

Application note

NEP-5000 SDI-12 option Hydrospider Halytech logger

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Confidentiality: Not confidential

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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 Hydros spider 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 Hydros spider Halytech loggers using Serial Digital Interface SDI-12 protocol.

The NEP-5000 family of sensors offers a comprehensive list of functions using its built-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.

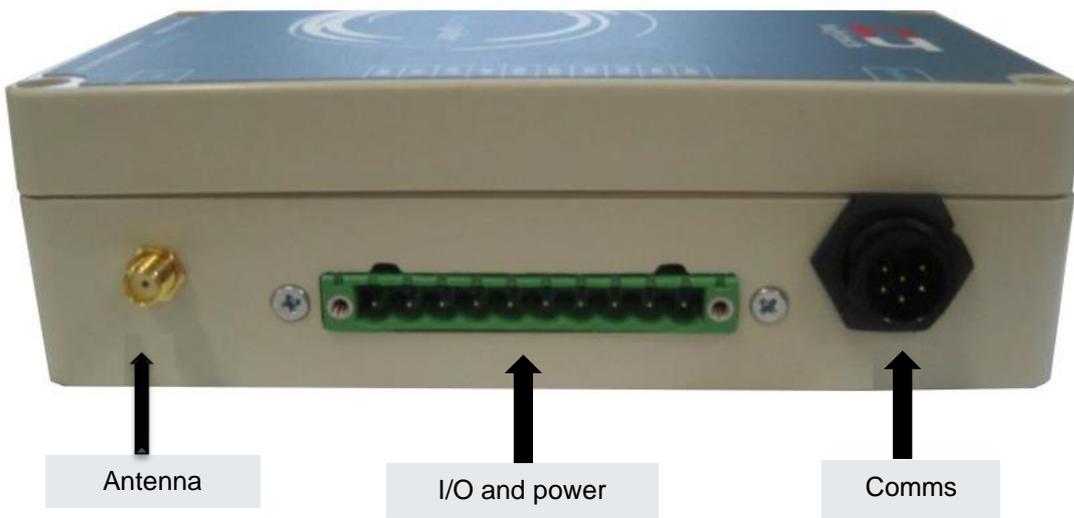
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1 Wiring diagrams

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

The Hydros spider 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).



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

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.

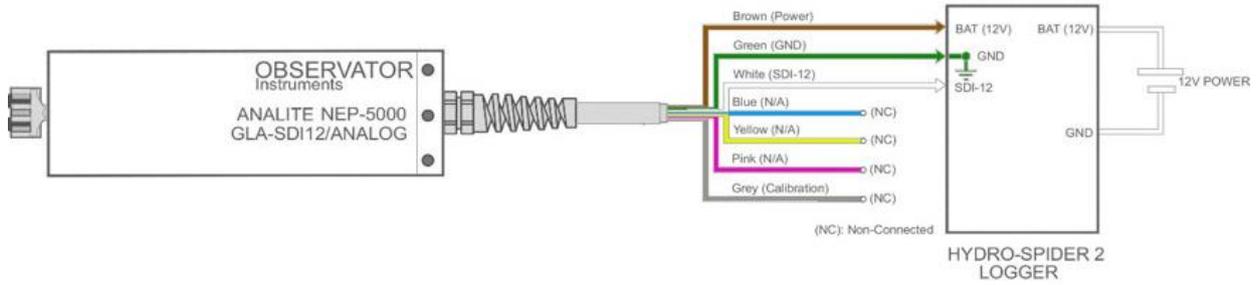


Figure 1.A: # Wiring Diagram WD8-A: SDI-12 (glanded)

