NEON SENSOR COMMAND, CONTROL AND CONFIGURATION (C3) DOCUMENT: 2D WIND

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See configuration management system for approval history.

Change Record

REVISION	DATE	ECO #	DESCRIPTION OF CHANGE
A	05/17/2012	ECO-00418	INITIAL RELEASE
B	05/28/2013	ECO-00593	Minor Updates
C	02/29/2016	ECO-03635	Error Handling Update Adjusted Settings update: 1. Changed 45° offset configuration to respective default settings for each sensor-type 2. Deactivated Speed of Sound and Sonic temperature measurements for extreme-heated 2D (CD00860000)
D	05/16/2022	ECO-06815	• Update NEON logo and fine print • Minor formatting updates

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1   DESCRIPTION

1.1   Purpose

This document specifies the command, control, and configuration details for operating a NEON sensor used for instrumental observations. 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 should be identified.

1.2   Scope

Gill's WindObserver II 2D Sonic Anemometer (RD [03]), and Extreme Weather WindObserver 2D Sonic Anemometer Heated (RD [04]) will be used throughout NEON's Observatory to monitor wind conditions. For the remainder of this document, the WindObserver II and Extreme Weather WindObserver will be referenced as 'WOII' and 'EWWO', respectively. Two versions of the WOII will be used: i) non-heated and ii) and heated. Version 1 will be used in locations where icing is not plausible, while version 3 will be used in areas where icing is likely. If severe icing is eminent (e.g. Tundra, mountainous terrain), the EWWO will be used. The firmware that shall be used with these sensors is version 6.01.

This document specifies the command, control, and configuration that are needed for operating this sensor. It does not provide implementation details, except for cases where these stem directly from the sensor conditions as described here.

A complete set of the Level 0 data products generated in this document can be found in appendix.

The 2D wind assembly will consist of following Data Generating Device (DGD) based on Data Generating Device DGD List and Hierarchies doc (AD [05]):

DGD Agile PN	DGD Agile Description
CD00310010	Assembly, 2D Sonic and Junction Box Non-Heated
CD00310000	Assembly, 2D Sonic Heated and Junction Box
CD00860000	Assembly, Extreme 2D Sonic and Junction Box

Further detailed sensor info under each DGD is as following:

1. Under CD00310010:
    a. NEON P/N: 0303440000
        i.   Sensor WindObserver II 2D Sonic Anemometer non-heated
        ii. Firmware Version: 6.01
2. Under CD00310000:
    a. NEON P/N: 0303440001
        i.   Sensor WindObserver II 2D Sonic Anemometer Heated

       ii.   Firmware Version: 6.01

3.   Under CD00860000:
     a.   NEON P/N: 0303440005
          i.   Sensor Extreme Weather WindObserver 2D Sonic Anemometer Heated
         ii.   Firmware Version: 6.01

2   RELATED DOCUMENTS AND ACRONYMS

2.1   Applicable Documents

Applicable documents contain information that shall be applied in the current document. Examples are higher level requirements documents, standards, rules and regulations.

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.001104	Data Generating Device DGD List and Hierarchies
AD [06]	NEON.DOC.000780	Algorithm Theoretical Basis Document (ATBD) 2D Wind Speed and Direction
AD [07]	NEON.DOC.XXXXXX	Standard Operating Procedure (SOP) 2D Wind Speed and Direction

2.2   Reference Documents

Reference documents contain information complementing, explaining, detailing, or otherwise supporting the information included in the current document.

RD [01]	NEON.DOC.000008 NEON Acronym List
RD [02]	NEON.DOC.000243 NEON Glossary of Terms
RD [03]	Gill Instruments Ltd. 2007. User Manual: WindObserver II Ultrasonic Anemometer. Document # 1390-PS-004. Issue 17.
RD [04]	Gill Instruments Ltd. 2011. User Manual: Extreme Weather WindObserver with Enhanced Heating Ultrasonic Anemometer. Document # 1390-PS-0018. Issue 6.

2.3   Acronyms

Acronym	Explanation
ATBD	Algorithm Theoretical Basis Document
C^3	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

3   ASSEMBLY, 2D SONIC AND JUNCTION BOX NON-HEATED / HEATED / EXTREME HEATED INTRODUCTION (CD00310010 / CD00310000 / CD00860000)

The following sections describe the configuration and command and control related to the three 2D sonic and junction box assemblies and corresponding data products (see Appendix). The communication standard for digital output with the 2D wind sonic anemometers shall be RS422. For more information regarding maintenance or topics concerning computer algorithms, please refer to AD [07] and AD [06], respectively.

4   ASSEMBLY, 2D SONIC AND JUNCTION BOX NON-HEATED / HEATED / EXTREME HEATED INTRODUCTION OVERVIEW OF SENSOR CONFIGURATION (CD00310010 / CD00310000 / CD00860000)

Table 1 details the configuration settings of the non-heated and heated 2D sonic and junction box assemblies (NEON P/N: 0303440000 and 0303440001).

