



## Application note

# NEP-5000 SDI-12, RS-485 and analogue wiper operations

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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	<a href="#">NEP-5000</a>
CFG files	<a href="#">NEP-5000</a>
Datasheet	<a href="#">NEP-5000</a>
Manual	<a href="#">NEP-5000</a>
Application notes	<a href="#">NEP-5000-SDI-12 option with Campbell logger</a>
	<a href="#">NEP-5000-SDI-12 option for H-522+ &amp; H-500XL loggers</a>
	<a href="#">NEP-5000-SDI-12 option with Hydros spider logger</a>
	<a href="#">NEP-5000-SDI-12, RS485 and analogue: wiper operations</a>
	<a href="#">NEP-5000 multi-point calibration</a>
	<a href="#">NEP-5000 firmware updating procedure</a>
	<a href="#">Pressure calibration</a>
	<a href="#">Shroud installation</a>
	<a href="#">Temperature calibration</a>
	<a href="#">Wiper replacement</a>
Videos	<a href="#">NEP-5000</a>

### Revision history

Date	Amendments	Company, position
2019-03-15	Initial document creation	Observator Australia, Document Controller
2019-03-17	Added reference documents	Observator Australia, Document Controller
2019-07-04	Quality review	Observator Australia, Operation Manager
2020-01-30	Updated document format	Observator Australia, Document Controller
2020-03-08	Updated summary section	Observator Australia, Document Controller
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### Procedure sign-off:

Date	Company, position	Status
2018-04-09	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 a list of optical cleaning functions for the NEP-5000 probe family.

The NEP-5000 family of sensors offers a comprehensive list of optical cleaning functions using its built-in wiper mechanism. Configuration of the NEP-5000 sensor using its Personal Computer (PC) configuration software will be discussed for the following scenarios.

### Chapter 1: “SDI-12 mode – wiping options”

- **Section 1.1:** “SDI-12 single direction wiping and reading wiper status”
- **Section 1.2:** “SDI-12 reverse directional optical wipe with auto reverse when jammed and reading wiper status”
- **Section 1.3:** “SDI-12 “Scrub wipe” with reverse direction when jammed and reading wiper status”

### Chapter 2: “Digital serial – wiping options”

- **Section 2.1:** “Polled mode wiping options”
- **Section 2.2:** “Free-flow mode wiping options including auto-wiping”

### Chapter 3: “Analogue mode – wiping options”

- **Section 3.1:** “Voltage and 4-20mA wiping options including auto-wiping”

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

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

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

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## 1 SDI-12 mode – wiping options

### 1.1 SDI-12 single direction wiping and reading wiper status

(Identical to NEP-395 wiper behaviour)

This mode provides single direction optical wipe action when invoked by an SDI-12 command (aM1!). After completion of the optical wiping action, the status will be available to read using standard SDI-12 data read command (aD0!). If the wiper gets stuck due to an obstruction, the sensor will simply cut the power to the after predetermine time-out (define by the user using PC configuration software) has elapsed.

When time-out occurs when the wiper is jammed, the wiper will stop on the spot (it will not try to park itself) and the status will be set to error (value =1).

#### 1.1.1 Reading optical wiper status

The value read using the SDI-12 (aD0!) will indicate 0 as if optical wiper manages to home and successfully park. Read as 1 if unable to park or time out. If this event occurred it is recommended not to take a turbidity measurement.

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.

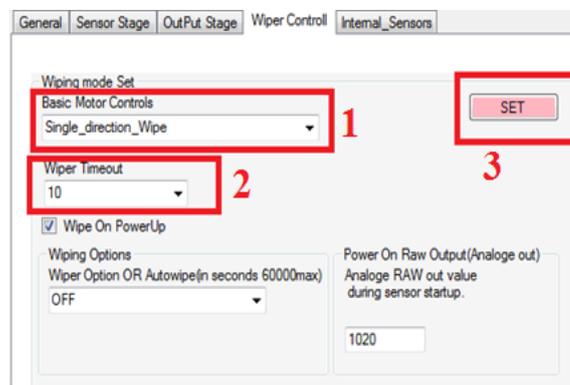
#### 1.1.2 Mode of operation

The logger sends (aM1!) command and waits an appropriate time requested by the sensor (response to (aM1!) by the sensor). Then read the optical wiper status by sending (aD0!). Once status data is loaded to the logged the user may analyse it prior to taking a reading.

