Application note

NEP-5000 multi-point calibration

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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-SDI12 option with Campbell logger
	NEP-5000-SDI12 option for H-522+ & H-500XL loggers
	NEP-5000-SDI12 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

Revision history

Date	Amendments	Company, position
2019-03-17	Initial document creation	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

Procedure sign-off:

Date	Company, position	Status
2019-03-17	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 multi-point calibration process for the NEP-5000 probe family.

Calibrators should complete the 2-point calibration as described in the <u>NEP-5000 manual Chapter - "Turbidity calibration"</u> prior starting the following steps.

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 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 "<u>NEP-5000 manual</u>".

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1   Starting multi-point calibration

1.1   Setup

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.

1.2   Complete the 2-point calibration

Please complete the 2-point calibration prior to undertaking the multi-point calibration. Refer to the NEP-5000 manual Chapter "Turbidity calibration".

1.3   Complete the multi-point calibration

Note: This is only needed, when the highest low-range is greater than 10NTU. For example, if the highest low range is 100NTU, then 10NTU, 40NTU solutions are needed.

1. Select "LOW NTU" range and "Set", tick "3rd calibration or higher point calibrations" box and "start".
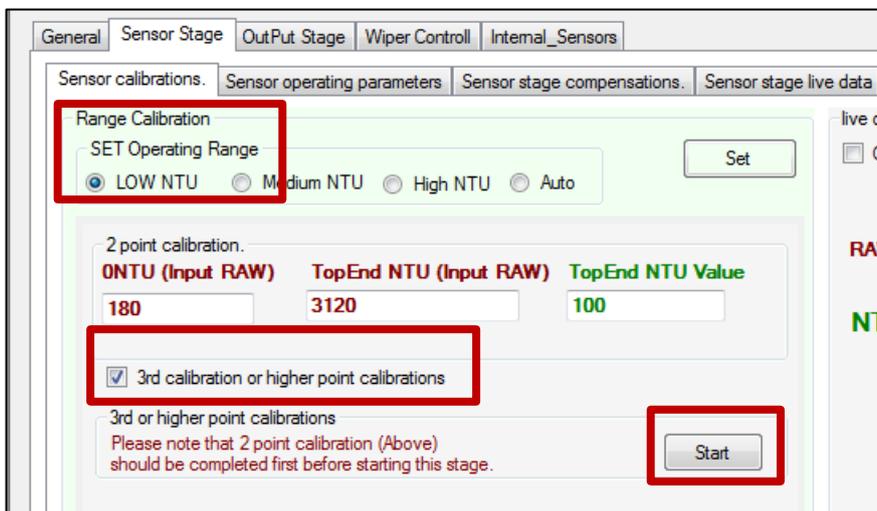
