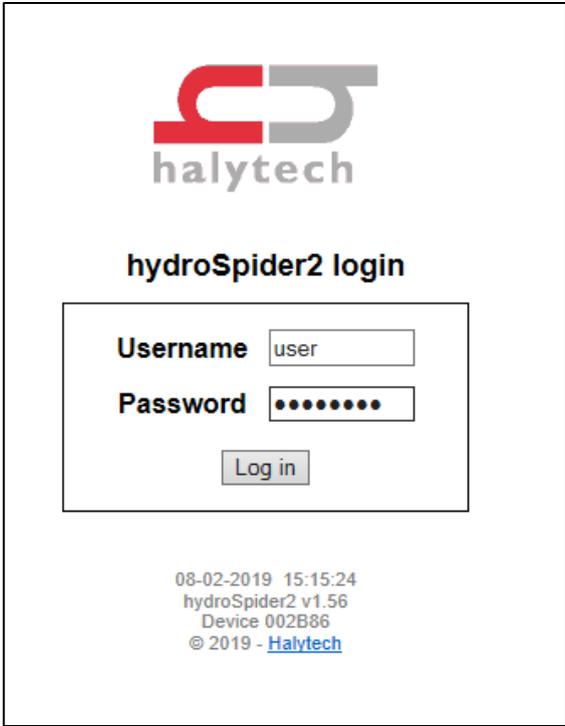
4. Access the "Change Setup" window and setup your "Location", "Time & Date", "User & Password":

Change Setup

Home >> Change Setup

Location — Time & Date
User & Password

Input Setup — Select Input to Calibrate
Controls — Select Alarm to Change

Network — Email
Reports — Twitter
Modem Diagnostics — Advanced

Manual Setup Management — Automatic Setup Management
Manual Software Upgrade — Automatic Software Upgrades
💾 Save setup to disk

↩ Exit change setup
Exiting setup will re-enable logging

Change Time and Date Settings

Time and Date		
Current date	20	02	2019
Current time	15	20	38	(hh:mm:ss) - 24 Hour
Time zone	+10 : 00	(Sydney is +10:00)

🕐 Set from computer

Time Synchronisation (NTP)	
Automatic NTP	☐
NTP server	time.google.com

🕐 Synchronise now

Note: daylight saving is not supported.

✕ Cancel   ✔ Save

Change User / Password

Administrator account	
Username	user
Password	changeme

The administrator account can be used to change and view setup.

Service account	
Username	service
Password	changeme

The service account can be used to perform tests and input calibration.

User account	
Username	user
Password	user

The user account can only be used to view setup.

✕ Cancel   ✔ Save

20-02-2019 15:21:03
hydroSpider2 v1.56
Device 002B86
© 2019 - Halytech

Change Location

Location	
Location (short)	Observator
Location (long)	

✕ Cancel   ✔ Save

20-02-2019 15:20:04
hydroSpider2 v1.56
Device 002B86
© 2019 - Halytech

3   Basic operations

3.1   Simple reading of turbidity (general use)

3.1.1   Setting up your NEP-5000 family turbidity sensor for simple turbidity readings (general use)

This setup requires users to have the following:

- NEP-5000 family sensor.

- NEP-5000 calibration module (calibration kit).
  Or request these settings during time of ordering.

- 12V Direct Current (DC) power supply.

- NEP-5000 user manual.

3.1.2   Mode of operation

The logger powers up the sensor using one of its power control switches and waits for the sensor (boot up time allowing total time of about twenty seconds to accommodate the power on wipe feature).

> Note: In this scenario the sensor will automatically carryout an optical clean (wipe) soon after boot up. Once the twenty seconds of boot up and wipe time has elapse, the logger issues a measure command (aM!) followed by read command (aD0!) to retrieve the newly measured turbidity value.

3.1.3   Use PC configuration software

The sensor configurations that is shown below requires users to connect to the sensor using its calibration software.

- Turbidity measuring range = Auto or desired single range.
  In calibration software under "Sensor Stage" > "Sensor calibration".

- Data acquisition time = 4 seconds or more if Auto range is selected or 2 seconds when single range is selected.
  In calibration software under "Output Stage" > "SDI-12 tab".

- SDI-12 address = 0 (Default) or any desired address.

