Ocean Sensor Systems, Inc.

Wave Staff III, OSSI-010-008
With 0-5V & RS232 Output and
A Self Grounding Coaxial Staff

General Description

The OSSI-010-008 Wave Staff III is a water level sensor that combines a rugged, sealed, waterproof package, low power microprocessor and a temperature stable, sensing circuit. The Wave Staff III operates from 5.5V to 40VDC and has analog and RS232 serial data outputs. The serial data output string contains the water level & temperatures in ASCII or binary format. The Wave Staff III can be programmed to free run or sample on demand. It is easily programmed via a PC serial port using our Wave Staff Interface Software. The Wave Staff III has two new features. The Coaxial Cable Staff eliminates the need for a separate water ground wire and both Staff & electrical cord are changeable.

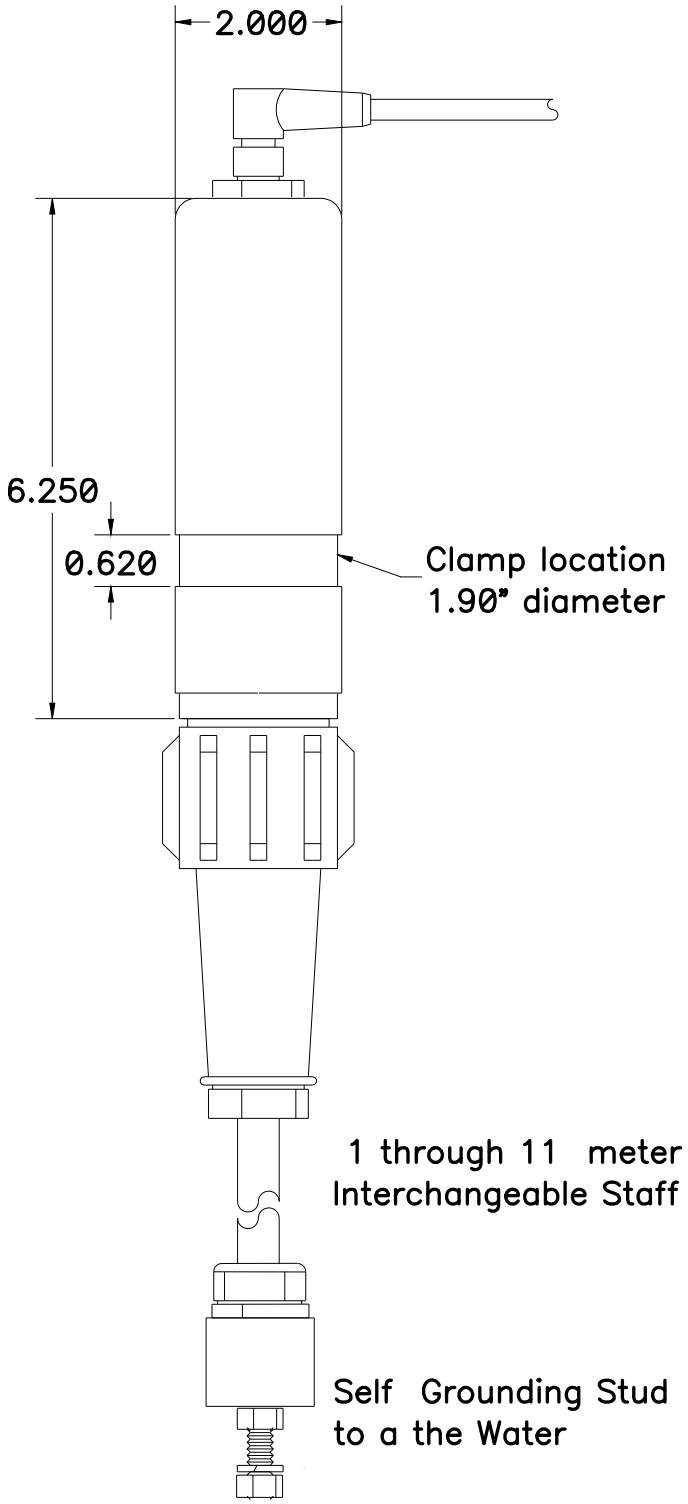
Features

- **Accurate Wave, Tide and Water Level Sensor**
- **Programmable 0-5V or RS232 Data Out**
- **Programmable Sample Rate Up to 30Hz**
- **Sample on Command for Simultaneous Sampling**
- **Programmable Air Temperature Serial Data Out**
- **Rugged Sealed Waterproof Design**
- **Changeable Teflon Coated Sensor Cable up to 11 meters**
- **Wide Input Voltage 5.5V to 40VDC**
- **Low Power Consumption 18 mA**
- **Data Accuracy ± 0.25%, 20-80% of Full Scale**
- **Data Accuracy ± 1.0%, 0-100% of Full Scale**
- **Data Resolution 0.025%**
- **Data Linearity ± 0.5%**