2. From the calibration program, make sure the "Calibration point (Solution's NTU value)" matches with the solution that needs to be calibrated, otherwise change it accordingly to calibration reference solution NTU value (e.g. "10NTU").
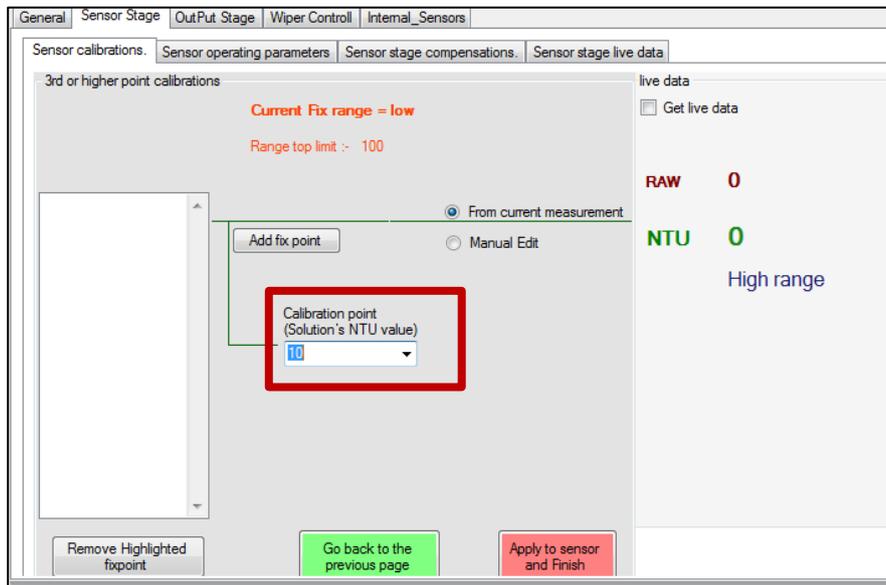
3. Tick "Get live data" to read the NTU solution, then, un-tick it when the reading is stabilized. Click "Add fix point", you should observe the NTU reading transferred to the multipoint fix point. Finally, select "Go back to previous page".
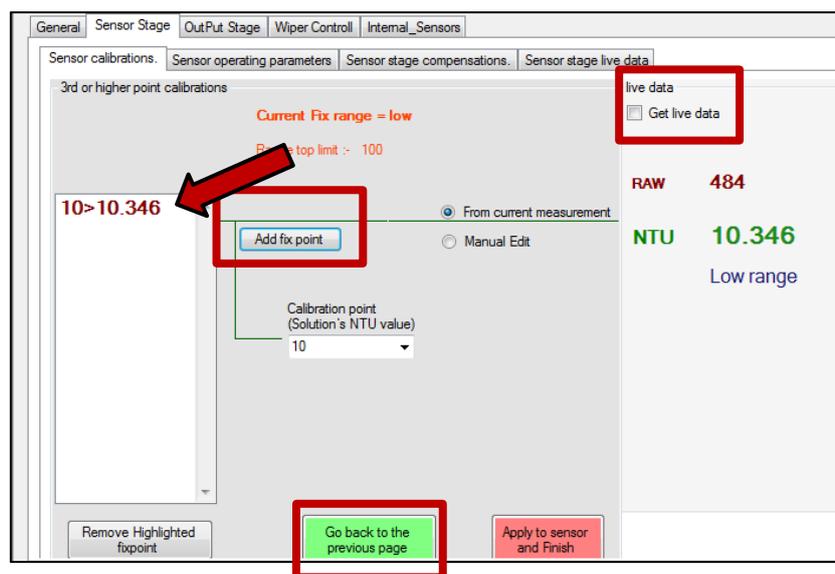
4. Select "Medium NTU" range and "Set" (e.g. "1,000NTU mid-range").
Tick "3rd calibration or higher point calibrations" box and "start".
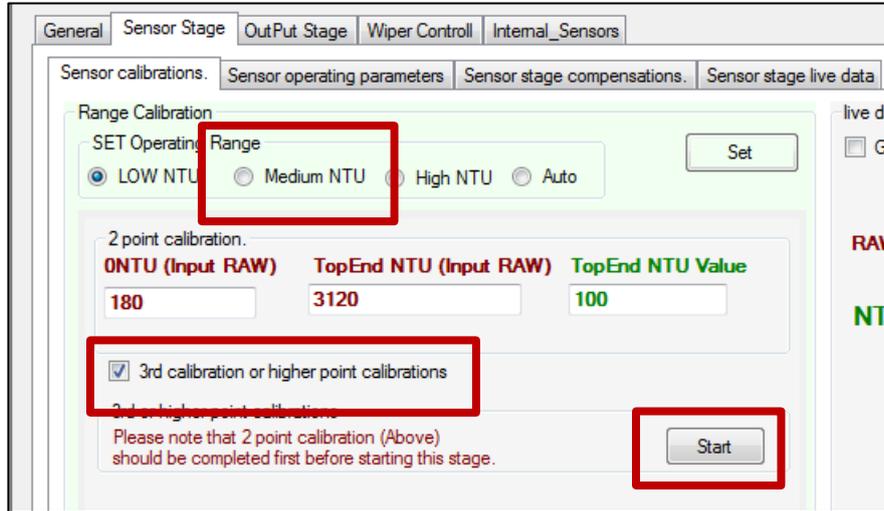
5. From the calibration program, make sure the "Calibration point (Solution's NTU value)" matches with the solution that needs to be calibrated, otherwise change it accordingly to calibration reference solution NTU value (e.g. still "10NTU").