- Communication protocol of the sensor = SDI-12.

To commit the above settings to permanent memory, please press 'set" followed by "save calibration".

- Wiper operation set to power on wipe.
  In calibration software under "Wiper Control".

3.1.4 Configure Hydrospider logger

In the "Change Input Setup" menu of the Hydrospider, set up a new SDI-12 input, called "Turbidity" as follows:
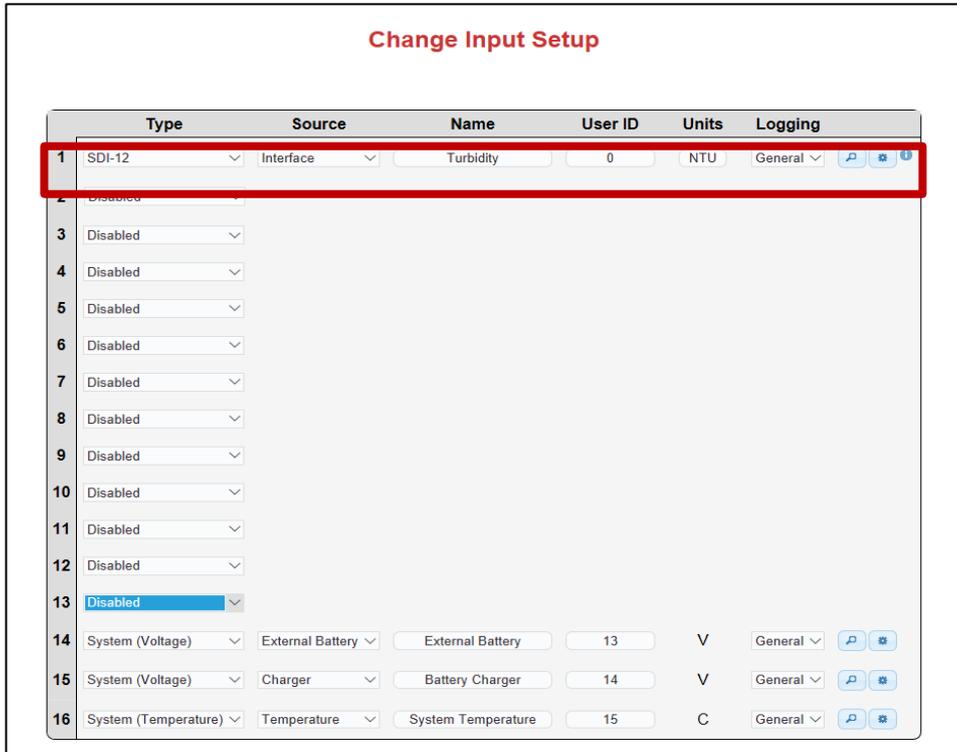
Select "Advanced Option" by clicking on the gearwheel icon and setup a measurement command "M" as follows and press "OK":
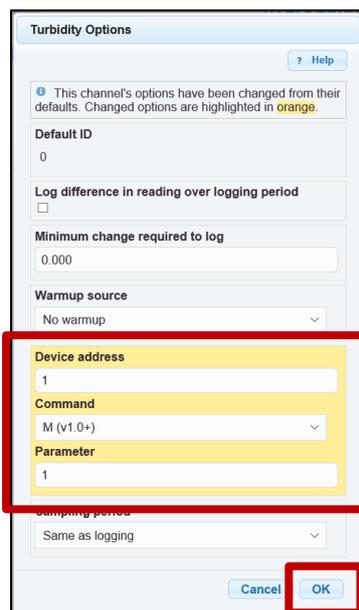
In the "Change Input Setup" menu of the Hydrospider, click on the "magnifying glass" icon to test your measurement command and check the turbidity value:
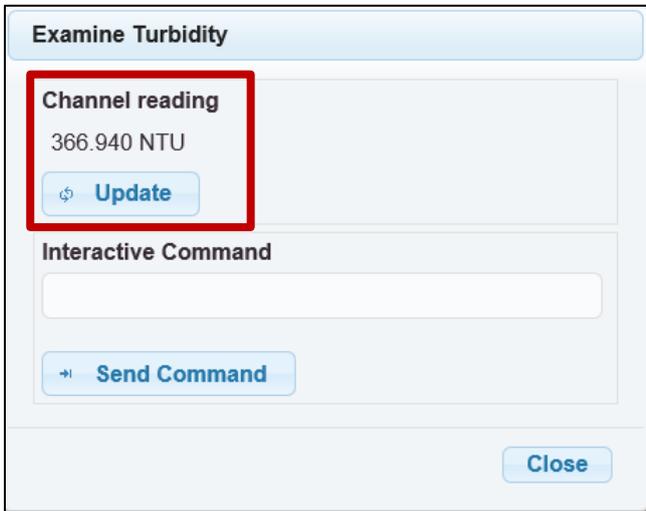
Examine Turbidity

