Conductivity Sensor 3919/4119/4120

D344 - May 2011

4119

4120

3919

**Conductivity Sensor 3919
Conductivity/Temperature Sensor 4119
Conductivity Sensor with analog output 4120**
are compact fully integrated sensors for measuring the electrical conductivity of seawater. The 3919 model is designed to be mounted directly on the top-end plate of RCM9/11 and RDCP as well as for stand alone operation via the SR10 or RS-232 interface. The 4119 model can be connected via cable to a AADI SR10/VR22 Data logger, and the 4120 model provides analog output to third party loggers.

Features of Conductivity 3919/4119/4120:

- *Smart sensor technology - provides calibrated data directly*

- *Real-time integrated calculation of salinity, density and sound of speed*

- *Low maintenance needs*

- *Easy functionallity check*

- *3 depth ranges, maximum 6000 meter*

- *Internal pressure never exceeds 1 bar therefor electronics and sensors are unaffected by sea depth*

- *Output format: SR10, RS-232, Analog 0-5V/4-20mA*

Conductivity is a key parameter for in-situ determination of several fundamental physical properties of seawater. For seawater, the ability to conduct electrical current is mostly dependent on temperature and the amount of inorganic dissolved solids. This means that, together with temperature and depth information, a good estimate of the salinity may be determined. Salinity is defined as the concentration of dissolved solids.

The Conductivity Sensors are based on an inductive principle. This provides for stable measurement without electrodes that are easily fouled and may wear out in the field.

Utilization of miniature components has made it possible to integrate all the required electronics. A digital signal processor calculates salinity, density and speed of sound. The salinity and density are calculated according to the UNESCO International Equation of State (IES 80).

The Conductivity Sensor 3919SW/3919IW/3919DW outputs data in both RS-232 and Aanderaa SR10 format. 4119 outputs SR10 format, while 4120 has analog output as well as RS-232.

All sensors are available in A and B versions; version B has enhanced accuracy compared to version A. Additionally, sensor 3919 is available in three depth ratings as well: 6000m (3919DW; Deep Water), 2000m (3919IW; Intermediate Water) and 300 m (3919SW; Shallow Water).

Conductivity Sensor 4119AIW, 4119BIW, 4120AIW and 4120BIW are designed to operate down to 2000 meter. 4119ASW, 4119BSW, 4120ASW and 4120BSW are designed for 300 meter. 4119 is designed for use with AADI Sensor disk. 4119 can not be used with CSP (Cylindrical Sealing Plug).

In RS-232 mode the output is: Conductivity in mS/cm, Temperature in °C, as well as calculated Salinity, Density and Speed of sound .

Two SR10 and analog outputs channels are available; one of the outputs can be configured to present Conductivity, Salinity, Density or Speed of Sound, while the other output presents the temperature measurement. The user may configure the range on both SR10 and analog outputs. This allows for a possibility to zoom in on the range of interest to obtain better resolution.

