INTERFACE CONTROL DOCUMENT CG-RSN SHELF

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Document Control Sheet

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1 Introduction

1.1 Identification

This interface Control Document (ICD) documents the interfaces between the Regional Scale Nodes (RSN) Low Power Junction Box (CE02SHBP-LJ01D) to the Coastal and Global Scale Nodes (CGSN) Endurance Array Offshore Benthic Experiment Package (BEP). This document details the interfaces between the CE02SHBP-LJ01D and the CE02SHBP, which include both electrical and mechanical physical interfaces.

The electrical interfaces include connection types, connector details, power consumption continuous and peak, power isolation, voltages, communications, timing, and galvanic isolation. The mechanical interfaces include the mounting of the LJ01D inside the BEP.

1.2 Ocean Observatories Initiative (OOI) System Overview

The Ocean Observatories Initiative (OOI) consists of sensors, networks, and support systems that will collect and make available ocean and seafloor data in a coordinated fashion to provide persistent observations over ranges of minutes up to years and decades. OOI will enable researchers to make simultaneous, interdisciplinary measurements to investigate a spectrum of phenomena including episodic, short-lived events (tectonic, volcanic, oceanographic, biological, and meteorological), and more subtle, longer-term changes and emergent phenomena in ocean systems (circulation patterns, climate change, ocean acidity, and ecosystem trends). For additional information on OOI, the reader is directed to the OOI Final Network Design (FND) document.

The RSN cabled infrastructure will provide the CGSN Oregon Endurance Shelf BEP with continuous power and high-speed Ethernet communications.

1.3 Document Scope and Organization

This document is organized into the following four sections:

1. Introduction – provides the scope, document organization and change control procedure for this document.
2. Related Documentation – cites other documents that provide input and reference for this ICD.
3. Description of Interfaces – provides details of the interfaces, starting with characteristics that are standard for all the interfaces.
4. Notes – contains general information that aids in the understanding of this document.

1.4 Change Control

This Interface Control Document is subject to the policies and procedures called out in the OOI Configuration Management Plan, 1000-00000, Section 3. Changes to the released version of this document may only be made via an Engineering Change Request (ECR) that has been approved by the OOI Change Control Board (CCB).

The most recent document revision of this ICD maintained in the OOI Document Management System (DMS) is the authoritative version, as printed hard copies are not controlled. Prior revisions of this document may be maintained in the OOI DMS for reference reasons, but are not authoritative.

2 Related Documentation

2.1 Parent Documents

The following documents are the parents from which this document's scope and content derive:

	NSF Cooperative Agreement No. 0957938
1000-00000	OOI Configuration Management Plan (CMP)
3101-00047	CGSN Configuration Management Plan
4021-00001	Regional Scale Nodes Project Execution Plan

2.2 Reference Documents

The following documents or drawings are referenced herein and are directly applicable to this document. In the event of conflict between any of these documents and this ICD, this document shall take precedence.

1101-00000	Final Network Design (FND)
1125-00000	L2 Reference Module
3715-10000	BEP ASM DRAWING
3715-10600	BEP LP ASM DRAWING
3715-90001	CE02SHBP INTERFACE BLOCK DIAGRAM
4511-56489	SITE 1, ENDURANCE LINE EXTENSION, FUNCTIONAL BLOCK DIAGRAM, REGIONAL SCALE NODES
4515-58713	SHELF BENTHIC PKG, SHBP, FUNCTIONAL BLOCK DIAGRAM, REGIONAL SCALE NODES
4813-63171	Regional Scale Nodes Low Power Junction Box Interface Control Document
	Hydrate Ridge Update RSN July 2011

2.3 Informational Documents

The following documents amplify or clarify the information presented in this document, but are not binding.

NA	Workhorse Monitor/ Sentinel User's Guide (Teledyne RDI)
NA	05T-05P Brochure (Sea-Bird Electronics, Inc. pump)
NA	Long Ranger ADCP User's Guide (Teledyne RDI)
NA	NAXYS Ethernet Hydrophone 02345 (Bjørge AS data sheet)
NA	OE14-408 10M Pixel Digital Stills Camera (Kongsberg manual)
NA	oe14-408 Underwater digital stills camera (Kongsberg product specification)
NA	OPERATING MANUAL AFT/SAMI^2-CO_2 (Sunburst Sensors, LLC)
NA	OPERATING MANUAL AFT/SAMI^2-pH (Sunburst Sensors, LLC)
NA	Oxygen Optode 4330/4330F (Aanderaa Data Instruments data sheet)
NA	SBE 16plus V2 SEACAT (Sea-Bird Electronics, Inc. manual)
NA	Spectral Absorption and Attenuation Meter ac-s User's Guide (WET Labs, Inc.)
NA	Vector Current Meter User Manual (Nortek AS)

