

**Operating manual** 

# VA 300

Mobile and stationary flow and air consumption measurement for compressed air and gases





## Important information

The operating instructions must be read in full and carefully observed before starting up the device.

The manufacturer cannot be held liable for any damage which occurs as a result of non-observance or non-compliance with this manual.

Should the device be tampered with in any manner other than a procedure which is described and specified in the manual, the warranty is cancelled and the manufacturer is exempt from liability.

The device is destined exclusively for the described application.

BEKO Technologies GmbH offers no guarantee for the suitability for any other purpose and is not liable for errors which may have slipped into this operating manual. They are also not liable for consequential damage resulting from the delivery, capability or use of this device.

## Area of application

The BEKO VA 300 product range is designed for stationary and mobile use in compressed air pipes, air ducts or shafts.

It is used for the measurement and control of flow and air consumption in operating air pressure and other gases.

The principle of measurement is based on the evacuation of heat from an electrically heated sensor into the surrounding air flow.

The measuring devices operate independently of pressure and temperature. When the sensor is fitted in a pipe, the output signal from the speed of flow is used to calculate the standard volume flow or mass flow of the medium.



## Safety instructions

## Must be read before starting up the device!

## Warning:

- Do not exceed the pressure range of 50 bar.
- Observe the measuring range of the sensor.
- Overheating destroys probes.
- Observe permissible storage, transport and operating temperatures.
- Improper handling or use of force when opening the device cancels all warranty claims.
- Adjustment and calibration work must only be carried out by trained personnel from the field of measuring and control engineering.
- Always observe the direction of flow when positioning the sensor.
- The safety ring on the sensor head must always remain undamaged and sit correctly in the intended groove.
- The screwed fixture must be pressure tight.
- The adapter sleeve must be tightened with a torque of 20 30 Nm.
- Avoid condensation on the sensor element or water drops in the measuring air at all costs as they cause faulty measuring results.
- The values of the inlet and outlet sections must not fall below the specified minimum values as this causes increased deviations in the measuring results.



## Determining the point of installation

In order to maintain the accuracy stipulated in the data sheets, the sensor must be inserted in the centre of a straight pipe section with unhindered flow characteristics.

Unhindered flow characteristics are achieved if the sections in front of the sensor (inlet) and behind the sensor (outlet) are sufficiently long, absolutely straight and lack obstructions such as edges, seams, curves etc.

Careful attention must be paid to the design of the outlet section as obstructions can cause counter-flow turbulence as well as turbulence in the direction of the flow.





- L = Length of the entire measurement section
- L1 = Length of inlet section
- L2 = Length of outlet section
- D = Diameter of measurement section

The following table shows the equalising sections necessary in relation to existing obstructions.







## Table of inlet and outlet sections

Flow obstruction	Min. length	Min. length
before the measurement section	inlet (L1)	outlet (L2)
Slight curve	12 v D	5 x D
(bend < 90°)		3.40
Reduction		
(Tube narrows towards measurement	15 x D	5 x D
section)		
Expansion		
(Rohr expands towards measurement	15 x D	5 x D
section)		
90° bend	15 v D	5 v D
or T piece	15 X D	520
2 x 90° bends		5 v D
on one level	20 X D	520
2 x 90° bends	25 v D	5 y D
3 dimensional change of direction	30 X D	320
Shut-off valve		5 y D
	40 X U	370

The respective minimum values required are indicated here. If it is not possible to observe the stipulated equalising sections, considerable deviations in measuring results must be expected.

## Installation position

The sensor head must sit in the centre of the pipe. Observe the direction of flow indicated on the tip of the sensor.