Channel reading
366.940 NTU
↻ **Update**

Interactive Command

⇥ **Send Command**

Close

In the "Change Input Setup" menu of the Hydrospider, select the "logging interval" and "logging offset" period as required per your application:
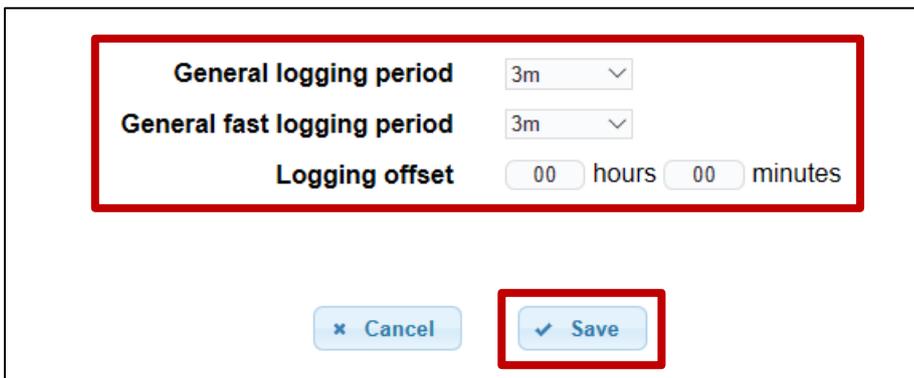
General logging period	3m ∨	
General fast logging period	3m ∨	
Logging offset	00 hours	00 minutes

✗ **Cancel**   ✓ **Save**

Note: You have successfully configured your measurement and wiping command and can go to the "View Input" menu of the Hydrospider, or check the logging history or use a "SDI-12 Verifier" to make sure each command has been set up properly.

View Inputs

Turbidity:	366.800 NTU	⟳ Update
External Battery:	12.027 V	⟳ Update
Battery Charger:	0.000 V	⟳ Update
System Temperature:	22.000 C	⟳ Update
		⟳ Update All

08-02-2019 15:17:36
hydroSpider2 v1.56
Device 002B86
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```
Nr SDI-12 Verifier (Monitor)