3 Description of Interfaces

3.1 Overview

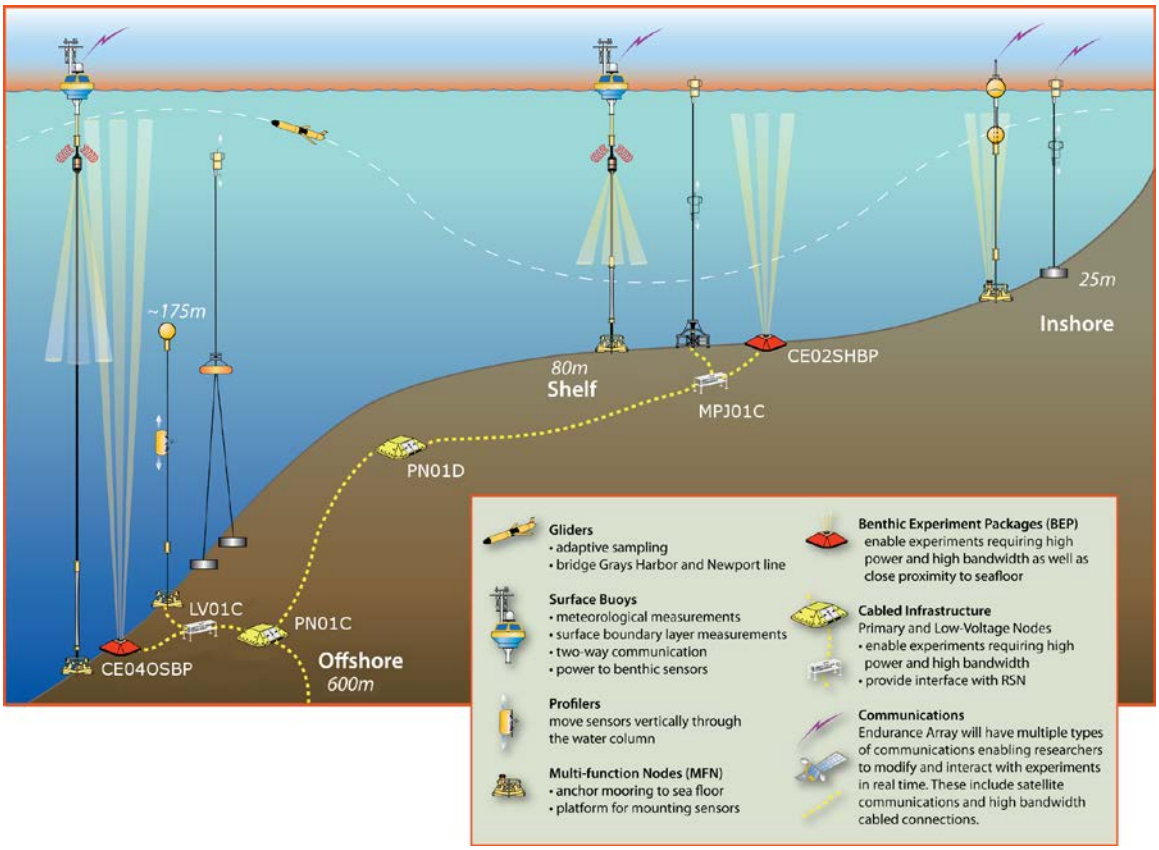

Figure 3-1 Oregon Endurance Cabled Infrastructure

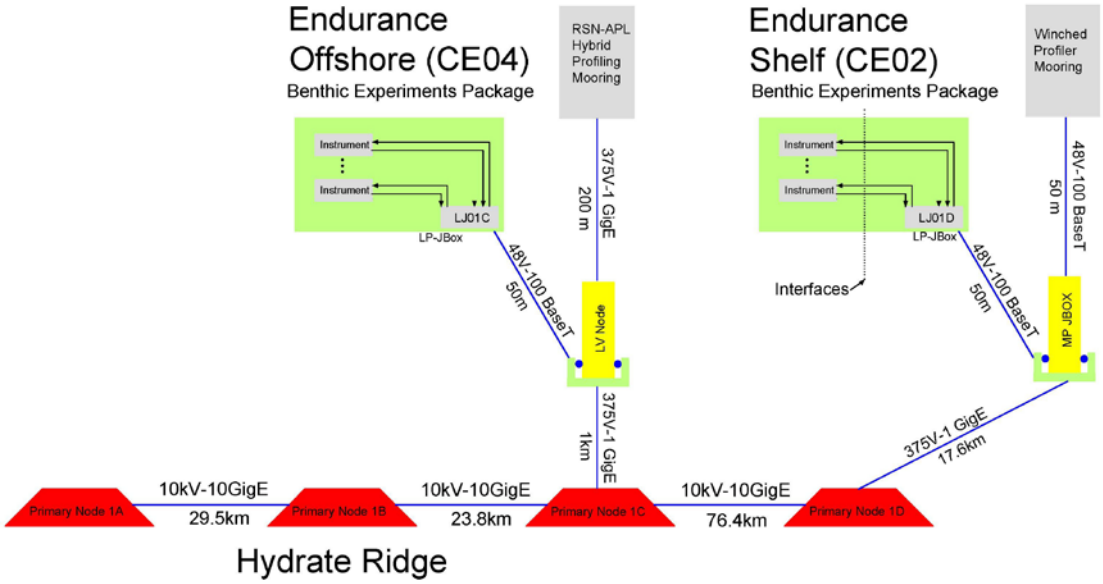

Figure 3-2 Cabled Block Diagram

The RSN Low Power Junction Box LJ01D at the Endurance Shelf site is connected to the RSN cabled infrastructure from the Primary Node PN1D through the Medium Power Node MPJ01C (Figure 3-1 and Figure 3-2). It will be located within the Endurance Shelf Benthic Experiments Package CEO2SHBP. LJ01D will supply power and communications via its 8 Low Power Instrument Ports (LP-IP) to the oceanographic instruments. These interconnections between the LJ01D and the instruments are interfaces addressed in this document.