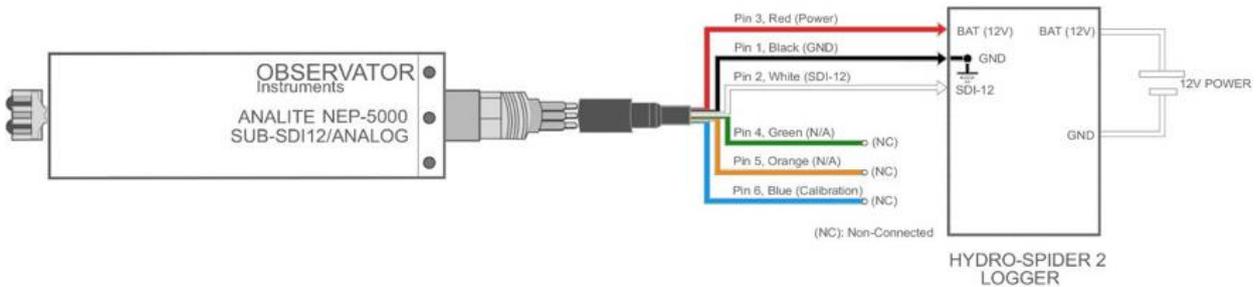


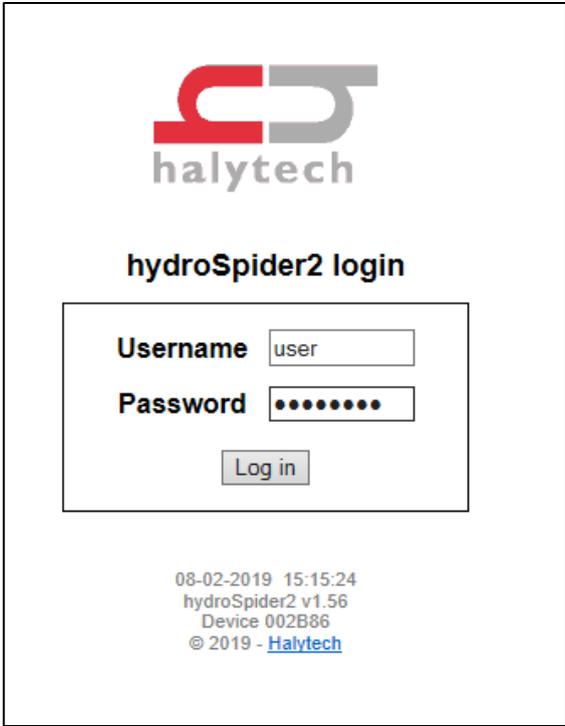
Figure 1.B: #WD7-A: SDI-12 (SubConn)

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 HydrosSpider

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**




halytech

hydroSpider2 login

Username

Password

08-02-2019 15:15:24
hydroSpider2 v1.56
Device 002B86
© 2019 - [Halytech](#)

4. Access the “Change Setup” window and setup your “Location”, “Time & Date”, “User & Password”:

The screenshot shows the 'Change Setup' main menu for the hydroSpider2 device. At the top, there is a navigation bar with 'Home >> Change Setup'. The main content area is titled 'Change Setup' and contains a grid of menu items: Location, Time & Date, User & Password, Input Setup (with a dropdown 'Select Input to Calibrate'), Controls (with a dropdown 'Select Alarm to Change'), Network, Email, Reports, Twitter, Modem Diagnostics, and Advanced. Below these are sections for Manual Setup Management and Automatic Setup Management, each with a 'Manual Software Upgrade' and 'Automatic Software Upgrades' option. At the bottom, there are buttons for 'Save setup to disk' and 'Exit change setup' (with a note: 'Exiting setup will re-enable logging').

The screenshot shows the 'Change Time and Date Settings' sub-menu. It has two main sections: 'Time and Date' and 'Time Synchronisation (NTP)'. The 'Time and Date' section includes fields for 'Current date' (20/02/2019), 'Current time' (15:20:38) with '(hh:mm:ss) - 24 Hour' label, and 'Time zone' (+10:00) with '(Sydney is +10:00)' label. There is a 'Set from computer' button. The 'Time Synchronisation (NTP)' section has an 'Automatic NTP' checkbox (unchecked) and an 'NTP server' field (time.google.com) with a 'Synchronise now' button. A note at the bottom states 'Note: daylight saving is not supported.' At the bottom of the screen are 'Cancel' and 'Save' buttons.