File  Configure  Mode  Transmit  Sensors  Hardware  Stop  Help

15:12:32 break:   16.0 ms
00:00:00.012 1M!10111

15:12:43 break:   16.1 ms
00:00:00.012 1D0!1+366.80
_
```
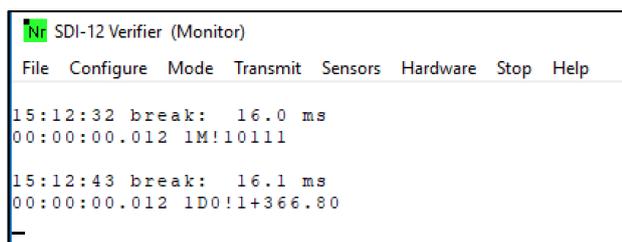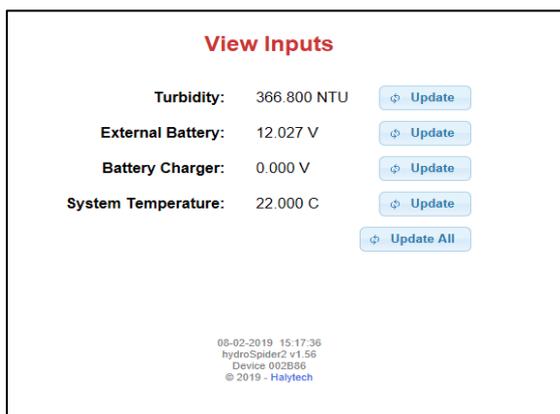
3.2 Reading of turbidity using auto-range feature after an optical wipe (recommended option)

3.2.1 Setting up your NEP-5000 family turbidity sensor for stable turbidity readings and allowing wiper to control via SDI-12

This setup requires users to have the following:

- NEP-5000 family sensor.

- NEP-5000 calibration module (calibration kit).
  Or request these settings during time of ordering.

- 12V DC power supply.

- NEP-5000 user manual.

3.2.2 Mode of operation

The logger powers up the sensor using one of its power control switches and waits for the sensor (boot up time of four seconds).

After the boot up delay has elapsed, the logger will send a SDI-12 wipe command (0M1!) followed by sixteen seconds of wipe completion delay. Once the wipe completion delay has elapsed, the logger issues a measure command (aM!) followed by the read command (aD0!) to retrieve the newly measured turbidity value.

3.2.3 Use PC configuration software

The sensor configurations that is shown below requires users to connect to the sensor using its calibration software.

- Turbidity measuring range = Auto or desired single range.
  In calibration software under "Sensor Stage" > "Sensor calibration".

- Data acquisition time = 4 seconds or more if Auto range is selected or 2 seconds when single range is selected.
  In calibration software under "Output Stage" > "SDI-12 tab".