## 

Strömungsrichtung / Direction of air flow

Outer dia. DA	Length LA	Thread <u>G</u> x	Pipe	Total length
21.3 mm	<u>350 mm</u>	<u>G</u> 1/2"	21.3 * 2.6 mm, Stahl 1.4301	<u>.</u> 500 mm
26.9 mm	430 mm	<u>G</u> 3/4"	26.9 * 2.6 mm, Stahl 1.4301	<u>.</u> 600 mm
<u>3</u> 3.7 mm	<u>5</u> 30 mm	<u>G</u> 1"	33.7 * 3.2 mm, Stahl 1.4301	.750 mm
42.4 mm	<u>660 mm</u>	<u>G</u> 1 1/4"	42.4 * 3.2 mm, Stahl 1.4301	<u>9</u> 00 mm
48.3 mm	750 mm	<u>G</u> 1 1/2"	48.3 * 3.2 mm, Stahl 1.4301	<u>1000 mm</u>
<u>60.3 mm</u>	<u>9</u> 30 mm	<u>G</u> 2"	60.3 * 3.6 mm, Stahl 1.4301	1250 mm
76.1 mm	1170 mm	<u>G</u> 2 1/2 "	76.1 * 3.6 mm, Stahl 1.4301	1500 mm

## Measurement section for VA 300 probes with flange connection



#### Strömungsrichtung / Direction of air flow

Outer dia. DA	Length L1	<u>L</u> A	DIN - flange	Pipe	Total length = L1 + 2 * DIN flange
88.9 mm	1750 mm	1330 mm	DN 80 / 88.9	88.9 * 2.0 mm, Stahl 1.4301	1750 + (2*50) <b>= 1850 mm</b>
114.3 mm	<u>2000 mm</u>	1700 mm	DN 100 / 114.3	114.3 * 2.0 mm, Stahl 1.4301	2000 + (2*52) <b>= 2104 mm</b>
139.7 mm	<u>2750 mm</u>	2050 mm	DN 125 / 139.7	139.7 * 3.0 mm, Stahl 1.4301	2750 + (2*55) <b>= 2860 mm</b>
.168.3 mm	<u>.</u> 3000 mm	2450 mm	DN 150 / 168.3	168.3 * 3.0 mm, Stahl 1.4301	<u>.</u> 3000 + ( 2*55) <b>= 3110 mm</b>



## **Assembly instructions**

## Safety information must be observed.

Assembly is carried out by inserting the connection thread (1/2" thread, SW 27) into the connection piece.

The sensor is then inserted to the required immersion depth and aligned according to the direction of air flow.

A depth gauge engraved on the probe tube will assist you, along with a flow alignment arrow and an aligning aid.

Once the sensor has been aligned, the adapter sleeve must be tightened with the stipulated torque (SW 17).

Attention: Alignment of the sensor must not be modified when tightening the connection thread and adapter sleeve.

If this should occur, check the immersion depth and alignment again and correct if necessary.

The angular deviation should not be greater than +- 2° in relation to the ideal position as otherwise the measuring accuracy will decrease.

## Commissioning

The valid measuring range and delivery configuration are programmed by the manufacturer on the basis of the user's specifications.

The **stationary** flow and air consumption measuring devices from the VA 300 series function according to the "plug and play" principle. The device is ready for operation as soon as the power supply is connected.

Modifications to the measuring ranges and signal output configurations can be carried out by the manufacturer or by the user with the aid of the appropriate software.

With mobile flow and air consumption measuring devices, the user will be able to carry out these modifications using the software and RS232 interface.

## Display with mains unit for VA300

d162h07.pdf



Technical data:			Max. connection
X1 X2	Mains connection Signal connections	230 V 50/60 Hz	1.50 mm² 0.50 mm²
X5		230V 50/60 Hz, max. 3 A	1.50 mm²
F1	Primary fuse mains unit	0.08 A delay action, 5 x20 mm, 250V	

Dimensions: 180 x 130 x 100 mm (l x w x h)

Information: Only connect the probe/device and change the fuse when the power supply is disconnected.





