

Title: NEON Sensor Command, Control and Configuration (C3) Document: Soil Temperature Profile		Date: 1/13/2016
NEON Doc. #: NEON.DOC.000442	Author: E. Ayres	Revision: B

## NEON SENSOR COMMAND, CONTROL AND CONFIGURATION (C3) DOCUMENT: SOIL TEMPERATURE PROFILE

PREPARED BY	ORGANIZATION	DATE
Edward Ayres	FIU	12/11/2015

APPROVALS	ORGANIZATION	APPROVAL DATE
Andrea Thorpe	PROJ SCI	1/11/2016
Dave Tazik	SCI	1/07/2016
Maurizio Miccolis	SI&V	1/07/2016

RELEASED BY	ORGANIZATION	RELEASE DATE
Anne Balsley	CM	1/13/2016

See configuration management system for approval history.

© 2016 NEON Inc. All rights reserved.

The National Ecological Observatory Network is a project solely funded by the National Science Foundation and managed under cooperative agreement by NEON, Inc. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

<i>Title:</i> NEON Sensor Command, Control and Configuration (C3) Document: Soil Temperature Profile		<i>Date:</i> 1/13/2016
<i>NEON Doc. #:</i> NEON.DOC.000442	<i>Author:</i> E. Ayres	<i>Revision:</i> B

## Change Record

REVISION	DATE	ECO #	DESCRIPTION OF CHANGE
A	06/11/2013	ECO-00466	Initial Release
B	2/11/2015	ECO-01834	Fixed typo in soil temperature data product ID. Added document number for Soil Temperature ATBD in the Applicable Documents table.
C	1/13/2016	ECO-03567	Updated to new template, updated DP numbers to new format

Title: NEON Sensor Command, Control and Configuration (C3) Document: Soil Temperature Profile		Date: 1/13/2016
NEON Doc. #: NEON.DOC.000442	Author: E. Ayres	Revision: B

**TABLE OF CONTENTS**

**1 DESCRIPTION.....1**

1.1 Purpose ..... 1

1.2 Scope..... 1

**2 Related documents and acronyms.....2**

2.1 Applicable Documents ..... 2

2.2 Reference Documents..... 2

2.3 Acronyms ..... 2

**3 Assembly, Soil PRT Terminated Cable, 25 Feet Introduction (CF00610000) .....2**

**4 ASSEMBLY, SOIL PRT TERMINATED CABLE, 25 FEET INTRODUCTION Overview of Sensor configuration (CF00610000) .....3**

**5 ASSEMBLY, SOIL PRT TERMINATED CABLE, 25 FEET INTRODUCTION Command and Control (CF00610000).....3**

5.1 Error handling ..... 3

5.2 Sensor controls specification ..... 3

**6 Assembly, Soil PRT Terminated Cable, 35 Feet Introduction (CF00620000) .....3**

**7 ASSEMBLY, SOIL PRT TERMINATED CABLE, 35 FEET INTRODUCTION Overview of Sensor configuration (CF00620000) .....3**

**8 ASSEMBLY, SOIL PRT TERMINATED CABLE, 35 FEET INTRODUCTION Command and Control (CF00620000).....3**

8.1 Error handling ..... 4

8.2 Sensor controls specification ..... 4

**9 Assembly integration.....4**

**10 Appendix.....4**

10.1 List of Level 0 data product..... 4

10.2 Assembly schematic drawing..... 6

**11 Bibliography .....6**

**LIST OF TABLES**

Table 1. Sensor configuration settings..... 3

<i>Title:</i> NEON Sensor Command, Control and Configuration (C3) Document: Soil Temperature Profile		<i>Date:</i> 1/13/2016
<i>NEON Doc. #:</i> NEON.DOC.000442	<i>Author:</i> E. Ayres	<i>Revision:</i> B

Table 2. Sensor configuration settings..... 3

Table 3. List of Level 0 data product associated with DPName: Soil temperature..... 4

Title: NEON Sensor Command, Control and Configuration (C3) Document: Soil Temperature Profile		Date: 1/13/2016
NEON Doc. #: NEON.DOC.000442	Author: E. Ayres	Revision: B

## 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

The sensor used to make soil temperature measurements shall be the Thermometrics Climate PRT Probe, which does not have firmware. Depending on cable length the NEON Product Number is CF00610000 (25 Foot cable) or CF00620000 (35 Foot cable).

