

Memo: Setup of the SDI-12 data decoder for Atmos-41
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To: OEM partners
Purpose: Describe how to setup the SDI-12 data decoder for using Atmos-41.
References: 18171 ATMOS 41 Integrator Guide.pdf
SDI-12-setup-guide-v3.pdf

Preface

The Atmos-41 is a weather station with 17 sensors. It is compatible with the SDI-12 data decoder.

Setup of the Atmos-41

In the integration guide we find on page 8 and onwards the different protocols the sensor device supports.

Standard (!M):

Table 2 aM! command sequence

Command	Response
This command reports average, accumulated, or maximum values. Please see ATMOS 41 Internal Measurement Sequence for more details.	
aM!	atttn
aD0!	a+<solar>+<precipitation>+<strikes>
aD1!	a+<windSpeed>+<windDirection>+<gustWindSpeed>
aD2!	a±<airTemperature>+<vaporPressure>+<atmosphericPressure>

NOTE: The measurement and corresponding data commands are intended to be used back to back. After a measurement command is processed by the sensor, a service request a <CR><LF> is sent from the sensor signaling the measurement is ready. Either wait until ttt seconds have passed or wait until the service request is received before sending the data commands. See the [SDI-12 Specifications v1.3](#) document for more information.

We configure the SDI-12 data decoder as:

Crysborg

Setup of the SDI-12 data decoder for Atmos-41

Decoder Type

sdi-12

Description

Atmos-41

Operation Mode

Automatic

Run every

30

seconds

Power Control

Always On

Required current

33

mA

Max Measure Time

10

seconds

Interrupt Definitions

+

	Min	Max	Difference	Value interrupt	Status interrupt
🗑	0	0	0.001	Value changed	Disabled

Sensor Definitions

SDI-12 address	Command Type
0	Standard (IM)

The setup will update every 30 seconds. It will power the sensor constantly and has a requirement of 33mA. The mA draw is taken from page 3 in the integration guide:

Current Drain (during measurement)	
Minimum	0.2 mA
Typical	8.0 mA
Maximum	33.0 mA

The interrupt is defined to interrupt on changes more than 0.001.

The sensor data setup:

Sensor Definitions

+	SDI-12 address	Command Type
	0	Standard (IM) ▼

+	Value Position	Description	Precision	Interrupt Definition
	0	Solar	0	Value: Change > 1 ▼
	1	Precipitation	2	Value: Change > 1 ▼
	2	Strike	0	Value: Change > 1 ▼
	3	Windspeed	2	Value: Change > 1 ▼
	4	Wind direction	0	Value: Change > 1 ▼
	5	Gust Wind speed	2	Value: Change > 1 ▼
	6	Air temperature	1	Value: Change > 1 ▼
	7	Vapor pressure	2	Value: Change > 1 ▼
	8	Atmospheric Pressure	1	Value: Change > 1 ▼

The precision must be set to match the need The same interrupt setup is used for all sensor values but could be using a different setup.. More on that later.

The setup is applied to the SDI-12 data decoder as described above.

The IO page now looks like:

	Description	Address	Index ↑	Type	Configuration	Config state	Attention	Value (expr modified)	Verify sum
	Solar	680088646	1	SDI-12	Unknown	Unconfigured	16	14	0
	Precipitation	680088646	2	SDI-12	Unknown	Unconfigured	0	0	0
	Strike	680088646	3	SDI-12	Unknown	Unconfigured	16	0	0
	Windspeed	680088646	4	SDI-12	Unknown	Unconfigured	16	0.15000000596046448	0
	Wind direction	680088646	5	SDI-12	Unknown	Unconfigured	16	296.3999938964844	0
	Gust Wind speed	680088646	6	SDI-12	Unknown	Unconfigured	16	0.1600000113248825	0
	Air temperature	680088646	7	SDI-12	Unknown	Unconfigured	16	22.200000762939453	0
	Vapor pressure	680088646	8	SDI-12	Unknown	Unconfigured	16	1.1400001049041748	0
	Atmospheric Pressure	680088646	9	SDI-12	Unknown	Unconfigured	0	0	0

Rows per page: 15 ▼ 1-9 of 9 <

All the descriptions from the “LU configuration” are carried over to the IO objects. The configuration and Config state relates to any IO configuration applied, see below. The attention is for use via the API. The value column shows the value read from the sensor device. Verify sum is for output decoders and shall be disregarded.