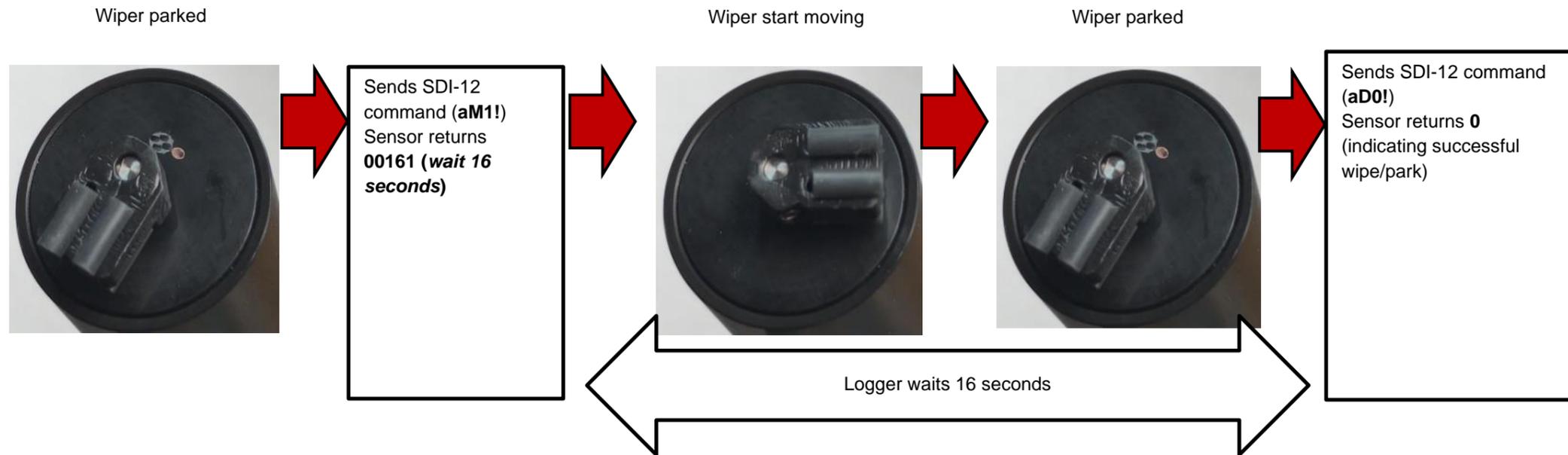
#### 1.1.3 Use PC configuration software

All of the sensor configurations that are shown below requires the user to connect to the sensor using its calibration software. Please refer to the NEP-5000 manual.