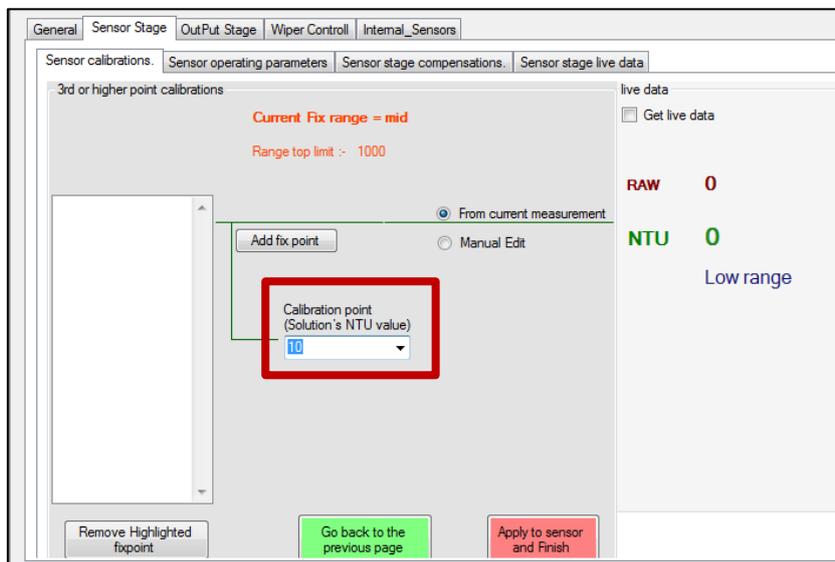
6. Tick "Get live data" to read the NTU solution, then, un-tick it when the reading is stabilized. Click "Add fix point", you should observe the NTU reading transferred to the multipoint fix point. Finally, select "Go back to previous page".
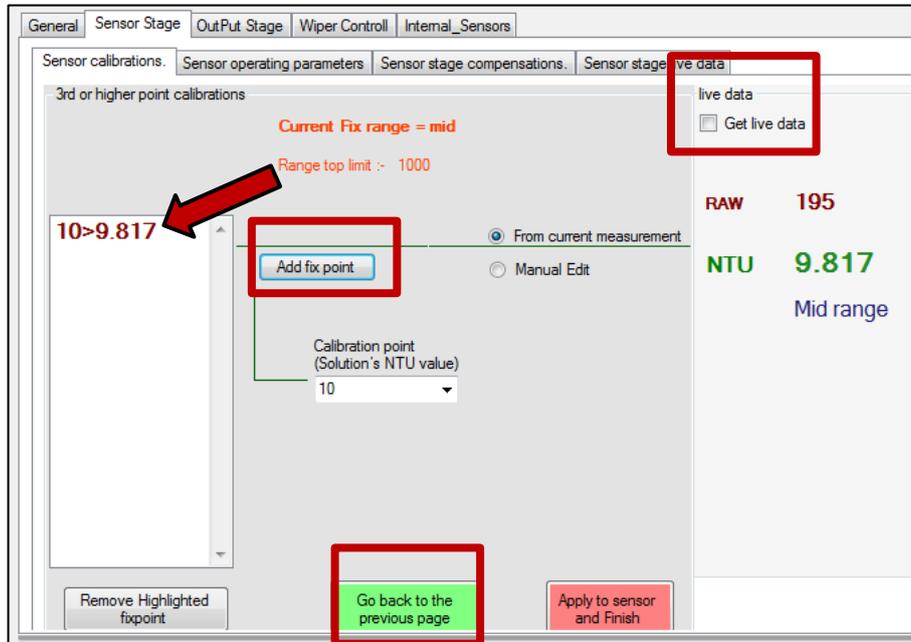
7. Select "High NTU" range and "Set".
   Tick "3rd calibration or higher point calibrations" box and "Start".
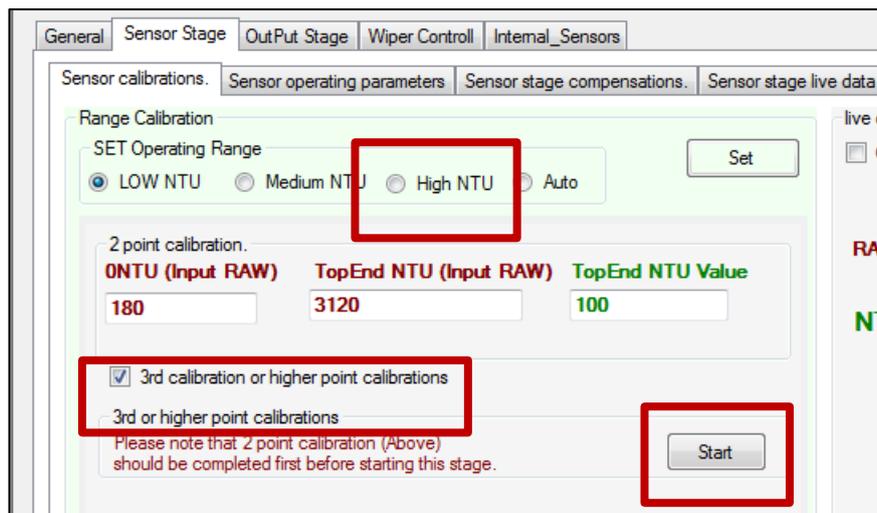
8. From the calibration program, make sure the "Calibration point (Solution's NTU value)" matches with the solution that needs to be calibrated, otherwise change it accordingly to calibration reference solution NTU value (e.g. still "10NTU").
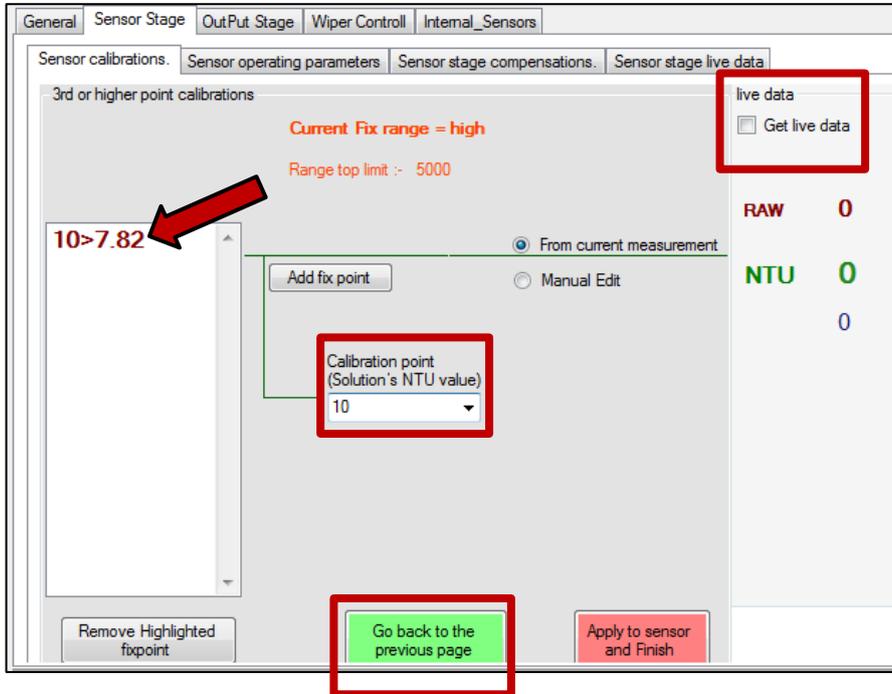
9. Now change the reference solution to step higher (e.g. from 10NTU to 40NTU).

