



Instruction Manual

DB50

***Thermal mass flowmeter and counter for compressed air
and non-aggressive gases***



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I. Foreword

Dear customer,

thank you very much for deciding in favour of the DB50. Please read this installation and operation manual carefully before mounting and initiating the device and follow our advice. A riskless operation and a correct functioning of the DB50 are only guaranteed in case of careful observation of the described instructions and notes.

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1 Intended use

The DB50 consumption sensor is used for continuous flow measurements.

The DB50 consumption sensor is designed and constructed exclusively for the intended purpose described here and may only be used accordingly.

The user must check whether the instrument is suitable for the selected application. It must be ensured that the medium is compatible with the wetted parts. The technical data listed in the data sheet are binding.

Improper handling or operation outside the technical specifications is not permitted. Claims of any kind based on improper use are excluded.

2 Safety instructions



- Please check whether this manual also corresponds to the device type.
- This manual must be read before installation, commissioning and maintenance.
- Please observe all instructions given in this operating manual. It contains basic information that must be observed during installation, operation and maintenance.
- In addition to these operating instructions, local or national regulations must be observed where applicable.
- Make sure that the DB50 is only operated within the permissible limits specified on the nameplate. Otherwise there is a danger to people and material and malfunctions and operating faults may occur
- Improper handling can lead to considerable personal injury and damage to property.
All activities described in this operating manual may only be carried out by qualified personnel with the qualifications described below
- The safety ring attached to the sensor head must always be undamaged and correctly fitted..
- The screw-in device must be screwed in pressure-tight.
- The clamping sleeve must be tightened with a tightening torque of 20-30 Nm.
- In the event of non-observance or non-compliance, the manufacturer cannot be held liable for any resulting damage. Interventions of any kind on the device, if they do not correspond to the intended and described procedures, lead to the warranty being voided and to the exclusion of liability.
- The device is intended exclusively for the described purpose.
- We do not assume any warranty with regard to the suitability for any particular purpose and no liability for errors contained in these operating instructions. Nor for consequential damages in connection with the delivery, performance or use of the device.
- Do not exceed the pressure range of 50 bar.
- Over 10 bar we recommend using the high-pressure protection for a safe installation.

Burnable gases

If this consumption sensor is used for measurement of burnable gases (e.g. natural gas) we explicitly point out that the sensor has no DVGW (= German Technical Association for Gas and Water) admission, however, it can be used for natural gas.

A DVGW admission is not mandatory.

The consumption sensor DB50 corresponds with the latest state of technology and can generally be used for burnable and non-burnable gases.

For the use in e.g. natural gas, the sensor will be calibrated in natural gas. The calibration protocol (inspection certificate) is included in the scope of delivery.

The area outside the pipe (environment of the sensor) is not allowed to be an explosive area (Ex-area)

Please read carefully before starting the device!

The consumption sensor DB50 measures the flow velocity (calorimetric principle) in the center of the pipe. Please observe mounting instruction and inlet section = 15 x inner diameter and outlet section = 5 x inner diameter.

The final values of the measuring ranges are as follows:

DB50 standard version 92.7 m/s, please take the flow rates from the tables on pages 14-15

DB50 max. version 185 m/s, please take the flow rates from the tables on pages 16-17

DB50 high speed version 224 m/s, please take the flow rates from the tables on pages 18-19

1. DB50 with Display with 4... 20 mA analogue- and pulse output**Please enter inner diameter of the pipe!****Values indicated in the display:**

Actual value in m³/h, m³/min etc.

Counter in m³, l, cf

as well as pulse output, 1 pulse per m³, l, cf

are calculated according to the set diameter. Please take the analogue value for flow rate 4...20 mA from the tables on pages 14 to 19

4 mA always corresponds with the starting value 0 m³/h, 0 m³/min. The final value 20 mA can be taken from the tables on pages 14 to 19.

Example DB50 Standard:

1" with inner diameter 25.0 mm, 4 mA = 0 m³/h and 20 mA = 122.2 m³/h

2" with inner diameter 53.1 mm, 4 mA = 0 m³/h und 20 mA = 600.0 m³/h

2. DB50 without Display with 4... 20 mA analogue- and pulse output**No adjustments are necessary at the consumption sensor.**

The respective final values for the flow rate can be taken from the tables on the pages 14 to 19.

Analogue start value 4 mA is always set as scaling value 0 m³/h, 0 m³/min etc.

Analogue end value 20 mA is the final value, see tables pages 14 -19.

Example DB50 Standard:

1" with inner diameter 25.0 mm, 4 mA = 0 m³/h and 20 mA = 122.2 m³/h

2" with inner diameter 53.1 mm, 4 mA = 0 m³/h und 20 mA = 600.0 m³/h

3 Instruments description

The DB50 is a compact consumption counter for compressed air and gases.

Special features:

- Optimum accuracy due to compact design
- Integrated Display showing Flow, consumption, velocity and temperature
- Input inner tube diameter via display keys
- Units free selectable. m³/h, m³/min, l/min, l/s, kg/h, kg/min, kg/s, cfm
- Modbus RTU (RS485) Interface
- Analogoutput 4..20mA
- Pulse output galv. isolated.

4 Technical data

Measurement:	Flow, Consumption and Velocity
Reference:	Standard settings ex works: DIN 1945, ISO 1217 at 20°C and 1000 mbar other standards can be adjusted by Display keys optional (optional)
Selectable Units:	m³/h (Standard settings ex- factory) m³/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min, kg/s, °C, °F
Measuring principle:	calorimetric measurement
Sensor:	Pt45, Pt1000
Measuring medium:	Air gases
Operating temperature:	-20 ... 70°C housing -30 ... 100°C probe tube
Relative humidity for measuring medium:	< 95 % r.H (no condensation on the sensor element allowed)
Operating pressure:	up to 50 bar
Power supply:	18 to 36 VDC Optional: PoE according to IEEE 802.3af, PD Class 2 (max. 6.5W), supply voltage from 36V to 57V DC
Power consumption:	max. 5W
Digital output:	RS 485 (Modbus RTU)
Analog output:	4...20 mA (see tables page 13 -18), max. burden < 500 Ohm
Pulse output:	pulse output potential free (dry contact) passive: max. 48Vdc, 150mA 1 pulse pro m³ resp. pro l, Valency adjustable with the display keys
Accuracy:	± 1,5 % m.v.* , ± 0,3 % f.s.*
Display:	optional TFT 1.8“ Resolution 220 x 176
Mounting thread:	G ½“, optional ½" NPT
Material:	Stainless steel 1.4301 / 1.4404
Protection class	IP65

* m.v. = measured values
f.s. = full scale

5 Installation

5.1 Pipe/tube requirements

- Correctly sized gaskets
- Correct aligned flanges and gaskets
- Diameter mismatch at the pipe junctions should be avoided but must be less than 1mm. For further information see ISO 14511
- Ensure clean pipes after installation
- .

5.2 Inlet / outlet runs

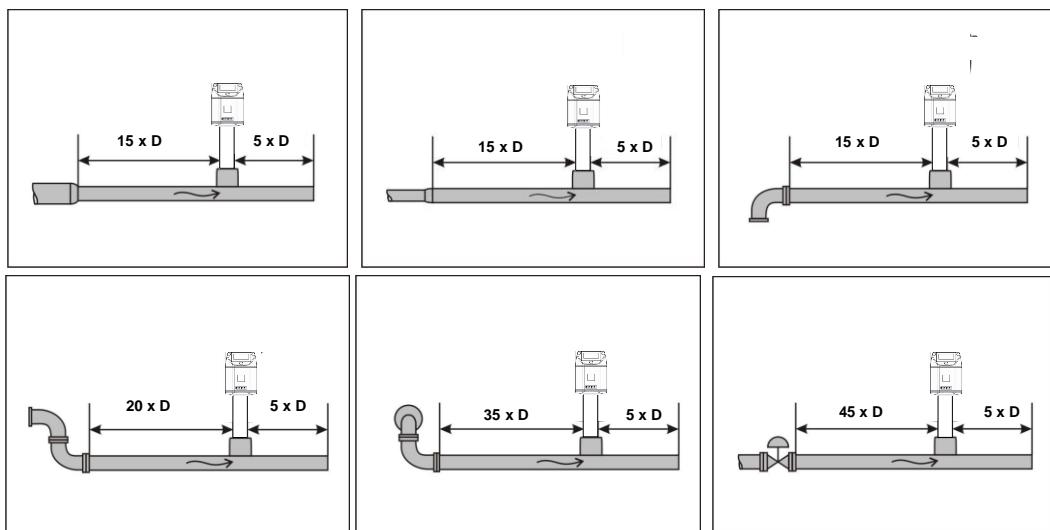
In order to maintain the accuracy stipulated in the data sheets, the sensor must be inserted in the centre of a straight pipe section with an undisturbed flow progression.

An undisturbed flow progression is achieved if the sections in front of the sensor (inlet) and behind the sensor (outlet) are sufficiently long, straight and without any obstructions such as edges, seams, curves etc.

Therefore, it is necessary to ensure the recommended inlet and outlet runs.

Table Inlet / Outlet runs

Flow obstruction before the measurement section	Min length Inlet run (L1)	Min length Outlet run (L2)
Slight curve (elbow < 90°)	12 x D	5 x D
Reduction (Pipe narrows to the measurement section)	15 x D	5 x D
Expansion (Pipe expands to the measurement section)	15 x D	5 x D
90° elbow or T-piece	15 x D	5 x D
2x elbow á 90° in einer Ebene	20 x D	5 x D
2x elbow á 90° 3-dimensional	35 x D	5 x D
Control valve	45 x D	5 x D



The values represent the min. lengths. In case the min. inlet / outlet runs could not be ensured, it must be expected to get increased or significant deviations of the measurement values.

5.3 Installation DB50

The installation of the sensor is done via a ball valve $\frac{1}{2}$ ".

If no valid measuring point with a ball valve $\frac{1}{2}$ " is available there are following ways to set up a measuring point.

5.3.1 $\frac{1}{2}$ " welded nipple with ball valve $\frac{1}{2}$ "



Important:

Ensure that the system is in shut down, ie. depressurized.

Note for installation with ball valve

Ball valve R 1/2", DN 15

Passage ball valve: Minimum Ø15 mm

5.3.2 Spot drilling collar with ball valve



In case the system could not be shut down, means to be set depressurized, there could be used the spot drilling collar (please request) to drill through the ball valve.

5.4 Installation of the Sensor

5.4.1 Mounting DB50 onto the ball valve

- Assembly is carried out by inserting the connection thread with gasket. (G1/2" thread, SW 32) into the ball valve with 1/2"internal thread. The sensor has to be tightened by hand as far as possible and then tighten with stipulated torque of 25-30 Nm. It must be ensured that the installation is pressure-tight.
- The sensor is then inserted to the required immersion depth (sensor tip in the middle of pipe) and aligned according to the direction of the airflow. A depth scale engraved on the probe tube, a flow alignment arrow and an aligning device will be of help for you. Once the sensor has been aligned the adapter sleeve must be tightened with stipulated torque of 20-30 Nm (SW 17).



WARNING

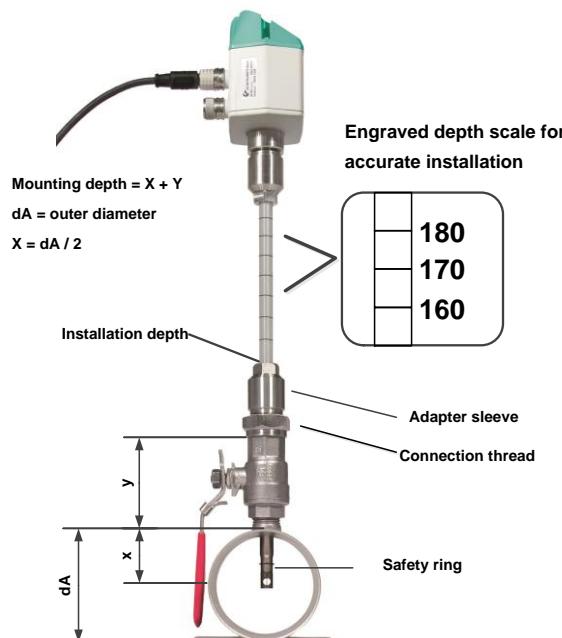
Components under high pressure! Risk of injury if the flow sensor is not installed in a pressure-tight manner.

- After installation, be sure to check and ensure the pressure tightness of the connection. Do not work directly over the sensor, but next to it to minimise possible hazards.

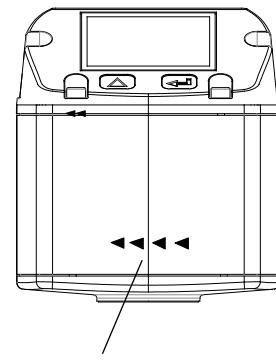


Attention: Alignment of the sensor must not be modified when tightening the connection thread and adapter sleeve. In this case, please check the immersion depth and alignment again and correct it if necessary. The angular deviation should not be greater than $\pm 2^\circ$ in relation to ideal position as otherwise the measuring accuracy will decrease.

Calculation mounting depth:



Alignment flow direction

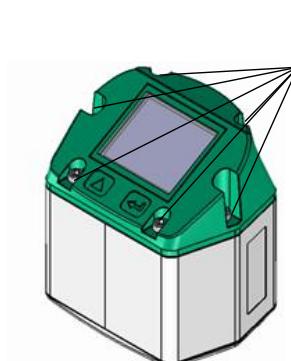


Sensor alignment

A max. angle deviation of $\pm 2^\circ$ is permitted to ensure correct measured values..



5.5 Display Head Position



Fastening screws

The Position of the Display head is twistable by 180 e.g. in case of reverse flow direction.

For this purpose the 6 fastening screws are to be released and the display head rotated 180°.

Caution:

It must be ensured that the connection plugs are still plugged and the gasket is installed correctly.

6 Measuring ranges

The consumption sensor DB50 is available in 4 different versions:

- | | |
|----------------------|-----------------------------------|
| • Low Speed | max. measuring range of 50 m/s |
| • Standard | max. measuring range of 92,7 m/s |
| • Max-Version | max. measuring range of 185,0 m/s |
| • High speed-Version | max. measuring range of 224 m/s |

The sensors are **programmed to pipe inner diameter of 53,1 mm.**

	Measuring range	Analogoue output Scaling
• Low Speed	0 ... 323,6 m ³ /h	4mA = 0 m ³ h, 20mA = 323,6 m ³ /h
• Standard	0 ... 600 m ³ /h	4mA = 0 m ³ h, 20mA = 600 m ³ /h
• Max-Version	0 ... 1197,59 m ³ /h	4mA = 0 m ³ h, 20mA = 1197,59 m ³ /h
• Highspeed-Version	0 ... 1450,06 m ³ /h	4mA = 0 m ³ h, 20mA = 1450,06 m ³ /h

In case of use in other inner pipe diameter the diameter, using the display version, the diameter has to be set first.