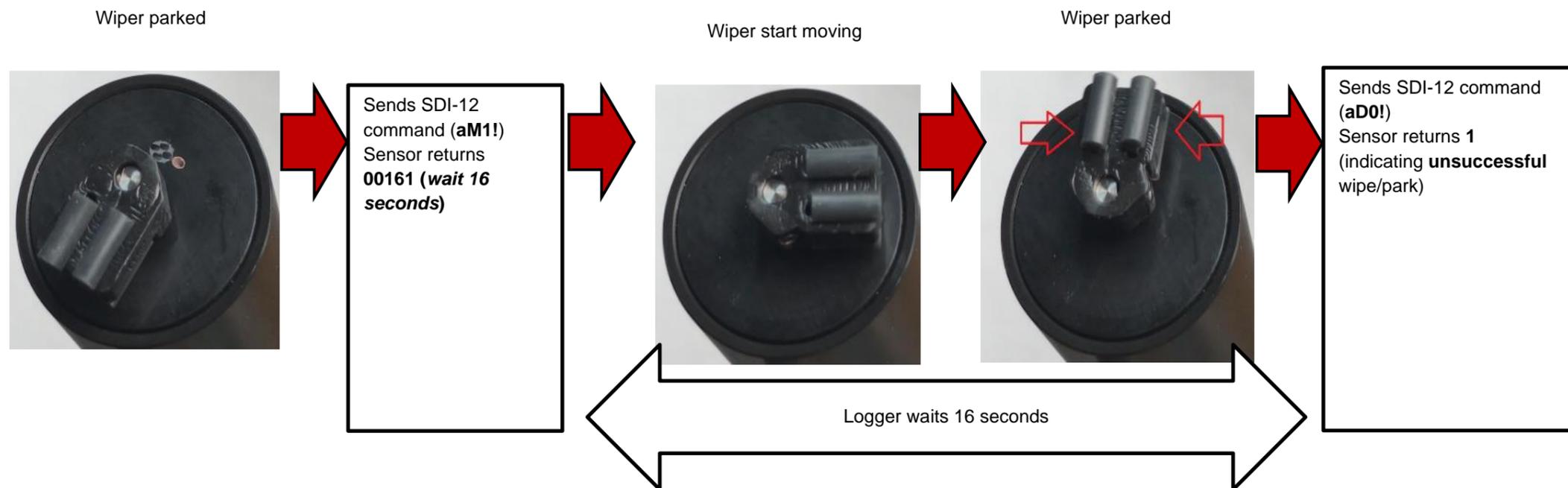
- Wiper mode = “Single\_direction\_Wipe”.  
In calibration software under “Wiper Control” > “Wiper mode set”.
- Wiper time out = 10 seconds.
- SDI-12 address = 0 (default) or any desired address.
- Communication protocol of the sensor = SDI-12.



1. Normal operation of the optical wiper not jammed.



2. Failure operation of the optical wiper (jammed).



## 1.2 SDI-12 reverse directional optical wipe with auto reverse when jammed and reading wiper status

This mode provides two directions optical wipe (wipe optics twice) action when invoked by an SDI-12 command (aM1!) and after completion of the optical wiping action the status will be available to read using standard SDI-12 data read command (aD0!). In an event when the wiper gets stuck due to an obstacle, the sensor will attempt to travel in the same direction until time out occurs. Then it automatically reverses the direction to the parking position and parks itself. Power cut out to the wiper and attempt period is defined using PC configuration software.

If the wiper is unable to park itself, the wiper status value =1 can be read as 1 using the (aD0!) SDI-12 command, all other events for the wiper status is read as 0.

### 1.2.1 Reading optical wiper status

The value read using the SDI-12 (aD0!) will indicate 0 as if optical wiper manages to home and successfully park. Read as 1 if unable to park or time out, if this event occurred it is recommended not to take a turbidity measurement.

This setup requires users to have 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.

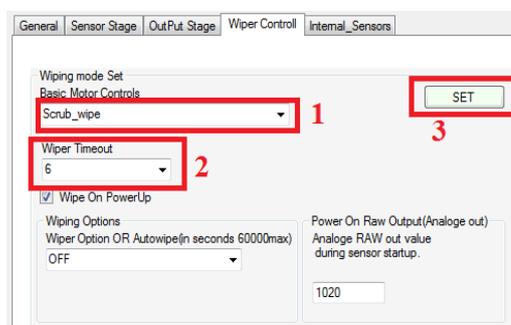
### 1.2.2 Mode of operation

The logger sends (aM1!) command and wait appropriate time requested by the sensor (response to (aM1!) by the sensor). Then read optical wiper status by sending (aD0!). Once status data is loaded to the logged the use may analyse it prior to taking a reading.

