NEON SENSOR COMMAND, CONTROL AND CONFIGURATION –

SOIL WATER CONTENT PROFILE

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See Configuration Management System for Approval History

Change Record

REVISION	DATE	ECO #	DESCRIPTION OF CHANGE
A	04/30/2013	ECO-00634	Initial Release
B	02/11/2015	ECO-02519	Calibration coefficients have been added

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1 DESCRIPTION

1.1 Purpose

This document specifies the command, control, and configuration details for operating the Soil Water Content Profile 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 Soil Water Content Profile 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 soil water content and soil water ion content will be measured using a Sentek TriSCAN sensor, RS-232 interface, rod, tube, top cap, and plastic expandable bung (NEON P/N: 0318950000, 0300230000, 0300230001-4 depending on rod length, 0300230005-8 depending on tube length, 0300230010, 0300230013 AD[02]). The RS-232 interface has firmware version 1.3.5.

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.000007 ATBD for Soil Water Content Profile

2.2 Reference Documents

RD [01]	NEON.DOC.000008	NEON Acronym List
RD [02]	NEON.DOC.000243	NEON Glossary of Terms
RD [03]		
RD [04]		

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
$\#_{CVAL}$	Value provided by CVAL

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.

3 INTRODUCTION

The sensor configuration and sensor command and control described here are related to the Soil Water Content Profile data product (NEON.DOM.SIT.DP0.00094.REV.001.HOR.VER.001) and the Soil Water Ion Content Profile data product (NEON.DOM.SIT.DP0.00094.REV.002.HOR.VER.001). A description of how sensor readings shall be converted to the soil water content profile and the soil water ion content data products is presented in the associated ATBD (AD[05]). The TIS assembly used to generate this data product consists of *n* TriSCAN sensors. The number of TriSCAN sensors per profile may differ among soil plots, but typically a profile will consist of 8 TriSCAN sensors. Configuration settings and the command and control structure are described separately for each component.

4 OVERVIEW OF SENSOR CONFIGURATION

4.1 TriSCAN sensors

Sensor configuration settings are shown in the table below.

Table 1. TriSCAN sensor configuration settings.

Parameter	**Default Setting**
Acquisition rate: Soil water content	0.1 Hz
Acquisition rate: Soil water ion content	0.1 Hz
Raw data measurements	Soil water content 1(NEON.DOM.SIT.DP0.00094.REV.001.HOR.001.001) … Soil water content *z* (NEON.DOM.SIT.DP0.00094.REV.001.HOR.00*z*.001) Soil water ion content 1(NEON.DOM.SIT.DP0.00094.REV.002.HOR.001.001) … Soil water ion content *z*(NEON.DOM.SIT.DP0.00094.REV.002.HOR.00*z*.001)
Water content high normalization value ($SWCF_{air}$)	$\#_{CVAL}$
Water content low normalization value ($SWCF_{water}$)	$\#_{CVAL}$
Water ion content high normalization value ($SWICF_{air}$)	$\#_{CVAL}$

Water ion content low normalization value ($SWICF_{water}$)	$\#_{CVAL}$
Water content calibration coefficient A	Value TBD*
Water content calibration coefficient B	Value TBD*
Water content calibration coefficient C	Value TBD*
Ion content calibration coefficient A	1
Ion content calibration coefficient B	1
Ion content calibration coefficient C	0

* Water content coefficients A, B, and C will be set to site- and depth-specific values. These values will be stored in the CI database. They will be calculated following the process described in the Soil Water Release Curves ATBD. If the site- and depth-specific coefficient values are not known prior to sensor deployment, they shall be set to the manufacturer default values (i.e., A = 0.1957, B = 0.404, and C = 0.02852) (Sentek 2003).

4.2 RS-232 interface and other assembly components

No configuration is required.

5 COMMAND AND CONTROL

There is no command and control for this assembly.

6 REFERENCES

Sentek. 2003. TriSCAN Agronomic User Manual, Version 1.2a. Sentek, Stepney, South Australia.