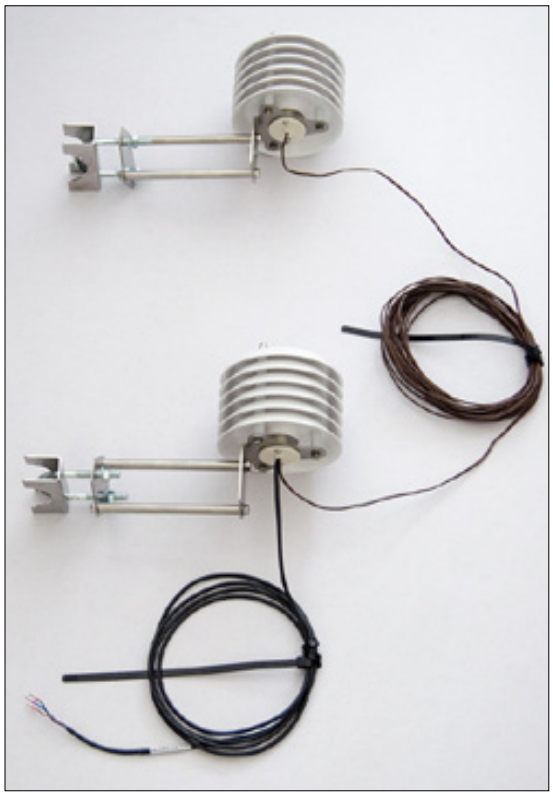
DT2T Delta T

(SDI-12 Integrator Guide)

Vertical Air Temperature Gradient Two-Sensor System DT2T

Small watertight datalogger designed for three sensors with SDI-12 output signal, suitable for harsh environment (typically soil moisture sensors).

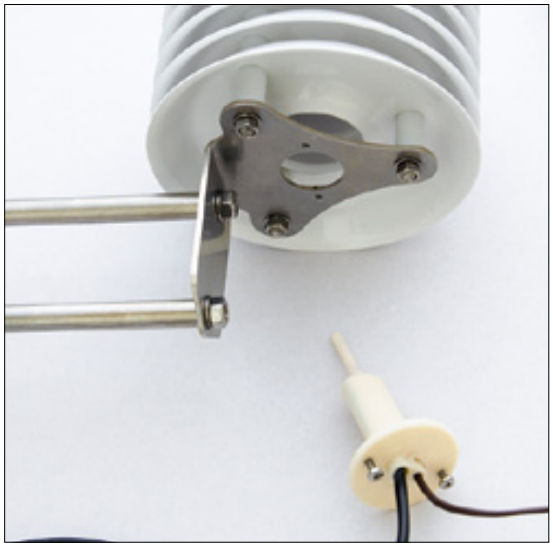


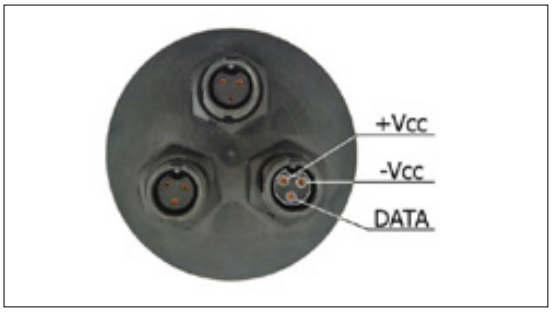
DT2T Delta-T System Features

- Direct measurement of dT with thermocouple
- No zero offset
- High accuracy
- Digital SDI-12 output
- Radiation shield with aluminum plates;

DT2T Specifications

- Time response @ 1 m/s: 90 sec.
- Max temperature difference: 10 K
- Max distance between sensors: 10 m
- Operating temperature range: -40 to 60 deg.C
- Power supply voltage: 5 to 16 V
- Holder for 50 mm tube.





SDI-12 Sensor Connection

- Sensor connection by 3-pin Switchcraft connectors;
- Three voltage inputs in eight ranges up to 1100 mV (2400 mV for V3A);

1. ATH-S2 SDI-12 Interface Specification Configuration

1.1 Configuration Commands & Returns

The DT2T device is compatible with SDI-12 version 1.3 as described in the documents on http://sdi-12.org/archives.php, except for continuous measurements (aR0 - aR9 or aRC0 - aRC9). The following tables list the relevant Measurement (M), Concurrent (C) and Data (D) commands, when necessary.