The corresponding scale values for the respective version could be found in sections 5.1 to 5.3.

Example:

Pipe 1“, Inner diameter 25mm

	Measuring range	Analogoue output Scaling
• Low Speed	0 ... 65,9 m ³ /h	4mA = 0 m ³ h, 20mA = 65,9 m ³ /h
• Grundversion(Standard)	0 ... 122,2 m ³ /h	4mA = 0 m ³ h, 20mA = 122,2 m ³ /h
• Max-Version	0 ... 243,88 m ³ /h	4mA = 0 m ³ h, 20mA = 243,88 m ³ /h
• Highspeed-Version	0 ... 295,30 m ³ /h	4mA = 0 m ³ h, 20mA = 295,30 m ³ /h

For changing the inner pipe diameter and adjusting the 4...20mA scaling, please refer to chapter “Operation”.

Please note:

The consumption sensor DB50 corresponds with the latest state of technology and can generally be used for burnable and non-burnable gases.

If this consumption sensor is used for measurement of burnable gases (e.g. natural gas) we explicitly point out that the sensor has no DVGW admission, however, it can be used for burnable gases. A DVGW admission is not mandatory.

For the use in e.g. natural gas, the sensor will be calibrated in natural gas. The calibration protocol (inspection certificate) is included in the scope of delivery.

The area outside the pipe (environment of the sensor) is not allowed to be an explosive area. (Ex area) .

6.1 Maximum Flow Ranges „Low Speed“

Inner diameter of the pipe		Flow (final value of measuring range in Nm ³ /h)								Max.
Inch	mm	Air ²⁾	Air ³⁾	Ar ³⁾	CO ₂ ³⁾	N ₂ ³⁾	O ₂ ³⁾	N ₂ O ³⁾	Natural gas ³⁾	m/s
1/4"	6,0	2,5	2,3	4,0	2,5	2,3	2,4	2,5	1,5	50
	10,0	8,1	7,4	12,6	8,0	7,4	7,7	7,9	4,8	50
	15,0	21,0	19,3	32,8	20,8	19,3	20,0	20,6	12,4	50
1/2"	16,1	24,6	22,6	38,4	24,3	22,6	23,4	24,1	14,6	50
3/4"	21,7	48,1	44,2	75,1	47,6	44,2	45,8	47,1	28,4	50
1"	25,0	65,9	60,6	103,1	65,2	60,6	62,8	64,6	39,0	50
	26,0	71,7	65,9	112,1	70,9	65,9	68,3	70,3	42,4	50
	27,3	79,7	73,2	124,5	78,8	73,2	75,9	78,1	47,1	50
	28,5	87,4	80,4	136,6	86,5	80,4	83,3	85,7	51,7	50
	30,0	97,6	89,7	152,6	96,6	89,7	93,0	95,7	57,7	50
1 1/4"	32,8	118,0	108,5	184,5	116,8	108,5	112,5	115,8	69,8	50
	36,0	143,6	132,1	224,6	142,1	132,1	136,9	140,9	85,0	50
	36,3	146,2	134,5	228,6	144,7	134,5	139,4	143,4	86,5	50
1 1/2"	39,3	172,9	159,0	270,4	171,1	159,0	164,9	169,6	102,3	50
	40,0	179,4	164,9	280,4	177,5	164,9	171,0	175,9	106,1	50
	41,9	196,9	181,0	307,8	194,8	181,0	187,7	193,1	116,5	50
	43,1	210,1	193,2	328,5	207,9	193,2	200,3	206,1	124,3	50
	45,8	238,4	219,3	372,8	235,9	219,3	227,3	233,8	141,1	50
2"	50,0	286,3	263,3	447,6	283,3	263,3	272,9	280,8	169,4	50
	51,2	300,6	276,4	469,9	297,4	276,4	286,5	294,8	177,9	50
	53,1	323,7	297,6	506,1	320,3	297,6	308,6	317,5	191,5	50
	54,5	341,4	313,9	533,8	337,8	313,9	325,5	334,8	202,0	50
	57,5	382,3	351,6	597,8	378,4	351,6	364,5	375,0	226,3	50
	60,0	417,3	383,8	652,5	413,0	383,8	397,9	409,3	247,0	50
	64,2	479,5	441,0	749,8	474,6	441,0	457,2	470,3	283,8	50

²⁾ Referred to DIN 1945 / ISO 1217 (20°C, 1000mbar) and compressed air.

³⁾ Referred to DIN 1343: 0°C, 1013,25 mbar

Measuring ranges

Inner diameter of the pipe		Flow (final value of measuring range in Nm ³ /h)								Max.
Inch	mm	Air ²⁾	Air ³⁾	Ar ³⁾	CO ₂ ³⁾	N ₂ ³⁾	O ₂ ³⁾	N ₂ O ³⁾	Natural gas ³⁾ Methan	m/s
2 1/2"	65,0	492,2	452,6	769,5	487,1	452,6	469,2	482,7	291,2	50
	70,3	577,8	531,3	903,4	571,8	531,3	550,9	566,7	341,9	50
	71,1	591,0	543,5	924,1	584,9	543,5	563,5	579,7	349,7	50
	76,1	678,7	624,1	1061,2	671,7	624,1	647,1	665,7	401,6	50
3"	80,0	751,9	691,4	1175,5	744,1	691,4	716,8	737,4	444,9	50
	82,5	799,6	735,3	1250,2	791,3	735,3	762,3	784,2	473,2	50
	84,9	846,8	778,7	1324,0	838,0	778,7	807,3	830,5	501,1	50
	90,0	952,7	876,1	1489,6	942,8	876,1	908,3	934,4	563,8	50
4"	100,0	1177,6	1082,9	1841,2	1165,4	1082,9	1122,7	1155,0	696,9	50
	107,1	1352,4	1243,7	2114,5	1338,4	1243,7	1289,4	1326,4	800,3	50
	110,0	1426,6	1311,9	2230,5	1411,8	1311,9	1360,2	1399,2	844,2	50
5"	125,0	1844,5	1696,1	2883,8	1825,3	1696,1	1758,5	1809,0	1091,5	50
	133,7	2110,1	1940,5	3299,2	2088,2	1940,5	2011,8	2069,6	1248,7	50
6"	150,0	2659,2	2445,4	4157,6	2631,6	2445,4	2535,3	2608,1	1573,6	50
	159,3	2999,2	2758,0	4689,2	2968,0	2758,0	2859,4	2941,6	1774,8	50
	182,5	3941,1	3624,2	6161,8	3900,1	3624,2	3757,4	3865,4	2332,1	50
	190,0	4271,6	3928,2	6678,7	4227,3	3928,2	4072,6	4189,6	2527,8	50
8"	200,0	4738,8	4357,7	7409,0	4689,5	4357,7	4517,9	4647,7	2804,2	50
	206,5	5051,8	4645,6	7898,4	4999,3	4645,6	4816,4	4954,8	2989,4	50
10"	250,0	7413,2	6817,1	11590,4	7336,1	6817,1	7067,7	7270,8	4386,8	50
	260,4	8052,4	7404,9	12589,8	7968,7	7404,9	7677,1	7897,7	4765,0	50
12"	300,0	10687,7	9828,3	16710,1	10576,6	9828,3	10189,6	10482,4	6324,5	50
	309,7	11390,0	10474,2	17808,1	11271,6	10474,2	10859,2	11171,2	6740,1	50
	339,6	13695,5	12594,2	21412,7	13553,1	12594,2	13057,2	13432,4	8104,4	50
	400,0	19000,4	17472,6	29706,8	18802,9	17472,6	18114,9	18635,4	11243,6	50
	500,0	29688,1	27300,9	46416,9	29379,5	27300,9	28304,5	29117,7	17568,1	50
	600,0	42750,8	39313,3	66840,4	42306,5	39313,3	40758,4	41929,6	25298,0	50
	700,0	58188,6	53509,8	90977,1	57583,9	53509,8	55476,8	57070,8	34433,4	50
	800,0	76001,4	69890,3	118827,3	75211,6	69890,3	72459,4	74541,4	44974,3	50
	900,0	96189,3	88454,9	150390,8	95189,7	88454,9	91706,5	94341,5	56920,6	50
	1000,0	118752,2	109203,6	185667,6	117518,1	109203,6	113217,9	116471,0	70272,3	50

²⁾ Referred to DIN 1945 / ISO 1217 (20°C, 1000mbar) and compressed air.

³⁾ Referred to DIN 1343: 0°C, 1013,25 mbar

6.2 Maximum Flow Ranges „Standard“

Inner diameter of the pipe		Flow (final value of measuring range in Nm³/h)								Max.
Inch	mm	Air ²⁾	Air ³⁾	Ar ³⁾	CO2 ³⁾	N2 ³⁾	O2 ³⁾	N2O ³⁾	Natural gas ³⁾ Methan	m/s
1/4"	6,0	4,7	4,3	7,4	4,7	4,3	4,5	4,6	2,8	92,7
	10,0	14,9	13,7	23,4	14,8	13,7	14,2	14,7	8,8	92,7
	15,0	38,9	35,8	60,9	38,5	35,8	37,1	38,2	23,0	92,7
1/2"	16,1	45,6	41,9	71,3	45,1	41,9	43,4	44,7	27,0	92,7
3/4"	21,7	89,1	81,9	139,3	88,2	81,9	84,9	87,4	52,7	92,7
1"	25,0	122,2	112,4	191,1	120,9	112,4	116,4	119,9	72,3	92,7
	26,0	132,9	122,2	207,8	131,5	122,2	126,5	130,3	78,6	92,7
	27,3	147,7	135,8	230,9	146,1	135,8	140,6	144,8	87,4	92,7
	28,5	162,0	149,0	253,3	160,3	149,0	154,3	158,9	95,9	92,7
	30,0	180,9	166,4	282,9	179,0	166,4	172,3	177,5	107,1	92,7
1 1/4"	32,8	218,8	201,2	342,1	216,5	201,2	208,4	214,6	129,5	92,7
	36,0	266,3	244,9	416,4	263,5	244,9	253,6	261,2	157,6	92,7
	36,3	271,1	249,3	423,9	268,3	249,3	258,2	265,9	160,4	92,7
1 1/2"	39,3	320,6	294,8	501,3	317,3	294,8	305,3	314,5	189,7	92,7
	40,0	332,6	305,8	519,9	329,1	305,8	316,7	326,2	196,8	92,7
	41,9	365,0	335,6	570,6	361,2	335,6	347,6	358,0	216,0	92,7
	43,1	389,5	358,2	609,0	385,4	358,2	370,9	382,0	230,5	92,7
	45,8	442,0	406,5	691,1	437,4	406,5	421,0	433,5	261,6	92,7
2"	50,0	530,8	488,1	829,8	525,2	488,1	505,5	520,6	314,1	92,7
	51,2	557,2	512,4	871,2	551,4	512,4	530,7	546,5	329,7	92,7
	53,1	600,1	551,8	938,2	593,8	551,8	571,5	588,6	355,1	92,7
	54,5	632,9	582,0	989,5	626,3	582,0	602,7	620,8	374,5	92,7
	57,5	708,9	651,9	1108,3	701,5	651,9	675,8	695,2	419,5	92,7
	60,0	773,7	711,5	1209,7	765,6	711,5	736,8	758,9	457,9	92,7
	64,2	889,1	817,6	1390,0	879,8	817,6	846,7	872,0	526,1	92,7

²⁾ Referred to DIN 1945 / ISO 1217 (20°C, 1000mbar) and compressed air.

³⁾ Referred to DIN 1343: 0°C, 1013,25 mbar

Measuring ranges

Inner diameter of the pipe		Flow (final value of measuring range in Nm ³ /h)								Max.
Inch	mm	Air ²⁾	Air ³⁾	Ar ³⁾	CO ₂ ³⁾	N ₂ ³⁾	O ₂ ³⁾	N ₂ O ³⁾	Natural gas ³⁾ Methan	m/s
2 1/2"	65,0	912,5	839,1	1426,6	902,9	839,1	869,0	895,0	540,0	92,7
	70,3	1071,2	985,1	1674,8	1060,0	985,1	1020,2	1050,7	633,9	92,7
	71,1	1095,8	1007,7	1713,1	1084,3	1007,7	1043,5	1074,7	648,4	92,7
	76,1	1258,3	1157,2	1967,3	1245,2	1157,2	1198,3	1234,2	744,6	92,7
3"	80,0	1394,0	1281,9	2179,4	1379,4	1281,9	1327,5	1367,2	824,9	92,7
	82,5	1482,5	1363,3	2317,7	1466,9	1363,3	1411,8	1454,0	877,2	92,7
	84,9	1570,0	1443,7	2454,5	1553,5	1443,7	1495,1	1539,8	929,0	92,7
	90,0	1766,4	1624,3	2761,6	1747,9	1624,3	1682,1	1732,4	1045,3	92,7
4"	100,0	2183,3	2007,8	3413,5	2160,5	2007,8	2079,2	2141,4	1292,0	92,7
	107,1	2507,4	2305,7	3920,1	2481,1	2305,7	2387,8	2459,2	1483,7	92,7
	110,0	2645,0	2432,3	4135,3	2617,3	2432,3	2518,9	2594,2	1565,2	92,7
5"	125,0	3419,6	3144,7	5346,3	3383,8	3144,7	3256,6	3353,9	2023,6	92,7
	133,7	3912,2	3597,6	6116,5	3871,3	3597,6	3725,7	3837,0	2315,1	92,7
6"	150,0	4930,2	4533,7	7708,0	4878,6	4533,7	4695,1	4835,4	2917,4	92,7
	159,3	5560,5	5113,3	8693,4	5502,3	5113,3	5295,3	5453,6	3290,4	92,7
	182,5	7306,7	6719,2	11423,6	7230,3	6719,2	6958,3	7166,4	4323,8	92,7
	190,0	7919,6	7282,8	12381,8	7836,8	7282,8	7542,0	7767,5	4686,5	92,7
8"	200,0	8785,7	8079,2	13735,8	8693,8	8079,2	8366,8	8616,9	5199,0	92,7
	206,5	9366,0	8612,9	14643,2	9268,0	8612,9	8919,4	9186,1	5542,4	92,7
10"	250,0	13744,0	12638,9	21487,8	13600,2	12638,9	13088,7	13480,0	8133,1	92,7
	260,4	14929,1	13728,7	23340,6	14772,9	13728,7	14217,2	14642,3	8834,4	92,7
12"	300,0	19815,0	18221,7	30979,4	19607,7	18221,7	18870,1	19434,3	11725,6	92,7
	309,7	21117,1	19419,1	33015,1	20896,1	19419,1	20110,1	20711,4	12496,1	92,7
	339,6	25391,4	23349,7	39697,7	25125,7	23349,7	24180,6	24903,6	15025,5	92,7
	400,0	35226,7	32394,1	55074,4	34858,0	32394,1	33546,9	34549,9	20845,6	92,7
	500,0	55041,6	50615,8	86053,8	54465,7	50615,8	52417,0	53984,3	32571,2	92,7
	600,0	79260,0	72886,8	123917,4	78430,6	72886,8	75480,5	77737,4	46902,5	92,7
	700,0	107881,6	99207,0	168665,4	106752,8	99207,0	102737,4	105809,2	63839,5	92,7
	800,0	140906,6	129576,5	220297,7	139432,2	129576,5	134187,6	138199,7	83382,2	92,7
	900,0	178334,9	163995,2	278814,3	176468,9	163995,2	169831,2	174909,1	105530,6	92,7
	1000,0	220166,6	202463,2	344215,1	217862,8	202463,2	209668,2	215937,1	130284,7	92,7

²⁾ Referred to DIN 1945 / ISO 1217 (20°C, 1000mbar) and compressed air.

