NEON SENSOR COMMAND, CONTROL, AND CONFIGURATION (C3) DOCUMENT: AQU WET DEPOSITION COLLECTOR ASSEMBLY

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Change Record

REVISION	DATE	ECO #	DESCRIPTION OF CHANGE
A	06/25/2015	ECO-02218	Initial release
B	12/06/2022	ECO-06925	Updated NEON logo and branding Minor formatting fixes

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1 DESCRIPTION

1.1 Purpose

This document specifies the command, control, and configuration details for operating the wet deposition collection assembly (e.g., N-CON sampler and associated infrastructures). 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. Raw data from the sensor are compensated by the DAS, but received at HQ for further processing as a L0 unfiltered and uncorrected data product until its associated algorithms are applied to produce a quality-controlled and -assured L1 data product in standard scientific units.

1.2 Scope

This document assumes that the wet deposition collector assembly used will be the same as that used in NEON.DOC.001421. This document specifies the command, control, and configuration that are needed for operating this sensor and accessories. It does not provide implementation details, except for cases where these stem directly from the sensor conditions as described here.

The N-CON TM model is a standalone instrument. It is equipped with its own heating and cooling control system and does not require external commands and controls. A PRT sensor will be used to monitor the temperature inside the sampler chamber.

This N-CON TM model sampler is relatively new to the market. No official manual is available yet. But its operating principle is identical to the N-CON MDN model sampler. Therefore, we can use N-CON MDN manual as the reference document RD [03], until such time as the TM model manual becomes available.

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 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 Wet Deposition Collection Assembly SOP (TBW)

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]	NEON.DOC.001421	NEON Sensor Command, Control and Configuration (C3) Document: Wet Deposition Collector Assembly

2.3 External References

External references contain information pertinent to this document, but are not NEON configuration-controlled. Examples include manuals, brochures, technical notes, and external websites.

ER [01]	N-CON Atmospheric Deposition Sampler Manual Model 00-125-4

2.4 Acronyms

Acronym	Explanation
C^3	Command, Control, and Configuration Document
SOP	Standard Operating Procedures
QA/QC	Quality Assurance/Quality Control
L0	Level 0
L1	Level 1
ENG	NEON Engineering group
CI	NEON Cyberinfrastructure group
PRT	Platinum Resistance Thermometers
NADP	North American Deposition Program
BASIN	Biogeosphere-Atmosphere Stable Isotope Network
GNIP	Global Network of Isotopes in Precipitation

2.5 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.

3 INTRODUCTION

The N-CON TM sampler is the sensor that will collect the samples for the chemical and isotopic (^{18}O and DH) analysis of precipitation. It is equipped with an infrared precipitation sensor that can detect precipitation drops and snowflakes, thus controlling the sampler lid to open and collect the "wet only" deposition samples during the precipitation or snow events, and close the lid thereafter. The dual-funnel/dual-bottle design allows a glass bottle with anti-evaporation capillary to collect samples for water isotopic analysis, and a polyethylene bottle to collect samples for precipitation chemistry analysis. Samples in both glass bottles and polyethylene bottles will be collected manually once every two weeks, indexed/asset tagged and sent to NEON contract labs for analysis following procedures from recognized international organizations (e. g., NADP, BASIN, GNIP, etc.), which will be described in a separate SOP (AD[05]).

This N-CON TM sampler is equipped with its own heating and cooling control system, and does not require external commands and controls. A PRT sensor will be used to monitor the chamber temperature.

The data products that are automatically output from the N-CON TM sampler include power status and lid open/close status. The data products output from the PRT temperature sensor will be temperature in degrees Celsius. The PRT sensor here is just used to monitor the temperature inside the sampler chamber and track the function of heater/cooling system. This PRT sensor will stay with assembly until failure. No annual calibration is required. Sensor drift will be monitored by field technicians following the SOPs (AD[05]). The temperature output will be streamed back to CI.

Digital signals for power status, lid open/close status, and PRT temperature are assumed to be digital and be output through Ethernet. **Table 1** shows the L0 data acquisition streams below.

Table 1. L0 data product that will be streamed at 0.1 Hz.

Parameters	units	L0 data products
Chamber temperature	°C	NEON.DXX.XXX.DP0.000XX.001.001.001.00N.001
Power status flag (0/1)	Binary	NEON.DXX.XXX.DP0.000XX.001.001.001.00N.001
Lid status flag (0/1)	Binary	NEON.DXX.XXX.DP0.000XX.001.001.001.00N.001

4 OVERVIEW OF SENSOR CONFIGURATION

The wet deposition collector shall be configured according to Section 4 in RD [03].

5 COMMAND AND CONTROL

5.1 Error Handling

Table 2. Truth table for power status error handling.

Control parameter(s)	Condition	Data acquisition system action	Output to CI
Power status	No power to instrument	Send trouble ticket	Power status flag (1)

5.2 Heater Control

Heater and chiller settings should be pre-configured, and should not be changed during field operations. When chamber temperature is out of range (<3°C or >25°C), an out of range flag will be generated at HQ as a L1 DP. Because there is no need of this flag for any command and control function, it is not required to generate it as a L0 DP at site by DAS.

6 ASSEMBLY INTEGRATION

N/A