The first character of all commands and responses is always 'a' where 'a' = device address. The last character of a command is the "!" character, which terminates each command. After a command is processed and/or the information is returned by the device, the device signals the response is complete by returning with <CR> <LF>. These last two bytes of a response are a carriage return and line feed.

1.1 Measurement Command – aM!

Example Command Input: `1M!`
Example Response: `10012`

Parameter Format	Fixed Character Length	Response Order	Description
`aM!`	1		Request for device measurement (M) at address (a), where example a=1.
`1`	1	1	Returns device address (Example: address 1)
`001`	3	2	Returns length of time (in seconds) after which the measured data will be available. If data is available earlier, the device sends the address terminated by the <CR> <LF> - service request.
`2`	1	3	Returns number of variables (Example: 2 variables)

1.2 Measurement Command with CRC – aMC!

Example Command Input: `1MC!`
Example Response: `10012`

Parameter Format	Fixed Character Length	Response Order	Description
`aMC!`	4		Request for device measurement at address (a) with CRC data control, where example a= 1.
`1`	1	1	Returns device address (Example: 1)
`001`	3	2	Returns length of time (in seconds) after which the measured data will be available. If data is available earlier, the device sends the address terminated by the <CR> <LF> - service request.
`2`	1	3	Returns number of variables (Example: 2 variables)

1.3 Concurrent Measurement – aC!

Example Command Input: 1C!
Example Response: 100102

Parameter Format	Fixed Character Length	Response Order	Description
aC!	3		Request for device measurement at address (a), where example a=1.
1	1	1	Returns device address (Example: 1)
001	3	2	Returns length of time (in seconds) after which the measured data will be available (Example: 1 second)
02	2	3	Returns number of variables (Example: 2 variables)

1.4 Concurrent Measurement with CRC – aCC!

Example Command Input: 1CC!
Example Response: 100102

Parameter Format	Fixed Character Length	Response Order	Description
aCC!	4		Request for device measurement at address (a) with CRC data control, where example a= 1.
1	1	1	Returns device address (Example: 1)
001	3	2	Returns length of time (in seconds) after which the measured data will be available (Example: 1 second)
02	2	3	Returns number of variables (Example: 2 variables)

1.5 Data command – aD0!

Example Command Input: 1D0!
Example Response: 1+20.321+60.542XYZ

Parameter Format	Fixed Character Length	Response Order	Description
aD0!	1		Request for device data (D) at address (a), where example a=1.
1	1	1	Returns device address (Example: 1)
+25.256	Variable	2	Returns dT in ° C
+20.233	Variable	3	Returns sensor temperature in ° C
XYZ	3	4	16-bit CRC - added only if aMC! or aCC! commands were requested for the measurement

1.6 Change Address – aAb!

Example Command Input: 1A2!
Example Response: 2

Parameter Format	Fixed Character Length	Description
aA2!	4	Request to change the device address (a). Example shows the request from 1 to a new address of 2, (where the first a=original address, A=address setting, and the second a=new address)
2	1	Responds with the new sensor address. For all subsequent commands, this new address will be used by the target sensor.

1.7 Address Query Command – ?!

Example Command Input: ?!
Example Response: 2

Command ?!: Be careful - there must be only one device on the line! While disconnected from a bus, the Address Query command can be used to determine which device is currently being communicated with. Sending this command over a bus will cause a bus contention where all the devices will respond simultaneously and corrupt the data line. This command is helpful when trying to isolate a failed device.

Parameter Format	Fixed Character Length	Description
?!	2	Retrieving the device address. Request for a response from any device listening on the data line.
2	1	Responds with attached sensor's address (Example: a=2)

1.8 Verification Command – aV!

Example Command Input: 1V!
Example Response: 10012

Parameter Format	Fixed Character Length	Response Order	Description
aV!	3		Request device measurement at address (a), where example a=1.
1	1	1	Returns device address (Example: 1)
001	3	2	Returns length of time (in seconds) after which the measured data will be available (Example: 1 second)
2	1	3	Returns number of variables (Example: 2 variables)

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