³⁾ Referred to DIN 1343: 0°C, 1013,25 mbar

6.3 Maximum Flow ranges „Max speed“

Inner diameter of the pipe		Flow (final value of measuring range in Nm³/h)								Max.
Inch	mm	Air ²⁾	Air ³⁾	Ar ³⁾	CO ₂ ³⁾	N ₂ ³⁾	O ₂ ³⁾	N ₂ O ³⁾	Natural gas ³⁾ Methan	m/s
1/4"	6,0	9,4	8,7	14,7	9,3	8,7	9,0	9,2	5,6	185,0
	10,0	29,8	27,4	46,6	29,5	27,4	28,4	29,2	17,6	185,0
	15,0	77,7	71,4	121,4	76,9	71,4	74,1	76,2	46,0	185,0
1/2"	16,1	91,0	83,7	142,2	90,0	83,7	86,7	89,2	53,8	185,0
3/4"	21,7	177,8	163,5	278,0	176,0	163,5	169,5	174,4	105,2	185,0
1"	25,0	243,9	224,3	381,3	241,3	224,3	232,5	239,2	144,3	185,0
	26,0	265,2	243,9	414,6	262,4	243,9	252,8	260,1	156,9	185,0
	27,3	294,7	271,0	460,8	291,7	271,0	281,0	289,1	174,4	185,0
28,5	323,3	297,3	505,5	320,0	297,3	308,3	317,1	191,3	185,0	
	30,0	361,1	332,0	564,5	357,3	332,0	344,3	354,1	213,7	185,0
	32,8	436,7	401,6	682,8	432,2	401,6	416,3	428,3	258,4	185,0
36,0	531,5	488,7	831,0	526,0	488,7	506,7	521,3	314,5	185,0	
	36,3	541,1	497,6	845,9	535,4	497,6	515,8	530,7	320,2	185,0
	39,3	639,8	588,4	1000,4	633,2	588,4	610,0	627,6	378,6	185,0
40,0	663,7	610,3	1037,7	656,8	610,3	632,7	650,9	392,7	185,0	
	41,9	728,4	669,8	1138,9	720,8	669,8	694,5	714,4	431,0	185,0
	43,1	777,3	714,8	1215,4	769,3	714,8	741,1	762,4	460,0	185,0
45,8	882,2	811,2	1379,3	873,0	811,2	841,1	865,2	522,0	185,0	
	50,0	1059,2	974,1	1656,1	1048,2	974,1	1009,9	1038,9	626,8	185,0
	51,2	1112,1	1022,6	1738,7	1100,5	1022,6	1060,2	1090,7	658,1	185,0
53,1	1197,6	1101,3	1872,4	1185,1	1101,3	1141,8	1174,6	708,7	185,0	
54,5	1263,1	1161,6	1974,9	1250,0	1161,6	1204,3	1238,9	747,5	185,0	
57,5	1414,7	1300,9	2211,8	1400,0	1300,9	1348,7	1387,5	837,1	185,0	
60,0	1544,1	1420,0	2414,2	1528,1	1420,0	1472,2	1514,5	913,7	185,0	
64,2	1774,3	1631,7	2774,1	1755,9	1631,7	1691,6	1740,2	1050,0	185,0	

²⁾ Referred to DIN 1945 / ISO 1217 (20°C, 1000mbar) and compressed air.

³⁾ Referred to DIN 1343: 0°C, 1013,25 mbar

Measuring ranges

Inner diameter of the pipe		Flow (final value of measuring range in Nm³/h)								Max.
Inch	mm	Air ²⁾	Air ³⁾	Ar ³⁾	CO ₂ ³⁾	N ₂ ³⁾	O ₂ ³⁾	N ₂ O ³⁾	Natural gas ³⁾ Methan	m/s
2 1/2"	65,0	1821,0	1674,6	2847,2	1802,1	1674,6	1736,2	1786,1	1077,6	185,0
	70,3	2137,9	1966,0	3342,5	2115,6	1966,0	2038,2	2096,8	1265,1	185,0
	71,1	2186,8	2011,0	3419,0	2164,1	2011,0	2084,9	2144,8	1294,0	185,0
	76,1	2511,2	2309,3	3926,3	2485,1	2309,3	2394,2	2463,0	1486,0	185,0
3"	80,0	2781,9	2558,2	4349,5	2753,0	2558,2	2652,3	2728,5	1646,2	185,0
	82,5	2958,5	2720,6	4625,6	2927,8	2720,6	2820,6	2901,7	1750,7	185,0
	84,9	3133,1	2881,2	4898,6	3100,6	2881,2	2987,1	3073,0	1854,1	185,0
	90,0	3525,1	3241,7	5511,5	3488,5	3241,7	3360,8	3457,4	2086,0	185,0
4"	100,0	4357,2	4006,9	6812,5	4311,9	4006,9	4154,1	4273,5	2578,4	185,0
	107,1	5003,9	4601,5	7823,5	4951,9	4601,5	4770,7	4907,8	2961,1	185,0
	110,0	5278,6	4854,1	8253,0	5223,7	4854,1	5032,6	5177,2	3123,6	185,0
5"	125,0	6824,5	6275,7	10670,0	6753,6	6275,7	6506,4	6693,4	4038,4	185,0
	133,7	7807,5	7179,7	12207,0	7726,4	7179,7	7443,7	7657,5	4620,1	185,0
6"	150,0	9839,0	9047,9	15383,2	9736,8	9047,9	9380,5	9650,0	5822,3	185,0
	159,3	11096,9	10204,6	17349,9	10981,6	10204,6	10579,7	10883,7	6566,7	185,0
	182,5	14581,9	13409,4	22798,7	14430,4	13409,4	13902,4	14301,8	8628,9	185,0
	190,0	15805,1	14534,2	24711,1	15640,8	14534,2	15068,5	15501,5	9352,7	185,0
8"	200,0	17533,5	16123,6	27413,4	17351,3	16123,6	16716,3	17196,7	10375,5	185,0
	206,5	18691,7	17188,7	29224,2	18497,4	17188,7	17820,6	18332,6	11060,9	185,0
10"	250,0	27428,8	25223,2	42884,5	27143,7	25223,2	26150,4	26901,8	16231,1	185,0
	260,4	29793,8	27398,1	46582,2	29484,2	27398,1	28405,2	29221,4	17630,6	185,0
12"	300,0	39544,5	36364,7	61827,4	39133,6	36364,7	37701,5	38784,8	23400,7	185,0
	309,7	42143,0	38754,3	65890,2	41705,1	38754,3	40179,0	41333,5	24938,4	185,0
	339,6	50673,3	46598,7	79227,1	50146,7	46598,7	48311,6	49699,8	29986,2	185,0
	400,0	70301,3	64648,4	109915,3	69570,8	64648,4	67024,9	68950,8	41601,2	185,0
	500,0	109845,8	101013,2	171742,6	108704,3	101013,2	104726,4	107735,6	65001,8	185,0
	600,0	158177,9	145459,0	247309,4	156534,3	145459,0	150806,1	155139,3	93602,6	185,0
	700,0	215297,7	197985,8	336615,6	213060,5	197985,8	205263,8	211161,8	127403,5	185,0
	800,0	281205,2	258593,7	439661,2	278283,1	258593,7	268099,7	275803,2	166404,6	185,0
	900,0	355900,4	327282,7	556446,2	352202,1	327282,7	339313,7	349063,4	210605,9	185,0
	1000,0	439383,1	404052,7	686970,6	434817,4	404052,7	418905,8	430942,5	260007,2	185,0

²⁾ Referred to DIN 1945 / ISO 1217 (20°C, 1000mbar) and compressed air.

³⁾ Referred to DIN 1343: 0°C, 1013,25 mbar

6.4 Maximum Flow ranges „High speed“

Inner diameter of the pipe		Flow (final value of measuring range in Nm³/h)								Max.
Inch	mm	Air ²⁾	Air ³⁾	Ar ³⁾	CO ₂ ³⁾	N ₂ ³⁾	O ₂ ³⁾	N ₂ O ³⁾	Natural gas ³⁾ Methan	m/s
1/4"	6,0	11,4	10,5	17,8	11,3	10,5	10,9	11,2	6,7	224,0
	10,0	36,1	33,2	56,4	35,7	33,2	34,4	35,4	21,4	224,0
	15,0	94,1	86,5	147,0	93,1	86,5	89,7	92,2	55,7	224,0
1/2"	16,1	110,2	101,3	172,2	109,0	101,3	105,0	108,0	65,2	224,0
3/4"	21,7	215,3	198,0	336,7	213,1	198,0	205,3	211,2	127,4	224,0
1"	25,0	295,3	271,6	461,7	292,2	271,6	281,5	289,6	174,7	224,0
	26,0	321,1	295,3	502,0	317,8	295,3	306,1	314,9	190,0	224,0
	27,3	356,9	328,2	557,9	353,1	328,2	340,2	350,0	211,2	224,0
	28,5	391,5	360,0	612,1	387,4	360,0	373,2	384,0	231,7	224,0
	30,0	437,2	402,0	683,6	432,7	402,0	416,8	428,8	258,7	224,0
1 1/4"	32,8	528,7	486,2	826,7	523,3	486,2	504,1	518,6	312,9	224,0
	36,0	643,5	591,8	1006,1	636,8	591,8	613,5	631,2	380,8	224,0
	36,3	655,1	602,4	1024,3	648,3	602,4	624,6	642,5	387,7	224,0
1 1/2"	39,3	774,7	712,4	1211,3	766,7	712,4	738,6	759,8	458,5	224,0
	40,0	803,6	739,0	1256,4	795,2	739,0	766,1	788,2	475,5	224,0
	41,9	882,0	811,0	1378,9	872,8	811,0	840,9	865,0	521,9	224,0
	43,1	941,2	865,5	1471,6	931,4	865,5	897,3	923,1	557,0	224,0
	45,8	1068,1	982,2	1670,0	1057,0	982,3	1018,4	1047,6	632,1	224,0
2"	50,0	1282,5	1179,4	2005,2	1269,2	1179,4	1222,8	1257,9	758,9	224,0
	51,2	1346,5	1238,2	2105,2	1332,5	1238,2	1283,7	1320,6	796,8	224,0
	53,1	1450,1	1333,5	2267,1	1435,0	1333,5	1382,5	1422,2	858,1	224,0
	54,5	1529,4	1406,4	2391,2	1513,5	1406,4	1458,1	1500,0	905,0	224,0
	57,5	1712,9	1575,2	2678,1	1695,1	1575,2	1633,2	1680,0	1013,6	224,0
	60,0	1869,6	1719,3	2923,2	1850,2	1719,3	1782,5	1833,7	1106,4	224,0
	64,2	2148,4	1975,6	3359,0	2126,1	1975,6	2048,3	2107,1	1271,3	224,0

²⁾ Referred to DIN 1945 / ISO 1217 (20°C, 1000mbar) and compressed air.