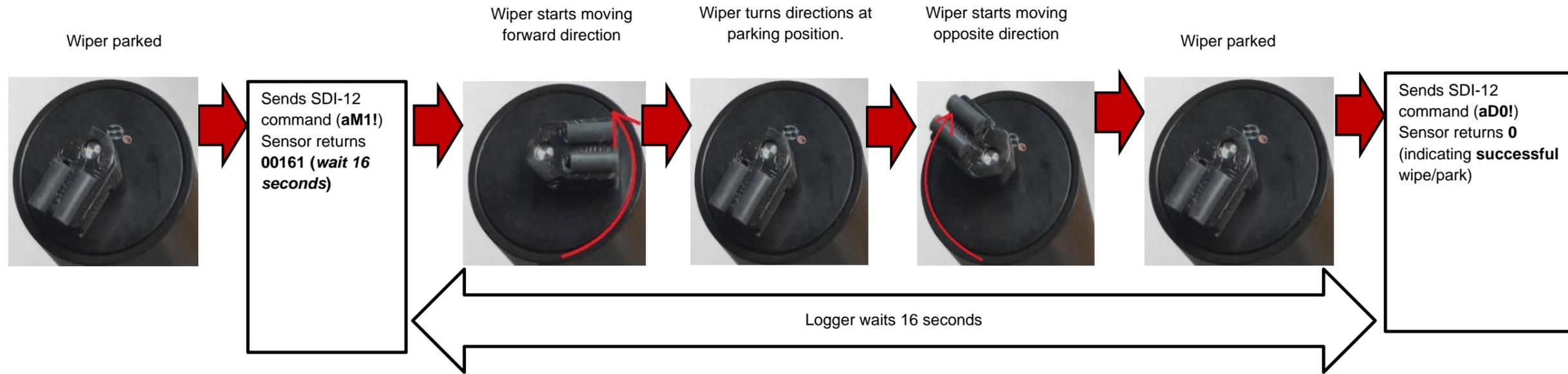
### 1.2.3 Use PC configuration software

All of the sensor configurations that shown below requires the user to connect to the sensor using its calibration software. Please refer to NEP-5000 manual.

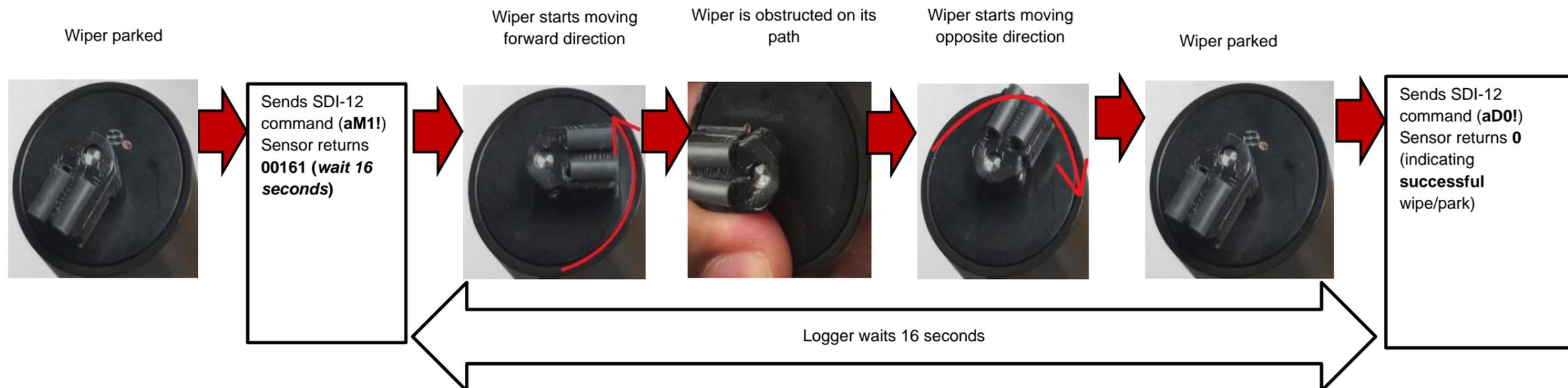
- Wiper mode = **“Return\_Wipe#1”**.  
In calibration software under “Wiper Control” > “Wiper mode set”.
- Wiper time out = **8 seconds**.
- SDI-12 address = 0 (default) or any desired address.
- Communication protocol of the sensor = SDI-12.