## Flow measuring ranges

Inner	diameter	Standard version VA 300 - 80	Max. version VA 300 - 120
Inch	mm	Measuring range	Measuring range
		from to	from to
1/4"	6	0.8 80 l/min	1.0 110 l/min
1/2"	16.1	2.5 760 l/min	3.5 1100 l/min
3/4"	21.7	0.3 90 m³/h	0.4 120 m³/h
1"	27.3	0.5 150 m³/h	0.6 200 m³/h
1 1/4"	36.0	0.9 280 m³/h	1.2 360 m³/h
1 1/2"	41.9	1.2 370 m³/h	1.5 500 m³/h
2"	53.1	2 600 m³/h	2.5 800 m³/h
2 1/2"	71.1	3.5 1100 m³/h	5 1500 m³/h
3"	84.9	5 1600 m³/h	7 2200 m³/h
4"	110.3	9 2700 m³/h	12 3600 m³/h
5"	133.7	13 4000 m³/h	18 5300 m³/h
6"	162.3	18 5800 m³/h	25 8000 m³/h
8"		On request	On request

## Drawing of VA 300 probe



\* Standard co. 285mm andere Längen auf Anfrage



## Short operating manual CS 2390-5

The flow and air consumption measuring device VA 300 supplies a 4 to 20 mA power signal which corresponds with the speed of flow Wn of max. 0 to 92.7 m/s.

The linear scale 4 to 20 mA corresponds with 0 to 92.7 m/s, based on 20 °C and 1000 mbar. The VA 300 measuring device can be fitted in the centre of any compressed air pipe and measures air consumption in m<sup>3</sup>/h in relation to the inner diameter, see next page.

With diameters other than those listed in table, the maximum volume flow (Vmax.) is calculated as follows:

Vmax: Wn x A x PF x 3600 Input:

Wn=92.7 m/s A =Area in m, (inner diameter / 2<sup>2</sup> x 3.141) PF=Tube profile factor, see table on next page Multiply by 3600 for seconds per hour

#### Example of calculation: with a diameter of 2", with inner diameter of 53.1 mm

V max: 92.7m/s x 0.002214 x 0.812x 3600 results in 600 m<sup>3</sup>/h, delivery status for 53.1 mm

#### Starting measurement

**1.** Insert mains connector for flow sensor into 230 V power supply.

**2.** Insert probe into CS 2390-5 in the left of the three M plug-in connections (M0,M1,M2) Left socket M0, middle M1, right M2. Select channel 0 for M0 connection.

**3.** Switch on device (slide switch on left-hand side of device)

**4.** The current measured value appears on the screen in  $m^3/h$ . Should the screen read 0 ----, the probe is connected to M1 or M2. Select the right channel with the **M**  $\blacktriangle$  key.

**5.** Insert probe into compressed air pipe according to operating manual.

6. Set the correct volume flow for the respective inner diameter.

## Factory pre-setting: 2 inches, 53.1 mm with 0 to 600 m<sup>3</sup>/h as limit values of volume flow measuring range

7. With other diameters, adjust the limit value of the measuring range, example 3 inches, dia 80 mm

#### set limit value of volume flow measuring range to 1389 m<sup>3</sup>/h, see table for dia. 80mm

8. Press FUNCTION key 3 x, the display shows Press PROG (▶) 1x, the display shows Select the figure to be altered with the PROG (▶) key, the figure in question starts flashing Set the number with the (▼) and (▲) keys.
9. 600S2 00600S2 0 left figure flashes

Keep pressing the **PROG** ( $\triangleright$ ) key until no more figures are flashing, 1389 m<sup>3</sup>/h is stored as the limit value of the measuring range.

Press  $\mathbf{M} \triangleq$  key **1** x, device is ready for measurement in 3 inches, 80 mm.

The setting 1389 m<sup>3</sup>/h for 3 inches remains stored when the device is switched off.



## Limit values of volume flow measuring range:

with version  $\frac{1}{4}$ ", the probe is automatically set to l/min.