³⁾ Referred to DIN 1343: 0°C, 1013,25 mbar

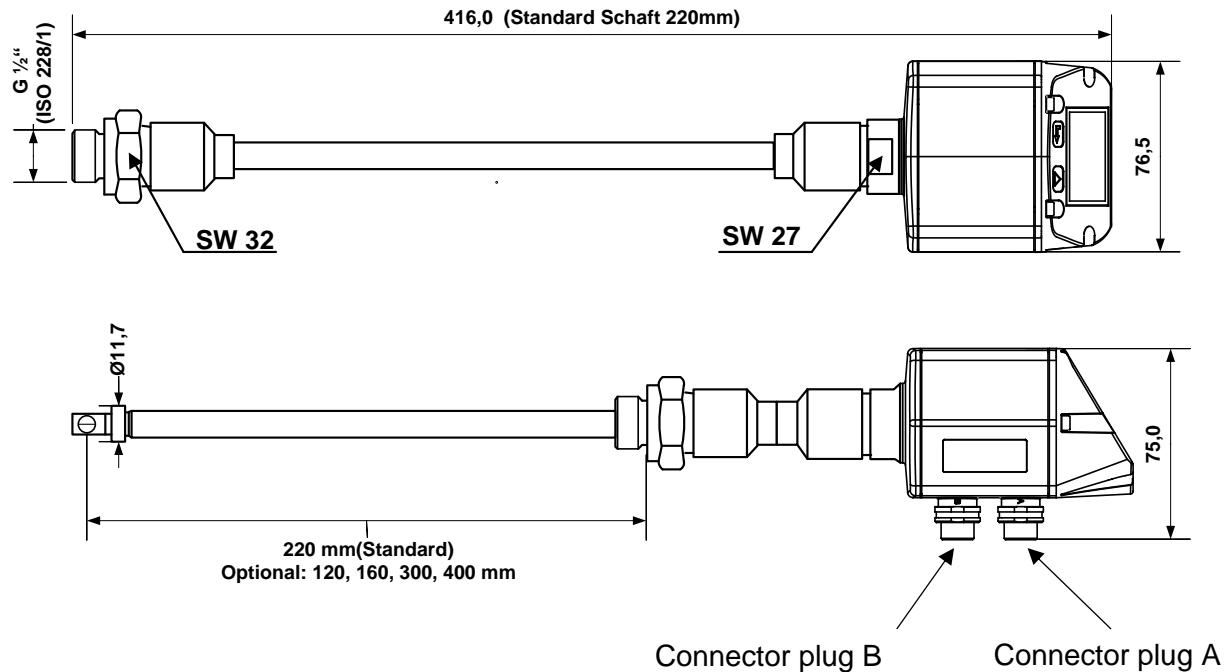
Measuring ranges

Inner diameter of the pipe		Flow (final value of measuring range in Nm³/h)								Max.
Inch	mm	Air ²⁾	Air ³⁾	Ar ³⁾	CO ₂ ³⁾	N ₂ ³⁾	O ₂ ³⁾	N ₂ O ³⁾	Natural gas ³⁾ Methan	m/s
2 1/2"	65,0	2204,9	2027,6	3447,4	2182,0	2027,6	2102,2	2162,6	1304,8	224,0
	70,3	2588,6	2380,4	4047,2	2561,7	2380,4	2467,9	2538,8	1531,8	224,0
	71,1	2647,8	2434,9	4139,8	2620,3	2434,9	2524,4	2596,9	1566,8	224,0
	76,1	3040,6	2796,1	4754,0	3009,0	2796,1	2898,9	2982,2	1799,3	224,0
3"	80,0	3368,4	3097,5	5266,4	3333,4	3097,5	3211,4	3303,7	1993,3	224,0
	82,5	3582,2	3294,2	5600,7	3545,0	3294,2	3415,2	3513,4	2119,8	224,0
	84,9	3793,6	3488,6	5931,3	3754,2	3488,6	3616,8	3720,8	2244,9	224,0
	90,0	4268,2	3925,0	6673,3	4223,9	3925,0	4069,3	4186,2	2525,8	224,0
4"	100,0	5275,8	4851,5	8248,6	5220,9	4851,6	5029,9	5174,4	3122,0	224,0
	107,1	6058,8	5571,6	9472,8	5995,8	5571,6	5776,4	5942,4	3585,3	224,0
	110,0	6391,3	5877,4	9992,8	6324,9	5877,4	6093,5	6268,6	3782,1	224,0
5"	125,0	8263,2	7598,7	12919,4	8177,3	7598,8	7878,1	8104,4	4889,8	224,0
	133,7	9453,4	8693,3	14780,3	9355,2	8693,3	9012,9	9271,8	5594,1	224,0
6"	150,0	11913,2	10955,3	18626,2	11789,4	10955,3	11358,0	11684,4	7049,7	224,0
	159,3	13436,3	12355,9	21007,4	13296,6	12355,9	12810,1	13178,1	7951,0	224,0
	182,5	17656,0	16236,3	27604,9	17472,5	16236,3	16833,1	17316,8	10448,0	224,0
	190,0	19137,0	17598,2	29920,4	18938,1	17598,2	18245,1	18769,3	11324,4	224,0
8"	200,0	21229,7	19522,7	33192,4	21009,1	19522,7	20240,3	20821,9	12562,8	224,0
	206,5	22632,1	20812,3	35385,0	22396,9	20812,3	21577,3	22197,3	13392,6	224,0
10"	250,0	33211,0	30540,6	51925,1	32865,9	30540,6	31663,2	32573,0	19652,8	224,0
	260,4	36074,6	33173,9	56402,2	35699,7	33174,0	34393,4	35381,6	21347,3	224,0
12"	300,0	47880,9	44030,8	74861,2	47383,3	44030,9	45649,4	46961,1	28333,8	224,0
	309,7	51027,2	46924,2	79780,5	50497,0	46924,3	48649,1	50047,0	30195,6	224,0
	339,6	61355,7	56422,1	95929,0	60718,1	56422,3	58496,2	60177,1	36307,5	224,0
	400,0	85121,6	78277,0	133086,6	84237,0	78277,2	81154,5	83486,4	50371,1	224,0
	500,0	133002,5	122307,8	207947,8	131620,4	122308,1	126803,9	130447,5	78704,9	224,0
	600,0	191523,6	176123,3	299444,9	189533,3	176123,7	182597,6	187844,3	113335,0	224,0
	700,0	260684,8	239723,3	407577,7	257975,9	239724,0	248535,6	255677,0	154261,5	224,0
	800,0	340486,3	313108,0	532346,4	336948,1	313108,8	324618,0	333945,5	201484,4	224,0
	900,0	430928,0	396277,3	673750,9	426450,0	396278,4	410844,6	422649,7	255003,8	224,0
	1000,0	532009,9	489231,3	831791,3	526481,5	489232,6	507215,6	521789,8	314819,5	224,0

²⁾ Referred to DIN 1945 / ISO 1217 (20°C, 1000mbar) and compressed air.

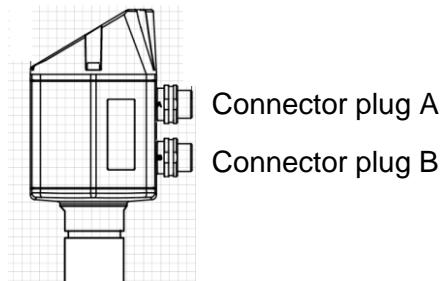
³⁾ Referred to DIN 1343: 0°C, 1013,25 mbar

7 Dimension



8 Electrical wiring

8.1 Modbus RTU, 4..20mA, Pulse or MBus



Attention: Not required connections NC must not be connected to a voltage and/or to protection earth. Cut and insulate cables.

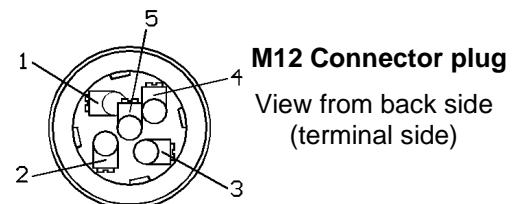
	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
Connector plug A	+VB	RS 485 (A) RS 485 (+)	-VB	RS 485 (B) RS 485 (-)	I+ 4..20 mA
Connector plug B Pulse output (standard)	NC	GND	DIR	Pulse galv. isolated	Pulse galv. isolated
Connector plug B Option MBus	NC	GND	DIR	MBus	MBus
Colours pulse cables 0553 0106 (5 m) 0553.0107 (10 m)	brown	white	blue	black	grey

Legend:

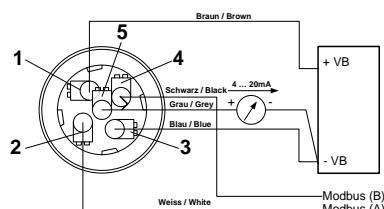
-VB	Negative supply voltage 0 V
+VB	Positive supply voltage 18...36 VDC smoothed
I +	Current signal 4...20 mA – selected measured signal
RS 485 (A) RS 485 (B)	Modbus RTU A / Modbus RTU (+) Modbus RTU B / Modbus RTU (-)

Pulse	Pulse for consumption
NC	Must not be connected to a voltage and/or to protection earth. Please cut and isolate cables.
MBus	MBus (reverse polarity protected)

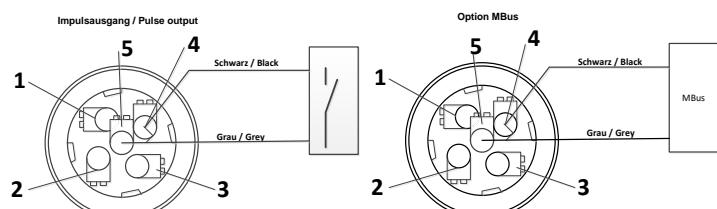
If no connection cable/ pulse cable is ordered the sensor will be supplied with a M12 connector plug. The user can connect the supply and signal cables as indicated in the connection diagram.



Connector plug A (M12 - A-coding)



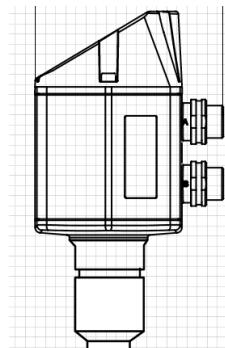
Connector plug B (M12 - A-coding)



Remark: If the sensor is placed at the end of the Modbus system a termination is required. The sensors have an internal switchable termination, therefore the 6 fastening screws from the lid are to be released and set the internal DIP Switch to "On". It must be ensured that the connection plugs are still plugged and the gasket is installed correctly.

Alternatively, a 120R resistor can be installed in the plug between pin 2 and pin 4.

8.2 Ethernet (optional PoE)



- Connector plug A
- Connector plug B (M12 X-coded 8 pole)

Connector plug B

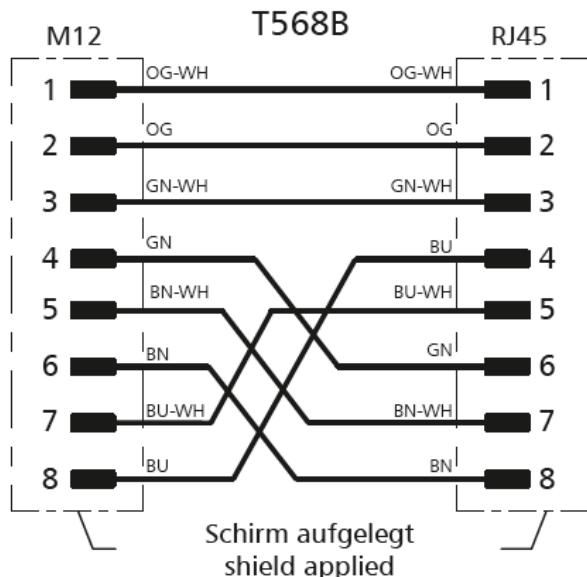
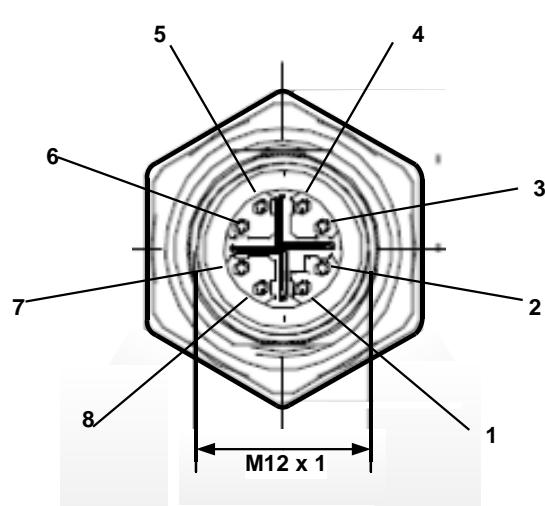
M12 x-coded 8 pole

Data LINES: 1,2 und 3,4

PoE LINES: 5,6 und 7,8

Connection cable

M12 x-coded to RJ45

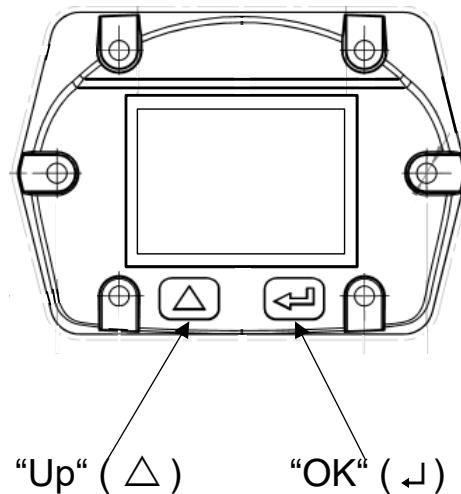


Connection cable: Cat 6.

*PoE: Power over Ethernet

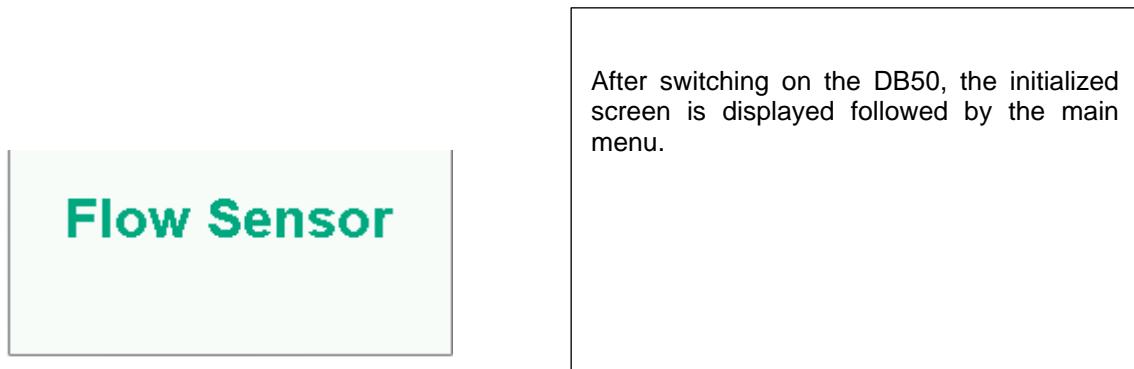
9 Operation

Remark: In version with option display only.



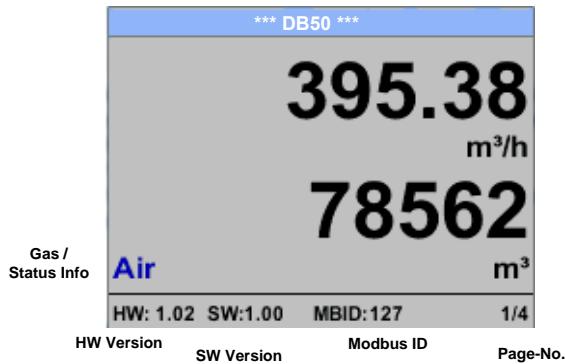
The operation of the DB50 is done by the two capacitive key buttons Up (Δ) und Enter (\leftarrow)

9.1 Initialization

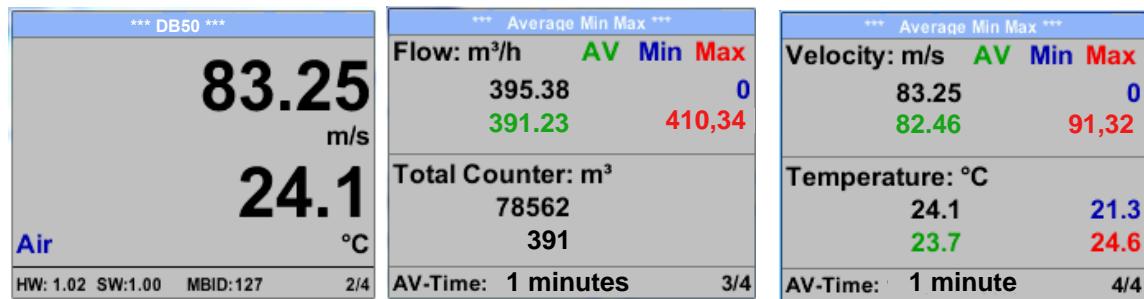


After switching on the DB50, the initialized screen is displayed followed by the main menu.

9.2 Main menu



Switching to pages 2-4 or back by pressing key „△“



AV-Time (Period for average value calculation) could be changed under [Sensor Setup.-Advanced- AV-Time](#)

9.3 Settings

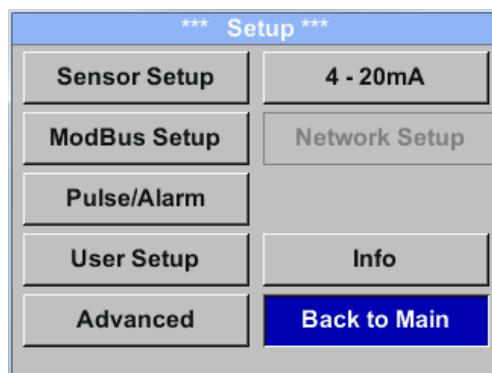
The settings menu could accessed by pressing the key „OK“.

But the access to the *settings menu* is password protected.



Factory settings for password at the time of delivery: 0000 (4 times zero).