3.2 Common Characteristics between LJ01D LP-IP to Instruments

3.2.1 Electrical

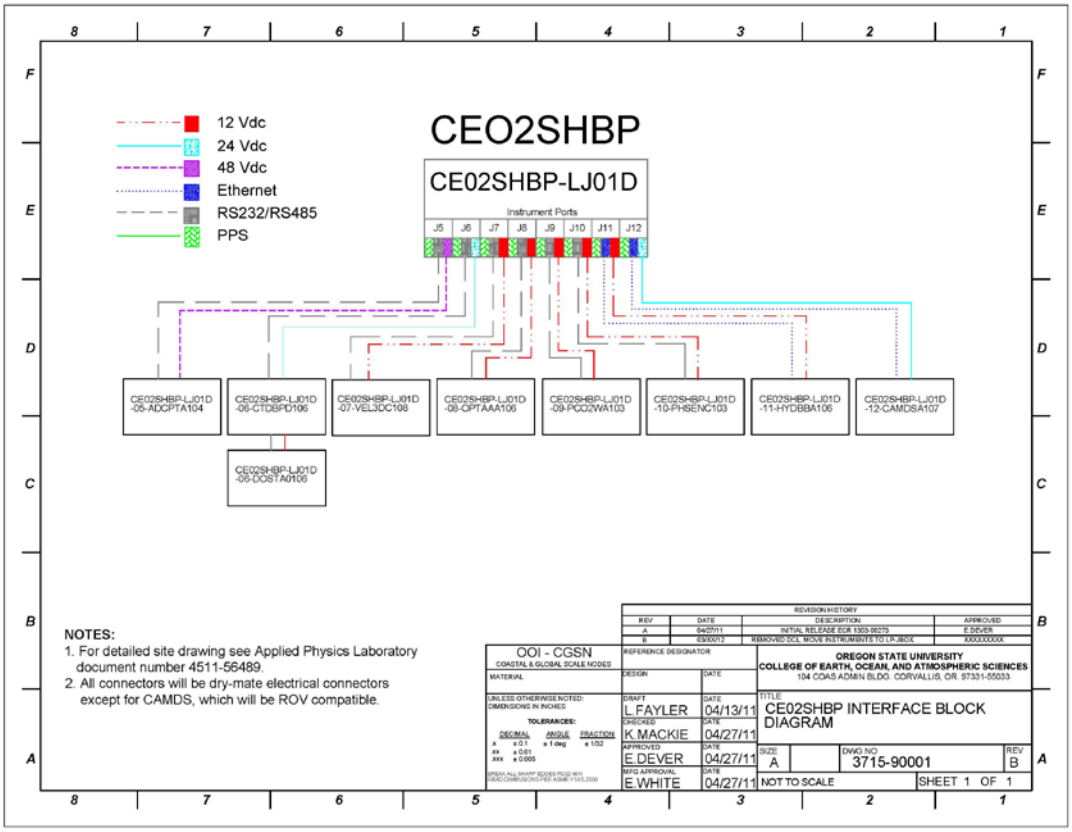

Figure 3-3 Electrical Interfaces Diagram

3.2.1.1 Power

LJ01D will provide a positive power supply to each of its eight Low Power Instrument Ports (LP-IP) with the following characteristics:

- 48, 24 or 12 Vdc will be pre-deployment configurable for each LP-IP
- Power will be provided by two-wire voltages floating free of housing, thus no connection to the seawater
- Instruments should ground all circuitry internally with no connection to seawater
- Regulated to within 1% of nominal voltage
- Supply ripple less than or equal to 1 Vp-p
- Maximum of 50 W per port
- Combined power available to all the LP-IP is no more than 170 W
- Combined inrush currents into the eight LP-IP will not exceed 10 A
- Each LP-IP will provide an Electrical Pulse Per Second timing signal

3.2.1.2 Communications

LJ01D will provide communications at each of its eight LP-IP with the following characteristics:

- Allow data to be moved from the instruments and made available to the Cyberinfrastructure (CI) in real-time
- Communications will be bi-directional
- IEEE 10/100 Base-T Ethernet, RS232, RS485 or RS422 will be pre-deployment configurable for each LP-IP

3.2.2 Mechanical

The CE02SH BEP will provide necessary mounting and bracketing for the LJO1D, as detailed in the drawings 3715-10000 BEP Assembly and 3715-10600 BEP Low Power Assembly.

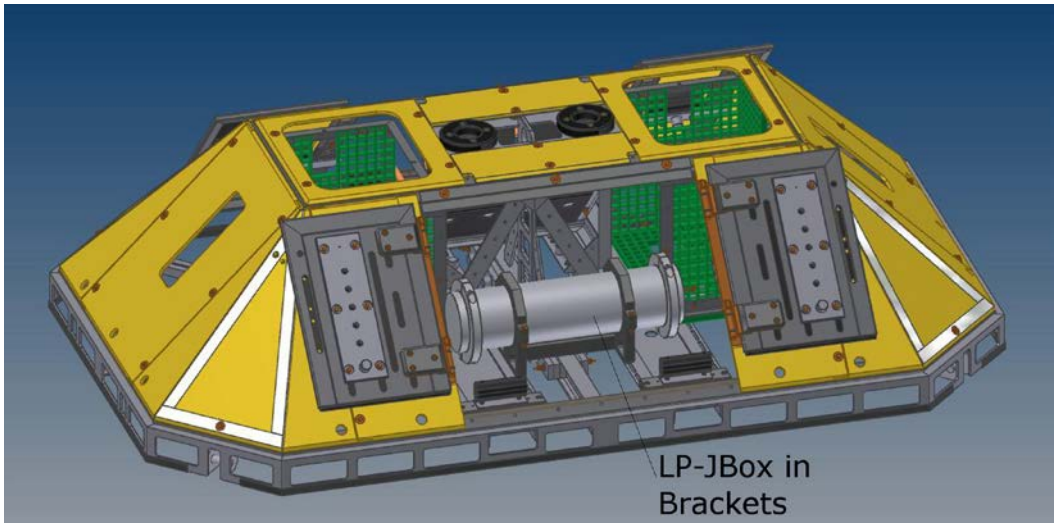

Figure 3-4 Low Power Junction Box in Benthic Experiment Package

3.2.3 Logical/Data

The details of the data/commands exchanges between the LJ01D and instruments will be provided by a separate interface document provided by RSN and CI.

3.2.4 Error Handling and Recovery

The details of the error handling and recovery exchanges between the LJ01D and instruments will be provided by a separate interface document provided by RSN and CI.

3.2.5 Privacy and Security

Does not apply to this interface.

3.3 CE02SHBP-LJ01D-05-ADCPTA104

The following are the interface details between LP-IP J05 and the Teledyne RD Instruments 300 kHz Monitor Acoustic Doppler Current Profiler (ADCP). Note LP-JBox LP-IP and Instrument pin out descriptions are as provided in vendor documentation therefore may not appear consistent between pin out tables. The connector model numbers, in the electrical pin out tables, are highlighted for example MHDL-12-FCR (4#16 8#22). The connectors for the LP-JBox and instruments listed in this document are the bulkheads for each.