Table 2 details the configuration settings of the extreme heated 2D sonic and junction box assembly (NEON P/N: 0303440005).

Table 1. Sensor configuration settings of NEON P/N: 0303440000 and 0303440001. Settings denoted by * are only applicable for NEON P/N: 0303440001.

Parameter	Default Setting	Code	Adapted Setting	Code
Baud rate	9600 (pulses s^{-1})	B3		
Duplex mode	Full Duplex	E1		
Data & parity options	8 bit, no parity, 1 stop bit	F1		
Averaging	Off	G0000		
Heater	Off	H1	Activated*	H2*
NMEA settings	"IIMWV"	K1		
ASCII message terminator	"CR LF"	L1		
Data output	ASCII Polar continuous	M2	ASCII UV continuous	M1
Node address	<A>	NA		
Output format	CSV	O1		
Output (acquisition) rate	1 Hz	P1		
Speed output	m s^{-1}	U1		
Vertical output padding	Off	V1		
45° Offset	Off	X1		
Speed of sound / Sonic Temp.	Off	A0	On	A3
Wind wraparound	On	C1		

Table 2. Sensor configuration settings of NEON P/N: 0303440005.

Parameter	Default Setting	Code	Adapted Setting	Code
Baud rate	9600 (pulses s^{-1})	B3		
Duplex mode	Full Duplex	E1		
Data & parity options	8 bit, no parity, 1 stop bit	F1		
Averaging	Off	G0000		
Heater	Off	H1	Activated	H2
NMEA settings	"IIMWV"	K1		
ASCII message terminator	"CR LF"	L1		
Data output	ASCII Polar continuous	M2	ASCII UV continuous	M1
Node address	<A>	NA		
Output format	CSV	O1		
Output (acquisition) rate	1 Hz	P1		
Speed output	m s^{-1}	U1		

Vertical output padding	Off	V1		
45° Offset	On	X2		
Speed of sound / Sonic Temp.	Off	A0		
Wind wraparound	On	C1		

5   ASSEMBLY, 2D SONIC AND JUNCTION BOX NON-HEATED COMMAND AND CONTROL (CD00310010)

5.1   Error Handling

If the sensor is operating under the influence of error, the data output's status will reference a variable other than 00, 60, or 66, and the condition shall be deemed "failed" (Table A1). If a failed condition lasts for more than three hours, it is recommended that the issue be forwarded to Problem Resolution and Tracking. Since Gill Instruments does not offer any command / control functions to handle errors, the sensor may need to be manually repaired.

Table 3. Truth table for sensor error handling.

Control parameter(s)	Condition	Data acquisition system action	Output to CI
Sensor status ≠ 00, 60, or 66 > 3 hours	failed	Location controller – configuration needed (TBD)	measurement/control parameters → trouble ticket (TBD)

5.2   Sensor Controls Specification

N/A

6   ASSEMBLY INTEGRATION

N/A

7 APPENDIX

7.1 List of Level 0 Data Product

Table 4. List of Level 0 data product associated with DPName: 2D wind (non-heated; CD00310010) and (heated; CD00310000).

DGD Agile PN	DPNumber	fieldName	description	Acquisition frequency (Hz)	dataType	units
CD00310010; CD00310000	NEON.DOM.SITE.DP0.00001.001.01306.HOR.VER.000	uVectorComponent	U (North-South) vector component	1	real	metersPerSecond
	NEON.DOM.SITE.DP0.00001.001.01307.HOR.VER.000	vVectorComponent	V (East-West) vector component	1	real	metersPerSecond
	NEON.DOM.SITE.DP0.00001.001.01308.HOR.VER.000	soundSpeed	Speed of sound	1	real	metersPerSecond
	NEON.DOM.SITE.DP0.00001.001.01309.HOR.VER.000	sensorTemp	Temperature of sensor	1	real	celsius
	NEON.DOM.SITE.DP0.00001.001.01310.HOR.VER.000	2dWindSensorStatus	Health Status of 2D wind speed sensor	1	integer	NA

Table 5. List of Level 0 data products associated with DPName: 2D wind (extreme-heated; CD00860000).

DGD Agile PN	DPNumber	fieldName	description	Acquisition frequency (Hz)	dataType	units
CD00860000	NEON.DOM.SITE.DP0.00001.001.01306.HOR.VER.000	uVectorComponent	U (North-South) vector component	1	real	metersPerSecond
	NEON.DOM.SITE.DP0.00001.001.01307.HOR.VER.000	vVectorComponent	V (East-West) vector component	1	real	metersPerSecond

	NEON.DOM.SITE.DP0.00001.001.01310.HOR.VER.000	2dWindSensorStatus	Health Status of 2D wind speed sensor	1	integer	NA

8   BIBLIOGRAPHY

N/A