



EMS Brno

Data Acquisition Environment

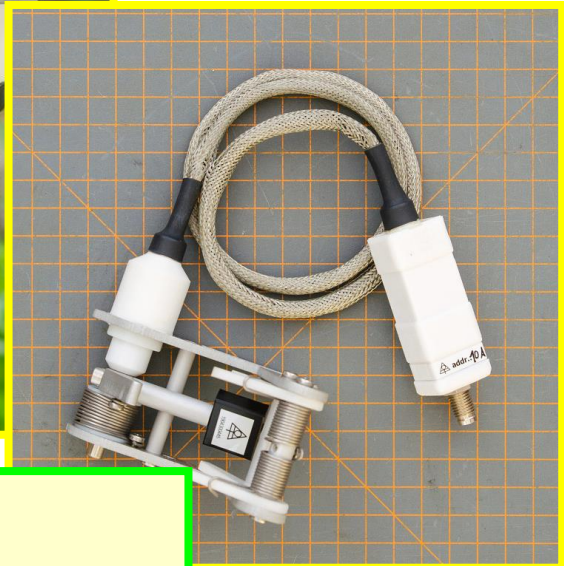
Hardware – Software – Cloud application

www.emsbrno.cz

Stem diameter sensor PDS40S - SDI

Main features:

- Sensing pivot concept
- Each sensor individually calibrated
- Step-less reading
- Temperature measurement
- Easy and fast non-invasive fixing
- Ready for SDI-12 network
- Manufactured by EMS



Specification:

- Working range 5 to 40 mm
- One micrometer resolution
- SDI-12 ver. 1.3 compatible
- Accuracy 0.5% full scale
- Tightening strength up to 3 N
- Temperature dependence better than $\pm 3 \mu\text{m/K}$

General description:

PDS40S is designed for the measurement of diameters of small stems or branches in the range between 5 and 40 mm. Sensor output is calibrated directly in millimeters of stem diameter.

The sensor is designed with respect to easy and fast installation. It is fastened on the measured object by means of three pressure levers; the central jib turns the rotary position sensor proportionally to the object diameter.

Adherence pressure is set as a compromise between the influence on plant tissues and stability of position. The bearing of position sensor is carefully shaped for minimal effect of temperature and axial forces.

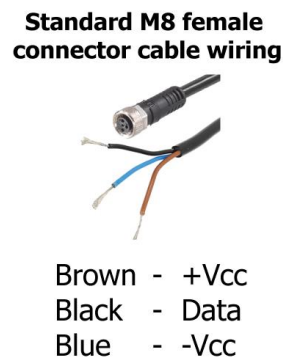
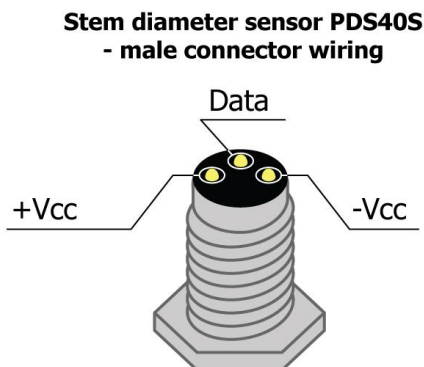
Each sensor is individually calibrated in 100 points over the whole range for excellent sensors linearity.

Installation notes:

Sensor has to be placed on a relatively straight and regularly shaped stem (or branch) such a way that the plastic cover of electronic does not touch the measured object. The cable has to be fastened to the stem in order to avoid its influence on the sensor position. The label on the black plate on the jib must be visible - it must point outwards of the stem.

Specification:

Measuring range:	5 to 40 mm
Accuracy:	> 0.5 mm
Linearity:	± 0.5 % of full scale
Resolution:	1.24 µm
Power voltage:	5 to 12 V
Current consumption idle:	20 µA
Current consumption meas.:	6 mA
Tightening strength:	1.5 to 2 N lateral levers, 2 to 3 N central sensing jib
Temperature accuracy:	± 0.2 deg. C
Temperature working range:	-40 to 60 deg. C
Warm-up time:	300 ms
Connection:	Three wire M8 connector male
Weight:	160 g
Protection:	IP 67



SDI-12 interface specification

PDS40S 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 PDS40 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
PSD40	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 diameter [mm]
+20.233	Variable	Temperature in °C
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