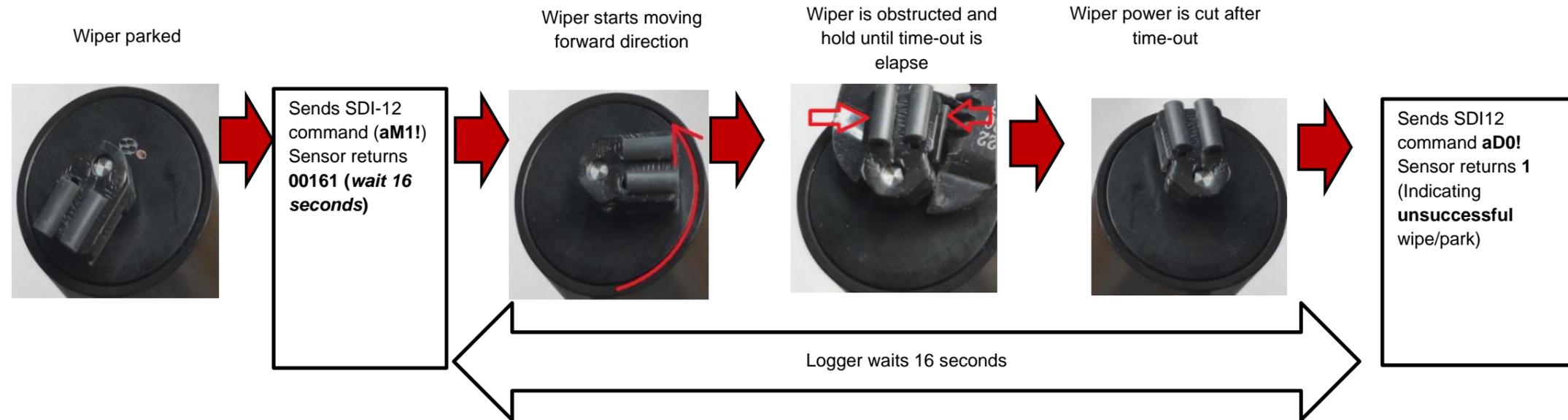
1. Reverse directional optical wipe with auto reverse when jammed and reading wiper status.



2. When wiper is obstructed when traveling.



3. When wiper is obstructed and hold when traveling.



### 1.3 SDI-12 “Scrub\_wipe” with reverse direction when jammed and reading wiper status

The “Scrub\_wipe” provides multiple wiper passes (scrubbing the optics) over the optics (five times) when invoked by an SDI-12 command (aM1!) and after completion of the optical wiping action the status will be available to read using standard SDI-12 data read command (aD0!). In an event of wiper gets stuck due to an obstetrical, the sensor will attempt to travel same direction until time out occurs then automatically reverse the direction to the parking position and park itself.

This type of wiping mode is ideal for high turbidity-based solutions or oil-based solutions.

In an event of wiper is unable to park itself the status value becomes 1. This value can be read using the SDI-12 command (aD0!) SDI-12 command, all other events the wiper status is read as 0.

#### 1.3.1 Reading optical wiper status

The value read using the SDI-12 (aD0!) will indicate 0 as if optical wiper manages to home and successfully park. Read as 1 if unable to park or time out, if this event occurred it is recommended not to take a turbidity measurement.

This setup requires users to have 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.