Ordering Information

Item Description	Staff Type	Part Number
1/2 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-0.5C
1 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-1C
1.5 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-1.5C
2 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-2C
3 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-3C
4 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-4C
5 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-5C
6 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-6C
7 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-7C
8 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-8C
9 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-9C
10 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-10C
11 Meter Cable Staff III	Teflon Coaxial Cable	OSSI-010-008-11C

Dimensions and Wire Configuration



WIRE COLOR CODE	
Black / Red	Signal and Power Ground
Green/Yellow	0 to 5V Analog Output
Red	Power In 5.5V - 40V
White / Red	Receive Data to PC
Yellow / Red	Transmit Data from PC

Electrical Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage		5.5		40	V
Input Current			18	23	mA
Data Accuracy	20-80% of Full Scale (3)			0.25	±%
Data Accuracy	0-100% of Full Scale			1.0	±%
Data Resolution	Percent of Full Scale			0.025	%
Data Linearity	Percent of Full Scale			0.5	± %
Analog Out	(Note 1)	0		5	V
Analog Out Noise, Peak	% FS (Note 2) 0-1MHz		5		mV
RS232 Data Out Noise, Peak	% FS		0.025		%

Note 1: Accuracy is guaranteed from 8mV to 4.9V with => 5K ohms load.
Note 2: Serial Data deselected.
Note 3: The unit may need to be calibrated in-situ to meet the Data Accuracy

Mechanical Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Units
Environment	Waterproof		30		meters
Cable Tension		0	50	500	Newtons

Data and Timing Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Units
Sync Sample Delay	Command to Start of Data Returned		6	7	ms
Free Run Sample Frequency		10		30	Hz
Serial Data Baud Rate			9.6		Kbaud
Serial Data	0 to Full Scale 1 thru. 11 Meter Staff	0000		4095	counts
Temperature Resolution	Per count from 0°C		0.0625		°C
Temperature Range		-10		+65	°C
Temperature Accuracy	-10°C to 65°C -40°C to 65°C			0.5 2.0	± °C
Temp. Update Rate			1		Hz.

Communications and Configuration:

The Wave Staff III may be configured with a PC's RS232 serial port. Use our convenient programming software or a Hyper Terminal with the following commands. The serial port settings on your computer are as follows: 9600 baud, 8 data bits, parity none, 1 stop bit, and no flow control.

Commands are two bytes and Acknowledgements are 4 bytes

Commands:
st = Stop running sample routine and wait for command instructions.
w = Write configuration data to Wave Staff from PC.
r = Read back configuration data to PC.
i = Read back ID number to PC.
g = Go run main sampling routine.

Acknowledgements:
STOK = Acknowledge Stop running command and wait for command instruction.
WOK = Acknowledge Write configuration and wait to receive data from PC.
ROK = Acknowledge Transmit configuration and transmit configuration data to PC.
IOK = Acknowledge ID Command and transmit ID (serial) number to PC.
GOK = Acknowledge go command and go run main sample and store data routine.
BAD = Receive failure or check sum on configuration data error
DOW = Do, write configure Wave Staff. (Wave Staff has not been configured)
DOK = Data Ok, Received configuration string with correct check sum

Monitoring the sampled data:
The sampled data may be monitored via the RS232 serial port if the configuration control byte is set to enable the RS232 port:
Example with Air Temperature enabled:
2345 +0416
2345 +0416
: :
2345 +0416
Example without Air Temperature enabled:
2345
2345
:
2345

Sync Mode Operation:
In Sync Mode the unit will transmit a dot when ready to receive a sample command. The Sample Commands may be either g or any two characters other than g.

1. The g command returns the sensor data first, a line end character second and a dot to indicate it's ready for the next sample command third.
2. The any character command initiates a sample with any key. Then a > is returned indicating the sampled data is ready. A second character must now be sent to receive the sampled data.