Inch	mm	m³∕h	m³/min l/min		l/s	m/s	PLF
1/4"	6.0	5	0.08	78	1.31	92.70	0.500
	10.0 <b>15</b>		0.25	250	4.19	92.70	0.575
	15.0	39	0.65	650	10.81	92.70	0.660
1/2"	16.1	45	0.76	760.8	12.68	92.70	0.672
3/4"	21.7	89	1.48	1484.9	24.75	92.70	0.722
1"	25.0	122	2.04	2036.3	33.94	92.70	0.746
	26.0	133	2.21	2214.3	36.90	92.70	0.750
	27.3	148	2.46	2457.5	40.96	92.70	0.755
	28.5	162	2.70	2699.6	44.99	92.70	0.761
	30.0	181	3.01	3014.8	50.25	92.70	0.767
1 1/4"	32.8	219	3.65	3646.2	60.77	92.70	0.776
	36.0	266	4.44	4437.6	73.96	92.70	0.784
	36.3	271	4,51	4511.9	75.20	92.70	0.784
1 1/2"	39.3	320	5.34	5335.7	88.93	92.70	0.791
	40.0	332	5.54	5541.4	92.36	92.70	0.793
	41.9	367	6.11	6111.0	101.8	92.70	0797
	43.1	389	6.49	6490.4	108.2	92.70	0.800
	45.8	442	7.37	7365.7	122.8	92.70	0.804
2"	50.0	531	8.84	8844.1	147.4	92.70	0.810
	51.2	557	9.29	9285.1	154.7	92.70	0.811
	53.1	600	10.00	10000	166.7	92.70	0.812
	54.5	633	10.55	10547	175.8	92.70	0.813
	57.5	708	11.80	11797	196.6	92.70	0.817
	60.0	774	12.89	12893	214.9	92.70	0.820
	64.2	889	14.81	14815	246.9	92.70	0.823
2 1/2"	65.0	912	15.20	15204	253.4	92.70	0.824
	70.3	1070	17.83	17828	297.1	92.70	0.826
	71.1	1094	18.24	18237	303.9	92.70	0.826
	76.1	1257	20.94	20942	349.0	92.70	0.828
3"	80.0	1389	23.14	23144	385.7	92.70	0.828
	82.5	1479	24.64	24642	410.7	92.70	0.829
	84.9	1568	26.13	26129	435.4	92.70	0.830
	90.0	1764	29.40	29398	489.9	92.70	0.831
4"	100.0	2180	36.34	36337	605.6	92.70	0.832
	107.1	2504	41.73	41730	695.5	92.70	0.833
5"	125.0	3423	57.06	57055	950.9	92.70	0.835
	133.7	3921	65.35	65351	1089	92.70	0.836
6"	150.0	4941	82.36	82356	1372	92.70	0.837
	159.3	5580	93.00	92996	1549	92.70	0.838
	182.5	7323	122.06	122055	2034	92.70	0.838
	190.0	7947	132.45	132451	2207	92.70	0.839
8"	200.0	8816	146.94	146936	2448	92.70	0.840
	206.5	9399	156.64	156642	2610	92.70	0.840
10"	250.0	13775	229.59	229587	3826	92.70	0.840
	260.4	14945	249.09	249086	4151	92.70	0.840
12"	300.0	19836	330.61	330606	5510	92.70	0.840



## Further menu points:

#### 1. Check memory status, screen displays SF 30,7:

Press **FUNCTION** key, screen displays **30,7 SF,** up to 3600 individual measured values are possible.

Delete memory for new measurement with **PROG** ( $\triangleright$ ) key. **SCLR SF** flashes on the screen Delete memory by pressing **M**  $\blacktriangle$  **CLEAR**, and press **M**  $\blacktriangle$  **CLEAR** again to return to measurement menu

#### 2. Alter ZY storage cycle:

Press **FUNCTION** key, the factory setting is a cycle of 00:00:05 ZY, which means that a measured value is stored every 5 seconds. Alterations are made using **PROG** ( $\triangleright$ ) and ( $_{\land}$ )( $_{\lor}$ ) **number** keys. Store with **PROG** ( $_{\triangleright}$ ) key until no figures are flashing. Return to measurement with **M** $_{\land}$  key.