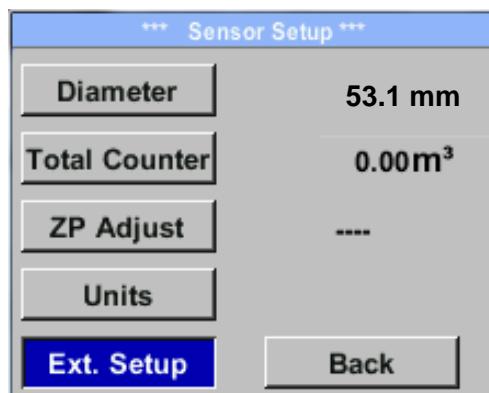
If required the password could be changed at *Setup–User setup–Password*.



Selection of a menu item or to change a value is done with the key „△“, a final move to the chosen menu item or takeover of the value change needs the confirmation by pressing the key „OK“

9.3.1 Sensor Setup

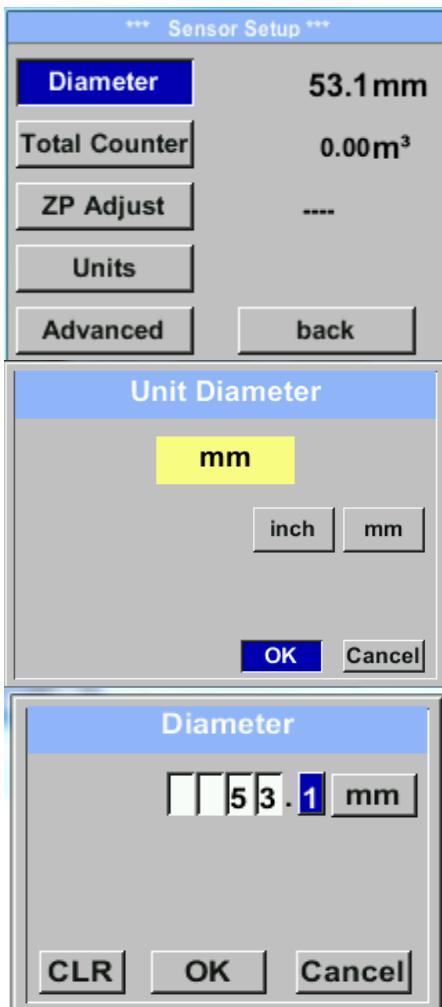
Setup → Sensor Setup



For changes, first select the menu item with key „△“ and then confirm it with “OK”.

9.3.1.1 Input / change tube diameter

Settings → Sensor Setup → Diameter



In order to change, e.g. the unit, first select by pressing key „△“ the field “Units” and then key “OK”.

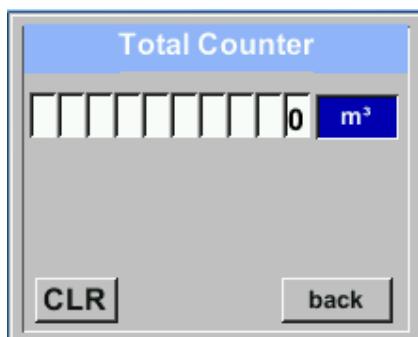
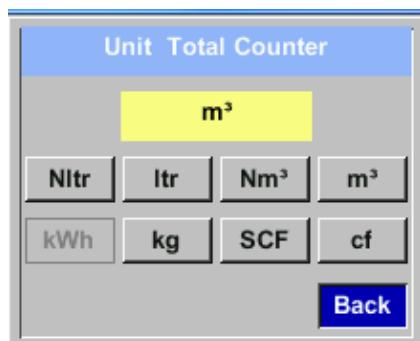
Select with the key „△“ the correct unit and then confirm selection by pressing 2x „OK“.

Entering / changing the diameter via button „△“, select the respective position and activate the position with the “OK” button.

By pressing „△“ the position value is incremented by 1. Complete with “OK” and activate next number position. Confirm entry by pressing „OK“.

9.3.1.2 Input / change consumption counter

Setup → Sensor Setup → Total Counter → Unit button



Important!

When the counter reach 100000000 m³ the counter will be reset to zero.

In order to change, e.g. the unit, first select by pressing key „△“ the button “Unit” and then key “OK”.

Select with the key „△“ the correct unit and then confirm selection by pressing 2x „OK“.

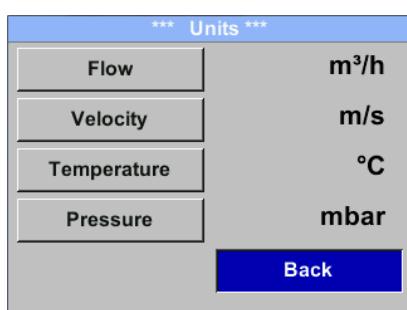
Entering / changing the consumption counter via button „△“, select the respective position and activate the position with the “OK” button.

By pressing „△“ the position value is incremented by 1. Complete with “OK” and activate next number position.

Confirm entry by pressing „OK“.

9.3.1.3 Definition of the units for flow, velocity, temperature and pressure

Setup → Sensor Setup → Units



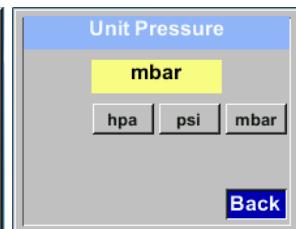
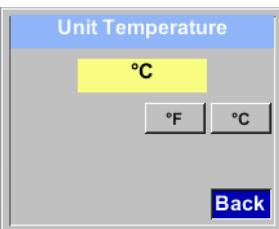
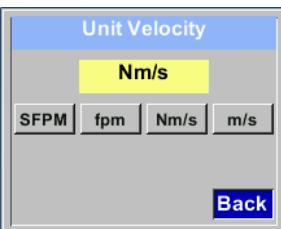
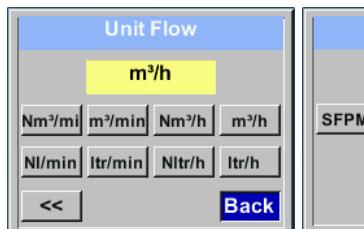
To make changes to the unit for the respective measurement value, first select by pressing „△“ the field of the „measurement value“ and activate „it with „OK“.

Selection of the new unit with „△“

In case the quantity of units selectable are not presentable on one page, please move to next page by pressing „<<“.

Confirm selection by pressing 2x „OK“.

Procedure for all 4 measurement variables is analogous.

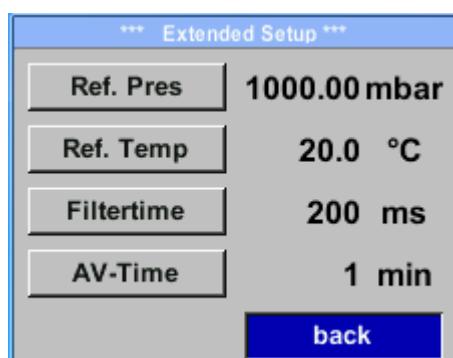


9.3.1.4 Definition of the reference conditions

Here can be defined the desired measured media reference conditions for pressure and temperature and times for the filter and averaging.

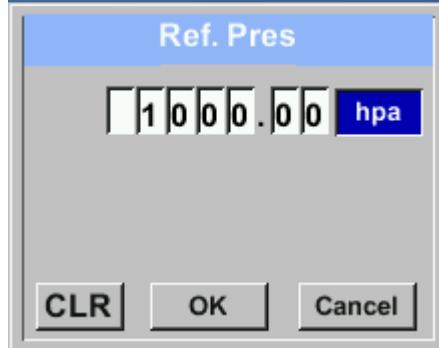
- Factory presetting for reference temperature and reference pressure are 20 °C, 1000 hPa
- All volume flow values (m³/h) and consumption values indicated in the display are related to 20 °C and 1000 hPa (according to ISO 1217 intake condition)
- Alternatively 0 °C and 1013 hPa (=standard cubic meter) can also be entered as a reference.
- **Do not enter the operation pressure or the operation temperature under reference conditions!**

Setup → Sensor Setup→ Advanced



To make changes, first select a menu with button „△“ and confirm selection by pressing „OK“.

Setup → Sensor Setup → Advanced → Ref.Pref

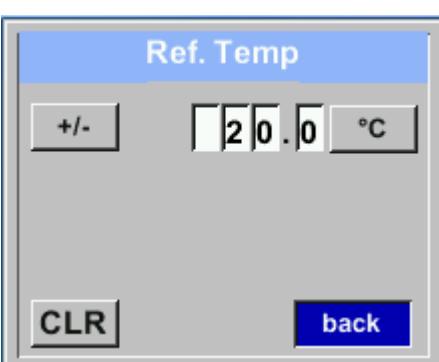


In order to change, e.g. the unit, first select by pressing key „△“ the field “Units” and then key “OK”.

Select with the key „△“ the correct unit and then confirm selection by pressing 2x „OK“.

Input / change of the value by selecting the respective position with button „△“ and entering by pressing button „OK“ .

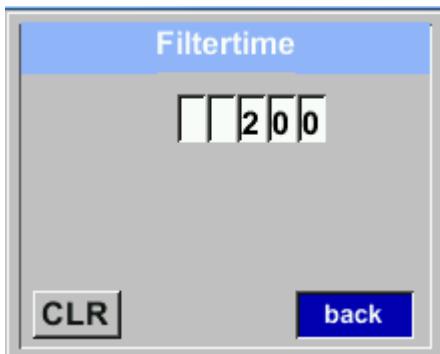
Setup → Sensor Setup→ Advanced → Ref.Temp



By pressing „△“ the position value is incremented by 1. Complete with “OK” and activate next number position.

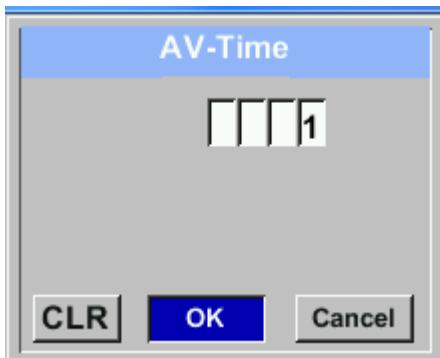
Procedure for changing the reference temperature is the same.

Setup → Sensor Setup→ Advanced → Filtertime



Under item "**Filtertime**" an attenuation can be defined.
Input values of 0 -10000 in [ms] are possible

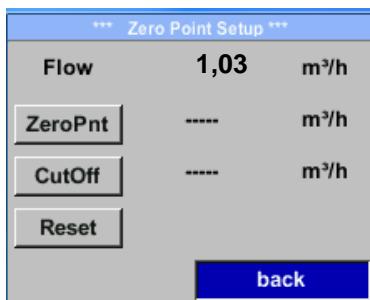
Setup → Sensor Setup→ Advanced → AV-Time



The time period for averaging can be entered here.
Input values of 1-1440 [minutes] are possible.
For average values see display window 3 + 4

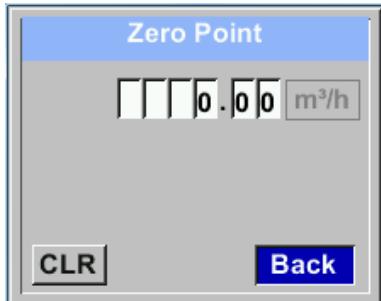
9.3.1.5 Setting of Zeropoint and Low-flow cut off

Setup → Sensor Setup → ZP Adjust



To make changes, first select a menu with button „ Δ “ and confirm selection by pressing „OK“.

Setup → Sensor Setup → ZP Adjust → ZeroPnt



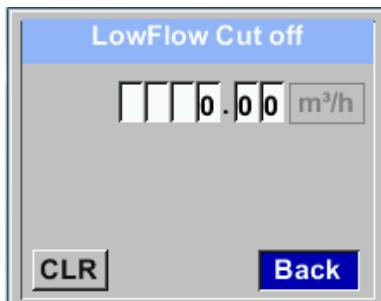
When, without flow, the installed sensor shows already a flow value of > 0 m³/h herewith the zero point of the characteristic could be reset.

For an input / change of the value select with the button „ Δ “ the respective number position and activate it with „OK“.

By pressing „ Δ “ the position value is incremented by 1. Confirm the input with „OK“ and activate next number position.

Leave menu with button „Back“

Setup → Sensor Setup → ZP Adjust → CutOff



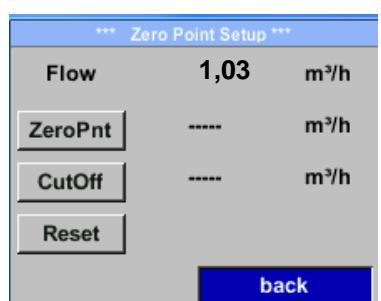
With the low-flow cut off activated, the flow below the defined "LowFlow Cut off" value will be displayed as 0 m³/h and not added to the consumption counter.

For an input / change of the value select with the button „ Δ “ the respective number position and activate it with „OK“.

By pressing „ Δ “ the position value is incremented by 1. Confirm the input with „OK“ and activate next number position.

Leave menu with button „Back“

Setup → Sensor Setup → ZP Adjust t → Reset



By selection of „Reset“ all settings for „ZeroPnt“ and „CutOff“ are reset.

Menu item to be select with button „ Δ “ and confirm the reset with „OK“.

Leave menu with button „Back“

9.3.2 Modbus Settings

9.3.2.1 Modbus RTU Setup

The Flow sensors DB50 comes with a Modbus RTU Interface.

Before commissioning the sensor the communication parameters

- Modbus ID, Baudrate, Parity und Stop bit

must be set in order to ensure the communication with the Modbus master.

Settings → Modbus Setup

*** ModBus Setup ***			
ID	1	Baudrate	19200
Stop	1	Parity	even
		Byte Orde	ABCD
<input type="button" value="Default"/>		<input type="button" value="back"/>	
<div style="border: 1px solid #ccc; padding: 5px; text-align: center;"> ID  <input type="button" value="CLR"/> <input type="button" value="OK"/> <input type="button" value="Cancel"/> </div>			
*** ModBus Setup ***			
ID	2	Baudrate	19200
Stop	1	Parity	even
		Byte Orde	ABCD
<input type="button" value="Default"/>		<input type="button" value="Save"/>	<input type="button" value="Cancel"/>

For changes, e.g. the sensor ID, first select by pressing key „ Δ “ the field “ID” and then key “OK”.

Select the desired position by pressing the “>” and select with “OK” button.

Change values by pressing the „ Δ “ values takeover by pressing “OK”.

Inputs for baudrate, stopbit and parity is done analogue.

By means of the button "Byte Order" it is possible to change the data format (Word Order). Possible formats are "ABCD" (Little Endian) and "CDAB" (Middle Endian)

Saving the changes by pressing “Save”, therefore select it with key „ Δ “ and then confirm it with “OK”.