The screenshot shows the 'Change Location' sub-menu. It has a 'Location' section with two input fields: 'Location (short)' containing 'Observator' and an empty 'Location (long)' field. At the bottom are 'Cancel' and 'Save' buttons. A footer at the bottom of the screen displays: '20-02-2019 15:20:04 hydroSpider2 v1.56 Device 002B86 © 2019 - Halytech'.

The screenshot shows the 'Change User / Password' sub-menu. It contains three account configuration sections: 'Administrator account', 'Service account', and 'User account'. Each section has 'Username' and 'Password' input fields. The 'Administrator account' section has a note: 'The administrator account can be used to change and view setup.' The 'Service account' section has a note: 'The service account can be used to perform tests and input calibration.' The 'User account' section has a note: 'The user account can only be used to view setup.' At the bottom are 'Cancel' and 'Save' buttons. A footer at the bottom of the screen displays: '20-02-2019 15:21:03 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.

The image displays two alternative configurations for the Range Calibration software. The left configuration is for 'Auto-Range', where the 'Auto' radio button is selected under 'SET Operating Range'. Below this, a table defines three NTU ranges: 0 to 97 (Low), 103 to 995 (Medium), and 1005 to 3000 (High). The right configuration is for 'Single Range', where the 'High NTU' radio button is selected. It shows a 2-point calibration with 'ONTU (Input RAW)' of 156, 'TopEnd NTU (Input RAW)' of 3540, and a 'TopEnd NTU Value' of 3000. Both configurations show the 'OutPut Control' section with 'accusation time' highlighted by a red circle and a red arrow pointing to the 'Start Measurement (aM!) command data acquisition period' dropdown menu.

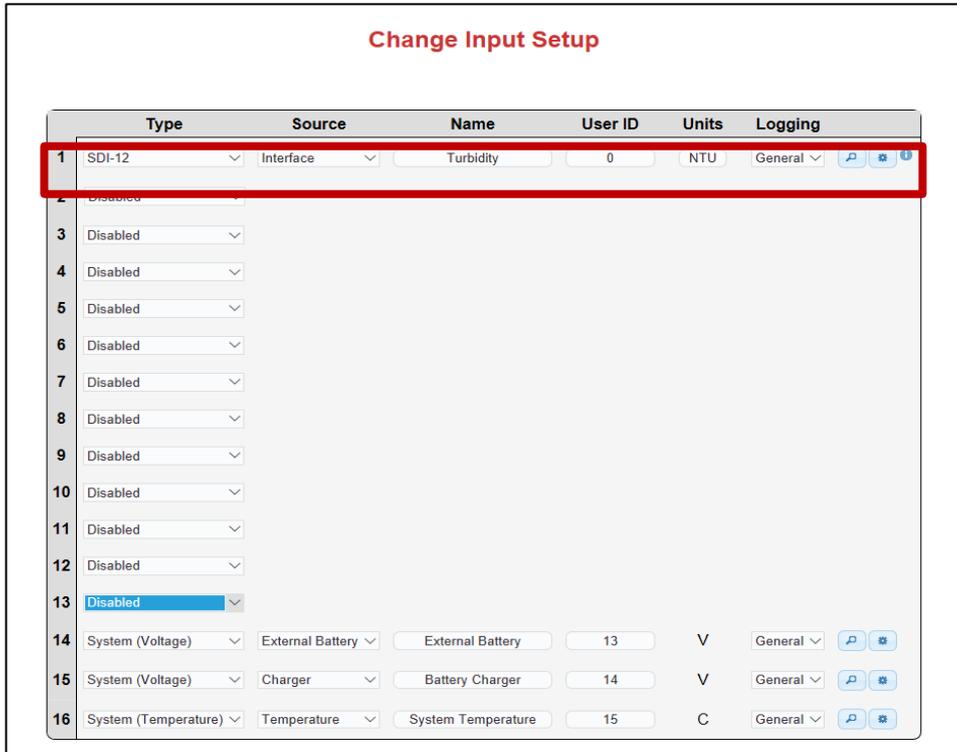
To commit the above settings to permanent memory, please press 'set' followed by "save calibration".