Let's convert the temperature to deg F. We create an IO configuration as:

Id	100
Protocol	mk3
Type	sdi12
Description	Celsius to Fahrenheit
Expression to modify interrupt value stored in object	$(9 * x / 5) + 32$
x gets replaced by value	
Secondary expression, usage depends on context	x
x gets replaced by value	
Reset io value to 0 after X seconds without interrupt, 0 = indefinitely	0
CREATE CANCEL	

And apply it to the temperature IO (7):

Description	Air temperature
Address	680088646
Index	7
SAVE CANCEL	
CONTROL CONFIGURE	
Config	Celsius to Fahrenheit
APPLY CONFIGURATION	

The IO page now looks like:

	Description	Address	Index ↑	Type	Configuration	Config state	Attention	Value (expr modified)	Verify sum
	Solar	680088646	1	SDI-12	Unknown	Unconfigured	16	7	0
	Precipitation	680088646	2	SDI-12	Unknown	Unconfigured	0	0	0
	Strike	680088646	3	SDI-12	Unknown	Unconfigured	16	0	0
	Windspeed	680088646	4	SDI-12	Unknown	Unconfigured	16	0.1300000101327896	0
	Wind direction	680088646	5	SDI-12	Unknown	Unconfigured	16	301.3999938964844	0
	Gust Wind speed	680088646	6	SDI-12	Unknown	Unconfigured	16	0.15000000596046448	0
	Air temperature	680088646	7	SDI-12	Celsius to Fahren...	Configured	16	72.13999938964844	0
	Vapor pressure	680088646	8	SDI-12	Unknown	Unconfigured	16	1.1400001049041748	0
	Atmospheric Pressure	680088646	9	SDI-12	Unknown	Unconfigured	16	100.00000762939453	0

Standard Arg (!M<n>):

If we look at table 3 in the integration guide:

Table 3 aM1! command sequence

Command	Response
This command reports instantaneous values.	
aM1!	atttn
aD0!	a±<xOrientation>±<yOrientation>+<nullValue>
NOTE: The measurement and corresponding data commands are intended to be used back to back. After a measurement command is processed by the sensor, a service request a <CR><LF> is sent from the sensor signaling the measurement is ready. Either wait until ttt seconds have passed or wait until the service request is received before sending the data commands. See the SDI-12 Specifications v1.3 document for more information.	

It is enhanced with two more values. We change the configuration to:

Sensor Definitions

+	SDI-12 address		Command Type		
🗑	0	Standard Arg (!M<n>)			
+	Cmd Arg	Value Position	Description	Precision	Interrupt Definition
🗑	0	0	Solar	0	Value: Change > 1
🗑	0	1	Precipitation	2	Value: Change > 1
🗑	0	2	Strike	0	Value: Change > 1
🗑	0	3	Windspeed	2	Value: Change > 1
🗑	0	4	Wind direction	0	Value: Change > 1
🗑	0	5	Gust Wind speed	2	Value: Change > 1
🗑	0	6	Air temperature	1	Value: Change > 1
🗑	0	7	Vapor pressure	2	Value: Change > 1
🗑	0	8	Atmospheric Pressure	1	Value: Change > 1
🗑	1	0	X Orientation	0	Value: Change > 1
🗑	1	1	Y Orientation	0	Value: Change > 1

In the setup above the original values from !M are referred to as Cmd Arg 0, whereas the extended are Cmd Arg 1.