3.3.1 Electrical

Pins	LP-JBOX LP-IP	Pins	Instrument
	J5 (MHDL-12-FCR (4#16 8#22))		CE02SHBP-LJ01D-05-ADCPTA104 (LPMBH-7-MP)
1	TOD+		NC
2	DGND	4	COMMUNICATION RETURN
3	PGND	7	POWER-
4	TOD-		NC
5	PPS+		NC
6	PPS-		NC
7	RTS		NC
8	TX	1	RS-232 IN
9	RX	2	RS-232 OUT
10	12V		NC
11	48V	3	POWER+
12	CTS		NC
	NC	5	CH B RS-485 IN A
	NC	6	CH B RS-485 IN B

Table 3-1 LJO1C J05 to ADCPTA104 Implementing a LPMBH connector

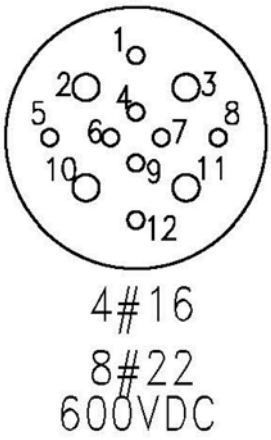

Figure 3-5 MHDL-12-FCR LP01D LP-IP Connector Pin Out

All the LP-IP connectors are the Teledyne Impulse Miniature High Density (MHDL) series underwater connectors, Figure 3-5. The connectors have a Titanium Grade 2 body, voltage rating of 600 Vdc, in a mated condition are rated for 10,000 PSI, with 4 contacts 16 AWG and 8 contacts 22 AWG.

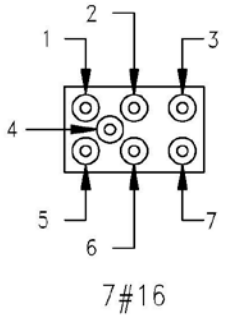

Figure 3-6 ADCPTA104 Monitor ADCP LPMPH Connector Pin Out

Teledyne RD Instruments 300 kHz Montior ADCP can be configured to use one of several connectors including the Teledyne Low Profile Impulse Mini Wet Pluggable (LPMPH) or the Micro Mini Wet Pluggable (MCBH) series bulkhead connector. For this application, a LPMPH series underwater connector is expected. The LPMPH connector is made of molded neoprene or polyurethane, voltage rating of 750 Vdc, in a mated condition rated for 10,000 PSI, all contacts are 16 AWG.

Pins	LP-JBOX LP-IP	Pins	Instrument
	J5 (MHDL-12-FCR (4#16 8#22))		CE02SHBP-LJ01D-05-ADCPTA104 (MCBH-8-MP)
1	TOD+		NC
2	DGND	4	COMMUNICATION RETURN
3	PGND	7	POWER-
4	TOD-		NC
5	PPS+		NC
6	PPS-		NC
7	RTS		NC
8	TX	1	RS-232 IN
9	RX	2	RS-232 OUT
10	12V		NC
11	48V	3	POWER+
12	CTS		NC
	NC	5	CH B RS-485 IN A
	NC	6	CH B RS-485 IN B
	NC	8	NC

Table 3-2 LJO1C J05 to ADCPTA104 Implementing a MCBH connector

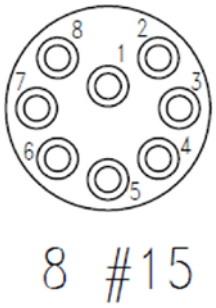

Figure 3-7 ADCPTA104 Monitor ADCP MCBH Connector Pin Out

Teledyne RD Instruments 300 kHz Montior ADCP can also be configured with the MCBH which is made of molded neoprene or polyurethane, voltage rating of 750 Vdc, in a mated condition rated for 10,000 PSI, all contacts are 18 AWG.

The Montior ADCP has a maximum inrush current of 3 A, continuous and peak power consumption are sampling dependent, but with a maximum operating power approximately 2.8 W.

Voltage supplied to the ADCP will be 48 Vdc, which is between the operating limits of the ADCP of 20 to 50 Vdc.

3.3.2 Mechanical

Does not apply to this interface.

3.3.3 Communications

The 300 kHz Montior ADCP communicates via the Electronics Industries Association (EIA) standard RS-232, with default setting of 9600 baud rate, 8 data bits, no parity, and 1 stop bit (8,N,1). The baud rate is settable between 300 to 115200, with output data in an ASCII or binary format. The input data format is in an ASCII format. Details for the communication of data and commands can be found in the RSN to CI ICD.

3.4 CE02SHBP-LJ01D-06-CTDBPD106

The following are the interface details between LP-IP J06 and the Sea-Bird Electronics, Inc.(SBE) 16*plus* V2 Seacat Conductivity/Temperature/Depth (CTD).

3.4.1 Electrical

Pins	LP-JBOX LP-IP	Pins	Instrument
	J6 (MHDL-12-FCR (4#16 8#22))		CE02SHBP-LJ01D-06-CTDBPD106 (MCBH-6-MP)
1	TOD+		NC
2	DGND		NC
3	PGND	1	Common
4	TOD-		NC
5	PPS+		NC
6	PPS-		NC
7	RTS		NC
8	TX	2	RS-232 data receive
9	RX	3	RS-232 data transmit
10	12V		NC
11	24V	6	Auxiliary power in (9-28 VDC)
12	CTS		NC
	NC	4	Pump power common (from CTD to Pump)
	NC	5	Pump power (from CTD to Pump)

Table 3-3 LJO1C J06 to CTDBPE108

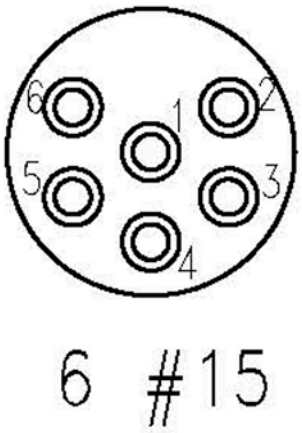

Figure 3-8 CTDBPE108 SBE 16*plus* V2 CTD Connector Pin Out

The Sea-Bird Electronics, Inc.(SBE) 16*plus* V2 CTD uses a Teledyne Micro Mini Wet Pluggable (MCBH) series underwater connector. The connector is made of molded

neoprene or polyurethane, voltage rating of 750 Vdc, in a mated condition rated for 10,000 PSI, all contacts are 15 AWG.