10. Select "High NTU", click "Set" and "Start".
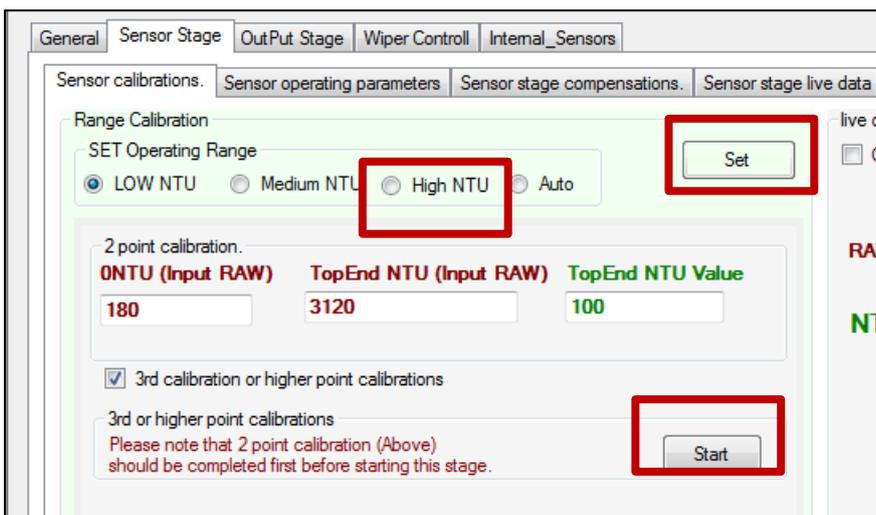
11. From the calibration program, make sure the "Calibration point (Solution's NTU value)" matches with the solution that needs to be calibrated, otherwise change it accordingly to calibration reference solution NTU value (e.g. now "40NTU").
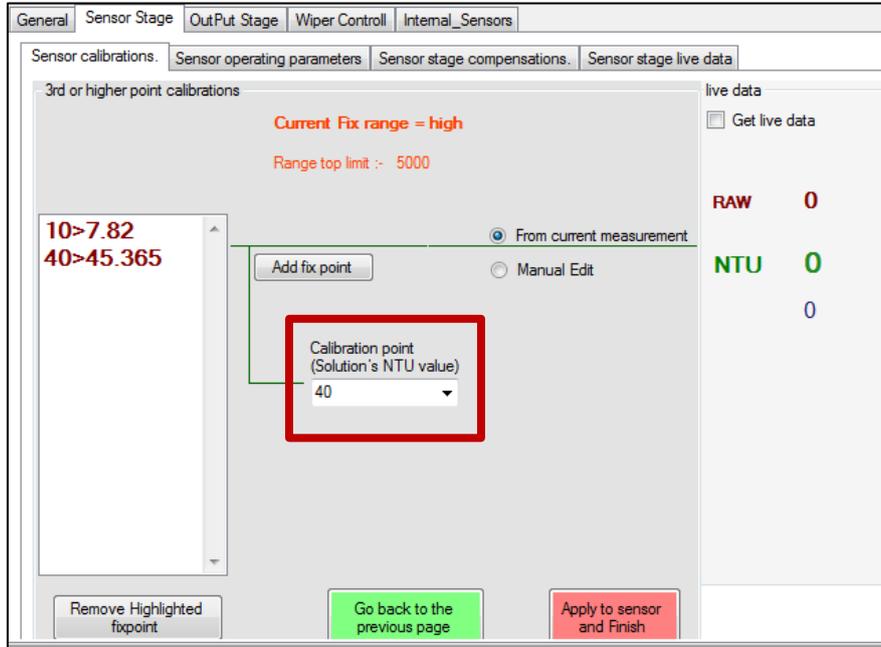

