NEON SENSOR COMMAND, CONTROL, AND CONFIGURATION: LEVEL TROLL 500

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See configuration management system for approval history.

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Change Record

REVISION	DATE	ECO #	DESCRIPTION OF CHANGE
A	02/19/2014	ECO-01541	Initial release
B	03/08/2022	ECO-06786	• Revised logo; revised fine print

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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

This document specifies the command, control, and configuration that is needed for operating the In-Situ Inc. Level TROLL 500; used to make measurements of surface water level in lakes and streams. The Level TROLL measures the surface water pressure of surface water bodies where sensors are deployed. The Level TROLL holds its calibration constraints within internal memory and performs the analog to digital data conversion internally before any data output occurs.

LEVELTROLL 500 NEON P/N 0317680000	FIRMWARE VERSION
Surface Water Pressure	2.07
Surface Water Temperature	2.07

This document specifies the command, control, and configuration that is 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. No command and control is required at the time of deployment. Only sensor configuration is required at the time of deployment.

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
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. 001198	ATBD for LevelTROLL 500 (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

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]	In-Situ Inc. Level TROLL Manual Revision 007 May 2012

2.4 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
AIS	Aquatic Instrumentation 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 INTRODUCTION

The sensor configuration and sensor command and control described here are related to the surface water pressure. The parameters will be measured by the Level TROLL at each sensor set location at NEON aquatic sites. The sensor is assumed to communication through an RS-422 connection. As mentioned above the analog to digital conversion, as well as the conversion to calibrated units is performed within the Level TROLL prior to output of the data for ingestion by the data acquisition system. **Table 1** below details the data measurement streams and associated L0 data product ID's.

Table 1. L0 data products acquired from In-Situ Inc. Level TROLL

Parameters	L0 data products
Pressure	NEON.DXX.XXX.DP0.XXXXXX.XXX.XXX.XXX.XXX.XXX
Pressure Data Quality ID	NEON.DXX.XXX.DP0.XXXXXX.XXX.XXX.XXX.XXX.XXX

* As of Rev A of this document, the AQU data products catalog is TBW. This table will be updated when that catalog becomes available.

4 OVERVIEW OF SENSOR CONFIGURATION

Data coming from the sensors is defined in **Table 1**, above. **Table 2** below details the Data Streams coming from the sensors, the required data collection frequency, the units coming directly from the sensor, and base units.

Table 2. Sensor configuration settings

DATA STREAMS	DATA COLLECTION FREQUENCY	DATA STREAM UNITS
Surface Water Pressure	1/60 Hz	kPa
Surface Water Temperature	1/60 Hz	deg. C
Battery Voltage	1/60 Hz	V
Data Quality ID	1/60 Hz	Whole Number

5 COMMAND AND CONTROL

The Level TROLL does not include equipment that requires remote command and control through the location controller; however initial set-up of the sensor will select, as a built-in option, to collect the data as a linear average of 3 measurements collected in a burst collection and averaged to a single point measurement.

5.1 Error handling

The Level TROLL does not report errors that need to be addressed, but does include quality codes for the collected data which will be output as a data stream. The following codes apply to all Data Quality ID data streams.

Table 3. Data quality codes

Id	Name	Description
0	Normal	Parameter measured without errors using a current calibration.
1	User Uncal	Parameter measured without errors using an expired user calibration.
2	Factory Uncal	Parameter measured without errors using and expired factory calibration.
3	Error	Parameter measured with error, sentinel value supplied.
4	Warm-up	Sensor is warming up, sentinel value supplied.
5	Disabled	Sensor is disabled, sentinel value supplied.
6	Calibrating	Sensor is calibrating, calibration value supplied.
7	Off Line	Device is off line, sentinel value supplied.
8	Warning	Parameter measured without errors but does not meet normal quality criteria.

5.2 Sensor controls specification

The Level TROLL will be configured in the RS-422 menu to the above settings. The Level TROLL will receive a query by the location controller. The Level TROLL will respond with the preconfigured data stream.

6 ASSEMBLY INTEGRATION

All assembly integration is handled by the sensor internally in the Level TROLL. The data output from the Level TROLL has already been converted from analog to digital signal with calibration constraints applied.

7 APPENDIX

N/A

8 BIBLIOGRAPHY

In-Situ Inc. LevelTROLL Manual Revision 007 May 2012

http://www.in-situ.com/products/water-level/level-troll-family/level-troll-500-instrument