Table of Contents

Original Release: November 17, 2009
Updated: March 12, 2018 for re-branding

Specifications

Power supply voltage: 9.0 – 16.0VDC
Power supply current – Active: 14mA Typ. @ 12.0V
Power supply current – Sleep: 60µA Typ. @ 12.0V
Measurement Latency: Approx. 1.3s
Default SDI-12 Address: 0

SDI-12 Command Nomenclature

a= Sensor address
{crc} = SDI-12 compatible 3-character CRC
<cr> = ASCII carriage return character
<lf> = ASCII line feed character
highlighted values indicate variable data

SDI-12 Commands

Setup Commands

Name	Command	Response
Sensor Identification	aI!	a13 INWUSA CT2X2.6ssssssssss<cr><lf> *Note: 2.6 will change to reflect current firmware revision, ssssssssss = device serial #*
Acknowledge Active	a!	a<cr><lf>
Address Query	?!	a<cr><lf>
Change Address	aAb!	b<cr><lf> Change address from a to b

Measurement Commands

Note: The default units setting for pressure is PSI. The default units setting for temperature is Celsius. To change Direct Read Output Units go to Sensor Settings ⚙ in your Aqua4Plus 2.0 control software (more detailed instructions can be found in the Aqua4Plus 2.0 software manual on our website). Conductivity is reported with both linear and non-linear temperature compensation. These are both always reported in µS/cm. Salinity is always reported in PSU, TDS in mg/L.

⚠ For highest accuracy when measuring salinity, you should have the pressure option installed. If you do not have the pressure option, contact Seametrics for further details.

Request Measurement

Name	Command	Response

Request measurement:
     temperature
     conductivity (linear)
     conductivity (non-linear)
     pressure
	aM!	atttn<cr><lf>
		"n" values available after "ttt" seconds
		Sample: a0024<cr><lf>

Read results	aD0!	aValue1Value2Value3Value4<cr><lf> *Value1 =temperature* *Value2 = conductivity (linear – µS/cm)* *Value3 = conductivity (non-linear –µS/cm)* *Value4 = pressure* *Sample*: a+22.0512+155.0127+155.2155+12.0512<cr><lf>
Request measurement: temperature	aM1!	atttn<cr><lf> *"n" values available after "ttt" seconds* Sample: a0021<cr><lf>
Read results	aD0!	aValue1<cr><lf> *Value1 = temperature* *Sample*: a+22.0512<cr><lf>
Request measurement: conductivity (linear)	aM2!	atttn<cr><lf> *"n" values available after "ttt" seconds* *Sample: a0021<cr><lf>*
Read results	aD0!	aValue1<cr><lf> *Value1 = conductivity (linear – µS/cm)* *Sample*: a+155.0127<cr><lf>
Request measurement: conductivity (non-linear)	aM3!	atttn<cr><lf> *"n" values available after "ttt" seconds* *Sample: a0021<cr><lf>*
Read results	aD0!	aValue1<cr><lf> *Value1 = conductivity (non-linear – µS/cm)* *Sample*: a+155.2155<cr><lf>
Request measurement: pressure	aM4!	atttn<cr><lf> *"n" values available after "ttt" seconds* *Sample: a0021<cr><lf>*
Read results	aD0!	aValue1<cr><lf> *Value1 = pressure* *Sample*: a+12.0512<cr><lf>
Request measurement: salinity	aM5!	atttn<cr><lf> *"n" values available after "ttt" seconds* *Sample: a0021<cr><lf>*
Read results	aD0!	aValue1<cr><lf> *Value1 = salinity* *Sample*: a+20.7862<cr><lf>
Request measurement: TDS	aM6!	atttn<cr><lf> *"n" values available after "ttt" seconds* *Sample: a0021<cr><lf>*