#### 3. Storing measured values

Store measured values via **Start key**.  $(_{A})(_{A})$  appears in the display Storage is stopped via **Stop** key.

#### 4. Read out memory with AMR Control VS Software

Insert RS 232 cable in right-hand socket on device and connect to PC Com port. Once AMR Control has been started, select search network, the following window appears:



Click on "Devices"

" Read-out memory of measured values"

See settings below, select "Execute":



Data Memory Device:00 AMR ALMEMO 2	390-5 🛛 🔀
Mode	Time Interval
⊙ Memory Readout - <u>A</u> II data	Start Time::
	Start Date
O Memory Readout - <u>T</u> ime Interval	End Time::
O Memory Readout - Numbers	End Date
	Number
U Llear Memory	Number <u>L</u> ist
Clear Memory and <u>M</u> easured Values	
O Start memory record	Use a number
Format: Spreadsheet 💌	System with CPU:
	Execute X Cancel

Enter file name in window "Save meas. values as", file is stored under C:Programme /Ahlborn/AMR Control /file name, or your own chosen path. Start Excel and open file with "all files" using Import assistant steps 1 to 3.

See settings in below windows. Carry out steps 1 to 3.

Text Import Wizard - Step 1 of 3	? 🗙
The Text Wizard has determined that your data is Delimited. If this is correct, choose Next, or choose the data type that best describes your data. Original data type Choose the file type that best describes your data: © Delimited - Characters such as commas or tabs separate each field. © Fixed width - Fields are aligned in columns with spaces between each field.	
Start import at <u>r</u> ow: 1 🛨 File <u>o</u> rigin: Windows (ANSI)	•
Preview of file C:\Documents and Settings\Administrator\Deskto\CS 2390 Test-3.TXT.           1         MEMORY:           2         "ALMEMO"; "RANGE: "; "NICr"; "DIGI"; "NICr";;;;;;;; "DIGI";;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;	, <b>1</b>
3 "2390-S";"COMMENT:";"";"Taupunkt";"";;;;;;;;;"Feuchte";;;;;;; 4 "V5";"LIM-MAX:";;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;	,   <b>↓</b>
	<u> </u>
Cancel < Back <u>N</u> ext > <u>F</u> inis	sh



xt Import Wizard - Step 2 of 3 🛛 🛛 🖓 🔀				
his screen lets you set the delimiters your data contains. You can see now your text is affected in the preview below.				
Delimiters       Image: Comma for the comma fo				
ata preview				
MEMORY: ALMEMO 2390-5 COMMENT: 75 LIM-MAX: LIM-MIN:				
Cancel < <u>B</u> ack <u>N</u> ext > <u>F</u> inish				
xt Import Wizard - Step 3 of 3				
xt Import Wizard - Step 3 of 3 ? X his screen lets you select each column and set he Data Format. © General				
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xt Import Wizard - Step 3 of 3   his screen lets you select each column and set the Data Format. 'General converts numeric values to numbers, date values to dates, and all remaining values to text. Advanced Column data format © General © Iext © Date: DMY © Do not import column (skip) ata preview				
xxt Import Wizard - Step 3 of 3       ? X         his screen lets you select each column and set the Data Format.       Column data format         'General' converts numeric values to numbers, date values to dates, and all remaining values to text.       Image: I				
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Activate "General"

"Finish"

Stored measured data is now ready for further processing in Excel.

## Should you have any further queries concerning programming of the device:

Please call our hotline +49 (0) 80 24 30 07-38



## Measuring ranges in relation to inner pipe diameter

This table is used when the standard VA 300-80 probe is to be used in different pipes.