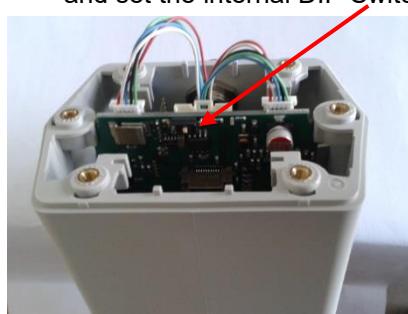
To set back to default values please press button “Set to Default”

Default values out of factory: Modbus

Baud rate: 19200
 Stopbit: 1
 Parity: even
 Byte Order: ABCD

ID: 1

Remark: If the sensor is placed at the end of the Modbus system a termination is required. The sensors have an internal switchable termination, therefore the 6 fastening screws from the lid are to be released and set the internal DIP Switch to “On”.



Alternatively, a 120R resistor can be installed in the plug between pin 2 and pin 4.

It must be ensured that the connection plugs are still plugged and the gasket is installed correctly, see also chapter 4.5.

9.3.2.2 Modbus TCP (Optional)

The Flow sensors DB50 comes optional with a Modbus TCP Interface (HW Interface:M12 x 1 X-coded connector).

Device supports with this option the Modbus TCP protocol for communication with SCADA systems. TCP port is set to 502 by default. Port can be changed at the sensor

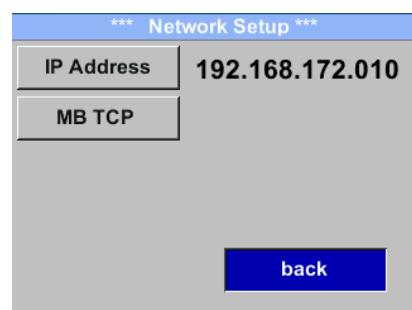
Modbus device address (Unit Identifier) can be set in the range of 1- 255. Specification and description of the Modbus protocol is free to download on: www.modbus.org.

Supported Modbus commands (functions):

Command	Code	Description
Function Code	3	(Read holding register)
Function code	16	(Write multiple registers)

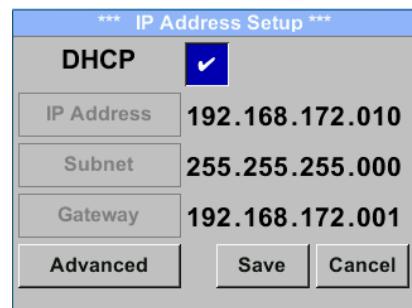
For more details, please see **Modbus RTU_TCP Installation V1.04**

Settings → Network Setup



9.3.2.2.1 Network Setup DHCP

Settings → Network Setup Settings → IP Address



Here you can set up and made a connection, with or without **DHCP**, to a computer.

Remark:

With activated **DHCP** the automatic integration of the sensor in an existing network is possible, without a manual configuration.

Storing of settings by pressing "**Save**"

9.3.2.2.2 Network Settings static IP

Settings → Network Setup Settings → IP Address → IP Address

Settings → Network Setup Settings → IP Address → Sub Netz

Settings → Network Setup Settings → IP Address → Gateway

*** IP Address Setup ***	
DHCP	<input type="checkbox"/>
IP Address	192.168.172.010
Subnet	255.255.255.000
Gateway	192.168.172.001
Advanced	<input type="button" value="back"/>

For manual (static) IP, the "**IP Address**", "**Subnet**" and "**Gateway**" selection keys must be selected and activated with "**OK**".

*** IP Address Setup ***	
DHCP	<input type="checkbox"/>
IP Address	192.168.172.010
Subnet	255.255.255.000
Gateway	192.168.172.001
Advanced	<input type="button" value="back"/>

The first data field of the selection, in this case the IP address, is then marked (red).

Confirm with "**OK**" the corresponding input menu is opened.

By means of ">", the next data field is changed.

IP Setup	
1 9 2	
<input type="button" value="CLR"/>	<input type="button" value="back"/>

Select the desired position with the ">" key and activate it with the "**OK**" key.

Change the values with the ">" key, and accept the values with the "**OK**" key.

Procedure for "**Subnet**" and "**Gateway**" is analogous.

Subnet Setup	
2 5 5	
<input type="button" value="CLR"/>	<input type="button" value="back"/>

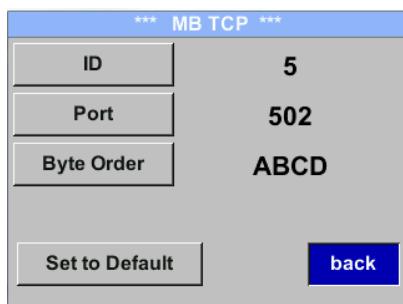
Gateway Setup	
1 9 2	
<input type="button" value="CLR"/>	<input type="button" value="back"/>

*** IP Address Setup ***	
DHCP	<input type="checkbox"/>
IP Address	192.168.172.011
Subnet	255.255.255.000
Gateway	192.168.172.001
Advanced	<input type="button" value="Save"/> <input type="button" value="Cancel"/>

Store the settings by „**Save**“

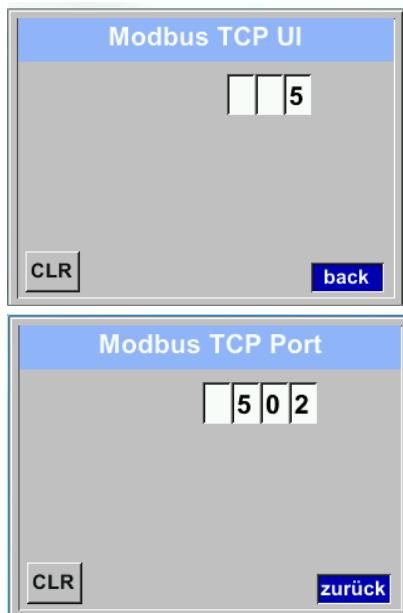
9.3.2.2.3 Modbus TCP Settings

Settings → Network Setup Settings → IP Address → MB TCP



Settings → Network Setup Settings → IP Address → ID

Settings → Network Setup Settings → IP Address → Port



For changes, e.g. the sensor ID, first select by pressing key „>“ the field “**ID**” and then key “**OK**”.

Select the desired position by pressing the “>” and select with “**OK**” button.

Change values by pressing the „>“ values takeover by pressing “**OK**”.

Input for the port is done analogue.

By means of the button “**Byte Format**” it is possible to change the data format (Word Order). Possible formats are “**ABCD**” (Little Endian) and “**CDAB**” (Middle Endian)

Saving the changes by pressing “**Save**”, therefore select it with key „>“ and then confirm it with “**OK**”.

Reset to the default settings by activating “**Set to Default**”-

9.3.2.3 Modbus Settings Register (2001...2005)

Modbus Register	Register Address	No.of Byte	Data Type	Description	Default Setting	Read Write	Unit /Comment
2001	2000	2	UInt16	Modbus ID	1	R/W	Modbus ID 1...247
2002	2001	2	UInt16	Baudrate	4	R/W	0 = 1200 1 = 2400 2 = 4800 3 = 9600 4 = 19200 5 = 38400
2003	2002	2	UInt16	Parity	1	R/W	0 = none 1 = even 2 = odd
2004	2003	2	UInt16	Number of Stopbits		R/W	0 = 1 Stop Bit 1 = 2 Stop Bit
2005	2004	2	UInt16	Word Order	0xABCD	R/W	0xABCD = Big Endian 0xCDAB = Middle Endian

9.3.2.4 Values Register (1001 ...1500)

Modbus Register	Register Address	No.of Byte	Data Type	Description	Def ault	Read Write	Unit /Comment
1101	1100	4	Float	Flow in m³/h		R	
1109	1108	4	Float	Flow in Nm³/h		R	
1117	1116	4	Float	Flow in m³/min		R	
1125	1124	4	Float	Flow in Nm³/min		R	
1133	1132	4	Float	Flow in ltr/h		R	
1141	1140	4	Float	Flow in NLtr/h		R	
1149	1148	4	Float	Flow in ltr/min		R	
1157	1156	4	Float	Flow in NLtr/min		R	
1165	1164	4	Float	Flow in ltr/s		R	
1173	1172	4	Float	Flow in NLtr/s		R	
1181	1180	4	Float	Flow in cfm		R	
1189	1188	4	Float	Flow in Ncfm		R	
1197	1196	4	Float	Flow in kg/h		R	
1205	1204	4	Float	Flow in kg/min		R	
1213	1212	4	Float	Flow in kg/s		R	
1221	1220	4	Float	Flow in kW		R	

Modbus Register	Register Address	No.of Byte	Data Type	Description	Default	Read Write	Unit /Comment
1269	1268	4	UInt32	Consumption m³ before comma	x	R	
1275	1274	4	UInt32	Consumption Nm³ before comma	x	R	
1281	1280	4	UInt32	Consumption ltr before comma	x	R	
1287	1286	4	UInt32	Consumption NLtr before comma	x	R	
1293	1292	4	UInt32	Consumption cf before comma	x	R	
1299	1298	4	UInt32	Consumption Ncf before comma	x	R	
1305	1304	4	UInt32	Consumption kg before comma	x	R	
1311	1310	4	UInt32	Consumption kWh before comma	x	R	
1347	1346	4	Float	Velocity m/s			
1355	1354	4	Float	Velocity Nm/s			
1363	1362	4	Float	Velocity Ft/min			
1371	1370	4	Float	Velocity NFt/min			
1419	1418	4	Float	GasTemp °C			
1427	1426	4	Float	GasTemp °F			

9.3.3 Pulse /Alarm

Setup → Sensor Setup→ Pulse/ Alarm

Relay Mode:	Alarm
Unit:	°C
Value	20.0
Hyst.	5.0
Hi-Lim.	OK Cancel

The galvanically isolated output can be defined as pulse- or alarm output.

Selection of field „**Relay Mode**“ with key „ Δ “ and change modus by pressing key „**OK**“.

*** Pulse / Alarm ***	
Relay Mode:	Alarm
Unit:	°C
Value	20.0
Hyst.	5.0
Hi-Lim.	OK Cancel

For alarm output following units could be chosen: kg/min, cfm, ltr/s, m³/h, m/s, °F, °C and kg/s.

„**Value**“ defines the Alarm value, „**Hyst.**“ defines the desired hysteresis and with „**Hi-Lim**“ or. „**Lo-Lim**“ the alarm settings when the alarm is activated

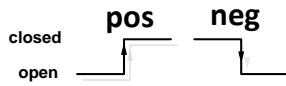
Hi-Lim: Value over limit

Lo-Lim: Value under limit

*** Pulse / Alarm ***	
Relay Mode:	Pulse
Unit:	m ³
Value	0.1
Polarity	pos.
Pls per second at max Speed:	0
Back	

For the pulse output following units could be chosen: kg, cf, ltr and m³. The pulse value definition to be done in menu „**Value**“. Lowest value is depending on max. flow of sensor and the max frequency of pulse output of 50Hz.

With „**Polarity**“ the switching state could be defined. Pos. = 0 → 1 neg. 1 → 0



9.3.3.1 Pulse output

The maximum frequency for pulse output is 50 pulses per second (50Hz).

The Pulse output is delayed by 1 second.

Pulse value	[m ³ /h]	[m ³ /min]	[l/min]
0.1 ltr / Pulse	18	0,3	300
1ltr / Pulse	180	3	3000
0.1m ³ / Pulse	18000	300	300000
1 m ³ / Pulse	180000	3000	3000000

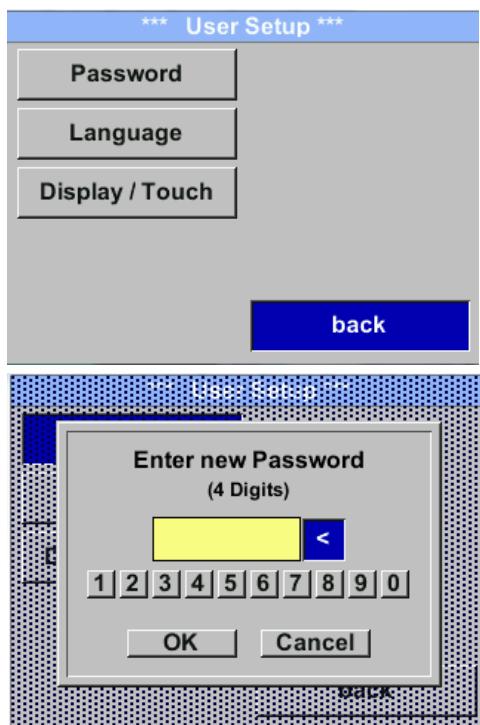
Table 1 Maximum flow for pulse output

Entering pulse values that are not allow a presentation to the full scale value, are not allowed. Entries are discarded and error message displayed.

9.3.4 User Setup

9.3.4.1 Password

Settings → UserSetup → Password



To make changes, first select a menu with button „ Δ “ and confirm selection by pressing „OK“.

It is possible to define a password. The required password length is 4 digits.
Please select with button „ Δ “ a figure and confirm it with „OK“. Repeat this 4 times.

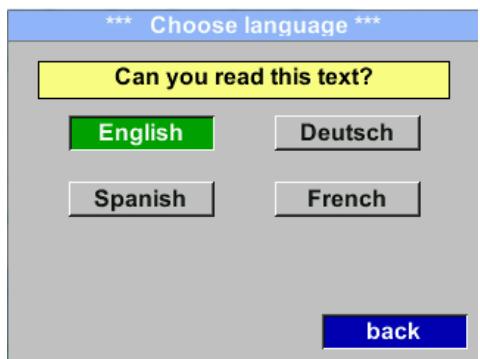
With „ Δ “ the last figure could be deleted.
Password input have to be inserted twice.

Confirmation of input/password by pressing „OK“.

Factory settings for password at the time of delivery: 0000 (4 times zero).

9.3.4.2 Language

Settings → UserSetup → Language

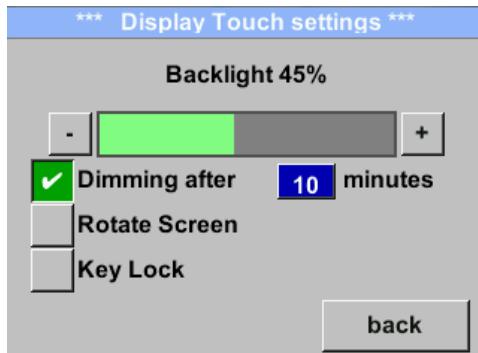


Currently 4 languages have been implemented and could be selected with button „ Δ “.

Change of language by confirming with “OK”. Leaving the menu with button “back”.

9.3.4.3 Display / Touch

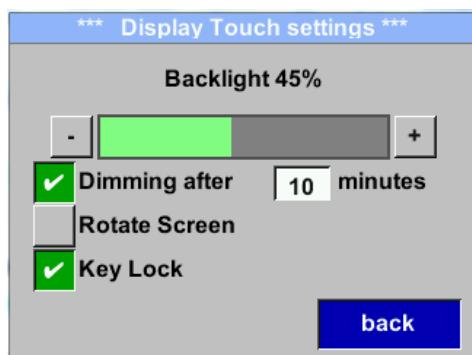
Settings → UserSetup → Display / Touch



With the button „-“ and with button „+“ it is possible to adjust the backlight / display brightness. The actual / adjusted backlight brightness is showed in the graph „**Backlight**.“

By activation “**Dimming after**” and entering a time a display dimming could be set.