- SDI-12 address = 0 (Default) or any desired address.

- Communication protocol of the sensor = SDI-12.

- Wiper operation set not to power on wipe (untick).
  In calibration software under "Wiper Control".

3.2.4 Configure Hydrospider logger

In the "Change Input Setup" menu of the Hydrospider, set up a new SDI-12 input, called "Wipe" as follows:
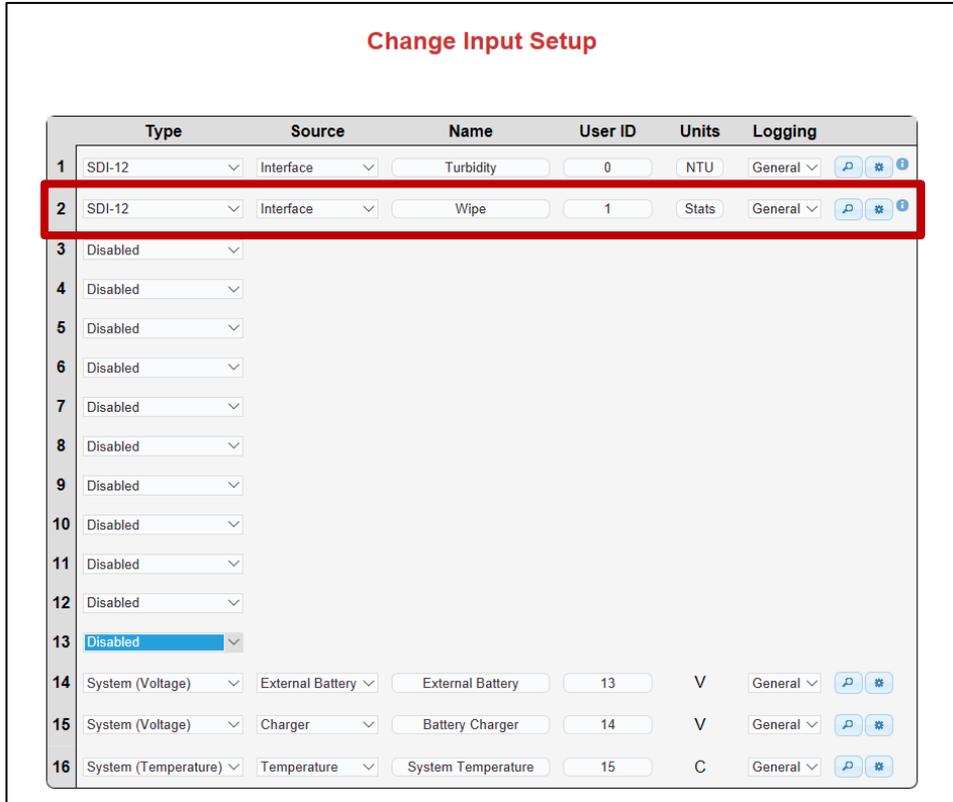
Select "Advanced Option" by clicking on the gearwheel icon and setup a wiping command "M1" as follows and press "OK":
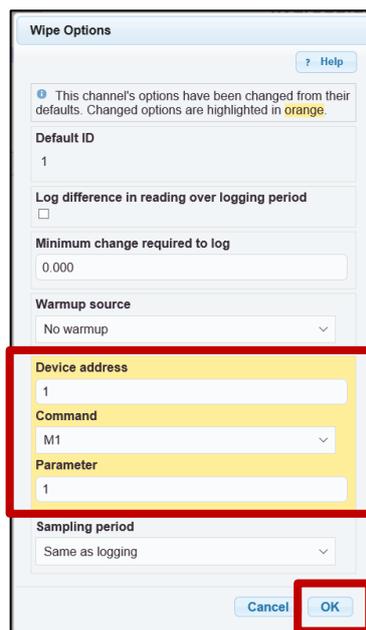
In the "Change Input Setup" menu of the Hydrospider, click on the "magnifying glass" icon to test your Wiping command and check if the sensor is wiping:

In the "Change Input Setup" menu of the Hydrospider, select the "logging interval" and "logging offset" period as required per your application:
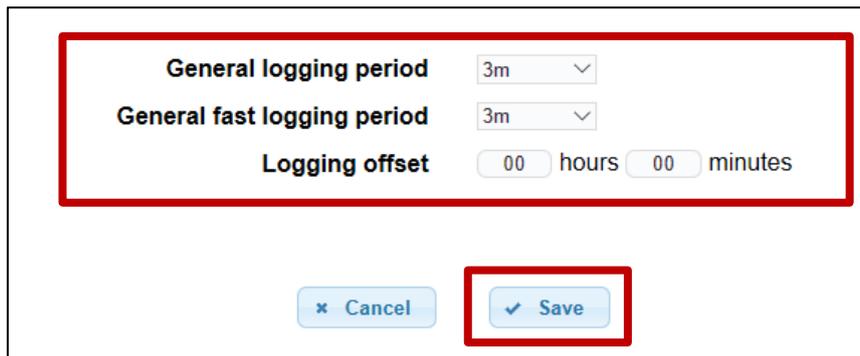
Note: You have successfully configured your measurement and wiping command and can go to the "View Input" menu of the Hydrospider, or check the logging history or use a "SDI-12 Verifier" to make sure each command has been set up properly.
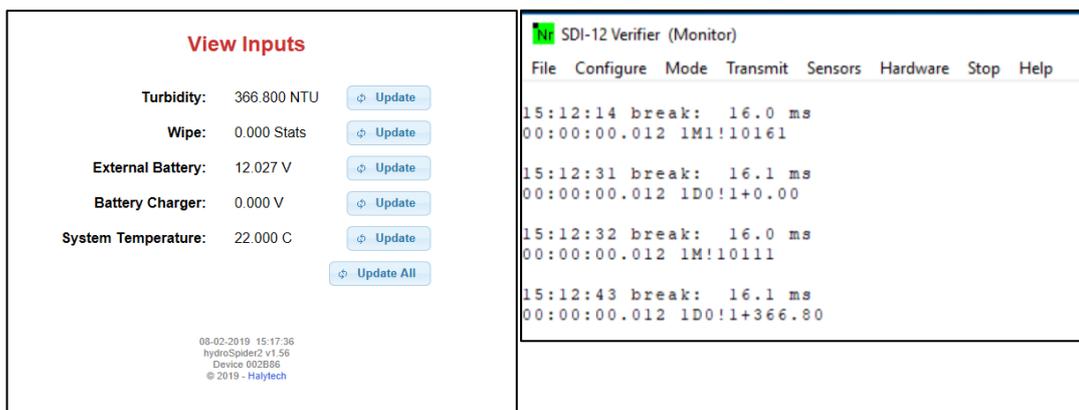
4   Check logging history

The user can check the logging history of the logger, in the "History" tab by clicking on "Get History":

The user will have access to the raw data and will need to manually extract the relevant information based on the "UserID" (refer to "UserID" selected in the "Change Input Setup" menu of the software):

Application note | NEP-5000 SDI-12 option Hydrospider Halytech logger
Status: Final | Not confidential

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