The SBE 16*plus* V2 CTD has a maximum inrush current of 2.0 A, continuous and peak power consumption are assumed be the same as the instrument will be sampling continuously with a maximum operating power approximately 7.5 W. The CTD will also be providing power to a SBE 5P pump and Aanderaa Data Instruments Oxygen Optode 4330, both of which are included in the inrush and operating power calculations. The Optode 4330 will be connected to the SBE 16*plus* V2 CTD J5 Auxiliary RS-232 Input port.

Voltage supplied to the CTD will be 24 Vdc, which is between its stated operating limits of 9 to 28 Vdc.

3.4.2 Mechanical

Does not apply to this interface.

3.4.3 Communications

The Sea-Bird Electronics, Inc.(SBE) 16*plus* V2 CTD communicates via the Electronics Industries Association (EIA) standard RS-232, with default setting of 9600 baud rate, 8 data bits, no parity, and 1 stop bit. The baud rate is settable between 600 to 38400, with output data in an ASCII or binary format. The input data format is in an ASCII format. Details for the communication of data and commands can be found in the RSN to CI ICD.

3.5 CE02SHBP-LJ01D-06-DOSTA0106

The following are the interface details between the Sea-Bird Electronics, Inc.(SBE) 16*plus* V2 Seacat Conductivity/Temperature/Depth (CTD) and the AAnderaa Data Instruments Oxygen Optode 4330. There is no direct interface to the LP-JBox but this interface between these instruments is included here for comprehensiveness. Note the contract for the Optode 4330 instrument has not been awarded. This particular instrument is an exemplar, so the exact power requirements and connector are not known. It is assumed that the instrument power requirements and type of communications should not be so radically different as to invalidate the following information. This exemplar functions as a placeholder until this document can be updated with finalized selection for the instrument measuring stable O_2 concentrations.

3.5.1 Electrical

Pins	Instrument	Pins	Instrument
	CE02SHBP-LJ01D-06-CTDBPD106 (MCBH-4-MP)		CE02SHBP-LJ01D-06-DOSTA0106 (Vendor Provided)
1	Common	2	Gnd
2	RS-232 Data transmit to RS-232 sensor	7	RS232 RXD
3	RS-232 Data receive from RS-232 sensor	8	RS232 TXD
4	Power to RS-232 sensor (10.5-11 Vdc max 500 mA)	1	Positive Supply (5-14 Vdc)
	NC	3	NCG
	NC	4	CAN_H
	NC	5	NCE
	NC	6	Do Not Use
	NC	9	NCR
	NC	10	CAN_L

Table 3-4 CTDBPD106 J5 to DOSTA0106

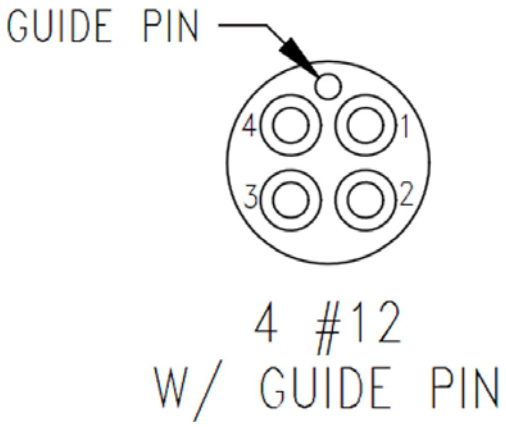

Figure 3-9 CTDBPD106 SBE CTD 16*plus* V2 Seacat J5 Connector Pin Out

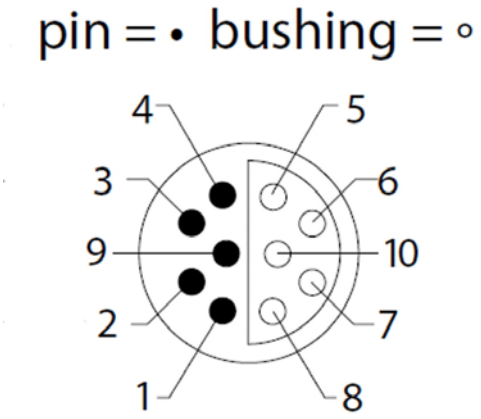

Figure 3-10 DOSTA0106 AAnderaa Data Instruments Oxygen Optode 4330

The Optode 4330 will be connected to the SBE 16*plus* V2 CTD J5 Auxiliary RS-232 Input port. The Sea-Bird Electronics, Inc.(SBE) 16*plus* V2 CTD uses a Teledyne Micro Mini Wet Pluggable (MCBH) series underwater connector. The connector is made of molded neoprene or polyurethane, voltage rating of 750 Vdc, in a mated condition rated for 10,000 PSI, all contacts are 15 AWG. The AAnderaa Data Instruments Oxygen Optode 4330 uses an in-house manufactured bulkhead with a LEMO 10 pole insert scotchcast into a receptacle, rated for 6000 m.

The Optode 4330 has a maximum inrush current of 100 mA, continuous and peak power consumption are assumed be the same as the instrument will be sampling continuously with a maximum operating power approximately 0.6 W.

The CTD is specified for supplying 10.5 to 11 Vdc at a maximum of 500 mA, which is between the Optode 4330 stated operating limits of 5 to 14 Vdc and 100 mA maximum current.

3.5.2 Mechanical

Does not apply to this interface.

3.5.3 Communications

The Sea-Bird Electronics, Inc.(SBE) 16*plus* V2 CTD communicates via the Electronics Industries Association (EIA) standard RS-232, with default setting of 9600 baud rate, 8 data

bits, no parity, and 1 stop bit. The Optode baud rate must be set to the same as the CTD, which is the Optode default. The Optode output data in an ASCII. The input data format is in an ASCII format. Details for the communication of data and commands can be found in the CG to CI ICD.

3.6 CE02SHBP-LJ01D-07-VEL3DC108

The following are the interface details between LP-IP J07 and Nortek AS Vector 3-D Single Point Current Meter.