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

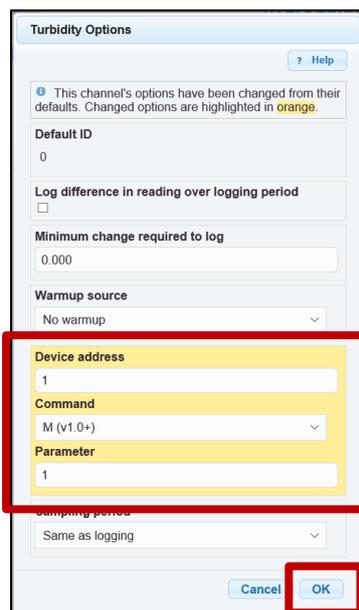
The screenshot shows the 'Wiper Control' tab of the calibration software. Under 'Wiping mode Set', 'Basic Motor Controls' is set to 'Single_direction_Wipe'. The 'Wiper Timeout' is set to 10. The 'Wipe On PowerUp' checkbox is checked and highlighted with a red box. Under 'Wiping Options', 'Wiper Option OR Autowipe(in seconds 60000max)' is set to 'OFF'. The 'Power On Raw Output(Analoge out)' field contains the value '0'. A 'SET' button is visible in the top right corner.

3.1.4 Configure HydrosSpider logger

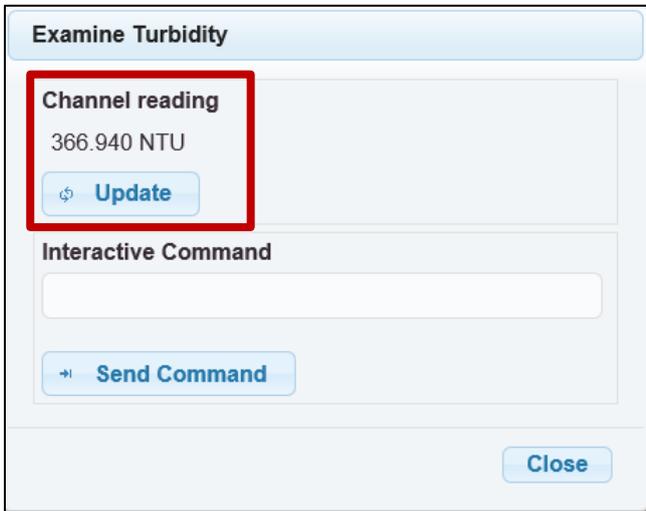
In the “Change Input Setup” menu of the HydrosSpider, set up a new SDI-12 input, called “Turbidity” as follows:



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 Hydrosponder, click on the “magnifying glass” icon to test your measurement command and check the turbidity value:

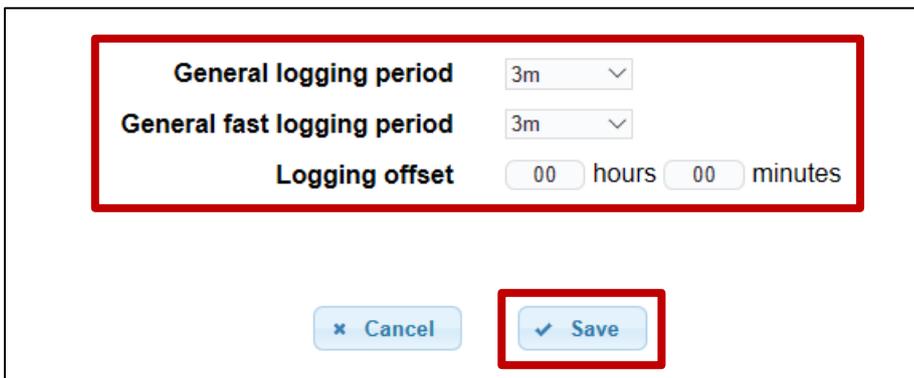


Examine Turbidity

Channel reading
366.940 NTU

Interactive Command

In the “Change Input Setup” menu of the Hydrosponder, select the “logging interval” and “logging offset” period as required per your application:

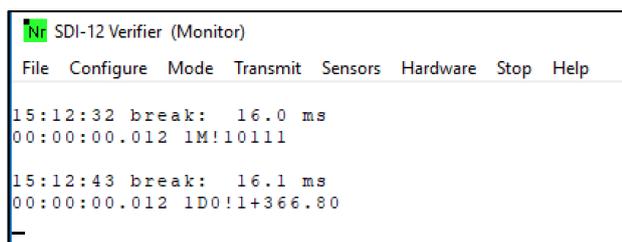
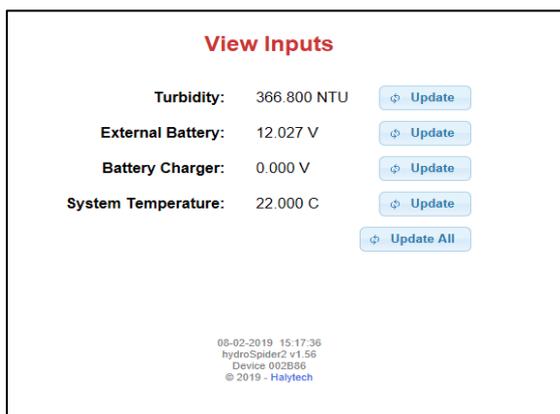


General logging period 3m

General fast logging period 3m

Logging offset 00 hours 00 minutes

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



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.

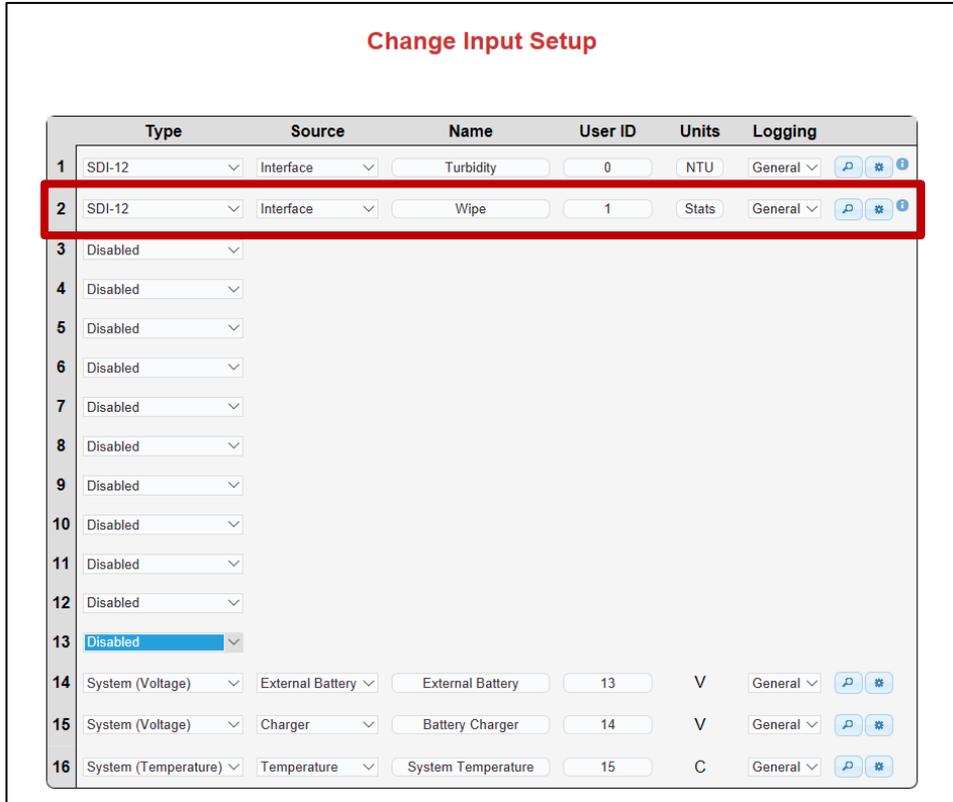
The image displays two alternative configurations for the calibration software. The left configuration shows the 'Range Calibration' window with 'Auto' selected under 'SET Operating Range'. Below this, a table of 'Range transition settings' is shown with values for Low, Medium, and High ranges. The 'OutPut Control' window shows 'SDI12' checked and 'accusation time' set to 2 seconds. The right configuration shows 'High NTU' selected under 'SET Operating Range'. The '2 point calibration' section shows values for ONTU (156), TopEnd NTU (3540), and TopEnd NTU Value (3000). The 'OutPut Control' window also shows 'SDI12' checked and 'accusation time' set to 2 seconds. A large 'OR' is placed between the two screenshots.