The IO page:

Description	Address	Index ↑	Type	Configuration	Config state	Attention	Value (expr modified)	Verify sum
 Solar	680088646	1	SDI-12	Unknown	Unconfigured	16	5	0
 Precipitation	680088646	2	SDI-12	Unknown	Unconfigured	0	0	0
 Strike	680088646	3	SDI-12	Unknown	Unconfigured	16	0	0
 Windspeed	680088646	4	SDI-12	Unknown	Unconfigured	16	0.1300000101327896	0
 Wind direction	680088646	5	SDI-12	Unknown	Unconfigured	16	303.3999938964844	0
 Gust Wind speed	680088646	6	SDI-12	Unknown	Unconfigured	16	0.15000000596046448	0
 Air temperature	680088646	7	SDI-12	Unknown	Unconfigured	16	22.30000114440918	0
 Vapor pressure	680088646	8	SDI-12	Unknown	Unconfigured	16	1.1400001049041748	0
 Atmospheric Pressure	680088646	9	SDI-12	Unknown	Unconfigured	16	100.010009765625	0
 X Orientation	680088646	10	SDI-12	Unknown	Unconfigured	16	4	0
 Y Orientation	680088646	11	SDI-12	Unknown	Unconfigured	16	37.70000076293945	0

Concurrent (!C):

In table 8 in the integration guide we have:

Table 8 **aC!** measurement command sequence

Command	Response
This command reports average, accumulated, or maximum values. Please see ATMOS 41 Internal Measurement Sequence for more details.	
aC!	atttnn
aD0!	a<solar>+<precipitation>+<strikes>+<strikeDistance>
aD1!	a<windSpeed>+<windDirection>+<gustWindSpeed>
aD2!	a±<airTemperature>+<vaporPressure>+<atmosphericPressure>+<relativeHumidity>± <humiditySensorTemperature>
aD3!	a±<xOrientation>±<yOrientation>+<nullValue>
aD4!	a±<NorthWindSpeed>±<EastWindSpeed>+<gustWindSpeed>
NOTE: Please see the SDI-12 Specifications v1.3 document for more information.	

We change the setup to:

Sensor Definitions

SDI-12 address		Command Type		
	0	Concurrent (!C)		
	Value Position	Description	Precision	Interrupt Definition
	0	Solar	0	Value: Change > 1
	1	Precipitation	2	Value: Change > 1
	2	Strike	0	Value: Change > 1
	3	Strike direction	2	Value: Change > 1
	4	Windspeed	0	Value: Change > 1
	5	Wind direction	2	Value: Change > 1
	6	Gust Wind speed	1	Value: Change > 1
	7	Air temperature	2	Value: Change > 1
	8	Vapor pressure	1	Value: Change > 1
	9	Atmospheric Pressure	0	Value: Change > 1
	10	Rel humidity	0	Value: Change > 1
	11	Humidity sensor temperature	0	Value: Change > 1
	12	X Orientation	0	Value: Change > 1
	13	Y Orientation	0	Value: Change > 1
	15	North Wind Speed	2	Value: Change > 1
	16	East Wind Speed	2	Value: Change > 1
	17	Gust Wind Speed	2	Value: Change > 1

Concurrent Arg (!C<n>):

Not supported by Atmos-41.

Continous (!R):

The Atmos-41 does not obey the standard:

CONTINUOUS MEASUREMENT COMMANDS IMPLEMENTATION

Continuous (R) measurement commands trigger a sensor measurement and return the data automatically after the readings are completed without needing to send a D command.

The aR4! command must be used at intervals of 10 s or greater for the response to be returned within 15.0 ms as defined in the SDI-12 standard.

aR0!, aR3!, and aR4! return more characters in their responses than the 75-character limitation called out in the SDI-12 Specification v1.3. It is recommended to use a buffer that can store at least 116 characters.