| Read results | aD0! | aValue1<cr><lf>
Value1 = TDS
Sample: a+14700.9<cr><lf> |

Request Measurement with CRC

Name	Command	Response
Request measurement w/CRC: temperature conductivity (linear) conductivity (non-linear) pressure	aMC!	atttn<cr><lf> *"n" values available after "ttt" seconds* *Sample:* a0024<cr><lf>
Read results	aD0!	aValue1Value2Value3Value4{crc}<cr><lf> *Value1 =temperature* *Value2 = conductivity (linear – µS/cm)* *Value3 = conductivity (non-linear –µS/cm)* *Value4 = pressure* *Sample*:a+22.0512+155.0127+155.2155+12.0512{crc}<cr><lf>
Request measurement w/CRC: temperature	aMC1!	atttn<cr><lf> *"n" values available after "ttt" seconds* *Sample:* a0021<cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf> *Value1 = temperature* *Sample*: a+22.0512{crc}<cr><lf>
Request measurement w/CRC: conductivity (linear)	aMC2!	atttn<cr><lf> *"n" values available after "ttt" seconds* *Sample:* a0021<cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf> *Value1 = conductivity (linear – µS/cm)* *Sample*: a+155.0127{crc}<cr><lf>
Request measurement w/CRC: conductivity (non-linear)	aMC3!	atttn<cr><lf> *"n" values available after "ttt" seconds* *Sample:* a0021<cr><lf>

Read results	aD0!	aValue1{crc}<cr><lf>
		Value1 = conductivity (non-linear –µS/cm)
		Sample: a+155.2155{crc}<cr><lf>
Request measurement w/CRC: pressure	aMC4!	atttn<cr><lf>
		"n" values available after "ttt" seconds
		*Sample: a*0021<cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf>
		Value1 = pressure
		Sample: a+12.0512{crc}<cr><lf>
Request measurement w/CRC: salinity	aMC5!	atttn<cr><lf>
		"n" values available after "ttt" seconds
		*Sample: a*0021<cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf>
		Value1 = salinity
		Sample: a+20.7862{crc}<cr><lf>
Request measurement w/CRC: TDS	aMC6!	atttn<cr><lf>
		"n" values available after "ttt" seconds
		*Sample: a*0021<cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf>
		Value1 = TDS
		Sample: a+14700.9{crc}<cr><lf>

Concurrent Measurement

Name	Command	Response
Request measurement: temperature conductivity (linear) conductivity (non-linear) pressure	aC!	atttnn<cr><lf>
		"nn" values available after "ttt" seconds
		*Sample: a*00204<cr><lf>
Read results	aD0!	aValue1Value2Value3Value4<cr><lf>
		Value1 = temperature
		Value2 = conductivity (linear – µS/cm)
		Value3 = conductivity (non-linear – µS/cm)
		Value4 = pressure
		Sample: a+22.0512+155.0127+155.2155+12.0512<cr><lf>
Request measurement: temperature	aC1!	atttnn<cr><lf>
		"nn" values available after "ttt" seconds
		Sample: a00201<cr><lf>

Read results	aD0!	aValue1\<cr>\<lf> *Value1 = temperature* *Sample*: a+22.0512\<cr>\<lf>
Request measurement: conductivity (linear)	aC2!	atttnn\<cr>\<lf> *"nn" values available after "ttt" seconds* *Sample:* a00201\<cr>\<lf>
Read results	aD0!	aValue1\<cr>\<lf> *Value1 = conductivity (linear – µS/cm)* *Sample*: a+155.0127\<cr>\<lf>
Request measurement: conductivity (non-linear)	aC3!	atttnn\<cr>\<lf> *"nn" values available after "ttt" seconds* *Sample:* a00201\<cr>\<lf>
Read results	aD0!	aValue1\<cr>\<lf> *Value1 = conductivity (non-linear – µS/cm)* *Sample*: a+155.2155\<cr>\<lf>
Request measurement: pressure	aC4!	atttnn\<cr>\<lf> *"nn" values available after "ttt" seconds* *Sample:* a00201\<cr>\<lf>
Read results	aD0!	aValue1\<cr>\<lf> *Value1 = pressure* *Sample*: a+12.0512\<cr>\<lf>
Request measurement: salinity	aC5!	atttnn\<cr>\<lf> *"nn" values available after "ttt" seconds* *Sample:* a00201\<cr>\<lf>
Read results	aD0!	aValue1\<cr>\<lf> *Value1 = salinity* *Sample*: a+20.7862\<cr>\<lf>
Request measurement: TDS	aC6!	atttnn\<cr>\<lf> *"nn" values available after "ttt" seconds* *Sample:* a00201\<cr>\<lf>
Read results	aD0!	aValue1\<cr>\<lf> *Value1 = TDS* *Sample*: a+14700.9\<cr>\<lf>