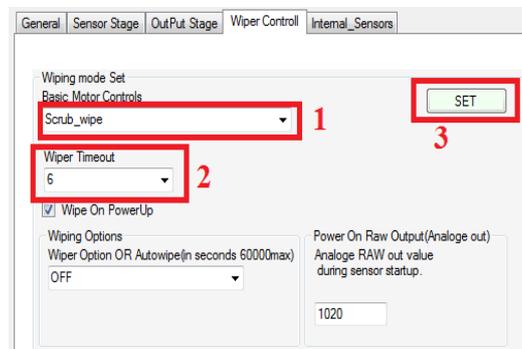
#### 1.3.2 Mode of operation

The logger sends (aM1!) command and wait appropriate time requested by the sensor (response to (aM1!) by the sensor). Then read optical wiper status by sending (aD0!). Once status data is loaded to the logged the use may analyse it prior to taking a reading.

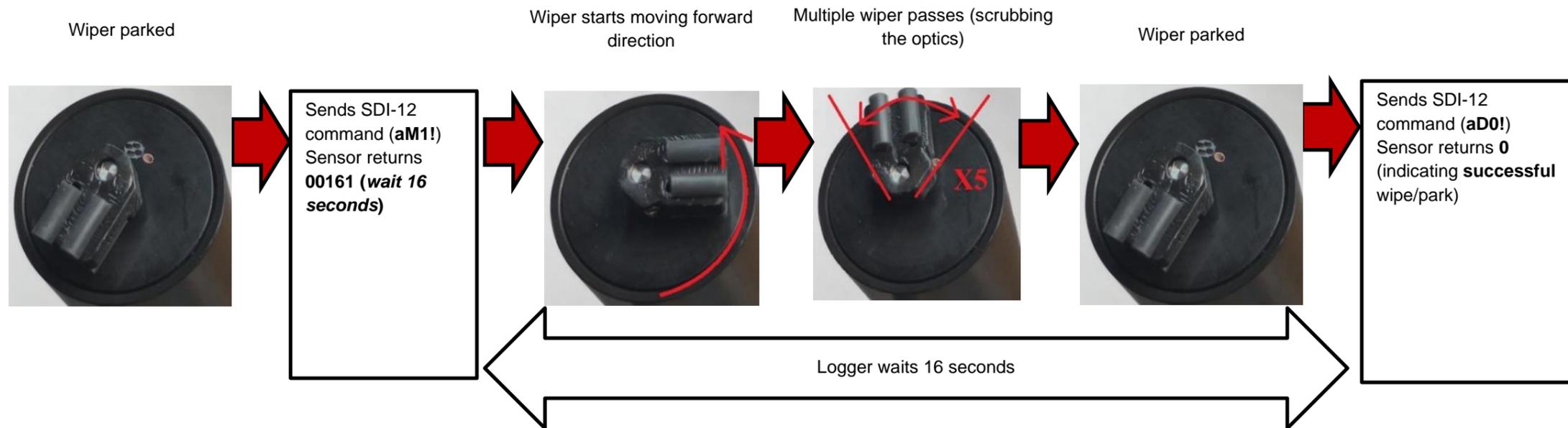
#### 1.3.3 Use PC configuration software

All of the sensor configurations that shown below requires the user to connect to the sensor using its calibration software. Please refer to NEP-5000 manual.