Configuring the Wave Staff III:

To Configure the Wave Staff a 44 comma separated 2 ASCII character string must be sent to the Wave Staff.
Configuration String, Comma Delimited, Transmitted via RS232 serial port to Wave Staff

Offset	Length & Type	Name	Range and Description
00h	3 ASCII bytes	Sensor Type	01, = Wave Staff version D
03h	3 ASCII bytes	Staff length Counter	00, to FF, Hex value determined by Staff Length, See Table below "Staff Length Configuration values"
06h	3 ASCII bytes	Staff length Prescaler	XX, Hex value determined by Staff Length, See Table below "Staff Length Configuration values"
09h	6 ASCII bytes	Gain Correction	00,00, to FF,FF, 16 bit unsigned Hex value, Gain correction value 1000 Hex = 0% 119A Hex = +10% 0E66 Hex = -10%
0Fh	6 ASCII bytes	Zero Correction	80,00, to 7F,FF, 16bit Sign 2s comp. Hex value, Zero correction value 00,00, = 0 % 00,05, = +5 counts FF,FB = 5 counts, Correction is 1 for 1
15h	3 ASCII bytes	Sample Frequency	02, or 05, or 0A, or 14, or 1E, Hex. Selects Sample Frequency 02, or 05, or 10, or 20, or 30 Hz
18h	24 ASCII bytes	(reserved)	00,00,00,00,00,00,00,00, = Reserved space, 8 comma delimited 3 ASCII char.
33h	27 ASCII bytes	(reserved)	00,00,00,00,00,00,00,00,00, = Reserved space, 9 comma delimited 3 ASCII char.
4Eh	51 ASCII Bytes	(reserved)	00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, = Reserved space, 17 comma delimited 3 ASCII char.
7Eh	3 ASCII bytes	Control Byte	See Control Byte Table below
81h	3 ASCII bytes	Check Sum	00, to FF, Value is the sum of the Hex values in offset 00h to 81h (Note: Treat all Dec. values as Hex Values)

Staff Length Configuration values for Coax Cable Staff

Staff type	Staff Length Meters	Staff Length Counter Hex Value at offset address 03h	Staff Length Prescaler Hex Value at offset address 06h
Coax Cable Staff	0.25	C7	2
Coax Cable Staff	0.5	C7	1
Coax Cable Staff	1	C7	0
Coax Cable Staff	1.5	85	0
Coax Cable Staff	2	C7	8
Coax Cable Staff	2.5	9F	8
Coax Cable Staff	3	85	8
Coax Cable Staff	3.5	72	8
Coax Cable Staff	4	64	8
Coax Cable Staff	4.5	58	8
Coax Cable Staff	5	50	8
Coax Cable Staff	5.5	48	8
Coax Cable Staff	6	42	8
Coax Cable Staff	6.5	3D	8
Coax Cable Staff	7	39	8
Coax Cable Staff	7.5	35	8
Coax Cable Staff	8	32	8
Coax Cable Staff	8.5	2F	8
Coax Cable Staff	9	2C	8
Coax Cable Staff	9.5	2A	8
Coax Cable Staff	10	28	8
Coax Cable Staff	10.5	26	8
Coax Cable Staff	11	24	8

Staff Length Configuration values for Coax Rod Staff

Staff type	Staff Length Meters	Staff Length Counter Hex Value at offset address 03h	Staff Length Prescaler Hex Value at offset address 06h
Coax Rod Staff	0.5	A3	2
Coax Rod Staff	1	A3	1
Coax Rod Staff	1.5	6D	1
Coax Rod Staff	2	A3	0

Sample 44 comma separated 2 ASCII character Configuring string:

Example: 3 meter Staff, 20Hz sample rate, free run mode, air water temp enabled, RS232 enabled, ASCII data , High Low Alarm outputs enabled. 01,3E,08,10,8C,FF,67,14,00,00,00,00,00,00,00,00,03,0B,B8,0B,54,03,E8,04,4C,00,00,00,00,00,00, 00,00,00,00,00,00,00,00,00,00,00,3A,7F

Control Byte	
Bit 7	0 = N.A.
Bit 6	1 = Sync mode: sensor waits for command via RS232
	0 = Free Run: Sensor samples at selected sample frequency
Bit 5	1 = Enable analog output 0 - 5V
	0 = Disable analog output
Bit 4	1 = Air Temp. enabled
	0 = Air Temp disabled
Bit 3	0 = N.A.
Bit 2	0 = 9600 baud, default
Bit 1	1 = RS232 output enabled
	0 = RS232 output disabled
Bit 0	1 = BIN Data format
	0 = ASCII Data format.