



<i>Title:</i> NEON Sensor Command, Control and Configuration (C3) Document: Barometric Pressure		<i>Date:</i> 05/16/2022
<i>NEON Doc. #:</i> NEON.DOC.000230	<i>Author:</i> E. Ayres	<i>Revision:</i> B

## NEON SENSOR COMMAND, CONTROL AND CONFIGURATION (C3) DOCUMENT: BAROMETRIC PRESSURE

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## Change Record

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## 1 DESCRIPTION

### 1.1 Purpose

This document specifies the command, control, and configuration details for operating the barometric pressure assembly and sensor. It includes a detailed discussion of all necessary requirements for operational control parameters, conditions/constraints, set points, and any necessary error handling. All Level 0 Data Products generated by the sensor are identified.

### 1.2 Scope

This document specifies the command, control, and configuration that is needed for operating the barometric pressure assembly. It does not provide implementation details, except for cases where these stem directly from the sensor conditions as described here. This document assumes that barometric pressure will be measured using a Vaisala BAROCAP Digital Barometer PTB330 Class A with one pressure sensor and using firmware 1.13 (NEON P/N: 0300380000) (AD[02]).

## 2 RELATED DOCUMENTS AND ACRONYMS

### 2.1 Applicable Documents

AD [01]	NEON.DOC.000001	NEON Observatory Design (NOD) Requirements
AD [02]	NEON.DOC.000291	NEON Configured Sensor List
AD [03]	NEON.DOC.005003	NEON Scientific Data Products Catalog
AD [04]	NEON.DOC.005005	NEON Level 0 Data Products Catalog
AD [05]	NEON.DOC.000653	Barometric pressure ATBD

### 2.2 Reference Documents

RD [01]	NEON.DOC.000008	NEON Acronym List
RD [02]	NEON.DOC.000243	NEON Glossary of Terms

### 2.3 Acronyms

Acronym	Explanation
ATBD	Algorithm Theoretical Basis Document
C <sup>3</sup>	Command, Control, and Configuration Document
SOP	Standard Operating Procedures
QA/QC	Quality Assurance/Quality Control
TIS	Terrestrial Instrument System
L0	Level 0
L1	Level 1
ENG	NEON Engineering group
CI	NEON Cyberinfrastructure group
DPS	NEON Data Products group
CVAL	NEON Calibration, Validation, and Audit Laboratory

### 2.4 Verb Convention

“Shall” is used whenever a statement expresses a convention that is binding. The verbs “should” and “may” express non-mandatory provisions. “Will” is used to express a declaration of purpose on the part of the design activity.



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### 3 INTRODUCTION

The sensor configuration and sensor command and control described here is related to the barometric pressure data product (NEON.DXX.XXX.DP0.00004.001.001.00X.00X.001). A description of how sensor readings shall be converted to the barometric pressure data product is presented in the associated ATBD (AD[05]). The TIS assembly to generate this data product consists of 1 component: barometric pressure sensor.

## 4 OVERVIEW OF SENSOR CONFIGURATION

### 4.1 Barometric Pressure Sensor

Sensor configuration settings are shown in the table below.

**Table 1.** Sensor configuration settings.

Parameter	Default Setting
LCP1 (linear calibration correction)	Off
MPCP1 (multipoint calibration correction)	Off
Pressure units	kPa
Internal temperature units	°C
Atmospheric pressure: Acquisition rate	Once every 10 seconds (0.1 Hz)
Internal temperature: Acquisition rate	Once every 10 seconds (0.1 Hz)
Data acquisition measurements	Barometric pressure (P <sub>1</sub> ) (NEON.DXX.XXX.DP0.00004.001.001.00X.00X.001) Internal temperature (TP1) (NEON.DXX.XXX.DP0.00004.001.002.00X.00X.001) Error status (Err) (NEON.DXX.XXX.DP0.00004.001.003.00X.00X.001)

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## 5 COMMAND AND CONTROL

### 5.1 Error Handling

All possible sensor error codes are shown in **Table 2**. When any of these errors occur the barometric pressure (NEON.DXX.XXX.DP0.00004.001.001.OOX.OOX.001) and internal temperature (NEON.DXX.XXX.DP0.00004.001.002.OOX.OOX.001) data streams will be set to zero, 0, and the sensor error flag (NEON.DXX.XXX.DP0.00004.001.003.OOX.OOX.001) will be set to one, 1. When an error occurs the specific sensor error code from **Table 2** shall be made available to NEON's Problem Tracking and Resolution system to determine what action is necessary. If an error message occurs (i.e., error status = 1) the sensor must be stopped, queried, have the error state reset, and restarted (Table 2RD[02]). At the time of writing it anticipated that the process to perform these actions will be fully described elsewhere (document TBD).

This document assumes that this sensor auto-resets its error status when the phenomenon causing the error ends. For example, if the temperature is outside the sensors' operating range the error flag will be set to 1 and the pressure data will be set to 0 until the temperature returns to a level within the operating range, at which point the error flag will be set to 0 and the pressure data stream will resume. If this does not occur automatically, a command and control process will be added to this document to ensure quality data continues to be collected after an error flag has occurred.





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## 6 REFERENCES

Vaisala. 2008. User's Guide: Vaisala BAROCAP Digital Barometer PTB330. Vaisala Ojy, Helsinki.

## 7 APPENDIX

**Table 2.** Codes and interpretation of sensor error message (Vaisala 2008).

Error Code	Error Message	Action
E10	Internal EEPROM read error.	Internal barometer failure. Return the barometer to the Vaisala Service Center.
E11	Internal EEPROM write error.	Internal barometer failure. Remove the barometer and return the faulty unit to Vaisala Service.
E12...E15	Add-on module 1/2/3/4 connection failure	Turn off the power and check the module connection. Turn on the power.
E8	Device internal temperature out of range	Ensure that the operating temperature is within the valid range
E6	Operating voltage out of range	Ensure that the operating voltage is within the valid range.
E7	Internal system voltage out of range	Internal barometer failure. Return the barometer to the Vaisala Service Center.
E20...E23	Configuration switches for analog output 1/2/3/4 set incorrectly	Check and re-set the switches of the analog output module, see section <a href="#">Changing Output Mode and Range on page 99</a> .
E5	Communication module installed in incorrect add-on module slot	Disconnect the power and change the communication module to module slot 1.
E28...E31	Unknown/incompatible module installed in add-on module slot 1/2/3/4)	Ensure that the module is compatible with the PTB330.
E4	Pressure out of valid range	Check that the assumed pressure is within the measurement range for the barometer.
E3	Difference between pressure transducers too large	1) Check that the barometer modules are measuring the same pressure or 2) Check if one of the barometer modules is out of the valid range or 3) Check if the DPMAX value is set too low.
E16...E19	Pressure measurement failure on add-on module 1/2/3/4	Internal barometer failure. Return the barometer to the Vaisala Service Center.
E9	Checksum error in the internal configuration memory	Internal barometer failure. Return the barometer to the Vaisala Service Center.
E24...E27	EEPROM failure on add-on module 1/2/3/4	Internal barometer failure. Return the barometer to the Vaisala Service Center.