3.6.1 Electrical

Pins	LP-JBOX LP-IP	Pins	Instrument
	J7 ((MHDL-12-FCR (4#16 8#22))		CE02SHBP-LJ01D-07-VEL3DC108 (LPMBH-8-FS)
1	TOD+		NC
2	DGND	5	RS232 ground
3	PGND	1	power ground
4	TOD-		NC
5	PPS+	6	Sync In
6	PPS-		NC
7	RTS		NC
8	TX	4	RS232 Rx
9	RX	3	RS232 Tx
10	12V	2	power positive
11	24/48V		NC
12	CTS		NC
	NC	7	sync out
	NC	8	not used

Table 3-5 LJO1D J07 to VEL3DC108

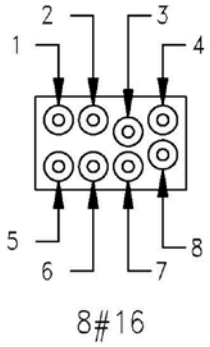

Figure 3-11 VEL3DC108 Nortek AS Vector Current Meter Connector Pin Out

The Norteck Vector uses a Teledyne Low Profile Impulse Mini Wet Pluggable (LPMPH) series underwater connector. The connector is made of molded neoprene or polyurethane, voltage rating of 600 Vdc, in a mated condition rated for 10,000 PSI, all contacts are 16 AWG.

The Nortek AS Vector has a maximum inrush current of 2.5 A, continuous sampling power will be approximately 1 W and peak power consumption is 1.5 W.

Voltage supplied to the Nortek will be 12 Vdc, which is between the operating limits of the of 9 to 18 Vdc.

3.6.2 Mechanical

Does not apply to this interface.

3.6.3 Communications

The Nortek AS Vector communicates via the Electronics Industries Association (EIA) standard RS-232, with default setting of 19200 baud rate, 8 data bits, no parity, and 1 stop bit. The baud rate is settable between 300 to 115200, with output data in an ASCII format. The input data format is in an ASCII format. Details for the communication of data and commands can be found in the RSN to CI ICD.

3.7 CE02SHBP-LJ01D-08-OPTAAA106

The The following are the interface details between LP-IP J08 and the WET Labs, Inc AC-S spectral resolution of in-situ absorption and beam attenuation coefficients. Note the contract for this instrument has not been awarded. This particular instrument is an exemplar, so the exact power requirements and connector are not known. It is assumed that the instrument power requirements and type of communications should not be so radically different as to invalidate the following. This exemplar functions as a placeholder until this document can be updated with finalized optical instrument selection.

3.7.1 Electrical

Pins	LP-JBOX LP-IP	Pins	Instrument
	J8 (MHDL-12-FCR (4#16 8#22))		CE02SHBP-LJ01D-08-OPTAAA106 (MCBH-6-MP)
1	TOD+		NC
2	DGND		NC
3	PGND	1	Common
4	TOD-		NC
5	PPS+		NC
6	PPS-		NC
7	RTS		NC
8	TX	2	RS-232 Receive
9	RX	5	RS-232 Send to Host
10	12V	4	Voltage in
11	24/48V		NC
12	CTS		NC
	NC	3	RS-485+
	NC	6	RS-485-

Table 3-6 LJO1D J08 to OPTAAA106

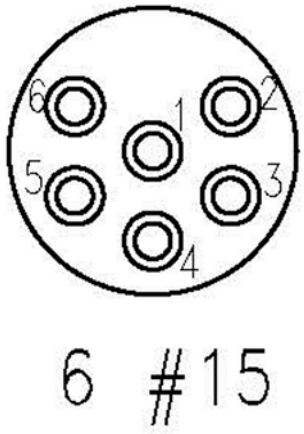

Figure 3-12 OPTAAA106 WET Labs Inc. AC-S Connector Pin Out

The WET Labs Inc. AC-S uses a Teledyne Micro Mini Wet Pluggable (MCBH) series underwater connector. The connector is made of molded neoprene or polyurethane, voltage rating of 750 Vdc, in a mated condition rated for 10,000 PSI, all contacts are 15 AWG.

The WET Labs Inc. AC-S has a maximum inrush current of 2.7 A, continuous and peak power consumption are assumed be the same as the instrument will be sampling continuously with a maximum operating power approximately 11.8 W. The AC-S will also be providing power to a SBE 5P pump which is included in the inrush current and operating power calculations. The pump has not been selected and may be a SBE 5M-1 which requires less power than the 5P.

Voltage supplied to the AC-S will be 12 Vdc, which is between the operating limits of 10 to 35 Vdc. Note the voltage supplied to the AC-S is directly supplied to the SBE 5P which has operating limits of 10 to 18 Vdc.

3.7.2 Mechanical

Does not apply to this interface.

3.7.3 Communications

The WET Labs Inc. AC-S communicates via the Electronics Industries Association (EIA) standard RS-232, with default setting of 11520 baud rate, 8 data bits, no parity, and 1 stop bit. The baud rate is not adjustable. Output data is in a binary format. Details for the communication of data and commands can be found in the RSN to CI ICD.

3.8 CE02SHBP-LJ01D-09-PC02WA103

The following are the interface details between LP-IP J09 and the Sunburst Sensors, LLC. SAMI^2-C0$_2$ partial pressure of C0$_2$ in water.

3.8.1 Electrical

Pins	LP-JBOX LP-IP	Pins	Instrument
	J9 (MHDL-12-FCR (4#16 8#22))		CE02SHBP-LJ01D-09-PCO2WA103 (MCBH-6-MP)
1	TOD+		NC
2	DGND	1	COM Ground

Pins	LP-JBOX LP-IP	Pins	Instrument
3	PGND	2	External Power Ground
4	TOD-		NC
5	PPS+		NC
6	PPS-		NC
7	RTS	5	RTS
8	TX	4	Rx
9	RX	3	Tx
10	12V	6	External Power High
11	24/48V		NC
12	CTS		NC

Table 3-7 LJO1D J09 to PC02WA103

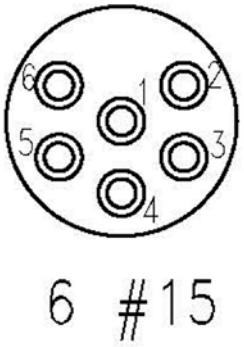

Figure 3-13 PC02WA103 Sunburst Sensors, LLC SAMI^2-C0$_2$ Connector Pin Out

The Sunburst Sensors, LLC. SAMI^2-C0$_2$ uses a Teledyne Micro Mini Wet Pluggable (MCBH) series underwater connector. The connector is made of molded neoprene or polyurethane, voltage rating of 750 Vdc, in a mated condition rated for 10,000 PSI, all contacts are 15 AWG.