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 Soil Temperature Profile 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
CF00610000	Assembly, Soil PRT Terminated Cable, 25 Feet
CF00620000	Assembly, Soil PRT Terminated Cable, 35 Feet

Further detailed sensor info under each DGD is as following:

1. Under CF00610000:
  - a. NEON PN #: 0332110000, Thermometrics Climate PRT Probe, no firmware

.....

2. Under CF00620000:
  - a. NEON PN #: 0332110000, Thermometrics Climate PRT Probe, no firmware

.....

## 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. 001571	NEON Algorithm Theoretical Basis Document – Soil Temperature

### 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]		
RD [04]		

### 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

## 3 ASSEMBLY, SOIL PRT TERMINATED CABLE, 25 FEET INTRODUCTION (CF00610000)

Soil Temperature Profile subsystem data product name and number are Soil temperature and NEON.DOM.SIT.DP0.00041, respectively. A description of how sensor readings shall be converted to the soil temperature profile data product is presented in the associated ATBD (AD[06]).

#### 4 ASSEMBLY, SOIL PRT TERMINATED CABLE, 25 FEET INTRODUCTION OVERVIEW OF SENSOR CONFIGURATION (CF00610000)

**Table 1.** Sensor configuration settings.

Parameter	Default Setting
Acquisition rate: Temperature	0.1 Hz

#### 5 ASSEMBLY, SOIL PRT TERMINATED CABLE, 25 FEET INTRODUCTION COMMAND AND CONTROL (CF00610000)

There is no command and control for this assembly.

##### 5.1 Error handling

NA

##### 5.2 Sensor controls specification

NA

#### 6 ASSEMBLY, SOIL PRT TERMINATED CABLE, 35 FEET INTRODUCTION (CF00620000)

Soil Temperature Profile subsystem data product name and number are Soil temperature and NEON.DOM.SIT.DP0.00041, respectively. A description of how sensor readings shall be converted to the soil temperature profile data product is presented in the associated ATBD (AD[06]).

#### 7 ASSEMBLY, SOIL PRT TERMINATED CABLE, 35 FEET INTRODUCTION OVERVIEW OF SENSOR CONFIGURATION (CF00620000)

**Table 2.** Sensor configuration settings.

Parameter	Default Setting
Acquisition rate: Temperature	0.1 Hz

#### 8 ASSEMBLY, SOIL PRT TERMINATED CABLE, 35 FEET INTRODUCTION COMMAND AND CONTROL (CF00620000)

There is no command and control for this assembly.

© 2016 NEON Inc. All rights reserved.

Title: NEON Sensor Command, Control and Configuration (C3) Document: Soil Temperature Profile		Date: 1/13/2016
NEON Doc. #: NEON.DOC.000442	Author: E. Ayres	Revision: B

## 8.1 Error handling

NA

## 8.2 Sensor controls specification

NA

## 9 ASSEMBLY INTEGRATION

There can be up to 9 Soil Temperature Profile DGDs in a single profile.

## 10 APPENDIX

NA

### 10.1 List of Level 0 data product

**Table 3.** List of Level 0 data product associated with DPName: Soil temperature



Title: NEON Sensor Command, Control and Configuration (C3) Document: Soil Temperature Profile		Date: 1/13/2016
NEON Doc. #: NEON.DOC.000442	Author: E. Ayres	Revision: B

DGD Agile PN	DPNumber	fieldName	description	Acquisition frequency (Hz)	dataType	units
CF00610000	NEON.DOM.SITE.DP0.00041.001.01728.HOR.VER.000	soilPRTResistanc e	Resistance of soil deployed Platinum Resistance Thermometer (PRT)	0.1	real	ohm
CF00620000	NEON.DOM.SITE.DP0.00041.001.01728.HOR.VER.000	soilPRTResistanc e	Resistance of soil deployed Platinum Resistance Thermometer (PRT)	0.1	real	ohm

<i>Title:</i> NEON Sensor Command, Control and Configuration (C3) Document: Soil Temperature Profile		<i>Date:</i> 1/13/2016
<i>NEON Doc. #:</i> NEON.DOC.000442	<i>Author:</i> E. Ayres	<i>Revision:</i> B

## 10.2 Assembly schematic drawing

NA

## 11 BIBLIOGRAPHY

NA