12. Tick "Get live data" to read the NTU solution, then, un-tick it when the reading is stabilized. Click "Add fix point", you should observe the NTU reading transferred to the multipoint fix point. Finally, select "Go back to previous page".
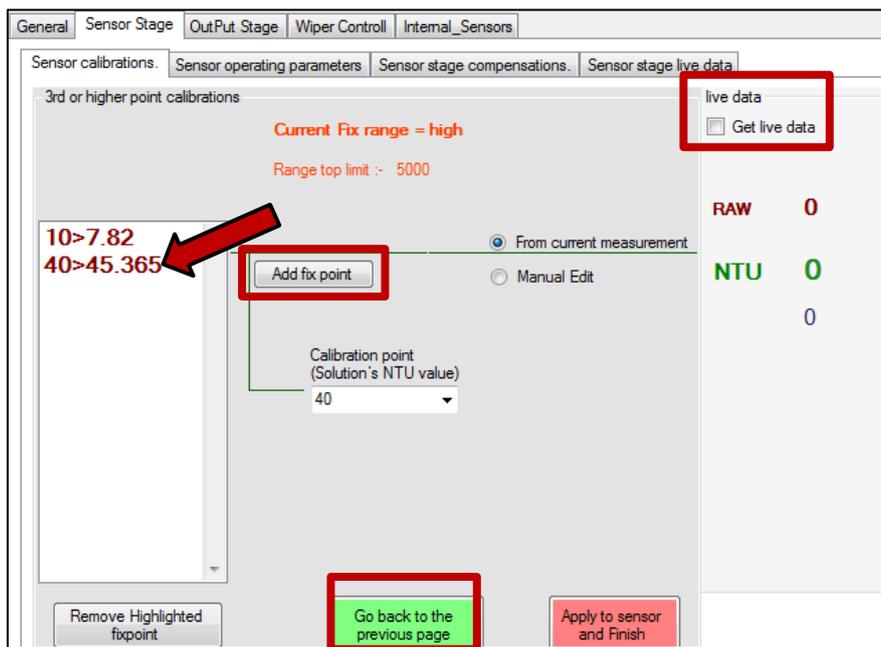
13. "LOW NTU" range is now completed for multipoint fix point (10 & 40 NTU only). "Apply to sensor and finish". Exit with "Go back to previous page".
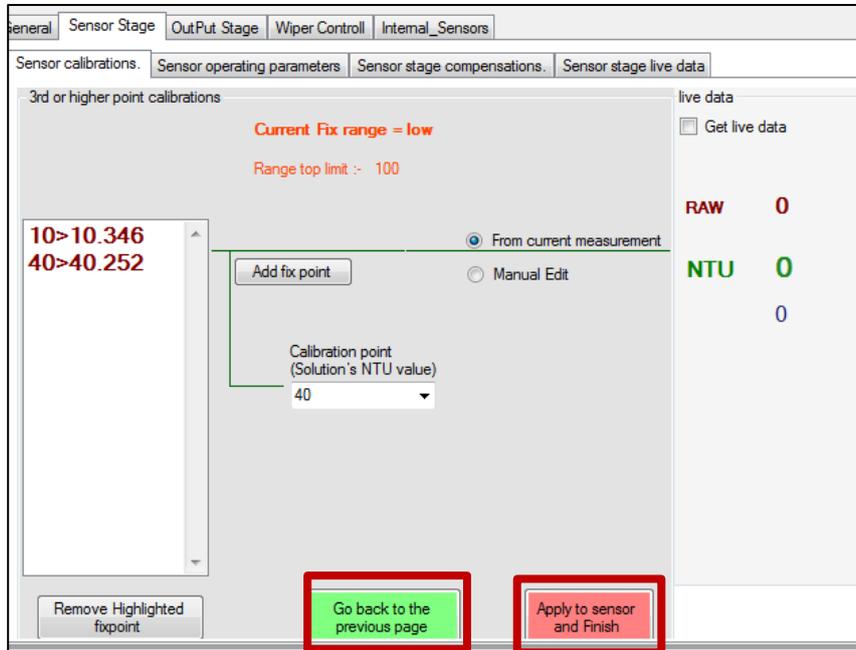
14. Select "Save calibration":
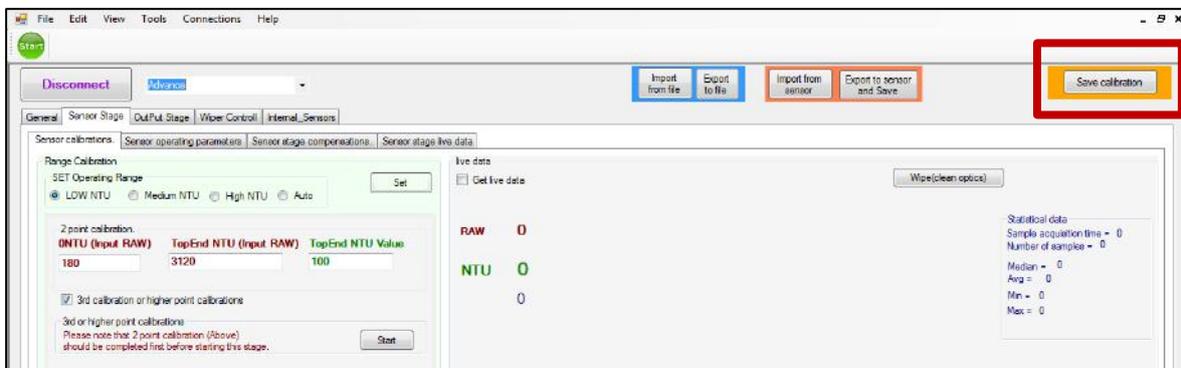
> Note: Only use "Apply to sensor and finish" and "save calibration" when all the multipoint fix point is completed for that calibration range.