Please note:

The VA 300-80 standard probe is programmed for the following standard features:

Inner pipe diameter : 53.1 mm

Analogue output 4 to 20 mA : 0 to 600 m<sup>3</sup>/h

Standard conditions :

DIN 1945 / ISO 1217

( corresponds with 92.7 m/sec. max. flow to hit sensor) ( 20 °C; 1000 mbar )

Inne diar	r pipe neter	(fin	Volu al value c	me flow of meas, rand	e)	max.	Profile	Adaption factor	
Inch	mm	m³/h	m³/min	l/min	l/s	m/s	factor		
1/4"	6.0	4.7	0.08	78.7	1.31	92.7	0.500	0.0079	
	10.0	15.1	0.25	251.1	4.19	92.7	0.575	0.0251	
	15.0	38.9	0.65	648.6	10.81	92.7	0.660	0.0649	
1/2"	16.1	45.6	0.76	760.8	12.68	92.7	0.672	0.0761	
3/4"	21.7	89.1	1.48	1484.9	24.75	92.7	0.722	0.1485	
1"	25.0	122.2	2.04	2036.3	33.94	92.7	0.746	0.2036	
	26.0	132.9	2.21	2214.3	36.90	92.7	0.750	0.2214	
	27.3	147.5	2.46	2457.5	40.96	92.7	0.755	0.2458	
	28.5	162.0	2.70	2699.6	44.99	92.7	0.761	0.2700	
	30.0	180.9	3.01	3014.8	50.25	92.7	0.767	0.3015	
1 1/4"	32.8	218.8	3.65	3646.2	60.77	92.7	0.776	0.3646	
	36.0	266.3	4.44	4437.6	73.96	92.7	0.784	0.4438	
	36.3	270.7	4.51	4511.9	75.20	92.7	0.784	0.4512	
1 1/2"	39.3	320.1	5.34	5335.7	88.93	92.7	0.791	0.5336	
	40.0	332.5	5.54	5541.4	92.36	92.7	0.793	0.5542	
	41.9	366.7	6.11	6111.0	101.8	92.7	0.797	0.6111	
	43.1	389.4	6.49	6490.4	108.1	92.7	0.800	0.6491	
	45.8	441.9	7.37	7365.7	122.7	92.7	0.804	0.7366	
2"	50.0	530.6	8.84	8844.1	147.4	92.7	0.810	0.8845	
	51.2	557.1	9.29	9285.1	154.7	92.7	0.811	0.9286	
	53.1	600.0	10.00	10000	166.6	92.7	0.812	1.0000	Χ
	54.5	632.8	10.55	10546	175.7	92.7	0.813	1.0547	
	57.5	707.8	11.80	11797	196.6	92.7	0.817	1.1798	
	60.0	773.6	12.89	12892	214.8	92.7	0.820	1.2894	
	64.2	888.9	14.81	14814	246.9	92.7	0.823	1.4816	