The Sunburst Sensors, LLC. SAMI^2-C0$_2$ has a maximum inrush current of 0.5 A, continuous power consumption will be approximately 4 W with peak power consumption 5.4 W.

Voltage supplied to the SAMI^2-C0$_2$ will be 12 Vdc, which is between the operating limits of 6 to 13.5 Vdc.

3.8.2 Mechanical

Does not apply to this interface.

3.8.3 Communications

The Sunburst Sensors, LLC. SAMI^2-C0$_2$ communicates via the Electronics Industries Association (EIA) standard RS-232, with default setting of 57600 baud rate, 8 data bits, no parity, and 1 stop bit. The baud rate is not adjustable. Output data is in a binary format. Details for the communication of data and commands can be found in the RSN to CI ICD.

3.9 CE02SHBP-LJ01D-10-PHSENC103

The following are the interface details between LP-IP J10 and the Sunburst Sensors, LLC. SAMI^2-*p*H total hydrogen ion scale in seawater.

3.9.1 Electrical

Pins	LP-JBOX LP-IP	Pins	Instrument
	J10 (MHDL-12-FCR (4#16 8#22))		CE02SHBP-LJ01D-10-PHSENC103 (MCBH-6-MP)
1	TOD+		NC
2	DGND	1	COM Ground
3	PGND	2	External Power Ground
4	TOD-		NC
5	PPS+		NC
6	PPS-		NC
7	RTS	5	RTS
8	TX	4	Rx
9	RX	3	Tx
10	12V	6	External Power High
11	24/48V		NC
12	CTS		NC

Table 3-8 LJO1D J10 to PHSENC103

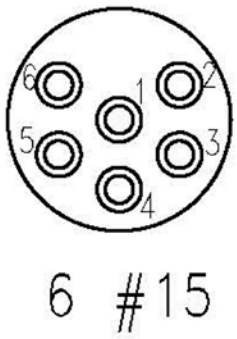

Figure 3-14 PHSENC103 Sunburst Sensors, LLC SAMI^2-*p*H Connector Pin Out

The Sunburst Sensors, LLC. SAMI^2-*p*H uses a Teledyne Micro Mini Wet Pluggable (MCBH) series underwater connector. The connector is made of molded neoprene or polyurethane, voltage rating of 750 Vdc, in a mated condition rated for 10,000 PSI, all contacts are 15 AWG.

The Sunburst Sensors, LLC. SAMI^2-*p*H has a maximum inrush current of 0.5 A, continuous power consumption will be approximately 4 W with peak power consumption 5.4 W.

Voltage supplied to the SAMI^2-*p*H will be 12 Vdc, which is between the operating limits of 6 to 13.5 Vdc.

3.9.2 Mechanical

Does not apply to this interface.

3.9.3 Communications

The Sunburst Sensors, LLC. SAMI^2-*p*H communicates via the Electronics Industries Association (EIA) standard RS-232, with default setting of 57600 baud rate, 8 data bits, no parity, and 1 stop bit. The baud rate is not adjustable. Output data is in a binary format. Details for the communication of data and commands can be found in the RSN to CI ICD.

3.10 CE02SHBP-LJ01D-11-HYDBB106

The following are the interface details between LP-IP J11 and the Instrument Concepts IC Listen HF. Note the contract for this instrument has not been awarded. This particular instrument is an exemplar, so the exact power requirements and connector are not known. It is assumed that the instrument power requirements and type of communications should not be so radically different as to invalidate the following. This exemplar functions as a placeholder until this document can be updated with the finalized broadband passive hydrophone selection.

3.10.1 Electrical

Pins	LP-JBOX LP-IP	Pins	Instrument
	J10 (MHDL-12-FCR (4#16 8#22))		CE02SHBP-LJ01D-11-HYDBBA106 (MCBH8M)
1	TOD+		NC
2	DGND		NC
3	PGND	1	DC-
4	TOD-		NC
5	PPS+	8	SYNC+
6	PPS-	2	SYNC-
7	TX+	6	ETH_RX+
8	TX-	5	ETH_ RX-
9	RX+	4	ETH_ TX+
10	12V		NC
11	24V	7	DC+
12	RX-	3	ETH_ TX-

Table 3-9 LJO1D J1D to HYDBBA106

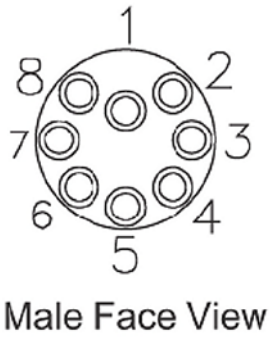

Figure 3-15 HYDBB106 Instrument Concepts, IC Listen HF Connector Pin Out

The Instrument Concepts IC Listen HF uses a SubConn Micro series underwater connector. The connector is made of molded neoprene, voltage rating of 300 Vdc, in a mated condition rated for 10,000 PSI, contacts are 22 AWG.

The Instrument Concepts IC Listen HF has a maximum inrush current of 0.025 A, continuous and peak power consumption are assumed be the same as the instrument will be sampling continuously with a maximum operating power approximately 0.5 W.

Voltage supplied to the IC Listen HF will be 24 Vdc, which is between the operating limits of 12 to 24 Vdc.

3.10.2 Mechanical

Does not apply to this interface.

3.10.3 Communications

The Instrument Concepts IC Listen HF communicates via the IEEE 802.3 100BASE-TX. Output data is in a binary format. Details for the communication of data and commands can be found in the RSN to CI ICD.

3.11 CE02SHBP-LJ01D-12-CAMDSA107

The following are the interface details between LP-IP J12 and the Kongsberg oe14-408 with flashgun. Note the contract for this instrument has not been awarded. This particular instrument is an exemplar, so the exact power requirements and connector are not known. It is assumed that the instrument power requirements and type of communications should not be so radically different as to invalidate the following. This exemplar functions as a placeholder until this document can be updated with finalized still camera with strobe selection.