15. "Go back to previous page", and repeat step 10 to 14, for low-range and mid-range.

> Note: The purpose to use one solution for all three ranges multipoint fix point is to have less contamination from different solutions.

16. "Go back to previous page", and repeat step 10 to 15, for every higher reference solution you wish to calibrate.

Please see some examples for multipoint fix point below (number of multi-point fix point for calibration is depending on the top limit of the range):

Top limit	Multi-point fix point
10NTU	0 (None)
400NTU	3 (10, 40 & 100NTU)
5,000NTU	6 (10, 40,100, 400, 1,000, 3,000NTU)
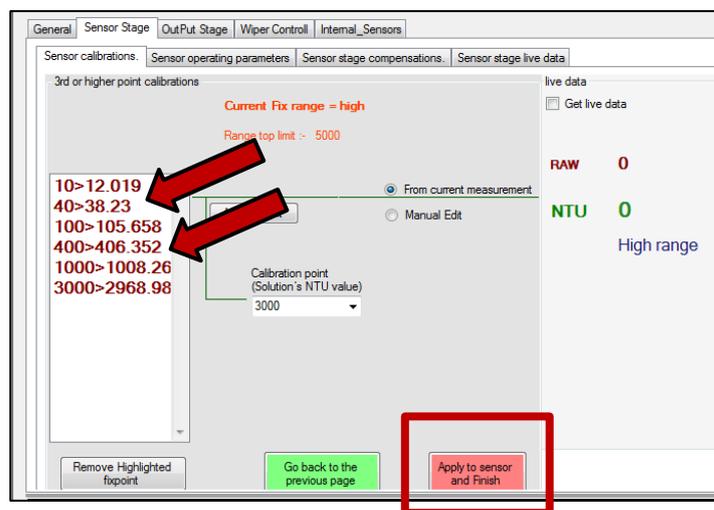
17. When all 3 range multi-point fix points are done, select "Auto", click "Auto populate from calibration data" and "save calibration".
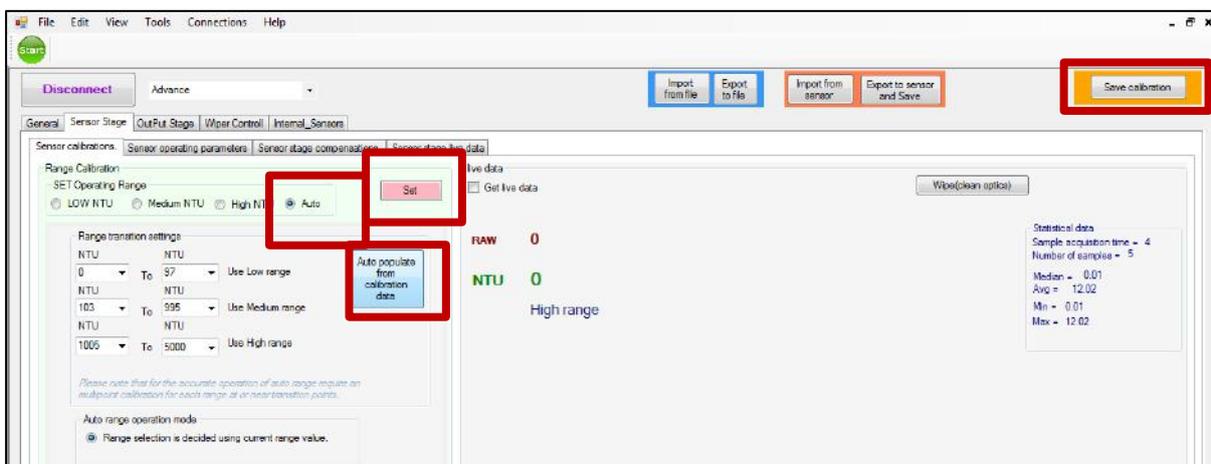
2   Check the results once multi-point calibration is completed

Select all 3 ranges at the same time and check and record each solution on a calibration certificate.

The calibrator must ensure that the following NEP-5000 specifications are obtained:

Resolution	Range	Resolution
	10NTU 100NTU 400NTU 1,000NTU 5,000NTU	±0.01NTU ±0.03NTU ±0.1NTU ±0.3NTU ±1.7NTU
Accuracy	±1% at 25"C up to 400NTU	
	±2% at 25nC up to 1,000NTU	
Linearity	Better than 0.5% for 0 to 20NTU	
	Better than 1.0% for 0 to 400NTU	
	Better than 2.0% for 0 to 3,000NTU	
Temperature coefficient	Better than ±0.05%/"C	
Zero drift	Less than ±0.2NTU	
Calibration	Factory calibrated using non-toxic AEPA polymer solutions	
Settling time	<1s after application of power to 99%	

Finally, export CFG file and upload it to an online repository.

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