Inne	er pipe		Volume flow					Adaptation
diai	meter	(fin	al value of meas. range)			max.	Profile	factor
Inch	mm	m³/h	m³/min	l/min	l/s	m/s	factor	
2 1/2"	65.0	913.5	15.22	15224	253.7	92.7	0.824	1.5225
	70.3	1071.1	17.85	17851	297.5	92.7	0.826	1.7852
	71.1	1095.6	18.26	18260	304.3	92.7	0.826	1.8260
	76.1	1258.2	20.97	20969	349.4	92.7	0.828	2.0970
3"	80.0	1390.4	23.17	23173	386.2	92.7	0.828	2.3174
	81.0	1425.4	23.76	23756	395.9	92.7	0.828	2.3757
	82.5	1480.5	24.67	24674	411.2	92.7	0.829	2.4675
	84.9	1569.8	26.16	26162	436.0	92.7	0.830	2.6163
	90.0	1766.1	29.44	29435	490.6	92.7	0.831	2.9436
4"	100.0	2183.1	36.38	36384	606.4	92.7	0.832	3.6384
	107.1	2507.1	41.78	41784	696.4	92.7	0.833	4.1784
	110.0	2644.7	44.08	44077	734.6	92.7	0.833	4.4078
5"	125.0	3423.3	57.1	57055	950.9	92.7	0.835	5.7055
	133.7	3921.1	65.4	65351	1089.2	92.7	0.836	6.5352
6"	150.0	4941.4	82.4	82356	1372.6	92.7	0.837	8.2357
	159.3	5579.8	93.0	92996	1549.9	92.7	0.838	9.2996
	182.5	7323.4	122.1	122055	2034.3	92.7	0.838	12.206
	190.0	7947.1	132.5	132451	2207.5	92.7	0.839	13.245
8"	200.0	8816.2	146.9	146936	2448.9	92.7	0.840	14.694
	206.5	9398.5	156.6	156642	2610.7	92.7	0.840	15.664
10"	250.0	13775	229.6	229587	3826.5	92.7	0.840	22.959
	260.4	14945	249.1	249086	4151.4	92.7	0.840	24.909
12"	300.0	19836	330.6	330606	5510.1	92.7	0.840	33.061
	309.7	21139	352.3	352331	5872.2	92.7	0.840	35.233
	339.6	25418	423.6	423646	7060.8	92.7	0.840	42.365
	388.8	33317	555.3	555291	9254.9	92.7	0.840	55.529
	500.0	55101	918.4	918350	15305	92.7	0.840	91.835
	600.0	79345	1322	1322424	22040	92.7	0.840	132.24
	700.0	107998	1800	1799966	29999	92.7	0.840	179.99
	800.0	141058	2351	2350976	39182	92.7	0.840	235.09
	900.0	178527	2975	2975455	49590	92.7	0.840	297.54
	1000.0	220404	3673	3673401	61223	92.7	0.840	367.34

## Measuring ranges in relation to inner pipe diameter



## Technical data

Measurands:	m³/h m/s (The underlying standard is valid: DIN 1945. ISO 1217 at 20°C and 1000 mbar)
Principle of measurement:	calorimetric measurement
Sensor:	2 x PT100
Measuring medium:	Air, gas
Operating temperature:	-30 to 140°C probe tube -30 to 80 °C housing
Operating pressure:	up to 50 bar
Analogue output:	4 to 20 mA for m <sup>3</sup> /h
Pulse output:	1 pulse per m³ (High signal 24 VDC 2ms)
Power supply: (stationary with flow processor)	230 VDC. 50 to 60 Hz
Power supply: (mobile, probe only)	24 VDC smoothed +- 15%
Accuracy: With measurement section	<ul> <li>+- 3% of m.v.</li> <li>+- 2% of m.v. (option via 5 point ISO precision calibration) This data is only valid in relation to the measurement section</li> </ul>
Accuracy: Without measurement section	+-4 % of m.v. +-3 % of m.v. (option via 5 point ISO precision calibration) This data is only valid when the correct inner diameter is entered.
Display:	Flow in m³/h (instantaneous value, 4 figures) Meter in m³ (total air consumption, 8 figures)
Selectable units:	m³/h (standard factory setting) m³/min. l/min. l/s. ft/min. cfm



## Service information

## Maintenance

The sensor head should be checked regularly for dirt and cleaned if necessary. Should dirt, dust or oil build up on the sensor element, a deviation will occur in the measured value.

A yearly check is recommended. Should the compressed air be heavily soiled, this interval must be shortened.

## Cleaning the sensor head

The sensor head can be cleaned by carefully moving it to and fro in warm water with a small amount of washing up liquid. Avoid physical intervention on the sensor (e.g. using a sponge or brush).

If soiling cannot be removed, service and maintenance must be carried out by the manufacturer.

## **Re: calibration**

If no customer specifications are given, then we recommend that calibration is carried out every 12 months. The sensor must be sent to the manufacturer for this purpose.

## Spare parts and repair

Spare parts are not available for reasons of measuring accuracy. If parts are faulty, they must be sent to the supplier for repair.

If the measuring device is used in important company installations, we recommend that you keep a spare measuring system ready.

## **Calibration certificates**

Calibration certificates are issued by the manufacturer on request. This is a feepaying service. Precision is tested with PTB (German National Metrology Institute) volume flow nozzles.



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