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

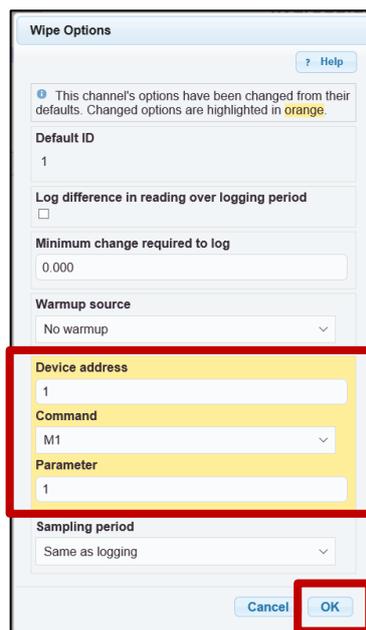
The screenshot shows the 'Wiper Control' tab in the calibration software. Under the 'Wiping mode Set' section, the 'Wipe On PowerUp' checkbox is highlighted with a red box and is currently unchecked. Other settings include 'Basic Motor Controls' set to 'Single_direction_Wipe', 'Wiper Timeout' set to 10, and 'Wiping Options' set to 'OFF'. The 'Power On Raw Output(Analoge out)' section shows an 'Analoge RAW out value' of 0.

3.2.4 Configure Hydrosponder logger

In the “Change Input Setup” menu of the Hydrosponder, set up a new SDI-12 input, called “Wipe” as follows:



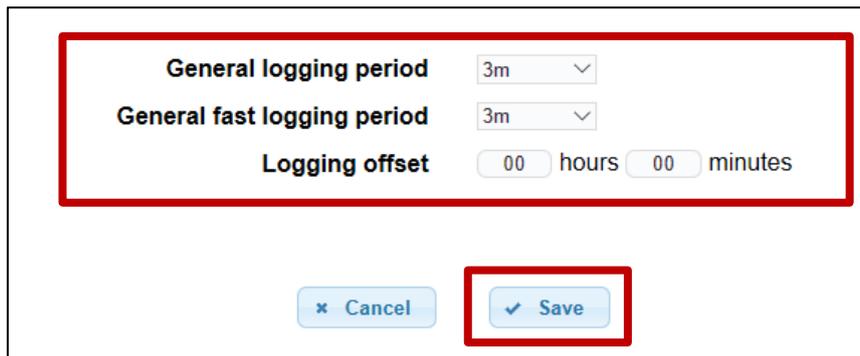
Select “Advanced Option” by clicking on the gearwheel icon and setup a wiping command “M1” as follows and press “OK”:



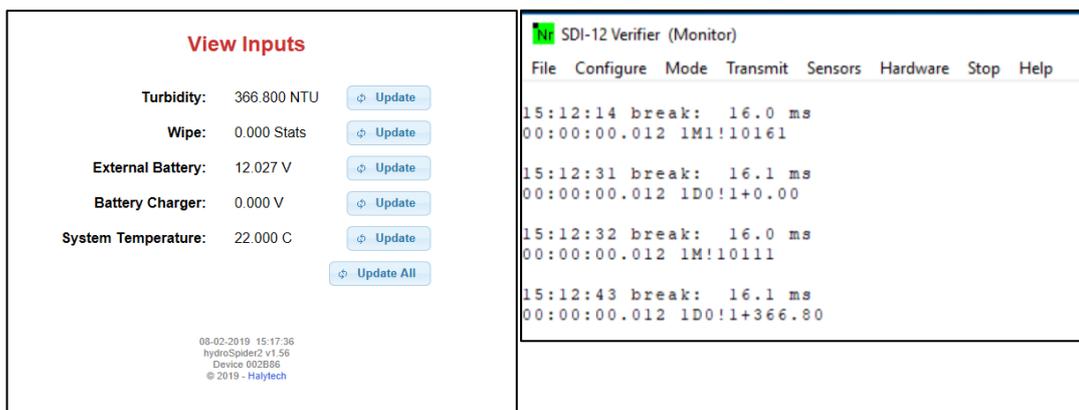
In the “Change Input Setup” menu of the HydrosSpider, click on the “magnifying glass” icon to test your Wiping command and check if the sensor is wiping:



In the “Change Input Setup” menu of the HydrosSpider, 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 HydrosSpider, 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):

	A	B	C	D	E
1	20/02/19	15:21:59	1	926	0
2	20/02/19	15:21:42	0	926	406.35
3	20/02/19	15:21:30	13	1517	12.027
4	20/02/19	15:21:30	15	1422	22
5	20/02/19	15:21:30	14	1521	0
6	20/02/19	15:21:29	1000	10001	EXITSETP
7	20/02/19	15:20:54	1000	301	CLKCHG
8	20/02/19	15:20:55	1000	300	CLKCHG
9	20/02/19	15:19:56	1000	301	CLKCHG
10	8/2/2019	15:25:11	1000	300	CLKCHG
11	8/2/2019	15:24:40	1000	10000	ENTRSETP
12	8/2/2019	15:24:13	0	926	406.58
13	8/2/2019	15:24:01	1	926	0
14	8/2/2019	15:24:00	13	1517	12.019
15	8/2/2019	15:24:00	15	1422	22
16	8/2/2019	15:24:00	14	1521	0

Date	Time	UserID	SecondaryID	Measured Value	
20/02/19	15:27:1	0	926	406.04	Turbidity
20/02/19	15:27:0	1	926	0	Wipe
20/02/19	15:27:0	13	1517	12.019	External Battery
20/02/19	15:27:0	15	1422	22	System Temperature
20/02/19	15:27:0	14	1521	0	Battery Charger
20/02/19	15:24:1	0	926	365.4	Turbidity
20/02/19	15:24:0	1	926	0	Wipe
20/02/19	15:24:0	13	1517	12.019	External Battery
20/02/19	15:24:0	15	1422	21.7	System Temperature
20/02/19	15:24:0	14	1521	0	Battery Charger

Change Input Setup

Type	Source	Name	User ID	Units	Logging
1	SDI-12	Interface	Turbidity	0	NTU General
2	SDI-12	Interface	Wipe	1	Stats General
3	Disabled				

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Since 1924 Observator has evolved to be a trend-setting developer and supplier in a wide variety of industries. Originating from the Netherlands, Observator has grown into an internationally oriented company with a worldwide distribution network and offices in Australia, Germany, the Netherlands, Singapore and the United Kingdom.