3.11.1 Electrical

Pins	LP-JBOX LP-IP	Pins	Instrument
	J11 (MHDL-12-FCR (4#16 8#22))		CE02SHBP-LJ01D-12-CAMDSA107 (Burton 5506-1508)
1	TOD+		
2	DGND		
3	PGND	1	0V +Screen
4	TOD-		
5	PPS+		
6	PPS-		
7	TX+	*	RX+
8	TX-	*	RX-
9	RX+	*	TX+
10	12V		
11	24V	2	Power
12	RX-	*	TX-
	NC	3	Video

Table 3-10 LJO1D J12 to CAMDSA107

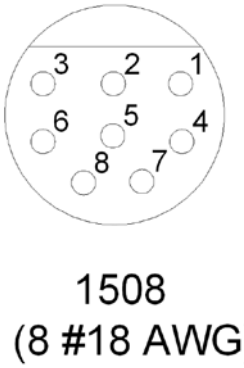

Figure 3-16 CAMDSA107 Kongsberg oe14-408 Connector Pin Out

The Kongsberg oe14-408 uses a COOPER Interconnect Burton 5500-1508 series underwater connector. The connector is made of molded elastomer, voltage rating of 600 Vdc, in a mated condition rated for 10,000 PSI, all contacts are 18 AWG. Note the Kongsberg has not finalized the Ethernet connection design which is indicated with an * in Table 3-10.

The Kongsberg oe14-408 with oe11-242 flashgun has a maximum inrush current of 1.5 A, peak power consumption of 36 W and a continuous power consumption of 13 W. The maximum power consumption occurs during the charge and discharge cycle of the flashgun.

Voltage supplied to the oe14-408 will be 24 Vdc, which is between the operating limits of 16 to 24 Vdc.

3.11.2 Mechanical

Does not apply to this interface.

3.11.3 Communications

The Kongsberg oe14-408 communicates via the IEEE 802.3 100BASE-T standard. Output data is in a binary format. Details for the communication of data and commands can be found in the RSN to CI ICD.

4 Notes

The purchase of some instruments as previously noted has not been finalized so the information for these are based on exemplar instruments. The information on inrush currents, maximum and operating power for all the instruments are based on vendor supplied information, and does not have outside verification.

5 Appendices

5.1 Appendix A: CE02SHBP Power and Data Budget

Unique Name	Instruments	Inrush Current	Sample Freq	T1 Sampling Duration	Number Samples during T1	Ts1 (turn on Time)	T2 (Sample Period)=T 1+Ts1	Non-Sampling Period	Supply Voltage	Sampling Current	Quiescent Current	Sampling Power	Quiescent Power	Avg Power Per sample period	Sample Periods per 24H	Bytes per Sample	Bytes per 24H
	Exemplar (unknown) are shaded	A	Hz (1/S)	S		S	S	S	(V)	(A)	(A)	(W)	(W)	(W)		(bytes/sample)	Kb
CE02SHBP-LJ01D-05-ADCPTA104 Velocity_profile_300m	Work Horse Monitor 300kHz ADCP Teledyne RDI	3.00	0.02	50	1	0	50	0	48	0.058	4.00E-06	2.789	1.92E-04	2.789	1728	3333	5624
CE02SHBP-LJ01D-06-CTDBPD106 CTD_bottom_pumped	16*plus* V2 Seacat Sea-Bird Electronics, Inc	1.90	1	60	60	0	60	0	24	0.222	2.00E-05	5.326	4.80E-04	5.326	1440	15	1266
CE02SHBP-LJ01C-06-DOSTA0106 oxygen_dissolved_stable	Oxygen Optode 4330 Aanderaa Data Instruments	0.10	1	60	60	0	60	0	12	0.050	5.00E-03	0.600	6.00E-02	0.600	1440	20	1688
CE02SHBP-LJ01D-07-VEL3DC108 Velocity_point_3D_turb	Vector Nortek AS	2.50	8	60	480	0	60	0	12	0.089	2.5E-08	1.068	3.00E-07	1.068	1440	27.5	18563
CE02SHBP-LJ01D-08-OPTAAA106 attenuation_absorption_optical	AC-S WET Labs Inc.	2.63	4	60	240	0	60	0	12	0.983	0	11.800	0.00E+00	11.800	1440	644	217350
CE02SHBP-LJ01D-09-PCO2WA103 pCO2_water	SAMI^2-CO_2 Sunburst Sensors, LLC	0.45	2.78E-04	2	5.56E-04	300	3600	3298	12	0.336	3.00E-05	4.032	3.60E-04	0.339	24	32	4.17E-04
CE02SHBP-LJ01D-10-PHSENC103 pH_stable	SAMI^2-*p*H Sunburst Sensors, LLC	0.45	5.56E-04	2	1.11E-03	180	1800	1618	12	0.333	3.00E-05	3.996	3.60E-04	0.404	48	231	1.20E-02
CE02SHBP-LJ01D-11-HYDBBA106 Hydrophone_BB_passive	instrument concepts IC LISTEN HF	0.03	5.00E+05	60	3.00E+07	0	60	0	24	0.021	0	0.500	0.00E+00	0.500	1440	2	84375000
CE02SHBP-LJ01D-12-CAMDSA107 camera_digital_still_strobe	oe14-408 w/flashgun Konsberg	1.50	0.05	60	3	30	3600	3510	12	1.100	0.05	13.200	6.00E-01	0.915	24	1.00E+07	703125

Max Inrush current on LJ01D	5.06
Sampling Current supplied by LJ01D	3.192
Avg Sampling Watts supplied by LJ01D	23.740
Max Sampling Watts supplied by LJ01D	43.310
Tx maximum Kbits/s	7900

Notes:

Frequency of ADCPT and HYDBB may interfere if sampling at the same time

Inrush current is based on not staggering turn on time, which shouldn't be done

Data for HYDBB may be processed reducing the amount of data by approximately 300 times.