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Specifications

PARAMETER	CONDUCTIVITY SENSOR 3919ASW/3919AIW/3919ADW 3919BSW/3919BIW/3919BDW	CONDUCTIVITY SENSOR 4119/4119ASW/4119AIW 4119BSW/4119BIW	CONDUCTIVITY SENSOR 4120ASW/4120AIW 4120BSW/4120BIW	
CONDUCTIVITY				
Measuring Range:	0-7.5 S/m (0-75 mS/cm)[1]	0-7.5 S/m (0-75 mS/cm)[1]	0-7.5 S/m (0-75 mS/cm)[1]	
Resolution:	0.0002 S/m (0.002mS/cm)[2]	0.0002 S/m (0.002mS/cm)[2]	0.0002 S/m (0.002mS/cm)[2]	
Accuracy:				
Model A:	± 0.005 S/m (± 0.05 mS/cm)	± 0.005 S/m (± 0.05 mS/cm)	± 0.005 S/m (± 0.05 mS/cm)	
Model B:	± 0.0018 S/m (± 0.018 mS/cm)	± 0.0018 S/m (± 0.018 mS/cm)	± 0.0018 S/m (± 0.018 mS/cm)	
Settling Time (90%):	< 3 sec[3]	< 3 sec[3]	< 3 sec[3]	
TEMPERATURE				
Range:	-5ºC to +40ºC (23ºF - 104ºF)[4]	-5ºC to +40ºC (23ºF - 104ºF)[4]	-5ºC to +40ºC (23ºF - 104ºF)[4]	
Resolution:	0.01ºC (0.018ºF)[5]	0.01ºC (0.018ºF)[5]	0.01ºC (0-5V)	0.02ºC (4-20mA)
Accuracy:	±0.1ºC (±0.18ºF)[4]	±0.1ºC (±0.18ºF)[4]	±0.1ºC (0-5V)[4]	±0.15ºC (4-20mA)[4]
Settling Time (63%):	< 10 sec	< 10 sec	< 10 sec	
Operating Temperature:	--5ºC-40ºC (23ºF-104 ºF)	-5ºC-40ºC (23ºF-104 ºF)	-5ºC-40ºC (23ºF-104 ºF)	
Operating Depth: SW:	0-300m (985 ft)	0-300m (985 ft)	0-300m (985 ft)	
IW:	0-2000m (6,560 ft)	0-2000m (6,560 ft)	0-2000m (6,560 ft)	
DW:	0-6000m (19,690 ft)			
Sampling Rate:	SR10: controlled by the datalogger. RS-232: From 1 sec to 255min	Controlled by the datalogger.	From 1 sec to 255 min	
Output Formats:	Aanderaa SR10[6] RS-232[8]	Aanderaa SR10[6] (Conductivity and Temperature)	0-5V outputs: ±0.1% of FS[7] 4-20mA output: ±0.2% of FS[7] RS-232[8]	
Current Consumption: Average:	SR10: 5mA/T where T is recording interval in min. RS232: 48mA/S +0.16mA where S is recording interval in sec.	5mA/T where T is recording interval in min.	48mA/S +0.16mA +Ia where S is recording interval in sec. and Ia is quiescent: 5 to 45mA when analog adaptor enabled.	
Maximum:	110 mA			
Quiescent:	SR10: 0 mA, RS-232: 0.16 mA			
Supply Voltage:	SR10: -6 to -14 Vdc RS-232: +5 to + 14Vdc	SR10: -6 to –14 Vdc	Analogue: +7 to +14Vdc RS-232: +5 to +14Vdc	
Dimensions:	Ø36x39.5x86mm/Ø44 (Ø1.42x3.386in)	OD44x172mm (OD1.73x6.78in)	OD44x172mm (OD1.73x6.78in)	
Weight:	240g (8.466oz)	560g (19.7oz)	560g (19.7oz)	
Materials:	Titanium	Titanium	Titanium	
Accessories: (not included)	Resistor set 3719 Setup Program 4040 Cable 4944,4946,4941,4939 Patch Cable 3854,4994,4995 Sensor Cable 4865 to PC[8] [9] Sensor Cable 4762 free end [9]	Resistor set 3719 Setup Program 4040[8] Cable 4943,4945 Sensor Cable 4865 to PC[8] [9]	Resistor set 3719 Setup Program 4040 Sensor Cable 4865 to PC[8] [9]. Sensor Cable 4762 free end [9]	

1) The range on both the SR10 outputs is user-configurable
2) For SR10: 0.1% of range or 0.0002 S/m, whichver is greater
3) Dependent on flow through cell bore
4) Calibrated range is -0.1ºC to 36ºC (32ºF to 96.8ºF)
5) For SR10: 0.1% of range or 0.01ºC (0.018ºF), whichver is greater
6) Anderaa SR10 are signal protocols that are used with Aanderaa equipment only.
7) The accuracy of the Analogue Adaptor in 0-5V output mode is specified to 0.1% of FS. Note however that at the end of the scale (<0.0-0.07> and <4.93-5.0>) the error may be larger.
8) 9600 Baud, 8 data bits, 1 stop bit, No Parity, Xon/Xoff Handshake. 5.0>) the error may be larger.
8) In order to change settings or calibrating the Conductivity, the Sensor has to be connected to a PC. To gain access to the 4119 Conductivity's RS-232 signals its cylindrical body must be removed, see Operating Manual TD222.
9) With CSP plug for field use

Pin Configuration:

Receptacle, exterior view; pin = ● , bushing = ○
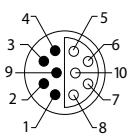
A) Ground for SR10
B) Supply for RS-232
C) Ground for RS-232
D) Supply for SR10

	3919	4119	4120	When used with Cable 4762	
				Plug	**Colour**
1:	Positive Supply[A], [B]	1: System Ground	1: Positive Supply	8	Green
2:	Ground[C]	2: *Not Connected*	2: Ground	7	Black
3:	-9V[D]	3: -9V	3: Analogue Output 1	6	White
4:	SR10 (Temperature)	4: *Not Connected*	4: Return Ground 1	5	Blue
5:	Bridge Voltage (BV)	5: Bridge Voltage (BV)	5: Analogue Output 2	4	Violet
6:	Reserved, *Do Not Connect*	6: SR10 (Conductivity)	6: Return Ground 2	3	Yellow
7:	RXD (RS-232)	7: *Not Connected*	7: RXD (RS-232)	2	Brown
8:	TXD (RS-232)	8: *Not Connected*	8: TXD (RS-232)	1	Grey
9:	Control Voltage	9: Control Voltage	9: *Not Connected*	10	Red
10:	SR10 (Conductivity)	10: SR10(Temperature)	10: *Not Connected*	9	Orange

