

## CALIBRATION CERTIFICATE

**Object of calibration:**

differential pressure transmitter	
manufacturer:	Regin
type:	Presigo PDT12S25-2
serial number:	011606300010:1306
measuring range (CH 1):	0... 1250 Pa
measuring range (CH 2):	0... 2500 Pa
output signal:	0... 10 V; 4... 20 mA

**Customer:** SmartNode Kft. / H-4030 Debrecen, Lándzsa u. 21

**User:** AB Regin / SE-428 22 Källered, Box 116,

**Place of calibration:** Accredited calibration laboratory of WM Laboratory Ltd.

**Calibration procedure:** tested pressure transmitter and reference pressure calibrator was connected with flexible tube. The output of the instrument was measured with a multimeter. Damping factor was 1 second. Supply voltage was 24 V. Load pressure was gradually changed by the pressure calibrator to the desired set values. All readings were made in stable pressure condition.  
ID of used procedure: PKE-2012-01.  
24,4 °C and 33 ± 2 %RH environmental conditions for calibration were met.

**Calibration reference standard(s):**

Reference	Manufacturer	Type	Serial number	Certificate
Differential pressure calibrator	Halstrup-Walcher GmbH	KAL100	9610.0037 AE463915	ATKIS 68301
Multifunctional calibrator	Beamex	MC2	20601	Commed Trade 8439/2016
Differential pressure meter	TSI Instruments Ltd.	PVM620	PVM621530004	ATKIS 68300
Power supply	MC Power	LAB-2303	DE 81972753	N/A

Results of the measurements are traced back to the primary standards of SI units.

**Results (Channel 1, Horizontal setting):**

Upper range value [ Pa ]	Measured output value			Calculated value based on average value [ Pa ]	Reference standard pressure [ Pa ]	Error [ Pa ]	Expanded uncertainty [ Pa ]
	min [ V ]	average [ V ]	max [ V ]				
50	3,992	3,996	4,000	20,0	20,0	0,0	0,4
50	8,002	8,006	8,010	40,0	40,0	0,0	0,5
100	6,000	6,000	6,000	60,0	60,0	0,0	0,6
100	8,002	8,006	8,010	80,1	80,1	0,0	0,7
500	1,994	1,995	1,996	99,8	100,2	-0,4	0,8
500	4,998	4,999	4,999	249,9	249,0	0,9	1,1
1000	5,006	5,008	5,010	500,8	500,0	0,8	2,3
1000	7,504	7,506	7,507	750,6	750,0	0,6	3,3
1250	8,005	8,006	8,007	1000,8	998,7	2,1	4,6
1250	9,601	9,602	9,603	1200,3	1196,9	3,4	5,5

**Results (Channel 1, Vertical setting):**

Upper range value [ Pa ]	Measured output value			Calculated value based on average value [ Pa ]	Reference standard pressure [ Pa ]	Error [ Pa ]	Expanded uncertainty [ Pa ]
	min [ V ]	average [ V ]	max [ V ]				
50	3,992	3,996	3,999	20,0	20,0	0,0	0,4
50	8,002	8,006	8,006	40,0	40,0	0,0	0,5
100	6,000	6,000	6,001	60,0	60,0	0,0	0,6
100	8,002	8,006	8,010	80,1	80,1	0,0	0,7
500	1,994	1,995	1,999	99,8	100,2	-0,4	0,8
500	4,998	4,999	5,001	249,9	249,0	0,9	1,1
1000	5,006	5,008	5,009	500,8	500,0	0,8	2,3
1000	7,504	7,506	7,507	750,6	750,0	0,6	3,3
1250	8,005	8,006	8,007	1000,8	998,7	2,1	4,6
1250	9,601	9,602	9,603	1200,2	1196,8	3,4	5,5



**Results (Channel 1, Horizontal setting):**

Upper range value [ Pa ]	Measured output value			Calculated value based on average value [ Pa ]	Reference standard pressure [ Pa ]	Error [ Pa ]	Expanded uncertainty [ Pa ]
	min [ mA ]	average [ mA ]	max [ mA ]				
50	10,370	10,372	10,374	19,9	20,0	-0,1	0,4
50	16,780	16,782	16,784	39,9	39,9	0,0	0,5
100	13,574	13,574	13,574	59,8	59,7	0,1	0,6
100	16,779	16,781	16,783	79,9	79,7	0,2	0,7
500	7,198	7,201	7,204	100,0	100,2	-0,2	0,8
500	12,010	12,010	12,010	250,3	249,9	0,4	1,1
1000	11,990	11,991	11,992	499,4	500,0	-0,6	2,3
1000	15,998	16,000	16,002	750,0	751,0	-1,0	3,3
1250	16,800	16,802	16,804	1000,2	999,4	0,8	4,6
1250	19,358	19,360	19,362	1200,0	1197,3	2,7	5,5

**Results (Channel 1, Vertical setting):**

Upper range value [ Pa ]	Measured output value			Calculated value based on average value [ Pa ]	Reference standard pressure [ Pa ]	Error [ Pa ]	Expanded uncertainty [ Pa ]
	min [ mA ]	average [ mA ]	max [ mA ]				
50	10,369	10,371	10,373	19,9	19,9	0,0	0,4
50	16,778	16,780	16,782	39,9	39,8	0,1	0,5
100	13,574	13,574	13,576	59,8	59,7	0,1	0,6
100	16,779	16,781	16,782	79,9	79,7	0,2	0,7
500	7,198	7,201	7,202	100,0	100,2	-0,2	0,8
500	12,010	12,010	12,011	250,3	249,9	0,4	1,1
1000	11,990	11,991	11,992	499,4	500,0	-0,6	2,3
1000	15,998	16,000	16,003	750,0	751,0	-1,0	3,3
1250	16,800	16,802	16,803	1000,2	999,2	1,0	4,6
1250	19,358	19,360	19,362	1200,0	1197,3	2,7	5,5