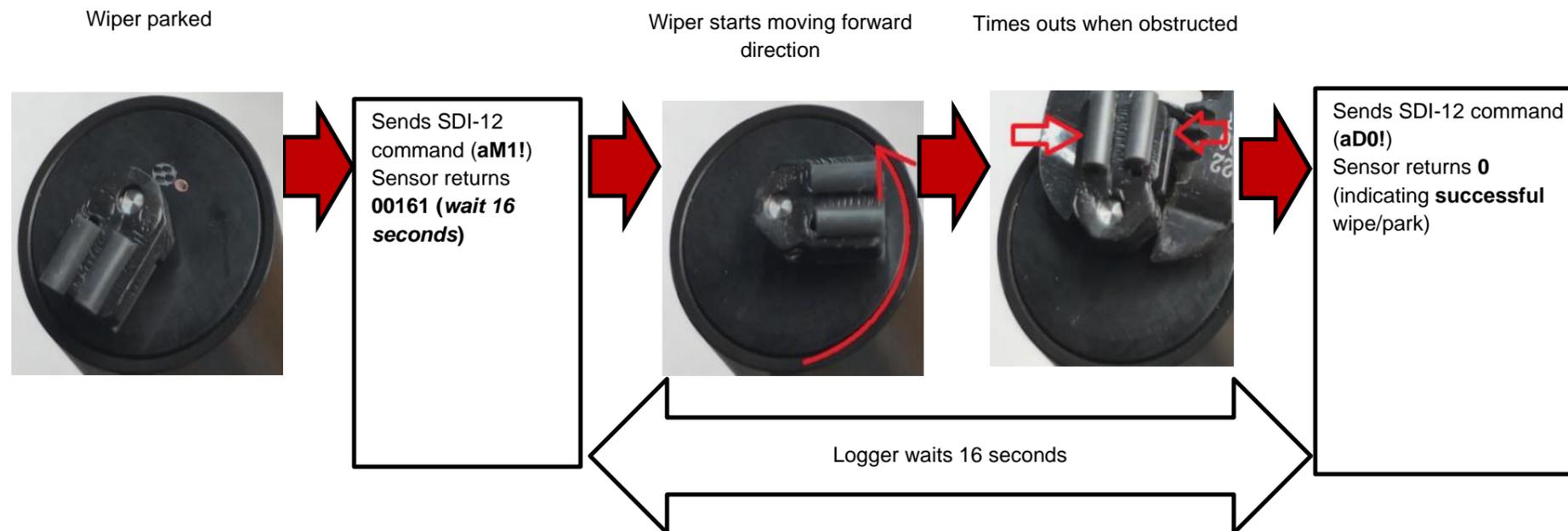
- Wiper mode = “Scrub\_wipe”.  
In calibration software under “Wiper Control” > “Wiper mode set”.
- Wiper time out = 6 seconds.
- SDI-12 address = 0 (default) or any desired address.
- Communication protocol of the sensor = SDI-12.



1. SDI-12 "Scrub\_wipe" with reverse direction when jammed and reading wiper status.



2. When wiper is obstructed and hold when traveling.



## 2 Digital serial – wiping options

### 2.1 Polled mode wiping options

When operating in digital serial polled mode via RS485, RS232 and TTL the following wiper options are available:

- Single direction wipe: Single pass over the optics and auto park. Wiper travels in single direction.
- Return wipe: Two pass over the optics and auto park. Wiper travels in two directions.
- Scrub wipe: Single pass and then 6 multiple passes over the optics and auto park. Wiper travels in two directions.

Wiping action can be invoked using “Sensor ID,wipe+0xD” command or using power on wipe option.

**Note:** The wiper status is not provided with this command set.

#### 2.1.1 Reading optical wiper status

This setup requires users to have the following:

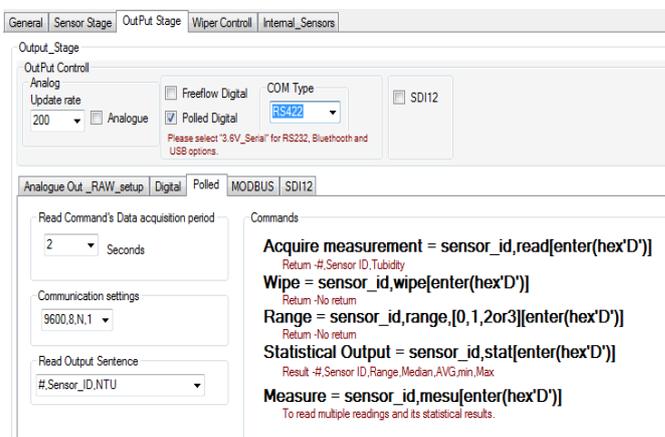
- NEP-5000 family sensor.
- NEP-5000 calibration module (calibration kit).  
Or request these settings during time of ordering.
- 12V DC power supply.
- NEP-5000 user manual.