With „**Rotate Screen**“ the display information could be rotated by 180°.

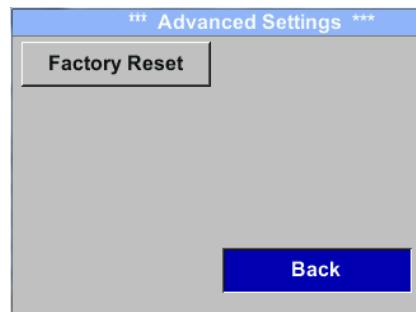


By activation of „**Key Lock**“ the operation of the sensor locked.

Unlocking the keyboard is only possible by restarting the sensor and calling the operating menu within the first 10s. To do this, use the “**OK**” button to enter the operating menu during this period

9.3.5 Advanced

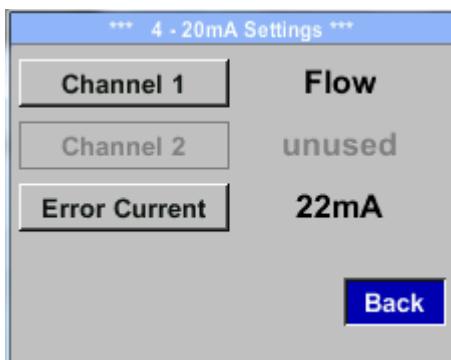
Settings → Advanced



By pressing „**Factory Reset**“ the sensor is set back to the factory settings.

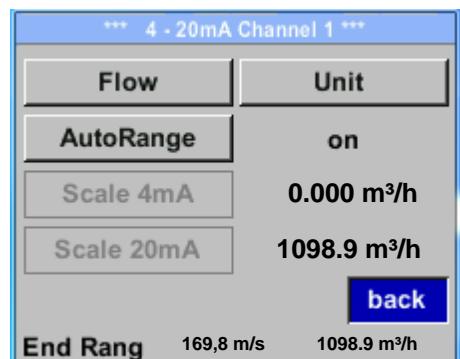
9.3.6 4 -20mA

Settings → 4-20mA



To make changes, first select a menu with button „**△**“ and confirm selection by pressing „**OK**“.

Settings → 4-20mA → Channel 1



The 4-20 mA Analogue output of the Sensor DB50 can be individually adjusted.

It is possible to assign following values „**Temperature**“, „**Velocity**“ und „**Flow**“ to the channel CH 1.

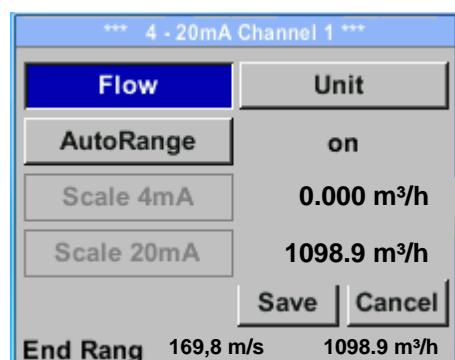
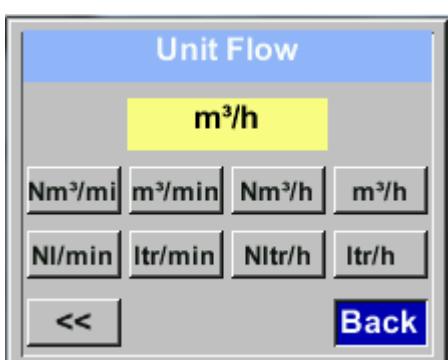
To make changes, first select the value item with button „**△**“ and confirm

Moving between the different measurements values or to deactivate the 4-20mA with setting to „**unused**“ by pressing „**OK**“.

To the selected measurement value a corresponding / appropriate unit needs to be defined. Select „**Unit**“ with „**△**“ and open menu with „**OK**“.

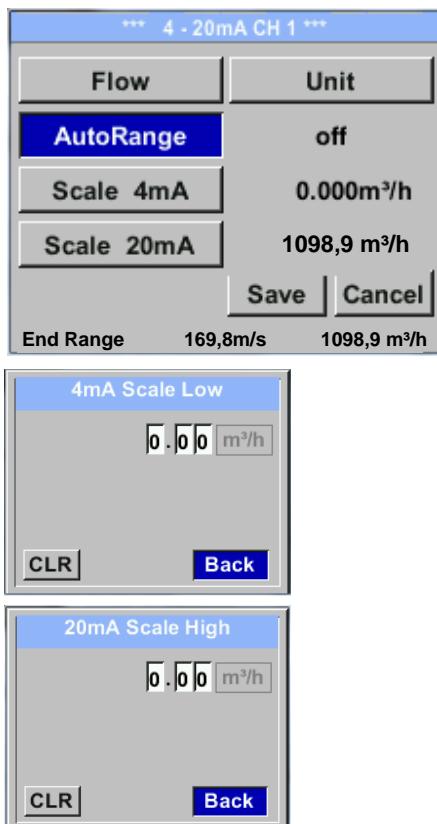
Select required unit with „**△**“ and take over by pressing „**OK**“.

Here e.g. for the measurement value Flow, procedure for the other measurements values is analog.



For saving the changes done press button „**Save**“ to discard the changes press button „**Cancel**“.

Leaving the menu with „**Back**“.



The scaling of the 4-20mA channel can be done automatically "Auto Range = on" or manual "AutoRange = off".

With button „ Δ “ select the menu item „AutoRange“ select with „OK“ the desired scaling method. (Automatically or manually)

In case of **AutoRange = off** with **„Scale 4mA“** und **„Scale 20mA“** the scale ranges needs to be defined.

Select with button „ Δ “ the item „Scale 4mA“ or „Scale 20mA“ and confirm with „OK“.

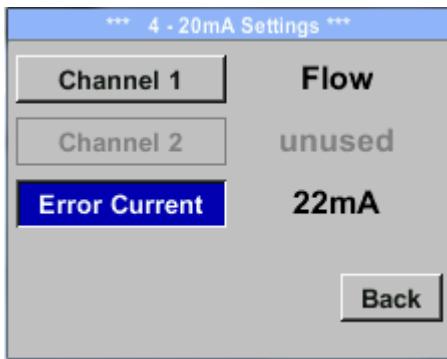
Input of the scaling values will be analogous as described before for value settings.

Using „CLR“ clears up the complete settings at once.

For „**Auto on**“, the max. scaling is calculated based on the inner tube diameter, max. measurement range and the reference conditions settings.

Take over of the inputs with „Save“ and leaveing the menu with „Back“.

Settings → 4-20mA → Error Current



This determines what is output in case of an error at the analog output.

- 2 mA Sensor error / System error
- 22 mA Sensor error / System error
- None Output according Namur (3.8mA – 20.5 mA)
<4mA to 3.8 mA Measuring range under range
>20mA to 20.5 mA Measuring range exceeding

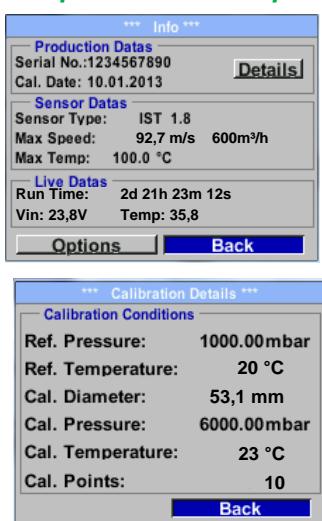
To make changes first select a menu item "Current Error" with button „ Δ “ and then select by pressing the „OK“ the desired mode

For saving the changes done press button „Save“ to discard the changes press button “Cancel”.

Leaving the menu with „Back“.

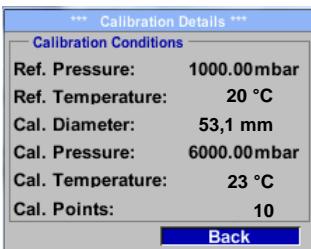
9.3.7 DB50 Info

Setup → Sensor Setup → Info

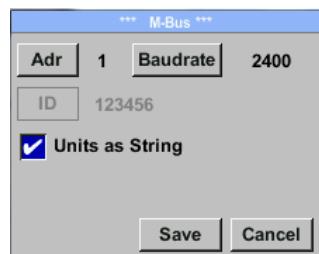
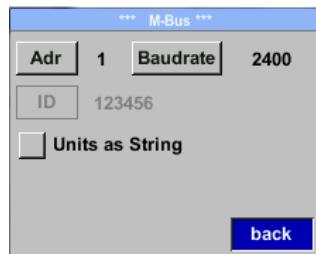


Here you get a brief description of the sensor data incl. the calibration data.

Under **Details**, you are able to see in addition the calibration conditions.



9.4 MBus



The Sensor offers two possibilities for coding the Value Information Field (VIF).

- Primary VIF (The units and multiplier correspond to MBus specification 4.8 chapter 8.4.3)
- Plain text VIF ((units are transmitted as ASCII characters. So units that are not included in MBus specification chapter 8.4.3 are possible

Download:

<https://m-bus.com/assets/downloads/MBDOC48.PDF>

Switch to Plain Text VIF by activation of „**Units as String**“.

9.4.1 Default Settings communication

Primary Adress*:	1
ID:	Serialnumber of Sensor
Baud rate*:	2400
Medium*:	depending on medium (Gas or Compressed Air)
Manufacturer ID:	CSI
VIF coding:	Primary VIF

Both addresses, Primary address and ID, could be automatic searched in the M-Bus system.

9.4.2 Default values transmitted

Value 1 with [Unit]*:	Consumption [m^3]
Value 2 with [Unit]*:	Flow [m^3/h]
Value 3 with [Unit]*:	Gas temperature [$^{\circ}C$]

*All Values could be changed / preset in production.

10 Status / Error messages

10.1 Status messages

- **CAL**

On the part of PKP Prozessmesstechnik GmbH a regular re-calibration is recommended, see chapter 13.

At delivery, the date at which the next recalibration is recommended is internally entered.

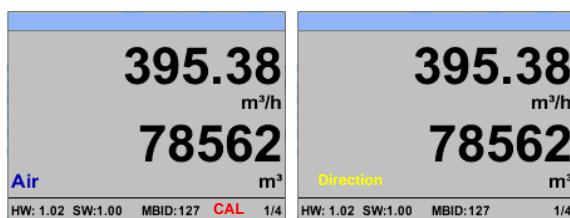
When this date is reached, a message appears in the display with the status message „**CAL**“.

Note: The measurement will continue without interruption or restriction.

- **Direction**

When used in conjunction with a direction switch, the status message "Direction" is displayed in case of opposite flow direction and no measurement may take place.

Status messages:



10.2 Error messages

- **Low Voltage**

If the supply voltage is less than 11V, the warning message „**Low Voltage**“ is displayed.

This means that the sensor can no longer work / measure correctly and thus there are none measured values for flow, consumption and speed are available.

- **Heater Error**

The error message „**Heater Error**“ occurs in case of failure of the heating sensor.

- **Internal Error**

In the case of this message „**Internal Error**“, the sensor has an internal read error on e.g. EEPROM, AD converter etc. detected.

- **Temp out of Range**

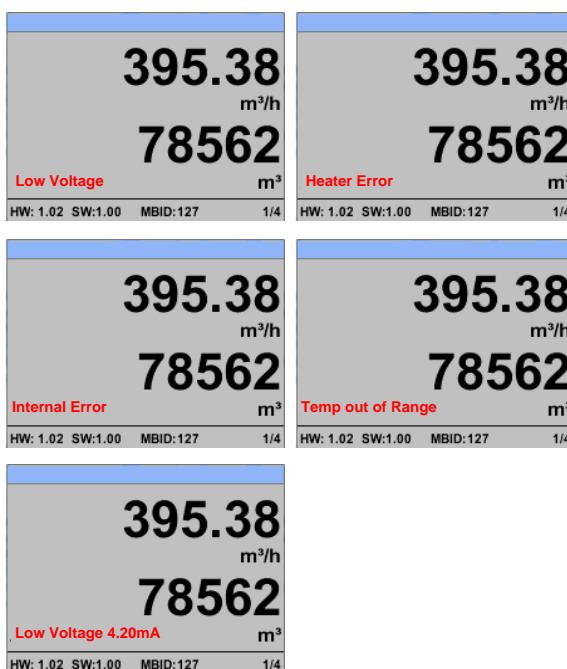
At media temperatures outside the specified temperature range, the status message „**Temp out of Range**“ occurs.

This temperature overshoot leads to incorrect measurement values (outside the sensor specification).

- **Low Voltage 4-20mA**

For sensors with a galvanically isolated 4-20mA output, a min. Supply voltage of 17.5V is required. If this value is undershot, the error message „**Low Voltage 4-20mA**“ is displayed.

Error messages:



11 Maintenance

The sensor head should be checked regularly for dirt and cleaned if necessary. Should dirt, dust or oil accumulate on the sensor element, a deviation will occur in the measuring value. An annual check is recommended. Should the compressed air be heavily soiled this interval must be shortened.

12 Cleaning of the sensor head

The sensor head can be cleaned by carefully moving it back and forth 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, the manufacturer must carry out service and maintenance.

13 Re-Calibration

If no customer specifications are given then we recommend carrying out calibration every 12 months. For this purpose, the sensor must be sent to the manufacturer.

14 Spare parts and repair

For reasons of measuring accuracy spare parts are not available.
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 keeping a spare measuring system ready.

15 Calibration

According to DIN ISO certification of the measuring instruments we recommend to calibrate and if applicable to adjust the instruments regularly from the manufacturer. The calibration intervals should comply with your internal specification. According to DIN ISO we recommend a calibration interval of one year for the instrument DB50.

On request and additional payment, calibration-certificates could be issued.
The precision is given due to use DKD-certified flow meters and verifiable

16 Warranty

If you have reason for complaint, we will of course repair any faults free of charge if it can be proven that they are manufacturing faults. The fault should be reported immediately after it has been found and within the warranty time guaranteed by us. Excluded from this warranty is damage caused by improper use and non-adherence to the instruction manual.

The warranty is also cancelled once the instrument has been opened - as far as this has not been mentioned in the instruction manual for maintenance purposes - or if the serial number in the instrument has been changed, damaged or removed.

The warranty time for the DB50 is 12 months. If no other definitions are given the accessory parts have a warranty time of 6 months. Warranty services do not extend the warranty time.

If in addition to the warranty service necessary repairs, adjustments or similar are carried out the warranty services are free of charge but there is a charge for other services such as transport and packaging costs. Other claims, especially those for damage occurring outside the instrument, are not included unless responsibility is legally binding.