Concurrent Measurement with CRC

Name	Command	Response

Request measurement w/CRC:
 	
    temperature
    conductivity (linear)
    conductivity (non-linear)
    pressure
	aCC!	atttnn<cr><lf>
		"nn" values available after "ttt" seconds
		Sample: a00204<cr><lf>

Read results	aD0!	aValue1Value2Value3Value4{crc}<cr><lf> *Value1 = temperature* *Value2 = conductivity (linear – µS/cm)* *Value3 = conductivity (non-linear – µS/cm)* *Value4 = pressure* *Sample*:a+22.0512+155.0127+155.2155+12.0512{crc}<cr><lf>
Request measurement w/CRC: temperature	aCC1!	atttnn<cr><lf> *"nn" values available after "ttt" seconds* *Sample:* a00201<cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf> *Value1 = temperature* *Sample*: a+22.0512{crc}<cr><lf>
Request measurement: conductivity (linear)	aCC2!	atttnn<cr><lf> *"nn" values available after "ttt" seconds* *Sample:* a00201<cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf> *Value1 = conductivity (linear – µS/cm)* *Sample*: a+155.0127{crc} <cr><lf>
Request measurement: conductivity (non-linear)	aCC3!	atttnn<cr><lf> *"nn" values available after "ttt" seconds* *Sample:* a00201 <cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf> *Value1 = conductivity (non-linear – µS/cm)* *Sample*: a+155.2155<{crc} cr><lf>
Request measurement: pressure	aCC4!	atttnn<cr><lf> *"nn" values available after "ttt" seconds* *Sample:* a00201 <cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf> *Value1 = pressure* *Sample*: a+12.0512{crc} <cr><lf>

Request measurement: salinity	aCC5!	atttnn<cr><lf> *"nn" values available after "ttt" seconds* *Sample:* a00201 <cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf> *Value1 = salinity* *Sample*: a+20.7862<{crc} cr><lf>
Request measurement: TDS	aCC6!	atttnn<cr><lf> *"nn" values available after "ttt" seconds* *Sample:* a00201 <cr><lf>
Read results	aD0!	aValue1{crc}<cr><lf> *Value1 = TDS* *Sample*: a+14700.9{crc} <cr><lf>

Modbus Register Definitions

All Modbus data is accessed as holding registers (4xxxxxx), using the Read Holding Registers (command type 3) and Preset Multiple Holding Registers (command type 0x10) Modbus commands.

Parameter data
Modbus parameter data is returned as 32-bit ieee floating point values. Each value is 32 bits in length, and therefore occupies two Modbus registers. As a result, the parameter registers must be read as pairs.

Modbus Register	Data Address	Description
462593-4	0xF480 (62592)	Temperature
462595-6	0xF482 (62594)	Conductivity – Linear (μS/cm)
462597-8	0xF484 (62596)	Conductivity – Non-linear (μS/cm)
462599-600	0xF486 (62598)	Pressure (psi)
4625601-2	0xF488 (62600)	Salinity (psu)
4625603-4	0xF48A (62602)	TDS (mg/L)

Note: The default units setting for pressure is PSI. The default units setting for temperature is Celsius. To change these, use the Direct Read Units option under the Sensor Settings ⚙ menu in the Aqua4Plus 2.0 Control Software. Conductivity is reported with both linear and non-linear temperature compensation. These are both always reported in μS/cm.

Sensor configuration/control

Modbus registers are provided for the following configuration and control functions.

Modbus Register	Data Address	Description
462977=a	0xF600 (62976)	Set sensor Modbus address = a (Write Only)
464545=b	0xFC20 (64544)	Set Modbus baud rate according to b (Write Only) b=0:38400 b=1:19200 b=2:9600
462992	0xF610 (62992)	Front end firmware version (Read Only)

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