**Results (Channel 2, Horizontal setting):**

Upper range value [ Pa ]	Measured output value			Calculated value based on average value [ Pa ]	Reference standard pressure [ Pa ]	Error [ Pa ]	Expanded uncertainty [ Pa ]
	min [ V ]	average [ V ]	max [ V ]				
100	1,990	1,992	1,994	19,9	20,1	-0,2	0,4
100	3,995	3,996	3,997	40,0	40,0	0,0	0,5
100	5,999	6,000	6,001	60,0	60,0	0,0	0,6
100	8,003	8,007	8,011	80,1	80,1	0,0	0,7
500	1,989	1,991	1,993	99,6	100,1	-0,5	0,8
500	4,995	4,997	4,998	249,8	249,1	0,7	1,1
1000	4,992	4,996	5,000	499,6	498,0	1,6	2,3
1000	7,504	7,507	7,510	750,7	748,0	2,7	3,3
2500	6,801	6,802	6,803	1700,5	1702,1	-1,6	4,6
2500	9,602	9,603	9,604	2400,8	2398,6	2,2	5,5

**Results (Channel 2, Vertical setting):**

Upper range value [ Pa ]	Measured output value			Calculated value based on average value [ Pa ]	Reference standard pressure [ Pa ]	Error [ Pa ]	Expanded uncertainty [ Pa ]
	min [ V ]	average [ V ]	max [ V ]				
100	1,989	1,991	1,992	19,9	19,9	0,0	0,4
100	3,996	3,997	3,998	40,0	40,0	0,0	0,5
100	5,999	6,000	6,001	60,0	60,0	0,0	0,6
100	8,004	8,008	8,010	80,1	80,1	0,0	0,7
500	1,989	1,991	1,992	99,6	100,1	-0,5	0,8
500	4,995	4,997	4,999	249,8	249,1	0,7	1,1
1000	4,992	4,996	4,998	499,6	498,0	1,6	2,3
1000	7,504	7,507	7,508	750,7	748,0	2,7	3,3
2500	6,801	6,802	6,803	1700,5	1702,1	-1,6	4,6
2500	9,602	9,603	9,605	2400,8	2398,5	2,3	5,5



**Results (Channel 2, Horizontal setting):**

Upper range value [ Pa ]	Measured output value			Calculated value based on average value [ Pa ]	Reference standard pressure [ Pa ]	Error [ Pa ]	Expanded uncertainty [ Pa ]
	min [ mA ]	average [ mA ]	max [ mA ]				
100	7,183	7,186	7,189	19,9	20,0	-0,1	0,4
100	10,388	10,392	10,396	40,0	40,0	0,0	0,5
100	13,599	13,600	13,600	60,0	60,0	0,0	0,6
100	16,802	16,802	16,802	80,0	79,7	0,3	0,7
500	7,188	7,189	7,190	99,7	99,7	0,0	0,8
500	11,908	11,910	11,912	247,2	249,3	-2,1	1,1
1000	12,007	12,011	12,014	500,7	498,7	2,0	2,3
1000	16,006	16,007	16,008	750,4	748,0	2,4	3,3
2500	14,880	14,881	14,882	1700,2	1701,6	-1,4	4,6
2500	19,359	19,361	19,363	2400,2	2397,7	2,5	5,5

**Results (Channel 2, Vertical setting):**

Upper range value [ Pa ]	Measured output value			Calculated value based on average value [ Pa ]	Reference standard pressure [ Pa ]	Error [ Pa ]	Expanded uncertainty [ Pa ]
	min [ mA ]	average [ mA ]	max [ mA ]				
100	7,184	7,187	7,189	19,9	19,4	0,5	0,4
100	10,392	10,396	10,397	40,0	39,5	0,5	0,5
100	13,603	13,603	13,607	60,0	59,3	0,7	0,6
100	16,806	16,806	16,809	80,0	79,2	0,8	0,7
500	7,188	7,189	7,190	99,7	99,7	0,0	0,8
500	11,908	11,910	11,912	247,2	249,3	-2,1	1,1
1000	12,007	12,011	12,012	500,7	498,7	2,0	2,3
1000	16,006	16,007	16,007	750,4	748,0	2,4	3,3
2500	14,879	14,880	14,880	1699,9	1701,4	-1,5	4,6
2500	19,359	19,361	19,362	2400,2	2397,7	2,5	5,5

**Uncertainty of measurement:**

The reported expanded uncertainty of measurement is stated uncertainty of measurement multiplied by the coverage factor  $k = 2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. This is the expanded measurement uncertainty include the reflectance standard, the calibration method, environmental conditions, etc. resulting from uncertainties.

The standard uncertainty in the determination of measurement uncertainty NAR-EA-4/02 expression of calibration in accordance with a publication.

**Does User request classification:**

YES

No

**Requirement:**

$\pm 1 \% FS$

**Classification of instrument:**

PASS

FAIL

UNCLASSIFIABLE

Classification is based on the Users's request. The classification is Pass only if at every calibration point the sum of error found at calibration and the expanded uncertainty does not exceed the maximum allowable limit.

**Notes:**

Calibration certificate refers to the state of instrument without adjustment (As Found).  
The following label was placed on the instrument:



Recalibration date considering the application and condition of the instrument is decided by User.

Calibration was  
done by:

**Máté Farkas**  
WM Laboratory Ltd.

Verified by:

**László Klagyivik**  
WM Laboratory Ltd.  
Head of Laboratory