After sales service after the warranty time has elapsed

We are of course there for you even after the warranty time has elapsed. In case of malfunctions, please send us the instrument with a short-form description of the fault. Please do not forget to indicate your telephone number so that we can call you in case of any questions.

DB50

Thermal Mass Flowmeter and Counter for Compressed Air and Non-Aggressive Gases

- **insertion model**
- **available for pipe sizes DN 15 to DN 1000**
- **flow velocities:**
0...50 m/s, 0...92,7 m/s, 0...185 m/s or 0...224 m/s
- **local LCD-display for flow rate, total or temperature (optional)**
- **output signals: 4...20 mA for flow rate or temperature, pulses for total**
- **for compressed air and non-aggressive gases**
- **zero balance possible at instrument**



Description:

Model DB50 thermal mass flow meters and counters report and measure mass flow rates and totals of non-aggressive gases, regardless of gas pressure and temperature.

Process gas flows around a heated temperature sensor that is encapsulated in glass. As a result, the sensor dissipates heat which an electronics module returns to the sensor to maintain it at a constant temperature. The dissipated heat energy is proportional to the mass flow rate of the gas and is output as a 4 to 20 mA signal by the electronic utilizing calibration curves and process parameters stored in the instrument.

The 4 to 20 mA signal is routed to secondary evaluation devices and provides the flow rate information. An additional pulse output with a pre-defined pulse value is used for totalizing purposes. Mass flow rate and total may also be displayed on an integrated back-lit display if required. The instruments are supplied with a 1/2" thread compression fitting and can be installed and disassembled under pressurized conditions.

Typical applications:

Model DB50 thermal mass flow meters and counters provide flow measurement of non-aggressive gases in DN 15 to DN 1000 pipe systems. Their rugged, heavy-duty design and easy handling and operation make them the right choice for measuring and monitoring compressed air consumption levels. They also provide measurements of other suitable gases such as: nitrogen oxygen, argon, helium and carbon dioxide.

Models:

- DB50.S...** standard-model, mass flow rate 0...92,7 m/s, G 1/2 male thread
DB50.L... mass flow rate 0...50 m/s, G 1/2 male thread
DB50.H1... mass flow rate 0...185 m/s, G 1/2 male thread
DB50.H2... mass flow rate 0...224 m/s, G 1/2 male thread

Measuring ranges:

The quoted measuring ranges are a rough guide only. The exact measuring ranges are calculated taking the actual inside diameter of the given pipe into account and are used during production to calibrate the instruments.

Air:

Nominal pipe size	Pipe inner diameter [mm]	Measuring range end values (20 mA) [m³/h] -air*			Probe length [mm]
		DB50.S 0...92,7 m/s	DB50.H1 0...185 m/s	DB50.H2 0...224 m/s	
DN 25	27,3	148	295	357	120
DN 32	36,0	266	531	644	120
DN 40	41,9	366	728	882	160
DN 50	53,1	600	1198	1450	160
DN 65	71,1	1095	2187	2648	160
DN 80	84,9	1569	3133	3794	160
DN 100	110,0	2644	5279	6391	220
DN 125	133,7	3921	7808	9453	220
DN 150	159,3	5579	11.097	13.436	220
DN 200	200,0	8816	17.533	21.230	300
DN 250	250,0	13.742	27.429	33.211	300
DN 300	300,0	19.836	39.545	47.881	300
DN 500	500,0	55.101	109.846	133.002	400
DN 600	600,0	79345	158.178	191.524	400

* based on 20 °C and 1000 mbar

Gases:

DB50.S: 0...92,7 m/s (standard)

Nominal pipe size**	Measuring range end values* (20 mA) [Nm³/h]					
	Ar	CO ₂	N ₂	O ₂	N ₂ O	Natural gas
DN 25	231	146	131	141	145	87
DN 32	416	263	237	254	261	157
DN 40	571	361	324	348	358	216
DN 50	938	594	533	572	588	355
DN 65	1713	1084	974	1045	1075	648
DN 80	2454	1553	1396	1497	1540	928
DN 100	4134	2617	2351	2522	2594	1564
DN 125	6115	3870	3478	3731	3836	2313
DN 150	8692	5501	4943	5303	5453	3287
DN 200	13.733	8691	7810	8378	8615	5194
DN 250	21.483	13.596	12.217	13.107	13.477	8125
DN 300	30.973	19.601	17.613	18.896	19.430	11.713
DN 500	86.036	54.448	48.926	52.489	53.973	32.538
DN 600	123.892	78.405	70.453	75.583	77.721	46.855

* based on 1013 mbar and 0 °C, ** pipe inner diameter as in the table „Air“, further gases on request

DB50.H1 = 0...185 m/s

Nominal pipe size**	Measuring range end values* (20 mA) [Nm³/h]					
	Ar	CO ₂	N ₂	O ₂	N ₂ O	Natural gas
DN 25	461	292	262	281	289	174
DN 32	831	526	473	507	521	314
DN 40	1139	721	648	695	714	431
DN 50	1872	1185	1065	1142	1174	708
DN 65	3419	2164	1945	2085	2144	1293
DN 80	4898	3101	2986	2988	3072	1853
DN 100	8252	5224	4694	5033	5176	3122
DN 125	12.205	7727	6942	7445	7656	4617
DN 150	17.347	10.983	9867	10.581	10.881	6562
DN 200	27.409	17.353	15.591	16.718	17.192	10.368
DN 250	42.878	27.147	24.389	26.154	26.895	16.220
DN 300	61.818	39.138	35.163	37.706	38.775	23.385
DN 500	171.716	108.718	97.674	104.739	107.708	64.958
DN 600	247.271	156.553	140.650	150.825	155.100	93.539

* based on 1013 mbar and 0 °C

** pipe inner diameter as in the table „Air“

further gases on request

DB50.H2 = 0...224 m/s

Nominal pipe size**	Measuring range end values* (20 mA) [Nm³/h]					
	Ar	CO ₂	N ₂	O ₂	N ₂ O	Erdgas
DN 25	558	353	317	340	350	211
DN 32	1006	637	572	614	631	381
DN 40	1379	873	784	841	865	522
DN 50	2267	1435	1290	1383	1422	858
DN 65	4140	2619	2355	2525	2597	1566
DN 80	5931	3753	3374	3618	3721	2244
DN 100	9992	6323	5684	6095	6269	3781
DN 125	14.779	9352	8407	9015	9272	5592
DN 150	21.006	13.292	11.949	12.812	13.178	7948
DN 200	33.190	21.002	18.879	20.244	20.822	12.558
DN 250	51.922	32.855	29.534	31.669	32.574	19.645
DN 300	74.857	47.368	42.580	45.658	46.962	28.322
DN 500	207.935	131.577	118.277	126.827	130.449	78.673
DN 600	299.427	189.472	170.319	182.631	187.847	113.290

* based on 1013 mbar and 0 °C

** pipe inner diameter as in the table „Air“

further gases on request



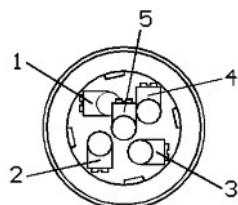
Display: (optional)

Display:	TFT 1,8"
Resolution:	220 x 176
Indication:	2 values simultaneous: actual flow and total flow (counter rate)
Menu navigation:	multilingual
Adjustable via key at the display:	inner diameter of pipe counter reset unit selection 4...20 mA scaling reference conditions (°C, mbar) pulse value zero point balance leak flow volume depression
Indication:	rotatable at 180°

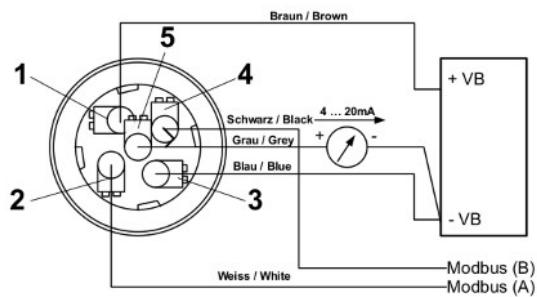
Electrical connection:

	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
Connection plug A	+VB	RS 485 (A)	-VB	RS 485 (B)	I+ (4...20 mA)
Connection plug B (pulse output)	NC	GND	DIR	pulse (galv. isolated)	pulse (galv. isolated)
Connection plug B (option MBus)	NC	NC	NC	MBus	MBus
Farben	brown	white	blue	black	grey

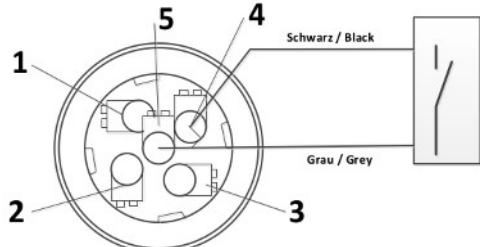
Connection plug 5-pole:



Connection plug A:



Connection plug B (pulse output / MBus):



Technical Data:

Parameters:

at compressed air:
at gases:
m³/h, l/min (1000 mbar, 20 °C)
Nm³/h, NL/min (1013 mbar, 0 °C)
Other reference conditions can be set via the keyboard or at the factory

Adjustable units:

m³/h (standard), m³/min, l/min,
l/s, ft/min, cfm, m/s, kg/h,
kg/min, g/s, lb/min, lb/h

Gas types:

air, nitrogen, argon, nitrous oxide, CO₂, oxygen, vacuum

Sensor:

thermal mass flow sensor
-30...110 °C (probe tube)
-30 ... 70 °C (housing)

Operating pressure:

up to 50 bar

Power supply:

18 bis 36 VDC

Power consumption:

max. 5 W

Burden:

< 500 Ohm

Digital output:

RS 485 (Modbus RTU)

Analogue output:

4...20 mA for m³/h resp. l/min or temperature

Pulse output:

1 pulse per m³ resp. per litre, galvanically separated scaling adjustable via keys

Accuracy:

± 1,5 % of m.v., ± 0,3 % of f.s.
± 1 % of m.v., ± 0,3 % of f.s. (optional)

Display (optional):

TFT 1,8"

Process connection:

G ½"

Mounting position:

any

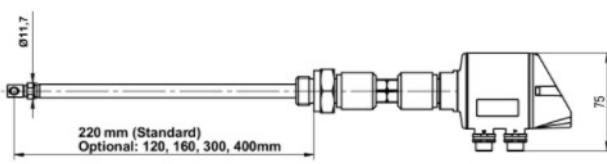
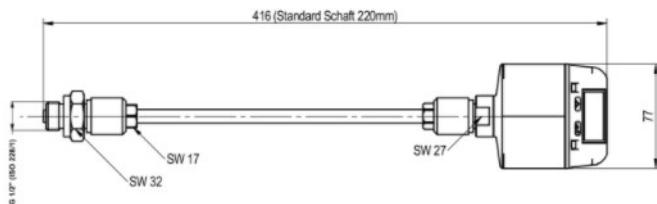
Material:

housing: Polycarbonate
st. st. 1.4301,

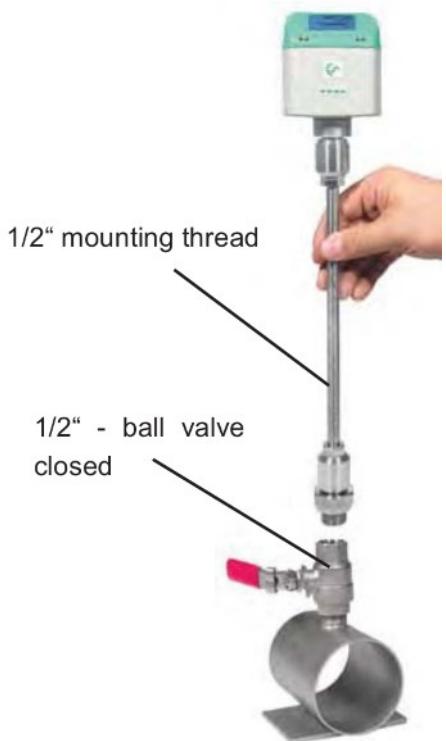
Electrical protection:

IP65

Dimensions:



Mounting information:



Order Code:

Order number: DB50. S. 12. L. A. 0

**Thermal Mass Flowmeters and Counters
for gases- insertion model**

Measuring ranges (see table):

L = 0...50 m/s
S = 0...92,7 m/s (Standard)
H1 = 0...185 m/s
H2 = 0...224 m/s

Probe length:

12 = 120 mm	40 = 400 mm
16 = 160 mm	50 = 500 mm
22 = 220 mm (Standard)	60 = 600 mm
30 = 300 mm	

Medium:

L = Air
N = Nitrogen
A = Argon
H = Helium
C = Carbon dioxide
S = Oxygen
B = Biogas
E = Natural gas

Accuracy:

A = +/- 1,5 % m.v. +/- 0,3 % f.s.
B = +/- 1 % m.v. +/- 0,3 % f.s.

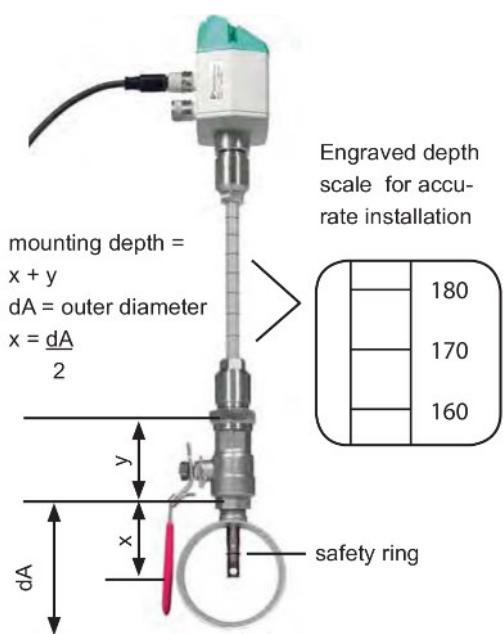
Options:

0 = none
D = with LCD-display
B = bi-directional measurement (flow direction is shown in the display)
I = analogue output set according to customer requirements
9 = please specify in writing

Other information: inside pipe diameter in mm (please specify when placing your order, is needed to calculate the exact measuring range.)

2 plugs M12 and 1 blind plug are included in delivery.

Accessories:



DB50-Z.M: installation kit, containing a weld-on fitting and 1/2" ball valve made of stainless steel

DB50-Z.N1: wall mounted power supply, 100-240 VAC, 10 VA on 24 VDC, 0,35 A

DB50-Z.N2: plug-in power supply unit, 100-240 VAC on 24 VDC, 0,35 A, with 2 m cable

DB50-Z.K5: factory calibration, 5 points

Order number: SM12. 5. 2. G. 0

M12-plug with PVC cable

Number of poles:

5= 5-pole

Cable length:

0 = without cable for self assembly
2 = 2 m PVC cable (standard)
5 = 5 m PVC cable
10 = 10 m PVC cable

Construction:

G = straight
W = angled

Option:

0 = none
9 = Please specify in writing