Applications

Conductivity model	3919ASW/3919AIW/3919ADW 3919BSW/3919BIW/3919BDW	4119/4119ASW/4119AIW 4119BSW/4119BIW	4120ASW/4120AIW 4120BSW/4120BIW
Description	Integrally/Direct Mounted or cable	Immersion Body for cable or sensor string.	Immersion Body w/ Analog and Serial Outputs.
Output	Dual Channel: RS-232 data string (Conductivity,Temp.) or Single SR10 (Conductivity) channel to RCM's or RDCP.	Dual Channel: SR10 (Conductivity and Temperature).	Dual Channel: 0-5V (Conductivity, Temp.) or 4-20mA (Conductivity, Temp.) RS232 (Conductivity, Temp).
Application	Add sensor(s) to top end-plate of our RCM 9/11, RDCP 600 or for OEM/Third party use. Use cable to PC or Datalogger	For use with Aanderaa 3636/3660 datalogger's on cable or in fastening ficture with sensor string, added sensors to AWS 2700 Weather Stations, DB 4700 Data Buoys or our self-contained recording instruments.	General Purpose use with third party datalogger's, e.g. CTD's, ARGO floats, ROV's; PLC's, process industry controllers, recorders, data acquisition and control systems.
Sample Rate	Set by host. RCM: continuously* – 120min. RDCP: 1min – 8hours. Internal interval setting for input to third party RS-232 interface.	Set by host. 3634/3660: 0.5min. - 180min. DB4700: continuously* - 180min. AWS 2700: continuously* - 180min.	
Multi-sensor Configuration	RCM9/11 or RDCP: Yes, 2nd 3919 via cable 4944 DL3634/3660: Max 4/17 sensors, depending on the configuration. DB4700: Max 10 sensors, depending on the configuration.	DL3634/3660: Max 4/17 sensors, depending on the configuration. DB4700: Max 10 sensors, depending on the configuration. Sensor attachment: single points on cable use 3913; In-line 3-sensor disk 3822, only 4119. RCM/RDCP: contact factory.	
Stand-alone Sensor	Use cable 4865/4762 Output: RS-232 (Conductivity,Temp.). Sampling Rate: 1s to 255 min.		User furnished datalogger or controller, Analog: use 4762 Cable. RS-232: use 4865/4762 Cable Output: 0-5 Vdc; 4-20 mAdc; or RS232 (Conductivity, Temperature). Sampling Rate: 1s to 255 min.

*) Note that when the conductivity sensor is connected to an instrument like the RCM, DB4700, AWS or a datalogger, the sampling rate in a continuous recording mode depends on the number of channels for storage etc.

**) Important: Take into considerations the Conductivity Sensors depth rating, refer specifications.

Setup Program 4040

We recommend our Conductivity Setup Program 4040 for configuration of the sensors, as:

– output format
– output parameters
– measurement rang

The setup program also allows you to load the last stored sensor configuraion.

The sensors can also be configured using the RS-232 port and a terminal program.

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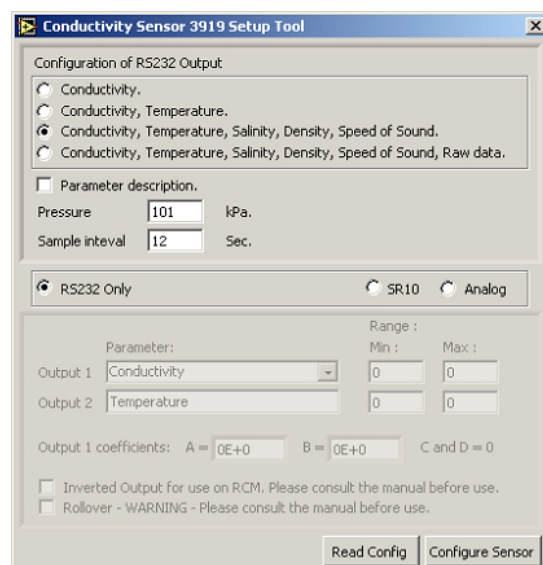
Cables

Cable from sensor to:	3919	4119	4120
PC with waterproof CSP, RS-232	4865	4865[3]	4865
RCM-9/11 or RDCP internal connection	3854/4994/4995		
RCM-9/11 or RDCP with waterproof top end plate connection	4944		
AADI datalogger 2 ch. (Conductivity,Temperature), SR-10	4941[1]/4939[2]	4945[1]/4943[2]	
AADI datalogger 1 ch. (Conductivity), SR-10	4946		
User furnished datalogger, CSP to free end	4762	4762	4762

[1] CSP to 2 x 6 pin plug, split cable
[2] CSP to 10 pin plug
[3] Adapter must be removed to gain access to RS-232

cable 4865. Connecting cable for PC

cable 4762. Connecting cable with free end

cable 3854. Connecting cable 10 pin to Cell Plug

CSP , Cylindrical Sealing Plug

Example of Application

The Conductivity Sensors are compact fully integrated sensors for measuring the electrical conductivity of seawater. They are designed to be mounted on the Recording Current Meters RCM 9, RCM 9 MkII, RCM 9 IW, RCM 9 LW, RCM 11 and Recording Doppler Current Profiler RDCP 600.

They can also be used as stand-alone sensors using RS-232 communication to different loggers and in various systems.

Two versions of this sensor are available, the B version has enhanced accuracy compared to the A version, see specifications.

Please fill in form 687 for best sensor performance, ref your order acknowledgement.

Latest version on internet

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Representative's Stamp

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