#### 2.1.2 Mode of operation

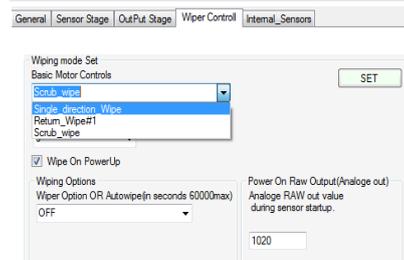
The logger or controlling PLC sends “Sensor ID,wipe+0xD” command to the sensor using RS485, RS232 or TTL interface and the sensor will execute requested wiping option selected by the PC software.

#### 2.1.3 Use PC configuration software

All of the sensor configurations that are shown below requires the user to connect to the sensor using its calibration software. Please refer to the NEP-5000 manual.



Wiper mode	Time out
Single_direction_Wipe	10 seconds
Return_Wipe	6 seconds
Scrub_Wipe	6 seconds



## 2.2 Free-flow mode wiping options including auto-wiping

In digital free-flow mode (automatic data streaming mode), the wiper can be activated periodically or during power up. The following wiping modes are available when selected using PC configuration software.

- Single direction wipe: Single pass over the optics and auto park. Wiper travels in single direction.
- Return wipe: Two passes over the optics and auto park. Wiper travels in two directions.
- Scrub wipe: Single pass and then 6 multiple passes over the optics and auto park. Wiper travels in two directions.

### 2.2.1 Reading optical wiper status

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.

### 2.2.2 Mode of operation

The logger or controlling Programmable Logic Controller (PLC) powers the sensor periodically and allows optical wipe time prior to logging (using power up wipe) the sensor data. Or the user may power up the sensor continuously and use the auto wipe option to activate the wiper.

### 2.2.3 Use PC configuration software

All of the sensor configurations that are shown below requires the user to connect to the sensor using its calibration software. Please refer to the [“NEP-5000 manual”](#).

Wiper mode	Time out
Single_direction_Wipe	10 seconds
Return_Wipe	6 seconds
Scrub_Wipe	6 seconds

### 3 Analogue mode – wiping options

#### 3.1 Voltage and 4-20mA wiping options including auto-wiping

In analogue mode (similar to digital free flow mode), the wiper can be activated by shorting the wiper wire to the Ground (GND) or during power up. Following wiping modes are available when selected using PC configuration software.

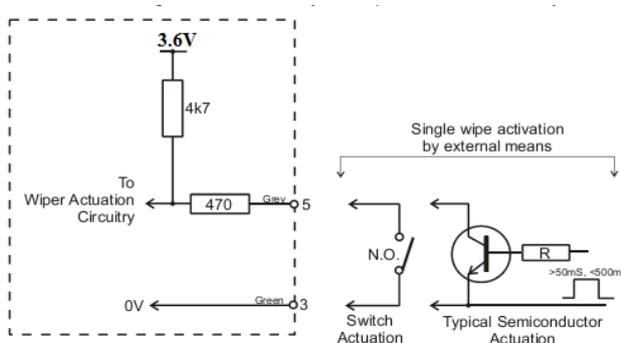
- Single direction wipe: Single pass over the optics and auto park. Wiper travels in single direction.
- Return wipe: Two pass over the optics and auto park. Wiper travels in two directions.
- Scrub wipe: Single pass and then six multiple passes over the optics and auto park. Wiper travels in two directions.

##### 3.1.1 Reading optical wiper status

Methods of triggering the wiper using dedicated wiper wire by shorting to the power GND.

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.



##### 3.1.2 Mode of operation

The logger or controlling PLC powers the sensor periodically and allows optical wipe time prior to logging (using power up wipe) the sensor data over the analogue channel. Or the user may power up the sensor continuously and use the auto wipe option to activate the wiper.

##### 3.1.3 Use PC configuration software

All of the sensor configurations that are shown below requires the user to connect to the sensor using its calibration software. Please refer to the NEP-5000 manual.

Wiper mode	Time out
Single_direction_Wipe	10 seconds
Return_Wipe	6 seconds
Scrub_Wipe	6 seconds

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