



EMS Brno

Data Acquisition Environment

Hardware – Software – Cloud application

www.emsbrno.cz

Stem increment sensor with digital output DRS26

Main features:

- Step-less reading
- Rotary position sensor
- No upper limit in stem diameter
- Circumference increment and temperature digital output
- Easy and fast non-invasive fixing
- Ready for SDI-12 network
- Manufactured by EMS



Specification:

- Minimal stem diameter 8 cm (optionally 4 – 8 cm)
- Increment range 65 mm
- Tightening strength 15 to 20 N
- Linearity 1% over full range
- SDI-12 ver. 1.3 compatible
- Fixing tape: stainless 12 x 0.2 mm

General description:

DRS26 sensor is intended for the measurement of stem increment of large stems with diameter 8 cm and larger (optionally 4 – 8 cm with base plate upgrade). Sensor output is calibrated directly in millimeters of increment of stem circumference.

The sensor is designed with respect to easy and fast installation. It is fastened on the measured object by means of stainless tape wrapped around the stem.

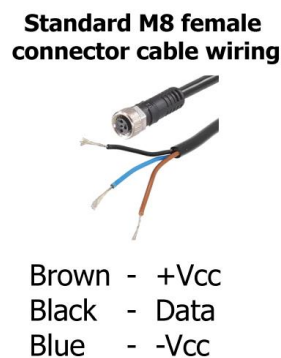
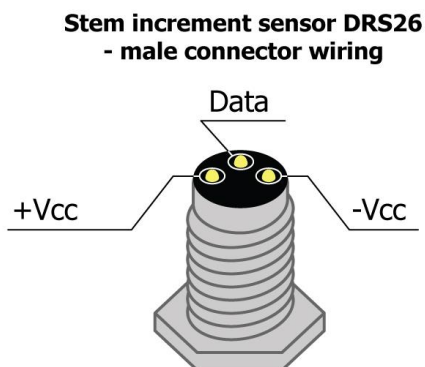
Adherence pressure is set as a compromise between the influence on plant tissues and stability of position.

Installation notes:

Sensor has to be placed on a relatively straight and regularly shaped part of stem. The cable should be fasten to the stem in order to avoid its influence on the sensor position.

Specification:

Increment sensors type	rotary position
Range	64 mm of circumference increment
Linearity	1 % of full scale
Resolution	1 μm
Temperature measurement accuracy	$\pm 0.2\text{ }^{\circ}\text{C}$ (within -10 to $+40\text{ }^{\circ}\text{C}$)
Tape strength	15 to 20 N in the whole range, stem diameter independent
Tape temperature coefficient	16 $\mu\text{m}/\text{m},\text{K}$
Power supply voltage	5.5 to 16 V
Current consumption idle	20 μA
Current consumption when measuring	6 mA
Warm-up time	300 ms
Connection	Three wire Escha M8 connector male
Connection cable length	2 m, 5 m, 10 m (special lengths on request)
Operating environment temperature	-40 to $60\text{ }^{\circ}\text{C}$
Operating environment humidity	0 to 100 %
Size	100 x 70 x 100 mm
Weight	ca 350 g
Protection	IP 68



SDI-12 interface specification

DRS26 sensor is compatible with SDI-12 version 1.3 described in documents on <http://sdi-12.org/archives.php>, except for continuous measurements (aR0 - aR9 or aRC0 - aRC9).

Overview of supported commands:

Datalogger commands are in bold. Each response from the sensor is terminated by <CR> <LF>

Info command - aI!

For instance:

1I! 113EMSBno DRS26 1.0Sn # 1234567890

Parameter	Length	Description
1I!	3	Request to read the sensor information at address 1
1	1	Sensor address - here 1
13	2	SDI version - here 1.3
EMSBno	8	Manufacturer - completed with space 0x20
DRS26	6	Model - completed with space 0x20
1.0	3	FW Sensor version - here 1.0
Sn#1234567890	13	Serial number of the sensor

Measurement command - aM!

For instance:

1M! 10012

Parameter	Length	Description
1M!	3	Sensor measurement request at address 1
1	1	Sensor address - here 1
001	3	Time after which the measured data will be available in seconds - here 1. If the data is available earlier, the sensor sends the address terminated by the <CR> <LF> - service request.
2	1	Number of variables returned - here 2

Data command - aD0!

For instance:

1D0! 1+25.256+20.233

Parameter	Length	Description
1D0!	4	Sensor data request at address 1
1	1	Sensor address - here 1
+25.256	Variable	Value of circumference increment [mm]
+20.233	Variable	Temperature in ° C
XYZ	3	16-bit CRC - added only if aMC! or aCC! commands were requested for the measurement

Valid for devices with serial number higher than A2212081001

Measurement command – aM1!

For instance:

1M1! 10013

Parameter	Length	Description
1M1!	3	Sensor measurement request at address 1
1	1	Sensor address - here 1
001	3	Time after which the measured data will be available in seconds - here 1. If the data is available earlier, the sensor sends the address terminated by the <CR> <LF> - service request.
3	1	Number of variables returned - here 3

Data command - aD0!

For instance:

1D0! 1+25.256+20.233+42.3

Parameter	Length	Description
1D0!	4	Sensor data request at address 1
1	1	Sensor address - here 1
+25.256	Variable	Value of circumference increment [mm]
+20.233	Variable	Temperature in ° C
+42.3	Variable	Internal relative humidity in %
XYZ	3	16-bit CRC - added only if aMC! or aCC! commands were requested for the measurement

Change Address - aAb!

For instance:

1A2! 2

Parameter	Length	Description
1A2!	4	Request to change the sensor address on the address 1 to address 2
2	1	New sensor address - here 2

Address Query command -?! - Be careful - there must be only one sensor on the line!

For instance:

?! 2

Parameter	Length	Description
?!	2	Retrieving the sensor address
2	1	Attached sensor address - here 2.

Concurrent Measurement - aC!

For instance:

1C! 100102

Parameter	Length	Description
1C!	3	Sensor measurement request at address 1
1	1	Sensor address - here 1
001	3	Time after which the measured data will be available in seconds - here 1
02	2	Number of variables returned - here 2

Measurement command with CRC - aMC!

For instance:

1MC! 10012

Parameter	Length	Description
1MC!	4	Sensor measurement request at address 1 with CRC data control
1	1	Sensor address here 1
001	3	Time after which the measured data will be available in seconds - here 1. If the data is available earlier, the sensor sends the address terminated by the <CR> <LF> - service request.
2	1	Number of variables returned - here 2

Concurrent Measurement with CRC - aCC!

For instance:

1CC! 100102

Parameter	Length	Description
1CC!	4	Sensor measurement request at address 1 with CRC data control
1	1	Sensor address here 1
001	3	Time after which the measured data will be available in seconds - here 1
02	2	Number of variables returned - here 2

Verification command - aV!

For instance:

1V! 10012

Parameter	Length	Description
1V!	3	Sensor measurement request at address 1
1	1	Sensor address here 1
001	3	Time after which the measured data will be available in seconds - here 1
2	1	Number of variables returned - here 2

Acknowledge Active – a!

For instance:

2! 2

Parameter	Length	Description
2!	2	Check the sensor connection
2	1	Sensor address respond - here 2